

Supporting Growth

Warkworth

Indicative Business Case for Route Protection

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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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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 Warkworth 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. This 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 Warkworth.

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 Warkworth. 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 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 Route Protection Strategy (**Appendix K**) provides more detail in this respect. The route protection process itself will take place over the next four years. 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 Warkworth 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 1.69 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 'development ready'. It provides for sequenced and accelerated greenfield growth in ten areas of Auckland, one of which is Warkworth.

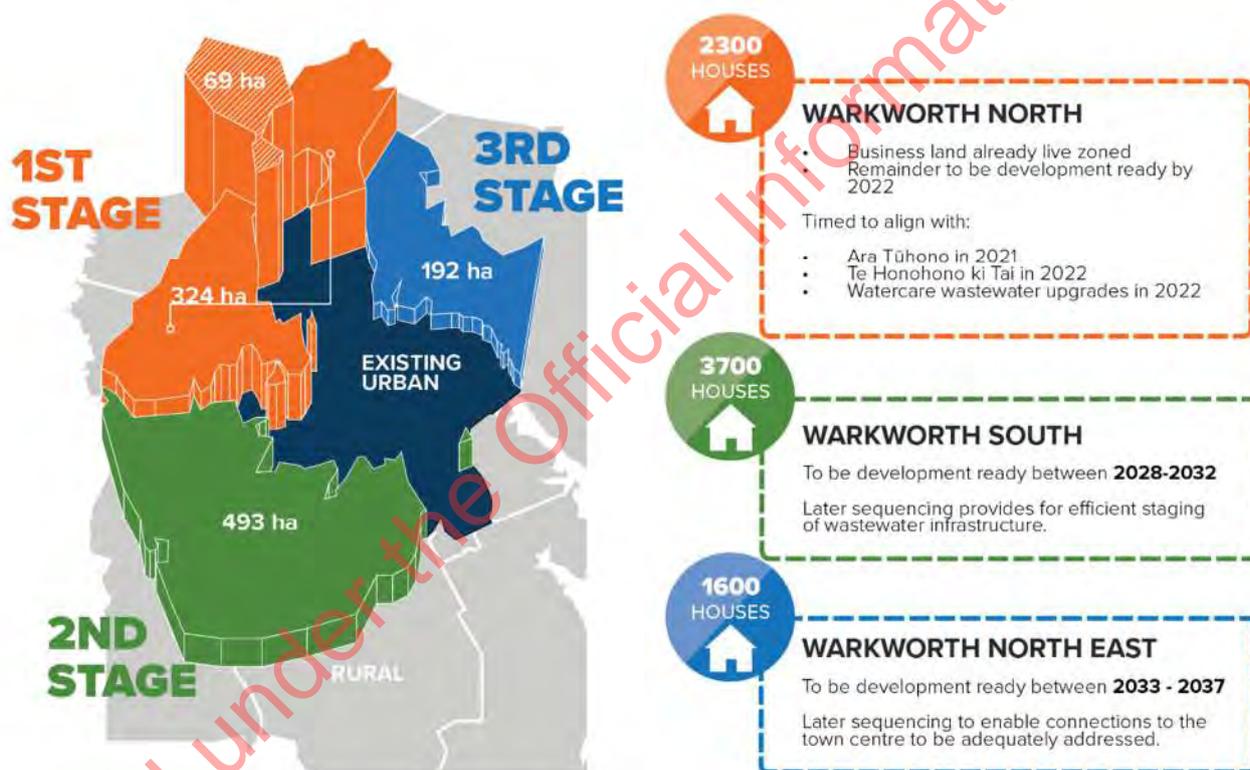
Planning for future urban growth in Warkworth

The Council has identified approximately 1,000 hectares ha. of land for future urban development in Warkworth. This land has been designated as a Future Urban Zone (FUZ). A staged release of land is planned, as shown in **Figure A**.

The FUZ land is anticipated to accommodate about 7,300 homes, plus around another 1,000 dwellings through intensification of the existing urban area and areas immediately surrounding Warkworth (currently approximately 2,200 dwellings). This equates to a total of about 10,500 dwellings, housing a future population of 25-30,000.

Current Council forecasting (as at 14 March 2019) anticipates an additional 5,400 jobs within the FUZ by 2046². Provision of jobs is intended to facilitate Warkworth’s development as a successful satellite town – and not a dormitory suburb of Auckland.

Figure A: FULSS land release and indicative housing yield



² This number is based on updated (February 2019) Warkworth Structure Plan jobs anticipated in the FUZ. The analysis that follows is based on an earlier draft version of the structure plan numbers. The modelling will be updated at the DBC stage to reflect the new employment numbers. The potential impact of increased employment within Warkworth may be shorter trips and/or higher levels of internal trip making. It may also draw trips into Warkworth from areas further afield. It is not anticipated that these changes will be material enough to alter the recommended infrastructure, which has been designed to be resilient to change.

Structure planning

The Warkworth FUZ area is subject to a structure planning process – a Council-led land use plan to transform it into an urban community – which is due to conclude in 2019. The dwelling and employment numbers in this IBC are therefore indicative of the expected quantum and location of growth and will be confirmed once the structure planning process is complete.

The Council's Draft Structure Plan currently anticipates between one and three additional centres of a local/ neighbourhood scale. Demand for business land is likely to be catered for in west Warkworth where most of the flat land is located, and/or located adjoining existing industrial areas.

Identifying transport problems

To identify the problems likely to affect the future transport system in Warkworth, the project team reviewed existing documentation, met with key stakeholders and held a workshop on 17 May 2018 to present the evidence that had been gathered. Following the workshop, more work was done to confirm the problems and the benefits that could be achieved if the problems are resolved, which are summarised in **Table A**.

Table A: Summary of transport problems

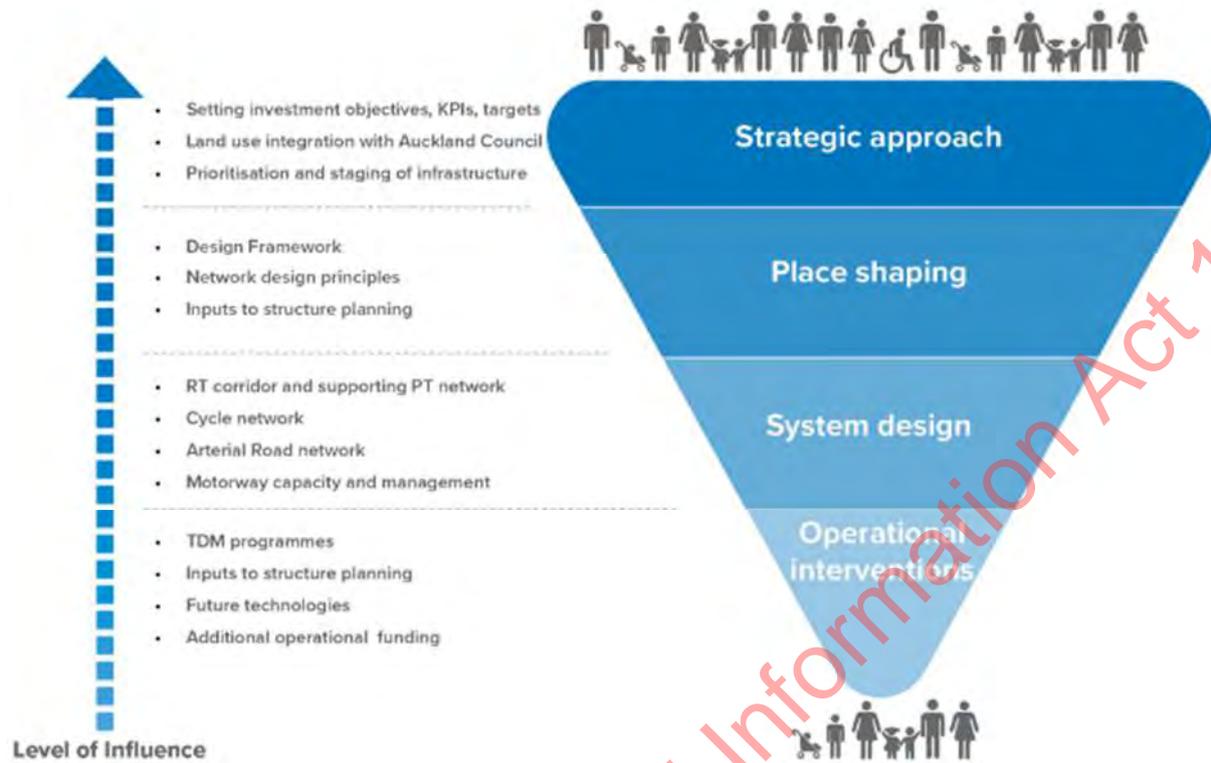
Problem	Explanation	Benefits
<p>Problem statement 1: Inability of the transport system to cope with travel demand caused by growth in Warkworth will compromise access to economic and social opportunities and core services (Weighting: 50%).</p>	<ul style="list-style-type: none"> The Warkworth FUZ areas have an insufficient roading network to accommodate demand The current road network is not sufficient to accommodate the forecast demand associated with growth in Warkworth Walking, cycling, and public transport outcomes will not be achieved without investment The GPS priorities will not be achieved without investment Access to economic and social opportunities in Warkworth will be restricted by congestion and lack of safe facilities for walking, cycling, and universal access, if the planned growth proceeds without investment in transport infrastructure. 	<ul style="list-style-type: none"> Access to economic and social opportunities and core services (30%) Reliable movement of people and goods (20%)

Problem	Explanation	Benefits
<p>Problem statement 2: Lack of safe, attractive, and resilient mode choices in Warkworth will result in a high reliance on private vehicles for all trips (Weighting: 30%).</p>	<ul style="list-style-type: none"> Warkworth's geographical size makes it an ideal candidate for increasing mode share, however the current transport system does not currently allow for this 91% of motorised trips in Warkworth are by private vehicle Provision of facilities to support public transport, walking and cycling in and around Warkworth is important to address growth demand as land for housing and employment is released Warkworth is the commercial centre that a much wider surrounding catchment draws upon. Growth of Warkworth and its wider catchment will be constrained if no allowance is made for other transport alternatives to meet demand. Existing walking and cycling facilities are limited, are not continuous and do not connect trip generating activities Sections through the Warkworth centre are limited by narrow road corridors and single lane bridges. Where stretches of footpaths exist, they are interrupted by vehicle crossings. 	<ul style="list-style-type: none"> Quality urban and natural environment and liveable Warkworth (20%) Reduced reliance on private vehicles (30%).
<p>Problem Statement 3: Failure to integrate transport planning with the pace, scale, and form of growth, will result in a poor quality urban and natural environment in Warkworth (Weighting: 20%).</p>	<ul style="list-style-type: none"> Significant residential and employment growth is anticipated in Warkworth over the next 30 years. To achieve the mode share aspiration for the area, urban form must support PT and active mode travel through providing a compact form. For Warkworth, provision of local employment is critical to achieving the desired mode share. The integration of land use and transport is vital to achieving a quality and connected urban and natural environment. 	

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**. This included consideration of an integrated set of policy-based, soft, and technical infrastructure measures to achieve the desired goal.

Figure B: Demand management influence through the project life cycle



The application of these demand management principles in Warkworth is forecast to result in a shift of 16% from private vehicle travel to alternative modes if the recommended network of improvements is provided, as summarised in **Table B**.

Table B: Estimated changes in mode share

Main means of travel to work	Percentage (existing)	Percentage (proposed)
Private Vehicle	91%	75%
Public Transport	0.2%	10%
Active Modes	9%	15%

Traffic modelling demand used to develop the recommended network of improvements for Warkworth includes a reduction of 16% over existing travel patterns (based on 2018 surveys of existing Warkworth residential areas) and the network has been developed to respond to this.

Option development and assessment

Over 100 options were considered as part of the long list development. This involved 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 investment objectives and the Te Tupu Ngātahi multi criteria assessment (MCA) framework. The framework assesses option performance against the investment objectives (see below) and four wellbeing measures: Cultural, Social, Environmental and Economic (see **Figure C**).

The investment objectives are:

- 1 Maintain reliable access to local economic and social opportunities and core services at 2016 levels.
- 2 Maintain reliable access to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels.
- 3 Deliver a transport system timed to integrate with FULSS staging, that enables a quality urban and natural environment in Warkworth.
- 4 Provide safe, resilient, and attractive travel choices that achieve a morning peak mode share of 26%³ for active modes and public transport and reduce private vehicle travel by 15% overall.

Figure C: Multi Criteria Assessment process



³ 26% is based on the Warkworth specific targets set out in the PBC, e.g. 10% for public transport, and 15.8% for active modes.

Recommended network

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

The recommended Warkworth transport network is shown in **Figure D** and provides:

- The local centre, high density residential activity, new school sites and sports fields all within viable walking and cycling distance of each other in south Warkworth. The transport system response includes footpaths, separated cycle facilities and safe crossing points, to provide safe, attractive alternatives to car travel.
- A public transport interchange provided adjacent to the proposed local centre, high density residential activity and potential new school sites. This co-location is intended to enable a good walk-up catchment, increasing uptake of public transport.
- A new arterial network that specifically connects key trip attractors (proposed business areas, local centres, sports fields and residential areas) along main desire lines. The intention is for this arterial network to be attractive for walking and cycling, to encourage mode shift away from vehicle use, and to provide for strategic east-west trips.
- New industrial / business land is located adjacent to existing similar activity, connected by and accessed from the proposed Western Link Road. With business land along much of its length the Western Link Road has been located to provide reliable access to the Ara Tūhono and a resilient alternative route to the existing SH1 corridor. Locating similar activities close together can also reduce the need to travel, given their adjacency.
- The Western Link Road is designed to have four traffic lanes; its purpose is to reduce traffic volumes on the existing SH1 corridor and enable space on that corridor to be reprioritised so that it can act as Warkworth's central north-south walking, cycling and public transport spine. All other new and existing corridors will retain existing capacity (generally two traffic lanes) and will generally have cross sections of 20m, 25m or 30m to accommodate a form that better integrates with the surrounding urbanised land use.
- A new southern motorway interchange located adjacent to new industrial / business land to provide reliable access for freight and provide a catalyst for the business land development.
- The southern motorway interchange also allows for a reduction in public transport operational costs (compared to only having a northern interchange) by reducing travel distances associated with the northern motorway interchange.
- Operational demand management measures must be implemented to achieve the lower travel demand on which the recommended network is based. These are to be developed in more detail during the DBC phase.

The map shown in **Figure D** 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.

Figure D: Warkworth recommended transport network

WARKWORTH INDICATIVE STRATEGIC TRANSPORT NETWORK

JULY 2019

Projects described in these maps have been identified by indicative business cases and will require further technical investigation, engagement with communities and landowners and statutory approvals before their final detail, location or land requirement is confirmed. They are also yet to be prioritised for funding for delivery over the next 10-30 years.

NEW OR IMPROVED PUBLIC TRANSPORT FACILITIES



- 1 Public transport interchange in north Warkworth
- 2 Public transport interchange in south Warkworth

NEW WALKING AND CYCLING CORRIDOR



- 3 Shared path adjacent to Mahurangi River between Mansel Drive and the existing Warkworth town centre

NEW OR IMPROVED TRANSPORT CORRIDOR



- 4 Sandspit Link Road
- 5 Western Link Road (including upgrade to Mansel Drive and Evelyln Street)
- 6 Wider Western Link
- 7 Southern interchange and arterial connection
- 8 Upgrade urban sections of SH1, Matakana Road, Sandspit Road, Woodcocks Road to accommodate walking and cycling

OTHER PRIORITY PROJECTS



- 9 Matakana Link Road – Te Honohono ki Tai
- 10 Ara Tūhono – Pūhoi to Warkworth Motorway (under construction)
- 11 Ara Tūhono – Warkworth to Wellsford indicative alignment
- 12 Hill Street Improvements business case area



LEGEND

- Warkworth Structure Plan area
- New growth area (Future Urban Zone)
- Existing urban area
- State Highway (SH)
- Existing bus stop in town centre
- New public transport interchange
- New walking and cycling corridor
- New interchange – south facing ramps only
- New transport corridor
- Improved transport corridor
- Other priority projects
- Priority projects under construction

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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**.

The staging responds to the desired FULSS timings which indicate three releases of land in Warkworth north (2022), Warkworth south (2028-2032), and Warkworth north east (2033-2037). 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.

Table C: Staging of the recommended network

Staging	Plan
<p>Stage 1 (2018-2028)</p> <p>Stage 1 projects support 1st decade land release in the north and will actively encourage mode shift and provide resilience to the network.</p> <ul style="list-style-type: none"> • Western Link Road North and South • Mansel Drive upgrade • Mahurangi River shared path • Park and ride (interim) (1a) • PT interchange/terminus in town centre (interim) (1b) • Operational demand management measures 	 <p>The map shows the geographical layout of Stage 1 projects in Warkworth. Key features include: <ul style="list-style-type: none"> MATAKANA LINK RD: A road project in the northern part of the town. ARA TUHONO: A location marked in the north-western area. WESTERN LINK ROAD NORTH: A road project connecting the northern and central areas. MANSEL DR: A road project in the central town area. SHARED USE PATH: A path project near the town center. WESTERN LINK ROAD SOUTH: A road project in the southern part of the town. </p>

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Staging	Plan
<p>Stage 2 (2028-2038)</p> <p>Stage 2 projects will support 2nd decade land release in the south and will contribute to better access to the town centre and the motorway.</p> <ul style="list-style-type: none"> • Southern Motorway Interchange • Wider Western Link Road • Public Transport Interchange (preferred long-term location, 2b) • Park and Ride (preferred long-term location, 2a) • Upgrade SH1 and Woodcocks Road • Upgrade key collectors to provide dedicated walking and cycling facilities • Operational demand management measures 	
<p>Stage 3 (2038+)</p> <p>Stage 3 projects will support third decade land release in Warkworth and will provide for strategic through trips and walking and cycling.</p> <ul style="list-style-type: none"> • Sandspit Link Road • Urbanise Matakana and Sandspit Roads • Operational demand management measures 	

What's changed since TFUG?

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

The difference between the TFUG network and this IBC proposed networks is summarised in **Table D** and **Table E**.

Table D: Elements added to the TFUG network

Infrastructure	Description
More extensive walking and cycling network	Expanded walking and cycling network
Mahurangi River shared path	Connects from Mansel Drive through to the town centre
Southern interchange	Motorway interchange adjacent to the southern FUZ area.
Wider Western Link Road	Arterial between Woodcocks Road and SH1

Table E: Elements not included or being delivered elsewhere

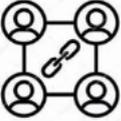
Infrastructure	Description
Matakana Link Road – Te Honohono ki Tai	Project being implemented separately by AT.
Frequent bus service to Auckland	Bus service to Silverdale already implemented by AT.

Outcomes

Table F describes the outcomes achieved by the recommended network in relation to the measurable KPIs (these are described in Chapter 4 of the IBC) 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	Outcome
<p>Safe, attractive walking and cycling</p> 	<p>A comprehensive walking and cycling network that enables a shift to these modes of 15% overall, with commuter and school journeys forecast to have a 30% mode shift (KPI4c, Investment Objective 4).</p> <p>87% of households in Warkworth within 3km cycle of employment and local activities (KPI1a, Investment Objective 1; KPI3c, Investment Objective 3).</p> <p>All routes are qualitatively assessed to have a personal and collective risk of lower than medium through improvements delivered (KPI4a, Investment Objective 4).</p>
<p>Frequent, reliable, accessible public transport</p> 	<p>55% of people live within 400m walk and 87% live within 3km cycle of good quality and frequent public transport services, supporting mode shift for both local and strategic journeys (5%) (KPI4d, Investment Objective 4).</p> <p>Supports a public transport network that provides access to wider key destinations (Wellsford, Matakana, Snells Beach, Algies Bay). This in turn enables better achievement of Ara Tūhono objectives by using that roading asset across modes rather than just for private vehicles.</p>
<p>Resilient</p> 	<p>Good quality alternatives to existing SH1 corridor and Hill Street intersection (KPI4e; Investment Objective 4).</p> <p>Provides flexibility to respond to changes in behaviour, growth, and technology.</p>
<p>Reliable</p> 	<p>Travel time variability (between the PM peak and interpeak) across the network is reduced from 41% to 5% overall. This means access to employment, social opportunities, and core services will be more reliable than it is currently (KPI1b and KPI2a, Investment Objective 2).</p> <p>Access to the strategic network will be reliable (due to reduced travel time variability) and resilient (due to an additional access to the motorway).</p> <p>Reliable travel is a key enabler of the satellite town concept, as it will attract jobs.</p>
<p>Development ready</p> 	<p>Warkworth may be 'development ready' in the FULSS timeframes depending on regional prioritisation of greenfield growth (KPI3a, Investment Objective 3).</p> <p>Enables route protection of arterial corridors.</p> <p>Provides appropriate capacity to meet the demands of growth.</p> <p>Provides flexibility to respond to changes in development timing.</p> <p>Provides opportunities to lead with behaviour-change initiatives.</p>

Areas	Outcome
Cohesive community 	<p>Existing corridors are enhanced with active mode facilities creating people-oriented streets where more people walk and cycle.</p> <p>Public transport services hub into town centre, helping to support local businesses with high foot traffic.</p> <p>Amenity-rich residential areas are a short, safe walk or cycle from parks, schools, shops and cafes, strengthening local communities.</p> <p>Pressure on the environment is reduced through lower vehicle emissions.</p> <p>Less physical space is required for car travel and can be re-purposed for people and community places.</p> <p>Consistent look and feel of new and existing corridors deliver a cohesive environment.</p>

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 Warkworth package, costs are as follows:

- Property and land costs of approximately s9(2)(j) (included in the costs below)
- Total estimated capital costs in the range of s9(2)(j)

The higher end of the capital cost range indicated above represents the P50 cost estimate. The lower end of the range indicates the potential cost to investors once developer contributions and value engineering opportunities have been realised.

Benefit Cost Ratio (BCR)

The BCR was calculated using the Net Present Value (NPV) benefits and P50 costs as outlined in Chapter 9 of the IBC and shown in Table G.

Table G: Benefit Cost Ratio

Item	Cost (\$M)
Total NPV benefits	s9(2)(j)
Total NPV costs	s9(2)(j)
Benefit Cost Ratio	1.2

This demonstrates a sound economic case to support the Warkworth recommended network with a BCR greater than 1.0.

Implementation

A preliminary property analysis has been developed for this project. s9(2)(j) to implement the recommended network of improvements for Warkworth. Cost estimates have been prepared and are in Appendix J: Property Strategy.

A preliminary route protection strategy has been developed for Warkworth and included within Appendix K: Route Protection Strategy. The recommended network has been divided into five potential route protection 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. Packaging and priority is likely to change as a result of programme-wide review across all four IBCs and feedback from the owner investors in relation to programme affordability.

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.

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 route protection for the following elements of the IBC programme within the next four years:

- 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 Warkworth, these elements are:

- Key collector road upgrades for walking and cycling
- Alnwick Street connection
- Demand management operational measures.

Pre-implementation further progresses individual projects from the DBC stage through the statutory approvals stage. The result of pre-implementation will be a network of corridors that are route protected. Once a project has been through the pre-implementation phase it will be ready for implementation, including detailed design and physical works.

PART A – STRATEGIC CASE

1 Introduction

The purpose of the Supporting Growth Programme (the Programme) is to identify the preferred 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 future urban area of Warkworth (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.

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
- Identifies an integrated transport network that enables growth in Warkworth
- 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 people⁴, 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. 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 of urban Hamilton.

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.

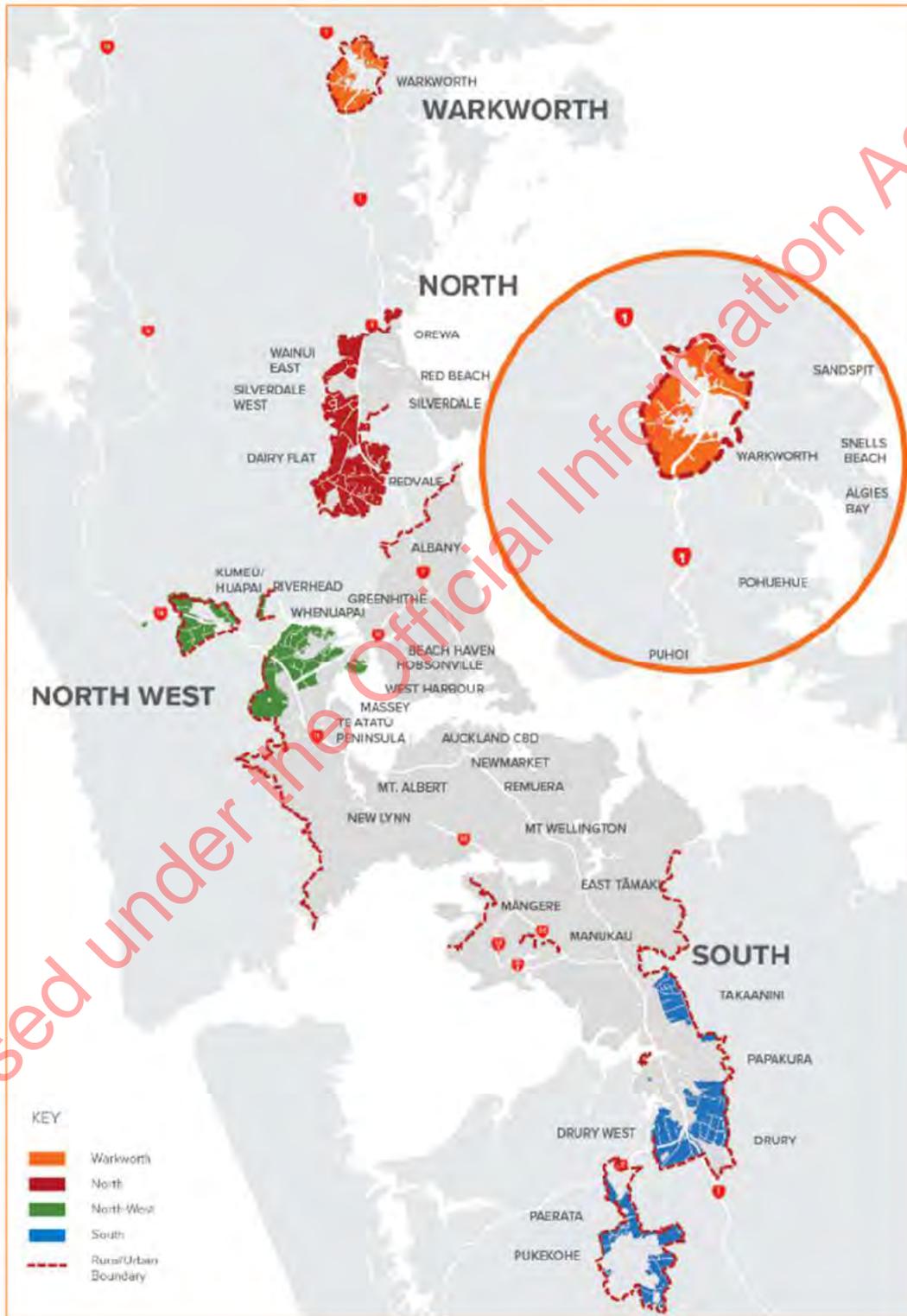
1.1.2 Warkworth

Warkworth is located at the northernmost extent of the Auckland region, approximately 60km from Auckland city centre, and 30km north of Orewa. Warkworth is the main settlement and place of employment beyond Orewa. It supports a large catchment area including Wellsford, the Matakana and Kowhai coastal communities, and Kaipara Flats to the west.

⁴ Statistics New Zealand, June 2018

The catchment is predominantly rural with low density residential, lifestyle blocks and general farming activity. Warkworth's main centre is separated from the rest of the urban area by the Mahurangi River and State highway 1 (SH1). Business and industrial activities are located on both sides of SH1 and recently business uses have located in areas south of Woodcocks Road.

Figure 1: Auckland's future urban growth areas (Warkworth inset)

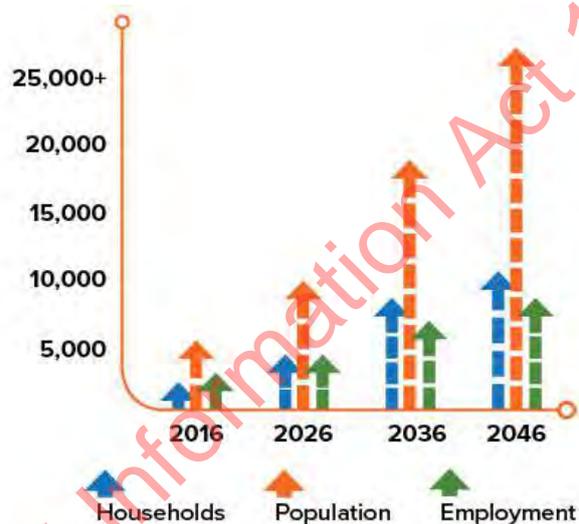


Auckland Council (the Council) has identified approximately 1,000 hectares (ha.) of land for future urban development in Warkworth. This land has been designated as a Future Urban Zone (FUZ), see Figure 3. This area is anticipated to accommodate approximately 7,300 dwellings within the FUZ areas, and a further approximately 1,000 dwellings through intensification of the existing urban area and areas immediately surrounding Warkworth. This is likely to equate to a future population 22,700⁵.

An additional 5,400 employment opportunities are anticipated within the FUZ by 2046⁶. Provision of jobs is intended to facilitate Warkworth's development as a successful satellite town - and not a dormitory suburb of Auckland. Figure 2 shows this growth over time.

In addition to this growth within Warkworth, a further 2,000 dwellings are anticipated in the adjacent Matakana and Kowhai coastal areas, and 1,200 dwellings in the rural area immediately south of Warkworth. Employment opportunities and access to services for these future residents may be provided in the Warkworth area, or further afield.

Figure 2: Forecast growth in households, employment and population (2016-2046)



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 will be 'development ready', the Council developed the FULSS to provide for sequenced and accelerated greenfield growth in the following areas of Auckland:

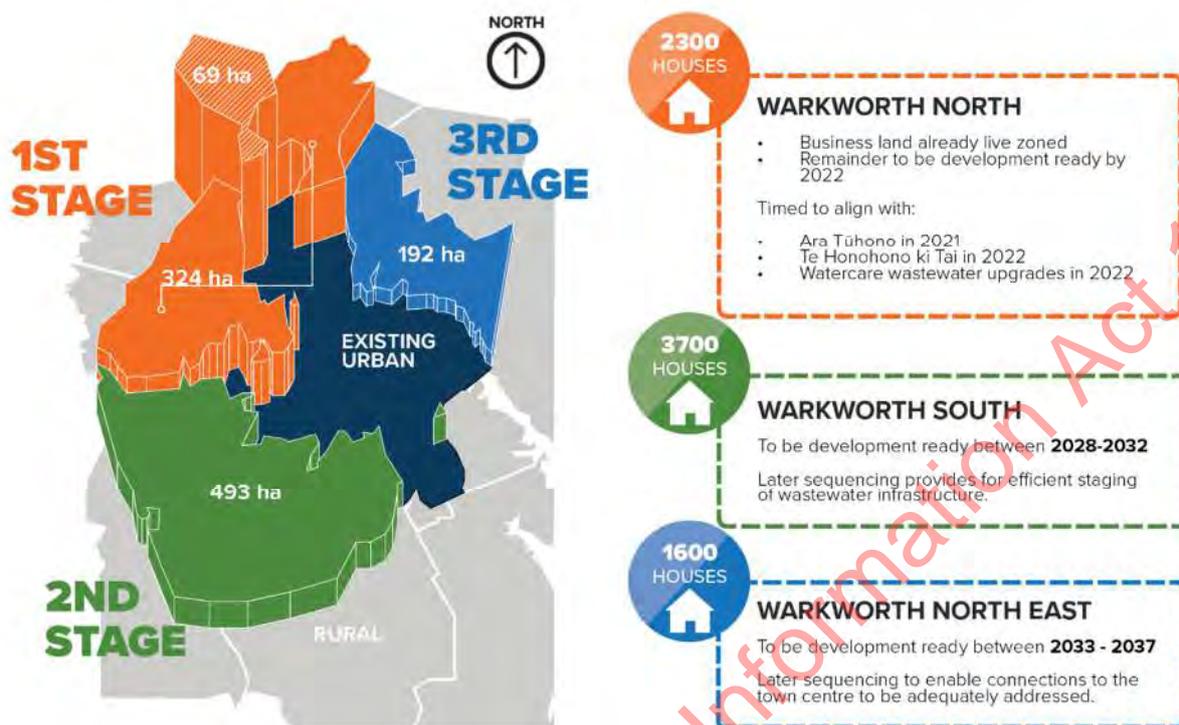
- North west: Whenuapai-Redhills, Westgate, Kumeu, and Huapai
- North: Orewa-Silverdale, Dairy Flat, and **Warkworth**
- South: Takanini, Drury west, Karaka, Drury, Paerata, Hingaia, and Pukekohe.

Of importance to this business case is the timing of growth and how this relates to the provision of infrastructure. As illustrated in Figure 3, the Council has provided for a staged land release and this impacts on the urgency of some of the proposed infrastructure required. The land release is staged in the following three sub areas: Warkworth North (69 ha. business land currently live zoned, with the remainder (324 ha.) development ready in 2022), Warkworth South (493 ha. development ready 2028-2032), and Warkworth North East (192 ha. development ready 2033-2037).

⁵ Note, this population figure is estimated based on likely future trends of decreasing household size which sees a occupant to household multiplier of between 2.1 and 2.4 used in Warkworth. If the trend for decreasing household sizes does not eventuate, the population may be higher, potentially between 25 and 30,000.

⁶ Note: Number is based on updated (February 2019) Warkworth Structure Plan jobs anticipated in the FUZ. The analysis that follows is based on an earlier draft version of the structure plan numbers. The modelling will be updated at the DBC stage to reflect the new employment numbers. The potential impacts of increased employment within Warkworth may be shorter trips. It may also draw trips into Warkworth from areas further afield. It is not anticipated that these changes will be material enough to alter the recommended infrastructure, which has been designed to be resilient to change.

Figure 3: FULSS land release and indicative housing yield⁷



1.2.2 Planning context

The Warkworth FUZ area is subject to a structure planning process led by the Council which is due to conclude in early 2019. While this has provided an opportunity to develop an integrated response the dwelling and employment numbers set out in this report are indicative and will be confirmed once the structure planning process is complete. It is worth noting that the different scenarios looked at by Council are not currently expected to result in changes to the proposed network.

The current draft of the preferred zoning for Warkworth is shown in Figure 4. The Council’s Draft Structure Plan currently anticipates between one and three additional centres of a local/ neighbourhood scale. Council’s Business Land Demand Topic Report (2018)⁷ recommends the existing centre remain the focus of economic activity with additional demand for light industrial land being accommodated in alternative locations. Demand for business land is likely to be catered for in west Warkworth where most of the flat land is located, and/or located adjoining existing industrial areas.

The Warkworth project team is working closely with Council through the structure planning process to support Warkworth’s development as a successful satellite town. This approach has enabled the development of a more integrated land use-transport system solution which responds to the proposed land uses illustrated in Figure 4. This process has been iterative, and the transport network has evolved as different land use and transport options have been assessed and public engagement feedback has been incorporated.

⁷ Total number of houses in the FULSS was 7,600. This has since been reduced to 7,300.

1.3 Business case approach

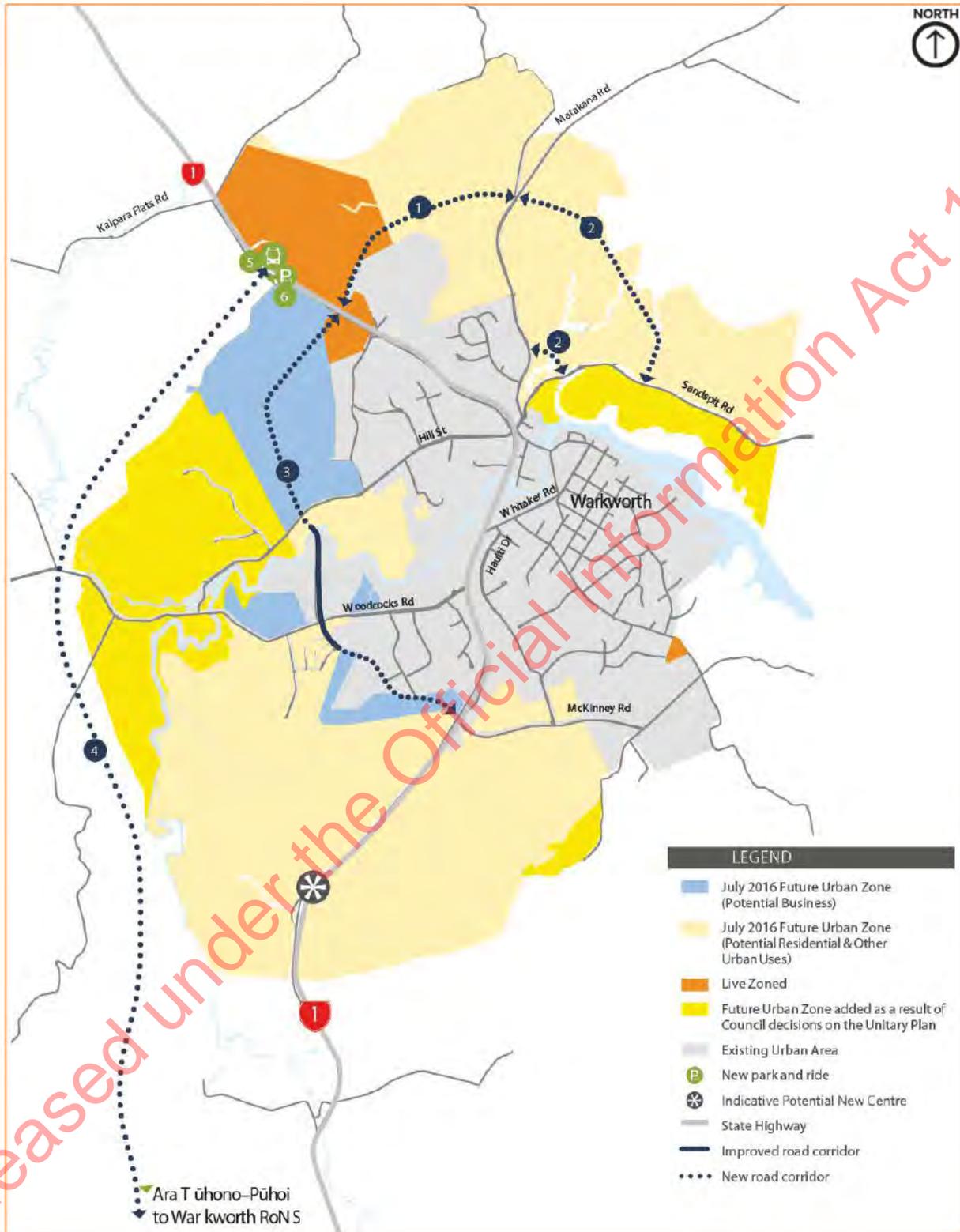
In 2016, Auckland Transport (AT), the New Zealand Transport Agency (the Transport Agency), and the Council worked in partnership to develop a Programme Business Case (PBC) that responded to the pace, scale, and staging of growth identified in the AUP: OP and FULSS. The intention of this business case-led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

1.3.1 TFUG Programme Business Case

The Transport for Future Urban Growth (TFUG) preferred 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 over the next three decades. The recommended programme is set out below and in Figure 5.

1. Matakana Link Road - – Te Honohono ki Tai
2. Future extension of Matakana Link Road - – Te Honohono ki Tai through to Sandspit Road (known as Sandspit Link Road)
3. Western Collector (northern and southern connections through to SH1)
4. Ara Tūhono/ Pūhoi to Warkworth motorway
5. Frequent bus service to Auckland
6. Park and ride
7. Implement cycle network.

Figure 5: TFUG preferred network



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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 preferred transport networks – including preparation of this IBC for the Warkworth area. Once confirmed, it will carry out the route protection process to protect the land for these networks over the next four 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 Indicative Business Case (IBC) further tests and develops the recommendations of the PBC to ensure they are robust. An optioneering exercise has been undertaken to determine if any additional options are required to accommodate the demand for movement associated with the forecast growth.

This IBC is focussed on the identification of the indicative⁸ recommended strategic transport network for route protection. This assessment allows for route protection by 2022 while providing an indication of the future network requirements. In determining these requirements for the implementation of travel demand management initiatives, the reduction in demand and providing for mode choice ensures the strategic transport network is right-sized.

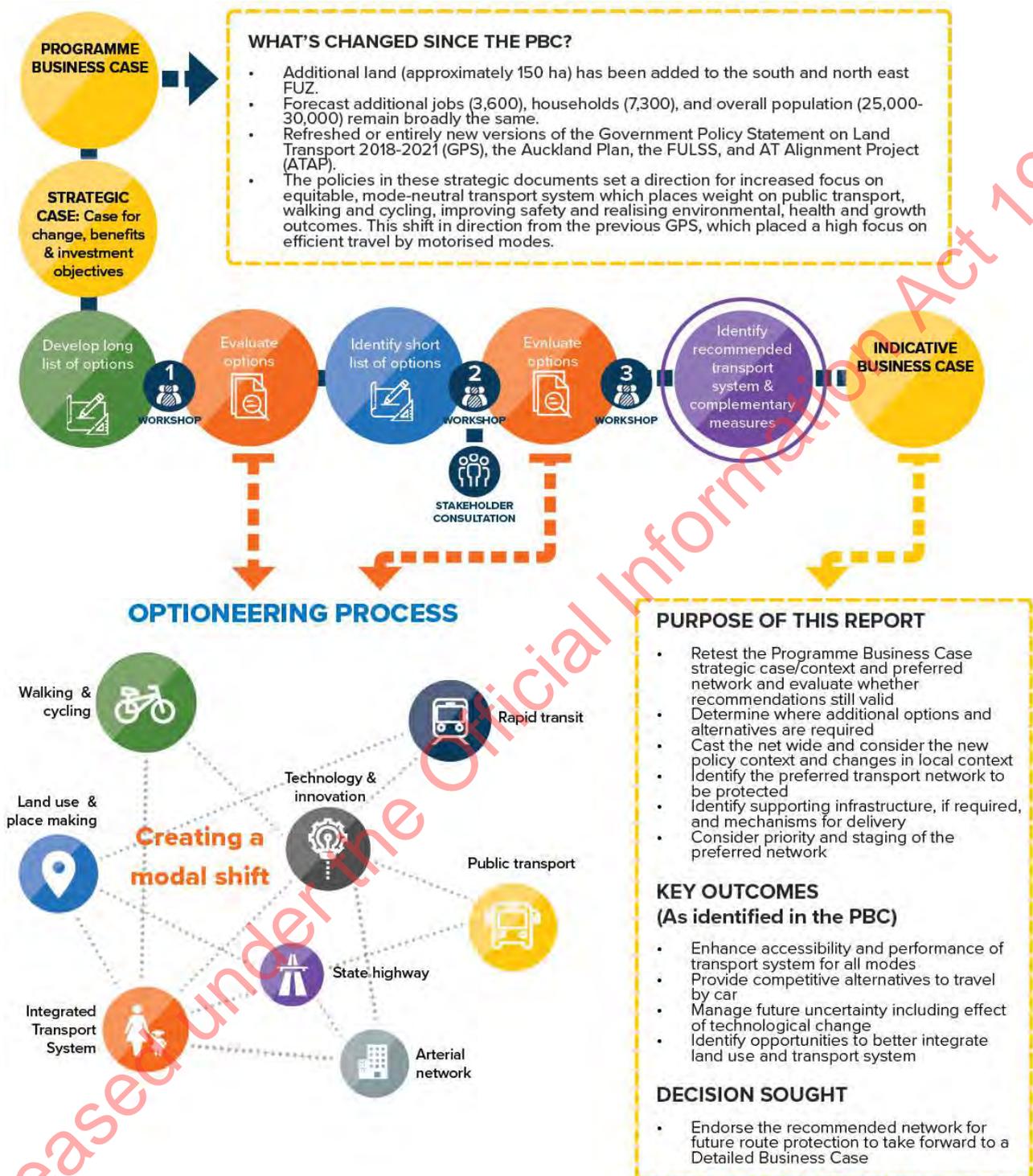
The implementation of the transport system to support the growth will need to be staged over the next 30 years as the land use changes. Given the scale and duration of the growth proposed, the early protection of these critical transport corridors is considered necessary to provide the required certainty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

This IBC therefore not only identifies the recommended transport network to facilitate the growth forecast, 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. This includes the potential financial implications as well as stakeholder impacts.

Figure 6 sets out the business case process, including: what's changed since the PBC; the purpose of this report; the process followed; and the key outcomes and decisions sought.

⁸ The recommended transport network is indicative. Actual corridor alignments will be confirmed at the next stage of development.

Figure 6: Business case process and timing



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2 Strategic alignment

This section describes the:

- Investors, partners, and key stakeholders to the Programme and their engagement in this project (Sections 2.1 and 2.2)
- Approach to community engagement (Section 2.3)
- Alignment with the current wider policy context and key investor organisational policies (Section 2.4).

2.1 Partners

This section describes the investors and partners to the Programme, and the engagement undertaken with them through the development of this business case. Further information on their roles and responsibilities can be found in Appendix A: Strategic Case and Appendix H: Engagement Summary Report.

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 the Owner Interface Managers (OIM) within Te Tupu Ngātahi. Engagement has been through regular forums leading up to business case milestones and attendance at business case workshops.

In Warkworth other Transport Agency and AT teams attended public open days alongside Te Tupu Ngātahi, including Matakana Link Road – Te Honohono ki Tai, Ara Tūhono (Pūhoi to Warkworth) and the Hill Street intersection improvement business case team.

2.1.2 Auckland Council

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

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

Programme wide, Te Tupu Ngātahi has facilitated a regular Auckland Council Integration Forum to enable these commitments and actively manage and identify risks and opportunities that are inherent to the programme.

Engagement with Auckland Council regarding Warkworth has been closely aligned with the structure planning process that is currently underway for the Warkworth future urban area. This has included joint attendance at open day sessions, supporting technical advice and attendance by key Council specialists at business case workshops. Close alignment with Auckland Council supports the Programme's desired outcome of integration of land use and transport.

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 these 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 business case, this has meant involving Manawhenua as partners in decision making and considering their views when identifying priorities for investment options.

Ten Manawhenua s9(2)(ba)(i) [REDACTED]

[REDACTED] have been involved in the development of this business case.

Ngāti Manuhiri are the predominant iwi with an interest in the area. s9(2)(ba)(i) [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
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- [REDACTED]
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- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

s9(2)(ba)(i) [REDACTED]

Te Tupu Ngātahi maintains a Manawhenua Forum (for operational and kaitiaki level interaction) and there are also opportunities for governance level relationships via the Tamaki Transport Table and the existing connections with governance through the owner participants (AT and the Transport Agency).

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 Warkworth business case workshops and three Multi Criteria Assessment (MCA) scoring hui (3rd September 2018, 13th September 2018, 4th October 2018). In terms of specific iwi attendance at each workshop and the specialist session completed for Warkworth refer to Appendix H: Engagement Summary Report.

2.2 Key stakeholders

Engagement with stakeholders has been undertaken primarily at a Programme-wide level, through a series of Stakeholder Reference Group presentations and one-on-one meetings. The purpose of these were to introduce the Programme, Te Tupu Ngātahi and to discuss options being considered throughout the public engagement process.

In Warkworth, engagement with key stakeholders has been undertaken with:

- Local stakeholder groups including Warkworth Transport Forum (this includes the local MP, Councillors and representatives from One Warkworth (business association) and other local community members/landowners).
- Significant land holders and developers in Warkworth. The overall purpose of these meetings was to discuss the short-listed options and hear about landowner/developer plans and potential issues/opportunities with the short-listed options.
- The Ministry of Education (MoE) – to discuss potential new school locations and issues/opportunities with the short-listed options. These discussions with MoE are occurring at a joint level with AT and the Council.

2.3 Community engagement

A public feedback period was held between 16 August and 7 September. Two public open days were held at the Warkworth Town Hall drawing approximately 140 people across both days. The information presented showed the key decisions being made by the Project team at the short-list phase and key information to consider associated with each option. Project staff were on hand and available to take attendees around each board and speak to the information, as well as available to answer specific questions. Attendees were encouraged to give their feedback via Post-it notes on the information boards and through online/hard copy survey forms.

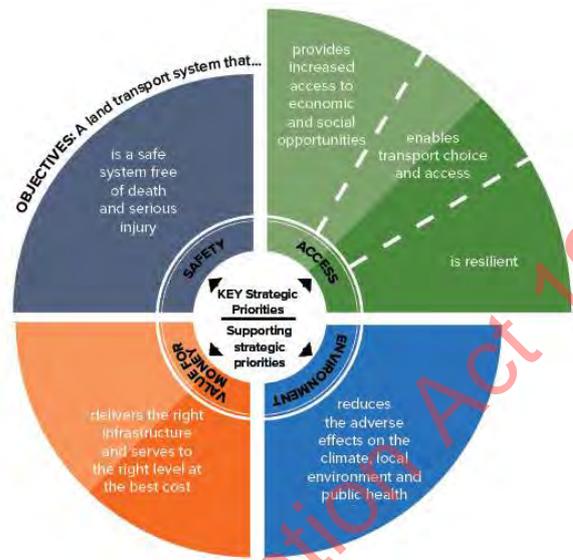
2.3.1 Future customers

At this stage, public engagement has largely attracted people from the current communities in growth areas or surrounding areas. It is highly likely that communities in these areas in future will be different compared to today, with much of the future communities will be made up from today's children and young people. 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 focussed on key transport issues and future aspirations for Auckland as a successful city to live in.

2.4 Policy context and organisational alignment

The policy context and organisational alignment relating to this investment proposal is illustrated in Figure 7. This investment proposal is strongly aligned with existing policy, including the AT Statement of Intent (SOI) and the Transport Agency's Long Term View (LTV) and SOI.

Figure 7: Policy context and organisational alignment



WHAT THIS MEANS FOR WARKWORTH

GPS 2018/19 – 2027/28

Sets priorities for a transport system which is: safe, provides access to economic and social opportunities, enables choice, is resilient, reduces the impact on the environment, climate, and public health, and delivers value for money.

The transport system in Warkworth will need to deliver on these priorities.

ATAP 2.0

The ATAP 2.0 themes align with the GPS 2018 and the Auckland Plan 2050. Available funding for greenfield projects in the ATAP Package includes \$1.3 billion allocated to greenfield transport infrastructure within the next 10 years. The package recognises that significant investment in transport infrastructure will be needed to enable the planned growth in future urban areas, to encourage the use of public transport and active modes, and to provide a reasonable level of service to future residents.

FULSS

Sets the pace and scale of growth for Warkworth over the next 30 years, with:

- 7,600 additional households by 2046.
- 3,600 additional employment opportunities by 2046.

Auckland Plan

- Identifies Warkworth as a satellite centre.
- Warkworth to accommodate significant residential and employment growth compared to its rural neighbours.
- Warkworth to have quality transport links, i.e. Puhoi to Warkworth, Matakana Link Road, Hill Street intersection improvements.
- Warkworth will be structure planned to identify the mix and location of housing, employment, retail, commercial and community facilities.

GPS 2018/19 – 2027/28

- Sets Government priorities for the NZ transport system

Auckland Transport Alignment Project 2.0

- Recommends Auckland’s transport investments for 2018-2028
- Reflects Auckland Council and government shared direction

Future Urban Land Supply Strategy (FULSS)

- Provides for sequenced and accelerated greenfield growth in Auckland
- Endorsed by NZ Transport Agency and Auckland Transport boards in 2016

Auckland Plan

- Long term spatial plan to ensure Auckland grows to meet opportunities and challenges of the future

From a policy perspective, the key documents that relate to this investment proposal are:

- Government Policy Statement (GPS) 2018
- The Auckland Plan 2050
- Auckland Transport Alignment Project (ATAP) 2018
- Future Urban Land Supply Strategy (FULSS) 2017 update.

These key documents and their relevance to legislative, regulatory, and policy context for this investment proposal are summarised below and serve to provide the key context for the discussions on problems, benefits and investment objectives which follow.

The relevance of these documents to this IBC is detailed in Appendix A: Strategic Case. The key points are:

- The GPS strategic priority of 'Access' is of particularly high relevance. Increasing access, transport choice and network resilience using a mode neutral approach closely align with the investment objectives of this IBC.
- The GPS supports '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 is a key priority for GPS 2018. In line with the GPS objective 'enabling transport choice and access', GPS 2018 supports investment in the provision of appropriately designed and maintained infrastructure (e.g. cycleways) and speed management is particularly important to increase access to, and uptake of, active forms of travel.
- The GPS supports transport and land use planning that reduces 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.
- The transport challenges identified in ATAP align with the IBC problem statements. Specifically, the issues of poor travel choice beyond private vehicles, especially in lower income areas, enabling and supporting a rapid acceleration in the rate of housing construction and the need to reduce the transport system's environmental impact
- The Auckland Plan 2050 recognises that the Warkworth growth area includes significant future urban areas due for sequencing according to the FULSS (2017). These areas are a result of changes to zoning in the Unitary Plan which forms the land use tool for FULSS. Structure planning will provide a high-level plan of how the area can be urbanised, mix and location of infrastructure and integration of land use.

Table 1: Organisational alignment

Organisation & policy	Relevance to Warkworth
AT Statement of Intent	<p>AT's SOI covers the three-year period from July 2018 to 2021. The primary purpose of the SOI is to state publicly the activities and intentions of AT and the overall objectives of AT. To this end, AT's key priorities for the next three years include:</p> <ul style="list-style-type: none"> • 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 View	<p>The Transport Agency's LTV 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.</p> <p>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 – technology, demographics, economic structure, climate change, funding sustainability, and data and information.</p>
Transport Agency Statement of Intent 2018-22 (Draft)	<p>The Transport Agency's SOI responds to recent changes in its operating environment, including the release of the new Government Policy Statement (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 multi-modal transport system that enables new housing opportunities, liveable cities and sustainable economic development in regional New Zealand.</p> <p>This supports the enduring outcomes for the transport sector:</p> <ul style="list-style-type: none"> • Inclusive access • Economic prosperity • Resilience and security • Environmental sustainability • Healthy and safe people. <p>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.</p>

3 Context

3.1 Overview

This section sets out the local context in Warkworth and identifies what this means for this business case in terms of constraints and opportunities. The transport context is discussed in the section following.

3.2 Location

Warkworth is located at the northernmost extent of the Auckland region, approximately 60km from Auckland city centre, and 30km north of Orewa.

The FUZ will extend the current urban area in all directions. Land release is proposed in a broadly anticlockwise direction as follows:

- North Warkworth is planned be released first, including the business land already live zoned, and is the area to the west of Matakana Link Road – Te Honohono ki Tai, as far south as Woodcocks Road, and bounded by SH1 in the east
- South Warkworth is planned to be released second, and is the area south of Woodcocks Road to the west of SH1, and as far north as the existing urban are to the east of SH1
- North east Warkworth is planned to be released last, is the area to the north of the Mahurangi River, and as far west as Matakana Link Road – Te Honohono ki Tai.

The Warkworth FUZ area will be less than 5km north-south and east-west.

3.2.1 Opportunities

The following opportunities have been identified in relation to Warkworth's location and spatial form:

- Maintain a rural satellite town, rather than a dormitory suburb of Auckland
- Given the extents of Warkworth are only 5km, deliver a compact urban form which supports a high level of walking and cycling
- Protect and enhance the scale and character of the rural township, which is critical to the identity and ongoing profile of Warkworth. The visual, environmental and socio-cultural effects of movement corridors must be balanced against this.
- Changes in land use and planned infrastructure provide opportunities for place making and integrated land use solutions.

3.2.2 Constraints/ challenges

The following potential constraints and challenges have been identified in relation to Warkworth's location and spatial form:

- A job to household ratio of 0.65:1 means out-commuting is likely⁹. The distance to the Auckland city centre (approximately 60km) is currently considered 'commutable' which means options must consider this potential movement pattern and how to manage it sustainably via public transport for example.

⁹ Ratio is based on an estimated total for Warkworth (current urban areas + FUZ) of 6,800 jobs and 10,400 households.

3.3 Environmental context

Warkworth is located at the northern reach of the Mahurangi River and lies within a topographical basin that is bordered to the north and south by hilly country and a mixture of native and exotic forest areas. The outer areas are characterized by the Dome Valley to the north west, the Conical Peak and Mt. Tamahunga to the north, while Moir's Hill is the main hill feature to the south, separating Warkworth from a complex valley system around Pūhoi.

Warkworth has a network of waterways and indigenous bush areas through its centre. Notably, the Mahurangi River and its tributaries traverse through the main town centre and beyond.

There are numerous significant ecological areas (SEAs) and areas of covenanted bush within the future urban area.

3.3.1 Opportunities

The following opportunity have been identified in relation to Warkworth's environmental context:

- Protect and enhance the natural character of the Mahurangi River and SEAs.

3.3.2 Constraints/ challenges

The following potential constraints and challenges have been identified in relation to Warkworth's environmental context:

- Poor ground conditions, drainage issues, floodplains, streams, and SEAs mean a significant proportion of the FUZ land is either unable to be built on or involve complex and costly engineering.
- Incised stream valley topography limits north-south and east-west corridor provision and creates severance.
- The Mahurangi River causes severance between north east and south east Warkworth. This has consequences for the urban form and potential transport solutions.

3.4 Population and social context

Warkworth's population is generally older, wealthier, and less diverse than the Auckland average (see Figure 8). Many residents are retired. There are a range of community facilities and services in the wider Warkworth catchment and in some of the smaller settlements on the periphery. Schools within Warkworth are:

- Warkworth Primary and Intermediate
- Mahurangi College.

There are several other schools are in the wider catchment including special character schools that draw students from a wider catchment beyond Warkworth.

The development of this business case has considered the community's documented aspirations for the future of their town. These include the draft Warkworth Structure Plan, the Rodney Local Board Plan amongst others. Customer insights are described further in Section 4.4.

3.4.1 Opportunities

The following opportunities have been identified in relation to Warkworth's social context:

- Existing schools are at or close to capacity, meaning new schools will need to be provided. The location of these schools must be carefully considered to ensure high quality transport outcomes for vulnerable users.

- There are opportunities to work with the Council and MoE in Warkworth to identify potential new school locations that are well-integrated with the transport system
- There is an opportunity to implement walking and cycling infrastructure which prioritises easy access to these locations and encourages high mode share from the outset.

3.4.2 Constraints/ challenges

The following potential constraints and challenges have been identified in relation to Warkworth's social context:

- The current population is ageing and generally stays and travels internally within Warkworth.
- Much of the current road network is rural or is incomplete. Local trips will continue to be a high focus in future, and with more residents these roads will be busier, require safety improvements and accommodation of modes other than the private car.

3.5 Economic context

Warkworth is the main economic centre north of metropolitan Auckland and south of Whangarei. Surrounding smaller towns and settlements such as Snells Beach, Matakana, Omaha, Wellsford and Kaipara Flats all rely on Warkworth as their major centre for various needs including employment, shopping, education, and recreation.

Warkworth is located on the Twin Coast Discovery Highway (SH1) and is a popular destination. The beaches and rural settlements east of Warkworth are also popular tourist locations visited extensively over holiday periods and on weekends. During holiday periods and weekends, there are significant numbers of additional residents in the region. This can cause issues for the existing transport network through and within Warkworth – which is often congested during these times.

3.5.1 Opportunities

The following opportunities have been identified in relation to Warkworth's economic context:

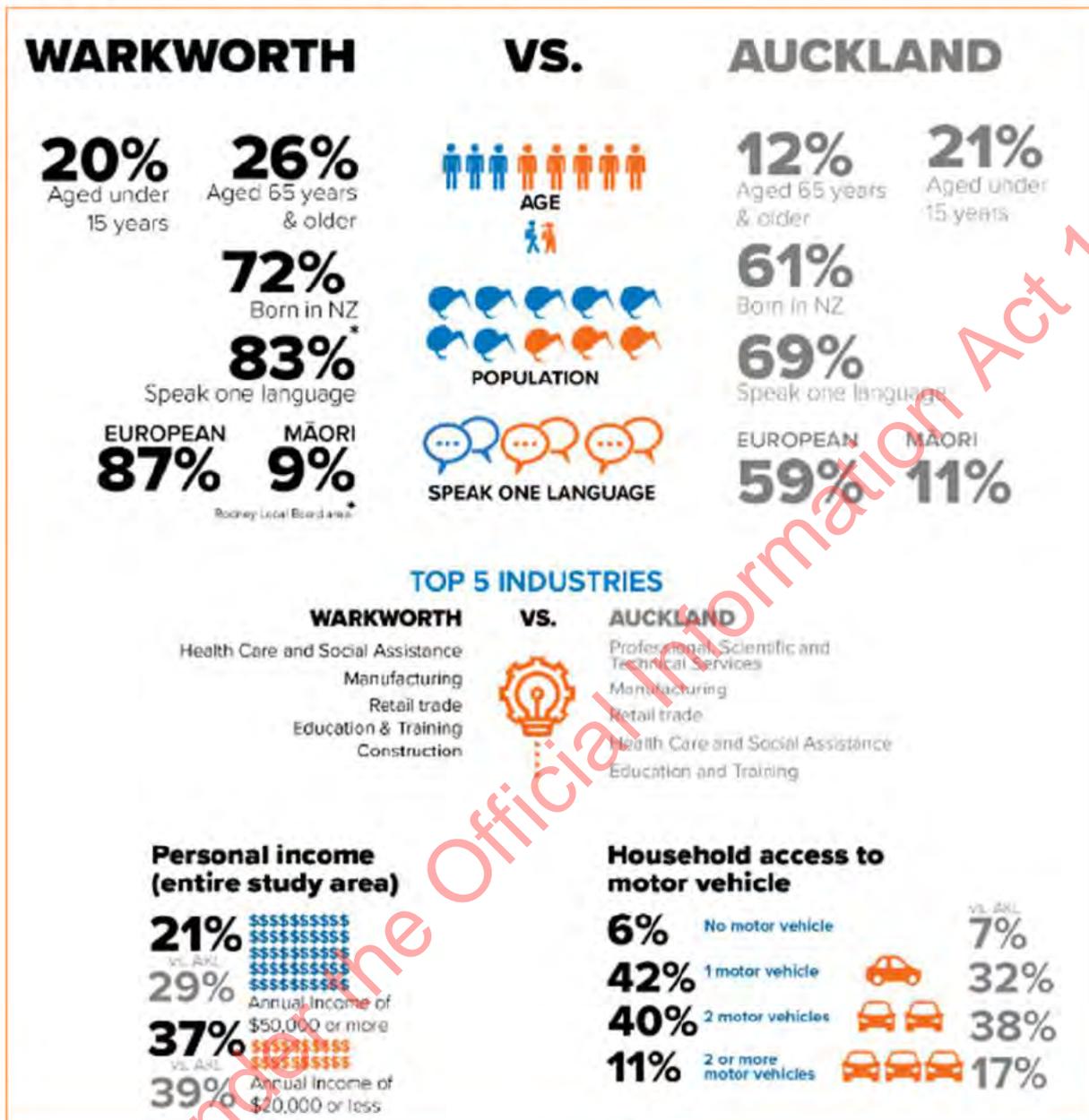
- Warkworth will continue to serve a large catchment which will allow the town to thrive – even when the majority of through traffic is removed due to construction of Ara Tūhono.

3.5.2 Constraints/ challenges

The following potential constraints and challenges have been identified in relation to Warkworth's economic context:

- High tourism causes congestion issues due to conflicts between local and strategic movements. While this constraint is likely to be largely removed once Ara Tūhono opens in 2021 there will still be tourism trips between Warkworth and the Eastern Beaches.
- The current town centre is in a constrained location between the Mahurangi River and SH1. Access is limited to a few roads and this is likely to continue to be an issue into the future due to the current built form. Opportunities to improve access to the town centre will be sought.
- The large catchment served by the town centre means most trips from rural areas are made by car. Parking is at a premium in the town centre because of the available modes and current high private car use, and this will become more of a challenge as growth occurs.

Figure 8: Warkworth’s current demographics



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4 Strategic assessment

4.1 Overview

This section sets out the:

- Current transport constraints, opportunities, and travel patterns relating to Warkworth (Sections 4.2 and 4.3)
- Key insights received through consultation with current customers (Section 4.5)
- Related transport projects in the region (Section 4.4)
- Problems, benefits, investment objectives, and KPIs which specifically relate to the Warkworth area (Sections 4.6 through 4.10).

4.2 Transport constraints and opportunities

This section sets out current transport constraints and opportunities in Warkworth. See Figure 9 also.

4.2.1 Constraints

SH1 severance. The existing SH1 corridor creates a severance effect for Warkworth. Few roads cross SH1 from east to west and there are even fewer opportunities for pedestrians or cyclists to cross. Much of the planned development is to occur to the west of SH1, whilst much of the existing urban area and town centre is located to the east. Overcoming severance between newly developing residential areas and nearby centres is an important challenge. Severance may be reduced when Ara Tuhono is opened and through traffic is reduced, however evidence from the transport model show that as growth occurs, current volumes are reached and surpassed by 2046.

Mahurangi River severance. The Mahurangi River severs the existing areas of north and south Warkworth, with Hill Street intersection being the only place to cross the river. This severance effect may be exacerbated in future when Warkworth is bigger and those in the north east require access to employment and services which may be located elsewhere in Warkworth.

Lack of transport choice. Current mode share in Warkworth shows a high reliance on private vehicles for all trips. There are limited public transport, cycling, and walking facilities. Despite this, the latter is relatively high for trips to work (9%).

Isolation from employment. Employment is largely located within the town centre and in the Woodcocks Road industrial area. Much of the existing residential activity is located to the east and

Figure 9: Transport constraints



north, separated either by SH1 or steep topography. Planned residential growth areas to the north and east are physically quite separate from these employment areas.

Existing roads. The existing rural road condition is not designed for the planned urbanisation. The reliance of the network on SH1 leads to lack of resilience. There are limited opportunities for pedestrians to cross existing roads at formalised facilities, this results in access and safety issues. Hill Street intersection is a major constraint as the conduit of all local and strategic east-west and north-south movements.

4.2.2 Opportunities

This business case provides an opportunity to better match the transport infrastructure to the surrounding land use.

There are significant opportunities to deliver safety and access outcomes via changes to the transport network.

4.3 Current travel patterns

Generally, current¹⁰ travel patterns in Warkworth can be described as:

- Some commuting to employment outside of Warkworth (less than 10% of trips)
- Travel to Warkworth from peripheral rural communities to access jobs and services
- Travel within Warkworth for existing residents, many of whom are retired and may not leave the town during the day
- Travel north-south where Warkworth is not the destination, but rather people are passing through Warkworth due to the configuration of the existing road network. This applies to both freight and tourist traffic.
- Current commuter travel is predominantly by private car (approximately 90%), with little or no travel by public transport or cycling. Walking is surprisingly above average at 9% which likely reflects the compact nature of the Warkworth urban area and provision of jobs close to homes.

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

- **Warkworth's role as a hub for jobs, services, and social activities** attracts people from across a wide rural catchment. This results in high demand for travel into Warkworth from peripheral rural communities. This travel is almost exclusively by private car due to distance and lack of public transport services. This results in pressure on parking provision in Warkworth town centre and contributes to congestion.
- **SH1 and the Mahurangi River constrain access to the town centre** resulting in access being from two roads: Whitaker Road and Elizabeth Street. These are both urbanised 20m wide, local standard roads with parking and can be very congested.
- **SH1 is the only north-south route** which must serve multiple competing needs, including providing access to the existing urban area, accommodating strategic through trips, and facilitating east-west movements due to limited east-west connections across SH1.

¹⁰ Based on 2013 Census data and 2018 modelled forecasts. Travel patterns assessed via the Census may have changed and are likely to continue changing following the introduction of public transport services in 2018.

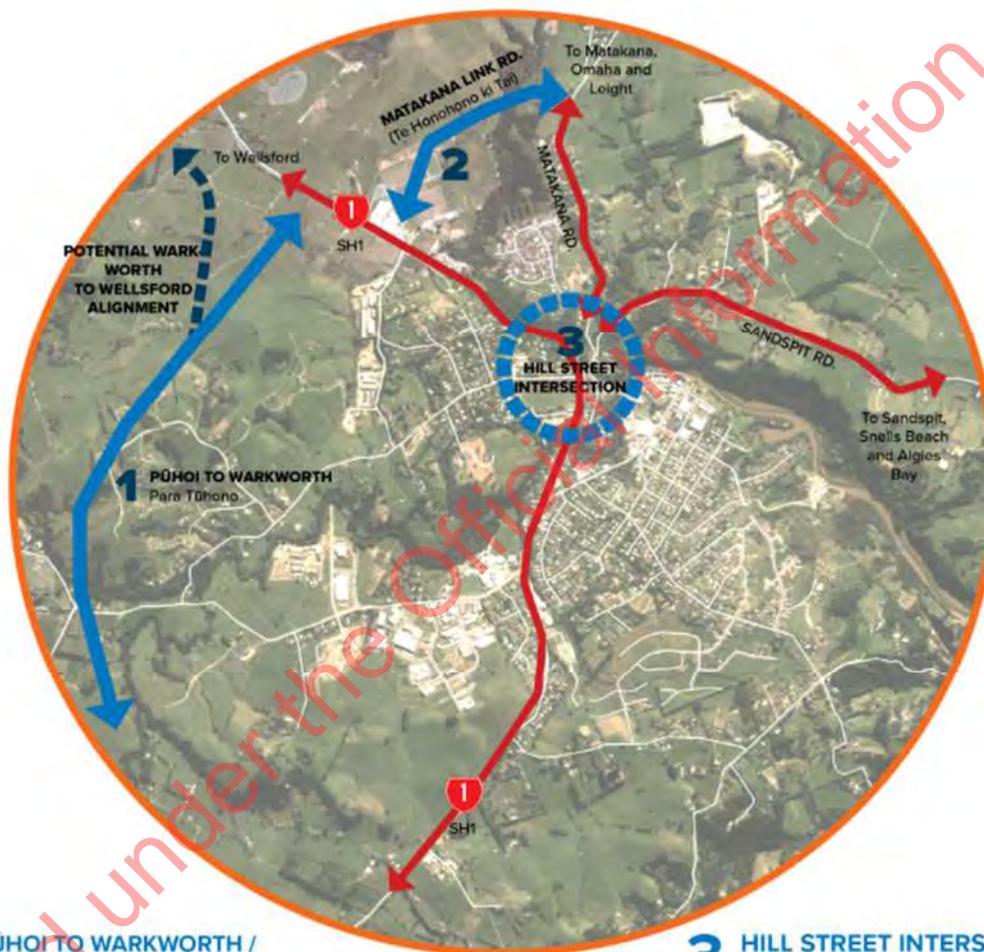
- **Convergence of all main routes at Hill Street intersection** causes significant delays. Queuing traffic restricts access to properties and causes perceived safety issues.

Current customer insights on the existing network gained during consultation are summarised overleaf.

4.4 Related projects

Several projects which impact the Warkworth growth area are currently under development. These are shown in Figure 10.

Figure 10: Warkworth interrelated projects



1. PŪHOI TO WARKWORTH / ARA TŪHONO

Provides an efficient and direct connection to Warkworth. Improves connections to markets for freight and other traffic. Improves reliability and time savings, reducing the cost to do business in local markets. A potential extension of the Ara Tūhono from Warkworth to Wellsford is currently being investigated.

2. MATAKANA LINK ROAD

A Notice of Requirement (NoR) has been lodged to provide interim corridor protection for the Matakana Link Road (Te Honohono ki Tai) project, one of the key projects identified by the PBC. This is still being confirmed through the statutory planning process. Te Honohono ki Tai will connect SH1 and Matakana Road, it will provide an alternative access for traffic destined for the Matakana and Kowhai Coasts reducing congestion at the Hill Street intersection.

3. HILL STREET INTERSECTION

This intersection currently provides the only crossing of the Mahurangi River to access the Matakana and Kowhai Coasts. This is a particular problem at holiday periods where increased traffic through this intersection causes significant congestion. A SSBC is currently assessing options to reduce congestion and improve multi-modal connectivity at the Hill Street intersection.

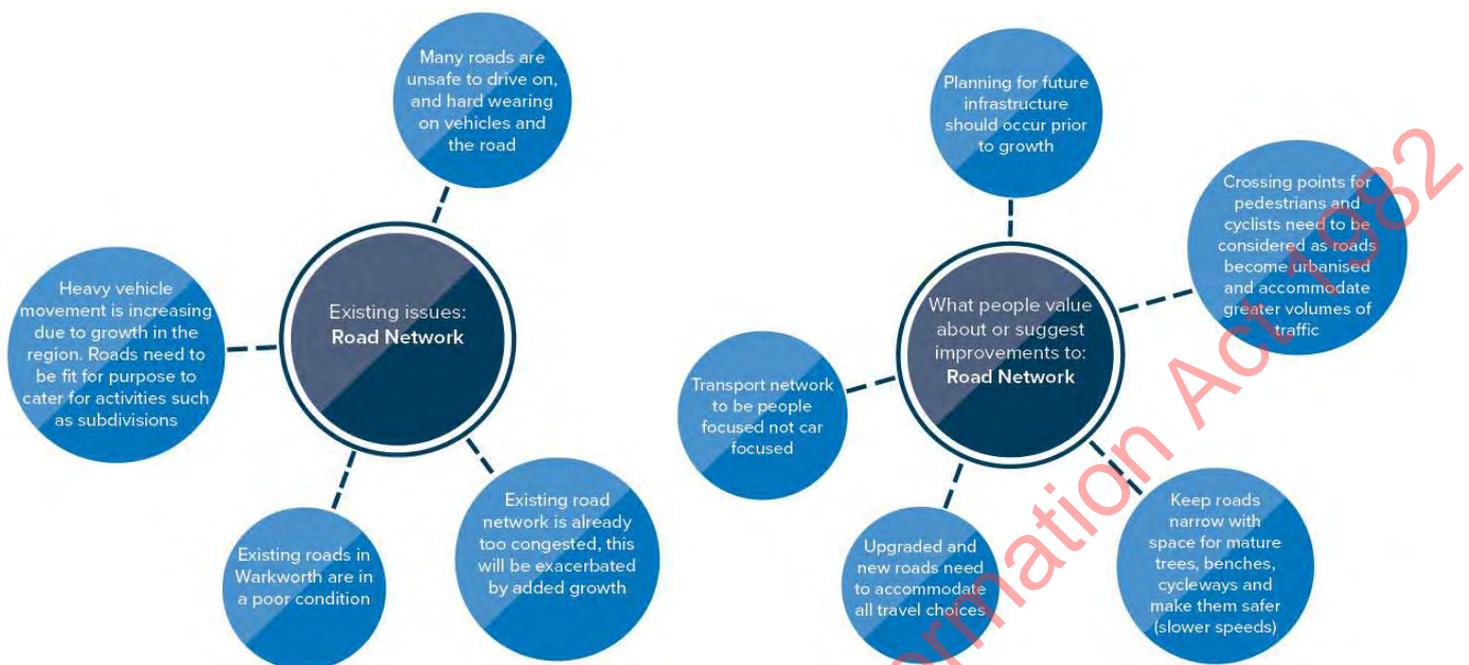
4.5 Key customer insights

Current customer insights on the existing network and suggestions for the future network were received during the public consultation period. Additionally, other surveys and data sources from the Transport Agency and AT have been interrogated to understand current customer needs. These insights are summarised in Figure 11 and Figure 12.

Figure 11: Customer insights – public transport and active travel



Figure 12: Customer insights – road network



4.6 Defining the problem

To identify the problems likely to affect the future transport system in Warkworth, the project team reviewed existing documentation, met with key stakeholders¹¹ and held a workshop on 17 May 2018 to present the evidence that had been gathered. At this workshop, the following key problems were identified:

- **Lack of existing and future system resilience and reliability** – the existing transport system has no alternative routes and all traffic heading north, south and to the Matakana and Kowhai Coasts must pass through the Hill Street intersection, 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** – currently there are only very limited public transport services and limited / connected footpaths and cycling facilities. Warkworth residents are very dependent on private vehicles and have told us that they don't feel safe to cycle because of high vehicle speed, high traffic volumes and lack of safe end-to-end facilities.
- 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.

These identified issues were developed into business case 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.

¹¹ List of stakeholders provided in Appendix H – Engagement Feedback Summary.

4.7 Problem 1: Access

Problem statement 1: Inability of the transport system to cope with travel demand caused by growth in Warkworth will compromise access to economic and social opportunities and core services (Weighting: 50%).

Problem 1 is defined as the inability of the transport system to cope with the travel demand caused by the planned growth of Warkworth over the next 30 years. If not addressed, this will have the effect of restricting access to economic and social opportunities and core services both locally, and in the wider Auckland region.

This problem has been investigated in terms of:

- Forecast growth of households, population, and employment opportunities in Warkworth
- Forecast future travel demand and trip distribution
- The impacts of this growth on the transport system and its ability to cope with demand
- The impacts of the above on access to economic and social opportunities and core services.

Appendix A: Strategic Case, presents the detailed evidence in support of this problem statement, with the key points summarised herein.

Problem 1 summary: Within Warkworth, the proposed residential growth will result in a satellite town the size of current Pukekohe, at least four to five times bigger than Warkworth's current size (see Figure 2 and Figure 3). Forecast growth is planned in greenfield areas surrounding the existing Warkworth urban area, which currently have a limited supporting transport network, reflective of a historically rural or semi-rural environment. There is some infill housing proposed for the existing Warkworth urban area. Planned residential and employment growth will significantly increase the demand for travel and traffic volumes and without appropriate infrastructure this will lead to congestion. Growth will therefore directly affect the ability of the transport network to function.

The evidence confirms that:

- The Warkworth FUZ areas have an insufficient roading network to accommodate the proposed increased demand associated with an additional 7,300 dwellings
- The current road network is not sufficient to accommodate the forecast demand associated with growth in Warkworth and is currently of a form and function that does not match the proposed urbanisation
- Walking, cycling, and public transport outcomes will not be achieved without investment due to the lack of facilities and services
- The GPS priorities will not be achieved without investment due to the current network constraints and extent of change in the Warkworth area
- Access to economic and social opportunities in Warkworth will be restricted by congestion and lack of safe facilities for walking, cycling, and universal access, if the planned growth proceeds without investment in transport infrastructure.

4.7.1 What happens if we do nothing in Warkworth?

Figure 13 sets out what would happen in Warkworth if the planned growth took place without corresponding investment in transport infrastructure. The key issues are likely to be:

- If standard trip generation rates are applied to the forecast growth in dwellings the resulting additional vehicle trips to the network would be approximately 5,800 to 7,300 additional peak hour vehicle trips. This unmanaged growth in demand for private vehicle travel will result in traffic volumes on existing roads above their designed capacity – resulting in severe congestion, severance, and high stress for travellers
- Growth would be constrained, and the economic viability of the satellite town impacted through increased congestion and negative urban design and land use integration outcomes
- Limited urbanisation of the currently rural road network, which will have negative outcomes for mode choice safety, urban form, and active travel. Which will in turn result in car use similar to that measured at current census levels (91% for commuting in Warkworth).
- Limited investment in public transport to key locations, resulting in high car use.
- Missed opportunity to provide lead infrastructure which supports mode shift and land use integration, i.e. walking and cycling, is lost due to unconnected development
- Missed opportunity to achieve transport and policy outcomes, i.e. mode shift and reduced reliance on private vehicles
- Liveability and customer satisfaction are compromised.

Table 2 sets out these impacts in the context of achieving the GPS priorities.

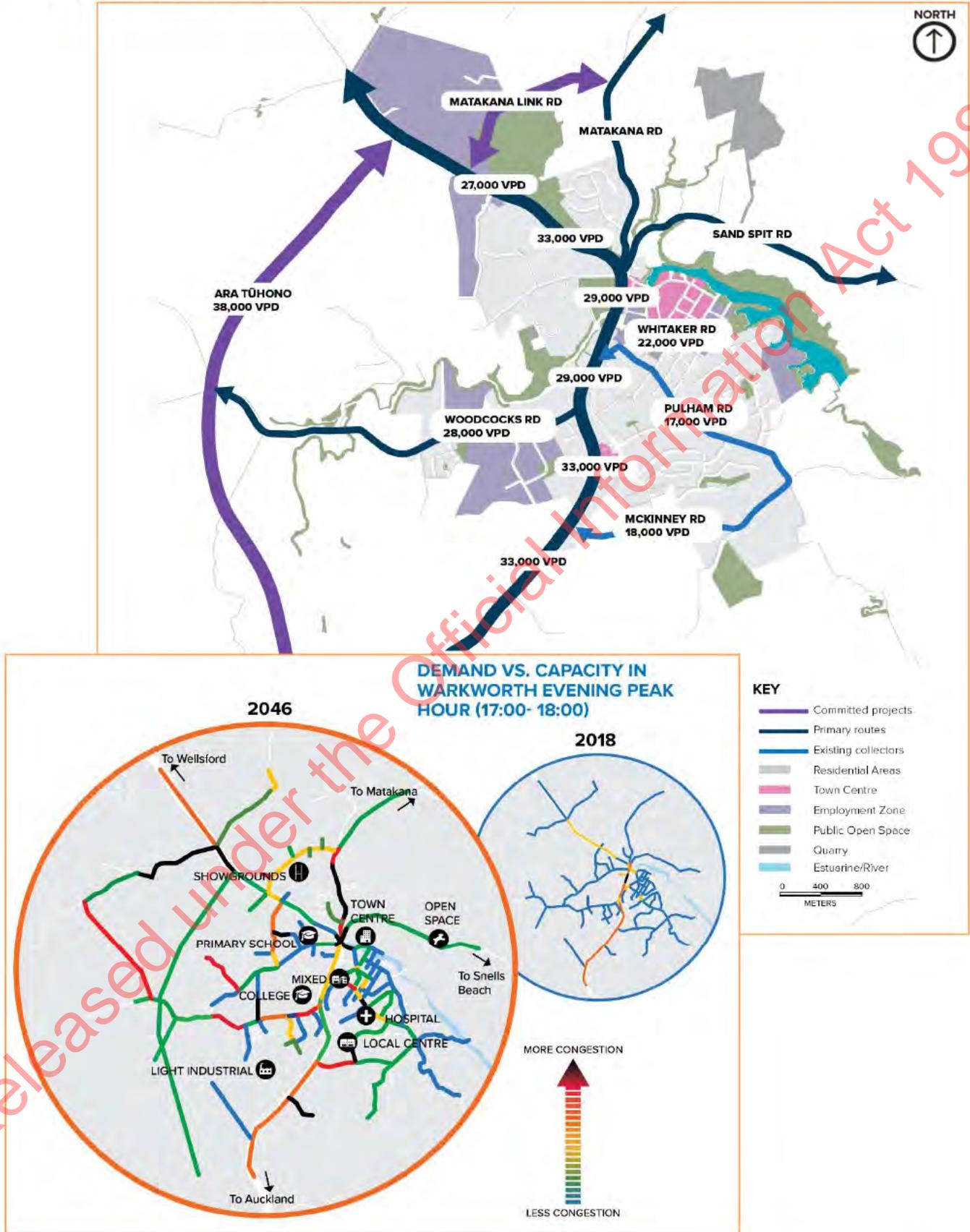
Table 2: Impacts of growth without transport investment – on achieving GPS priorities

GPS priority	Impact of planned growth
Access	<ul style="list-style-type: none"> • Limited investment in walking and cycling facilities results in high car usage, despite the relatively small geographic distances of local trips (<5km). • Limited investment in public transport to key locations, results in high car use. • No arterials designed for movement of people across a variety of modes limits the functionality of the rest of the network leading to restrictions in access to social and employment opportunities • 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 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 (see Figure 13) – resulting in severe congestion, severance, and high stress for travellers.
Safety	<ul style="list-style-type: none"> • 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.

GPS priority	Impact of planned growth
Value for Money	<ul style="list-style-type: none">• Lower infrastructure build cost to AT and Transport Agency; however, this is at the cost of safety and improved access.• Entirely reliant on developers to provide new infrastructure, reducing ability to deliver a system wide approach.
Environment	<ul style="list-style-type: none">• 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.• Without an integrated network facilitating mode choice wider roads will be 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 less healthy people in the community.

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Figure 13: Impact of planned growth on Warkworth’s transport network without further investment in the transport network¹²



4.8 Problem 2: Mode choice

Problem statement 2: Lack of safe, attractive, and resilient mode choices in Warkworth will result in a high reliance on private vehicles for all trips (Weighting: 30%).

Problem 2 is defined as the lack of safe, attractive and resilient mode choices in Warkworth resulting in a high reliance on private vehicles for all trips. If not addressed this problem will continue in the future urban area.

This problem has been investigated in terms of:

- Current transport choice in Warkworth
- Impacts on mode share.

Appendix A: Strategic Case, presents the detailed evidence in support of this problem statement, with the key points summarised herein.

The need for safe and resilient choices is an important element of current transport policy. The GPS recognises that the safety of people should be paramount, including vulnerable road users such as pedestrians and cyclists, and those with mobility impairments. In an urban context, safety should encompass not only reduction in motor vehicle crashes, but also safe cycling facilities, separated from vehicles and well lit, well-surveilled pedestrian paths and places where people wait for public transport. The GPS 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. These choices will enable more equitable access and quality living environments.

ATAP and the Auckland Plan focus on encouraging walking and cycling and making these active modes safe and the preferred choices for many more Aucklanders.

Warkworth's compact geographical size makes it an ideal candidate for delivering on these 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 (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 public transport interchanges and park and rides such as bicycle or micro mobility parking, electric charging points and lockers.

A transport system that enables a significantly higher proportion of trips to be made by public transport, walking and cycling will support the intended growth of Warkworth while minimising the impacts of congestion. Provision of facilities to support public transport, walking and cycling in and around Warkworth is important to address this demand as land for housing and employment is released.

¹² These numbers are based on trip generation rates that are significantly lower than those experienced presently. If the demographic changes which support these assumptions do not eventuate, trips may be higher than shown.

The lack of safe, attractive and resilient mode choices in Warkworth has contributed to and resulted in a high reliance on private vehicles for all trips. Unless an improvement in reliable and attractive travel options are provided, the planned growth for Warkworth will continue to directly affect the ability of the transport network to function and constrains the ability for the transport network to contribute to the health and safety benefits for its community.

The evidence confirms that:

- Warkworth's geographical size makes it an ideal candidate for increasing mode share, however the current transport system does not currently allow for this
- 91% of motorised trips in Warkworth are by private vehicle
- A significantly higher proportion of trips made by public transport, walking and cycling will support the planned growth of Warkworth while minimising the impacts of congestion and improving environmental effects
- Provision of facilities to support public transport, walking and cycling in and around Warkworth is important to address growth demand as land for housing and employment is released
- Warkworth is only currently served by long distance, commuter, and local bus services. These services are infrequent (approximately three buses in each direction per day), and except for the privately-operated commuter service to Auckland, are not timed to coincide with a standard working day. This will not meet the planned growth demand. Warkworth is the commercial centre that a much wider surrounding catchment draws upon. Growth of Warkworth and its wider catchment will be constrained if allowance is made for other transport alternatives to meet demand.
- Existing walking and cycling facilities are limited, are not continuous and do not connect trip generating activities
- Sections through the Warkworth centre are limited by narrow road corridors and single lane bridges. Where stretches of footpaths exist, they are interrupted by vehicle crossings.

4.8.1 Evidence to demonstrate cause

Public transport

Currently public transport services in Warkworth are limited and used by very few people.

The privately run Mahu Express Bus runs from Warkworth to Auckland city centre three times a day.

From September 2018, a public transport service has run hourly to Hibiscus Coast station (half hourly in peak times) between 6.30 to 19.30, with a shorter day on weekends.

The frequency of the Kowhai Connection has recently been reviewed and now runs on a 1.5-hour schedule between Warkworth, Algies Bay, Whangateau, Point Wells and Omaha.



Opportunities to influence customer behaviour

Customer insight gathering at the next stage of project development is suggested to explore current and future customers' need to commute to Auckland for work, tertiary education and other opportunities and how to provide better access to multi-modal travel options for different types of commuters.

Active modes

There are pedestrian facilities along some sections of SH1, but these are not continuous and at some intersections, formal crossing facilities are not provided.

Where footpaths exist, they are interrupted by vehicle crossings.

There are no formal cycling routes or facilities in the Warkworth area. The Rodney Greenways Paths and Trails Plan: Puhoi to Pakiri includes a proposed greenway network for Warkworth, however funding is not committed for these proposals.



Opportunities to influence customer behaviour

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, comfortable cycling networks are key to creating a network effect
- Scenic areas are great for recreational use, but to create mode shift direct lines to key destinations are necessary
- On busy arterials separation is very important
- All walking and cycling infrastructure needs good lighting and passive surveillance, especially at night
- There are specific guidelines include around shared paths width vs volume/speed
- Specifications of minimum widths of footpaths/cycle lanes/ shared paths and when to use which, and the levels of service for different audiences.

There is potential to conduct local customer insight 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 around proximity and shortest journey versus scenic enjoyment, actual and perceived safety on/near roads and, personal security when using less public routes.

Reliance on private vehicles

Why is this undesirable?

- Spend more on transport (costly)
- Adds greenhouse gases to environment
- Requires more roads to carry the same number of people (value for money)
- Social isolation – fewer people walking and cycling
- Is difficult to get around if you don't have a car
- Small businesses benefit from more people walking and cycling past
- People walking, cycling, using public transport are healthier.

Parking in the center is at a premium and this is likely to be an issue in the future with expected growth



It is important that residents have a way for to access the town centre by means other than a car.

Large catchment served by town centre means majority of trips from rural areas are made by car.

Parking is at a premium in the town centre and this will only become more of a challenge as growth occurs

Opportunities to influence customer behaviour

Currently, the town centre is mostly accessed by car, which places strain on parking and local streets. There are several options being explored in the Travel Demand Management (TDM) space to influence customer behaviour in their use of motor vehicles to access the town centre. Local experiments with TDM levers would help to find the optimal levers for Warkworth's unique local conditions.

Changing demographics

The current population is ageing and generally stays and travels internally within Warkworth, but newer, younger families will have different needs.

Local trips will continue to be an important focus in future. With more residents, roads will be busier, require safety improvements and require that modes other than private car are accommodated.

Opportunities to influence customer behaviour

There is a need to balance the needs of current and changing future population groups to increase the attractiveness of active and public transport options.

Regarding the current ageing 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 ensure footpaths 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 against new technologies such as e-scooters.

In summary, footpaths and cycle lanes will need to cater for a diversity of customers, keeping in mind their different needs and different speeds.



82% 61%

Most common means of travel is driving a private car, company car, truck or van

Catering for tourism

High tourism in and around Warkworth causes congestion issues due to conflicts between local and strategic movements.

Opportunity to influence customer behaviour

There is a potential conflict between the needs of tourists and local traffic in the area. Further investigation is required to determine how we can assist the tourism industry to provide and advocate the use of different travel options without compromising the movements of the local customers.



4.9 Problem 3: Urban form outcomes

Problem Statement 3: Failure to integrate transport planning with the pace, scale, and form of growth, will result in a poor quality urban and natural environment in Warkworth (Weighting: 20%).

Problem 3 is a future problem which may be caused by a lack of integrated land use and transport planning. This will limit the ability of the transport system to positively contribute to a quality, connected urban and natural environment in Warkworth.

This problem has been investigated in terms of:

- Pace, scale, and form of urban development in Warkworth
- Potential outcomes of a non-integrated approach to land use and transport planning.

Appendix A: Strategic Case, presents the detailed evidence in support of this problem statement, with the key points summarised herein.

Given the mostly undeveloped nature of the identified growth areas, the transport system does not currently match what would be expected within an urban area, as illustrated in the evidence from Problems 1 and 2. A proactive approach to effective land use and transport network integration will contribute towards the identified outcomes and strategic direction of the Auckland Plan. These outcomes focus on providing social, environmental and economic wellbeing for all Aucklanders. The success of the growth areas as urban places will therefore deliver on these outcomes.

The GPS 2018 recognises that accessibility and safe, reliable transport options are important measures of the quality of a place to live, work and play. This includes access to local employment, education and core services, encouraging shorter and more sustainable travel patterns, and providing for walking, cycling and public transport options.

The evidence confirms that:

- Significant residential and employment growth is anticipated in Warkworth over the next 30 years with the town forecast to grow to around 5-6 times its current size.
- To achieve the mode share aspiration for the area, urban form must support PT and active mode travel through providing a compact form. For Warkworth, provision of local employment is critical to achieving the desired mode share.
- The integration of land use and transport is vital to achieving a quality and connected urban and natural environment.

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.

4.9.1 Evidence to demonstrate cause

TRANSPORT SYSTEM'S INFLUENCE ON THE URBAN ENVIRONMENT

The transport system is a major determinant of urban form. If not managed properly, the transport system can promote land uses which do not support the land use outcomes sought, such as 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 and achieving a quality urban form. For example, public transport systems, walking, cycling, rail and roading improvements that promote and support the development of higher density urban centres and corridors are likely to in turn attract more people, more activity and more investment into these areas.



FACTORS INFLUENCING URBAN FORM:

- Rapid public transport networks such as light rail and busways.
- Strong network of pedestrian paths and connections.
- Safe and dedicated cycle provision.
- Shared spaces, especially on main streets where pedestrians, cyclists and public transport can safely share the road.
- Laneways of cafes and activity.
- Reductions in speed.
- Markets, festivals and events along public streets.

CHALLENGES FOR EXISTING AND FUTURE WARKWORTH STREETS INCLUDE:

- Minimising severance impacts on communities and neighbourhoods (such as highly trafficked roads and streets).
- Avoiding poor quality public realm.
- Avoiding barriers to residents easily and safely walking to nearby shops or employment opportunities.
- Reducing levels of air, water and noise pollution around roads/transport corridors.
- Avoiding poor levels of public surveillance in local centres.

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Figure 14: Ideal walking and cycling distances from facilities and services (Source: Auckland Plan, 2018)



LAND USE TO SUPPORT ACTIVE TRAVEL MODES

Land use patterns and the urban environment are key factors in influencing the level of active travel within an area. A well-connected network of neighbourhood streets generally encourages walking and cycling. Most people will walk or cycle a limited distance, particularly if the network of streets allows a greater range of destinations to be within comfortable walking or cycling distance from any point in the neighbourhood. Combining connectivity and sensitive public space design encourages people to change their mode of transport, especially for local trips. Providing connections that allow through-access for walkers and cyclists needs to be combined with improving the quality of the environment if these connections are to attract use. Safety - both perceived and actual is commonly considered vital in encouraging active travel and is something which the urban environment has a high level of control over.

LAND USE TO SUPPORT PUBLIC TRANSPORT

For public transport services to be effective for customers, the frequency and availability of services are key. Land use and the urban environment play a big part in supporting the PT network. Density and community focal points around stops and stations increase demand for services and in turn lead to a higher level of provision. Lower densities create less demand for public transport, which may compromise the viability of frequent services.

The Regional Public Transport Plan (RPTP) 2015 indicates that to provide a 'core network of frequent and reliable services' requires high density corridors for Rapid Services and medium to high density corridors for Frequent Services.

4.9.2 Case Study: Davis, California

This section sets out a case study of Davis, California, which demonstrates how targeted legislation, policy, and investment in cycling can achieve a substantial mode share for cycling.

Davis, California is a city in the United States with a population of approximately 65,000 people, that has focussed on providing cycle infrastructure since the 1960's. It has since become a leader in the implementation of cycle facilities, and through this process has achieved a desirable mode share within the city.

This case study illustrates that provision of good walking and cycling infrastructure, coupled with legislation educational community programmes, leads to desirable mode share proportions within a city.

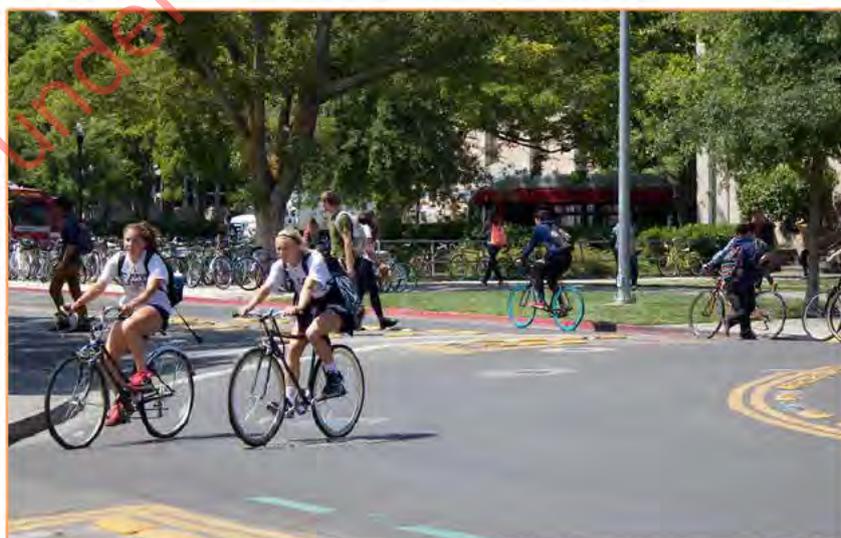
Davis was the first city in the U.S to **legislate for and implement standardized cycling lanes**, dating back to the 1960's. Most of the country was building cities for private vehicles, with Davis an exception designing for bicycle use. As the city expanded, **new facilities were mandated and built**. As a result, Davis now features an extensive cycle network, consisting of over 100 miles of bike lanes, bike path, grade separated crossings and shared paths. It is **understood that 98% of the main streets in Davis have some form of bicycle provision**.

Davis has actively encouraged **pro-cycling planning and policy**, as well as undertaken **promotional events and educational programmes**. There is a bicycle on the City of Davis logo. These measures lead to cycling having a strong presence in the community and it is **seen as a suitable transport choice**.

Because of these measures, cycle mode share within the city is high. The 2010 U.S. Census Bureau count revealed that **Davis had the highest percentage of bicycle commuters in the U.S.** An estimated **22.1% of the working population commuted** to their job using a bicycle. The **University campus had a 50% cycle modal share**.

The Davis' Bicycle Plan aims to increase the amount of bicycle trips as a percentage of all trips made in town to 25%. Further, this year (2018) has seen Davis named as the safest city for cycling in the U.S.

Figure 15: Cycling in Davis, California (2015)



4.10 Problems, benefits, investment objectives

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

These are summarised in Table 4 and described in further detail in Appendix A: Strategic Case.

4.10.1 Consistency with the PBC

As part of the process of developing the investment objectives for Warkworth, close attention was paid to the investment objectives set out in the PBC. Five investment objectives were developed for the PBC and these have been translated into four investment objectives relevant to the Warkworth area. Table 3 sets out the links between the objectives and where there are differences, elaborates on these.

Table 3: Links and differences between the PBC and IBC objectives

PBC Investment Objectives	IBC Investment Objectives	Rationale
IO1: Enhance Auckland's liveability by providing a level of access to jobs and core services for each future urban area equal to the wider Auckland region by 2046.	IO1: Maintain reliable access to local economic and social opportunities and core services at 2016 levels.	Change to '2016 levels' from 'equal to the wider Auckland region by 2046' as the latter is difficult to measure and requires speculation on the 'level of access' that will be available across Auckland in 2046, whereas '2016 levels' are tangible, and set a baseline that says we will commit to delivering growth in Warkworth without making existing access issues worse.
IO4: Support economic growth through maintaining travel time reliability for freight and interregional trips on strategic corridors at existing (2016) levels.	IO2: Maintain reliable access to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels.	Change in language from 'travel time reliability' to 'access', to reflect updated GPS priorities.

PBC Investment Objectives	IBC Investment Objectives	Rationale
<p>IO5: Enable land to be developed in line with the Future Urban Land Supply Strategy by ensuring required transport infrastructure is delivered on time.</p>	<p>IO3: Deliver a transport system timed to integrate with FULSS staging, that enables a quality urban and natural environment in Warkworth.</p>	<p>Investment objectives 2 and 5 combined to include achieving FULSS timings as well as delivering a quality urban and natural environment.</p>
<p>IO2: Enhance Auckland’s liveability through improved environmental, cultural, and community outcomes (air and water quality, biodiversity, safety).</p>		
<p>IO3: Enhance Auckland’s liveability and connectivity through achieving a morning peak mode share for walking, cycling, and public transport in all future urban areas of 45% by 2043.</p>	<p>IO4: Provide safe, resilient, and attractive travel choices that achieve a morning peak mode share of 26%¹³ for active modes and public transport and reduce private vehicle travel for all trips by 15% overall.</p>	<p>The PBC-wide target of 45% was an aspirational target taken from the Auckland Plan. In the PBC it is stated that for Warkworth the ‘target of 45% mode share for these modes is unlikely to be achieved given the intended urban density levels of Warkworth and the remoteness of Warkworth to Auckland’s other urban areas and its public transport network’.</p> <p>The programme was estimated to result in approximately 10% mode share for public transport trips in Warkworth in the AM peak (from a current share of less than 1%). The PBC target for active modes (15.8%) has been retained, giving a total mode share target of approximately 26%.</p>

¹³ 26% is based on the Warkworth specific targets set out in the PBC, e.g. 10% for public transport, and 15.8% for active modes.

Table 4: Problems, benefits, investment objectives, KPIs, and targets

PBC PROBLEMS	IBC PROBLEMS	BENEFITS	INVESTMENT OBJECTIVE	INVESTMENT KPI	TARGET
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 in and around growth areas	P1: Inability of the regional transport system to cope with travel demand caused by growth in Warkworth will compromise access to economic and social opportunities and core services (50%)	B1: Access to economic and social opportunities and core services (30%)	IO1: Maintain reliable access to local economic and social opportunities and core services at 2016 levels	KPI1a: Maintain level of access to local social and economic opportunities	80% living within walkable (400m) or cyclable (3km) distance of employment
				KPI1b: Maintain reliability of the transport network to and within the greenfield growth areas	Journey time reliability no worse than 2016 levels Network performance no worse than 2016 levels Network throughput – proportion of system capacity used for all modes
	B2: Reliable movement of people and goods (20%)	IO2: Maintain reliable access to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels	KPI2a: Maintain reliable access to the strategic network for all modes	Better than Do Minimum and incremental increases.	
				People throughput of PT interchanges	
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	P2: Failure to integrate transport planning with the pace, scale and form of growth will result in a poor quality urban and natural environment in Warkworth (20%)	B3: Quality urban and natural environment and liveable Warkworth (20%)	IO3: Deliver a transport system timed to integrate with FULSS staging, that enables a quality urban and natural environment in Warkworth	KPI3a: Transport enables land to be developed in line with the timeframes of the FULSS	Transport infrastructure is in place by the 'development ready' times identified in the FULSS
				KPI3b: Minimise adverse environment and community impacts of transport in greenfields	Captured in MCA wellbeing analysis
				KPI3c: Connected urban environment	80% of Warkworth residents are living within 10 minutes' walk/cycle of facilities
				KPI3d: Wider network integration	Impacts on transition points with the wider network are less than minor following mitigation
	P3: Lack of safe, attractive and resilient mode choices in Warkworth will result in high reliance on private vehicles for all trips (30%)	B4: Reduced reliance on private vehicles (30%)	IO4: Provide safe, resilient, and attractive travel choices that achieve a morning peak mode share of 26% for active modes and public transport and reduce private vehicle travel for all trips by 15% overall.	KPI4a: Provide a safe future transport system that also addresses existing safety problems	All routes have a personal and collective risk of medium or lower. More than 90% of surveyed cyclists perceive an improvement in safety and attractiveness of facilities
				KPI4b: Right traffic is on right routes	Traffic is reduced on local (collector) roads where we want to encourage walking and cycling/ traffic is directed onto appropriate routes for journey purpose
				KPI4c: Effectiveness of the transport network to and within the greenfield growth areas	15% reduction in mode share of private vehicles (measured by census)
				KPI4d: Quality transport options are available	80% Warkworth residents living a walkable (400m) or cyclable (3km) distance of regular, reliable PT service 80% houses within 400m of good quality, well connected cycle infrastructure
			KPI4e: Provide a resilient transport system	Viable (low increase in travel time/cost) alternatives are available (both routes and mode choices)	

5 Route protection

5.1 Approach

The next stage of implementation for the recommended network depends in part on the nature of the intervention identified and the “agency” (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 preferred option, as identified in the PBC. 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. There are several potential mechanisms for route protection, which are discussed further in the Route Protection Strategy (Appendix K). The route protection process itself will take place over the next four years.

While the business case 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:

- **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, with the transport network in mind and gives certainty that the transport system can be operated. A good example of this approach is provided for Transit Oriented Development (TOD) projects, where the transport infrastructure is integral with the wider land use pattern.
- **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 costs savings associated with the control or management that route protection can place on development on the land. Figure 16 illustrates the component costs of land as farmland, FUZ zone, and land once developed. In comparison with the other growth areas in Auckland, the North (including Warkworth) has the highest land cost once developed; hence the highest level of risk. In Warkworth, the Unitary Plan changed much of the area from a rural land zone to FUZ. While the FUZ is a transitional zone and cannot be developed before being ‘live zoned’, land values have increased following announcement of the FUZ zone.

Figure 16: Mid-point land values in relation to the RUB (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 also 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). An example of this was seen in the recent urban development of Hobsonville Point, where the establishment of ferry services was identified as part of the urban development and an attractor to people choosing to move into the area.
- **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. This enables working with developers to provide the infrastructure in stages, with them delivering the earthworks and two-lane roads, and SGA the subsequent additional infrastructure.
- **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, providing for higher land uses to be zoned around future public transport interchanges.
- **Provides a mechanism for AT and the Transport Agency to plan for future financial investment while retaining flexibility** on the detailed development of the preferred future network, enabling it to respond to the pace, scale, and exact location of future urban growth.

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).

Further discussion on specific route protection options is provided for the recommended network (in Part C - Implementation) and the Route Protection Strategy (Appendix H). Appendix H 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 provides further cost evaluation of the above benefits (and costs).

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 (Figure 17)
- Multi Criteria Assessment process used to evaluate the effects and opportunities associated with each option (Section 6.1)
- Approach to travel demand management (Section 6.2)
- Assumptions made and refined through the optioneering process (Section 6.4)
- 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)
- Approach to non-infrastructure options (Section 7.2.6)
- Feedback and response to consultation and engagement with both the public (incorporated throughout the options assessment) and Manawhenua (Section 7.4).

Further details are provided in Appendix B1: Long List Assessment, Appendix B2: Short List Assessment, and Appendix C: Transport Modelling.

Figure 17: Option development process



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6 Option development and assessment

6.1 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 18). 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.

Figure 18: Multi Criteria Assessment process



The MCA wellbeings and criteria are explained in more detail in Appendix B1. The wellbeings 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 the project team about which options to discard and which to include in the recommended package.

The investment objectives are:

- 1 Maintain reliable access to local economic and social opportunities and core services at 2016 levels.
- 2 Maintain reliable access to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels.
- 3 Deliver a transport system timed to integrate with FULSS staging, that enables a quality urban and natural environment in Warkworth.

- 4 Provide safe, resilient, and attractive travel choices that achieve a morning peak mode share of 26% for active modes¹⁴ and public transport and reduce private vehicle travel for all trips by 15% overall.

6.1.1 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 as a group response 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.

6.1.2 Design framework

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

6.1.3 Non-scored criteria

In addition to the scored criteria, several non-scored criteria were considered (see Table 5). While no score was included for each criterion, the outcomes of the qualitative assessment were considered when identifying the short list options.

Table 5: Non-scored criteria

Criteria	Description
Stakeholder feedback	Stakeholder and community feedback for each option identifying scale / validity of objections, key issues and opportunity as well as identified preference / proposed changes to options etc. Feedback provided by other key partners / stakeholders.
Policy Analysis	Options alignment with the strategic policy framework including the AUP: OP and Auckland Plan with consideration given to provisions that derive from section 6 of the Resource Management Act.
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 Benefit Cost Ratio (BCR) (High/Medium/Low/Very low) for each option. Short list Assessment – Indicative Benefit Cost Ratio.
Resilience	Avoid adverse geology; avoid steep slopes; seismic impacts; other resilience risks (low level infrastructure near coastlines, inundation areas).

¹⁴ 26% is based on the Warkworth specific targets set out in the PBC, e.g. 10% for public transport, and 15.8% for active modes.

6.2 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.

6.2.1 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”ⁱⁱ.

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 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 Warkworth business case.

6.3 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 19.

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 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).

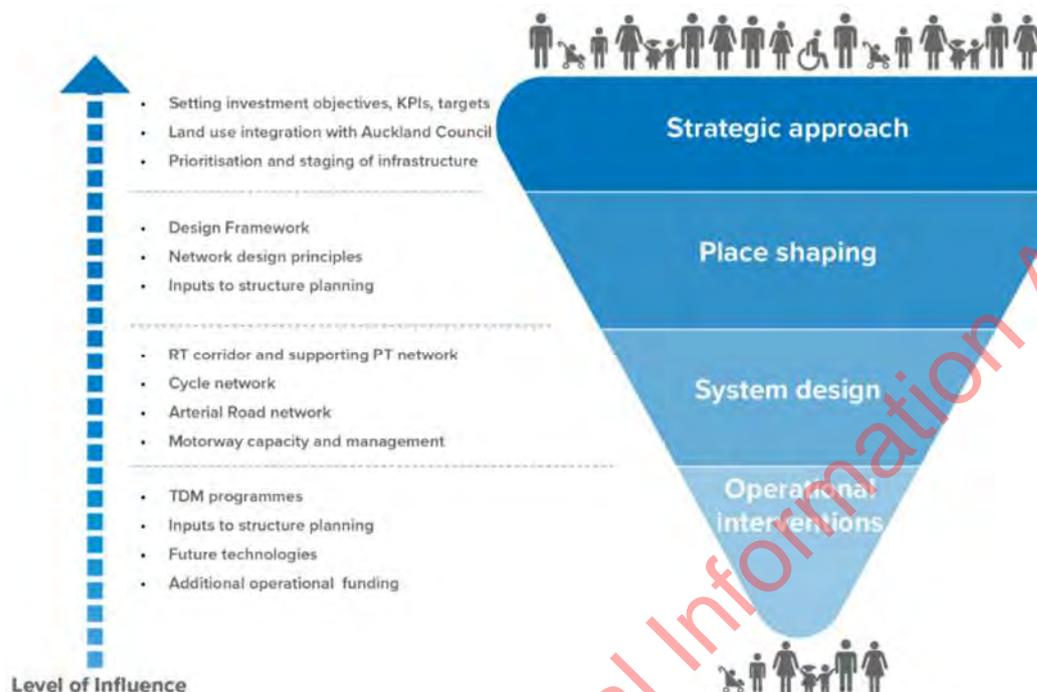
This hierarchy of intervention for travel demand has been at the forefront of thinking within the Warkworth business case process.

6.3.1 Step 1 – Strategic approach

At a strategic level, a framework of problems, benefits and investment objectives has been developed for Warkworth (see Table 4). 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 19: Demand management influence through the project life cycle



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.

6.3.2 Step 2 – Place shaping/ Developing good urban form

The importance of place shaping and developing good urban form is paramount to influencing 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 Warkworth business case 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 Warkworth business case in several ways to achieve desirable demand management outcomes, as follows:

- Working closely with Auckland Council on structure planning and integrated transport assessments (ITAs) to ensure 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

- 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.

6.3.3 Step 3 – System design

A range of system design options to influence travel demand were considered during the option development and evaluation process (Figure 20).

The relative effectiveness of different options to manage demand was evaluated in a Warkworth specific context using the agreed investment objectives and KPIs.

Options that performed better against these indicators were selected for the recommended network.

Figure 20: System design examples



6.3.4 Step 4 – Operational interventions

A range of operational travel demand management options have been identified (Figure 21) to be applied in parallel to complement the strategic network infrastructure recommended in the business case. It is recommended these measures are developed in detail in the DBC phase.

Figure 21: Operational option examples



6.3.5 Influencing demand in Warkworth

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 Warkworth is forecast to result in a shift of **16%** from private vehicle travel to alternative modes if the recommended network of improvements is provided. This is summarised in Table 6.

Table 6: Estimated changes in mode share

Main means of travel to work	Percentage (existing)	Percentage (proposed)
Private vehicle	91%	75%
Public transport	0.2%	10% ¹⁵
Active modes	9%	15%

Traffic modelling demands used to develop the recommended network of improvements for Warkworth include a reduction of 16% (see Figure 22) over existing travel patterns (based on 2018 surveys of existing Warkworth residential areas) and therefore the recommended network has been developed to respond to this lower level of demand.

Figure 22: Trips associated with additional dwellings in Warkworth



If elements of the programme recommended to support mode shift, such as 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. In that 'low TDM effect' scenario, an additional 16% of private vehicle travel could be expected on Warkworth roads. This would mean four traffic lanes are required along the full urban length of the existing SH1 and on the connections to the town centre like Whitaker Road in addition to the infrastructure recommended.

If operational demand management interventions were also provided¹⁶ to complement recommended infrastructure, it is considered that an additional 10% mode shift could be achieved, giving a 65% private vehicle mode share. It is recommended that these operational interventions are investigated in more detail in the DBC phase to support this mode shift.

It is acknowledged that these forecasts do not meet the overall PBC objective 45% of AM peak trips by walking, cycling, and public transport by 2043. However, in a rural fringe location such as Warkworth, it is important to recognise that due to the long distances involved and the less dense activity outside the Warkworth urban area, it will remain infeasible to use public transport, walk or cycle for a large proportion of trips. **This was acknowledged in the PBC which set a lower target of 10% public transport use in Warkworth which of forecast to be met by the recommended network of this IBC.**

¹⁵ This is in line with the 10% public transport mode share proposed in the PBC.

¹⁶ These are described in detail in Appendix I - Travel Demand Strategy.

6.4 Cross section assumptions

In developing the options short list, several assumptions have been 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 cross sections were initially assumed to be 32m (Cross section A, Figure 23) based on AT's Roads and Streets Framework and have been designed in response to the opportunity to provide a multi modal transport corridor. As options have been developed and assessed, the early assumptions about a standard 32m cross section have been revisited. This has led to the development of additional narrower cross sections. 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 the demand management principles.

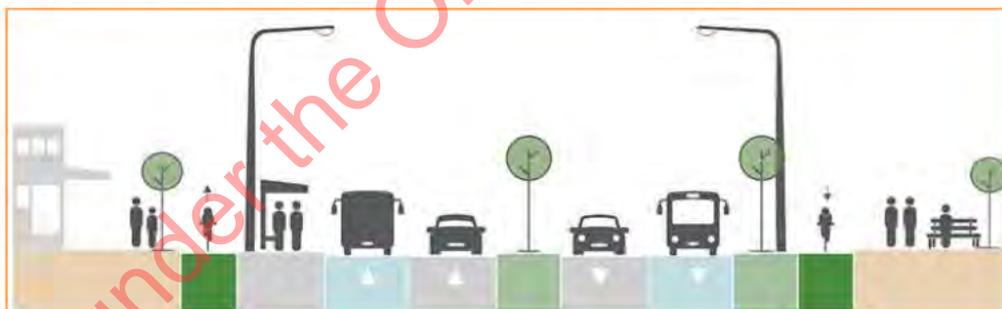
In Warkworth's case this means a 30m cross section for SH1 (Cross section B) and a 20m cross section for many existing collector-type roads (Cross section D). Both are likely to be able to be achieved within the existing road reserve, requiring limited widening and therefore disruption to property and residents – although this will need to be confirmed following further investigation at the DBC stage. A fourth cross section type has been developed for new arterials where private vehicle demand is not expected to exceed two lanes (one in each direction). This is 25m wide (Cross section C). These cross sections are summarised below and referenced throughout the sections that following.

6.4.1 Cross section A – 32m arterial

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.

Figure 23: Example 32m cross section – Cross section A

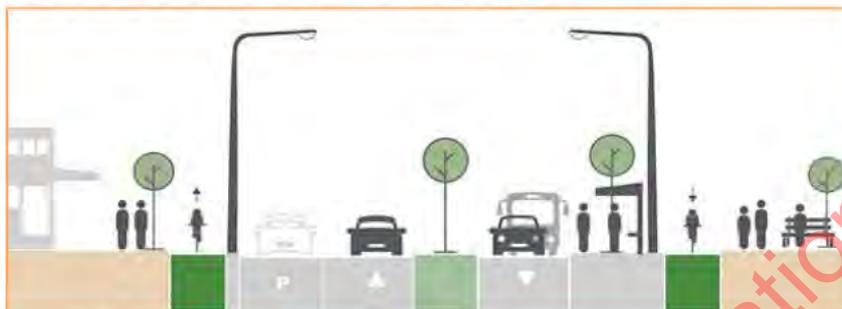


6.4.2 Cross section B – 30m arterial

Form – 30m, accommodating separated walking and cycling, public transport facilities/ parking, and two lanes for public transport and general traffic. There may be three lanes in places at intersections for turning movements.

Application – Key access corridor with a focus on walking, cycling, and public transport. This cross section is unique to Warkworth, where repurposing of existing 30m wide road space is planned.

Figure 24: Example 30m cross section – Cross section B



6.4.3 Cross section C – 25m arterial

Form – 25m, accommodating separated walking and cycling, public transport facilities, and two lanes for public transport and general traffic.

Application – Strategic movement corridors where the demand management approach has reduced demand to a two-lane level, and therefore a 32m cross section is not required.

Figure 25: Example 25m cross section – Cross section C



6.4.4 Cross section D – 20m collector

Form – 20m, accommodating separated walking and cycling, public transport facilities/ parking, and two lanes for public transport and general traffic.

Application – Urbanisation of existing 'key' collectors which may be possible within the existing road reserve (to be confirmed following further investigation at the DBC stage). These roads have an important role in connecting the walking and cycling and public transport network in Warkworth.

Figure 26: Example 20m cross section – Cross section D



6.5 Key considerations

This section sets out the key considerations for option development in each of the three areas in Warkworth.

6.5.1 Warkworth north

- Provide resilience to Hill Street intersection and SH1 as the current main north-south route.
- Provide access to proposed business land in north west Warkworth.
- Provide access to the strategic network via Ara Tūhono
- Provide alternative access to SH1 to promote resilience
- Provide structured access to the northern FUZ land which allows an effective collector network to be built by developers.

6.5.2 Warkworth south

- Provide access to the strategic network either via SH1 or Ara Tūhono for the south Warkworth FUZ.
- Provide access to proposed business land and local centre in south west Warkworth.
- Provide structured access to the southern FUZ land which allows an effective collector network to be built by developers.

6.5.3 Warkworth north east

- Provide access to the town centre which is currently via Hill Street intersection.
- Accommodate strategic through trips from the south to the Matakana and Kowhai Coasts – these are also currently via Hill Street.
- Provide a resilient east-west connection in north east Warkworth which doesn't use Hill Street.
- Provide an alternative to Hill Street which allows this intersection to accommodate active modes and public transport effectively.
- Provide structured access to the north east FUZ land which allows an effective collector network to be built by developers.

7 Option analysis

This section:

- Starts by describing the recommended transport network for Warkworth in full, including the key outcomes it delivers
- Provides a summary of the long list, demonstrating the breadth of options considered and the rationale for discounting the options which did not progress to the short list
- Sets out additional detail on the short-listed options and rationale for their inclusion as part of the recommended network.

7.1 Recommended network

The people of Warkworth 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 Warkworth.

The future Warkworth urban area will retain its existing town centre at its heart, adjacent to the Mahurangi River and to the east of the existing SH1 corridor. According to the draft structure plan, it will have a secondary local centre in the south and two proposed neighbourhood centres near Woodcocks Road and Matakana Road, and existing and new industrial and business land to the west of the existing SH1 corridor. New and existing residential areas will surround these activities.

Warkworth sits at a crossroads for access north, towards Whangarei, south towards Auckland and east towards the Matakana and Kowhai Coasts. The Hill Street intersection is the critical point where all these radial movements intersect. Key desire lines connect these activities in all directions, but the current transport network only allows radial movements, focused on the town centre and Hill Street intersection. The recommended Warkworth network provides the supporting connections forming a spiderweb circulatory pattern, with the town centre remaining the central focus.

The guiding principle for the development of Warkworth's future transport system is to shape travel behaviour by integrating with land use activities, to encourage travel by active modes and public transport, to reduce reliance on private vehicle travel, to reduce pressure on the environment and to create a cohesive community with a strong character and sense of identity that is not dominated by car travel.

The transport network has been chosen to deliver the following objectives:

- Maintain reliable **access** to local economic and social opportunities and core services at 2016 levels.
- Maintain reliable **access** to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels.
- Deliver a transport system **timed to integrate** with FULSS staging, that enables a **quality urban and natural environment** in Warkworth.

- Provide **safe, resilient, and attractive travel choices** that achieve a morning peak mode share of 26%¹⁷ for active modes and public transport and **reduce private vehicle travel** for all trips by 15% overall.

The objectives to maintain access at 2016 levels, with safe, attractive, and sustainable alternatives to private vehicle travel in a quality urban environment have delivered Warkworth specific cross sections tailored to make best use of existing road corridors, minimising widening and reducing disruption to property and residents. Improvements on all corridors focus on urbanising currently largely rural cross sections to provide separated walking and cycling facilities.

Close collaboration between the Te Tupu Ngātahi business case team and the Council's structure planning team to integrate Warkworth's future transport system with its planned land use activity from the outset has enabled some key outcomes including:

- The local centre, high density residential activity, new school sites and sports fields all planned to be located within viable walking and cycling distance of each other in south Warkworth. The transport system response includes footpaths, separated cycle facilities and safe crossing points, to provide safe, attractive alternatives to car travel.
- A public transport interchange provided adjacent to the proposed local centre, high density residential activity and potential new school sites. This co-location is intended to enable a good walk-up catchment, increasing uptake of public transport. Public transport services connect this interchange with the town centre, new and existing business activity and residential areas. They also connect areas outside of the Warkworth future urban area (Wellsford, Kowhai and Matakana Coasts, Hibiscus Coast) with an attractive, frequent alternative to private vehicle travel.
- A new arterial network that specifically connects key trip attractors (proposed business areas, local centres, sports fields and residential areas) along main desire lines. The network has been designed to integrate with Warkworth's topography (Mahurangi River and tributaries, SEAs, large escarpments and other hill terrain and areas of poor geology), aiming to provide direct connections and minimise gradients while also minimising earthworks requirements. The intention is for this arterial network to be attractive for walking and cycling, to encourage mode shift away from vehicle use, and to provide for strategic east-west trips.
- New industrial / business land is located adjacent to existing similar activity, connected by and accessed from the proposed Western Link Road. With business land along much of its length the Western Link Road has been located to provide reliable access to the Ara Tūhono and a resilient alternative route to the existing SH1 corridor. Locating similar activities close together can also reduce the need to travel, given their adjacency.
- Western Link Road also provides the boundary between different land use.
- The Western Link Road is designed to have four traffic lanes; its purpose is to reduce traffic volumes on the existing SH1 corridor and enable space on that corridor to be reprioritised so that it can act as Warkworth's central north-south walking, cycling and public transport spine, connecting a southern local centre, Mahurangi College, business and residential activity with the town centre. All other new and existing corridors will retain existing capacity (generally two traffic lanes) and will generally have cross sections of 20m, 25m or 30m to accommodate a form that better integrates with the surrounding urbanised land use.

¹⁷ 26% is based on the Warkworth specific targets set out in the PBC, e.g. 10% for public transport, and 15.8% for active modes.

- A new southern motorway interchange located adjacent to new industrial / business land to provide reliable access for freight and provide a catalyst for the business land development. The southern motorway interchange also allows for a reduction in public transport operational costs (compared to only having a northern interchange) by reducing travel distances associated with the northern motorway interchange.
- Operational demand management measures must be implemented to achieve the lower travel demand on which the recommended network is based. These are to be developed in more detail during the DBC phase.

The outcome of this integrated approach is a forecast reduction in private vehicle demand of 16% over current rates. The sections which follow summarise the options long-list and short list developed in response to this lower demand forecast.

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Figure 27: Warkworth recommended transport network



7.2 Options long list

The options long list for Warkworth consisted of 105 options. These options are summarised below, along with rationale for discounting those options which did not progress to the short list. Due to the significant number of options produced, a map is not included here. The full options long list and individual maps can be found at Appendix B1.

7.2.1 Strategic connections

The following strategic options were considered for Warkworth. Table 7 sets out the rationale for discounting options which did not proceed to the short list.

- **Public Transport Interchange (with parking)** – North – near Ara Tūhono interchange or South – near Southern Interchange (dependent on interchange and location)
- **Southern Interchange** – Three potential locations – Woodcocks Road, Wyllie Road, Perry Road
- **Southern Interchange** - different operational forms, i.e. freight only or public transport only
- **Changes to SH1** – space reallocation for walking, cycling, and access or increase capacity
- **Passenger rail** on North Auckland Line
- **Ferries** to Auckland
- **Rapid Transit Network (RTN) extension** to Warkworth
- **Bus lanes, High Occupancy Vehicle (HOV) lanes, T2/3, freight lanes** on motorway or SH1.

Table 7: Rationale for discarded ‘strategic’ options

Strategic Connections	Rationale
Southern Interchange Woodcocks Road or Perry Road	Access via Woodcocks Road is undesirable due to major school located here and SEA. Perry Road is outside of the FUZ, & environmental and engineering challenges.
Southern Interchange freight or PT only	Likely low demand
Passenger rail & ferries to Auckland	Uncompetitive journey times (> 2hours), likely low demand, high capital and operating costs
RTN extension	Demand unlikely to justify high costs and environmental impacts
Bus lanes, HOV lanes, T2/3, freight lanes	No congestion on SH1 to Silverdale, likely low demand

7.2.2 Western connections

The following options have been considered in west Warkworth. Table 8 sets out the rationale for discounting options which did not proceed to the short list.

- **Urbanise existing roads** – Woodcocks Road, Hill Street, Falls Road
- **Western Link Road (North)** – Four potential new alignments between Hudson Road and Ara Tūhono
- **Western Link Road (South)** – Four potential new alignments between McKinney Road and Valerie Close

- **Wider Western Link Road** – New north-south link between Western Link Road and Ara Tūhono.

Table 8: Rationale for discarded western options

Western Connections	Rationale
Western Link Road N	Two alignments discarded due to proximity with existing intersections
Western Link Road S	One alignment discarded due to proximity with existing intersections
Wider Western Link Road	North section discarded due to poor ground conditions and inability to find an appropriate alignment

7.2.3 Eastern connections

The following options have been considered in east Warkworth. Table 9 sets out the rationale for discounting options which did not proceed to the short list.

- **Urbanise existing roads** – McKinney Road, Matakana Road, Sandspit Road
- **Ferry to Matakana and Kowhai Coast** via Mahurangi River
- **Sandspit Link Road** – Four potential new alignments between Matakana Road and Sandspit Road
- **Mahurangi River Crossing** – Tunnel or bridge
- **South East Link Road** – Two potential alignments either urbanising McKinney Road or a new road connecting SH1 and Pulham Road.

Table 9: Rationale for discarded eastern options

Eastern connections	Rationale
Ferry	Recreational function, does not facilitate growth, high costs
Sandspit Link Road	Two alignments discarded due to repetition
Mahurangi River Crossing	Tunnel discarded due to engineering and environmental impacts

7.2.4 Local connections

The following local connections have been considered in Warkworth. Table 10 sets out the rationale for discounting options which did not proceed to the short list.

- **Bus lanes** on local roads
- **Bus priority** at intersections
- **Connect local roads** – Alnwick Street, Hauiti Drive & John Andrew Drive
- **Additional east-west roading connections** to improve severance.

Table 10: Rationale for discarded local options

Local connections	Rationale
Bus lanes on local roads	Likely lack of congestion and demand for local bus lanes
Additional east-west connections	East-west connections included in other roading and active travel options

7.2.5 Active modes

The following active mode options have been considered in Warkworth. Table 11 sets out the rationale for discounting options which did not proceed to the short list.

- Walking and cycling **hub and spoke network**
- **Mahurangi River crossing** – Walking and cycling bridge
- **Mahurangi River route** – East-west
- **East-west connections over SH1.**

Table 11: Rationale for discarded active mode options

Active modes	Rationale
Mahurangi River walking and cycling bridge	Complex engineering and inability to achieve a gradient appropriate for active modes due to height differential on each side of the river
East-west connections over SH1	Grade separate options discarded due to complexity and perception that grade separation prioritises cars

7.2.6 Non-infrastructure

The following non-infrastructure options have been considered for Warkworth. Table 12 sets out the rationale for discounting options which did not proceed to the short list.

- **Differing land uses**, for example deprioritising the existing town centre, moving Mahurangi College, or testing different locations of business land.
- **Express buses** via Ara Tūhono or SH1
- **Local buses** and connections to wider rural communities
- **Behaviour change** responses
- **Town centre parking** – Car free town, shared space, limited parking, increased parking
- **Pricing**
- **Technology**

Table 12: Approach to progressing non-infrastructure options

Approach to non-infrastructure options	
Land use options	Worked through in collaboration with Auckland Council
Public transport network & services	Collaboration with AT Metro
Behaviour change	Te Tupu Ngātahi programme wide approach – refer to Appendix I – Travel Demand Strategy
Parking strategy	AT study recommended
Pricing & technology	AT/ Transport Agency regional / national policy

7.3 Options short list

The options short list is shown in Figure 28. The short-listed options are described in further detail in the sections that follow.

Figure 28: Warkworth options short list



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7.3.1 Short list assessment

This section describes the choice of options from the short list and sets out the rationale for discarding the remaining options.

7.3.1.1 Strategic connections

The strategic connections options include:

- A Southern Interchange near to Wyllie Road
- Changes to existing SH1, with potential for either increased capacity or reallocation of space within the existing corridor
- A public transport interchange and associated Park and ride

Southern Interchange (near to Wyllie Road, southern ramps only)

Purpose: A Southern Interchange (south facing ramps only) has been designed to provide motorway access to the southern FUZ area as an alternative to the northern interchange. See **Figure 29** for an indicative location.

Option assessment:

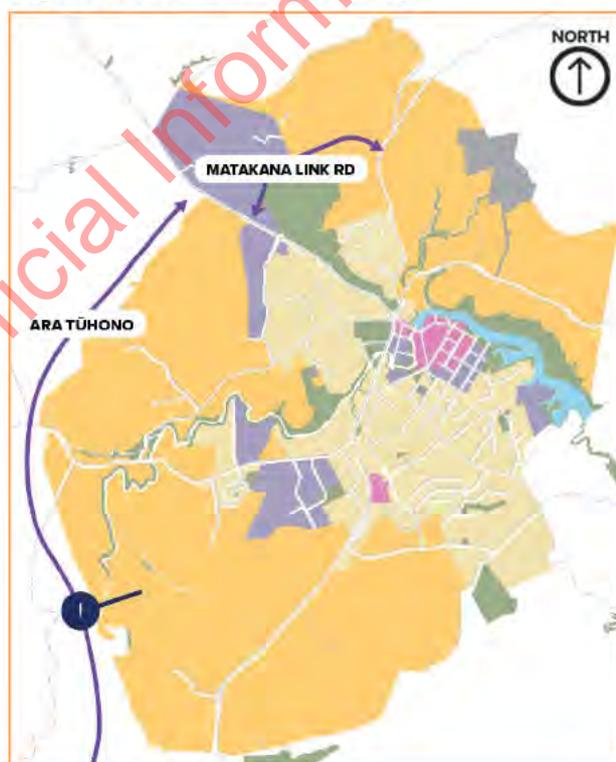
The Southern Interchange provides **motorway access to approximately 3,600 additional houses** in the southern FUZ area. This **reduces the need for users to travel north on existing SH1 and via Hill Street intersection** to access the motorway. This **supports network resilience** as a secondary motorway access for approximately 10,000 vehicles per day (vpd).

It **reduces traffic volumes on the existing SH1 south of Warkworth from 27,000 vpd to approximately 20,000 vpd (2018 levels)** thereby **reducing need for significant investment** to improve the existing SH1 to four lanes from a safety and capacity perspective. An additional benefit of this is that it **creates an opportunity for the existing SH1 within Warkworth to be prioritised for cyclist and pedestrian access** thereby better integrating with the surrounding land use.

There are **some traffic impacts on Woodcocks Road**, with volumes increasing from 10,000 to 14,000 vpd because of growth, and by a further 3,000 vpd to 17,000 vpd once the interchange is implemented. Mahurangi College is located on Woodcocks Road and the **impacts of increased traffic on this road on vulnerable users will be carefully considered at the next stage** – particularly provision of safe and appropriate footpaths, cycleways, and crossing facilities.

An interchange in this location **supports and enables adjacent land uses, including industrial land providing approximately 900 jobs** which is 25% of the proposed total employment in

Figure 29: Southern Interchange



Warkworth. It also **supports a planned public transport interchange and southern Park and ride facility.**

The proposed location of the Southern Interchange has a **relationship with the proposed location of the Warkworth to Wellsford (WW2W) Interchange** which has been under development in parallel with this project. The WW2W interchange is located to the north of Woodcocks Road, and offers all movements north and south. The links between these two projects have been considered carefully to ensure an integrated approach. This has included consideration of physical location and proximity of both interchanges to ensure appropriate spacing is maintained. It is not possible to provide north facing ramps at the Southern Interchange as these would conflict with the south facing ramps of the the WW2W interchange.

Stakeholder / public consultation feedback:

- Strong support for a Southern Interchange
- Most respondents were in favour of planning for and protecting this Interchange prior to development occurring in the south of Warkworth
- Consideration should be made to a Park and ride facility near the Interchange.

Response: A Southern Interchange is recommended for Warkworth. Planning is starting now through the Programme to enable infrastructure to be delivered ahead of development.

Issues for further consideration: The proposed Southern Interchange is located in an area which minimises the impact on the receiving environment as far as possible. Opportunities to further minimise impacts will be sought at the next stage, through further technical work and consultation with key stakeholders.

Ongoing liaison is required

Summary: This option is necessary to support the planned growth in south Warkworth, and is therefore part of the recommended network.

Existing SH1 - Additional traffic capacity vs. Space reallocation & local access)

Purpose: Two options have been considered for existing SH1: either to provide additional traffic capacity to accommodate growth, or to reallocate the existing space to provide walking and cycling infrastructure and to open local accesses and reduce severance (with any additional traffic capacity provided elsewhere in the network, if required). See **Figure 30** for extent of SH1 concerned.

Option assessment:

Following the introduction of the Ara Tūhono motorway in 2021, traffic volumes will drop on the existing SH1 through Warkworth as strategic through traffic is reduced.

Growth of Warkworth and the surrounding areas will progressively increase volumes on this route, reaching between 20,000 and 30,000 vpd through the Warkworth FUZ area by 2046.

These forecast volumes may make **space reallocation and opening-up access challenging**. However, parallel to existing SH1 in the western FUZ land, it is proposed to implement a new link road. It is planned that this **Western Link Road will form the main north-south link for general traffic, freight, and public transport**. See Western Link Road.

Intersection changes are proposed which will prioritise this route and direct traffic (and capacity) in this direction. This will **allow space on the existing SH1 to be reallocated from its current form to a single lane for general traffic** – which is focussed on general traffic provision – and limitations on access removed.

This route will then form the **walking and cycling 'spine' of Warkworth**, providing access to schools and the town centre.

Much of the existing designation is already 30m (Cross section B), so it is planned to repurpose this space for walking and cycling infrastructure and to improve the placemaking role of this route at the heart of Warkworth. The exact layout will be developed in more detail at the DBC stage.

Figure 30: State highway 1



Stakeholder / public consultation feedback:

- Split feedback on whether SH1 should include extra capacity for general vehicles or a reallocation of road space for walking and cycling
- Support for SH1 to function as an 'urban arterial' after the Ara Tūhono motorway is constructed
- Some concern that growth will result in an increase in traffic along SH1 which may mean limited walking and cycling opportunities, in particular for school children.

Response: Our aim is to prioritise mode shift for alternative transport modes and therefore walking and cycling facilities will be provided on all arterial roads but no additional capacity for general traffic will be provided.

Issues for further consideration: Reallocation of space within the existing SH1 corridor and prioritisation of a new corridor (for general traffic) may be challenging due to the existing established nature of existing SH1. There are opportunities for urban design and placemaking interventions to improve this transition.

There is a narrow (16m) bridge on SH1, just south of Hill Street intersection which is a constraint. Further work is needed regarding what can be achieved in terms of width for walking and cycling infrastructure. Impacts on the current designation will be explored more fully at the next stage of work.

Prioritisation of the Western Link Road via intersection priority and signage needs to be explored further to full understand the level to which traffic can be reduced on SH1 and the opportunity for walking, cycling, and placemaking capitalised on.

Summary: Additional traffic capacity will be required in Warkworth by 2046 to service north-south movement patterns. As discussed, it is planned to provide this capacity on the new Western Link Road rather than existing SH1. The recommended network therefore includes existing SH1 as the key north-south walking and cycling corridor.

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Public Transport Interchange and Park and ride facilities (North vs. South)

Purpose: Two options have been considered for a public transport interchange and Park and ride facilities in Warkworth to provide access to strategic public transport services as a viable alternative to the private car. See **Figure 31** for indicative locations. For costing and assessment purposes a Park and ride of 300 spaces has been considered.

Option assessment:

Park and ride for Warkworth was proposed as part of the TfUG preferred network. This option has been further developed and tested as part of this IBC, with sites in both the north and south assessed. The focus of this option has shifted since the PBC, with a **public transport interchange being the focus of the facility**, with associated parking provided. This will enable access to strategic public transport services via a variety of modes. This shift in emphasis reflects the compact nature of the future Warkworth urban form and the **opportunity to capture access by walking, cycling, and feeder buses**, rather than just by private car.

The long term (2046) recommended option is in the south, adjacent to the Southern Interchange.

The southern site complements adjacent land uses such as the local centre and high density living. It also supports an efficient public transport network and service pattern which minimises the need for strategic long distances services to enter Warkworth due to its proposed location close to the Southern Interchange. It is therefore a desirable location for this interchange. The location shown on the map is the indicative location for parking, with the main bus terminus and interchange between services located adjacent to the local centre proposed by Council to the west of SH1.

In the medium term (over the next 15-20 years) prior to implementation of the Southern Interchange, a location in north Warkworth close to the existing SH1 corridor between Hill Street and the Ara Tūhono interchange is preferred. Like the long-term solution, the label on the map is indicative of a location for parking, with the main bus terminus and interchange between services located elsewhere, in the town centre.

The long-term PT interchange is assessed by AT Metro to need the following facilities: six bus stops, plus two layover spaces. In the interim, the Warkworth town centre location bus stops will need to be long enough to enable two small buses to stop and pick up passengers.

Figure 31: Public transport interchange/ Park and ride locations



Stakeholder / public consultation feedback:

- Strong support for public transport stations, and for these to provide a mix of Park and ride and local bus feeder services

- More respondents favoured stations in the North of Warkworth as a central location for most people to access
- Integrate walking and cycling connections with public transport
- Strong support for local bus services that are regular and frequent. Many people responded they would use an improved public transport network to access local shops, services and community facilities.

Response: Our aim is to prioritise mode shift for alternative transport modes through providing PT interchanges and Park and rides in Warkworth.

Issues for further consideration: A specific location for both the north and south will be determined swiftly at the next phase of the business case process through further technical work and stakeholder/community consultation (including landowners in the area). A transition plan will be developed once the implementation timeframes for the Southern Interchange are confirmed.

Summary: The long-term preferred location for the PT interchange and Park and ride facility is in south Warkworth. This is included in the recommended network. Due to the long lead times associated with the Southern Interchange, an interim PT interchange is also recommended in north Warkworth.

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7.3.1.2 Western connections

The western connection options include:

- Western Link Road (North, Central, and South)
- Wider Western Link Road
- Urbanisation of existing roads in west Warkworth.

Western Link Road (North, Central, South)

Purpose: The Western Link Road has been designed to enable development in west Warkworth and provide access to FUZ land and industrial areas, provide walking and cycling facilities, take pressure off existing SH1 and Hill Street intersection. See **Figure 32** for the indicative alignment.

Option assessment:

The **Western Link Road passes through or adjacent to the proposed industrial land** in Auckland Council's Draft Structure Plan (see **Figure 3**) and provides access for freight movements as well as other planned activities in west Warkworth.

The Western Link Road provides a **viable alternative to the existing SH1 and Hill Street intersection for north-south trips and significantly reduces traffic volumes on SH1**, carrying between 16 and 20,000 vpd depending on the section. Without this additional link the volumes on SH1 and through Hill Street intersection are up to 30,000 vpd and severe congestion (up to 25 minutes delay at Hill Street) will be experienced in the peaks.

This road is also proposed to be a key public transport link and given the proposed surrounding industrial land uses will carry a number of heavy vehicles.

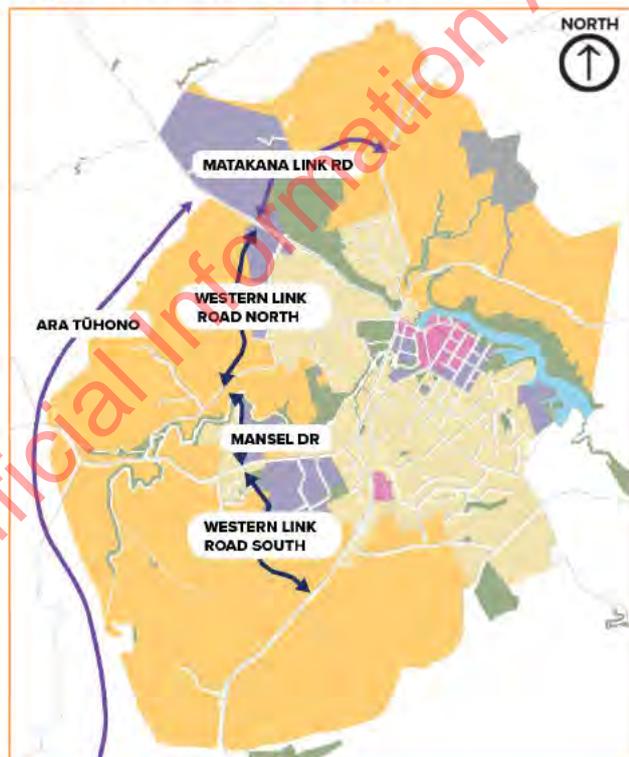
The northern section provides a direct connection to the Matakana Link Road – Te Honohono ki Tai and through to the proposed Sandspit Link Road, as a strategic route to the Matakana and Kowhai Coasts.

This route is proposed to be **prioritised for general traffic, freight and public transport as the main north-south route**. This will allow space on the existing SH1 to be reallocated, including a potential reduction to a single general traffic lane throughout and utilised as the main walking and cycling 'spine' in Warkworth.

Separated walking and cycling facilities will be provided along the length of the Western Link Road, to ensure a good level of access for these modes.

This prioritisation means that **capacity (four laning) can be targeted to this route only** (using Cross section A), whereas a strategy of just catering for modelled forecast demand may have seen four lanes provided both on this route and in places on the existing SH1.

Figure 32: Western Link Road



Regarding the provision of four lanes, it is recognised that a level of congestion, caused by only providing two lanes, may force users on to alternative modes – although the ‘tipping point’ at which congestion effects this outcome is not certain. If that strategy is adopted, the walking, cycling, and public transport offering needs to be good enough to provide genuine choice. The network recommended by this business case is a minimum starting point for providing that choice.

The four-laning on the Western Link Road is the **only place in Warkworth where four lanes is being recommended** and where additional capacity is being provided. If two lanes were provided and a level of congestion accepted, there would be **negative impacts on both public transport and freight/business users who would have to operate in general traffic**. As such, if four general traffic lanes are not provided there is **likely to be a need for HOV/bus/freight lanes to give these users an advantage over single occupancy car use, otherwise the desired mode shift is unlikely to occur**. This would mean the same corridor width is required, albeit with a different allocation of space.

Furthermore, the cost savings associated with providing two lanes over four lanes is approximately 20-25%, which is a small saving in the context of the overall programme. The disbenefits to public transport and freight, and also potential impacts on the walking, cycling, and placemaking role of SH1 are trade-offs that are not assessed to be worthwhile.

This **corridor can be implemented in independent stages**, e.g. constructed as land released for development. There is also **potential to stage capacity**, with two lanes provided initially and four lanes provided in the future especially given the developer interest and land holdings. Noting the points above, the decision about whether to use additional capacity for traffic or a specific priority use can be deferred to a later point due to the flexibility offered by the staged approach as long as the complete width is protected for initially. There is some pressure to develop this corridor early with developers at either end looking to develop their sites through private plan changes. This

s9(2)(j)

This is also a **more desirable outcome from an urban design perspective where the existing SH1 can be better integrated with surrounding land uses and provide safe active mode access to schools**.

The sections below set out the justification for selection of the recommended option for each component of the Western Link Road.

Northern section (New road vs urbanised Hudson Road)

A new link in the western FUZ land is generally preferred over urbanising Hudson Road as it opens access to this area and enables development. A new link would connect through to Matakana Link Road - **Te Honohono ki Tai** in the north and make use of the existing Mansel Drive link (which was built with the intention it would form the central section of this corridor). A developer has proposed a private plan change in this area that has passed through the Planning Committee, increasing the urgency to respond and work collaboratively to achieve the investors' desired outcomes. This developer is prepared to build a two-lane collector road in this area which can be upgraded to an arterial standard. s9(2)(j)

Central section (Urbanised Mansel Drive)

Mansel Drive is an existing recently connected section of road, which joins Woodcocks Road in the south to Hill Street/Falls Road in the north. The bridge connection to Hill Street/ Falls Road is less than three years old. Although this section is largely urbanised with a retirement village and Mitre

10 built on each side, it is likely that additional width will be required to accommodate the planned strategic function of this route. Further work needs to be undertaken to understand the constraints here. Specifically, what approach is taken to the relatively new bridge and development which has occurred adjacent to the corridor.

Mansel Drive provides a connection between the north and south Western Link Roads and plays an important role as an alternative to Falls Road, which has a single lane ford through an SEA (see **Figure 35**).

Transport modelling shows that closure or restriction of access to Falls Road, in response to environmental concerns, increases the importance of Mansel Drive, and traffic volumes on this link are forecast to be approximately 20,000 vehicles per day in 2046.

Southern section (New road – 3 alignment options)

The southern section of the Western Link Road has been designed to take pressure off the eastern section of Woodcocks Road – between Mansel Drive and the existing SH1 – which will experience very high traffic volumes (between 23,000 and 27,000 vehicles per day) once growth happens. This is an undesirable outcome due to the already urbanised nature of Woodcocks Road which has a high number of vehicle accesses to industrial businesses, and the main secondary school (Mahurangi College) located here. As discussed previously, the impacts of increased traffic on this road on vulnerable users will be carefully considered at the next stage – particularly provision of safe and appropriate footpaths, cycleways, and crossing facilities.

A southern section of the Western Link Road also provides access to the future urban zone and offers a direct through route onto Mansel Drive and through to Matakana Link Road – **Te Honohono ki Tai**.

The most northern alignment was part of the TFUG preferred option and connects east-west (over the existing SH1) to McKinney Road. The central and southern alignments provide alternatives which were designed to connect through to a potential south eastern arterial. The latter (southern alignment) responds to Auckland Council's desire to expand the existing industrial area off Woodcocks Road (see land use map at **Figure 3**) and is preferred.

NB. While investigated at the long list stage and part of the consultation a south eastern arterial has been discarded at the shortlisting stage due to modelled forecast demand which would not justify a new arterial road in this area. This means the east-west connection from Western Link Road through to the south east FUZ is not maintained by this project. In parallel to this business case however, an Integrated Transport Assessment (ITA) is being prepared as part of the Council's structure planning process. Within this, east-west connections in this area are planned to be maintained via the collector road network which is considered more appropriate given the surrounding land use and forecast traffic volumes.

Stakeholder / public consultation feedback:

- Strong support for Western Link to align in the north with Matakana Link Road– Te Honohono ki Tai
- Strong support for Western Link to connect to SH1 south of McKinney Road
- Safety concerns at existing Mansel Drive and Woodcocks Road intersection
- Some concern regarding heavy vehicle movement associated with the industrial zoned land increasing near existing and future residential areas
- Concerns raised by Warkworth Transport Forum and the Local Board over the proposal to provide four traffic lanes on this route

- McKinney Road intersection with SH1 needs to be upgraded.

Response: The recommended option broadly aligns with the feedback received. Safety at intersections will be reviewed during further design stages. It has been identified now that McKinney road intersection signalisation should be investigated further (to support surrounding urban development) and its layout improved and made safer. Further testing of the requirement for four traffic lanes will be completed at the DBC stage.

Issues for further consideration: At the next stage of the business case further stakeholder/community consultation will be undertaken (including landowners in the area) on the exact alignment. This will include further dialogue with:

- s9(2)(j) [REDACTED]
- s9(2)(b)(ii) [REDACTED]
- s9(2)(j) [REDACTED]
- [REDACTED]

Also, at the next stage further work needs to be undertaken to understand the constraints in the Mansel Drive section of the Western Link Road. Specifically, what approach is taken to the relatively new bridge and development which has occurred adjacent to the corridor.

Summary: The northern section of the Western Link Road is proposed as a new road, s9(2)(j) [REDACTED]. The central section is proposed as an upgrade to Mansel Drive, noting issues around existing recent development which will need to be dealt with at the next stage. The southern section is proposed as a new link which takes the southernmost of the three proposed alignments, s9(2)(j) [REDACTED].

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Wider Western Link Road

Purpose: The Wider Western Link Road serves two purposes. Firstly, it connects the Southern Interchange to both Woodcocks Road in the north and SH1 in the south. The road also provides access deep into the southern FUZ, where access will otherwise be difficult to provide due to topography and streams. See **Figure 33** for an indicative alignment.

Option assessment:

The Wider Western Link Road is forecast to have approximately 12,000 vpd using this link. It distributes traffic to and from the Southern Interchange to the north (Woodcocks Road) and south (SH1) in relatively equal proportions,

The link goes north-south rather than directly east through to either SH1 or Woodcocks Road due to a large escarpment which makes a direct link challenging to implement from an earthworks and construction (and therefore cost) perspective. A direct link, to the road connecting to the Southern Interchange, particularly to Woodcocks Road, is undesirable for the reasons previously discussed.

The Wider Western Link Road enables public transport services to access a southern PT interchange location and to use the southern motorway interchange for access to destinations south of Warkworth.

Traffic volumes indicate a 2-lane 25m cross section (Cross section C) would be appropriate for this option.

Figure 33: Wider Western Link Road



Stakeholder / public consultation feedback:

- Support for additional connectivity, especially to a Southern Interchange
- Consideration of re-alignment to follow Valerie Close.

Response: As below, further consideration will be undertaken as to the exact alignment of the wider link following further technical work and consultation.

Issues for further consideration: s9(2)(j)

noting that issues regarding funding of stream/river crossings may apply, s9(2)(j)

The northern section of this link crosses a tributary of the Mahurangi River which is a natural stream management area. Opportunities to mitigate impacts will be sought at the next stage of development.

The southern connection to the existing SH1 as currently planned crosses a large area of flat land which may be considered for a school location in future. Close working will be undertaken with

Council, MoE, and landowners in the area to ensure a final alignment is selected which complements any proposed school location.

Summary: This option is part of the recommended network.

Urbanise existing corridors (Woodcocks Road, Hill Street/ Falls Road)

Purpose: To urbanise existing corridors through the provision of walking and cycling facilities on existing roads which enable mode shift and provide a connected active mode network in Warkworth. To improve safety for users of these roads, particularly vulnerable users. See **Figure 34** for location/ length of proposed changes.

Option assessment:

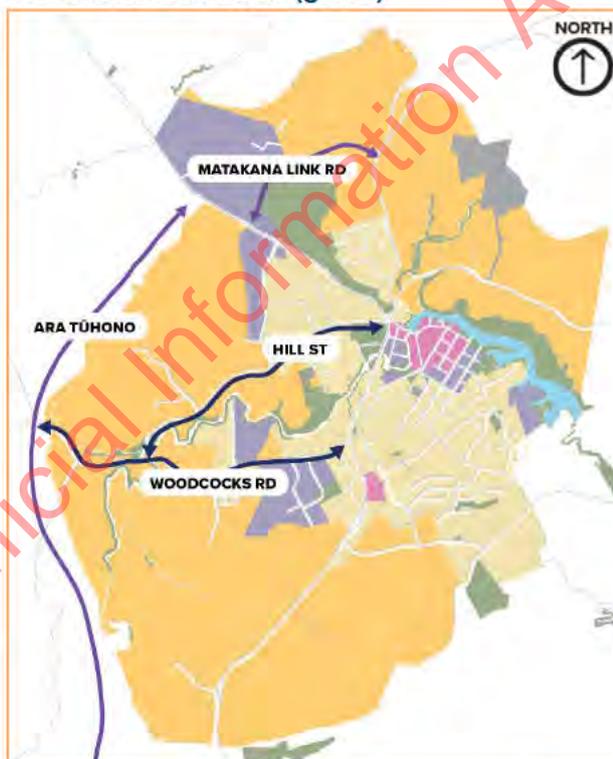
Three existing main roads in west Warkworth have been considered for potential urbanisation: Woodcocks Road and Hill Street/ Falls Road. **Upgrades include separated walking and cycling infrastructure** and potential for targeted increased traffic capacity at intersections if required.

Woodcocks Road is a key east-west link in the existing network. Traffic volumes are forecast to increase as growth occurs, with around a 4000-5000 vpd increase because of growth. Traffic is further increased on this road following provision of the Southern Interchange, by around a further 3000-4000 vehicles per day. This brings volumes west of Mansel Drive to approximately 9000-10000 vehicles per day. **This section of the route is recommended to be urbanised for walking and cycling only, with no additional traffic capacity.** The volumes east of Mansel Drive through to SH1 are approximately 15000-17000 vehicles per day. Although this is approaching the threshold at which four lanes may be considered, it is **recommended that provision of walking and cycling infrastructure (as part of a comprehensive Warkworth network) will encourage high levels of local trip making by active modes and mitigate the need for additional general traffic capacity.** The 25m cross section is considered appropriate here.

Earlier discussion highlights the need to manage general traffic carefully on this route due to the interaction of vulnerable users accessing Mahurangi College.

Hill Street/ Falls Road is a north-south/ east-west collector road which connects into the Hill Street intersection in the north. Hill Street is the location of the main primary school in Warkworth. Traffic volumes are forecast to be relatively low on this route and this route is replicated by both Woodcocks Road to the south and SH1 to the north. Walking and cycling facilities will be provided on both Woodcocks Road and SH1, and on the Mahurangi River cycle route, from which access will be provided to the primary school and sports facilities. It is therefore recommended that no upgrades or changes are made to this part of Hill Street.

Figure 34: Woodcocks Road (dark blue), Hill Street/ Falls Road (green)



Falls Road is a sensitive receiving environment (Figure 35) and any changes here, particularly those which encourage increased traffic and require infrastructure works, are undesirable and not supported.

Stakeholder / public consultation feedback:

- Strong support for safety improvements on existing roads, especially in providing segregation of cycling infrastructure
- Strong support for improvements to crossing facilities, especially around schools
- Support for upgrades to Hills Street.
- Support for protection of Falls Road, particularly the areas around the ford.

Response: Our aim is to prioritise mode shift for alternative transport routes, and therefore walking and cycling infrastructure on Woodcocks Road is included as it is a key east-west connection.

Improvements to Hill Street/Falls Road is not part of the recommended network, for the reasons stated above.

Issues for further consideration: At the next stage of development, the DBC will consider the opportunities to protect and enhance the natural environment shown on Falls Road. This may include restricted access or closure of Falls Road as a through route. This outcome is dependent on further investigations into Mansel Drive and whether the required multi-modal cross section can be achieved.

Summary: Urbanisation of Woodcocks Road forms part of the recommended network. Hill Street and Falls Road are not recommended for interventions for the reasons stated above.

Figure 35: Falls Road ford and SEA



7.3.1.3 Eastern connections

The eastern connections options include:

- Sandspit Link Road
- Mahurangi Bridge
- South Eastern Link Road
- Urbanisation of existing roads in east Warkworth.

Sandspit Link Road (New – 2 alignments)

Purpose: This option has been designed to enable development and provide access to FUZ land, provide walking and cycling facilities, provide for strategic east-west movements to Matakana and Kowhai Coasts avoiding Hill Street intersection. See **Figure 36** for the indicative alignment.

Option assessment:

Sandspit Link Road **plays an important role in providing an alternative to Hill Street intersection for strategic movements to the Snells Beach and Algies Bay areas.**

It also **provides access to the north east FUZ land.**

Two alignments have been considered, an 'inner' and 'outer' alignment, so called as they run to the south (inner) and north (outer) of a limestone quarry (shaded grey on the map, left).

The **inner alignment is preferred as it better penetrates the FUZ land**, whereas the outer alignment is longer (and therefore more expensive to construct) and passes outside the FUZ. From a land use planning perspective this **outer alignment is not favoured as it is likely to increase pressure for urban sprawl** outside the land zoned for future urban development.

Figure 36: Sandspit Link Road



Traffic volumes are assessed as approximately 5,000 vpd. in 2046. s9(2)(j)

This is partly due to the strategic nature of the corridor in providing for the movement patterns stated above, and due to the incised stream valley topography, which means the road is likely to require several stream crossings. s9(2)(j)

This may lead to undesirable urban form outcomes, where cul-de-sacs are built from either Matakana or Sandspit Road, and the benefits of the through connection recommended by the business case are lost.

Implementing this route **removes this traffic from Hill Street intersection and from local routes around the town centre.** This also enables **substantial reductions in travel time variability,**

Mahurangi Bridge (New – Outer alignment)

Purpose: This option has been designed to link desire lines between north east Warkworth and town centre, and north east and south east Warkworth, and provide resilience as an alternative connection to Hill Street. See **Figure 37** for an indicative location.

Option assessment:

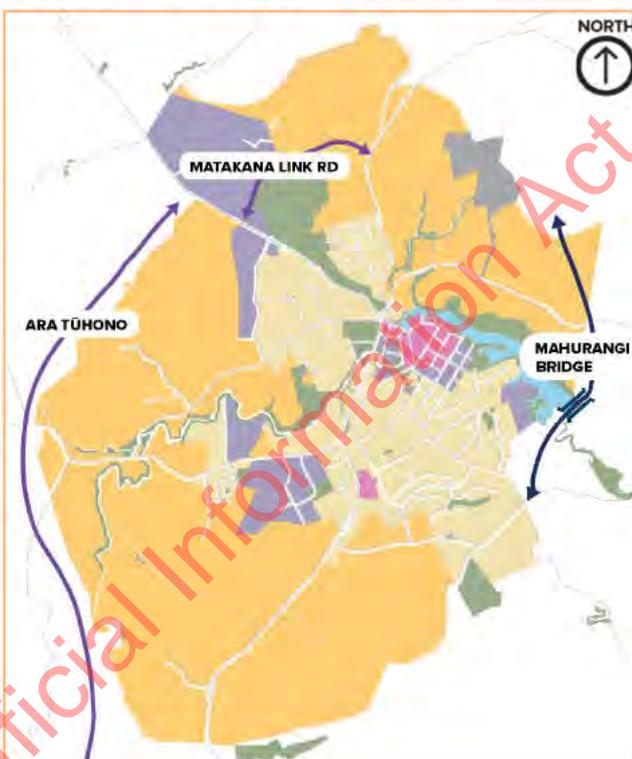
A bridge over the Mahurangi River was intended to connect a desire line between the north east and south east growth areas. It was intended to provide an alternative link to the town centre, a key attractor, and an alternative east-west link to the Hill Street intersection.

When modelled, the bridge was assessed as having low demand (less than 6000vpd), and a limited impact on the surrounding road network with only small numbers of trips transferring from the adjacent local roads.

Due to environmental and topographical constraints, the location of the bridge is further south than the town centre so does not address the potential desire for a connection from north east Warkworth to the town centre. It is also not consistent with the main desire line for east-west access to the strategic network at Ara Tūhono, with the proposed Sandspit Link Road providing a more attractive and direct connection for trips to the motorway. Provision of this link is a key factor in removing the need for a bridge.

The bridge also has extremely high costs and environmental and cultural impacts which would make it challenging to implement. It was therefore discounted from the short list.

Figure 37: Mahurangi Bridge



Stakeholder / public consultation feedback:

- Most respondents agreed that this would have significant cost and environmental implications and there was general support for this option not to go ahead
- Some respondents did suggest a walking and cycling connection across the Mahurangi.

Response: A bridge (in any form) across the Mahurangi River is not recommended in recognition of the potential significant visual, ecological and cultural values this presents. A walking and cycling bridge was investigated at various locations across the river. Due to the height differences (c. 50-60m) of the banks on each side, it was not possible to achieve a gradient that would be suitable for walking and cycling.

Issues for further consideration: None, bridge has been discounted as an option.

Summary: Bridge has been discounted as an option, based on the summary analysis above and the inclusion of Sandspit Link Road in the recommended network.

South Eastern Link Road (New vs urbanised McKinney Road)

Purpose: This option has been designed to enable development and provide access to FUZ land in south east, and to provide walking and cycling facilities for access to the town centre from the south. See **Figure 38** for indicative alignment.

Option assessment:

A new arterial has been assessed in the south east Warkworth future growth areas. It has been compared to a potential urbanisation of an existing road in the area, McKinney Road and the connecting roads through to the town centre (shown in green on the map adjacent).

Transport modelling suggests traffic volumes on a new link of approximately 7,000-8,000vpd, which are relatively low and **unlikely to justify providing a new arterial in this area**, without compelling other reasons, i.e. it does not provide a strategic connection like Sandspit Link Road and is paralleled by McKinney Road. These volumes can therefore be catered for via **an upgrade of the existing McKinney Road without the need to build a new roading connection.**

The main challenge this presents is that the **east-west connection across SH1 is lost** due to the selection of the Western Link Road option (AR6C) which does not connect through to McKinney Road.

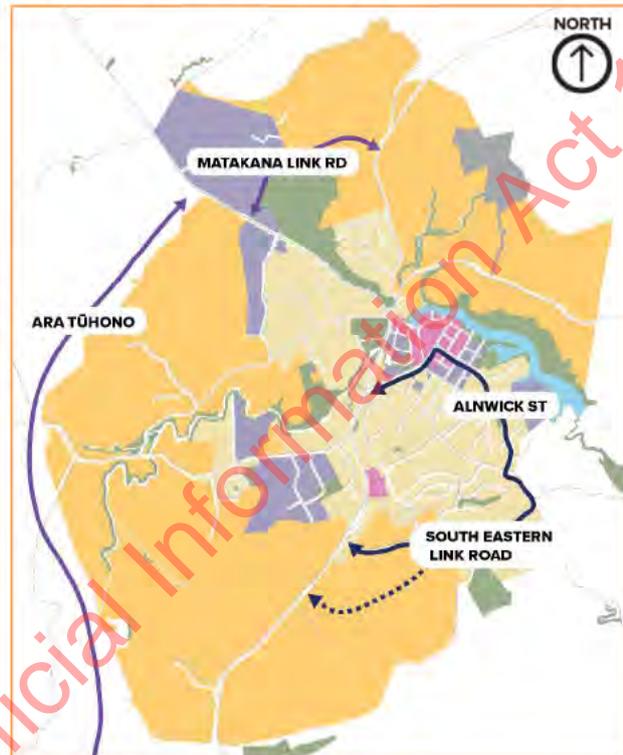
To mitigate this, **work has been done in collaboration with the Council's structure planning team, who have included a collector road in the network (indicated broadly by the dotted green line on the map above) which can provide that east-west connection through to the Western Link Road.**

Walking and cycling infrastructure is proposed to be provided on all roads shown in green on the map. This includes McKinney Road, Wilson Road, Pulham Road, Alnwick Street, and Whitaker Road.

Alnwick Street is not currently connected through to the town centre. A connection is needed to provide an additional route through to the town centre which has benefit for all modes. Without this route, most traffic will use either Pulham Road, or travel north on SH1 to access the town centre from Whitaker Road. **This route is proposed to be a key link for public transport.**

All these roads are proposed to be collector standard and urbanised within their existing road reserve (generally 20m, Cross section D) where possible. They are however **key links for providing access to the town centre**, enabling demand to be shared more evenly with Whitaker Road, and it is considered that the **walking and cycling infrastructure here is essential to achieving the desired mode shift.**

Figure 38: South East Link Road



The **importance of the key collectors in achieving the investment objectives cannot be ignored**. Discussion on protection and implementation of these routes is set out in Part C – Implementation.

Issues for further consideration: The importance of the key collectors in achieving the investment objectives cannot be ignored. Discussion on protection and implementation of these routes is set out in Part C – Implementation.

Stakeholder / public consultation feedback:

- As previously noted, strong support for safety improvements on existing roads, especially in providing segregation of cycling infrastructure
- Support for improvements to McKinney Road in particular due to existing safety issues
- Some concern regarding impacts on existing residential areas around Pulham Road and Alnwick Street with an increase in traffic.

Response: Our aim is to provide walking and cycling facilities to encourage mode shift. Some increase in traffic is anticipated because of future growth in Warkworth, however urbanisation improvements will help mitigate the impacts.

Summary: The urbanisation (for walking and cycling) of McKinney Road, Wilson Road, Pulham Road, Alnwick Street, and Whitaker Road is part of the recommended network.

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Urbanise existing roads (Matakana Road, Sandspit Road)

Purpose: This option has been designed to urbanise existing road through the provision of walking and cycling facilities which enable mode choice and improve access and safety of existing roads.

Option assessment:

Urbanisation of both Matakana Road and Sandspit Road have been considered to **provide walking and cycling infrastructure and improve access and safety for all users.**

Both roads are **currently rural in nature**, see **photographs overleaf** for representative examples of the current corridor.

Widening throughout will be required to accommodate walking and cycling infrastructure. Neither road currently has footpaths and cycling in in the main traffic lane with limited narrow shoulders.

From a general traffic perspective, **neither road is likely to require additional capacity along most of its length.** The exception to this is at the southernmost ends where the links connect to each other and on to Hill Street intersection. There is a likely need for additional traffic capacity here to accommodate demand.

Walking and cycling infrastructure on these roads is critical to achieving a mode shift, particularly for short distance trips and accessing the town centre from the north Warkworth area. **The success of these measures however is largely dependent on the walking and cycling infrastructure provided at Hill Street intersection.** The Warkworth project team has worked closely with the Hill Street team to ensure integration of approach and aligned outcomes. It is recommended that a tailored cross section of 25m (Cross section C) is used here to achieve these facilities.

Stakeholder / public consultation feedback:

- Strong support for upgrades to Matakana Road and Sandspit Road.

Issues for further consideration: Opportunities to work with the Hill Street project team will continue in the next phase. Alignment of planning will be pursued at every opportunity to ensure walking and cycling outcomes are achieved for north east Warkworth.

Summary: Urbanisation of both Matakana Road and Sandspit Road is included in the recommended option.

Figure 39: Matakana Road (dark blue, left), Sandspit Road (dark blue, right)



Figure 40: Matakana Road



Figure 41: Sandspit Road



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7.3.1.4 Walking and cycling

The walking and cycling options include:

- Hub and spoke principles
- Mahurangi Rive cycleway.

Hub and spoke network principles

Purpose: This option has been designed to link to key attractors (hubs) such as the town centre, jobs, and schools with connectors (spokes) flowing out into suburbs. See **Figure 42**.

Option assessment:

The walking and cycling network in Warkworth is proposed to consist of separated walking and cycling facilities on all new and existing arterials, to the edge of the FUZ, as shown on the map (right). This reflects the hub and spoke principle approach, connecting into the town centre and passing schools and existing and proposed future industrial land.

In addition, and to achieve mode shift, it is recommended that walking and cycling infrastructure is included on the key collectors which provide access to the town centre as previously discussed.

The map (left) shows the routes on which walking and cycling infrastructure are to be provided (not Ara Tūhono motorway). Walking and cycling infrastructure is shown on a 32m cross section below. Walking and cycling infrastructure is proposed to be the same on smaller cross sections, i.e. 25m and 20m, although more work will need to be done at the DBC stage to confirm the exact nature of these facilities. For example, a shared path may be appropriate in some locations.

Figure 42: Walking and cycling routes



Stakeholder / public consultation feedback:

- Support for walking and cycling improvements
- Safety and segregation noted as the most important consideration for people.

Response: safe, separated walking and cycling facilities will be provided on all arterial roads.

Issues for further consideration: Opportunities to work with the Hill Street project team will continue in the next phase. Alignment of planning will be pursued at every opportunity to ensure walking and cycling outcomes are achieved.

Summary: Walking and cycling on all links shown is included in the recommended network.

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Mahurangi River shared path

Purpose: This option has been designed to provide an off-road strategic route which addresses east-west connectivity issues and connects FUZ land in the west with schools, sports fields, and the town centre. See **Figure 42** and **Figure 43**.

Option assessment:

A shared path route along the Mahurangi River was assessed as part of the options short-list. The full route initially extended to the eastern and western boundaries of the FUZ, however on assessment there was duplication of proposed arterial routes, and these outer components are not proposed to be progressed as part of the recommended option.

The central component (shown in pink, left) connects from Mansel Drive in the east, through to the town centre in the west. This provides an off-road east-west connection which links to the back of the two schools (Hill Street Primary and Mahurangi College). It also provides a connection to the sports fields near the primary school.

It is proposed that the route will go underneath the old SH1 and into the town centre, to provide a fully off road east-west link that can be accessed from the western FUZ area.

This option has a strategic function and is key to addressing safety and mode shift. This is particularly relevant for access to school by vulnerable users (children).

This section is assessed as having a strategic function and is therefore recommended for route protection.

Figure 43: Indicative strategic shared path



Stakeholder / public consultation feedback

- Strong support for a strategic route along the Mahurangi River
- Most people responded they would use an improved walking and cycling network for health, fitness and recreation.

Issues for further consideration: The width and design of this path will be confirmed at the next stage of development.

Summary: This option is included in the recommended network.

s9(2)(ba)(i)

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8 Recommended network

8.1 Overview

This section:

- Summarises the recommended network
- Proposes a staged implementation of that network
- Compares the differences in infrastructure between the recommended network and the TFUG network
- Describes the outcomes achieved in relation to the investment objectives and KPIs
- Describes the results alignment achieved in relation to the Investment Assessment Framework (IAF).

8.2 Recommended network summary

Figure 44 sets out the recommended network for Warkworth.

Figure 44: Warkworth recommended transport network



8.2.1 Public transport

8.2.1.1 Public transport interchange/ Park and ride

Form: *Prior to construction of the Southern Interchange:* Public transport interchange/terminus in the town centre, with a park and ride with bus stops around SH1/ Western Link Road; *Post-construction of the Southern Interchange:* Public transport interchange/ terminus near the local centre in the south, and a park and ride with bus stops adjacent to the Southern Interchange.

Note: The exact locations, access arrangements, and scale of facility are to be confirmed at the DBC stage following further investigation.

Key features:

- Provides access for southern growth area
- Enables high density residential, industrial, local centre and school
- Proximity to local centre and housing maximises potential walk/ cycle-up catchment
- Supports a comprehensive public transport network.

8.2.2 Walking and cycling

8.2.2.1 Mahurangi River shared path

Form: Shared path (actual width to be determined at DBC stage) adjacent to Mahurangi River between Mansel Drive and the town centre.

Key features:

- Provides cycle and pedestrian access along key desire line, connecting key locations such as planned town centres to the west, primary and secondary schools, sports fields and industrial area
- Off-road riverside location is attractive alternative to road corridors for walking and cycling.

8.2.3 Operational demand management measures

Form: Travel behaviour change schemes, carpooling schemes and support, car sharing and bicycle hire schemes, on-demand services, mobility as a service platforms, promotional / educational campaigns and monitoring.

Key features:

- Complements infrastructure provision to encourage additional uptake of alternatives to private car travel.

8.2.4 Urbanisation of existing roads

8.2.4.1 Arterial roads

Form: Two-lane arterial corridors. Separated walking & cycling facilities.

Key features:

- Separated walking cycle facilities to encourage mode shift
- Most existing corridors are rural, with no kerbs or footpaths. Not currently safe or attractive for walking or cycling
- No road capacity upgrades proposed.

8.2.4.2 Collector roads

Form: Two-lane corridors. Separated walking & cycling facilities.

Key features:

- Provide separated walking and cycling facilities to support mode shift and connect new and existing urban areas to the town centre
- Provide for key public transport routes.

8.2.5 New infrastructure

8.2.5.1 Western Link Road (North, Central, South)

Form: Four-lane arterial corridor. Separated walking & cycling facilities.

Key features:

- Only four lane section of the Warkworth road network, the central spine of the transport system
- Connects key north-south desire lines and business land uses
- Provides a resilient alternative to the existing SH1 corridor and Hill Street intersection
- Provides a direct connection through to Matakana Link Road – Te Honohono ki Tai
- Enables access to western growth area.

8.2.5.2 Wider Western Link Road

Form: Two-lane arterial corridor. Separated walking & cycling facilities.

Key features:

- Provides access to southern public transport interchange, park and ride and southern motorway interchange
- Direct connection to key activities: proposed local centre, high density residential activity, potential school site
- Follows Mahurangi River tributary – flat gradient and riverside location provide attractive walking and cycling corridor.

8.2.5.3 Southern Interchange

Form: Interchange with south-facing ramps only.

Key features:

- Provides access for southern growth area: high density residential, industrial, local centre and school
- Provides a reduction in public transport operating costs when compared to access via the northern interchange. Also offers a simpler and better public transport network and service pattern compared to the north.
- Reduces traffic volumes to 2018 levels on the old SH1.

8.2.5.4 Sandspit Link Road

Form: Two-lane arterial corridor. Separated walking & cycling facilities.

Key features:

- Resilient alternative to existing SH1 corridor and Hill Street intersection
- Enables access to eastern growth area and Snells Beach, Algies Bay

Provision of this link significantly reduces the need for other transport infrastructure in the area, for example the Mahurangi River bridge.

8.3 Alignment with Investment Objectives and GPS priorities

Table 14 sets out how the elements of the recommended network are aligned with the investment objectives and GPS priorities.

Table 14: Alignment with Investment Objectives and GPS priorities

Option group	Element	Alignment with Investment Objectives*				Alignment with GPS priorities			
		1. Local access	2. Strategic access	3. FULLS timing	4. Mode choice	Safety	Access	Environment	Value for Money
Public transport	Interim north PT interchange with Park & ride	M	H	M	H	M	H	H	L
	Ultimate south PT interchange with separate park and ride	M	H	M	H	M	H	H	L
Walking & cycling	Mahurangi River shared path	H	L	H	H	M	H	M	H
Urbanisation of existing roads to provide walking and cycling infrastructure	SH1	H	L	H	H	M	H	M	L
	Matakana Road	H	L	H	H	M	H	M	L
	Sandspit Road	H	L	H	H	M	H	M	L
	Woodcocks Road	H	L	H	H	M	H	M	L
	Key collectors	H	L	M	H	M	H	M	L
New infrastructure	Western Link Road	H	M	H	M	M	H	M	H
	Wider Western Link Road	H	M	H	M	M	H	M	L
	Sandspit Link Road	H	M	H	M	M	H	M	L
	Southern Interchange	L	H	L	M	H	H	M	M

*Investment objectives

- IO1: Maintain reliable access to local economic and social opportunities and core services at 2016 levels
- IO2: Maintain reliable access to strategic public transport services, freight and inter-regional trips on strategic corridors, at 2016 levels
- IO3: Deliver a transport system timed to integrate with FULSS staging, that enables a quality urban and natural environment in Warkworth
- IO4: Provide safe, resilient, and attractive travel choices that achieve a morning peak mode share of 26%¹⁸ for active modes and public transport and reduce private vehicle travel for all trips by 15% overall.

¹⁸ 26% is based on the Warkworth specific targets set out in the PBC, e.g. 10% for public transport, and 15.8% for active modes.

8.4 Staging of implementation

This section describes the proposed approach to staging the implementation of the recommended network. The staging responds to the desired FULSS timings which indicate three releases of land in Warkworth north (2022), Warkworth south (2028-2032), and Warkworth north east (2033-2037).

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

8.4.1 Stage 1 (2018-2028)

Stage 1 projects (Figure 45) will support 1st decade land release (area for release broadly shaded in blue) in the north and will actively encourage mode shift and provide resilience to the network.

- Western Link Road North and South.** The southern component is likely to use the existing Evelyn Street to connect to Woodcocks Road. There may be challenges to be addressed here due to the recently developed nature of this area, which includes housing.

- s9(2)(j) and 9(2)(b)(ii)**
 [Redacted text block]

Figure 45: Stage 1 implementation (2018-2028)



- Connection to SH1 south provides an important alternative corridor to the existing SH1, improving the resilience and performance of the network
- Mansel Drive** recommended for an upgrade, although a staged approach may be appropriate with additional capacity provided in a later decade as additional growth occurs.
- Mahurangi River shared path** is recommended in Stage 1 to support land release and encourage immediate walking/cycling behaviour in new residents and workers. It will address a significant perception that walking and cycling is not safe in Warkworth currently. It connects

key activities – schools, playing fields, town centre – and can be delivered sooner and more easily than improvements to existing SH1 or Woodcocks Road

- **Park and ride (interim)** required in Stage 1 to support mode shift to public transport, particularly for longer distance travel to the south.
- **Operational demand management measures** provided to complement Stage 1 projects as they are implemented.

8.4.2 Stage 2 (2028-2038)

Stage 2 projects (Figure 46) will support 2nd decade land release (area for release broadly shaded in blue) in the south and will contribute to better access to the town centre and the motorway.

- **Southern Motorway Interchange and Wider Western Link Road** to be implemented as lead infrastructure to support release of land in south Warkworth especially the business land which will help Warkworth operate as a satellite centre while also increasing network resilience
- **Public Transport Interchange** (ultimate) located adjacent to proposed local centre and high-density residential activity and park and ride located near the Southern Motorway Interchange.

At this time the bus network will change from an interchange in the town centre (as per Stage 1) to the location near the southern local centre. Significant reductions in operating costs can be achieved, along with improved routing options and provision of a network that benefits locals trips if buses are routed via Southern Motorway Interchange instead of north. Relocation further encourages increased PT usage in the southern FUZ land.

- Providing a dedicated bus facility away from the town centre reduces the need to terminate and layover buses here, allowing for a more efficient use of space within the town centre.
- **Upgrade SH1 and Woodcocks Road** to urban arterial standard including footpaths and separated cycle facilities, the former occurring after the Western Link Road is fully operational as a four-lane route. s9(2)(j)

- **Upgrade key collectors to provide dedicated walking and cycling facilities.** Also includes constructing the missing section of Alnwick Street. Provides alternative access to town centre, reducing demand on Whitaker Road.
- **Operational demand management measures** provided to complement Stage 2 projects as they are implemented.

Figure 46: Stage 2 implementation (2028-2038)

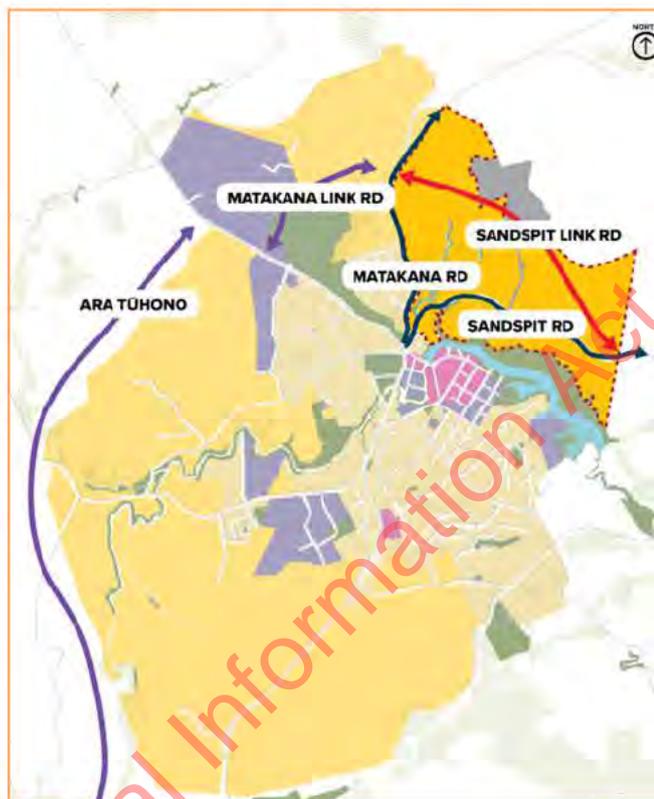


8.4.3 Stage 3 (2038+)

Stage 3 projects (Figure 47) will support third decade land release (area for release broadly shaded in blue) in Warkworth and will provide for strategic through trips and walking and cycling.

- **Sandspit Link Road** provides strategic connection from Snells Beach, Algies Bay, connecting to Matakana Link Road – Te Honohono ki Tai and Ara Tūhono, avoiding Hill Street intersection.
- **Urbanise Matakana and Sandspit Roads** to urban arterial standard including footpaths and separated cycle facilities. Required to support the urbanisation of this area.
- **Operational demand management** measures provided to complement Stage 3 projects as they are implemented.

Figure 47: Stage 3 implementation (2038+)



8.5 What's changed since TFUG?

The TFUG PBC identified a comprehensive transport network for Warkworth which centred around improving the liveability of Warkworth through improving access to jobs, environment, travel choice, and economic growth. This section compares the differences between the infrastructure proposed in TFUG and the infrastructure proposed by this IBC (Figure 48).

Table 15 sets out the elements of the network that have been further tested and developed since the PBC and are consistent between the PBC and IBC.

Table 15: Elements consistent between the PBC and IBC

Infrastructure	Description	Changes to option (if any)
Western Link Road (previously called the Western Collector)	North-south arterial west of existing SH1	Option development and traffic modelling indicates high demand for north-south movement in the Warkworth FUZ which justify provision of an additional north-south arterial to SH1. s9(2)(j) [REDACTED] [REDACTED] [REDACTED]. Council's desire to increase the industrial land zoning adjacent to Woodcocks Road, and landowner consultation have informed the choice of southern alignment (Woodcocks Road to SH1).
Upgrade Mansel Drive	Existing road that forms the central section of the Western Link Road	Mansel Drive has no cycling facilities and will require additional capacity for public transport, freight, and general traffic consistent with the northern and southern extents of the Western Link Road.
Sandspit Link Road	Arterial connecting Matakana Road and Sandspit Road	This link has been assessed as providing access to the north-east FUZ area to enable development in an environmentally and topographically challenging area s9(2)(j) [REDACTED] [REDACTED] It is also an important east-west connection for through movements avoiding Hill Street and strategic traffic travelling to the Matakana and Kowhai Coasts. Choice of alignment has been informed by environmental and topographic considerations and landowner consultation.

Infrastructure	Description	Changes to option (if any)
Public transport interchange/ park and ride	Park and Ride	<p>Northern location (town centre) is recommended as an interim location for a public transport interchange/terminus, with a park and ride with bus stops around the SH1/Western Link Road (until the Southern Interchange is built).</p> <p>Recommended long term location for the park and ride (with bus stops) is in south Warkworth (next to Southern Interchange) rather than the northern location recommended in the PBC. The ultimate PT interchange/terminus will be near the local centre in the south. This is due to a better alignment with land uses in the south and easier access for Warkworth's residents by foot, bicycle, and feeder bus.</p> <p>This change in location is also linked to the provision of a Southern Interchange which supports a more efficient bus network.</p> <p>A southern location requires an interim park and ride in north Warkworth, prior to the implementation of the Southern Interchange. This interim arrangement may be required for 15 years or more.</p>
Cycle network	Comprehensive network	<p>The PBC cycle network included cycling on the following links:</p> <ul style="list-style-type: none"> • Western Collector (Western Link Road) • Matakana Link Road – Te Honohono ki Tai • Sandspit Link Road • Alnwick Street <p>The IBC has developed a more comprehensive cycle network which includes the above, plus:</p> <ul style="list-style-type: none"> • State Highway 1 • Woodcocks Road • Matakana Road • Sandspit Road • Whitaker Road/ Pulham Street/ Wilson Street/ McKinney Road • Wider Western Link Road • Mahurangi River Shared Path <p>The cycle network set out above covers the extent of the roads within the Warkworth RUB. Where footpaths do not currently exist, they will also be provided on these links.</p>

Table 16 sets out elements that have been added to the PBC network and the rationale for these additions.

Table 16: Elements added to the TFUG network

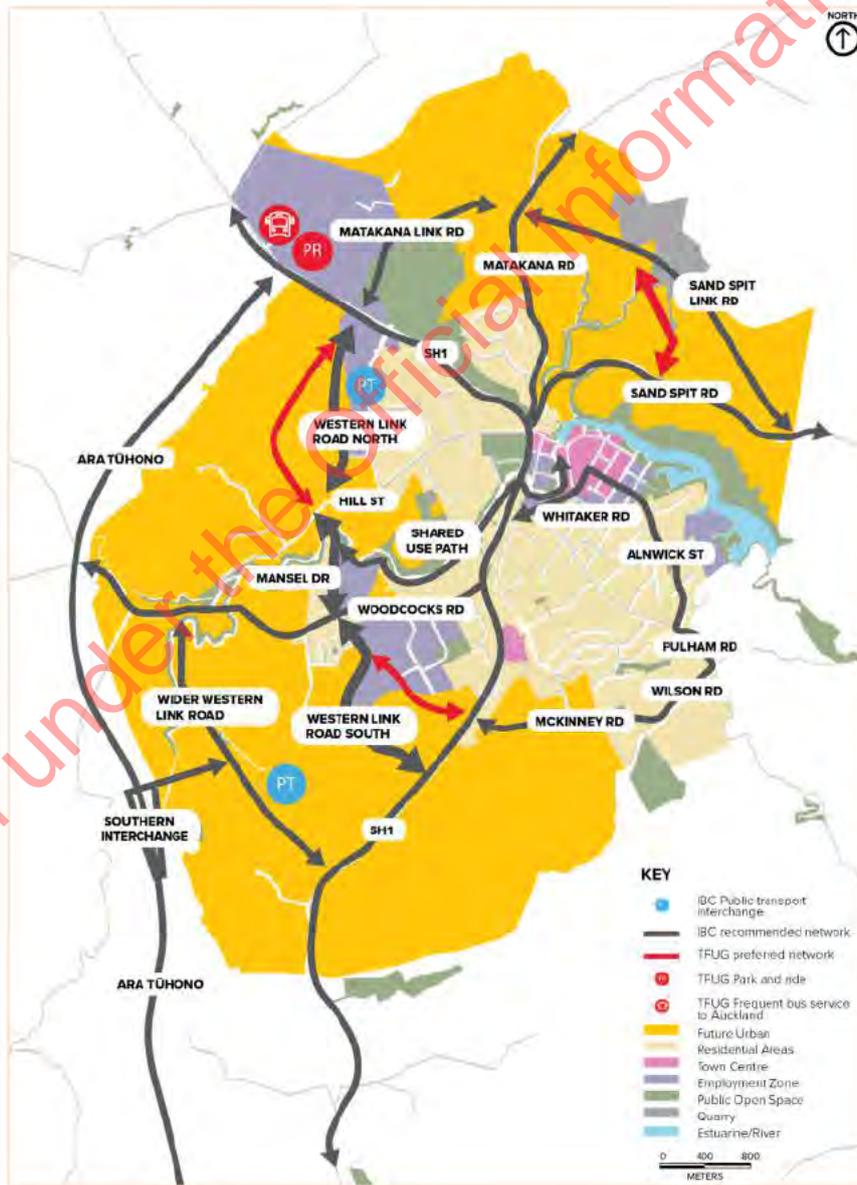
Infrastructure	Description	Rationale
More extensive walking and cycling network	See Table 15 for expanded walking and cycling network	There are no or limited footpaths and cycle facilities on existing rural roads, these are required to provide universal access and mode choice for the new growth areas.
Mahurangi River shared path	Connects from Mansel Drive through to the town centre	See Table 15 for expanded cycling network. Provides a direct east-west connection for active modes between the western FUZ land and key trip attractors including Mahurangi College, Hill Street Primary School, and existing sports fields. Positively received by public during consultation.
Southern interchange	Motorway interchange adjacent to the southern FUZ area.	IBC more detailed assessment has identified that there are increased flows on the existing SH1 south of Warkworth which a concern in terms of the safe operation of the existing SH1. The Southern Interchange is needed to increase access to south Warkworth, including business land and employment, and maintain traffic volumes on SH1 at 2018 (two-lane) levels. This creates an opportunity (along with provision of the Western Link Road) to prioritise SH1 within Warkworth for walking and cycling and create positive placemaking and urban form outcomes. The Southern Interchange also supports adjacent land uses and access to industrial land in south Warkworth, which in turn helps Warkworth operate as a satellite town. The interchange also provides for an efficient public transport network due to its association with the Park and Ride and Public Transport Interchange.
Wider Western Link Road	Arterial between Woodcocks Road and SH1	Needed to provide access to south west FUZ land and provide access to the Southern Interchange. Provides access for strategic public transport, taking pressure off the northern SH1 corridor and Ara Tūhono interchange.

Table 17 sets out the elements that were included in the PBC network but are now being implemented separately.

Table 17: Elements not included or being delivered elsewhere

Infrastructure	Description	Rationale
Matakana Link Road – Te Honohono ki Tai	Not included	Project being implemented separately by AT.
Frequent bus service to Auckland	Not included	Bus service to Silverdale has already been implemented by AT.

Figure 48: Comparison of TFUG preferred network and IBC recommended network

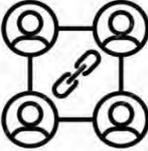


8.6 Outcomes delivered

Table 18 describes the outcomes achieved by the recommended network in relation to the measurable KPIs and investment objectives (see Chapter 6 for references). A benefits realisation plan will be developed in the next project phase to measure success against each of these outcomes.

Table 18: Recommended network outcomes

Areas	Outcome
<p>Safe, attractive walking and cycling</p> 	<p>Comprehensive walking and cycling network enables a shift to these modes of 15% overall, with commuter and school journeys forecast to have a 30% mode shift (KPI4c, Investment Objective 4).</p> <p>87% of households in Warkworth within 3km cycle of employment and local activities (KPI1a, Investment Objective 1; KPI3c, Investment Objective 3).</p> <p>All routes are qualitatively assessed to have a personal and collective risk of lower than medium through improvements delivered (KPI4a, Investment Objective 4).</p>
<p>Frequent, reliable, accessible public transport</p> 	<p>55% of people live within 400m walk and 87% live within 3km cycle of good quality and frequent public transport services, supporting mode shift for both local and strategic journeys (5%) (KPI4d, Investment Objective 4).</p> <p>Supports a public transport network that provides access to wider key destinations (Wellsford, Matakana, Snells Beach, Algies Bay). This in turn enables better achievement of Ara Tūhono objectives by using that roading asset across modes rather than just for private vehicles.</p>
<p>Resilient</p> 	<p>Good quality alternatives to existing SH1 corridor and Hill Street intersection (KPI4e; Investment Objective 4).</p> <p>Provides flexibility to respond to changes in behaviour, growth, and technology.</p>
<p>Reliable</p> 	<p>Travel time variability (between the PM peak and interpeak) across the network is reduced from 41% to 5% overall. This means access to employment, social opportunities, and core services will be more reliable than it is currently (KPI1b and KPI2a, Investment Objective 2).</p> <p>Access to the strategic network will be reliable (due to reduced travel time variability) and resilient (due to an additional access to the motorway).</p> <p>Reliable travel is a key enabler of the satellite town concept, as it will attract jobs.</p>
<p>Development ready</p> 	<p>Warkworth may be 'development ready' in the FULSS timeframes depending on regional prioritisation of greenfield growth (KPI3a, Investment Objective 3).</p> <p>Enables route protection of arterial corridors.</p> <p>Provides appropriate capacity to meet the demands of growth.</p> <p>Provides flexibility to respond to changes in development timing.</p> <p>Provides opportunities to lead with behaviour-change initiatives.</p>

Areas	Outcome
Cohesive community 	<p>Existing corridors are enhanced with active mode facilities creating people-oriented streets where more people walk and cycle.</p> <p>Public transport services hub into town centre, helping to support local businesses with high foot traffic.</p> <p>Amenity-rich residential areas are a short, safe walk or cycle from parks, schools, shops and cafes, strengthening local communities.</p> <p>Pressure on the environment is reduced through lower vehicle emissions.</p> <p>Less physical space is required for car travel and can be re-purposed for people and community places.</p> <p>Consistent look and feel of new and existing corridors deliver a cohesive environment.</p>

8.7 Dealing with uncertainty

Growth within Warkworth is staged over the next two decades. Planning for transport corridors to serve future growth over this period has some degree of uncertainty. The uncertainties for the Warkworth area have been explored in Table 19.

Table 19: Effect of uncertainty on recommended option

Uncertainty	Effect of recommended network
Changes in timing of growth Growth in the FUZ area could occur quicker (market driven, politically driven) or slower than predicted by the FULSS.	If growth occurred faster than predicted, infrastructure would need to be provided in the FUZ to respond and enable this growth. Infrastructure timing for the packages of projects to support FUZ development could change in timing according to land use timeframes.
Changes in land use type Land use type could change to include additional employment	<p>Changes in the composition of the FUZ area may impact on the ratio of local jobs to population and influence the travel demand to/from the area.</p> <p>An increase in the number of jobs in the study area would improve the job-to-household ratio, potentially leading to higher levels of internal trip making and a reduction in out-commuting to other employment centres.</p> <p>Depending on the level of increase of employment, this may result in increased in-commuting to Warkworth, although this is not expected to be at a level that would require changes to the planned transport infrastructure.</p>
Changes in yield Recent development in south Auckland has resulted in increased yields being achieved in greenfield development areas	It is feasible that yield of greenfield areas could change in the future. This could lead to a change in travel demand and behaviour.

Uncertainty	Effect of recommended network
over and above what was previously planned for	A significant change in yield could warrant review of the recommended network with potentially more infrastructure required to accommodate growth.
<p>Local networks</p> <p>The SGA programme focuses on strategic and arterial transport links. Local transport networks will be developed further through structure planning s9(2)(i)</p> <p>████████████████████</p> <p>████████████████████</p> <p>██████████</p>	<p>The quality and connectedness of the local network will have a significant impact on travel behaviour in the growth area. This is particularly the case for walking and cycling networks. Local and collector routes play an important part in ensuring legible and attractive mode choice is available.</p> <p>Public transport services are often required to make use of local transport connections to access people. The design of the local road connections can influence the reliability and attractiveness of PT services.</p> <p>If the local transport networks are not provided to an acceptable level, this could impact on the performance of the recommended network against the investment objectives.</p>

8.8 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 evaluationⁱⁱⁱ against GPS priorities. The cost benefit appraisal has been assessed as **LOW**. The analysis to support this assessment is described in Appendix D: Economic Case.

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

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

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.

The recommended Warkworth network responds to the access requirements of 7,300 new dwellings and 3,600 new employment opportunities. The network is integrated with Auckland Council's land use aspirations as captured in the draft Warkworth structure plan 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 **HIGH** results alignment against all four activity classes, as indicated by the elements in Table 15.

In addition to the Access Liveable Cities category, the recommended network 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 20: Results alignment – access liveable cities

Activity class	High results alignment
Walking and cycling improvements	<ul style="list-style-type: none"> • Supports increasing the uptake of children using walking and cycling especially to and from school – by including walking and cycling facilities along desire lines to schools. Mahurangi River path provides direct, off-road access to Mahurangi College and Warkworth Primary School. • Supports agreed integrated land use and multi-modal plans in major metros – with transport interventions that support land use, i.e. public transport interchange next to high density residential and local centre, connected with safe, attractive walking and cycling facilities. • Addresses a significant gap in access to new housing in high growth urban areas – 87% of future Warkworth residents will be within 3km of employment opportunities using safe, attractive, separated cycle facilities.
Public transport improvements	<ul style="list-style-type: none"> • Addresses significant gap in access to new housing in high growth urban areas - 55% of future Warkworth residents will live within 400m of reliable, frequent public transport services. • Supports agreed integrated land use, multi-modal plans and mode shift in major metros – public transport interchange provided adjacent to local centre, high density residential activity and potential new school site. Strong walk-up catchment. • Improves intermodal connectivity where this enhances the appropriate use of public transport – Park and ride facility provided to enable rural residents to transfer to public transport services, particularly for longer distance travel to Hibiscus Coast station and beyond. Secure cycle parking to be provided at PT interchange. Good walk-up catchment to PT interchange from proximity of high density residential and local centre. • Makes best use of the public transport service operations and connection to other services – public transport service is designed to connect rural centres (Wellsford, Matakana, Leigh, Snells Beach, Algies Bay) with Warkworth town centre and the town centre to Hibiscus Coast station. All services to hub through town centre, enabling good quality connection to other services and maximising walk-up demand and foot traffic to local retail. When southern motorway interchange is provided, services will use this route, significantly reducing operating costs associated with longer travel distance to northern motorway interchange.
Promotion of demand management programmes	<ul style="list-style-type: none"> • Targets opportunity to establish and promote active modes or public transport access to new housing in high growth urban areas – Warkworth has several very active community groups. Programme identifies opportunities to work with these groups to promote active modes and public transport use once services and facilities are in place. Facilities designed to directly connect schools, retirement villages and the town centre mean that potential users can be more specifically targeted.
Road improvements	<ul style="list-style-type: none"> • 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.

9 Economics

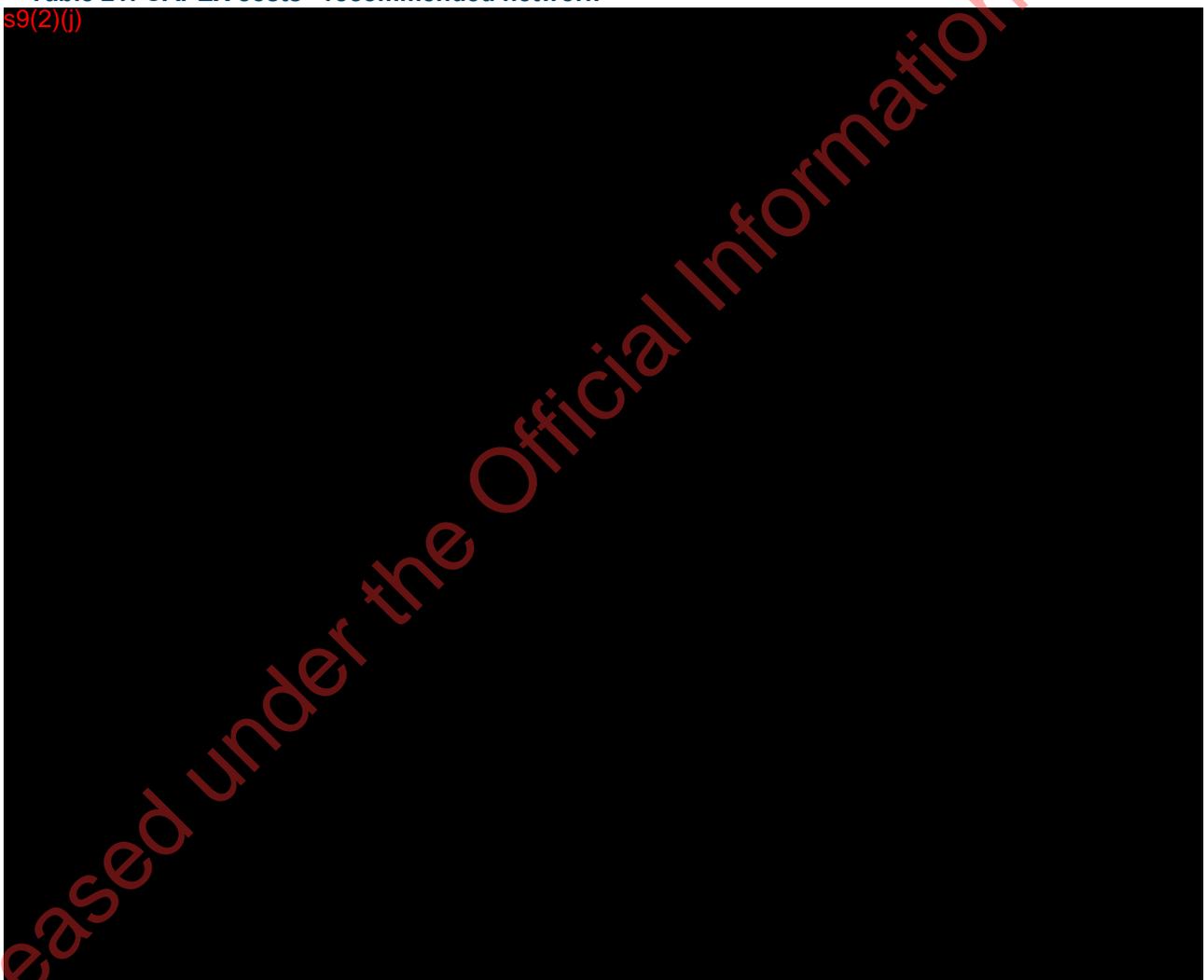
This section sets out the costs, benefits, and BCR for the recommended network. Further detail on the economic analysis undertaken can be found in Appendix D: Economic Case. Further detail on the cost estimating approach can be found in Appendix E: Design and Cost Report.

9.1 Costs

The capital and operating costs (CAPEX and OPEX, respectively) of options were developed and considered through the option selection process. Individual project elements comprising the recommended network were priced to an Indicative Business Case Estimate (IBE) level. These costs have been peer reviewed by Bonds CM. Table 21 summarises the CAPEX costs of the recommended network.

Table 21: CAPEX costs - recommended network

s9(2)(j)



¹⁹ Cost line includes southern park and ride site

9.1.1 Operating and maintenance costs

OPEX has been calculated as outlined in Appendix D: Design and Cost Report. OPEX costs have been provided in a Net Present Value (NPV) format as there are varying costs per year due to renewals that make it difficult to provide a typical yearly figure. All NPV figures have been calculated over a 40-year period. Table 22 summarises the OPEX costs for the recommended network.

Table 22: Operating and maintenance costs – recommended network

Item	Cost (\$M)
General infrastructure maintenance (annual) and bridges maintenance (after 10 years)	s9(2)(j)
Resurfacing (every 10 years)	
Ongoing operational demand management measures (annual)	

Table 23 sets out the present value of these costs.

Table 23: Present value costs (discounted million NZ\$)

s9(2)(j)

9.2 Benefits

The economic benefits of the recommended network are summarised in Table 24.

Table 24: Economic benefits – recommended network

Item	Recommended network
Travel Time Costs	530
Congestion Costs	105
Trip Reliability	25
Vehicle Operating Costs	80
Accident Costs	60
Active Modes	20
Public Transport Benefits	5
CO2	5
Agglomeration benefits	80
PV total net Benefits	910

These benefits show a typical pattern of benefits seen on many transport projects, with travel time savings the principal area of benefit. Safety benefits are comparatively low due to the limited existing safety issues in the area.

9.3 Benefit Cost Ratio (BCR)

The BCR was calculated using the NPV benefits and costs described above. It is set out in Table 25.

Table 25: Benefit cost ratio – recommended network

Item	Cost (\$M)
s9(2)(j)	
Benefit Cost Ratio	1.2

This demonstrates a sound economic case to support the Warkworth recommended network with a BCR greater than 1.0.

9.4 Sensitivities

A range of sensitivity tests have been carried out. The results of these tests are presented in Table 26.

Table 26: Sensitivity tests

Sensitivity	Test 1	Test 2	Test 3
Discount rate	Base Case 6%	Discount Rate 4%	Discount Rate 8%
	1.2	1.6	1.0
Benefits progression	Base Case (2036 @ 50% of 2046)	2036 @ 25% of 2046	2036 @ 75% of 2046
	1.2	1.1	1.5
Cost estimate	Expected Case (P50)	P95 cost	Optimistic (20% lower than p50)
	1.2	1.0	1.5
Postponed time zero	Base Case (2024)	Time Zero 2028	Time Zero 2034
	1.2	1.5	1.8
Wider economic benefits	Base Case (10%)	Pessimistic (5%)	Optimistic (20%)
	1.2	1.2	1.3

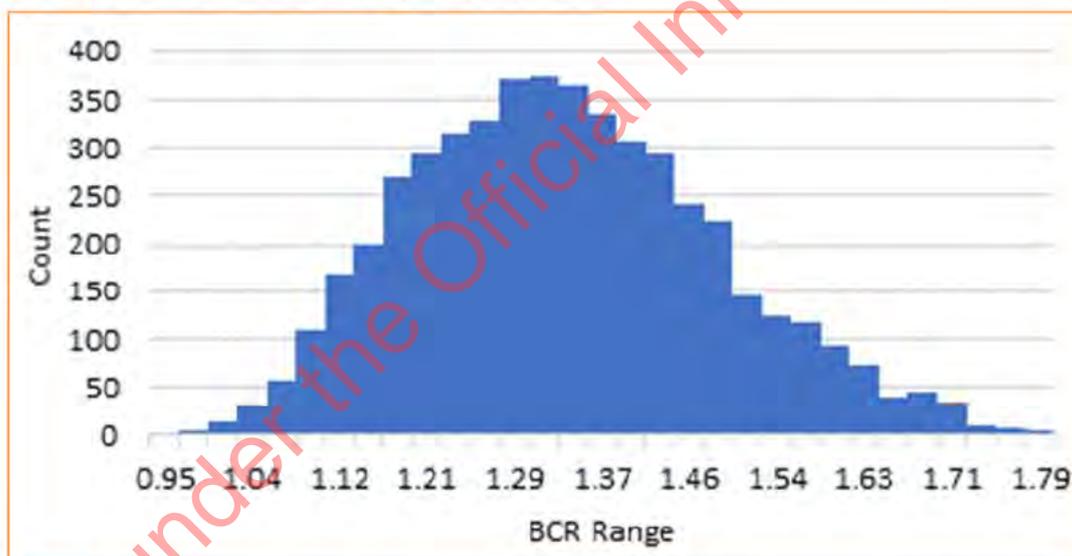
9.5 BCR risk analysis

A risk analysis has been undertaken to assess the likely BCR range of the recommended network. This risk analysis was based on a high-level risk-based Monte Carlo analysis approach. The Monte Carlo 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.** A major assumption around the benefit progression has been made for the economic analysis. The analysis assumed that the benefits in 2026 and 2036 will be 5% and 75% of the 2046 benefits respectively. A low of 0% (year 2026) and 50% (year 2036), and a high of 15% (year 2026) and 80% (year 2036) have been included in the Monte Carlo analysis based on a triangular probability distribution.
- **Hill Street improvement for vehicles.** The extent of improvement on Hill Street may have an impact on the benefits. The preferred option currently has s9(2)(j) million benefits assuming no improvements at the Hill Street intersection. s9(2)(j) million benefit has been assumed on the lower scale (based on a transport model with Hill Street vehicle improvements) and s9(2)(j) million adopted for the higher scale in the Monte Carlo analysis, based on a triangular probability distribution.

Based on the Monte Carlo analysis with 5,000 iterations, a BCR distribution range was developed. The recommended network has a BCR range between 1.1 and 1.6 (based on 5th and 95th percentile Monte Carlo analysis output distribution profile).

Figure 49 - Recommended network BCR distribution



9.6 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 Warkworth are generally individual sections that collectively form a transport network in Warkworth 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.

9.6.1 Scenario testing

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. The affordability of the recommended network is acknowledged as the main barrier to approval and implementation at this time. To that end, a series of alternative scenarios have been put forward that 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 expected estimate cost for the Warkworth recommended network is **9.2 million**. The recommended network delivers HIGH results alignment and a benefit cost ratio of **1.2**.

Four scenarios have been tested to explore alternative investment scenarios as follows:

Scenario 1 – No new roads

Scenario 1 consists of:

- Urbanisation of existing arterial roads to include separated walking and cycling access
- Mahurangi River shared path
- Public transport interchange/ park and ride only
- All motorway access would be via the northern interchange
- No new roads.

Scenario 2 – Western Link Road only

- As Scenario 1 but including the Western Link Road at 32m (4-lane) cross section.

Scenario 3 – Southern Interchange and two-lane roads

- As Scenario 2 but including all new arterials and the Southern Interchange at 25m (2-lane) cross sections.

Scenario 4 – Southern Interchange, two-lane roads, no cycling infrastructure

- As Scenario 3 but all cross sections are 20m (2-lanes). Only footpaths and no cycle facilities provided.

The costs, benefits, and disbenefits of each scenario are summarised below. Appendix M provides additional detail on each scenario.

This analysis has shown that while there are less costly, and therefore arguably more affordable, options they do not deliver the outcomes sought as well as the recommended network, nor do they make economic sense. This confirms that the recommended network is the appropriate package of works to support growth in Warkworth. Closing the affordability gap is therefore a substantive focus of subsequent stages of the recommended network's development.

Scenario	Benefits	Disbenefits	Alignment with Investment objectives				Alignment with GPS priorities			
			1. Local access	2. Strategic access	3. FULLS timing	4. Mode choice	Safety	Access	Environment	Value for Money
2	<ul style="list-style-type: none"> Reduced cost to AT and the Transport Agency Western Link Road provides strategic alternative to existing SH1 corridor and direct connection to Matakana Link Road – Te Honohono ki Tai. Provides some local network resilience by spreading demand across two corridors instead of just one. Improved walking and cycling facilities provided to encourage some mode shift away from single occupant vehicles. Estimated total cost (PV) = $\\$9(2)(0)$ <p>Estimated AT/the Transport Agency cost ($\\$9(2)(0)$) = $\\$9(2)(0)$</p>	<ul style="list-style-type: none"> $\\$9(2)(0)$ Land may not be able to be developed due to high infrastructure costs. $\\$9(2)(0)$ Corridors may never be constructed. All vehicle, pedestrian, cycling and public transport traffic must use a limited road network until new roads are provided by developers. Collector roads in south-east Warkworth are not upgraded and all access to the town centre is via Whitaker Road and Pulham Road which are both congested, the former severely. Lack of investment here means there are very limited walking and no cycling facilities to access the town centre which is likely to compound existing access and parking issues. Poor urban form and placemaking outcomes. Some economic benefits. Estimated economic benefits (PV) = $\\$9(2)(0)$ <p>BCR = 1.0 (National) BCR = 1.1 (Government)</p>	M	L	L	L	L	M	L	L
3	<ul style="list-style-type: none"> Reduced cost to AT and the Transport Agency. 	<ul style="list-style-type: none"> Only marginal reduction in cost as most new corridors already recommended to have only 2 traffic lanes. 	M	M	M	L	L	L	L	L

Scenario	Benefits	Disbenefits	Alignment with Investment objectives				Alignment with GPS priorities			
			1. Local access	2. Strategic access	3. FULLS timing	4. Mode choice	Safety	Access	Environment	Value for Money
	<ul style="list-style-type: none"> All new arterial connections are provided, enabling land to be released for development. Improved walking and cycling facilities provided to encourage some mode shift away from single occupant vehicles. Estimated total cost = \$9(2)(0) <p>Estimated AT/the Transport Agency cost \$9(2)(0)</p>	<ul style="list-style-type: none"> Western Link Road is less effective in reducing traffic on SH1. SH1 corridor is very congested and the opportunity to realise walking, cycling, and placemaking outcomes in this corridor are lost. Congestion is likely to affect public transport and freight movements, impacting mode shift and reducing the attractiveness of Warkworth as a place to live and do business. Collector roads in south-east Warkworth are not upgraded and all access to the town centre is via Whitaker Road and Pulham Road which are both congested, the former severely. Lack of investment here means there are very limited walking and no cycling facilities to access the town centre which is likely to compound existing access and parking issues. Some economic benefits. Estimated economic benefits (PV) = \$9(2)(0) <p>BCR = 0.8 (National) BCR = 1.1 (Government)</p>								
4	<ul style="list-style-type: none"> Reduced cost to AT and the Transport Agency All new arterial connections are provided, enabling land to be released for development. 	<ul style="list-style-type: none"> No cycling facilities are provided. Reduced mode shift away from single occupant vehicles is anticipated. Business as usual outcome. Very limited investment in mode shift. 	L	M	M	L	L	L	L	L

Scenario	Benefits	Disbenefits	Alignment with Investment objectives				Alignment with GPS priorities			
			1. Local access	2. Strategic access	3. FULLS timing	4. Mode choice	Safety	Access	Environment	Value for Money
	<ul style="list-style-type: none"> Estimated total cost = $£9(2)(0)$ Estimated AT/the Transport Agency cost $£9(2)(0)$ 	<ul style="list-style-type: none"> Collector roads in south-east Warkworth are not upgraded and all access to the town centre is via Whitaker Road and Pulham Road which are both congested, the former severely. Lack of investment here means there are very limited walking and no cycling facilities to access the town centre which is likely to compound existing access and parking issues. Some economic benefits. Estimated economic benefits (PV) = $£9(2)(0)$ <p>BCR = 0.9 (National) BCR = 1.7 (Government)</p>								

PART C – IMPLEMENTATION

10 Implementation

This section describes the preliminary property and statutory approval strategies for the recommended option.

10.1 Property approach

A preliminary property analysis has been developed for this project. This is included as Appendix J: Property Strategy. s9(2)(j)

implement the recommended network of improvements for Warkworth. Cost estimates have been prepared to acquire this property and are provided in Appendix J: Property Strategy. 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.

s9(2)(j)



10.2 Route protection strategy

This IBC contains a preliminary route protection strategy (Appendix K) for the recommended area-based network, developed with the assistance of a Technical Guidance Note that sets out a methodology for identifying potential route protection packages on the basis of 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

s9(2)(j)



protection, namely **identification**, **communication** and **formal protection**. These layers are discussed in greater detail in the **Programme Wide Management Case** document.

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.

Appendix K for this IBC identifies NoRs as the ultimate form of route protection for the majority of recommended network components, along with some plan change processes and a number of 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 in Appendix K 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 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.

Appendix K needs to be read in the context of these next steps, on the basis that 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.

10.2.1 Summary of preliminary approach to route protection

A preliminary property analysis has been developed for this project. s9(2)(j)

s9(2)(j) to implement the recommended network of improvements for Warkworth. Cost estimates have been prepared and are in Appendix J: Property Strategy.

A preliminary route protection strategy has been developed for Warkworth and included within Appendix K: Route Protection Strategy. The recommended network has been divided into five potential route protection 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. Packaging and priority is likely to change as a result of programme-wide review across all four IBCs and feedback from the owner investors in relation to programme affordability.

Table 28: Preliminary approvals packages – recommended network²¹

Package	Components	Mechanism	Priority	Requiring authority
W1 New arterials and new interim park and ride	Western Link Road North	s9(2)(j) NoR	High	AT
	Western Link Road South	NoR	High	AT
	Upgrade to Mansel Drive	NoR	High	AT
	Sandspit Link Road	NoR	Medium	AT
	Interim park and ride	NoR (if required)	High	AT
W2 Upgrades to arterials	State Highway 1 upgrade – widening to add active modes and public transport (include Hill Street bridge)	NoR alteration	High	TBC at the next stage
	Woodcocks Road	NoR	High	AT
	Whitaker Road	NoR	High	AT
	Matakana Road	NoR or potential for delivery via 'business as usual' consents teams	Medium	AT

²¹ Operational demand management measures do not require statutory approvals and therefore are not included in Table 28.

Package	Components	Mechanism	Priority	Requiring authority
	Sandspit Road	NoR or potential for delivery via 'business as usual' consents teams	Medium	AT
W3 Interchanges	Southern Interchange	NoR/alteration	Medium/high	Transport Agency
	South public transport interchange	NoR	Medium	AT
	Wider Western Link Road	NoR	Medium	AT
W4 Collector Road Improvements	McKinney Road, Wilson Road, Pulham Road, Alnwick Road	Unknown at this stage (AT)	Medium	TBC at the next stage
W5 Cycleways along waterways	East-west cycleway connection along streams	Unknown at this stage (Council)	Medium/high	TBC at the next stage

11 Financial case

This section sets out the financial case for both route protection of the recommended network and ultimate implementation of the network.

11.1 Cost of route protection

This IBC seeks funding to progress to DBC and route protection for the recommended network. The recommended network will require further investigation with a route protection approach recommended.

The cost and funding required for this next step can be described as follows:

11.1.1 DBC and NOR costs

Route protection using Notices of Requirement (NOR) is the recommended mechanism for several projects identified in the recommended package. The IBC seeks to progress the recommended package to the next phase including further investigation (DBC) and NOR. For Warkworth, the **DBC and NOR phase** for the recommended network is expected to cost s9(2)(j)

11.1.2 Expected property costs from NORs

Once a designation is in place, history suggests a proportion of the total property required will be purchased by the requiring authority (further described in Appendix J: Property Strategy).

s9(2)(j)

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 the recommended package results in an estimated property liability as summarised in Figure 50.

Figure 50: Estimated property liability scenarios

s9(2)(j)



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.

s9(2)(j)

11.2 Early route protection – return on investment

An approach has been developed to quantify the return on investment associated with early route protection. s9(2)(j)

s9(2)(j)

The following assumptions have been made:

- Early route protection would be in place by 2020
- Late route protection would be in place by 2027

s9(2)(j)

- Escalation in property price has been tested at 0% (low) and 10% (high) per annum
- Early route protection requires acquisition of property early (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.

s9(2)(j)

While this assessment will need to be confirmed with project specific details and timing, s9(2)(j)

Financial benefits of route protection must be considered against other benefits and management issues.

s9(2)(j)

11.3 Recommended network cashflow

11.3.1 Financial case uncertainty

The financial case and particularly the cost and critical property liability aspect (given the route protection focus) is based on several 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.

11.3.2 Capital costs for recommended network

A cost estimate for the recommended network has been developed and is reported in detail in Appendix E: Design and Cost Report. Costs have been developed for each project element, as described in Section 9.

For the recommended Warkworth package, costs are as follows:

- Property and land costs of approximately \$9(2)(j) (included in the costs below).
- Total estimated capital costs in the range of \$9(2)(j)

The higher end of the capital cost range indicated above represents the P50 cost estimate. The lower end of the range indicates the potential cost to investors once developer contributions and value engineering opportunities have been realised, see Sections 11.8 and 11.10 respectively.

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

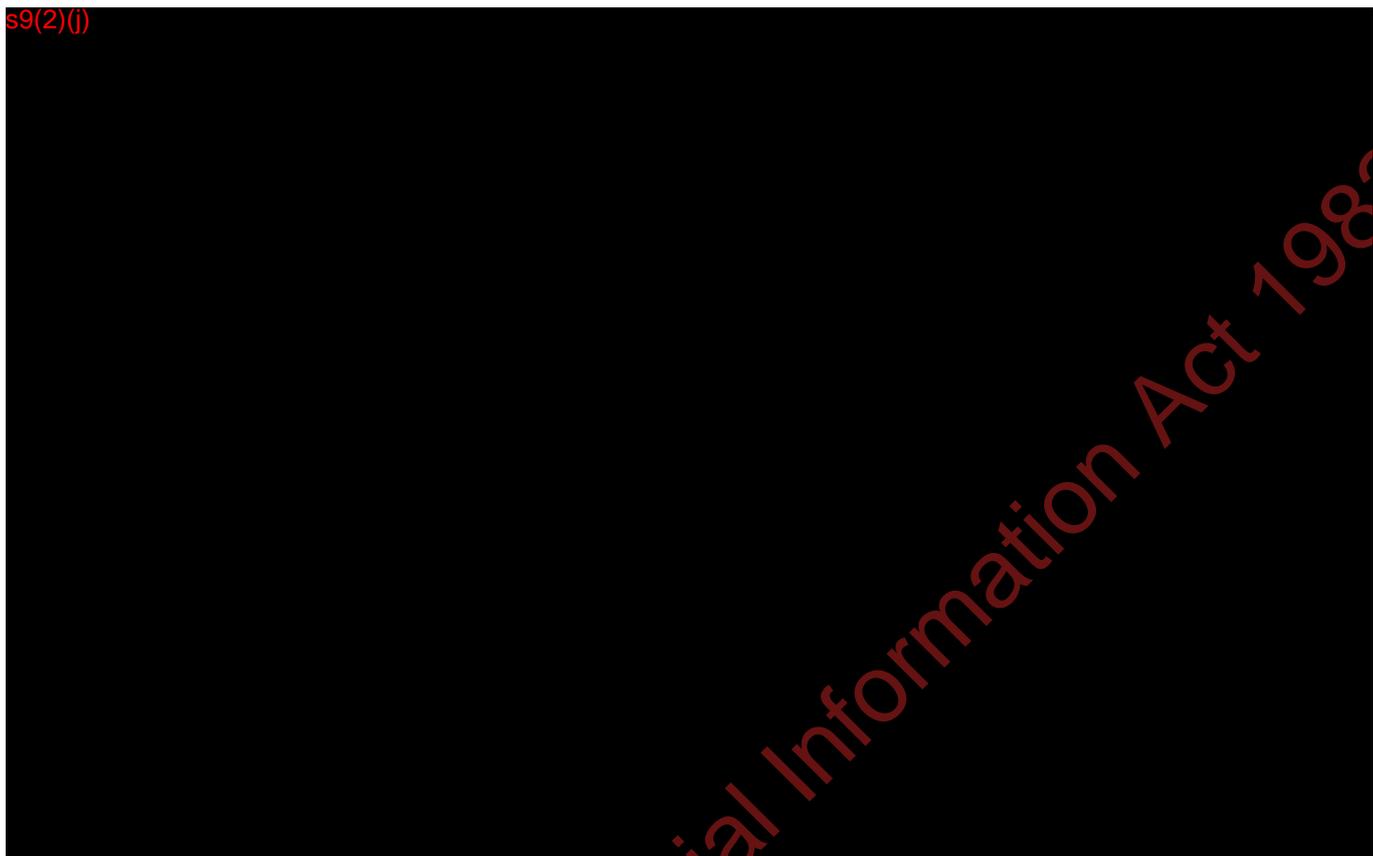
These costs have been peer reviewed by BONDCM and are within 3-4%.

11.4 Cash flow

Based on current estimates, the anticipated cash flows for the investment proposal over its intended life span are summarised in Figure 50. Costs will be spread over multiple decades, based on the staging outlined in Section 8.3, and will be shared between the Transport Agency, AT and other parties according to the assumptions previously stated.

A substantive portion of the costs relate to upgrading existing arterial corridors, of which much 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 51: Cash flow for recommended network



11.5 Ongoing operations and maintenance costs

Operations and maintenance costs for the recommended option are set out in Table 29.

Table 29: Ongoing annual costs

Item	Recommended network (\$M)
General infrastructure maintenance (annual) and bridges maintenance (after 10 years)	s9(2)(j)
Resurfacing (every 10 years)	
Operational travel demand management measures (annual)	

11.6 Cost by area

The recommended network includes projects serving existing communities in the Warkworth area and the FUZ. Costs for the recommended network has been split based on if a project primarily serves the existing area of the FUZ area. The following assumptions have been made:

- All infrastructure geographically within the growth area has been assigned to the FUZ area.
- All infrastructure geographically within the existing area has been assigned there.
- A project which responds to an existing problem but is made worse by the growth area has cost split evenly between the existing and FUZ areas.

Costs by decade for the existing area and FUZ area are outlined in Figure 52.

Figure 52: CAPEX (P50) split by area



11.7 Cost comparison with PBC

The projected estimate for the recommended network is s9(2)(j). This includes the total cost of implementation of the recommended network, including items which Te Tupu Ngatahi will not deliver route protection for, such as the key collector network upgrades.

This cost is considerably greater than the cost of the TFUG PBC preferred package of s9(2)(j).

The increased costs s9(2)(j) can be attributed to three key differences:

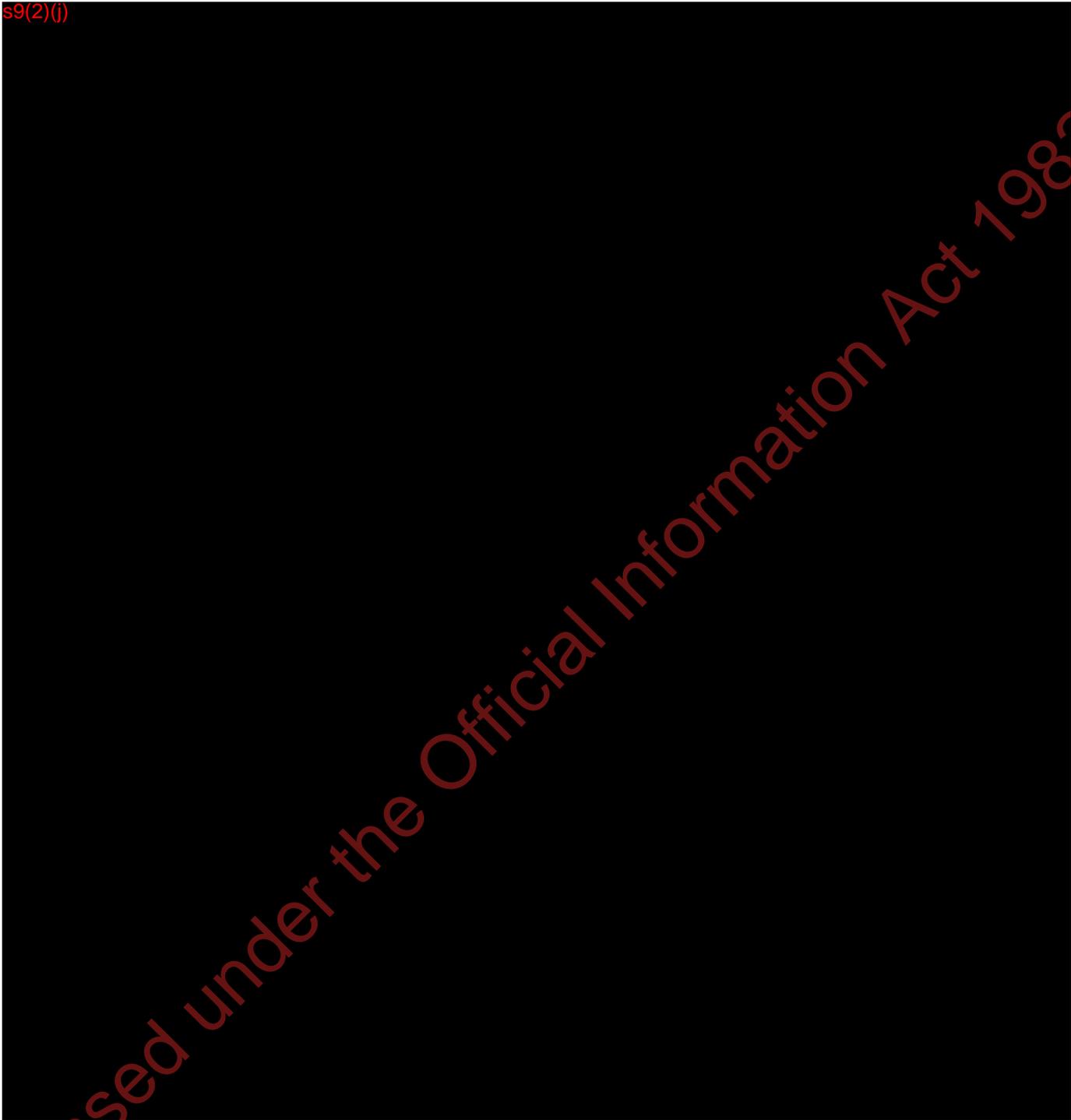
- Upgrades to existing roads are included in the IBC, but were not included in the PBC - s9(2)(j)
- Additional infrastructure is recommended (motorway interchange, Wider Western Link Road and Mahurangi River shared path) - s9(2)(j)
- Increased cost estimates for PBC projects - s9(2)(j)

A cost comparison was undertaken for those projects that are common between the PBC and IBC. The two estimates vary significantly in terms of total scope, and the current IBC estimates include more detail and greater cost provision for specific items, particularly for earthworks, structures, intersections and traffic management. While individual rates vary across specific items, the review found that broader rates were comparable. Detailed analysis is provided in Appendix E: Design and Cost Report.

Table 30 compares physical works costs between the PBC and IBC and includes property costs.

Table 30: Comparison of PBC and IBC cost estimates (IBE level)

s9(2)(j)



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To understand the difference in costs between the PBC and the IBC, a detailed comparison of estimates has been prepared for **Sandspit Link Road**, as this project is consistent between programmes. The key differences are set out in Table 31.

Table 31: Differences between PBC and IBC cost estimates for Sandspit Link Road

s9(2)(j)

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11.8 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 in a Programme Wide Summary note which sets out the work done in this area and the approach to this critical issue in the next stage of the programme development (DBC).

11.9 Opportunity savings from developers

There is potential for some new arterial roads to be partially funded by property developers as part of a package of development contributions. AT usually require new developments to construct identified roads to a collector road standard to mitigate the effects of their development, based on an agreed cross-section, which is then vested to public ownership. In the first decade, there is potential for the

Western Link Road to be partially funded in this way. Similarly, in the second and third decade, there is potential for the Wider Western Link Road and Sandspit Link Road to also be partially funded in this way.

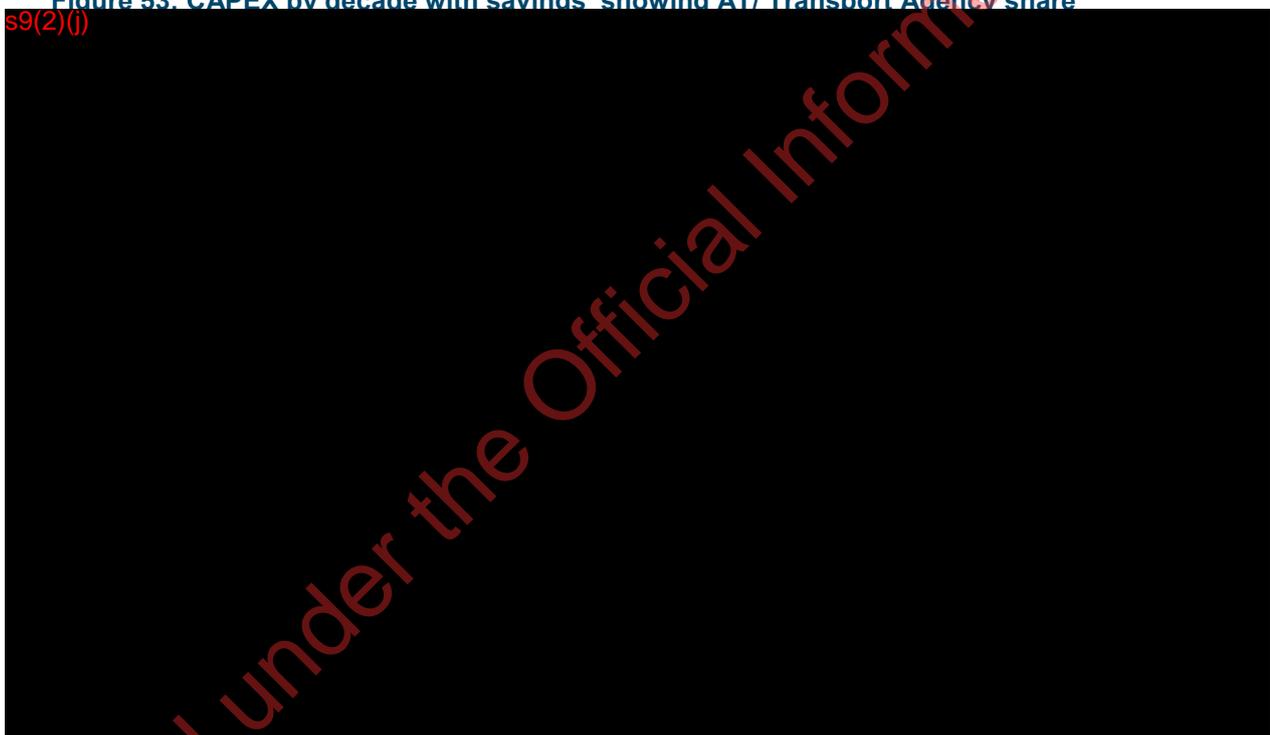
This approach would greatly reduce the implementation cost to AT and the Transport Agency. When determining the opportunity for a reduction in capital cost over the full Warkworth recommended network, the following assumptions have been made:

- s9(2)(j) [REDACTED]
- [REDACTED]
- Active mode and strategic road corridors are fully paid by AT and the Transport Agency.

s9(2)(j) [REDACTED] Details of this analysis are provided in Appendix E: Design and Cost Report.

The required funding is set out in Figure 53 taking account of proposed implementation timeframes and reductions in cost from developer related savings.

Figure 53: CAPEX by decade with savings showing AT/ Transport Agency share



11.10 Cost sharing

The Transport Agency is typically responsible for costs associated with:

- State highway improvements
- Motorway interchanges and ramps
- 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 54.

s9(2)(j) potential for cost optimisation during the DBC phase, projects serving existing areas and remaining funding required from AT or the NLTF. The assessment of cost optimisation looked at a reduction in cost to the recommended network because of:

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

Given most of this funding is required outside the current RLTP period, there is time to further consider the funding requirements and how this could be addressed. The funding requirement for the Warkworth growth area is substantial and consideration of alternative funding sources is recommended.

Figure 54: Total funding requirements for the recommended network (NZD\$)



11.11 Funding shortfall

ATAP includes the following commentary with respect to the Supporting Growth Programme of works:

- \$1.3billion 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.
- ATAP identified a funding challenge for decades two and three of the proposed programme.

The 2018-2028 Auckland Regional Land Transport Plan (RLTP) has \$275million allocated for greenfield transport infrastructure projects.

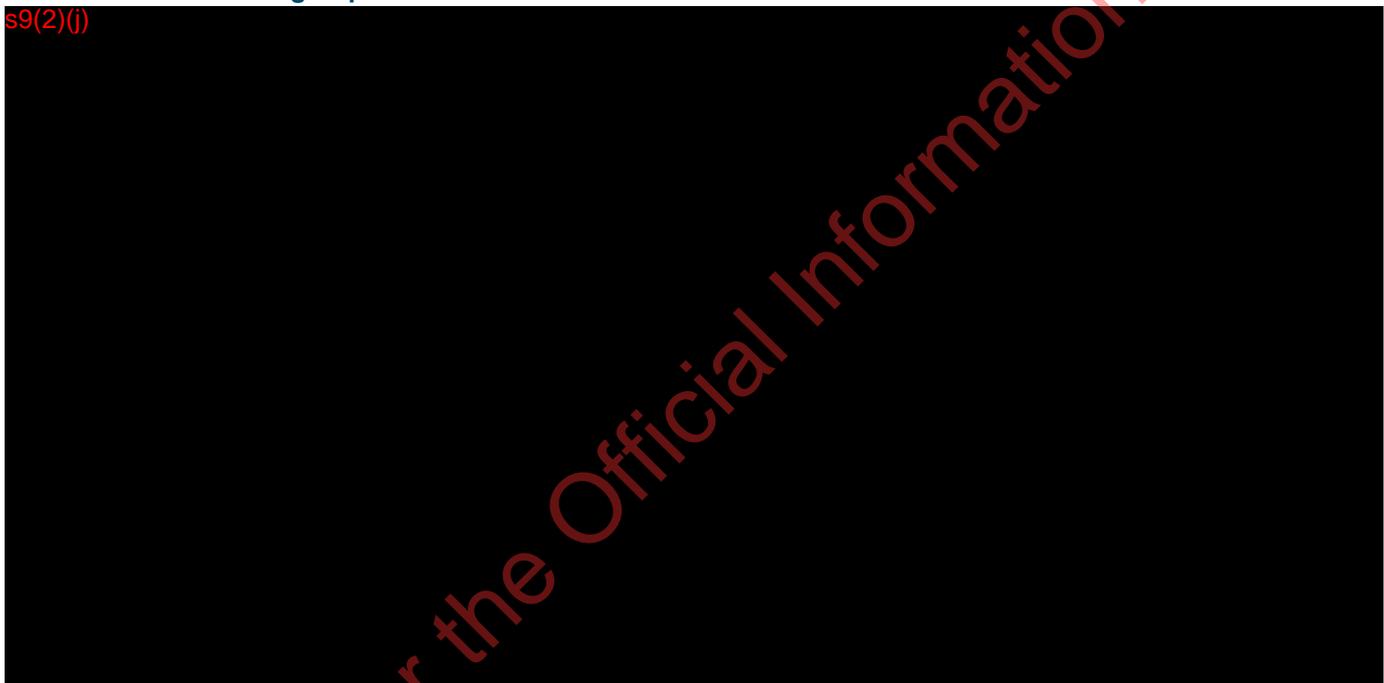
s9(2)(j)



As the RLTP allocates funding for a 10-year period, costs for the recommended network within the first decade are shown in Table 32 with commentary on likely funding sources provided.

Table 32: Funding required within first decade

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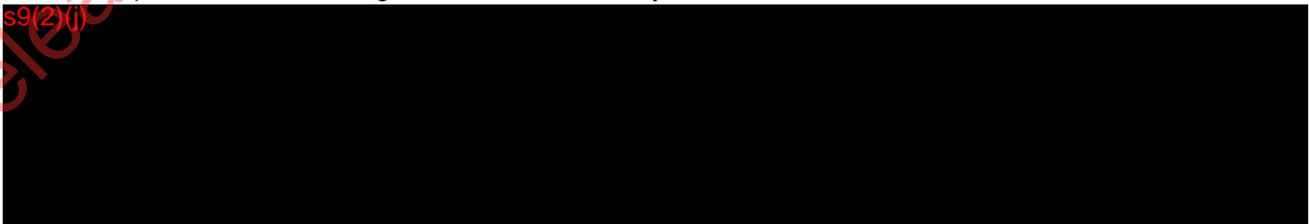
s9(2)(g)(i)



11.12 Programme wide affordability

Investment within the currently 10-year period has also been considered across the Programme and this is presented in the Programme Wide Summary note.

s9(2)(j)



11.13 Alternative funding sources

There are several different investigations currently underway by Treasury, Ministry of Transport and others to consider the mechanisms for the future funding of infrastructure. This includes consideration of:

- 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.

Value capture is a potential option that has stronger merit for these growth focused projects; however, until a mechanism is developed across the region it remains a concept rather than a tangible funding option. s9(2)(i)

[REDACTED]

[REDACTED]

[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, as outlined in the Programme Wide Management Case, 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.

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. As well as this IBC specific management plan a Programme Wide Management Case has been developed that sets out the management of the programme elements of this programme of works.

12.1 Programme governance

Te Tupu Ngātahi has been formed to deliver route protection for the preferred 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 55.

The Governance Management Plan describes the key roles and responsibilities of each of these groups.

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 project 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. These change controls and Te Tupu Ngātahi's own 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 to ensure 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.

Figure 55: Te Tupu Ngātahi governance structure



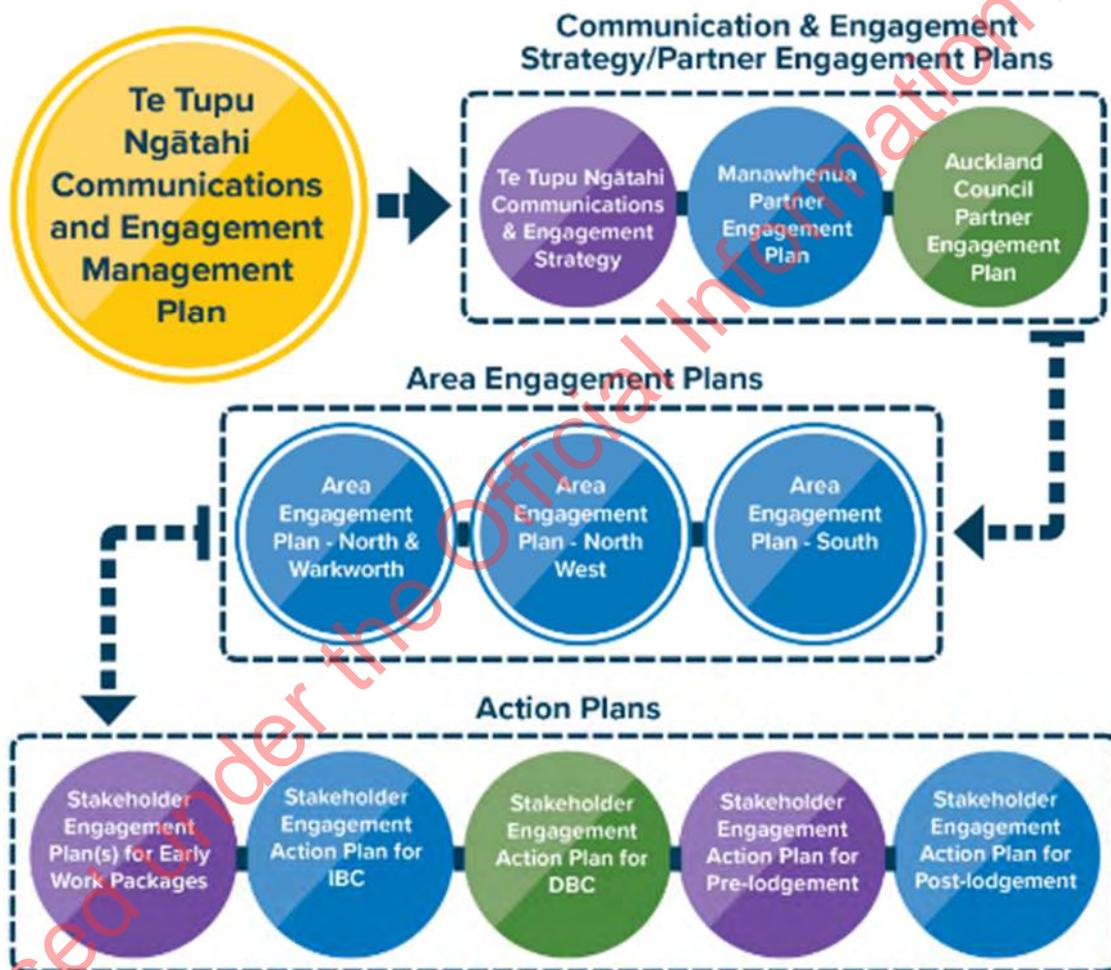
12.4 Partner relationships and stakeholder engagement

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 56.

Figure 56: Communications and engagement



12.4.2 Next steps

Engagement and communication in the next stage (following AT and Transport Agency Board endorsement of the recommended network), will build on engagement undertaken during the business case phase. The focus of the next stage of engagement in Warkworth 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/ Te Tupu Ngātahi forums, workshop environments, and individual meetings;
- **Provide information on staging and timing** for the preferred 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 preferred network to identify potential design responses and environmental management / mitigation (for consenting 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 the western growth areas in Warkworth. A communications plan has been developed for this activity.
- 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 preferred network.

12.5 Risk and opportunity management

The Te Tupu Ngātahi 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.

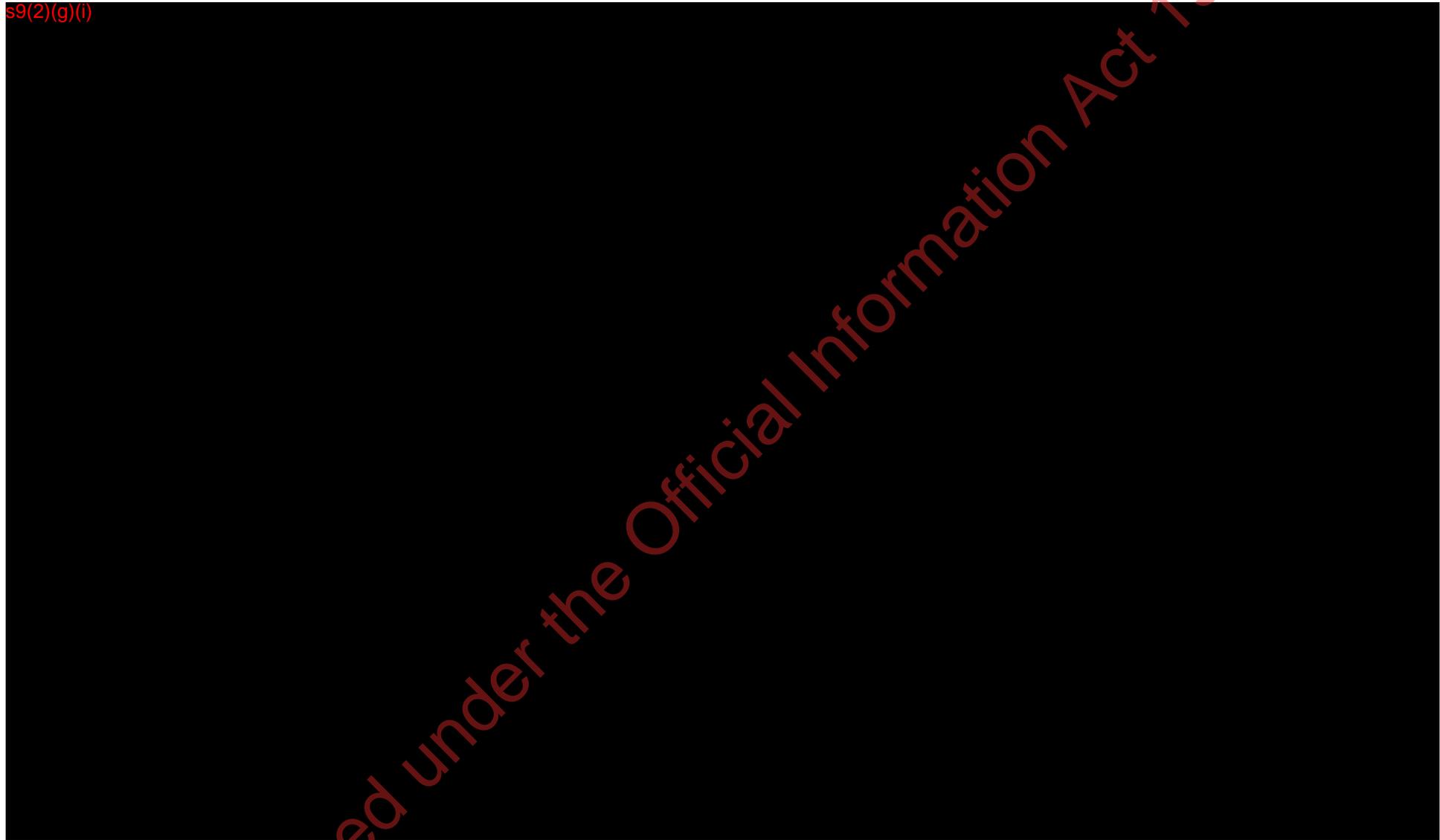
Risk and opportunity will be managed at three levels:

- 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 Warkworth area and can be found in Appendix L: Risk. The 'Critical' and 'High' risks are set out in Table 33.

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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
- Consenting
- Potential land acquisition (if route protection is confirmed).

12.6 Issues management

Issues will be managed to ensure 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.

12.7 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 the procurement strategy

12.7.1 Detailed Business Case

It is expected that the Detailed Business Case (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 additional transit operation opportunities - how existing infrastructure in the SGA network could be used more efficiently.
- Identification of additional land use integration opportunities
- 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, and
- Identify priority order for route protection and implementation.

The proposed DBC(s) follow the structure of the consenting packages described previously. Table 34 sets out the DBC packages and the key issues to be addressed as part of each package.

Preliminary priority for route protection has been predicted based on urgency and complexity and whether there are opportunities to enhance outcomes. The delivery of individual DBCs within

Warkworth area will consider these preliminary priorities and will inform the next stage of route protection strategy having regard to programme-wide considerations including affordability.

Table 34: DBC packages and key issues to be addressed

Consenting/ DBC package	Component projects	Issues to be addressed in the DBC
W1 New arterials and new interim park and ride	Western Link Road North	Further consideration of form of corridor (2-lanes vs. 4-lanes). s9(2)(j) [Redacted] s9(2)(b)(ii) [Redacted]
	Western Link Road South	Further consideration of form of corridor (2-lanes vs. 4-lanes). Engagement with landowners regarding alignment. Engagement with residents regarding potential connection at Evelyn Drive and property impacts of widening in this corridor.
	Upgrade to Mansel Drive	Further consideration of form of corridor (2-lanes vs. 4-lanes). Engagement with landowners and residents regarding potential property impacts of widening the corridor. Engagement with AT regarding possible ways to make use of existing bridge which may either need widening or an additional structure adjacent.
	Sandspit Link Road	Further consideration of alignment to avoid sensitive environmental areas. Additional engagement with landowners and residents, particularly the quarry owners who may be affected by the current alignment. s9(2)(j) [Redacted]
	Interim park and ride	Site identification. Potential for site identification to be done in collaboration with landowners, including Foodstuffs, Turnstone and other landowners closer to SH1.

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Consenting/ DBC package	Component projects	Issues to be addressed in the DBC
W2 Upgrades to arterials	State Highway 1 upgrade – widening to add active modes and public transport	Further discussion with investors regarding the form of cycling infrastructure in these corridors, i.e. shared path vs. segregated infrastructure. Corridor assessment to identify areas where widening may be required to accommodate infrastructure. Identification of areas where route protection may be required to ensure width is protected for the future. Identification of areas where ‘pinch points’ exist where infrastructure compromises may need to be considered, for example shared paths over separated cycleways.
	Woodcocks Road	
	Whitaker Road	
	Matakana Road	
	Sandspit Road	
W3 Interchanges	Southern Interchange	The links between this project and the Warkworth to Wellsford Interchange will need to be considered carefully at the next stage of development to ensure an integrated approach. The proposed Southern Interchange is located in an area which minimises the impact on the receiving environment as far as possible. Opportunities to further minimise impacts will be sought at the next stage, through further technical work and consultation with key stakeholders. Consideration of potential impacts on the Ara Tūhono PPP contract.
	South public transport interchange	Site identification in conjunction with Council's structure planning process, ideally adjacent to the local centre proposed for south Warkworth.
	Park and ride with bus stops	Site identification in conjunction with Council's structure planning process, ideally adjacent to the Southern Interchange.
	Wider Western Link Road	Consideration of alignment to minimise crossings of Mahurangi River tributaries and impacts on SEAs. Consideration of funding approach s9(2)(j) [REDACTED] [REDACTED] [REDACTED]

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Consenting/ DBC package	Component projects	Issues to be addressed in the DBC
W4 Collector Road Improvements	McKinney Road, Wilson Road, Pulham Road, Alnwick Road	<p>Further discussion with investors regarding the form of cycling infrastructure in these corridors, i.e. shared path vs. segregated infrastructure.</p> <p>Corridor assessment to identify areas where widening may be required to accommodate infrastructure.</p> <p>Identification of areas where route protection may be required to ensure width is protected for the future.</p> <p>Identification of areas where 'pinch points' exist where infrastructure compromises may need to be considered, for example shared paths over separated cycleways.</p>
W5 Cycleways along waterways	Mahurangi River Shared Path	<p>Identification of exact routing and extent (including the opportunity to extend further west along the river to also connect with the new planned Neighbourhood Centre shown on Council's Structure Plan).</p> <p>Discussion with various landowners, including the school regarding access.</p> <p>Assessment of environmental effects of building adjacent to the riparian margin.</p>

Packages W4 (Collector Road Improvements) and W5 (Mahurangi River Shared Path) 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).

Table 35 sets out the general considerations at the DBC stage.

Table 35: General considerations at the DBC stage

Component	Issues to be addressed in the DBC
Stormwater management	<p>Integrated approach to stormwater management</p> <p>Working to develop an integrated approach to the catchment management (flooding) and storm water treatment that captures all the potential developments (transport and land use) that are likely over the next 30 years to reduce the impacts of continued development on the health and sustainability of the waterways and improves the resilience of the transport system.</p>
Utilities	<p>Integrated approach to provision of utilities</p> <p>Integrating the transport response with the needs and opportunities of the utility providers to provide a better whole of system outcome. The key examples are the opportunity to the transmission network identified by Transpower which could reduce the complexity and risks associated with their designations.</p>

Component	Issues to be addressed in the DBC
Active modes	<p>Facility type</p> <p>For the new corridors where cycling facilities are identified, high quality separated walking and cycling facilities are proposed. For the retro-fitting of existing corridors, it is expected that a mixture of shared path and separated facilities will be provided. These will be investigated further at the DBC.</p>
Urban form	<p>Transport and urban form</p> <p>An integrated transport network that supports 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.</p> <p>During the IBC development, Programme-wide urban design principles were developed and documented in Part A of the Te Tupu Ngatahi Urban Design Framework (see 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).</p>
Financial	<p>Financial and Management Cases</p> <p>Further investigations and assessments are required to determine the affordability of the proposals to the requiring authorities and the potential delivery mechanisms including but not limited to:</p> <p>s9(2)(j) [REDACTED]</p> <p>[REDACTED]</p> <p>Ensure that lower cost interventions are considered</p> <p>Identify and explore different funding and revenue streams (where possible) to improve affordability of the recommended network</p> <p>Include a wider range of cost sensitivities and escalation on the capital and property costs.</p>

12.7.2 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 the majority of network components even if lower levels of protection are utilised in the short to medium terms for second or third decade projects.

12.7.3 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 Te Tupu Ngātahi projects and the factors that would influence the method of implementation procurement will almost certainly change over time, a detailed implementation strategy should be developed for each project as part of the DBC phase.

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