

North Detailed Business Case

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Version 1.2

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Disclaimer

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

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Appendix B: North Climate Change Assessment

Appendix C: Alternatives Assessment

Appendix D: North Technical Assessments

Appendix E: North Engagement Summary

Appendix F: North Urban Design Evaluation

Appendix G: North Transport Outcomes

Appendix H: North Design Report

Appendix I: North Property Overview

Appendix J: North Cost Report

Appendix K: North Economics Assessment

Appendix L: North Route Protection Strategy

Appendix M: North Risk Register

Appendix N: North Staging Considerations

Appendix O: Mana Whenua engagement summary

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Acronym/Term	Description
ADT	Average Daily Traffic
AT	Auckland Transport
ATAP	Auckland Transport Alignment Plan
AUPOIP	Auckland Unitary Plan - Operative in Part
BAU	Business as usual
BCR	Benefit Cost Ratio
CFAF	Corridor Form and Function
CO2	Carbon Dioxide
Council	Auckland Council
CRV	Increment for traffic congestion
DA	Developer Agreement
DBC	Detailed Business Case
Development ready	Bulk infrastructure is in place to service development, including three waters, transport, and social infrastructure
DoC	Department of Conservation
DSIs	Deaths and serious injuries
FAR	Funding Assistance Rate
FENZ	Fire and Emergency New Zealand
FTN	Frequent Transit Network
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
GHG	Greenhouse gases
GPS 2018	Government Policy Statement on Land Transport 2018/19 – 2027/28
GPS 2021	Draft Government Policy Statement on Land Transport 2021/22 – 2030/31
ha	hectare
IBC	Indicative Business Case
IOs	Investment Objectives
IQA	Investment Quality Assurance
ITA	Integrated Transport Assessment

Acronym/Term	Description
KPIs	Key Performance Indicators
LOS	Level of Service
LOV	Low occupancy vehicle
MCA	Multi Criteria Analysis
MHS	Mixed Housing Suburban
MHU	Mixed Housing Urban
MoE	Ministry of Education
MSM	Auckland Regional Transport Model (Macro Strategic Model)
MSQA	Management, Surveillance, and Quality Assurance
NIMT	North Island Main Trunk Line
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
No2	Nitrogen Dioxide
NoR	Notice of Requirement
NZUP	New Zealand Upgrade Programme
OIM	Owner Interface Manager
Partners	Collectively refers to Auckland Transport, Waka Kotahi NZ Transport Agency, Manawhenua, Auckland Council
PBC	Programme Business Case
PBIOs	Problems, benefits and investment objectives
PM10	Air quality – Particulate matter
PT	Public transport
P50	Project cost with sufficient funding to provide a 50% level of confidence
P95	Project cost with sufficient funding to provide a 95% level of confidence
RASF	Roads and Streets Framework
RLTP	Regional Land Transport Plan
RMA	Resource Management Act 1991
RPTP	Regional Public Transport Plan
SEA	Significant Ecological Area

Acronym/Term	Description
SGA	Supporting Growth Alliance (referred to as Te Tupu Ngātahi)
SH1	State Highway 1
SiDRA	Intersection modelling software
SSBC	Single Stage Business Case
TDM	Travel Demand Management
Te Tupu Ngātahi	Supporting Growth Alliance
TFUG	Transport for Future Urban Growth
THAB	Terraced Houses and Apartment Buildings
The Programme	The Supporting Growth Programme
TOD	Transit Oriented Development
UDF	Te Tupu Ngātahi Urban Design Framework
Waka Kotahi	Waka Kotahi New Zealand Transport Agency
WEB	Wider Economic Benefits
VEPM	Vehicle Emissions Prediction Model (Waka Kotahi)
VKT	Vehicle Kilometres Travelled
vpd	Vehicles per day
VOC	Vehicle Operating Costs

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1 Executive Summary

The purpose of the Te Tupu Ngātahi Programme (the Programme) is to recommend a sustainable transport network for route protection to support Auckland's planned greenfield growth over the next 30 years. Access to high quality public transport and safe walking and cycling options to support urban growth will avoid or minimise new transport emissions as growth occurs.

The North DBC study area is approximately, 14km in length, 4km north of Albany, and 20km north of the city centre. Auckland Council has identified approximately 4,000 ha of land for future urban development in the North, including parts of Ōrewa, Wainui East, Silverdale West and Dairy Flat (the 'Northern growth area').

This Northern growth area is anticipated to accommodate approximately:

- 41,000 dwellings
- 110,000 additional people
- 22,000 new jobs

The timing of land use in the Northern Growth area is uncertain. The Future Urban Land Supply Strategy (FULSS) provides some indication of assumed development, however more recent forecasts suggest a slower development of the majority of the land in FUZ. The DBC has assumed development of the north area in line with the latest land use forecasts from Auckland Council (Scenario i11.6) but recognises uncertainty in timing.

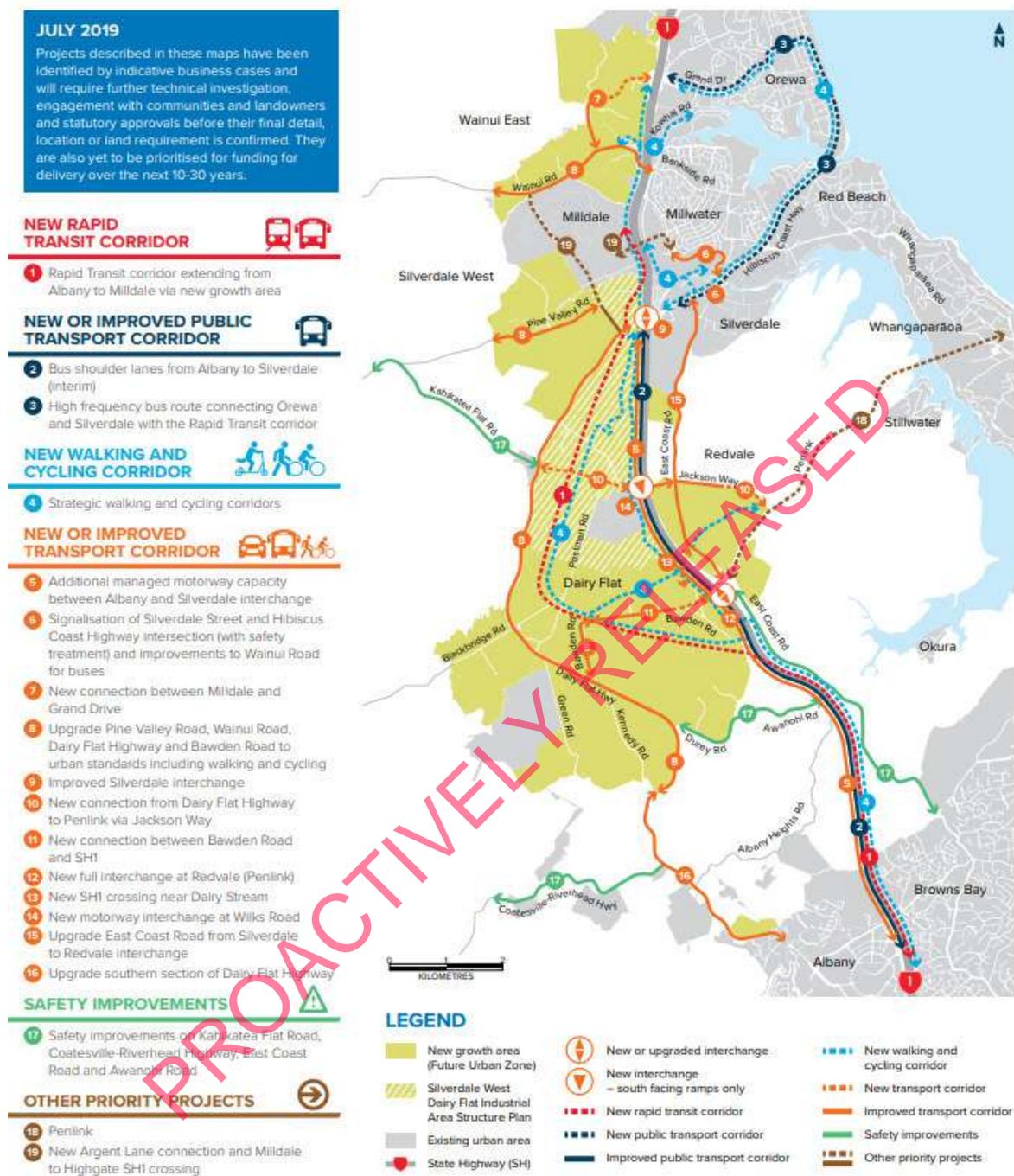
While Councils timing for development suggests a long timeframe (majority of growth outside of the 2048 timeframe) to development for much of the North area, development pressure is present in a number of areas, with plan changes (both private and council led), fast track consents and structure planning occurring.

1.1 Scope of the project

The North Detailed Business Case (DBC) follows on from the outcomes identified at both the Programme Business Case (PBC) and Indicative Business Case (IBC) stages and further investigates and confirms a fit-for-purpose transport network for route protection in the Northern growth area.

The DBC scope encompasses the IBC Indicative Strategic Transport Network as shown in Figure a 1.

Figure a 1: North IBC Recommended Network (2019)



Together these projects form a cohesive transport response for the Northern growth area to respond to planned future growth. The transport investment identified in the IBC enables an integrated transport system with a range of strategic and local elements supporting mode choice in the North. The IBC network vision included a connected walking and cycling network supporting an enhanced local and regional public transport system. The timing for implementation will vary and will be dependent on the release of surrounding land use.

This document focuses on providing the overall North DBC investment case for route protection and details the recommended route protection strategy. The preparation of the Notices of Requirement (NoRs) for applicable corridors is being completed in parallel to this DBC.

1.2 Why is investment needed?

The proposed growth in the North is a significant increase from the existing population of 63,000¹ and employment in an area that is presently predominantly rural in character. With the urban development of the FUZ area, the existing population could triple. The existing transport system is not appropriate, and this growth will exacerbate existing transport problems resulting in the current network being unsuitable to support this planned future growth.

The existing transport system is not designed to accommodate intensified growth and will only exacerbate existing problems if not planned appropriately. Without any investment in alternative modes, the majority of additional trips will continue to be undertaken by private vehicles and the Vehicle Kilometres Travelled (VKT) would be expected to significantly increase, with associated increases in greenhouse gas emissions. By 2048, the additional VKT would result in significant congestion on existing routes such as SH1, Interchanges and key connections such as Dairy Flat Highway and East Coast Road and further reduce access to social and employment destinations.

The future challenge for the North therefore, is not if the greenfield growth will or should occur, but rather what needs to be done, so when this growth happens the transport network is best positioned to respond appropriately. The future transport network needs to support a well functioning urban environment, which enables a variety of homes to have good accessibility for all people between housing, jobs, community services, natural spaces, including by way of public or active transport. Otherwise without investment, urban growth will continue to contribute to congestion and transport emissions rather than supporting the government policy to avoid emissions when growth occurs.

Without significant transport investment, the North growth area will experience:

- **Poorly integrated land use** which will result in reduced access to social and economic opportunities, reduced viability of industrial land, compromised liveability and reduced opportunities to maximise transport catchments to increase mode share for public transport, walking and cycling.
- **Reduced climate change outcomes** resulting in an inability to shift to low emission transport modes with a continual reliance on private, low occupancy vehicles. The network will remain susceptible to climate change risks such as flooding.
- **Limited transport choice** which will compromise transformational mode shift targets and not deliver the benefits of a compact urban form.
- **Reduced resilience** arising from limited access to SH1 and congestion at key interchanges such as Silverdale.
- **Decreased safety** including additional conflict between active modes and increasing traffic as well as on rural roads which are not safe or efficient for future multimodal travel.
- **Unmanaged growth in demand for private vehicle travel** which will cause severe congestion on the local network.
- **Reduced reliability** for bus networks which will be delayed in the congestion.

Therefore, it is critical that the transport requirements for the North are planned for to match the intended growth. Route protection is the first and critical step for ensuring the transport enhancements needed can be provided. The intent of route protection is to identify and appropriately protect the land

¹ Current population in Ōrewa Silverdale and Whangaparāoa, 2018 census

/ corridor necessary to enable the future construction, operation and maintenance of the recommended network options.

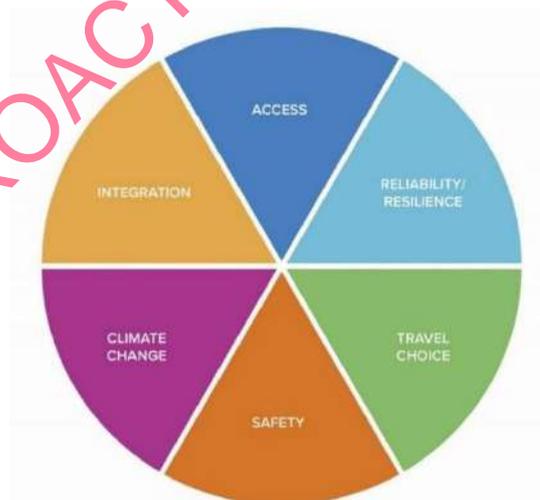
Route protection provides the mechanism to protect the network in advance as opposed to retrospectively making the transport interventions fit the existing urban form. The key benefits of route protection is that it:

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

1.3 Problems and benefits of investment

Six problem areas have been reconfirmed for the North as shown in Figure 1-1. Investment in these elements was determined to maximise land use and transport integration and align with the Ministry of Transport (MoT) Transport Outcomes Framework and GPS 2021.

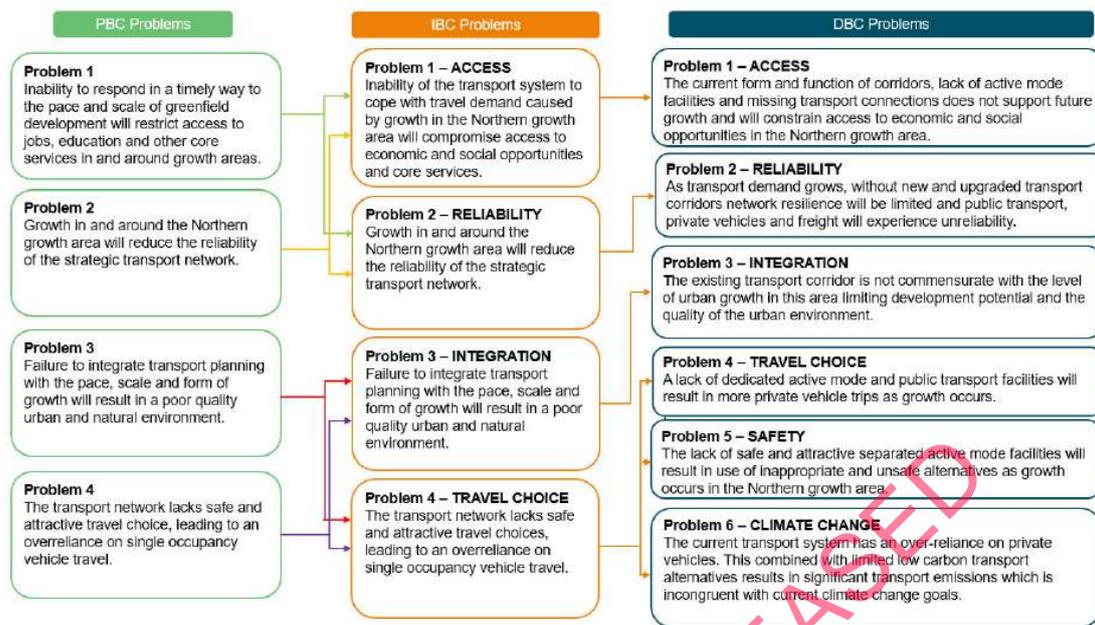
Figure 1-1 Problem areas for investment in the North



The underlying causes of all these problems can be attributed to the planned urbanisation in the Northern growth area and the resulting increased transport demands.

A summary of the problems and how they map across the previous business cases is shown in Figure 1-2.

Figure 1-2 North Investment logic map

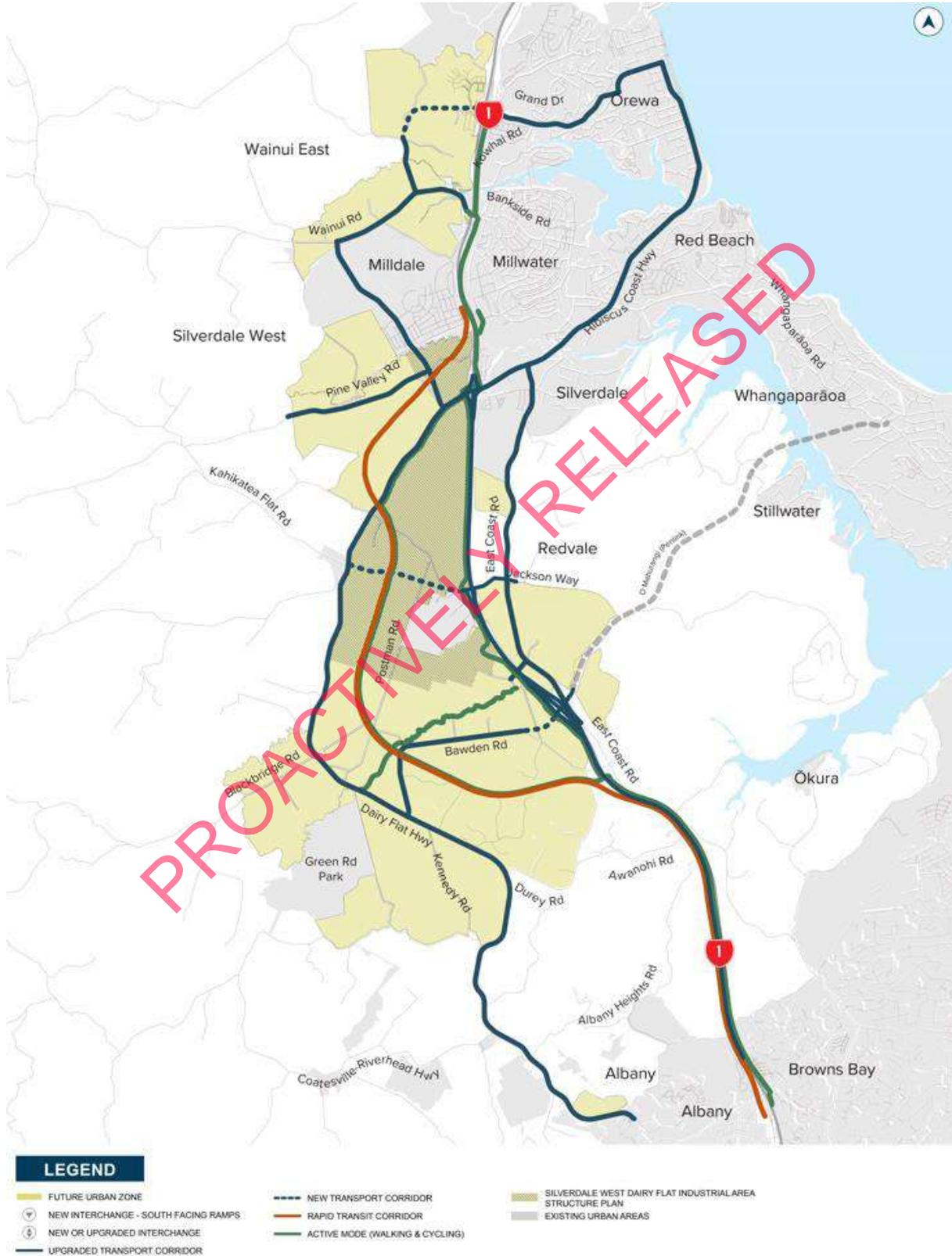


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1.4 Recommended North Transport Network

The recommended North transport package is shown in Figure 1-3.

Figure 1-3 Recommended North Transport Network



Overall, this is a comprehensive transport solution that responds to planned growth and provides a transport network that supports:

- Long term development of a low carbon transport system to support future growth and facilitates mode shift from private vehicles to public transport and active modes to reduce greenhouse gas emissions.
- The network supports local jobs with the Silverdale West industrial area and provides direct freight access to the strategic network to minimise conflict with surrounding residential land.
- Support Councils aspirations for future centres in the future urban areas with direct access to the RTC corridor.
- Opportunity for intensification of land use around RTC station and walk up catchments.
- Opportunities for walk up catchments to public transport interchanges and a high frequency local bus network.
- Increased reliability for public transport through provision of an alternative strategic link (a new rapid transit corridor) and additional resilience through urbanised alternative routes.
- Real travel choice with high quality, attractive alternatives to the private vehicle. This includes a contiguous, legible active mode network that connects people to key destinations and encourages active mode trips within compact urban areas.
- An area-wide focus on safety through a holistic set of measures including Road to Zero safety principles, fully separated cycling/pedestrian facilities, well designed intersections and sufficient space for all modes to interact safely.

The outcomes will be achieved by targeted investment in:

- **A new Rapid Transit corridor between Albany and Milldale** – To provide a strategic public transport corridor to serve the growth in the North between Albany and Silverdale, leading to an increase in public transport (PT) mode share and improved accessibility to social and economic opportunities in the North.
- **Upgrades to SH1 between Albany and Silverdale with a new interchange at Wilks Road and upgraded interchange at Redvale** – The interchanges provide access to/from the strategic road network to serve adjacent development areas. Widening to SH1 will provide room for bus shoulder lanes from Albany to Silverdale in the short-medium term, with managed motorway capacity between Albany and Silverdale Interchange in the long term.
- **Improvements to the existing Silverdale Interchange** – Updated layout at the Silverdale Interchange to improve accessibility for future communities.
- **A new walking and cycling path along SH1 (SH1 Walking and Cycling Path)** – To provide a high-quality strategic walking and cycling connection adjacent to SH1 which will allow people to access social and economic opportunities in the various development areas in the North.
- **A new walking and cycling path along the rapid transit corridor (RTC Walking and Cycling Path)** – To provide a high-quality strategic walking and cycling connection adjacent to the proposed RTC in Dairy Flat and Silverdale which will allow people to access social and economic opportunities.
- **Provision of a network of urban arterials** that will support provision for frequent public transport, walking and cycling and general traffic including: Upgrade to Wainui Road, Upgrade to Pine Valley Road, Upgrade to Dairy Flat Highway between Silverdale and Albany, New connection between Dairy Flat Highway and Wilks Road (New Link Road), Upgrade to East Coast Road between Silverdale and Redvale Interchange, Upgrade and extension to Bawden Road, New Connection between Milldale and Grand Drive, Upgrade of Hibiscus Coast Highway and Grand Drive for public

transport and active modes, A new SH1 crossing at Dairy Stream (Dairy Stream Motorway Crossing), New Argent Lane and new Pine Valley Road,

- **Improved walking and cycling links including:** Upgrades to the Wainui Interchange for Active Modes, A new active mode connection along the Dairy Stream and the Silverdale to Highgate active mode connection.

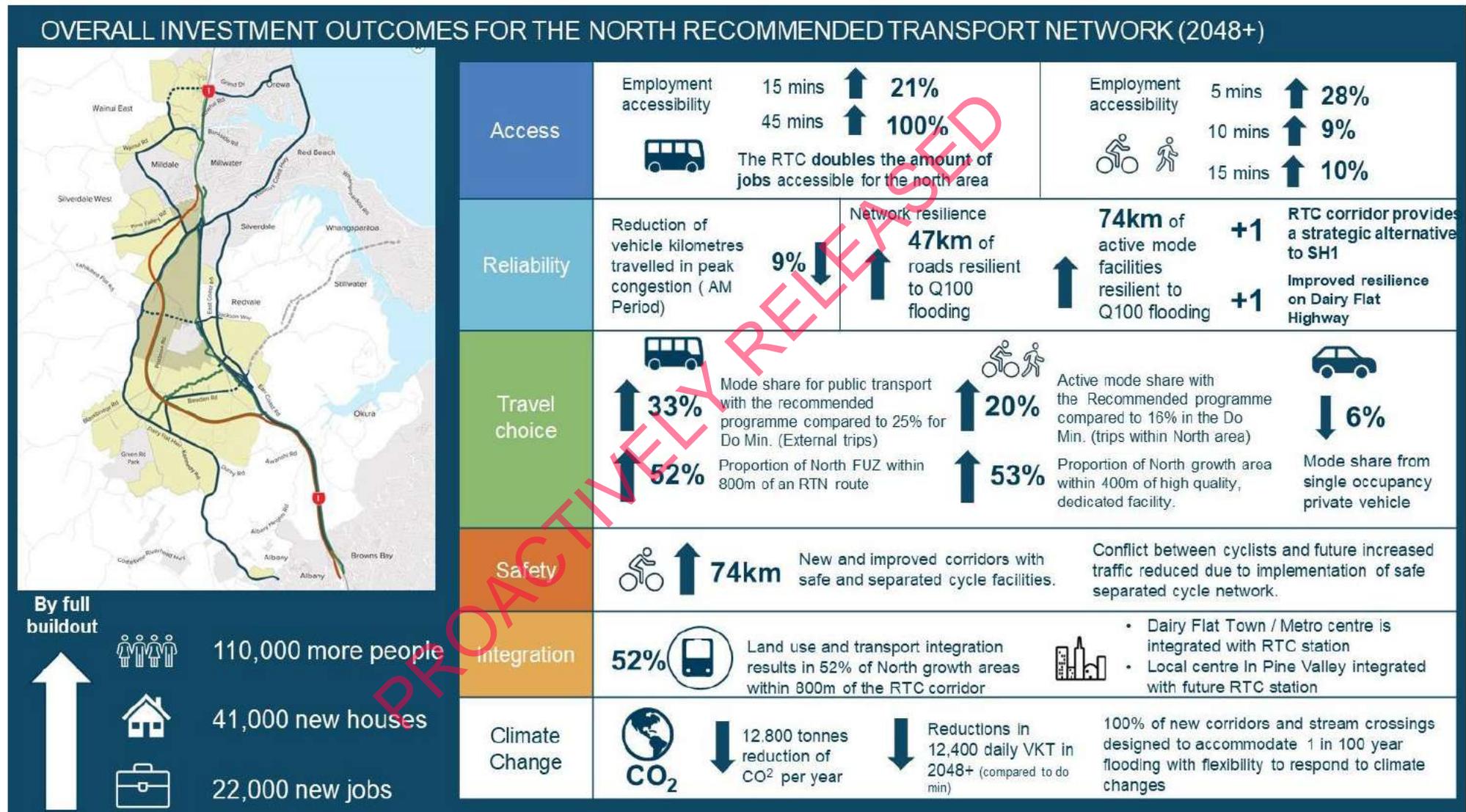
It is noted that this recommended network will also require supporting measures to maximise the benefit realisation of the network including ongoing land use integration, travel demand management, operational funding to provide increased bus frequencies and implementation of a collector local network that continues to link active mode facilities and bus services.

1.5 Outcomes achieved

The key outcomes for this recommended network are shown in Figure 1-4.

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Figure 1-4 North DBC Transport Network Outcomes



1.6 Staging

The North network has been designed with enough flexibility to respond to land use changes whilst making the best use of existing assets and minimising impacts from new infrastructure. The main impact on the North network from land use changes is expected to be in relation to the timing of investment.

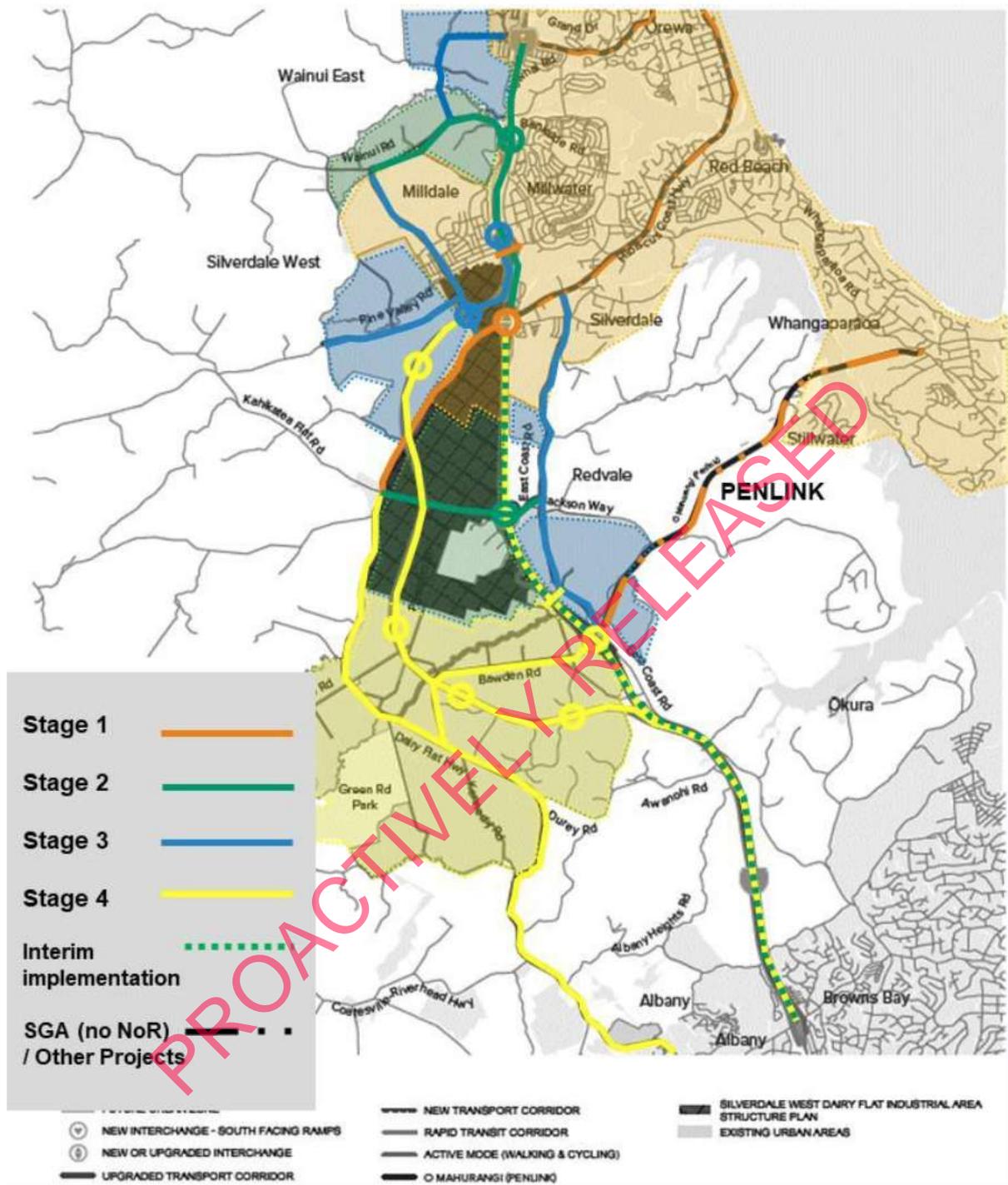
A set of key principles has been applied to the recommended North network, which links staging to broader strategic goals regarding travel demand management and desired modal shift.

The suggested principles for the North staging can be summarised as:

- Provide a meaningful improvement to walking and cycling and public transport in the short to medium term to support the existing urban areas and portions of new growth already underway.
- Programme public transport and active mode facilities and services from the outset of urban development to support a shift to more sustainable travel.
- Prioritise PT and active mode facilities that support attractive access to the RTC stations.
- Consider staging of elements of a project to match likely development stages and system needs, whilst also considering pathways to achieve the full-build elements.
- Consider the needs to support place-function, not solely movement function.
- Provide safe travel by all modes.
- Staging that can respond to the timing, scale and form of urban development.

Considering all these principles and the current understanding of how the land use is planned to develop, the recommended staging for North is therefore shown in Figure 1-5

Figure 1-5 Proposed North Staging



1.7 Costs and benefits

The overall estimated cost (P50 undiscounted with no escalation) for the full North programme is **\$6.4B** of which **\$680M** is associated with property purchase.

The Base Estimate Benefit Cost Ratio (BCR) for the package is shown in Table 1-1. The BCR for the full North programme is 1.1 based on traditional benefits and 1.3 inclusive of Wider Economic Benefits (WEBs).

Table 1-1 BCRs for North DBC by package

Projects	BCR	BCR including WEBS
Full Recommended Transport Network	1.1	1.3
RTC	1.8	2.0
SH1	1.0	1.1
Wainui	0.6	0.6
Silverdale West	2.0	2.3
Dairy Flat	0.3	0.4

The North recommended transport programme underpins the whole premise for growth in Northern Growth area and without it, growth would be constrained. The evaluation is based on the standard evaluation methods for transport infrastructure, which is typically dominated by travel time savings. The purpose of a large portion of the Northern projects is about providing the basic infrastructure to make growth happen such as urbanising existing rural roads. A number of the corridors involve addition of walking and cycling infrastructure and urbanising an existing rural road. The local projects (Dairy Flat, Wainui and Silverdale West) have high costs but relatively small transport benefits (primarily walk/cycle and public transport benefits), and exclude other, un-monetised benefits that would also arise from 'urbanisation'. There is inherent overlap between the RTC and SH1 projects and local packages given the beneficiaries of each projects are often similar.

Despite the low BCR, the recommended programme is still needed to respond to the planned growth and realise the wider transport outcomes and therefore the DBC continues to recommend the full programme is route protected to enable the growth sought.

Further, Route Protection of the network now is expected to provide value for money in the long-term preventing build out on the optimal transport corridors, reducing future construction costs and delivering enhanced outcomes through integration with the urban development.

1.8 Proposed route protection

The Route Protection strategy has been developed to support the North DBC and makes recommendations on the prioritisation, packaging and preferred planning mechanism to secure route protection for the North recommended network.

The proposed route protection strategy is shown in Figure 1-6.

The corridors in the North DBC are split into two types of route protection:

- **“Type A”** - No route protection as the corridor upgrade does not require additional land

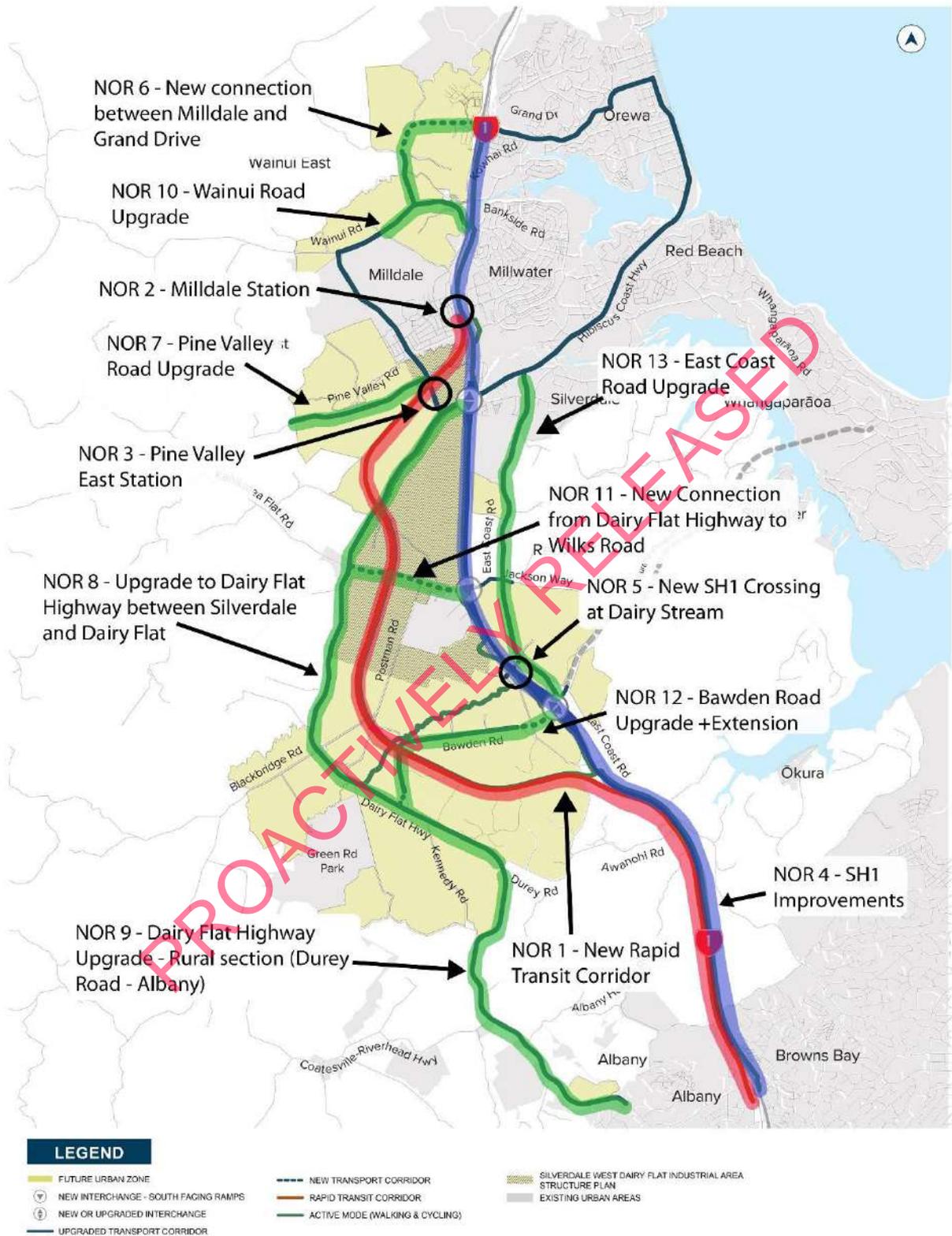
- **Notice of Requirement** – Lodgement of a Notice of Requirement (NoR) for route protection or alteration to an existing designation.

Through the development of the route protection strategy some extents of projects have changed due to agreements with developers including the Wainui Road upgrade and new connection between Milldale and Grand Drive.

The North Route Protection Strategy has also been developed to support the North DBC and makes recommendations on the prioritisation, packaging and preferred planning mechanism to secure route protection for the North recommended network. Figure 1-6 outlines the notice of requirements proposed through this DBC. Processes will be put in place to manage the non NoR route protection pathways and are set out in the next steps for this DBC.

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Figure 1-6 North Route Protection Strategy



1.9 Property

There is a potential property cost implication for the 13 NoRs recommended to be lodged and some strategic acquisition is desirable. A total of 1518 property interests have been identified for acquisition in the North.

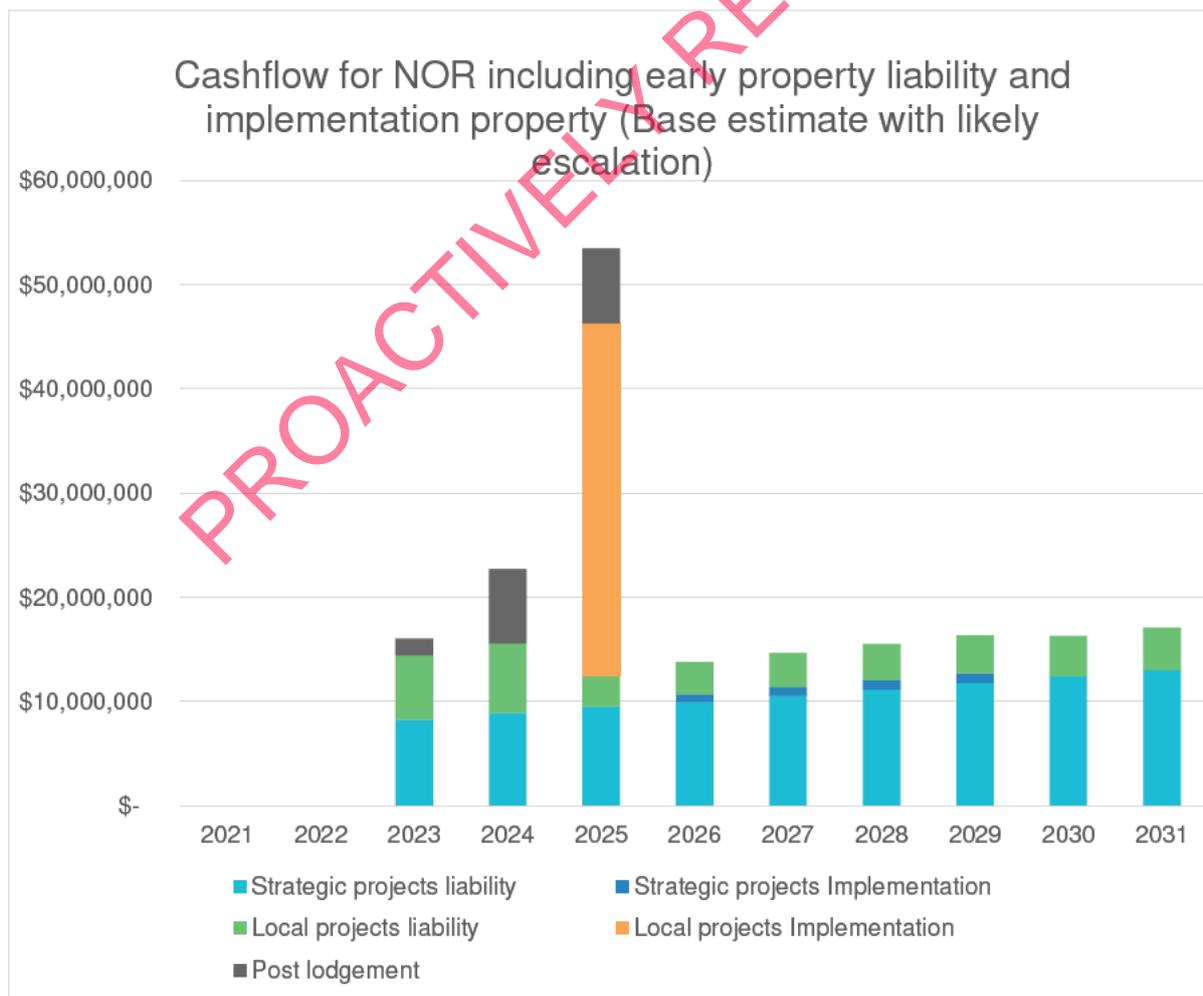
While the vast majority (70-80%) of property purchase is typically anticipated in the three years prior to implementation of a particular project, this acquisition could occur prior to route protection being enacted, or during the route protection process.

NoR route protection costs consist of three components:

- Post lodgement funding for the NoR.
- **Early property acquisition** - property costs that could be anticipated during the route protection process.
- **Implementation property acquisition** - costs that would be incurred in the 3 years prior to project implementation.

The overall cashflow associated with the cost of route protection (NoR Post lodgement, Early property acquisition and property implementation) is shown in Figure 1-7.

Figure 1-7 Cashflow for cost of route protection- NoR Post Lodgement Costs, Early Property Acquisition, Property Implementation (base estimate plus likely escalation 10%)

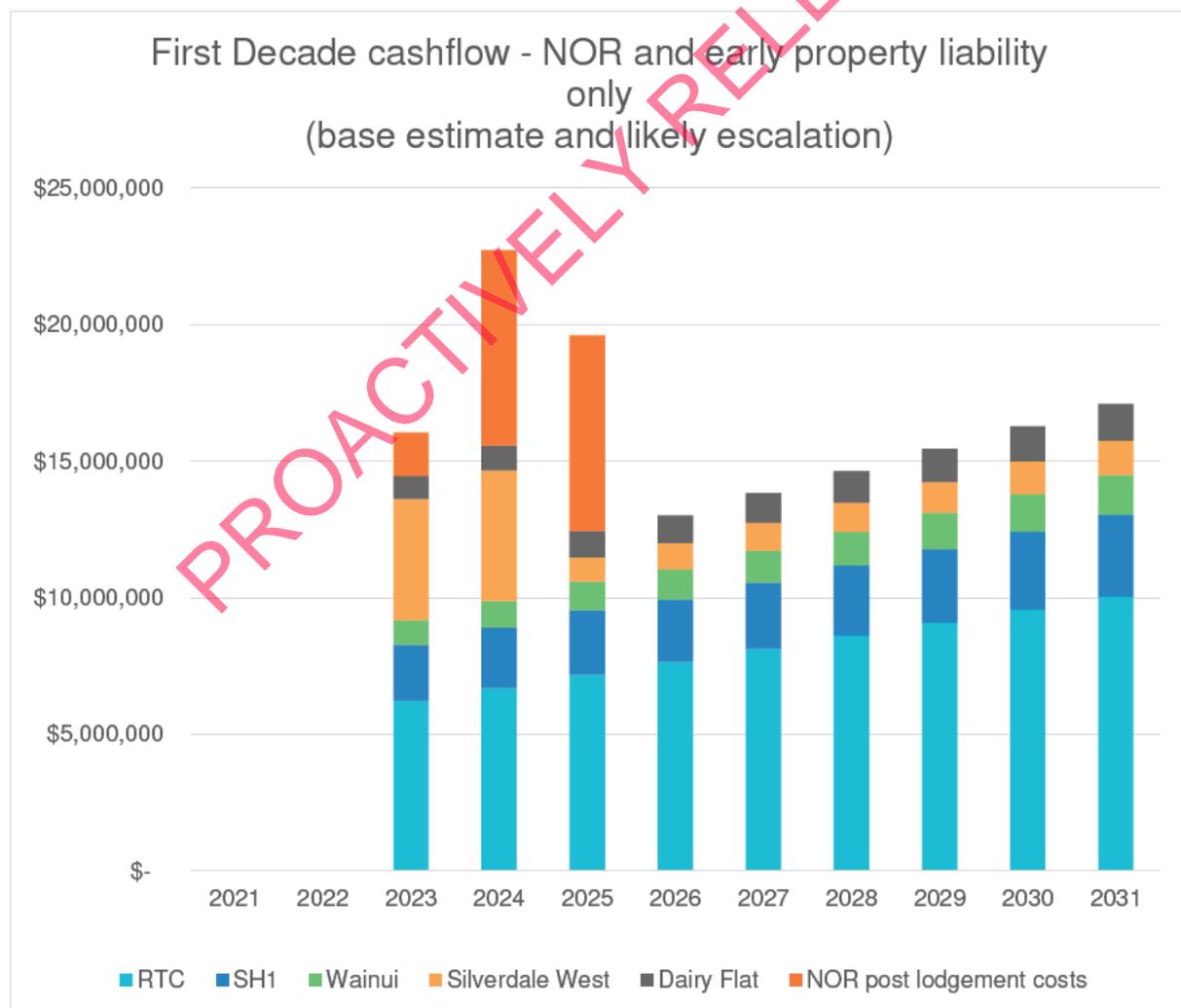


The graph illustrates the initial cost for route protection, with the NoR costs incurred in 2023/2024. There is then a cluster of potential early property acquisition costs (light blue) which are phased into implementation property costs (orange) as the second decade timed projects start requiring property purchase in the 3 years prior to construction. The green costs show strategic acquisitions. The implementation costs are spread evenly throughout the project timeline showing a balanced property profile for the North investment.

The current RLTP is from 2021/22 to 2030/2031 and the North costs that fall into this first decade are shown in Figure 1-8 below. Within the current RLTP, there is no allocation for the North Property acquisition (\$133M assuming 10% escalation) and only the post lodgement activities are currently included.

The total first decade early property acquisition ranges from \$106M (5% escalation) to \$159M (15% escalation) depending on the level of escalation assumed. The assumed staging to respond to land use release demonstrates the speed at which the early property acquisition is anticipated to start to meet the current implementation timeframes.

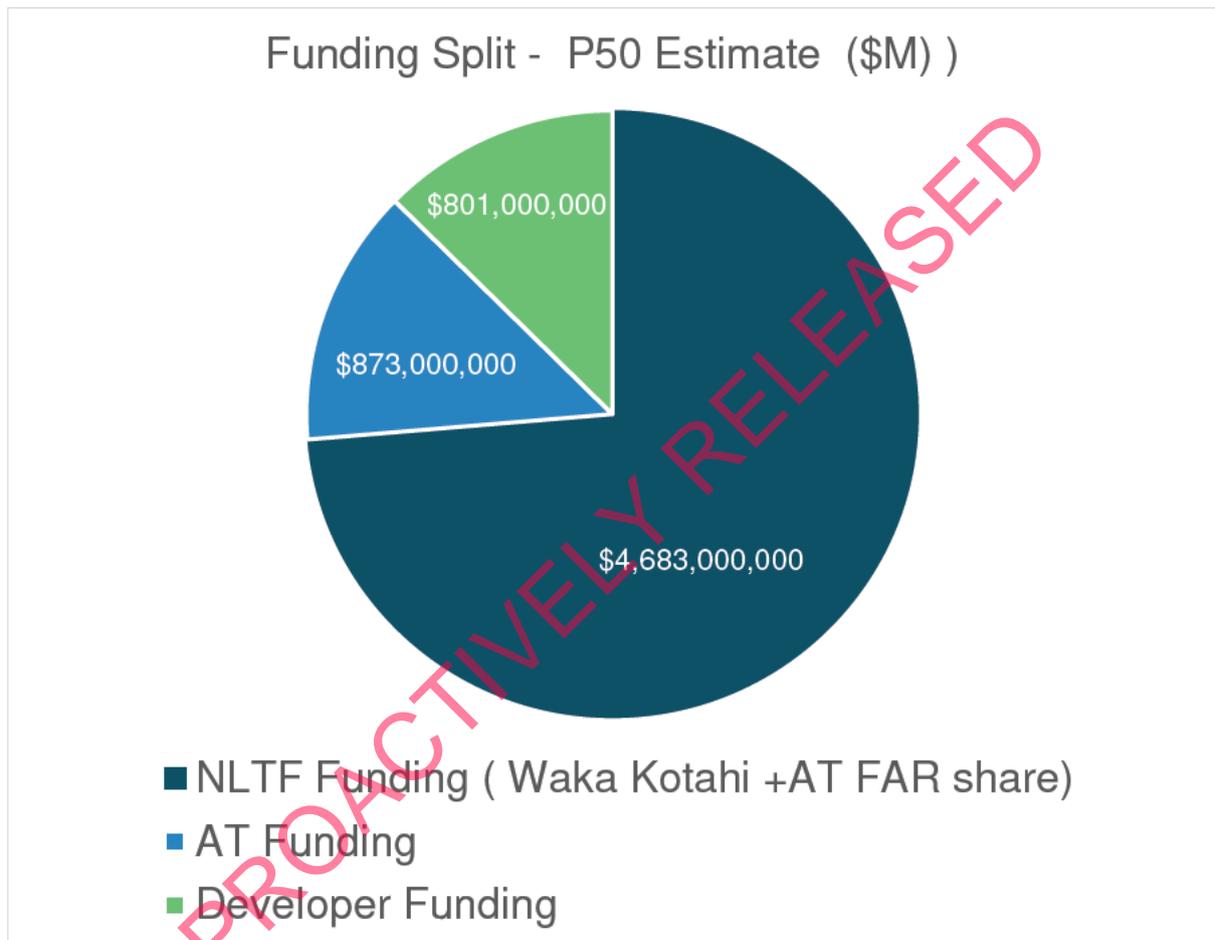
Figure 1-8 First decade (2021-2031) cashflow for cost of route protection – NOR Post Lodgement Costs, Early Property Acquisition (base estimate plus likely escalation 10%)



1.10 Funding share

The estimated funding split for the P50 costs is shown in Figure 1-9. This highlights that the majority of funding (\$4.7Bn) is likely to be required from the National Land Transport Fund (NLTF) which consists of the Waka Kotahi share plus the Auckland Transport FAR share. There are good opportunities for the Auckland Transport share (and ultimately NLTF) to be reduced through the ability to harness contributory funding from developers which is currently estimated to have an indicative value around \$801M P50 costs for the North DBC.

Figure 1-9 Funding Split for North Projects (P50 Costs)



1.11 Key risks and opportunities

A Risk and Opportunity Management Plan has been developed and endorsed by the Te Tupu Ngātahi governance team. The risk management process is consistent with AS/NZS ISO 31000:2009 and is consistent with typical risk management processes undertaken by AT and the Waka Kotahi. Key overarching risks and opportunities at a programme-wide level include:

- Legal challenge due to climate change
- Political perspective changes staging and or priorities
- Scale of affordability gap
- Opportunity for improved future urban form where there is a change in road corridor

- Design changes and site investigation feedback leads to additional unexpected property impacts
- Different growth pace than assumed
- Poorly understood / mitigated construction impacts lead to objections
- Protracted negotiations with property owners

Specific additional North DBC risks and opportunities include:

- **Interface uncertainties with parallel projects** – The RTC corridor connects to the wider network in Albany. There is uncertainty over the nature and timing of adjoining projects.
- **Regional consenting complexities** –mostly associated with natural wetlands/streams, stormwater and significant ecological areas.
- **Integration of land use with the transport network** represents both a risk and opportunity. If land use does not complement the RTC corridor, outcomes are at risk. Conversely integration of land use with the RTC could enhance system outcomes.
- **Opportunity for value capture** around RTC stations which could help to fund the project's implementation.
- **Risk of build out at the RTC stations** (south of Pine Valley) prior to route protection of these stations considering route protection now is not recommended for these elements.

1.12 Recommendations sought for approval

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

1. **Approval of the North recommended transport network.**
2. **Approval of lodgement of 13 NORs to protect future transport corridors in the northern area**
3. **Approval to release funding from the existing allocated SGA funding for the North post lodgement activities.**
4. **Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended North Package.**

It is acknowledged that this business case is focused on route protection and that there are funding implications associated with the potential early property acquisition of this route protection.

This business case does not seek to resolve issues surrounding the funding required for the delivery of the recommended new infrastructure and services. For a range of reasons including the impact of Covid-19 on forward revenue projections, there is significant uncertainty surrounding the ability to fund the programme using traditional funding mechanisms/ NLTF over the long-term.

Acknowledging this uncertainty and the forecast long-term funding gap, it is recommended that route protection should be undertaken and completed at this time to provide:

- **Ability to plan infrastructure to support planned growth.** The very nature of route protection enables the provision of planned infrastructure rather than “responsive” infrastructure which typically results in infrastructure being retrospectively added and squeezed into available land that has already experienced growth-related development.

This planned approach therefore provides the owners with significant opportunity to front foot and respond to key issues such as climate change and other mitigation/ adaptation needs of the network. Importantly it also protects the ability to actually realise the step change in transport outcomes (mode shift, land use integration and accessibility enhancements) which otherwise could be compromised as space is restricted. It also allows proactive collaboration with developers to assist in the delivery of key infrastructure and drive good urban outcomes.

- **Financial upside.** Financially, a small investment now is forecast to save many millions of dollars in property and implementation costs that makes financial sense. Route protection requires some upfront expenditure (costs of obtaining NoR and early purchase of some property) but reduces overall cost of implementation and property purchase.
- **Ease of Implementation.** Implementation will be considerably less difficult (and costly) with designations in place prior to the growth. In some locations it will unlock development infrastructure where land has fragmented ownership.
- **Increased certainty for developers.** Route protection provides increased certainty for developers. This increases opportunities for co-funding agreements to be reached, resulting in the best possible opportunity for increased affordability of the required infrastructure and achieving quality urban form.
- **Ability to deal with unplanned growth.** While much of the growth in the northern area is anticipated and desired to occur beyond the next 20 years, private plan changes are likely to occur out of sequence. With designations in place, WK and AT have set expectations on what infrastructure is required to support FUZ development and can negotiate better outcomes (i.e. Value for money or quality of solutions) than would be possible without the designations in place.

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

1. Having a property team focused on the Te Tupu Ngātahi programme.
2. Developing an agreed position for the programme on the approach and application to betterment.
3. Developing and providing a programme position on advanced property purchase.
4. Providing the agreed programme positions outlined above to the Auckland Transport and Waka Kotahi boards for endorsement in 2023.

There is also the challenge of funding the implementation of the options identified given the constrained National Land Transport Fund (NLTF). Whilst not the focus of this business case, it is important that Auckland Transport and Waka Kotahi work together to resolve this long-term funding challenge. It is almost certain, given the challenges facing the NLTF, that alternative funding mechanisms are required. Whilst both organisations have experience with these, the scale of the wider Te Tupu Ngātahi programme is of a scale not undertaken before, providing unique challenges and opportunities for alternative funding models.

2 Introduction

Auckland is projected to experience significant population growth over the next 30 years and Auckland Council has planned new greenfield growth areas as part of its response to support this increasing population.

The purpose of the Te Tupu Ngātahi Programme (the Programme) is to recommend a sustainable transport network for route protection to respond to this planned growth. This will be achieved through access to high quality public transport and safe walking and cycling options to avoid or minimise new transport emissions as this planned growth occurs.

The North (DBC) follows on from the outcomes identified at both the Programme Business Case (PBC) and Indicative Business Case (IBC) stages and further investigates and confirms a fit-for-purpose transport network for the northern growth area. This DBC:

- Identifies changes since the development of the IBC.
- Reviews the IBC assumptions, evidence and main findings.
- Develops and assesses options and confirms the preferred option for each corridor.
- Develops the economic case and measures expected benefits and outcomes.
- Identifies the arrangements needed for delivery and route protection.

The scope of this DBC is limited to outlining the case for **route protection** for the North network. As projects progress for funding consideration and construction, separate implementation business cases will need to be prepared.

2.1 The Northern growth area

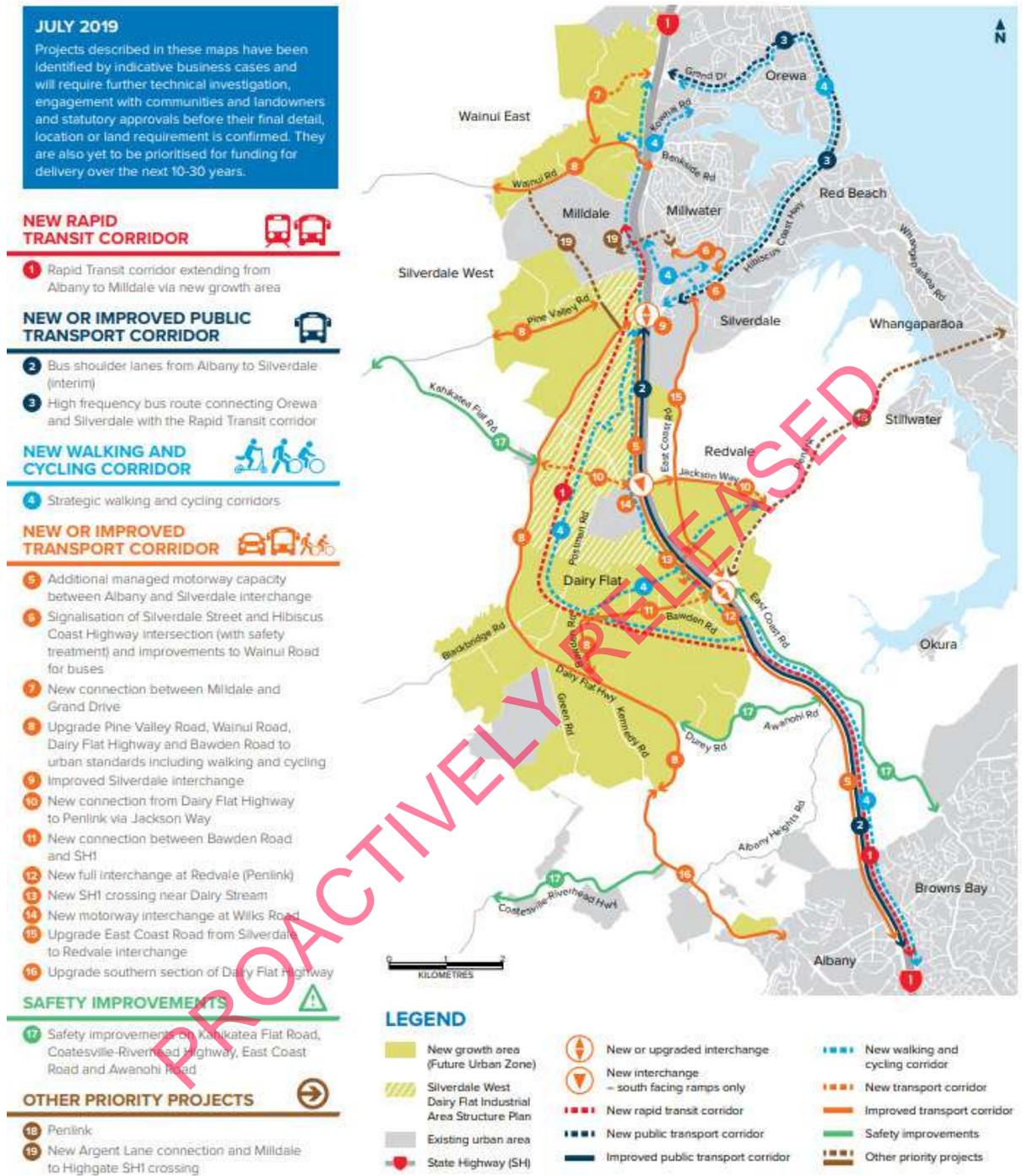
The North DBC study area is approximately 14km in length, 4km north of Albany, and 20km north of the city centre. Auckland Council has identified approximately 4,000 ha of land for future urban development in the North, including parts of Ōrewa, Wainui East, Silverdale West and Dairy Flat (the 'Northern growth area')².

This Northern growth area is anticipated to accommodate approximately 41,000 dwellings. When combined with growth in the existing urban areas in the wider North study area (Ōrewa, Silverdale, Redvale, Whangaparāoa) the wider northern area accommodates around 76,000 households. The total increase in households (over 2018) could grow to more than three times its existing population of approximately 63,000 people by full buildout (beyond 2048). In addition, the number of jobs in the North study area is expected to increase from approximately 12,000 to 34,000 over the same period.

The infrastructure identified in the IBC to support the North growth is shown in Figure 2-1.

² Based on the Future Urban Land Supply Strategy update 2017

Figure 2-1 North Indicative Strategic Transport Network



The recommended IBC network provides:

- A new 16km rapid transit corridor from Albany via Dairy Flat and onto Milldale providing efficient, frequent, high-quality public transport
- Improved public transport connections for the wider area with bus priority on key routes including a high frequency bus route connecting Ōrewa and Silverdale
- An integrated system of arterial roads that have a dual function to connect sub-regions and to link land uses to the new public transport system and existing strategic road network.

- 28km of new dedicated high quality walking and cycling paths
- Improvements to the Northern Motorway (SH1) including additional space to respond to increased travel demand and upgraded interchanges at Redvale and Silverdale and a new interchange at Wilks Road.

Accordingly, the DBC encompasses a total of 23 projects from the IBC Indicative Strategic Transport Network. This Strategic Case provides a breakdown of each element within this system – noting that the collective benefit of the network as a whole outweighs the individual benefits to each element.

Since the IBC phase in 2019, several changes in policy and land use context have occurred which have been considered during this business case. These are set out in the following sections.

2.2 Business Case change history

A snapshot of the North Business Case history is shown in Table 2-1. It summarises the recommended network for each Business Case stage, the urbanisation growth assumptions and the applicable regulatory and planning policies influencing decisions made. It is noted that the drivers for transport intervention have not changed throughout this process with continuity of:

- **Growth in North:** Dwellings, jobs and population assumptions have continued to increase throughout the business case stages demonstrating further urban intensification.
- **Regulatory and planning policies:** These policies support the mode neutral approach to transport interventions.

Table 2-1 History of the North Business Case

Stage	Detail	Growth	Policy
Programme Business Case (2016-2017)	<p>TFUG considered a programme of intervention for the North, Warkworth and South growth areas. The possible North interventions included:</p> <ul style="list-style-type: none"> • An extension to the RTC corridor from Albany to Grand Drive • Upgrades to the SH1 corridor including new interchanges • A range of upgrades to new and existing roads 	<ul style="list-style-type: none"> • Responds to the pace, scale and staging of growth identified in the AUPOIP and FULSS 2015. • FULSS 2015 greenfield growth assumptions: Additional dwellings - 25,500-13,100 additional Jobs - 4,040. 	<ul style="list-style-type: none"> • FULSS (2015). • AUPOIP (2015). • I9 Land Use Scenario. • ATAP first revision. • GPS on Land Transport (2015-2018)
Indicative Business Case (2018 - 2019)	<p>IBC focused on North area only:</p> <ul style="list-style-type: none"> • Diversion of the RTC corridor through the FUZ • Upgrades to SH1 with bus priority in the short term 	<ul style="list-style-type: none"> • Response to the pace of the updated FULSS 2017. • FULSS 2017 greenfield growth assumptions: Dwellings 32,000 Jobs 20,000 	<ul style="list-style-type: none"> • Updated FULSS (2017). • I11.4 Land Use Scenario. • Updated ATAP. • New GPS (2018-2021). • New Auckland Plan 2050. • Outcome: new GPS and Auckland Plan reinforces a

Stage	Detail	Growth	Policy
	<ul style="list-style-type: none"> Upgrade to a package of roads New walking and cycling connections 	<ul style="list-style-type: none"> Modelled growth assumptions* – Dwellings 42,000 Jobs 25,000 Total Population 180,000 (including Ōrewa, Silverdale and Whangaparāoa) 	<p>balanced, mode neutral response in the North. Focusing on greater mode choice and consideration of modal priorities.</p>
<p>Detailed Business Case</p> <p>(2020-2021)</p>	<p>DBC investigated interventions identified during the IBC:</p> <ul style="list-style-type: none"> Some minor changes to RTC route, particularly in Pine Valley area Confirmation of SH1 upgrade projects New and upgraded road corridors Separate walking and cycling upgrades on SH1, RTC and Dairy Stream with local connections. 	<ul style="list-style-type: none"> Silverdale West structure plan has been adopted. Response to the pace of the updated FULSS 2017. Similar modelled growth to IBC numbers so ultimate transport response is commensurate. Modelled growth assumptions* – Dwellings 42,000 in FUZ Jobs 25,000 Total Population 180,000 (including Ōrewa, Silverdale and Whangaparāoa) Additional time until full build out. Could affect timing of infrastructure. Using 2048+ scenario for modelling. 	<ul style="list-style-type: none"> I11.5 Land Use Scenario New GPS (2021-2024) Vision Zero 2019. Climate Change Response (Zero Carbon) Amendment Act 2019 NPS Urban development (NPS-UD). NPS Freshwater Management (NPS-FM). Outcome: Continued focus on mode shift and choice. Increased focus on achieving climate change response and intensification of development at transport nodes.

*Modelled growth numbers are generally reported in this DBC documentation. The modelled growth assumptions include the full buildout of the North i.e., both Future Urban Zoning as well as subdivisional capability under the Unitary Plan.³

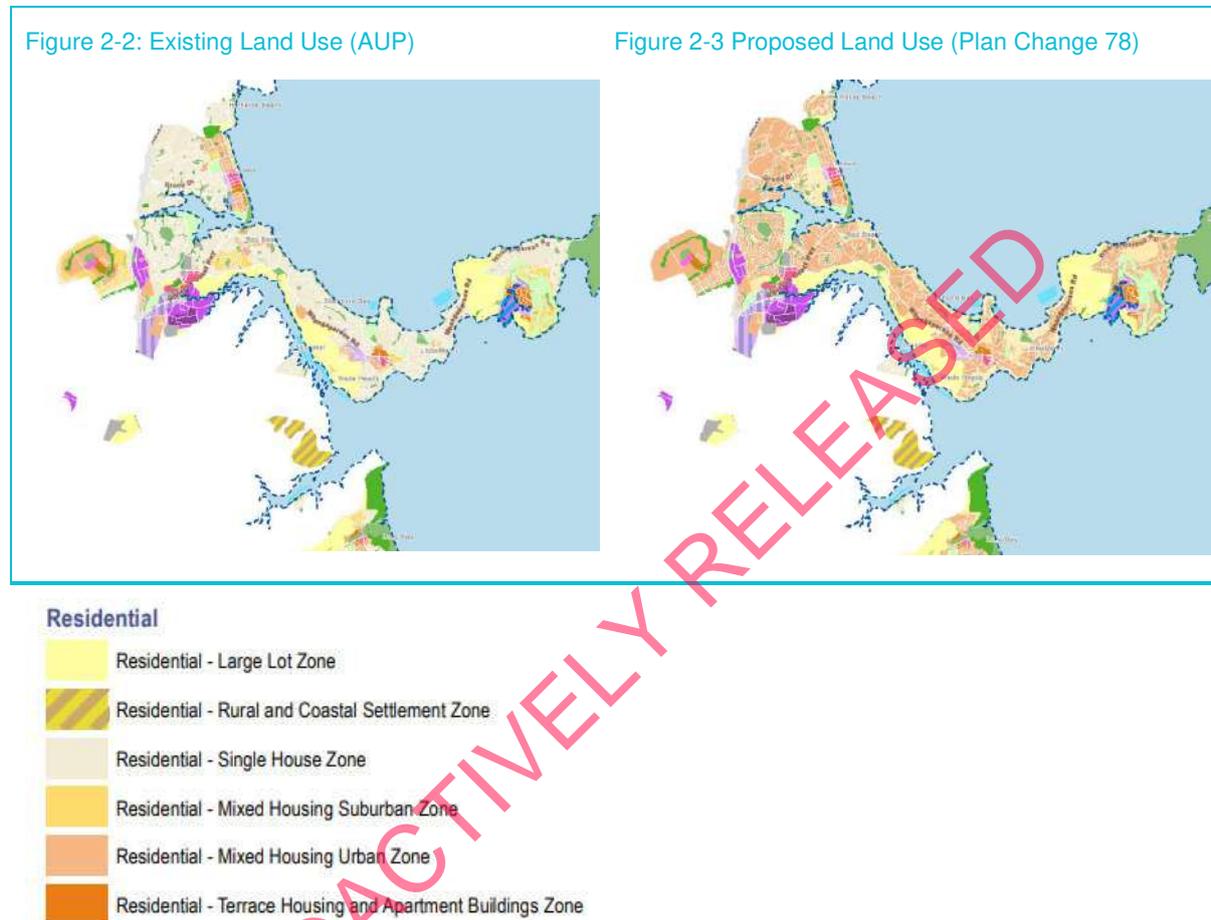
2.3 Recent changes in policy

Recent policy changes include the introduction of the National Policy Standard on Urban Development (NPS:UD) and Medium Density Residential Standards (MDRS). The intention of the MDRS is to enable housing choice in main urban areas. These standards support the development of three homes up to three storeys on each site, without the need for resource consent. To enable this, the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021

³ This does not take into account the MDRS and NPS:UD

(RMA-EHS) requires Tier 1 territorial authorities in greater Auckland, Hamilton, Tauranga, Wellington and Christchurch to incorporate the MDRS into every relevant residential zone in their district plan.

In the case of the North, much of the land within the study area is not live zoned and the MDRS changes will not take effect until plan changes to rezone future urban zone are undertaken. The MDRS will result in changes in already established areas such as Ōrewa, Silverdale, Millwater, Whangaparāoa and Milldale. The proposed changes are shown below in Figure 2-2 and Figure 2-3.



As shown, Plan Change 78 enables greater densities within the existing urban areas in the North with the predominant change being a shift from residential single house zone and mixed housing suburban zone changing to the mixed housing urban zone. This will allow for intensification of these areas for any developments within the area. The expected level of uptake for increased density in the areas shown is still unclear in the north area.

Much of the surrounding areas, like Millwater, parts of Milldale and Upper Ōrewa area have a relatively new housing stock and are less likely to be affected by changes in density rules. Other areas have potential for greater intensification including:

- Parts of Whangaparāoa – sites of larger sizes and the Ō Mahurangi Penlink project provides an improvement to transport access
- Remaining areas within Milldale Development – While a portion of the Milldale development has been constructed, subsequent stages could be implemented with higher densities

- Remaining areas in Ōrewa Heights – Like Milldale, remaining development areas could increase in density following changes in legislation.
- Future Urban areas once lived zoned will enable greater density, particularly around the RTC corridor primarily as a result of the NPS:UD.

The RMA is set to be repealed and replaced with three new pieces of legislation including:

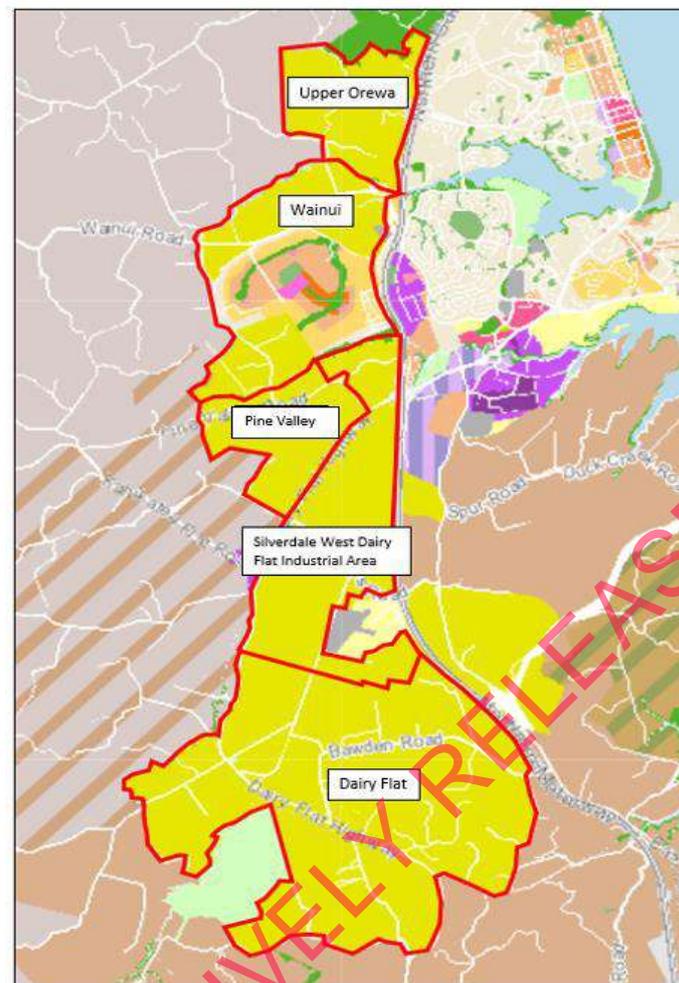
- Spatial Planning Act (SPA) which requires the development of long-term regional spatial strategies to help coordinate and integrate decisions made under relevant legislation
- Natural and Built Environment Act (NBA), the main replacement for the RMA, to protect and restore the environment while better enabling development
- Climate Adaptation Act (CAA) to address complex issues associated with managed retreat, and funding and financing climate adaptation.

The Natural and Built Environment Bill and Spatial Planning Bill were introduced to Parliament in early 2023. The Climate Change Adaptation Bill is likely to follow in the second half of 2023. While these changes to the RMA will likely take some time to be in place and are unlikely to effect the designation process, future implementation phases of project will need to consider the change in legislation.

2.4 Land use

Land use planning in the Northern Growth area is varied. Portions of the study are live zoned such as the Wainui area (Milldale Development). The Silverdale West Dairy Flat Industrial area has been structure planned (adopted by Council in 2019). The remaining areas including Upper Ōrewa, Pine Valley and Dairy Flat have not been structure planned and Auckland Council have no current plans to progress structure planning at this time. Figure 2-4 shows the relevant future urban zones within the study area.

Figure 2-4: Wainui Silverdale Dairy Flat Future Urban Zones



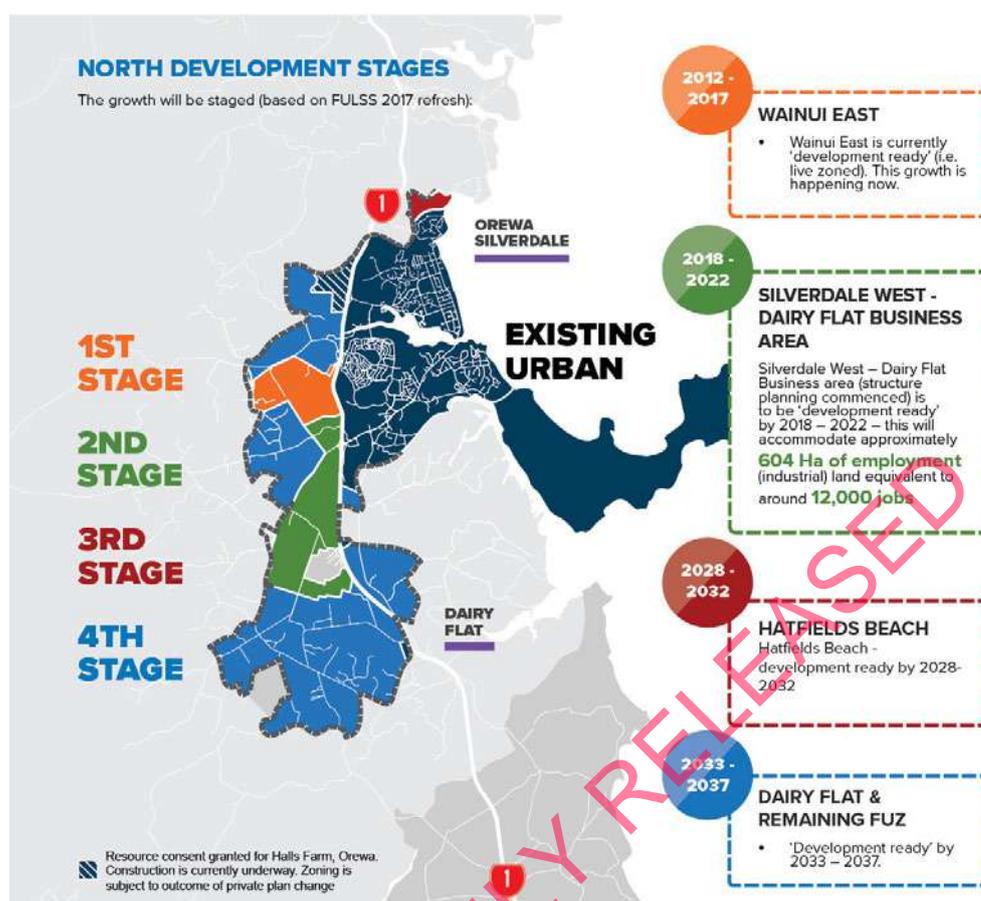
2.5 Timing of Growth

The development of the majority of North FUZ land is anticipated to occur over the long term and has been planned to be sequenced in stages over the next 20+ years as bulk infrastructure capacity allows.

To provide clarity about when the land identified in the AUP: OP will be 'development ready', Auckland Council developed the FULSS to provide for sequenced and accelerated greenfield growth in the future urban areas of Auckland. The FULSS refresh (2017) provides for a staged release of land in the Northern growth area as indicated in Figure 2-5.

The Silverdale West Industrial area is anticipated for development now, with Council in the process of pursuing a Council led plan change for the first stage. The majority of the remaining FUZ land is anticipated to be development ready by 2033-2037.

Figure 2-5: North Growth Area Development Stages



It is acknowledged that due to recent changes to land use policies (such as the Medium Density Residential Standards and the NPS:UD) Auckland Council is currently revisiting the land use strategy which is being completed in parallel to this DBC via the 'Future Development Strategy' workstream. This document will set out the Councils desired sequencing of land development in the Auckland region.

It is not expected to significantly change the quantum and location of future land available in the northern growth area, but increased intensification, different housing typology and refined staging are expected. Given the Dairy Flat and remaining FUZ area is one of the last areas anticipated to be development ready in the FULSS, a delay in expected timing for Dairy Flat is expected as part of this refined development strategy.

There is still considerable uncertainty around timing of the growth in the northern area for the following reasons:

- Council have identified a need for industrial land in the north immediately and are progressing a plan change for the first phase of this area. Several developers are known to have land holdings in this area and have indicated a desire for development of the land within the next 5 years.
- Growth in and around Milldale is continuing at a faster rate than has been historically forecast. Te Tupu Ngātahi is aware of early structure planning for Milldale North (area immediately north of Milldale led by Fulton Hogan).

- An outcome of policy changes may increase 'out of sequence' plan changes by third parties as has been the case in other areas in Auckland. In Drury, out of sequence plan changes in areas anticipated to be developed beyond 2035 have been successful through the judicial process.
- Implementation of the Ō Mahurangi Penlink Project is likely to increase land use pressure through improved accessibility for the eastern FUZ land adjoining this corridor.

In addition to the project specific factors listed above, there are some macro-economic factors such as market conditions, pricing (i.e. developer contributions), road pricing, net migration to Auckland, and brownfield versus greenfield development uptake which could influence the timing of development. At this stage the FULSS remains the best regional forecast available that considers how growth might be realised in Auckland.

2.5.1 Silverdale West- Dairy Flat Industrial Structure Plan

The council's FULSS identifies part of the Silverdale West Dairy Flat area specifically for business and it is sequenced to be development ready in the period 2018 – 2022.

The Silverdale West Dairy Flat area will become the focus for future light industry growth in the urban north due to the urban growth proposed in the wider area and the imminent exhaustion of light industry zoned land supply in the North Shore, Silverdale and the Highgate Business Park.

In 2020, Auckland Council finalised a structure plan for the Silverdale West-Dairy Flat area (see Figure 2-6 below) that identifies the future land use through this area as a mixture of light and heavy industry. Riparian margins and floodplains are also shown.

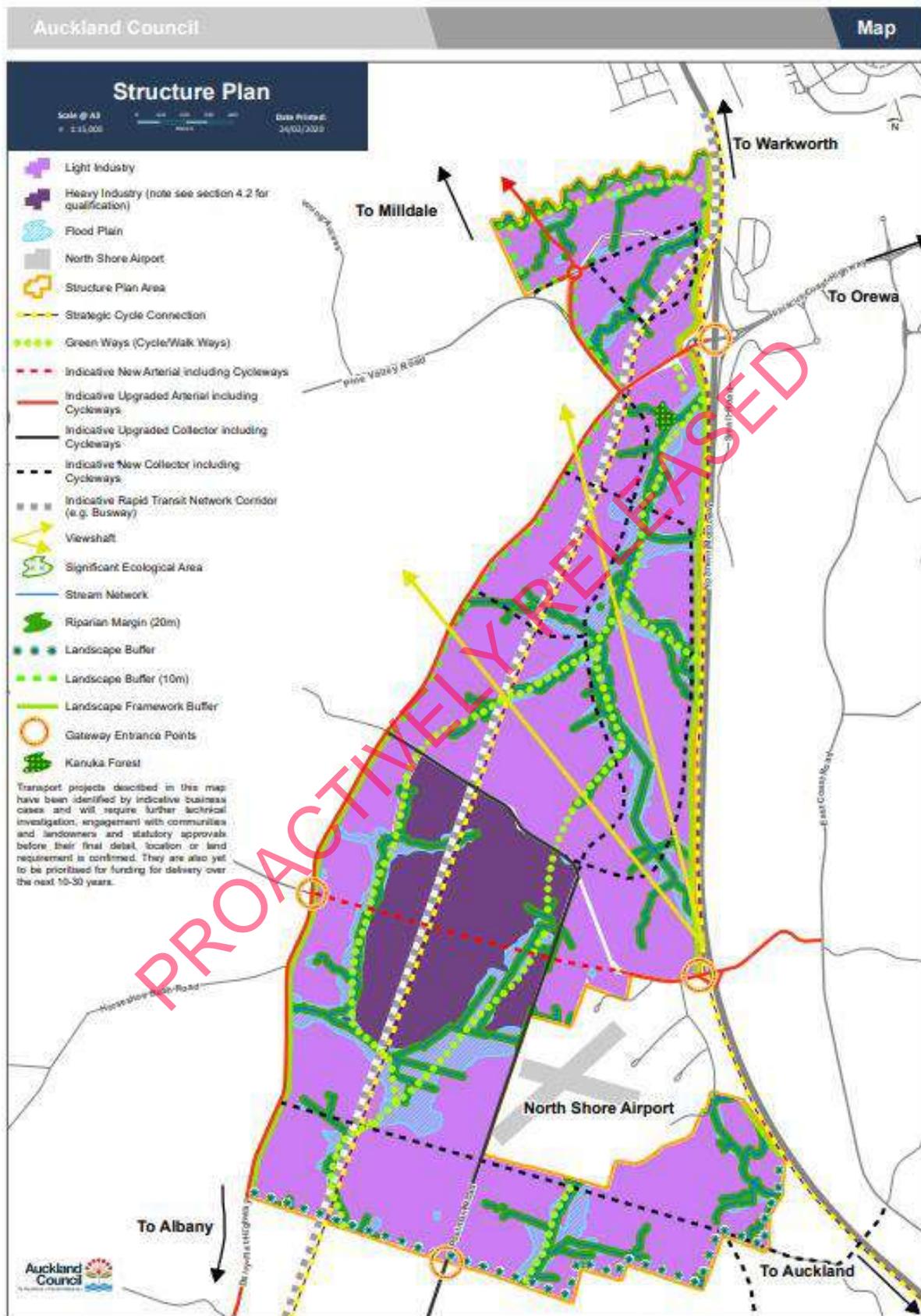
The structure plan identifies 294ha (net, excludes floodplains and roads) for light industry and 56ha (net) for heavy industry. The area of heavy industry is located south of Wilks Road. The total structure plan area is 603ha gross, however, once floodplains and roads are deducted the net developable area is 350ha.

By 2048 the additional industrial land demand for the northeast will amount to between 156 and 299ha (net) of light industry zoned land and up to 125ha (net) of heavy industry zoned land. It is considered prudent to plan to accommodate near the high end of the range given the difficulties with finding more industrial land once other activities are in place.

While there is a preference for the northern part of Auckland to provide for some heavy industry in the future, it is acknowledged that it is difficult to predict the mix of industrial land needed in 20 years' time. Before a decision is made on the appropriate zoning, the need for land for heavy industry will be reassessed prior to the plan change required to rezone the land in Stage 2 (2038-2048).

Although the structure plan has little statutory weighting under the RMA, it shows the Council's intended land use for Silverdale West and the northern part of Dairy Flat. This may change through the subsequent Council led plan change process (which will be subject to submissions, hearings and likely appeals with court proceedings). Additionally, private developers have their own aspirations for the area and may also submit their own private plan changes.

Figure 2-6: Silverdale West - Dairy Flat Industrial Structure Plan



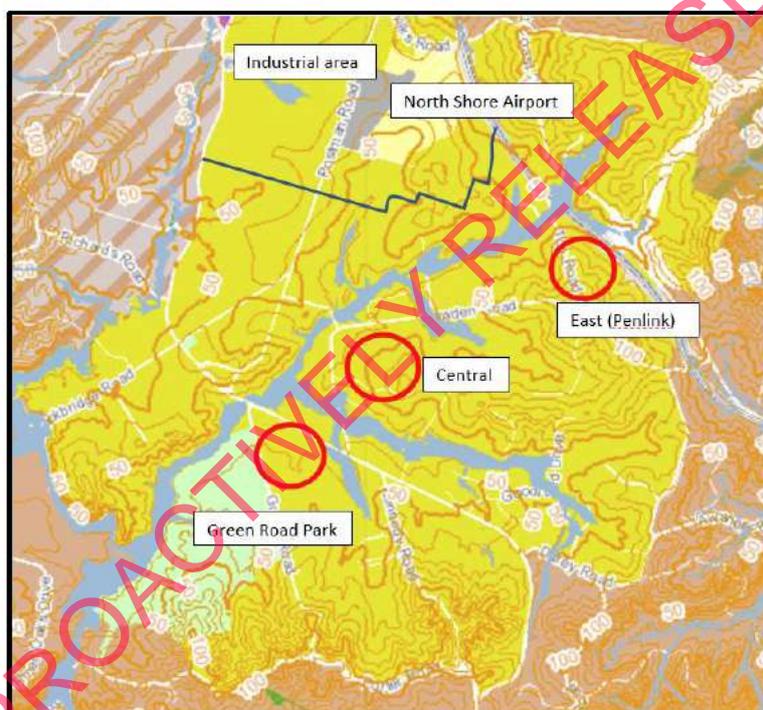
Note: The Structure Plan maps show an outdated transport network based on the IBC.

2.5.2 Wainui Silverdale Dairy Flat Draft Spatial Land Use Strategy

The Dairy Flat area has not been structure planned which results in land use uncertainty for this future urban area. The structure planning process for this area is not expected to occur until around 10 years prior to development of the area. Although 2,000 ha of land has been identified as future urban, the exact level of housing density and quantum of employment land required is not known.

Auckland Council have developed a Draft Spatial Land Use Strategy for the Dairy Flat area in parallel with the Te Tupu Ngātahi DBC. This strategy has been developed concurrently with the North DBC which allowed an iterative land use and transport integration process to occur. The Spatial Land Use Strategy identifies a need for a large town centre or small metropolitan centre to support the wider FUZ area. A range of options for a future centre location have been considered in Dairy Flat as per Figure 2-7. The Spatial Land Use Plan Silverdale Dairy Flat is draft and has not been adopted by the council's Planning, Environment and Community Committee.

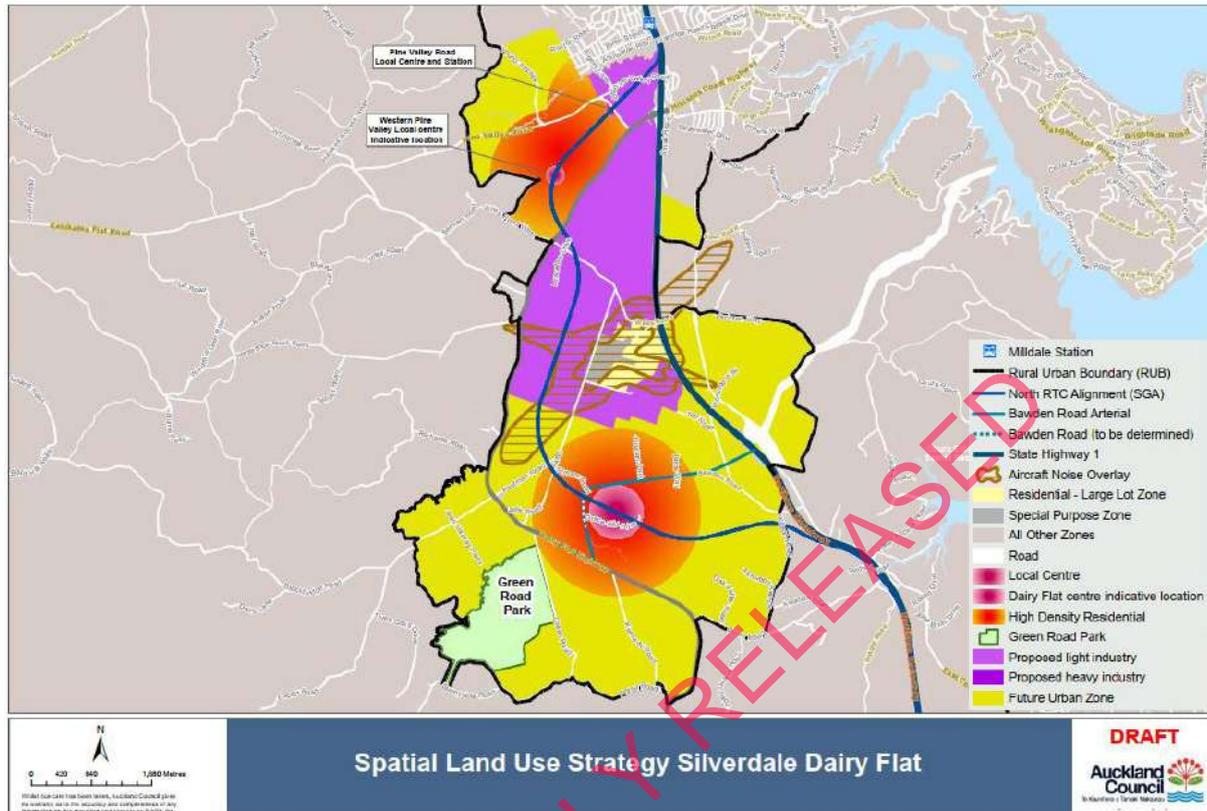
Figure 2-7: Town Centre Options Considered in Council's Draft Framework



The development of the Strategy has been influenced by a number of factors including zoning principles from the Auckland Unitary Plan, directions from the National Policy Statement on Urban Development, the existing land uses and zonings of adjacent land, the North Strategic Transport Network, potential future RTC station locations, future business and centre land requirements and various land constraints such as flooding and natural heritage.

Auckland Council's decision on where a future centre is located has been done so in collaboration with Te Tupu Ngātahi and other key partners including Manawhenua, Auckland Transport, Waka Kotahi. A central location with a strong integration with the proposed rapid transit corridor has been identified by the strategy as the preferred location for a centre in the Dairy Flat area. Figure 2-8 shows the draft spatial land use strategy identifying locations of centres in Dairy Flat and Pine Valley. The Spatial Land Use Plan Silverdale Dairy Flat is draft and has not been adopted by the council's Planning, Environment and Community Committee.

Figure 2-8: Auckland Council Draft Spatial Land Use Strategy



2.5.3 Wainui and Pine Valley

Part of the Wainui area is live zoned for the Milldale development, including a new township (residential and town centre zoning) – see below. This area is currently under development with initial stages now occupied by residents.

Figure 2-9: Milldale zoning under the AUP



2.5.4 Ara Hills development – Upper Ōrewa

In the northern portion of the study area, the Ara Hills development has consent for development of around 500 households to the land north west of the Grand Drive interchange.

Figure 2-10: Ara Hills consented development under the AUP



Ara Hills
Development -
Masterplan

2.6 North DBC Scope

The DBC scope encompasses the IBC Indicative Strategic Transport Network. Together these projects form a cohesive transport response for the Northern growth area to respond to planned future growth.

The transport investment identified in the IBC will enable an integrated transport system with a range of strategic and local elements supporting mode choice in the North. The infrastructure identified to support this growth includes the following key aspects:

- A new 16km rapid transit corridor from Albany via Dairy Flat and onto Milldale providing efficient, frequent, high-quality public transport
- Improved public transport connections for the wider area with bus priority on key routes including a high frequency bus route connecting Ōrewa and Silverdale
- An integrated system of arterial roads that have a dual function to connect sub-regions and to link land uses to the new public transport system and existing strategic road network.
- 28km of new dedicated high quality walking and cycling paths
- Improvements to the Northern Motorway (SH1) including additional space to respond to increased travel demand and upgraded interchanges at Redvale and Silverdale and a new interchange at Wilks Road.

Accordingly, the DBC encompasses the IBC Indicative Strategic Transport Network. This Strategic Case provides a breakdown of each element within this system – noting that the collective benefit of the network as a whole outweighs the individual benefits to each element.

The DBC considers the case for investment and refinement of options for the projects outlined in Table 2-2. These projects form the arterial strategic transport network for the northern area but it is acknowledged that there will also need to be a complementary collector road network and other cycle connections.

The investment decisions sought at this stage are:

1. **Approval of the North recommended transport network.**
2. **Approval of lodgement of 13 NORs to protect future transport corridors in the northern area.**
3. **Approval for funding release for the North post lodgement activities.**
4. **Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended North Package.**

This document focuses on providing the overall North DBC investment case for route protection and details the recommended route protection strategy. The preparation of the Notice of Requirement (NoR) packages is being prepared concurrently with this DBC.

Given the number and range of projects across the entire Te Tupu Ngātahi Programme and the difference in likely timing of implementation (between 10-30+ years), three broad DBC types have been identified:

- **Type A: Detailed Business Case for corridor confirmation** – identification of a preferred corridor however, no further detailed work required as no investment is being sought for route protection.
- **Type B: Detailed Business Case for route protection** – identification of a preferred corridor with sufficient design to inform the assessment of effects and lodge a NoR Investment in pre-implementation and resultant property costs sought.

- **Type C: Detailed Business Case for implementation** – a typical DBC assessment suitable for selection of a preferred option with sufficient detail to progress to pre-implementation, and implementation funding is sought.

The projects within this DBC have been allocated to the following type of business cases as detailed in Table 2-2.

Table 2-2 Projects included in DBC and pathway proposed

NOR # / Project		Business Case Type			Commentary
		Type A	Type B	Type C	
1	Rapid Transit Corridor including a shared path along the rapid transit corridor		✓		Typical Detailed Business Case for route protection
2	RTC – Milldale station		✓		Typical Detailed Business Case for route protection
3	RTC – Pine Valley Station		✓		Typical Detailed Business Case for route protection
4	4A: Upgrades to SH1 between Albany and Silverdale		✓		Typical Detailed Business Case for route protection
	4B: A new walking and cycling path along SH1		✓		Typical Detailed Business Case for route protection
	4C: Improvements to the existing Silverdale Interchange		✓		Typical Detailed Business Case for route protection
	4D: A new interchange at Wilks Road		✓		Typical Detailed Business Case for route protection
	4E: Upgrades to the Redvale interchange		✓		Typical Detailed Business Case for route protection
	4F: Upgrades to the Wainui interchange for active modes		✓		Typical Detailed Business Case for route protection
	4G: Silverdale to Highgate Active Mode Connection		✓		Typical Detailed Business Case for route protection
5	New SH1 crossing at Dairy Stream		✓		Typical Detailed Business Case for route protection
6	New connection between Milldale and Grand Drive		✓		Typical Detailed Business Case for route protection

NOR # / Project		Business Case Type			Commentary
		Type A	Type B	Type C	
7	Upgrades to Pine Valley Road		✓		Typical Detailed Business Case for route protection
8	Upgrade to Dairy Flat Highway between Dairy Flat and Silverdale interchange		✓		Typical Detailed Business Case for route protection
9	Upgrade to Dairy Flat Highway between Albany Village and FUZ		✓		Typical Detailed Business Case for route protection
10	Upgrade to Wainui Road		✓		Typical Detailed Business Case for route protection. Part of the corridor is already protected via a developer agreement therefore scope reduced.
11	New Road between Kahikatea Flat Road and Wilks Road		✓		Typical Detailed Business Case for route protection
12	Upgrade to Bawden Road and extension to create a new connection with SH1		✓		Typical Detailed Business Case for route protection
13	Upgrade to East Coast Road from Silverdale to Redvale Interchange		✓		Typical Detailed Business Case for route protection
A1 ⁴	New Argent Lane and new Pine Valley Road	✓			Corridor is already route protected
A2	Upgrade of Hibiscus Coast Highway and Grand Drive for public transport and active modes	✓			No route protection required as proposed treatment stays within existing road reserve.
A3	Dairy Stream Active Mode Path	✓			No route protection required as land is within riparian margin
A4	Jackson Way arterial road link		N/A		Removed from DBC scope
A5	Kowhai Road active mode connection		N/A		Removed from DBC scope

⁴ No NOR proposed for type A projects.

NOR # / Project		Business Case Type			Commentary
		Type A	Type B	Type C	
A6	John Creek active mode connection	N/A			Removed from DBC scope

Three projects from the IBC have been removed from the DBC scope. These projects and an explanation as to why they have been removed is outlined below:

- **Jackson Way arterial road link** – Removed as the form and function process confirmed this route as a collector road therefore outside the scope of Te Tupu Ngātahi
- **Kowhai Road active mode connection** – Since the IBC, a developer has consented an equivalent connection and this is no longer considered to be required.
- **John Creek active mode connection** – Since the IBC, the structure plan has confirmed a John Creek facility will be provided and is likely to be delivered by developers hence is no longer considered to be required for route protection.

This DBC has undertaken sufficient design detail and assessment to confirm the footprint required to provide for future infrastructure. This footprint strikes a balance of minimising land requirement whilst maintaining flexibility for future decisions over the next 30 years. Examples of how flexibility has been managed is shown in Table 2-3.

Table 2-3 Management of flexibility in the North DBC

Item	How flexibility has been managed
Road space allocation	The cross sections provide sufficient space to provide for the individual modal elements – but how this road space might ultimately be allocated will be confirmed during the future individual implementation DBCs and will reflect the design standards at that time.
Intersections	Generally, where possible, design has allowed for flexibility in intersection type for future design in particular roundabouts and signals to provide for future decision making.
Stormwater treatment	Each corridor has had stormwater analysis undertaken to understand the stormwater treatment and attenuation requirements including impacts from future climate change. This has informed the footprint for stormwater measures including identification of wetlands where appropriate. The Waka Kotahi standard is NZTA P46 Stormwater Specification and the AT specification is “Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01).
Management of greenhouse gas (GHG) emissions.	A number of factors will encourage mode shift in time with development to support the management of GHG emissions associated with future growth: <ul style="list-style-type: none"> • Flexibility in road space allocation and longevity of the programme provides sufficient opportunities to realise future design changes or use of materials to best support low carbon infrastructure throughout the lifecycle of the project.

Item	How flexibility has been managed
	<ul style="list-style-type: none"> Flexibility for programme staging to allow re-prioritisation of elements to best respond to mode shift targets as interdependent factors such as funding and changing land use occurs.
Bridges	Where corridors anticipate a bridge replacement will be required in the lifetime of the designations, sufficient space has been allowed for in the designation to support construction of the bridge.

2.7 Structure of North DBC

This DBC document provides a summary of the North Business Case and more detailed information for each corridor is included in the specific appendices referenced throughout the DBC.

All appendices have been written to allow individual corridor information to be easily decoupled from this overarching DBC for use in future individual corridor business case processes or preparation of NoR workstreams. Details of the appendices' purpose are shown in Table 2-4.

All appendices are formatted similarly with reporting ordered as follows:

- Generic or process orientated information.
- Strategic project information.
- Strategic projects, followed by arterial roads and active mode connections.

The economic case has been prepared for the overall North area with an additional assessment lens for each project.

The programme outcomes have been reported for all of the North area and where meaningful, in a similar geographic way to support staged delivery by area.

Table 2-4 North DBC appendices

Appendix	Summary of purpose
A: North Strategic Case	Strategic Case for the DBC including specific evidence for each project corridor. Identifies any changes to the policy and strategic direction since the completion of the IBC.
B: North Climate Change Assessment	Summary of the climate change assessment undertaken to consider the role of each corridor in supporting the climate change response and the identification of future opportunities.
C: North Assessment of alternatives	Summary of option assessment process for the DBC and AEE. Includes detailed documentation for each corridor individually.
D: North Technical Assessments	Range of technical notes to support the North DBC: D1: Hibiscus Coast Highway Transport option assessment

Appendix	Summary of purpose
E: Engagement Summary	Summary of results from the 2022 North engagement.
F: Urban Design Evaluation	Urban design evaluation for all projects in the DBC using the Te Tupu Ngātahi Design Framework principles.
G: North Transport Outcomes	Specific information on transport outcomes for the recommended transport network.
H: North Design Report	Engineering report that documents assumptions and decisions for the recommended network for each project.
I: North Property Overview	Assumptions and methodology for the estimate of property costs.
J: North Cost Report	Assumptions and methodology for costing. Costs prepared for each project.
K: North Economics Assessment	Economic assessment for North. Includes assumptions and outcomes.
L: North Route Protection Strategy	Strategy to route protect for the North.
M: North Risk Register	Key overall North risks and individual project risks.
N: North Staging Considerations	Potential staging for the North network. Includes qualitative commentary of both land use and transport factors for staging and commentary on triggers. Includes an alternative staging assessment for consideration.
O: Mana Whenua engagement summary	Overview of Manawhenua engagement undertaken and feedback received on projects.
P: ESR screens	Environmental screens as per (Z/19 Taumata Taiao – Environmental and Sustainability Standard) for strategic projects

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Strategic Case

3 Why is investment needed?

Auckland is New Zealand's largest city and the economic heart of the nation. The current transport network with its high reliance on private vehicle use does not support the aspirations of New Zealand to address climate change with a move to a low carbon economy.

Over the next 30 or more years, the Northern growth area is expected to accommodate:

- 41,000 additional dwellings in the FUZ area
- 110,000 additional people
- 22,000 additional jobs.

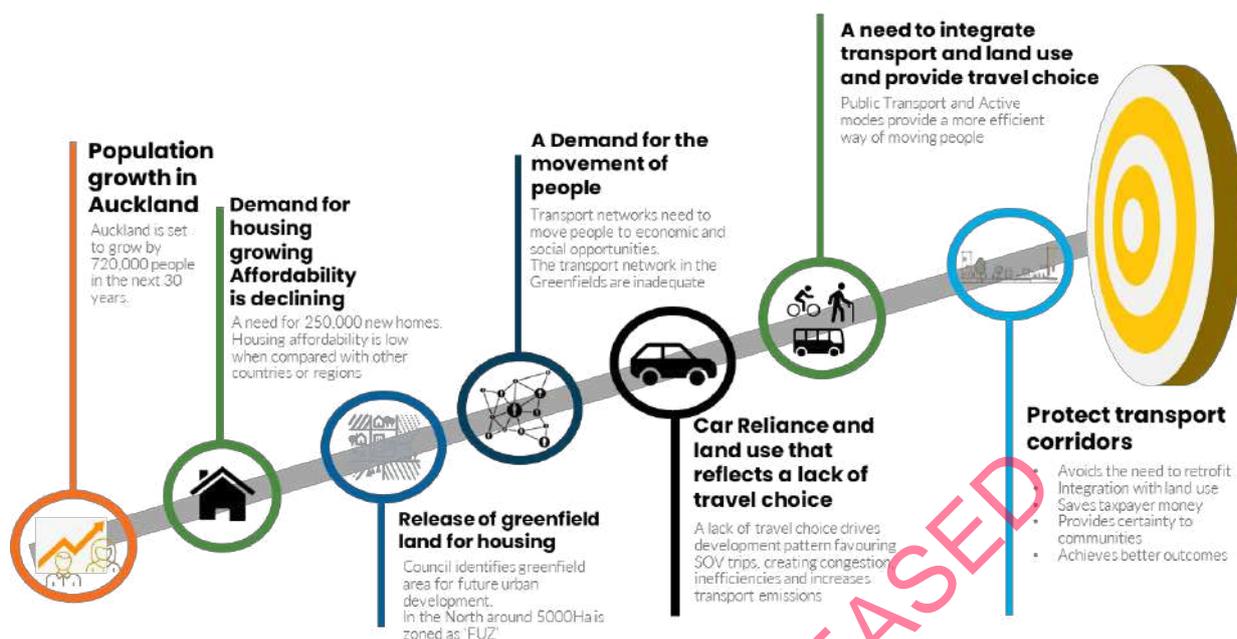
This is a significant increase from the existing population of the northern area of 63,000⁵ and a significant change in the FUZ zone which is presently predominantly rural in character. With the realisation of the NPS:UD and MDRS this intensification could be even more than is currently estimated. The existing transport system is not appropriate, and this growth will exacerbate existing transport problems resulting in the current network being unsuitable to support this planned future growth.

Without any investment in alternative modes, the majority of additional trips will continue to be undertaken by private vehicles and the Vehicle Kilometres Travelled (VKT) would be expected to significantly increase. By 2048, the additional VKT would result in significant congestion on existing routes such SH1, Interchanges and key connections such as Dairy Flat Highway and East Coast Road and further reduce access to social and employment destinations.

The future challenge for the North therefore, is not if the greenfield growth will or should occur, but rather what needs to be done, so when this growth happens the transport network is best positioned to respond appropriately. The future transport network needs to support a well functioning urban environment, which enables a variety of homes to have good accessibility for all people between housing, jobs, community services, natural spaces, including by way of public or active transport. Otherwise without investment, urban growth will continue to contribute to congestion and transport emissions rather than supporting the government policy to avoid emissions when growth occurs. Figure 3-1 sets out some important context for the business case and outlines the desired outcomes of route protection.

⁵ Current population in Ōrewa Silverdale and Whangaparāoa, 2018 census

Figure 3-1: Purpose of this business case



The Northern Growth area has a large area of Future Urban Zone which has been identified for urbanisation. Whilst there is some timing uncertainty, growth is highly likely to happen at some point. The existing network will be unable to support the overall climate change goals of shifting trips to lower emission travel options including public transport and active transport. It is critical that the transport system supports and shapes the scale of growth proposed. Table 3-1 shows the most probable issues that will likely occur in the North if investment does not occur.

Table 3-1 Key issues for the North without transport investment

Key issues	Potential outcome
Existing transport network cannot accommodate additional transport demands.	<ul style="list-style-type: none"> The current transport network is already under pressure (e.g. SH1 and Silverdale Interchange) and future transport demands will exacerbate existing issues thus limiting the North's growth potential. The existing network does not provide suitable access to future land uses, resulting in indirect/longer trips between existing and future key destinations.
Poor land use integration	<ul style="list-style-type: none"> Limited opportunities to encourage public transport, walking and cycling, resulting in private car use to continue at existing levels. The consequences of a lack of integration between land use and transport could contribute to increased separation, reduced opportunity for pedestrians and cyclists to cross safely between destinations and a perception of severance. This would be exacerbated without crossings at intersections and midblock crossings providing access to the expected high density residential development adjacent to the corridor. Does not support the delivery of the desired compact urban form for key locations such as Local Town Centres and Public Transport.

Key issues	Potential outcome
	<ul style="list-style-type: none"> • Inability to match employment land (e.g. Silverdale West – Dairy Flat Industrial area) with the transport network will not enable more local employment options and limit its ability to operate as a sub-regional economic and employment hub. • Inability of the transport network to respond flexibly to changing densities from land use policies such as the NPS:UD and MDRS resulting in residential intensification that is not supported by low carbon transport network options and reinforces the current private vehicle preferences. • Opportunity to provide lead infrastructure which supports mode shift, i.e., walking and cycling, is lost due to unconnected development. • The Northern growth area's growth potential is limited. • Liveability outcomes are compromised.
Limited travel choice	<ul style="list-style-type: none"> • Limited investment in public transport (i.e. facilities and stations) to easily access key locations in the Northern growth area reinforces high private vehicle dependence. • Limited investment in active mode facilities will result in a network which is not legible, unsafe and not well connected. • Unmanaged growth in demand for private vehicle travel, which will result in traffic volumes on existing roads above their designed capacity – resulting in severe congestion, severance, and high stress for all modes. • Limited urbanisation of the currently rural road network (such as Wainui Road, Pine Valley Road, Dairy Flat Highway and Bawden Road) which will have negative outcomes for safety, urban form, and active travel. • Strategic network resilience risk associated with limited access to future Northern growth areas via the state highway network. Over-reliance on these connections for both strategic and local activities will compromise both functions.
Contribution to climate change	<ul style="list-style-type: none"> • Without investment in transport choice, private cars will continue to be the dominant mode in the North. With growth this will increase the number of private vehicle trips and potentially increase transport emissions depending on the vehicle fleet. This does not support the development of a low carbon transport system. • A poorly connected walking and cycling network, or a network with missing links will reduce the potential for mode shift and miss the opportunity to capture new active mode users for short internal trips.
Safety	<ul style="list-style-type: none"> • Existing safety risks are likely to increase on local corridors within the North transport network traffic volumes increase with limited investment in safe solutions. • Active mode safety issues will be exacerbated without investment in suitable and safe walking and cycling facilities.

Key issues	Potential outcome
Environmental challenges	<ul style="list-style-type: none"> Without consideration, the transport network may not be able to adapt to climate change challenges like increased severity and occurrence of flooding.

3.1 Why route protect?

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

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

- **Provides certainty and direction for future land use.** This supports key land use integration measures such as future structure planning processes and intensification around stations and public transport routes.
- **Provides a mechanism for AT and Waka Kotahi to plan for future financial investment while retaining flexibility** on the detailed development of the recommended future network, enabling it to respond to the pace, scale, and exact location of future urban growth.
- **Allows for major infrastructure to be implemented at the right time**, integrated with the urban development driving the desired transport and urban outcomes. 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.
- **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.
- **Protects project feasibility.** Route protection prevents the land from being developed in a manner which makes projects more expensive, has compromised outcomes or in the worst case the project is no longer feasible. This is particularly important with pressure for private plan changes creating potential for live zoning to occur prior to route protection. It is noted that when development occurs before projects are provided for in the Regional Land Transport Plan (RLTP), developers currently do not contribute to the cost of projects which they benefit from and contribute traffic to but do not require for their development to proceed.
- **Improved Climate change Resilience and Environmental effects.** Through route protection, the projects team can select optimum alignments for critical infrastructure which avoid floodplains and areas of high environmental value. These corridors are protected from buildout and having to weigh up effects on communities vs environmental and climate considerations when implemented.

Parts of the Northern Growth area is seeing increased development pressure which further supports the need for timely route protection as detailed in this DBC.

4 What has changed since the IBC?

There has been a wide array of changes to policy, land use and transport assumptions between the endorsement of the North IBC and the preparation of this North DBC.

Table 4-1 below provides a summary of the key changes and how the DBC has responded to these changes. For more detail refer to **Appendix A: North Strategic Case**.

Overall, the recommendations of the IBC are still consistent with respect to the key changes. It is noted that the DBC has specific actions for managing land use uncertainty and reassessing all corridors against the stronger policy shift to support emission reductions.

Land use and transport project assumptions are in constant evolution. This DBC is focused on using the new information to:

- Identify and where possible mitigate or reduce project risks.
- Better understand the flexibility that will be required during option development for route protection.
- Test the resilience of the proposed programme to changing land use.
- Align with other endorsed projects technical requirements and where necessary identify opportunities for improved outcomes.

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Table 4-1: Summary of Key Changes since the IBC

Change Since North IBC	DBC Response
<p>Land Use policy and strategic alignment</p> <ul style="list-style-type: none"> • Auckland 2050 • National Policy Statement (NPS-UD) on Urban Development • Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021. • NPS on Freshwater Management (NPS-FM). • Proposed NPS for Indigenous Biodiversity. • NPS for Highly Productive Land (NPS-HPL) 	<p>The optioneering process to date has used multi criteria analysis (MCA) to assess a wide range of social and environmental impacts. The impact of the new NPS criteria has been considered through the options assessment phase.</p> <p>The NPS-UD requires councils to plan for growth and ensure a well-functioning urban environment for all people, communities, and future generations with a key requirement to enable intensification around centres and along public transport routes. The Resource Management Amendment Act strengthens the NPS:UD and includes a new Medium Density Residential Standards(MDRS) which allow development up to three homes of three storeys on most sites without a resource consent. This differs from the Auckland Unitary Plan which has designated zones for Mixed House Urban which is the most similar zoning to the proposed MDRS.</p> <p>In terms of impacts on the Northern Growth area, these policy changes have the potential for the following changes:</p> <ul style="list-style-type: none"> • Policy changes could delay the need for greenfield growth area further into the future • Allow for more intensified residential development in the Northern Growth area particular in the vicinity of the RTC corridor and centres. <p>This is obviously less coordinated than through a Structure Plan process and is harder to predict where intensification might occur as it depends on public and private developer appetites and availability of suitable sites. It is understood that the MDRS is seeking to build new houses faster, rather than increasing the population in Auckland, so the overall growth assumptions for Auckland remain valid, it is potentially the timing and location of the growth which is uncertain.</p> <p>To manage this uncertainty in the DBC it is intended that each corridor in the recommended DBC network will be assessed at a high level to consider how the recommended footprint might change should higher intensification materialise in the adjacent land use. For example, could a change in residential land use intensification adjacent the corridors change the recommendation from a 2 lane cross section to a 4 lane cross section.</p>

Change Since North IBC		DBC Response
		The impact of the environmental based NPS criteria will be considered in the DBC by specialists as part of the MCA process.
Policy focus on Climate Change	<ul style="list-style-type: none"> The Climate Change Response (Zero Carbon) Amendment Act 2019 Amendments support contribution to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5° Celsius above pre-industrial levels and allow New Zealand to prepare for, and adapt to, the effects of climate change. Ministry for the Environment Te hau Mārohi ki anamata: Transitioning to a low-emissions and climate-resilient future. Includes an emissions reduction plan. Ministry for the Environment National Adaptation Plan. 	<p>The IBC was built on the premises of:</p> <ul style="list-style-type: none"> Transport and land use integration – a guiding principle to provide a transport network that supports land use development and good urban form. Prioritising mode choice – specifically focusing on improved public transport reliability and services and creation of a well-connected walking and cycling network. <p>The result is a recommended transport system which reduces the reliance on private vehicles and shifts trips to low carbon alternatives. The DBC also continues to build on demand management principles adopted in the IBC and does not provide for unconstrained demand but rather seeks opportunities to influence and reduce demand alongside the recommended infrastructure. The MfE emissions document details the proposed approach to reducing emissions such as reducing VKT by integrating land use and transport and providing travel choice. The premise of this DBC aligns well to these goals and as such, the DBC is well positioned to respond to climate change outcomes.</p> <p>Specific actions to be undertaken in the DBC will include a Te Tupu Ngātahi climate change assessment of the DBC corridors to ensure proposed investment is consistent with climate change targets.</p>
Land Use Assumptions and development pressures.	<ul style="list-style-type: none"> Formal land use assumption changes include: Silverdale West – Dairy Flat Industrial Structure Plan completed in 2020. Increasing development pressure has been identified in the areas below: Milldale development – The area is currently under development and land has been set aside for an RT station in the eastern part of the development. 	<p>The DBC is cognisant of any changes in the land use assumptions and utilises the most current land use assumptions available. Of those identified to date, there are no significant changes to base land use assumptions from the IBC.</p> <p>As previously mentioned, the timing and exact scale and form of growth for the majority of the FUZ areas in the North is uncertain. Structure planning, which will confirm the land use zoning within these FUZ areas, has not yet commenced for the majority of these areas. Most of the FUZ areas are not likely to be structure planned until after 2030.</p>

Change Since North IBC	DBC Response
<ul style="list-style-type: none"> Ara Hills development adjacent to the Grand Drive Interchange. 	<p>Generally, the DBC responds to growth as currently identified in the FULSS. However, there is evidence of ongoing development pressure in certain areas of the North such as Wainui and Upper Ōrewa. These development pressures are currently within the existing future urban zoned land. Hence, the impacts of this early development are largely focused on staging, sequencing and the resulting pressure on strategic transport infrastructure.</p> <p>There is currently no evidence of any development proposals that are located outside the FUZ which could have a wider implication on the proposed network as it generates additional demand where previously there were none.</p>
<p>Modelled Growth Assumptions</p> <ul style="list-style-type: none"> Overall growth projections in the Northern growth area remain generally consistent in terms of full build out quantum. Growth projections are expected to be slightly slower and more linear in terms of full build realisation. 	<p>The overall quantum of growth in land use model i11.6 remains largely the same as i11.4 which was used in the IBC. As these growth assumptions were the basis on which the transport network was developed, the overall conclusions of the North IBC remain valid. The Latest I11.6 land use forecast show a slower take up of growth in the Northern Growth area compared with previous forecasts. By the 2048 year, only 30% of growth is assumed to have occurred with the remaining growth forecast to occur post 2048. This represents growth occurring around 2 years later than the I11.4 scenario assumed in the previous business case.</p> <p>Potential impacts from the MDRS have not been included in AFC land use models as yet so the impact of intensification will be considered qualitatively for each corridor during the optioneering process.</p> <p>The change in growth timing could potentially impact the recommended timing of implementation of transport projects in the DBC.</p>
<p>Transport Policy and Strategic Alignment</p> <ul style="list-style-type: none"> Ministry of Transport Outcomes Framework. An updated GPS on Land Transport has been released, which places increased focus on climate change objectives and freight connections rather than broader environmental outcomes and value for money. Road to Zero 	<p>There have been some key changes to the policy and strategic direction since the IBC. These changes are however still consistent with the overarching outcomes sought from the IBC. These include access, mode shift, environmental sustainability, and safety. The GPS also has a greater focus on climate change.</p> <p>With these continuing objectives it is considered that the IBC conclusions are well aligned with the current transport strategic and policy directions. The problems and assessment in the DBC have been</p>

Change Since North IBC	DBC Response
	refined to accommodate these GPS changes. More details on how the network will support addressing climate change will be included.
<p>Transport Projects changes</p> <ul style="list-style-type: none"> • Ō Mahurangi Penlink: Designated and included in the ATAP 2018 Package for implementation between 2018 and 2028. • Albany to Silverdale bus shoulder lanes on SH1: Included in Regional Land Transport Plan and ATAP as part of improvements to SH1, between Albany and Ōrewa. • Norther Corridor Improvements: A new continuous motorway route between the Northern Motorway (SH1) and Upper Harbour Motorway (SH18), plus extension of the Northern Busway from Constellation Station to Albany. • Additional Waitematā Harbour Connections Business Case: A business case was completed in 2020 for the Additional Waitematā Harbour connections looking at cross harbour connectivity and changes to the RTN network through the North Shore. • Additional work completed on the Auckland Rapid Transit Baseline document. 	<p>From the IBC there has been little change that would have demonstrable effect on the conclusions in the IBC.</p> <p>The Ō Mahurangi Penlink project has progressed faster than assumed in the IBC phase with NZUP funding and construction anticipated to begin in 2022. This has limited effect on the North projects given the long-term focus of the Te Tupu Ngātahi scope.</p> <p>Both the AWHC and Rapid Transit Baseline have placed additional weight on the need for a RTC corridor to connect into the current Albany station on the West of SH1. This has potential to result in changes in assumed tie in for the RTC extension to the north.</p> <p>There has been no additional funding identified since the IBC that would change the indicative staging of these investments.</p> <p>The DBC will interface with the designs of these complementary transport projects.</p>
<p>COVID19 impacts</p>	<p>The impact of COVID19 on the transport system has three key impacts.</p> <ul style="list-style-type: none"> • Resilience of public transport operations. • Change in funding levels and type. <p>While the response to COVID19 has had a direct and immediate impact on public transport and transport demand, it is expected in the longer-term horizon, such as that assessed in the DBC that transport demands will return to projected levels.</p> <ul style="list-style-type: none"> • The realisation of work from home opportunities following COVID19 is considered important for the North where a future aspiration might be for residents to live and work within the area and commute

Change Since North IBC	DBC Response
<ul style="list-style-type: none"><li data-bbox="405 276 819 300">• A kick-start for working from home.	<p data-bbox="976 276 2080 368">some days to urban Tāmaki Makaurau. COVID19 has shown that this type of flexible working can be possible. Additional uptake in work from home will have an impact consistent with longer term aspirations for reduced travel demand, which is already predicated in the base modelling assumptions.</p> <ul style="list-style-type: none"><li data-bbox="976 376 2080 440">• Given the long-term nature of the DBC no specific COVID19 related changes to land use and travel demand assumptions are considered necessary.

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5 North projects

This DBC proposes an integrated transport network to support the expected future growth in the Northern Growth area. Overall, the package seeks to improve connectivity for the North and support transformational mode shift by providing high quality, safe and attractive transport environments.

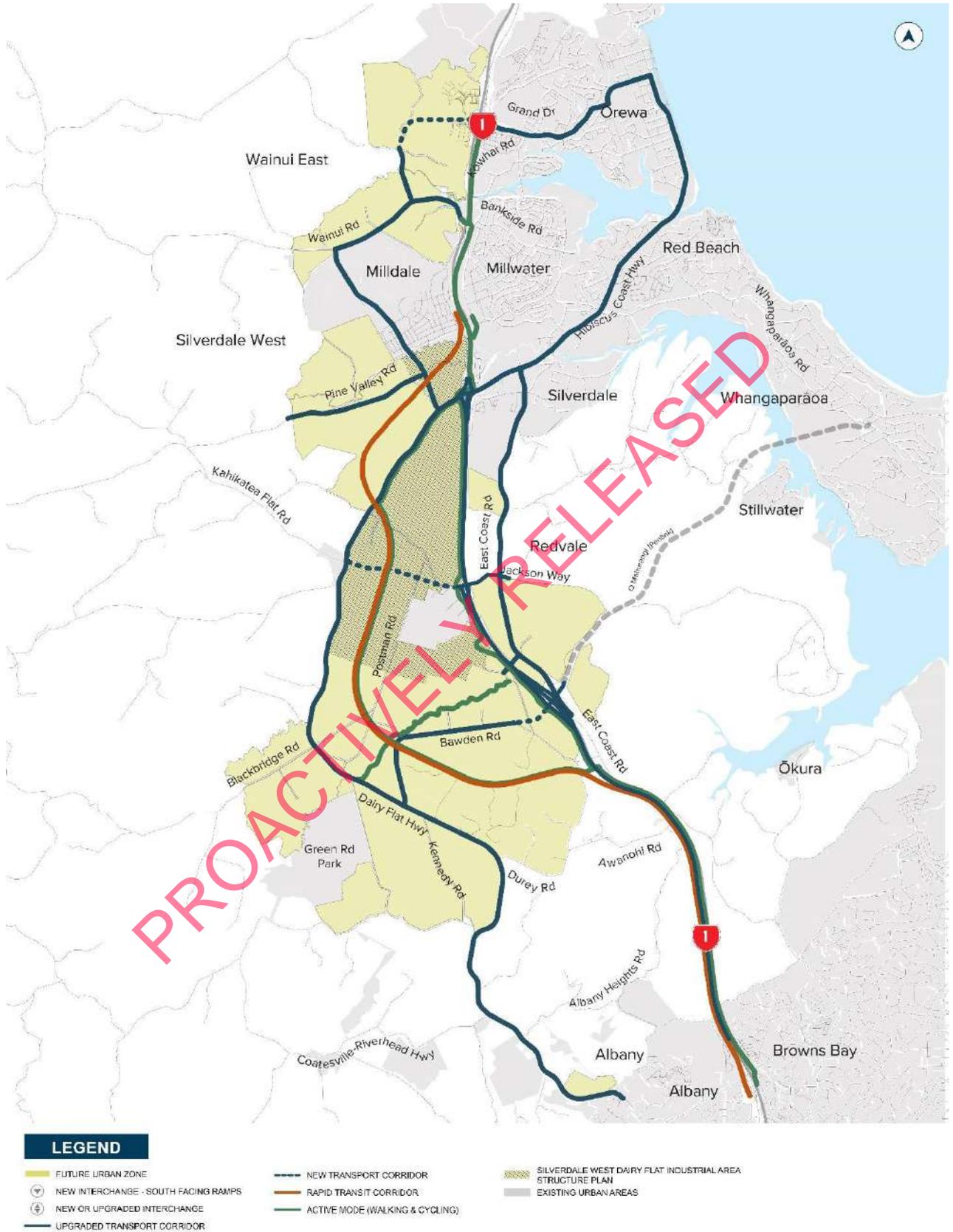
Twenty-two projects from the recommended North IBC programme were considered as part of this North DBC as shown in Figure 5-1 below.

Three projects from the IBC have been removed from the DBC scope. These projects and an explanation as to why they been removed is outlined below:

- **Jackson Way arterial road link** – Removed as the form and function process confirmed this route as a collector road therefore outside the scope of Te Tupu Ngātahi
- **Kowhai Road active mode connection** – Since the IBC, a developer has consented an equivalent connection and this is no longer considered to be required.
- **John Creek active mode connection** – Since the IBC, the structure plan has confirmed a John Creek facility will be provided and is likely to be delivered by developers hence is no longer considered to be required for route protection.

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Figure 5-1 North IBC projects proceeding to DBC



The next section provides a summary of the projects assessed in this document. Full project descriptions are included in the corridor assessments in **Appendix A: North Strategic Case**.

5.1 DBC projects

Table 5-1 describes the extent and intent of each project as well as the desired outcomes for the North Package. Whilst assessed as separate projects there is a strong interdependency between all elements to collectively provide the integrated future transport network.

Table 5-1 Projects assessed in North DBC

NOR # / Project		Project Description and desired outcomes	DBC Interdependencies
1-3	Rapid Transit Corridor including a shared path along the rapid transit corridor	<p>A strategic public transport corridor to serve the growth in the North between Albany and Milldale, leading to an increase in PT mode share and improved accessibility to social and economic opportunities.</p> <p>Strategic active mode connection adjacent to the RTN corridor in Dairy Flat and Silverdale West providing increased travel choice and access to social and economic opportunities.</p>	<ul style="list-style-type: none"> Makes use of part of SH1 corridor north of Albany. Upgrades to SH1 between Albany and Silverdale Bawden Road, Dairy Flat and Argent Lane
2	Rapid Transit Corridor – Milldale Station	RTC station providing access to the Milldale, Highgate and Millwater areas. The station is the end of the RTC.	<ul style="list-style-type: none"> Rapid Transit corridor Milldale Highgate bridge (external project)
3	Rapid Transit Corridor – Pine Valley East Station	RTC station in Pine Valley East providing access to the surrounding land and provide a park and ride opportunity.	<ul style="list-style-type: none"> Rapid Transit corridor New Pine Valley Road Upgrade of Pine Valley Road.
4	A: Upgrades to SH1 between Albany and Silverdale	Widening to SH1 to provide bus shoulder lanes from Albany to Silverdale in the short-medium term, with managed motorway capacity between Albany and Silverdale Interchange in the long term.	<ul style="list-style-type: none"> RTC project between Albany and Awanohi
	B: A new walking and cycling path along SH1	Strategic active mode connection adjacent to SH1 between Albany and Grand Drive.	<ul style="list-style-type: none"> SH1 upgrades between Albany and Silverdale interchange Interchange upgrade projects at Silverdale, Wilks and Redvale.
	C: Improvements to the existing Silverdale Interchange	Silverdale Interchange improvements and upgrade for all modes.	<ul style="list-style-type: none"> SH1 upgrades New walking and cycling path on SH1
	D: A new interchange at Wilks Road	New Wilks Road and upgraded Redvale motorway interchanges to	<ul style="list-style-type: none"> New walking and cycling path on SH1

NOR # / Project	Project Description and desired outcomes	DBC Interdependencies
<p>E: Upgrades to the Redvale interchange</p> <p>F: Upgrades to the Wainui interchange for active modes</p> <p>G: Silverdale to Highgate Active Mode Connection</p>	<p>integrate adjacent FUZ with the strategic motorway network.</p> <p>Active mode connection across SH1 just north of the Wainui Road Bridge.</p> <p>Active mode connection between Millwater, and Highgate to Hibiscus Coast Highway</p>	<ul style="list-style-type: none"> • New Road between Kahikatea Flat Road and Wilks Road • New walking and cycling path on SH1 • Bawden Road • Ō Mahurangi Penlink project • New walking and cycling path on SH1 • Wainui Road upgrade • New walking and cycling path on SH1
5	New SH1 crossing at Dairy Stream	<ul style="list-style-type: none"> • New walking and cycling path on SH1 • SH1 upgrades • East Coast Road upgrades
6	New connection between Milldale and Grand Drive	<ul style="list-style-type: none"> • Wainui Road upgrade • Ara Hills Development
7	Upgrades to Pine Valley Road	<ul style="list-style-type: none"> • New Pine Valley Road / Argent Lane
8	Upgrade to Dairy Flat Highway between Dairy Flat and Silverdale interchange	<ul style="list-style-type: none"> • Silverdale interchange upgrades • Rapid Transit Corridor • New Road between Kahikatea Flat Road and Wilks Road • Bawden Road upgrade and extension • Dairy Flat Highway between Albany Village and FUZ
9	Upgrade to Dairy Flat Highway between Albany Village and the FUZ	<ul style="list-style-type: none"> • Upgrade to Dairy Flat Highway between Dairy Flat and Silverdale interchange • AT project for The Avenue

NOR # / Project		Project Description and desired outcomes	DBC Interdependencies
10	Upgrade to Wainui Road	Urbanisation of Wainui Road between Argent Lane and the Wainui Road Bridge to provide walking and cycling facilities	<ul style="list-style-type: none"> Wainui Active mode connection New connection between Milldale and Grand Drive
11	New Connection between Kahikatea Flat Road and Wilks Road	A new transport corridor between the Silverdale West - Dairy Flat Industrial Area SH1.	<ul style="list-style-type: none"> Wilks Road interchange Upgrade to Dairy Flat Highway
12	Upgrade to Bawden Road and extension to create a new connection with SH1	Urbanisation and upgrade of Bawden Road to provide a strategic connection between SH1 and the future Dairy Flat town centre.	<ul style="list-style-type: none"> Redvale interchange upgrade Dairy Flat Highway Rapid Transit corridor
13	Upgrade to East Coast Road from Silverdale to Redvale Interchange	Upgrade of East Coast Road between Silverdale and Redvale to provide walking and cycling facilities.	<ul style="list-style-type: none"> Wilks Road interchange Ō Mahurangi Penlink project New walking and cycling path on SH1
A1	New Argent Lane and new Pine Valley Road	Upgrades to the existing Argent Lane between Wainui Road to Old Pine Valley Road	<ul style="list-style-type: none"> Pine Valley Road upgrade
A2	Upgrade of Hibiscus Coast Highway and Grand Drive for public transport and active modes	Upgrade of Hibiscus-Coast Highway between the Grand Drive and Silverdale Interchanges to provide walking and cycling facilities and bus priority	<ul style="list-style-type: none"> Silverdale Interchange upgrades Ara Hills development and project to provide active modes connection across Grand Drive interchange.
A3	Dairy Stream Active Mode Path	Active mode connection through the growth area of Dairy Flat.	<ul style="list-style-type: none"> Dairy Flat SH1 crossing SH1 upgrades

5.2 Complementary Projects

There are several projects being developed separately in the North which are complementary to the Te Tupu Ngātahi transport network. These projects combined with the Te Tupu Ngātahi network form the complete transport response for the North. Table 5-2 summarises these additional projects and demonstrate how they integrate with the additional investment recommended in this DBC.

Table 5-2 Complementary North Projects

Project	Integration with North DBC
Ō Mahurangi - Penlink	<p>The DBC will tie in to the proposed Redvale interchange providing connectivity to the west and upgraded to also provide north facing ramps in this location.</p> <p>Walking and cycling facilities provided as part of the Ō Mahurangi Penlink project will connect to the future walking and cycling network.</p>
Northern Corridor Improvements: A new continuous motorway route between the Northern Motorway (SH1) and Upper Harbour Motorway (SH18), plus extension of the Northern Busway from Constellation Station to Albany.	The DBC looks to tie active mode and RTC upgrades with the facilities provided as part of the northern corridor improvements project
Waitematā Harbour Connections Business Case: A business case is underway in 2022 for the Waitematā Harbour connections looking at cross harbour connectivity and changes to the RTN network through the North Shore.	The DBC looks to integrate with the RTN network south of the study area with a connection assumed at the Albany Station.
Dairy Flat Highway safety improvements	The AT safety project implemented a range of safety upgrades along Dairy Flat Highway. The southernmost section of Dairy Flat Highway was not treated as part of this study and this scope is included in the Dairy Flat highway upgrade project proposed as part of this DBC.
Milldale Highgate Bridge	A new bridge being delivered by Fulton Hogan and Crown infrastructure partners providing access between John Fair Drive and Millwater Highway Parkway.
SH1 optimisation project	A project looking at short term optimisation on SH1 between Albany and Silverdale including provision of sections of bus shoulder lanes between the Motorway service centre and Silverdale.
Dairy Flat Highway / The Avenue / Lucas Creek upgrade	A separate Auckland Transport project has been undertaken around the Dairy Flat Avenue intersection with the Avenue including upgrades to the Lucas Creek bridge. A DBC has been completed and a

Project	Integration with North DBC
	recommended option has been identified. This project is awaiting implementation funding and has been assumed to be in place in the long term.

6 Guiding Principles for the North

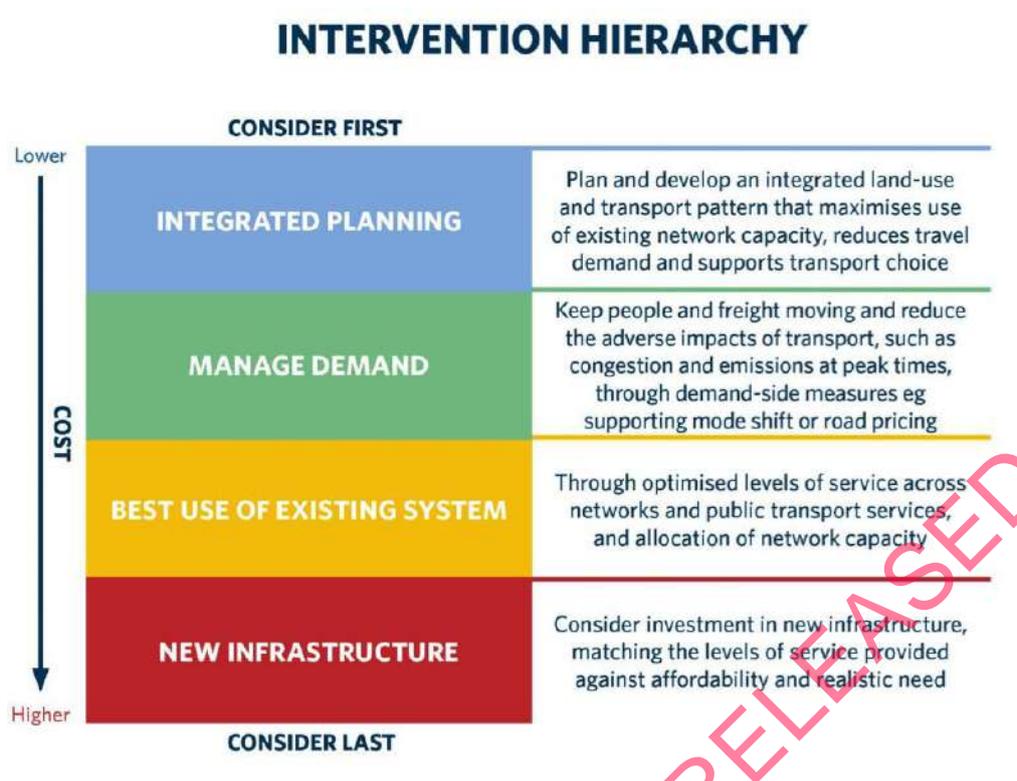
The North DBC has been shaped by a number of key principles and these have been applied throughout the identification and development of corridors to confirm the future recommended transport network.

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

For existing roads identified for upgrade in this DBC, detail was developed around supporting the adjacent future land use, managing demand through supporting road space to maximise people throughput (e.g., on buses) and reallocation of road space to provide for corridor specific modal priorities such as dedicated cycle and walking facilities.

The transport network does identify new pieces of infrastructure such as a new RTC corridor, new or upgraded interchanges and new multimodal road corridors. These have been recommended to provide an integrated and legible local network that supports access between key future land uses such as employment, residential and centres. The provision for additional vehicle capacity has been very carefully considered and all new routes are intended to be multimodal.

Figure 6-1 Transport intervention hierarchy (source Waka Kotahi)



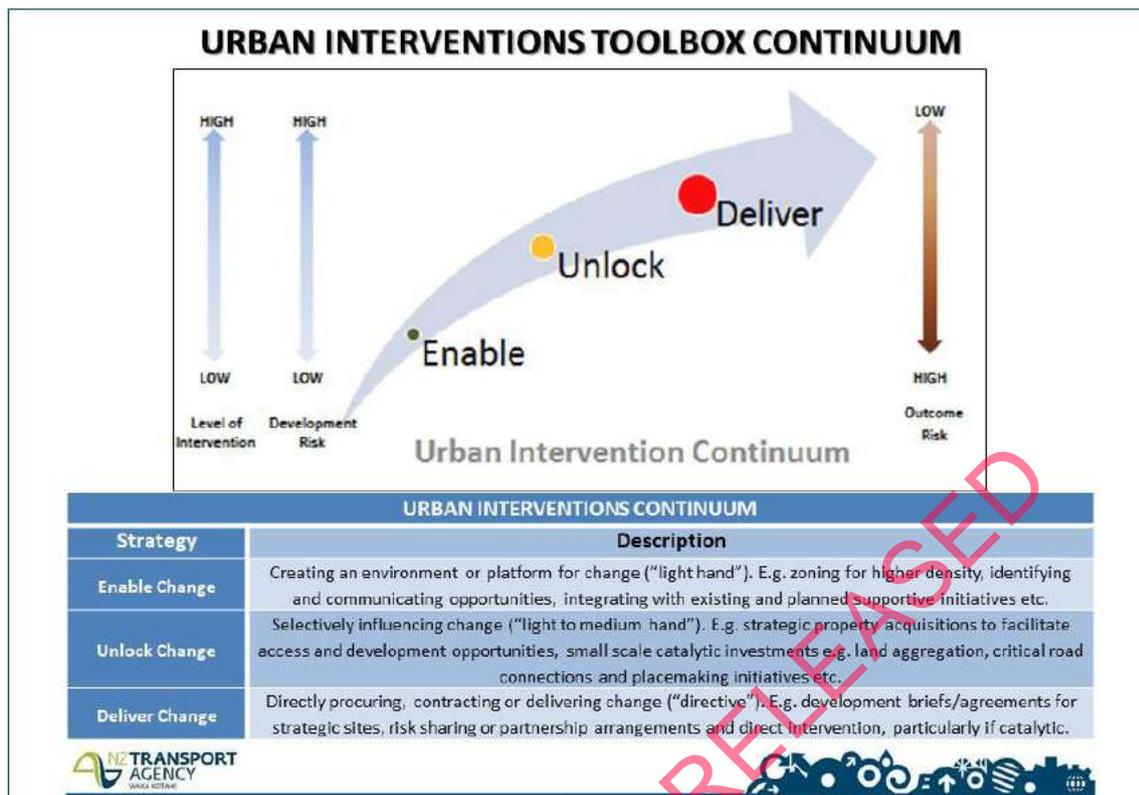
6.1 Land use integration

Integration between land use and transport is a critical factor in maximising future transport and community outcomes in the Northern Growth area. The transport network supports the land use through:

- Improving accessibility.
- Strengthening the physical character of urban environments to impact customer journey experience.
- Providing infrastructure to move people and goods efficiently between desired destinations.

The step change for transport integration is to consider how infrastructure can also be used to support and drive better placemaking in the North. This “unlocking” is a key part of the urban interventions continuum as shown in Figure 6-2 and is where significant opportunities can be realised in the North. The consideration of land use integration in the North started during the development of North PBC and IBC and has continued as an iterative process throughout this DBC. This will continue as the corridors move from route protection to implementation in the future.

Figure 6-2 Urban intervention principles



Examples that will enable and unlock change in North include:

- The Rapid Transit corridor diverts through the Dairy Flat and Silverdale West FUZ areas and will provide a significant opportunity for large portions of the future development in these areas to be within a direct walk-up catchment of a high-quality Rapid Transit service. This will help to reduce auto dependency, drive a quality compact urban form and ensure connectivity to economic and social opportunities.
- Creation of a legible walking and cycle network that connects key destinations throughout the North such as RTC stations, centres, schools, employment areas and makes active modes a real transport choice for the short journeys.
- Understanding future social infrastructure requirements such as schools, parks, town centres and the transport connections required to serve these customers. Conversely, using the proposed transport infrastructure to inform future land purchases for new social infrastructure to maximise outcomes.
- Use of the arterial network to form key spines within growth areas to enable better and more coherent land use integration by multiple developers.
- Use of the road hierarchy of State Highways and local roads to better manage freight movements and reduce trips through residential areas. i.e. provision of a new arterial road and connection to the new Wilks road interchange will allow industrial activity traffic direct access to the SH1 corridor and avoid movements through the adjacent residential areas.
- Use of form and function to balance placemaking and modal needs on the corridors. For example, consideration/provision of bus priority facilities on primary bus routes.
-

- Specific land use integration tasks and collaboration undertaken in this DBC are shown in Table 6-1. Land use planners from Waka Kotahi and Auckland Transport have been involved in specific Te Tupu Ngātahi North land use integration sessions as well as participating in many of these Partner discussions outlined below.

Table 6-1 Land Use integration discussions in the North

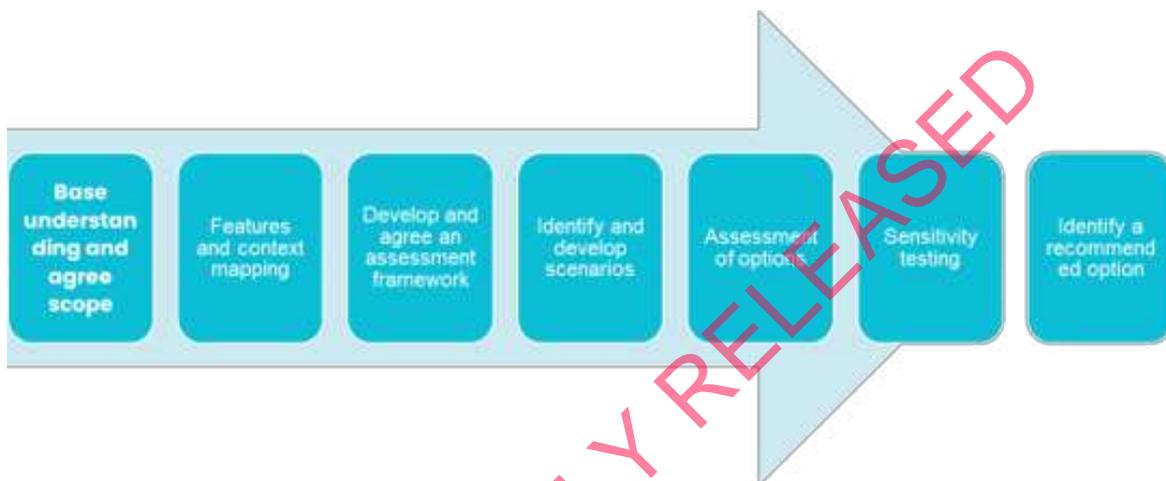
Stage of analysis	Auckland Council	Government Partners ⁶	Private Developers
<p>Preliminary assessment</p> <p>Gap analysis.</p> <p>Constraint mapping.</p> <p>Form and Function.</p>	<p>Understanding existing land use.</p> <p>Potential impacts of the National Policy Statement: Urban Development and future areas of densification as part of the MDRS.</p> <p>Discussion about adopted structure plan and Auckland Council’s vision.</p> <p>Land use implications for the RTC corridor and position of a future Dairy flat centre.</p> <p>Ongoing discussions about developer activity and Plan Change progression.</p>	<p>Strategic planning of key social assets.</p> <p>Planned upgrades to existing assets.</p>	<p>Consented developments.</p> <p>Future plans of large landowners particularly upcoming “soft lodgement” of Plan Changes and Plan Changes under development.</p>
<p>Option development and assessment</p>	<p>Consideration of RTC alignment options and implications on Land use throughout the FUZ area.</p> <p>Land use interface with proposed locations for the park and ride and RTC interchanges.</p> <p>Opportunities and challenges with residual land i.e., RTC alignment through industrial areas.</p> <p>Connectivity and access to future land uses.</p> <p>Discussion on trade-offs for competing land uses on existing constrained corridors.</p>	<p>Understanding potential impacts on existing facilities or assets.</p> <p>Preferences for corridor widening.</p>	<p>Understanding potential impacts on existing and future developments.</p> <p>Opportunities for staging or collective delivery.</p>

⁶ Government partners include Ministry of Education, New Zealand Defence Force

6.1.1 Dairy Flat integration workstream

The RTC project and integration with surrounding land use is a critical outcome for the success of the urban area in the future. In response to this critical interface, Te Tupu Ngātahi worked closely with Auckland Transport, Waka Kotahi, Auckland Council and Manawhenua representatives in considering the interaction of land use and the RTC project through a parallel workstream dubbed the 'Dairy Flat integration process'. The process is summarised in Table 6-2. At a high level, the process sought to consider land use options and transport options together instead of separate assessments of transport options and a separate land use planning exercise through structure planning. The process occurred in Late 2021 through to Mid 2022.

Table 6-2 Dairy Flat land use integration assessment process



Options were developed by a technical stakeholder group and were qualitatively assessed against a set of both land use and transport criteria, agreed by the workshop participants.

The initial assessment was completed by the Te Tupu Ngātahi project team for the transport criteria, and Auckland Council for the land use criteria. The results were then challenged in the workshops by the wider group. Following the qualitative assessment, the scenarios were ranked in terms of preference and sensitivity testing was performed on the rankings. Key trades off between the options were discussed by the group and a general consensus was reached as to the preferred RTC alignment with some further work required to confirm land use.

Due to the importance of land use integration in driving the outcomes sought for the RTC, an option was included to retest an option which follows the State Highway corridor representing an option which was discarded at the IBC phase (IBC option reference MT1-1). Table 6-3 summarised the outcome of the integration assessment.

Table 6-3: Summary of Dairy Flat integration assessment

Categories	Short list Criteria	Green Park Centre options			Central centre options		East centre	Dual Town Centres
		SCENARIO 1: Green Park centre and Southern RTC (RT-06)	SCENARIO 2: Green Park centre and south central RTC (RT-04B)	SCENARIO 3: Green Park and Central RTC (RT-04A)	SCENARIO 4: Central centre and south central RTC (RT-04B)	SCENARIO 5: Central centre and central RTC (RT-04A)	SCENARIO 6: East centre and Eastern RTC (MT1-1)	SCENARIO 7: Dual Town Centre and eastern RTC (MT1-1)
Ranking by category	Te Ao Māori	5	5	1	5	1	3	3
	Environmental	7	3	1	6	2	3	3
	Town centre	1	2	3	3	3	3	3
	Transport outcomes	2	4	5	2	1	6	7
	Development around station	1	1	1	1	1	6	6
	Social	4	4	4	1	4	1	1
	Cost / staging	5	5	3	7	4	1	1
Overall ranking	Overall ranking	7	5	2	6	1	3	4

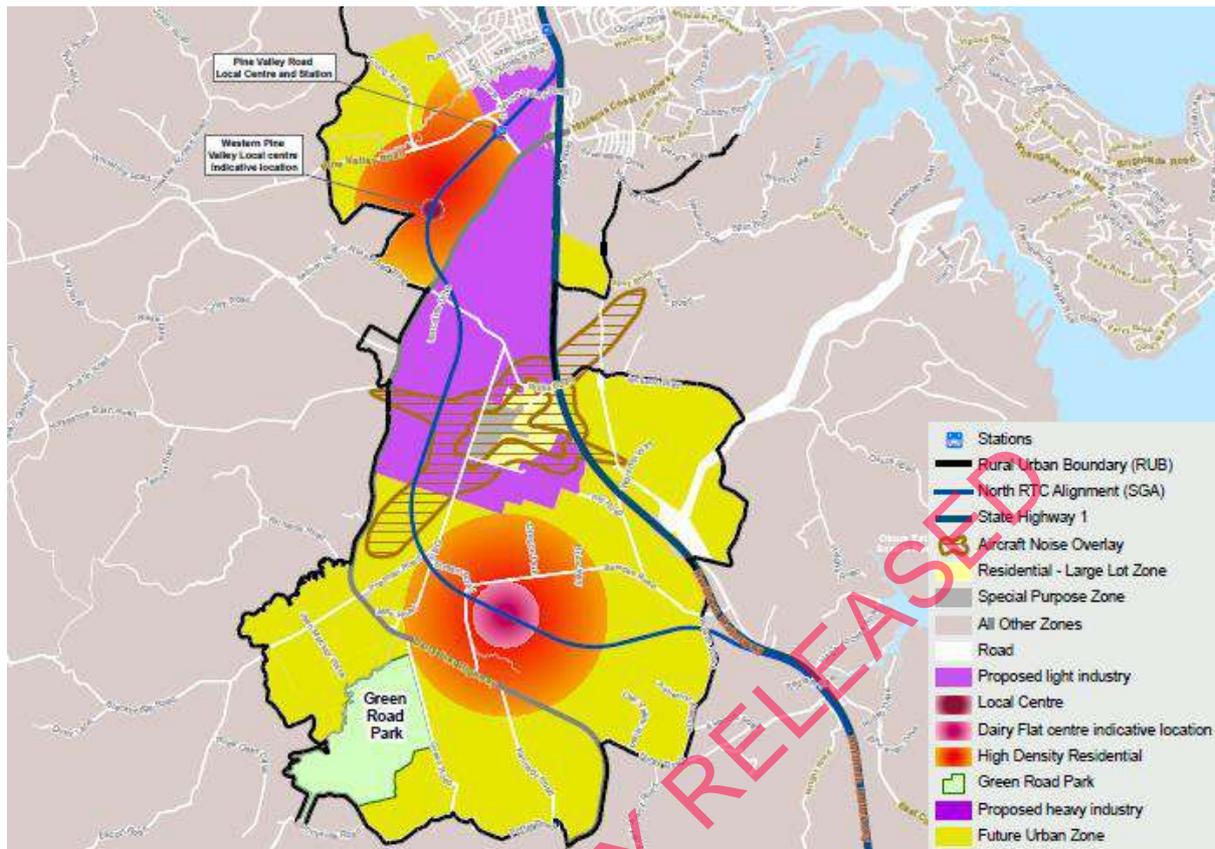
In summary, the analysis concluded that Scenario 5: Central Centre and central RTC alignment (which is RT-04 in MCA analysis above) ranked highest overall, followed by Scenario 3: Green Park Centre and Central RTC. This confirmed the conclusion from the MCA analysis that RT-04 is the overall preferred RTC alignment, and that it is flexible to work with different town centre options. It was acknowledged at the time that further work is required to confirm a town centre location including community consultation and completion of a Spatial Land Use Strategy.

In July 2022, Auckland Council released a Draft Dairy Flat Spatial Land Use Strategy that proposed a town centre extending in an elliptical shape between Green Park and the RT-04 RTC alignment (central alignment). In response to feedback from the community, Auckland Council Community Facilities team, Waka Kotahi and Auckland Transport, Council revised their draft strategy to confirm a preference for a Central Town Centre as summarised in Figure 6-3. The reasons for this change in strategy for the town centre location are as follows:

- The Auckland Council community facilities team advised that it is preferable that community facilities are located as close as possible to the likely RTC station in Dairy Flat, even if that means purchasing additional land. Therefore, the Green Road Park was no longer the preferred location for community facilities.
- They also pointed out that it was not essential that a centre be located near the major sports facilities contemplated for the Park, as such sports facilities had regional rather than local catchments. Also, with the likely development of intensive sports facilities, with floodlighting etc and extended hours of operation, there would be reverse sensitivity issues if high density residential activity was located too close to the parts of the park where these activities would be located.
- Community engagement on the plan raised concerns regarding flooding issues in the Dairy Stream floodplain hindering town centre development – if a town centre is located closer to Green Park. Healthy Waters also carried out some additional flood modelling to reflect increased temperature increase scenarios. This demonstrated that the extent of the flood plains in the area will increase slightly, particularly the east-west floodplain just north of Dairy Flat Highway, which could make it more difficult to integrate the parts of the centre on either side.

As the central centre option was preferred through the Dairy Flat integration process and was the underlying assumption for the MCA analysis, this change in town centre location assumption reconfirmed the project team's preference for RT-04 through the Dairy Flat segment.

Figure 6-3: Draft Auckland Council Strategic Land use framework



Specific land use integration outcomes and opportunities are detailed throughout the DBC and supporting appendices, in particular, **Appendix C: Option Assessment** and **Appendix F: Urban Design Evaluation**. The Management Case in Section 14 of this DBC includes more detail about next steps for projects with identified land use opportunities.

6.2 Te Tupu Ngātahi Urban Design Framework

The development of the North DBC development has relied strongly on the principles of the Te Tupu Ngātahi Urban Design Framework (UDF) in particular the location of the RTC station locations. This document provides measurable guidance for land use and transport integration throughout each phase of the programme delivery. The UDF takes a systems approach to how urban areas are organised and understood and pulls these apart in layers spanning history, the natural environment and the built form.

The DBC has used the design principles for each of these system layers to understand how the transport networks contribute to the urban system as a whole. Each of the principles describe what 'good looks like' and what to aim for in the design of transport networks that contribute positively to new or planned communities, environments, corridors and the social and economic vitality of Auckland. This framework has also provided spatial definition to some of the themes such as sustainability and integration which are discussed further in the following sections.

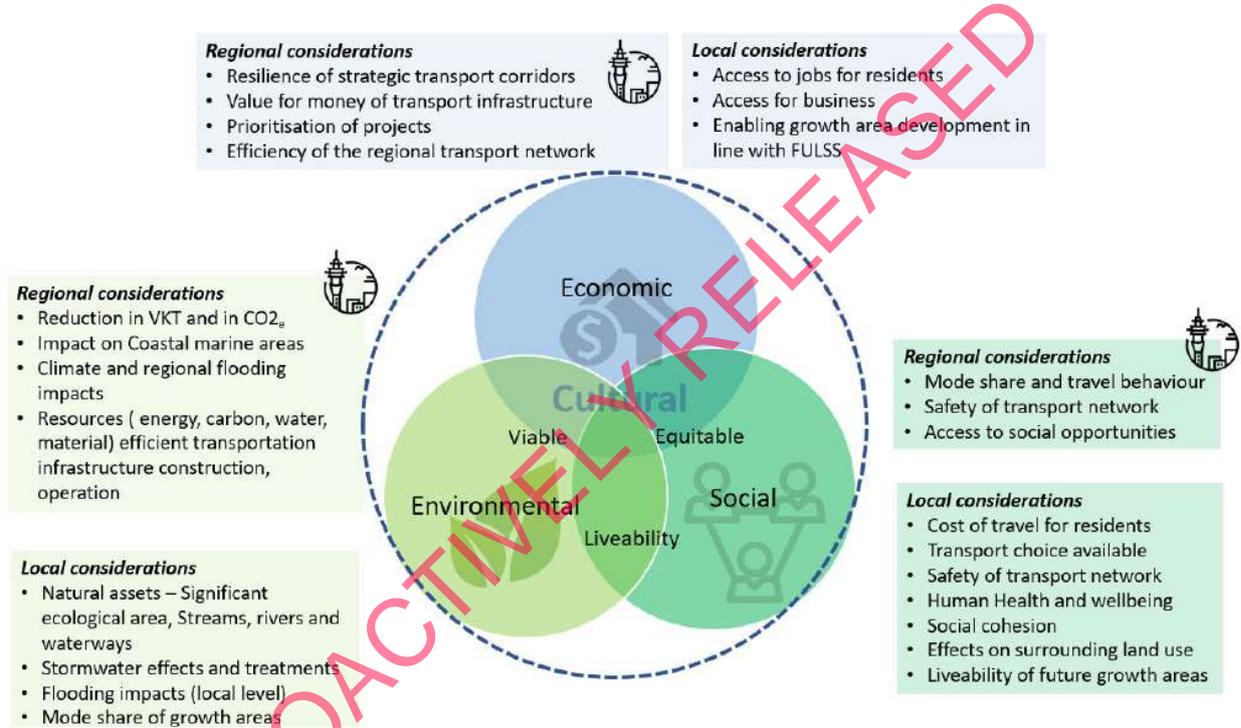
6.3 Sustainable outcomes

Sustainability is an overarching principle of this DBC and reflects the core principles of the GPS 2021 to ensure the land transport system is both economically and environmentally sustainable.

The Te Tupu Ngātahi Programme has identified four factors that work in partnership to achieve sustainable outcomes as shown in Figure 6-4. These pillars of sustainability include:

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

Figure 6-4 Sustainability principles



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

The outcomes can be achieved at both the local and regional level and the application to the North transport network is shown in Table 6-4.

Table 6-4 Sustainability applications in the North

Sustainability factor	Measures	Applied in the North DBC
Cultural	Extent and effects on sites and places of cultural heritage value	<ul style="list-style-type: none"> • Regular manawhenua engagement and feedback, particularly in the development and assessment of options. • Heritage specialist reviewed option alignments.

Sustainability factor	Measures	Applied in the North DBC
	to manawhenua and built heritage.	
Environmental 	Responding to climate change by providing a transport system that supports a reduction in emissions, is responsive to flooding impacts and limits impacts on our key natural assets such as wetlands and ecological habitats.	<ul style="list-style-type: none"> • Appropriate stormwater treatment including provision for green infrastructure in rural areas and suitable treatment and attenuation. Full details of stormwater infrastructure are included in Appendix H: Design Report. • Priority focus on completing a core cycling network. • Public transport priority facilities to improve the reliability and quality of services. PT facilities to be planned, designed, constructed and operated to significantly reduce not only operational but also whole of life emissions. • Identification of location and quality of wetlands, streams and ecological areas during constraint mapping to inform option selection. • Flood mapping to inform option selection and assess potential impacts of new corridors on the landscape. • Assessment of reduction of emissions on whole of life basis in the economic analysis for the recommended programme.
Social 	Transport has key role to improve people's wellbeing and liveability of places.	<ul style="list-style-type: none"> • DBC focuses on safety improvements, particularly for existing corridors. • DBC priority is improving transport choice and is reflected in modal priority assessments, rapid transit, walking and cycling network. • Liveability addressed primarily through our urban design specialists who input at all stages of the corridor development. • Social cohesion and human health are specific MCA assessment criteria so impacts considered in detail for all corridors.
Economic 	Access to jobs and businesses and enabling growth. At the regional level this includes resilience of the network, value for money and prioritisation	<ul style="list-style-type: none"> • North investment objectives and associated KPIs specifically measure improvements in access. • Land use assessment for all corridors includes consideration of trip destinations as well as an understanding of future land uses and impacts of intensification. • Specific analysis to better understand the outcomes of each corridor and to inform prioritisation for implementation. • Through option development the future cross section has been challenged from an efficiency perspective to: <ul style="list-style-type: none"> - Balance flexibility. - Maintain transport outcomes – seeking to balance land requirements with outcomes achieved e.g., does the additional land provide step change in outcomes or can the outcomes be maintained with a reduction in cross section which minimises property impacts.

Sustainability factor	Measures	Applied in the North DBC
		- These decision points have been tested with stakeholders and trade-offs clearly discussed to achieve a balanced network.

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

Therefore, the principles of sustainable development have been captured through seeking to achieve a balanced decision-making process which:

- Reviews a holistic and broad suite of sustainability aspects during option development.
- Identifies the biggest risks and opportunities.
- Prioritises those identified aspects for focus.
- Strives to enhance those sustainability aspects (not just mitigate).

6.4 Climate change response

Climate change is one aspect of the overall sustainable response and links closely with the sustainable outcomes discussed in the previous section. Whilst climate change is not a new consideration for the development of transport infrastructure, recent changes in policy such as the Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan and He Pou a Rangi the Climate Change Commission have reconfirmed the importance of systems change and diverse action to affect significant and timely reductions to emissions. Fundamentally the goal is to limit global temperature increases by reducing greenhouse gas emissions by 50 per cent by 2030 and achieve net zero emissions by 2050.

Reducing transport emissions is an important contributor to meeting New Zealand's emissions targets. It is recognised that transport plays a key role. This aligns well with the GPS 2021 and by extension, to the development of this North DBC which itself aligns closely to the goals of the GPS 2021.

The Emissions reduction plan⁷ sets a transport target to reduce emissions by 41% by 2035 (from 2019 levels) with a focus on reducing reliance on cars and support people to walk, cycle and use public transport; rapidly adopt low-emission vehicles; and begin work to decarbonise heavy transport and freight. Auckland Council have developed the TERP⁸ which sets a road map to achieving a 64 per cent reduction to Auckland's transport emissions by 2030.

The North DBC is built on:

- **Transport and land use integration** – a guiding principle as described in Section 6.1 and 6.2 and providing a transport network to support land use development and good urban form.

⁷ Ministry for the Environment, 2022. Emission Reduction Plan.

⁸ Auckland Council, 2023. Transport Emissions Reduction Pathway

- **Prioritising mode choice** – specifically focusing on rapid transit, improved public transport reliability and services and creation of a well-connected walking and cycling network.
- **Provision of resilient infrastructure** – corridor selection and design has considered the long term resilience of key transport infrastructure with respect to natural hazards such as flooding and slips.

The result is a recommended transport system which has the capability to actively reduce the future growth area's reliance on private vehicles by providing accessible active mode routes and public transport options that connect people to where they need to go and are resilient to a changing climate.

It is noted that the climate change response of this DBC is part of a wider New Zealand transport response which includes complementary initiatives such as increasing the adoption of electric vehicles and use of low carbon fuels. A change to an electric or low emissions fleet will not however address congestion and integrated land use planning retains an ongoing role, particularly as areas in the Northern Growth area are developed in the future. The importance of the supporting local roading network also cannot be overlooked. The Te Tupu Ngātahi North network will provide the key connections and initial driver for mode shift but to maximise mode shift outcomes the local roads have a parallel role to further connect local cycling, support walk up catchments to public transport and provide efficient local bus networks.

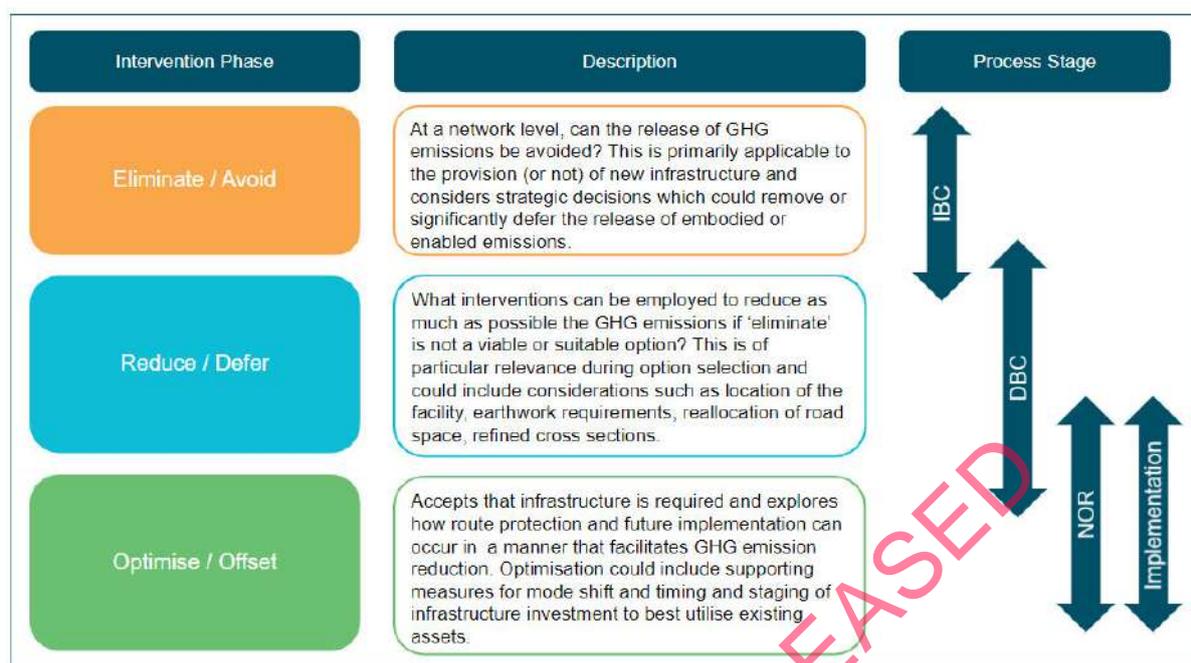
The climate change strategies for the North can be split into three types:

- **Mitigation** - aimed at addressing the causes and minimising the possible impacts of climate change including the reduction of Green House Gas (GHG) emissions.
- **Adaptation** – focused on reducing the negative effects and identifying opportunities that arise from climate change.
- **Resilience** – focus on provision of resilient infrastructure to sea level rise, flooding and natural hazards.

As a route protection business case, the North DBC is primarily focused on mitigation strategies which includes the assessment of three broad categories of embodied carbon, enabled carbon and land use changes. However, adaptive measures have also been considered through the optioneering process such as avoidance of natural hazard areas and flood adaption measures.

In acknowledgement of the increasing priority to consider climate change impacts, the North DBC has therefore undertaken a series of climate change workshops for the corridors. This process occurred in parallel with the option development and assessment and applied an Eliminate-Reduce-Optimise intervention framework to consider climate change impacts for the corridors as shown in Figure 6-5 .

Figure 6-5 Eliminate-Reduce-Optimise intervention framework



As part of this assessment each corridor was taken through the three stages to understand what decisions could be made to further improve climate change response outcomes. Opportunities for reducing impacts were subsequently used in the DBC optioneering process and additional optimisation measures were identified as part of the next steps for each corridor.

Full information for each corridor is included in **Appendix B: Climate Change Assessment**.

Decisions for the corridors have been focused on getting the corridor in the 'right' place to best support land use, providing lower-emission travel options through enabling public transport and active transport infrastructure. Adaptation measures have been considered at a high level for the corridors with the main emphasis being on flood related adaptive measures that may be required and any impact on the associated designation. It is expected that adaptation measures will be considered in more detail as the projects progress through future design and implementation processes.

A summary of the type of climate mitigation strategies identified and applied in the North include:

- Assessment of modal priorities for each project to understand the corridors road function. This has then informed the allocation of road space to best support sustainable mobility modes such as bus, walking and cycling. By way of example, 100% of corridors provide new or improved active facilities.
- Focus on proximity of public transport to population density and social infrastructure. This is particularly relevant for the Rapid Transit corridor and maximise walk up catchments through land use integration.
- Development of a connected cycle network that provides both regional and local cycle links and maximises the ability of people to access public transport or key destinations.
- Restriction of the provision of additional vehicle capacity. A staging strategy for SH1 upgrades which uses road space for Public Transport for the next 20 years before converting to a managed lane in the future.

- Location of new corridors to reduce construction and embodied emissions e.g., reduced earthworks and smaller/less structures.
- Best use of existing corridors by reallocating road space for alternative modes rather than widening for active modes e.g., Hibiscus Coast Highway active mode and PT priority. This reduces impacts on surrounding land use and a potential reduction in embodied carbon and construction emissions.
- On highly constrained corridors using a refined cross section to provide the transport outcomes but balance impacts on constraints such as Significant Ecological Areas (SEA) and future ability for sequestration or reduced embodied carbon in smaller structures or removing the need for new retaining walls. e.g., Dairy Flat highway between Dairy Flat and Albany and East Coast Road.
- Using route protection to provide a suitable footprint to allow future flexibility in design to best accommodate climate mitigation measures and enable future choices to be made on materials.

6.5 Demand management

As previously mentioned, a guiding principle of this DBC 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. The other aspect within this climate change response is to improve the performance of the land transport system by changing transport demand and travel behaviour. Demand management activities influence how, when and where people and freight travel and has the following objectives:

- Shaping transport demand to better balance with supply.
- Shaping travel behaviour to ease pressure on the transport network and environment.
- Delivering economic benefits to businesses, communities or Aotearoa as a whole.⁹

Therefore, the North DBC continues to build on demand management principles adopted in the IBC and does not provide for unconstrained demand but rather seeks opportunities to influence and reduce demand alongside the recommended infrastructure. A four-step approach to Travel Demand Management (TDM) and influencing travel behaviour has been used, as shown in Figure 6-6. This includes consideration of an integrated set of policy-based, soft measures to achieve the desired goal.

⁹ <https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/activity-classes-and-work-categories/road-safety-promotion/wc-421-travel-demand-management>.

Demand management influence	North DBC Response
Developing good urban form to influence travel behaviour e.g., provision of good quality, frequent public transport service to key destinations	<ul style="list-style-type: none"> • Place shaping has been further developed for key infrastructure such as the Rapid Transit Corridor and SH interchanges. • Consideration of how changes in intensification will happen for land use near proposed frequent transit networks. • Impacts on social infrastructure such as a planned schools in Wainui East and Milldale. • Legible and well-connected active mode network focusing on connecting key destinations.
System design Areas of focus for infrastructure design	<ul style="list-style-type: none"> • Rigorous application of iterative Corridor Form and Function process to balance place and movement functions on corridor. • Focusing on public transport priority, connected cycle networks and minimisation of additional capacity for private vehicles. • Consideration of the wider bus network when determining station locations.
Operational interventions Possible operational measures to support targeted mode shifts	<ul style="list-style-type: none"> • Restricted parking on arterial corridors. • Potential pricing of the Park and Ride site. • Assessment of complementary operational design measures for the recommended programme e.g., end of trip facilities, travel behaviour change schemes, promotions and monitoring. These types of opportunities have been identified where applicable during this DBC, but more detail is expected to be developed as corridors progress from route protection to funding and implementation business cases. • Although out of scope for this DBC, it is acknowledged that investment in public transport infrastructure alone will not influence demand. Instead, additional funding will be required for more public transport services to put buses and rapid transit vehicles onto the network to achieve better frequency and longer hours of operation.

6.6 Public Transport Approach

A frequent, efficient, and well-connected public transport system is critical to supporting local and regional trips to/from the Northern Growth Area. At the commencement of the DBC, the overall public transport strategy was reassessed to understand if further refinement would better support place making and land use integration for the area.

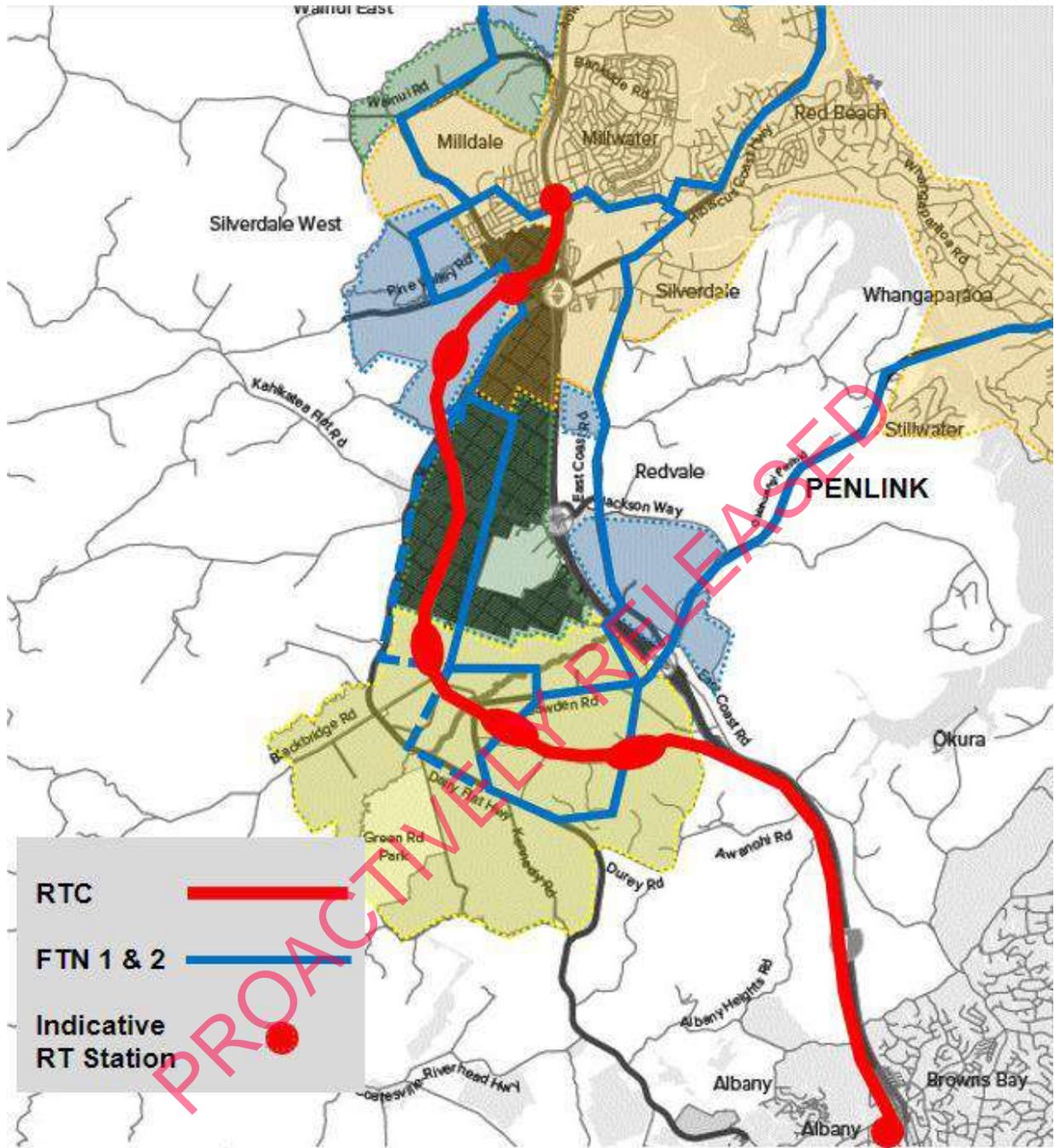
The Approach to public transport in the north can be summarised as follows:

- A core Rapid Transit corridor which will form the public transport spine through the growth area.
- The Milldale station (end of the RT line) will provide a transfer point for services from Ōrewa, Millwater and Silverdale.
- The Pine Valley Station will provide a transfer between a local FTN on Argent Lane and the RTC corridor.
- The Pine Valley Station will provide an opportunity for a park and ride facility to be provided. This is expected to serve the Rural hinterland and provide an opportunity to access the RTC corridor.
- An FTN service from Whangaparāoa will connect to the RTC corridor via an eastern station in the Dairy Flat area and extended on towards a Dairy Flat centre.
- Local services will provide PT access to the Silverdale West Industrial area.

Figure 6-7 sets out a high-level strategy as to how the future PT network will operate with full buildout of the area.

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Figure 6-7: North PT strategy map



6.7 Active mode network

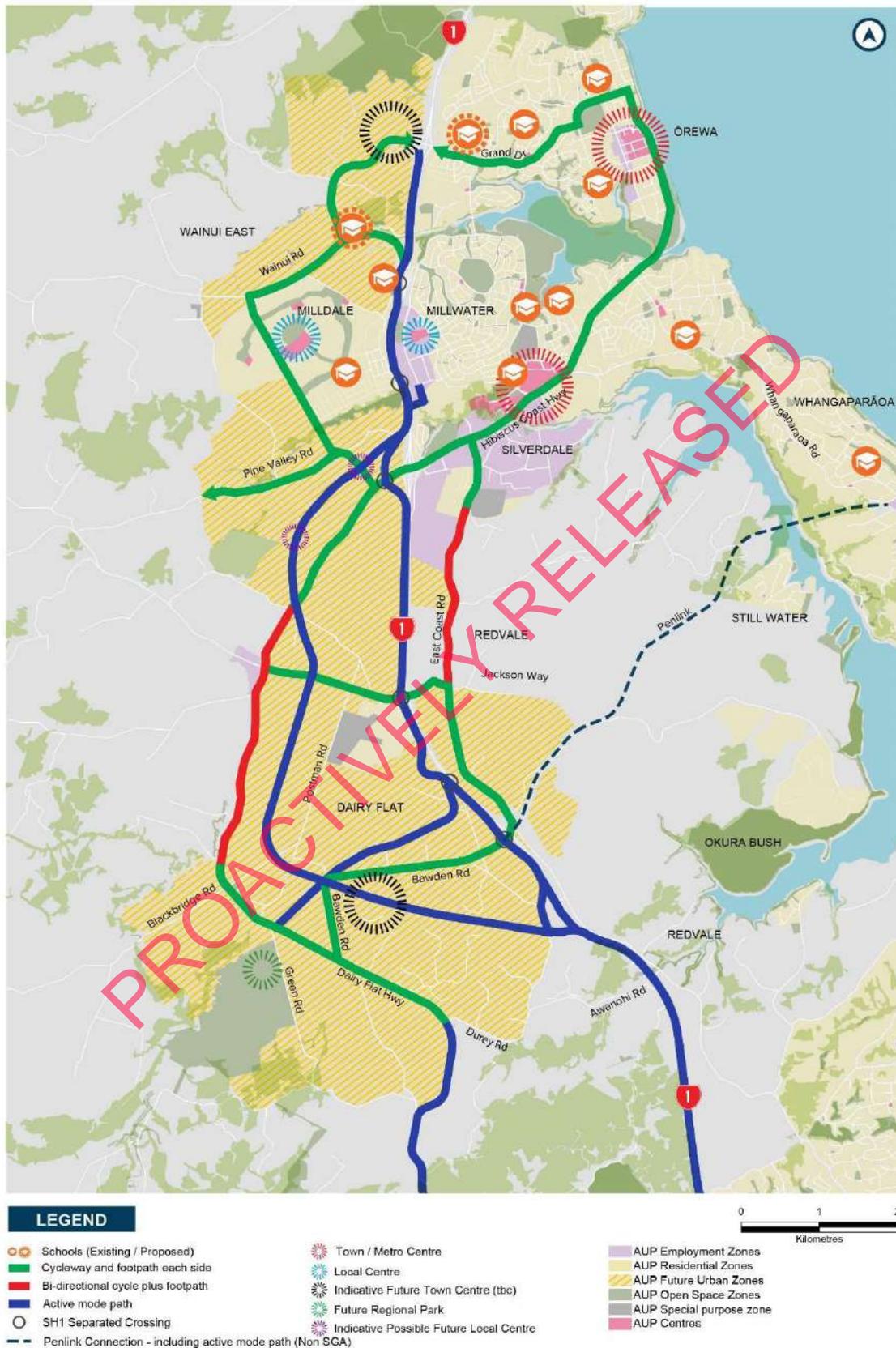
With much of the northern growth area within around 2km of a Rapid Transit stop, or a centre, The North is well placed to support a legible walking, cycling and micro mobility network for short trips.

At the commencement of the DBC the overall active mode network was reconsidered to confirm the network approach for North for these modes. It is based on a “hub and spoke” approach to connect people to key social and employment destinations and focuses on achieving a legible network. The indicative network is shown in Figure 6-8.

The optioneering in this DBC has been based on achieving this network including confirmation of the type of cycling facility to suit the corridors’ function. Overall, the DBC aims to create an attractive well-connected network that supports mode shift from private vehicle to active modes for short trips within the North.

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Figure 6-8 Indicative North Walking, Cycling and Micro mobility Network



7 North investment case

During the IBC phase problem statements, benefits, and investment objectives (PBIOS) were identified for the Northern growth area. The IBC demonstrated a strong case for investment and was focused around four key problem areas: Access, Reliability, Integration and Safe Travel Choice. Investment in these elements were determined to maximise land use and transport integration and align with the Ministry of Transport (MoT) Transport Outcomes Framework and GPS 2018 goals at the time.

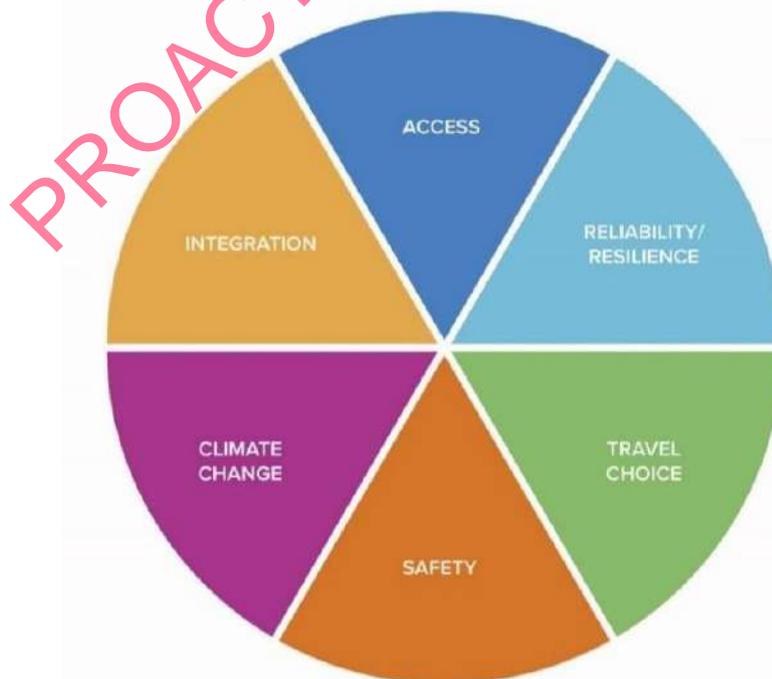
At the commencement of this DBC, these investment areas were carefully reconsidered with respect to changes since the IBC and discussions with Auckland Transport and Waka Kotahi. This DBC has decoupled the four original IBC problems into six individual problems. The core elements of these remain the same, however the additional detail provides the opportunity for individual corridor assessments to be more targeted and to provide better clarity on how the individual corridor contributes to the delivery of the overall package outcomes.

During the IBC, safety was not specifically identified as a problem however aspects of road safety were picked up in other problem statements and the design approach was considered to adequately meet safety standards. During the DBC, this problem has been made more explicit as evidence suggests this a key problem for some projects within the package.

Whilst this DBC is primarily assessing how to accommodate future growth and its impacts on the transport system in the North, it is acknowledged that the policy framework has shifted since the IBC to have a greater focus on climate change. Therefore, it is appropriate that a specific climate change problem is now added as the sixth problem to the suite of problem themes.

As a result of this process, the six key problem areas for investment in the North were confirmed as shown in Figure 7-1.

Figure 7-1: Six North Problem Areas



7.1 Problem definition

The access, resilience, travel choice, safety and integration problems remain significant and are supported by the evidence detailed in the IBC. This evidence is summarised in [Table 7-1](#). The changes in policy and growth since the IBC will result in more intensification than previously assumed and will further exacerbate these significant problems. The increase in developer activity is further evidence of the pressure on the area to respond to growth.

Table 7-1: Summary of Evidence

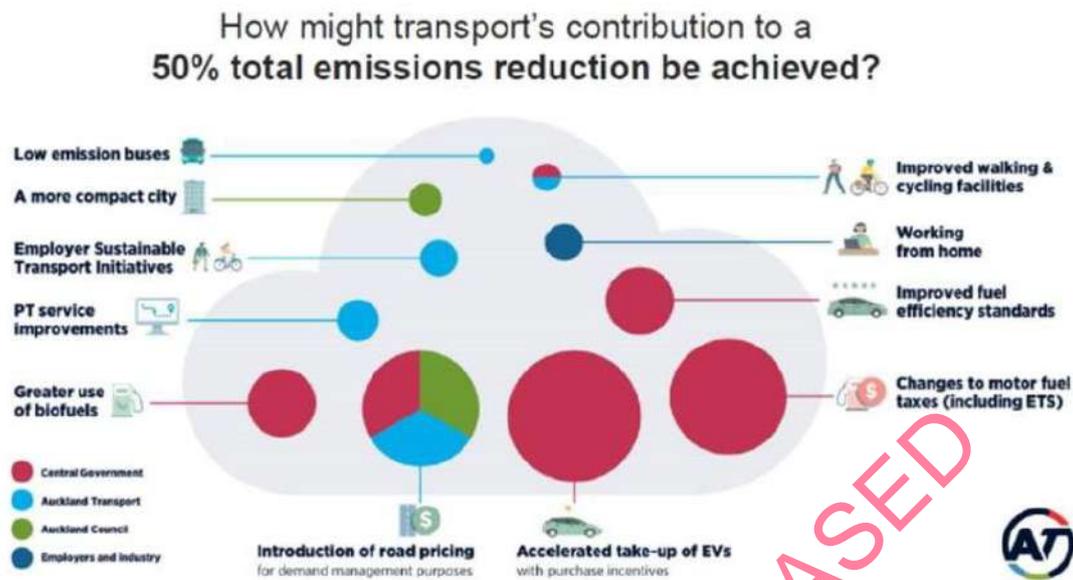
Problem	DBC Problem description	Evidence presented in IBC
Access	The current form and function of corridors, lack of active mode facilities and missing transport connections does not support future growth and will constrain access to economic and social opportunities in the North.	Transport network is not of the right form and function and capacity to provide for future demands. Existing provision does not connect future land uses. Significant residential and employment growth is planned in the North which will exacerbate these issues.
Reliability/ Resilience	As transport demand grows, without new and upgraded transport corridors network resilience will be limited and public transport, private vehicles and freight will experience unreliability.	<p>The three main north-south strategic routes providing access to the south (SH1, Dairy Flat Highway and East Coast Road) will experience reduced reliability, impacting on the resilience of the strategic network overall. The same is expected for access to SH1.</p> <p>Local road alternatives are not suitable for future transport requirements. Particularly, for managing with an increase in freight movements generating from the large Silverdale West – Dairy Flat Industrial area. The limited mode choice along local and strategic corridors is another key cause of the reliability problem.</p>
Travel Choice	A lack of dedicated active mode and public transport facilities will result in more private vehicle trips as growth occurs.	<p>Public transport use in the North is currently low (~8%) and walking and cycling mode share is particularly low (~1%), reflecting car-oriented transport and land use form and limited choices.</p> <p>Limited walking and cycling facilities that do not connect trip generating activities, aren't continuous and have limited crossing opportunities. Infrequent public transport routes that serve a limited catchment.</p>
Safety	A lack of safe and attractive separated active mode facilities will result in the use of inappropriate and unsafe alternatives.	Increasing traffic volumes resulting from growth will exacerbate existing safety issues. Existing safety issues are present on Dairy Flat Highway, Pine Valley Road, East Coast Road (intersection with Tavern Road).

Problem	DBC Problem description	Evidence presented in IBC
		Additional risk for active mode users from a lack of safe and separated facilities. High vehicle speeds on existing rural roads creates an unsafe environment for active mode users which will continue unless urbanised.
Integration	The existing transport corridor is not commensurate with the level of urban growth in this area limiting development potential and the quality of the urban environment.	Current urban form does not support public transport and active mode travel. Transport systems that include high quality public transport and walking and cycling promote and support development of higher density urban centres and corridors, which in turn attract more development and people.
Climate Change	The current transport system has an over-reliance on private vehicles. This combined with limited low carbon transport alternatives results in significant transport emissions which is incongruent with current climate change goals	<p>The IBC did not identify a specific problem related to the Climate change. The IBC had a premise of mode shift and was focused on creating a future network that reduced reliance on private vehicles. As part of this development, it already considered which parts of the network would be required to support this mode shift which forms part of the mitigation response for the impact of Climate Change.</p> <p>The IBC principles of land use integration, travel demand management, transport hierarchy and sustainable outcomes all supported the underlying desire for a low carbon transport network. Therefore, this new problem was already being considered implicitly as part of the IBC. The DBC does however take the opportunity to specifically highlight climate change.</p>

It is noted that the transport response to climate change goals and the reduction of transport emissions is made up of many factors as shown in Figure 7 2.

This shows that the concepts of improved walking and cycling facilities or bus services are just smaller parts of the climate change response and in fact the movement to the use of biofuels, electrification of the fleet and road pricing are considered the heavy lifters in addressing climate change.

Figure 7-2: Transport's contribution to transport emission reduction (source: Auckland Transport)



The DBC cannot influence these wider policy decisions, but it can support with the smaller contributions through the network provisions to support mode shift. Therefore, it was decided to focus the climate change problem for this DBC on a response to maximise mode shift to public transport or active modes and to reduce future private vehicles trips. The reduction in emissions of the remaining private vehicles trips will need to be addressed through biofuels or fleet electrification.

The Northern growth area is heavily reliant on private vehicles with a current mode share of 88%. Without alternative low carbon travel choices, this mode share will not change in the future. By addressing the other five problems this over reliance on private vehicles will in fact be reduced. The provision of better access for all modes, land use integration with the transport infrastructure, improved reliability for the network and provision of active mode and bus facilities will collectively encourage mode shift. Growth itself will increase the number of transport trips in the North, but the measure of success will be how many of these new (and existing) trips can be undertaken on a low carbon transport network.

It is acknowledged that climate change response is not just restricted to mode shift, however this is the main problem identified that this DBC is going to address with respect to the future transport network associated with planned greenfield growth. As a route protection DBC, the main focus is on mitigation measures and ensuring the appropriate transport corridors or facilities are provided in the right places to support the growth. That is, that the enabled carbon is reduced through better travel choices being made. This also includes assessment in some instances if a corridor is still required and supports the overall climate change response for the North. The DBC does not reach the level of design which focus on more adaptive measures such as embodied carbon but does consider this concept during option selection through:

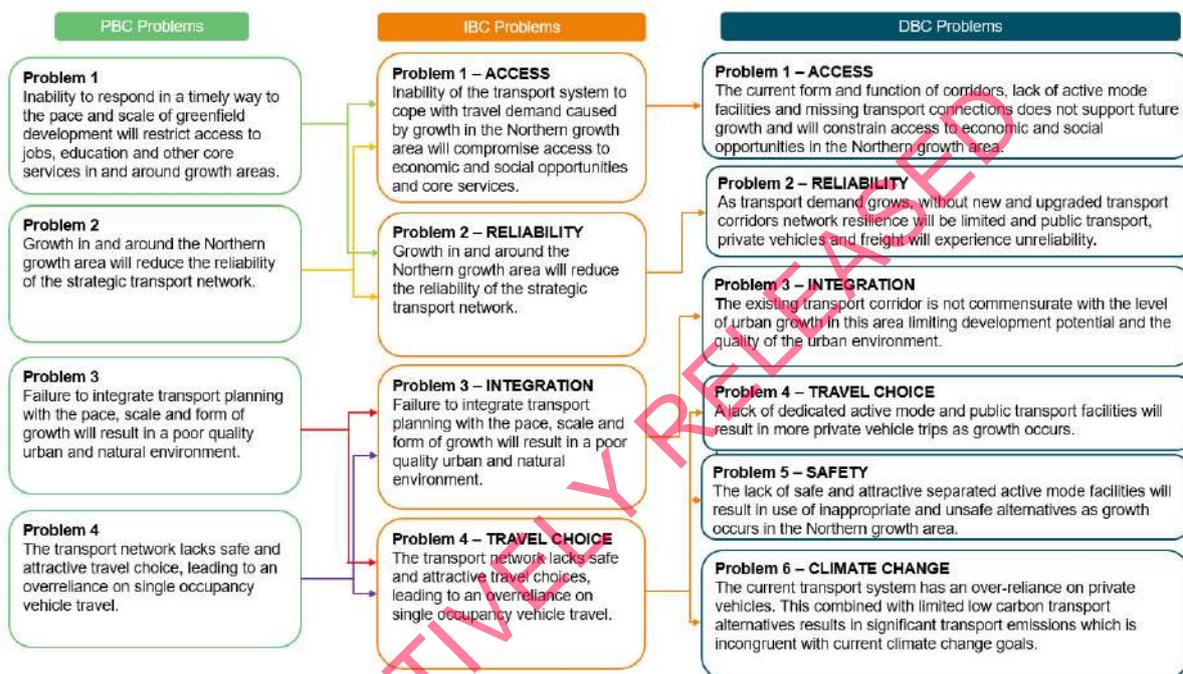
- Each project has been considered during gap assessment against a climate change lens to understand the corridor's role in developing a low carbon transport network. This has been of particular importance to the strategic infrastructure within the North network.
- The resilience problem includes provision for the consideration of responses to climate change issues like 100-year flooding and the resulting availability of alternative routes. This is primarily for new greenfield corridors and will factor into the location of new alignments and was considered

during option assessment. In addition, any new infrastructure that is required on existing roads such as bridges have had their footprint considered with respect to flooding levels.

7.2 Problem Mapping

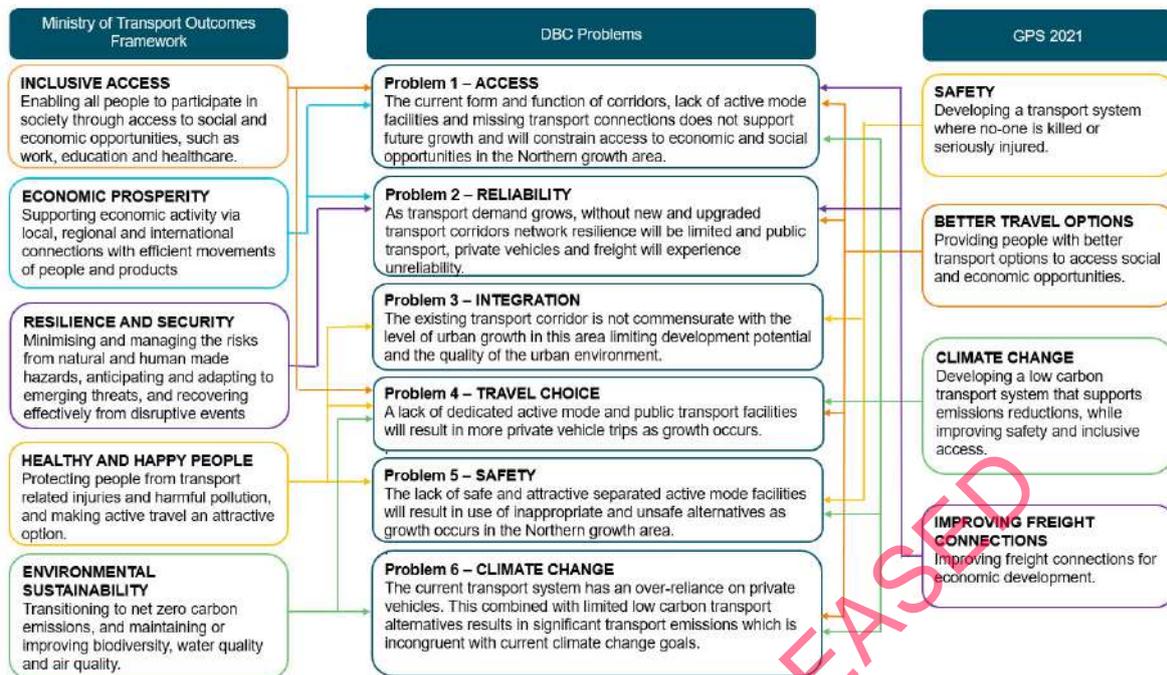
There is a direct line of sight between the IBC and DBC problems themes as shown Figure 7-3. This confirms that the problems identified in the IBC and in the DBC continue to be valid and applicable at both an area level for the North, and as detailed further in this Strategic Case on a per project basis.

Figure 7-3: Problem mapping across PBC, IBC and DBC



Investment in addressing these problem statements will maximise land use and transport integration and align with the GPS 2021 and MoT Transport Outcomes Framework. The DBC problem themes as identified above have also been mapped against both of these strategic guiding documents in Figure 7-4 to demonstrate how the DBC is well aligned to the outcomes being sought.

Figure 7-4: DBC problems against current strategic policy direction



The mapping shows that the identified problems map closely to the four strategic priorities of the GPS. Safety and Better Travel Options remain cornerstones of the North network. The renewed emphasis on improving freight connections is particularly relevant for the proposed Wilks Road Interchange and Industrial Arterial connecting SH1 to the Silverdale West – Dairy Flat Industrial area.

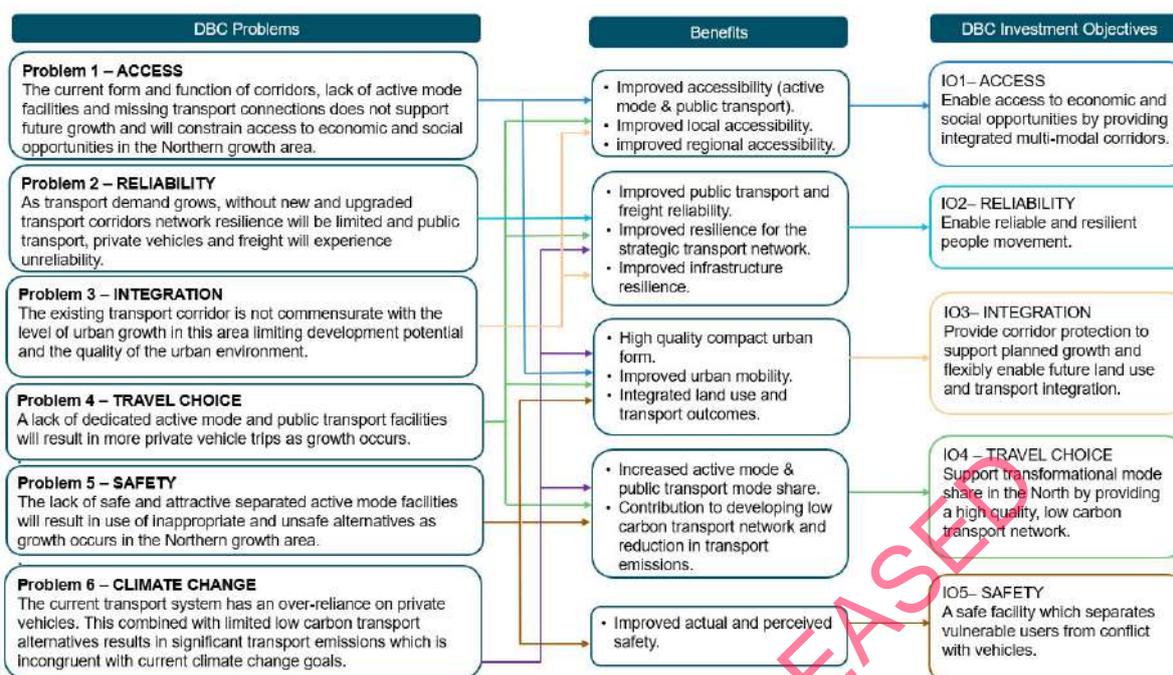
The mapping to the MoT Transport Outcomes Framework also confirms alignment with the five key outcomes to improve wellbeing and liveability through inclusive access, healthy and safe people, economic prosperity, environmental sustainability and resilience and security.

Therefore, it is considered that the problems identified for the North align closely with broader strategic goals. Accordingly, investment will realise outcomes that support the development of a low carbon transport system that safely and efficiently connects peoples and goods to key social and economic opportunities.

7.3 Investment Logic Map

The Investment Logic Map (ILM) for the DBC is shown in Figure 7-5. The identification of benefits and investment objectives were discussed with the project team and key representatives from Auckland Transport and Waka Kotahi. The measures identified all align with the new Waka Kotahi Benefits Management Framework (2021).

Figure 7-5: North ILM



In general, the DBC problems map directly with an investment objective. The one exception is the Climate Change problem. A separate Climate Change investment objective was considered; however, it was felt that the intentions of this objective to develop a low carbon transport system that supports emission reductions while improving safety and inclusive access is already collectively achieved by the other investment areas and would be essentially double counting. For example:

- **Travel choice** investment objectives include measures for mode shift, mode share and reduction in emissions associated with this mode shift.
- **Resilience** measures already include an assessment of the susceptibility of infrastructure to climate change (in particular Q100 flooding).

Whilst climate change does not have a specific investment objective, this DBC does provide additional commentary on how the North transport network as well as individual projects themselves contribute to addressing climate change. This commentary is included in the climate change assessment section, option summaries and the outcomes reports. This approach remains consistent with the wider Te Tupu Ngātahi programme assessments.

The key benefits for the North from addressing these problems are:

- Improved accessibility for local and interregional trips.
- Improved public transport and freight reliability
- Improved network reliability and resilience for the strategic transport network.
- Improved infrastructure resilience.
- High quality compact urban form with improved urban mobility.
- Integrated land use and transport outcomes.
- Reduced reliance on private vehicles with increased public transport and active mode share.
- Contribution to the development of a low carbon transport network and associated reductions in transport emissions.
- Improved actual and perceived safety for active modes.

- Reduced occurrence of Deaths and Serious Injuries.

8 Project Specific Investment Outcomes

The previous section has detailed the overarching investment themes for the North. Each corridor has also been considered individually to understand its specific contributions to the overall North outcomes. Whilst each corridor likely contributes in some way to all six problem themes, they have been split into primary and secondary contributions as detailed in Table 8-1. The primary themes are where the corridor has a strong contribution to achieving outcomes for that theme. The secondary themes are where the corridors have a lower-level impact and may contribute as part of a greater network effect rather than the specific corridor itself.

The process of the problem statement development is described in further detail in the main DBC.

Table 8-1: North project contributions to investment themes

NOR	Projects	Access	Resilience	Integration	Travel Choice	Safety	Climate Change
	✓ Primary S Secondary						
1,2,3	Rapid Transit Corridor	✓	✓	✓	✓	S	✓
4A,D,E	Upgrades to SH1 between Albany and Silverdale	✓	✓	✓	✓	S	✓
4B	A new walking and cycling path along SH1	✓	S	✓	✓	✓	✓
4C	Improvements to the existing Silverdale Interchange	✓	✓	S	✓	✓	✓
4F	Upgrade of the Wainui interchange for active modes	✓	S	✓	✓	S	✓
4G	Silverdale to Highgate active mode connection	✓	S	✓	✓	✓	✓
5	Dairy Flat SH1 crossing	✓	✓	✓	✓	S	✓
6	New connection between Milldale and Grand Drive	✓	✓	S	✓	S	✓

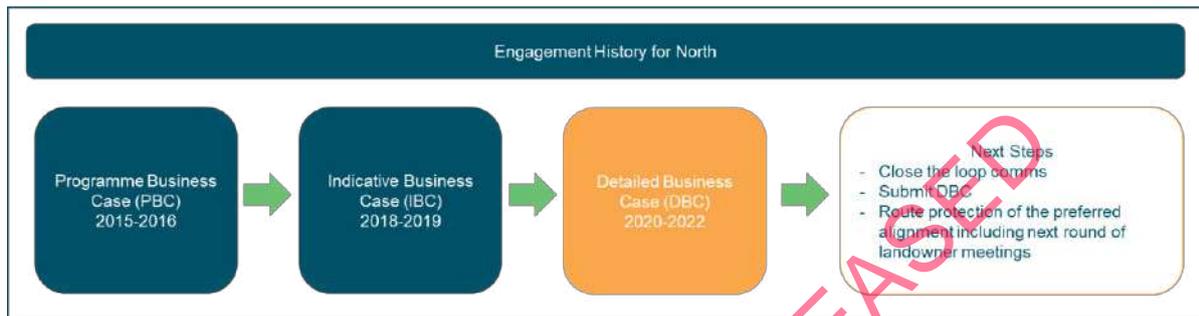
NOR	Projects	Access	Resilience	Integration	Travel Choice	Safety	Climate Change
	✓ Primary S Secondary						
7	Upgrade to Pine Valley Road	✓	S	✓	✓	S	✓
8	Upgrade to Dairy Flat Highway between Dairy Flat and Silverdale interchange	✓	✓	✓	✓	S	✓
9	Upgrade to Dairy Flat Highway between Albany Village and FUZ	✓	S	✓	✓	✓	✓
10	Upgrade to Wainui Road	✓	S	✓	✓	S	✓
11	New road between Dairy Flat Highway and Wilks Road	✓	✓	S	✓	S	✓
12	Upgrade to Bawden Road and extension to create a new connection with SH1	✓	✓	✓	✓	S	✓
13	Upgrade to East Coast Road from Silverdale to Redvale Interchange	✓	S	✓	✓	✓	✓
A1	New Argent Lane and new Pine Valley Road	✓	✓	✓	✓	S	✓
A2	Upgrade of Hibiscus Coast Highway and Grand Drive for public transport and active modes	✓	S	✓	✓	✓	✓
A3	Dairy Stream Active Mode Path	✓	S	✓	✓	✓	✓

The investment cases for each individual strategic project are discussed in detail in Appendix A – North Strategic Case. These have been written separately to enable progression of individual corridors should this be required in the future.

9 Partner and stakeholder engagement

This section summarises engagement undertaken with Partners, key stakeholders, and the community by Te Tupu Ngātahi for the North DBC. The engagement undertaken to support the DBC is a continuation of previous engagement that took place during the PBC and IBC phases as illustrated in Figure 9-1 below.

Figure 9-1 North engagement process



The purpose of engagement in this DBC was to provide information on preferred routes and to gather feedback on these to inform the emerging preferred corridors.

The public engagement primarily took a 'landowner first' approach with letters sent to potentially impacted property owners with one-on-one meetings available. An advertising and social media campaign raised awareness of the engagement with the wider community and directed people to the online interactive engagement platform to provide feedback. Briefings were held with key stakeholders, advocacy groups and local boards.

Engagement with partners, stakeholders and landowners will be ongoing throughout the DBC and NoR process.

A summary of who we engaged with is included in Table 9-1. A full engagement summary report is included in **Appendix E: Engagement Summary**.

Table 9-1 North DBC engagement

Who we engaged	How we engaged
Owners	<p>Te Tupu Ngātahi has had ongoing engagement with Waka Kotahi and Auckland Transport throughout the development of this DBC. Led by Owner Interface Managers, the project team has collaborated regularly with a team of key technical representatives from the organisations to ensure technical and strategic alignment of the DBC. Forums have included:</p> <ul style="list-style-type: none"> Regular technical sessions to discuss emerging preferred options and any subsequent changes following design. Specific sessions to discuss design assumptions, key principles or locational design issues. Technical review of draft designs to identify emerging issues.

Who we engaged	How we engaged
	<ul style="list-style-type: none"> Regular briefings on complementary projects to ensure alignment between workstreams.
Partners	<ul style="list-style-type: none"> Auckland Council Partnership Forum – twice monthly meetings to update Council on Te Tupu Ngātahi projects (including North). Northern Manawhenua– Te Tupu Ngātahi recognises the responsibilities and commitments of engagement with Manawhenua as a Treaty Partner.. Throughout the DBC there has been ongoing monthly hui with the project teams from all North Te Tupu Ngātahi projects. Manawhenua partners also attended Multi Criteria Analysis workshops. Feedback obtained from Manawhenua was incorporated in the development of options and to confirm the emerging preferred options. Auckland Council Plans and Places – ongoing and regular meetings. Representatives were invited to all technical stakeholder sessions to comment on the emerging preferred design. Key topics of discussion included land use transport integration particularly between the RTC and potential Dairy Flat centre, the impacts of the Medium Density Residential Standards (MDRS) and future intensification in the North, discussion on industrial zoning and transport requirements to support this land.
Elected members	<ul style="list-style-type: none"> Regular updates to elected members including: Upper Harbour Local Board presentation (6 April 2023) Hibiscus Coast and Bays (4 April 2023) Rodney (24 April 2023) Memo (12 July) –Auckland Transport’s Customer Liaison Knowledge Management team
Stakeholders	<ul style="list-style-type: none"> Meetings and briefings for both Business North Harbour and the Silverdale Business Association Ministry of Education - ongoing bi-monthly meetings are held to provide an overview of the Te Tupu Ngātahi programme. Infrastructure interface meetings – regular ongoing meetings are held with Watercare, Vector and First gas to provide updates on all Te Tupu Ngātahi projects. North Shore Aero Club Inc (North Shore Airport) – Meeting to discuss projects in the vicinity of the airport and discussion on future expansion plans for the runway. Department of Conservation - Meetings to discuss project impacts and potential for active mode corridors to integrate with reserve areas.
Potentially affected landowners	<ul style="list-style-type: none"> We sent letters to 1,274 potentially affected landowners in early July 2022 inviting them to have their say and to contact us to have a conversation with the project team. We held 18 landowner meetings which were held either online (via Teams), or in person. A community drop-in event on Saturday 13 August 2022 was attended by around 200 people. A representative from Auckland Council attended to engage on the Draft Spatial Land Use Strategy - Dairy Flat and Silverdale Future Urban Zones. Key themes that emerged from this event included:

Who we engaged	How we engaged
	<ul style="list-style-type: none"> ○ Varying degrees of understanding towards the proposed RTC route ○ The implications of lodging NoRs now, as opposed to long-term implementation ○ The change in alignment in the Pine Valley Road area ○ Flooding constraints in the Dairy Flat area ● From the drop-in we received 18 pieces of feedback collected through post-it notes available for attendees to stick onto an A0 map. Attendees also provided feedback online after the event.
Community	<ul style="list-style-type: none"> ● Advertising and social media campaign to promote the consultation to the wider community. Information was shared on Twitter and Facebook by AT, Rodney Local Board and Business North Harbour. The project also featured in articles in Greater Auckland, Stuff and NBR. ● Online interactive engagement platform - During the engagement period there were 3,047 unique visitors to the project site. Of these, 58 (26.61%) were survey submissions, 160 (73.39%) were 'drops' on the interactive social map. We also received 23 pieces of feedback by email. ● Downloadable content was moderately accessed by Hive visitors. The project page had Chinese and Te Reo Māori translations available on the Hive site from the outset of community engagement. The Chinese translation received 52 downloads, whereas the Te Reo translation was downloaded 25 times. We also uploaded a downloadable map of the project footprint following requests at our drop-in event; this was downloaded 21 times.

9.1 Summary of feedback

The Te Tupu Ngātahi approach to protect land now for future transport options was supported by the majority of community feedback respondents. Partner, key stakeholder and community feedback was generally supportive of the preferred transport network.

Landowner meetings with the project team also provided an opportunity to gather feedback. Due to the size of the North package, several different areas and comments were made on both the specific projects and the overall process and prospect of land acquisition.

The most common concern was the long-time frames for project implementation and the uncertainty this creates. Landowners said that they would have difficulty selling their property and would not be able to develop their land. While some were relieved that they would not have to move in the near future, others felt strongly that living with a designation over their property for 20-30 years was an unfair burden.

Other key concerns were related to:

- Flooding
- Bawden Road corridor
- Water quality along Dairy Stream
- General queries over the NoR process, lodgement, funding, construction, timelines

- Valued features on their land e.g. trees and ponds
- Property access

Specific feedback relating to the projects was received and is summarised in Table 9-2 below. Following the engagement period, the feedback was carefully analysed and used by the project team to either confirm the emerging preferred option for each corridor or, where appropriate, consider additional alignments or refinements to further inform option selection.

Table 9-2: Summary of key themes and responses

Project	What we heard	What we did in the DBC
Rapid Transit Project	<ul style="list-style-type: none"> • RTC should follow SH1 to utilise existing infrastructure, avoid disruption and property impacts in existing rural environment, and provide a more direct route. • Extensive flooding issues in this area makes this an inappropriate place for new transport links, town centre, and urban development. Concern that the construction of these may also make these issues worse. • Location of the RTC on the ridgeline will be where the noise and visual impacts will be the greatest • Query on how those living east of SH1 in Whangaparāoa and Hibiscus Coast Bays can access the RTC • Extend RTC to stop in centre of Milldale (rather than the edge) and up to Ōrewa. Consider branches along SH1 and out to Whangaparāoa. • Preference for the same mode from the city out to RTC. Busway preferred by some as more reliable and less subject to faults. 	<ul style="list-style-type: none"> • Review previous assessment of the RTC which follows the SH1 corridor. • Continue conversations with Auckland Council around the centre location and integration with the RTC corridor. • Review flooding information and photos supplied. • Continue conversations with Auckland Council around the centre location and integration with the RTC corridor. • Considered noise and visual impacts in more detail in option assessment and subsequent AEE process. • Consider providing more direct services to the Whangaparāoa and Hibiscus Coast Bay areas. • Consider the wider supporting public transport network. • Review the previous work which considered this option. • While this decision on mode cannot be made yet, the designation approach future proofs the corridor for multiple modes.
Future Walking and Cycling paths	<ul style="list-style-type: none"> • Support for Dairy Stream path. This is also a good opportunity to ensure flow rates in Dairy Stream and out to Riverhead are maintained • Support for separate facilities for pedestrians and cyclists • Support for separated cycling lanes on all new or upgraded roads • Request for walking and cycling facilities to Ōrewa and Hibiscus Coast 	<ul style="list-style-type: none"> • Continue to develop this project and include in the DBC. • Most proposed cross sections include space for separate walking and cycling facilities. • This is a design principle of Te Tupu Ngātahi. All roads to include separate walking and cycling facilities. • This corridor is included within the scope of the DBC. Due to the built-up nature of the corridor, Te Tupu Ngātahi have recommended this project is not route protected and goes straight to detailed design.

Project	What we heard	What we did in the DBC
	<ul style="list-style-type: none"> Ensure the walking and cycling provision does not compromise the RTC. 	<ul style="list-style-type: none"> All walking and cycling facilities are completely separated from the RTC facility.
Future improvements for SH1	<ul style="list-style-type: none"> Support for proposed SH1 improvements Support for upgrading Silverdale Interchange Include additional lanes on SH1 Wilks Road interchange should also include north ramps Loop ramp at Wilks Rd Interchange not feasible due to steep terrain Avoid impacting around the bush around Lonely Track Rd and SH1 that forms links Tiri Tiri Matangi and Whangaparāoa to the Waitakere Ranges 	<ul style="list-style-type: none"> Continue to develop this SH1 upgrade and interchange upgrades and route protect the space required. Review previous work during IBC which considered provision of North facing ramps at Wilks Rd. Project team have met with these property owners and have undertaken additional options assessment to explore the viability of the alternatives proposed. The project team have considered numerous options in this location and have considered impacts on ecological areas in identifying the emerging preferred option.
Future Road Upgrades	<ul style="list-style-type: none"> Support for the inclusion of bus lanes on upgraded corridors and specifically around the Ō Mahurangi Penlink interchange Support for a roundabout at intersection between Dairy Flat Highway and Postman Rd Safety improvements are needed for existing roads Bawden Rd should be realigned as the sharp corners are unsafe and the proposed interchange will increase traffic on this road Pine Valley Rd needs to be upgraded along the whole length. Vehicle numbers along this road are out of date. Consider upgrading Kahikatea Flat Rd into Dairy Flat and bring forward implementation of Wilks Rd Interchange Consider noise mitigation along Bawden Road due to increase in traffic numbers 	<ul style="list-style-type: none"> While the Ō Mahurangi Penlink project is outside the scope of Te Tupu Ngātahi, consideration will be given to buses in the ultimate design of the Redvale interchange. The project team will consider the appropriate intersection form at this location. All corridors with the Te Tupu Ngātahi programme will be upgraded to an appropriate and safe urban form. This will be considered in the design development. Consider refining the design of this corridor. Our planning considers full buildout of the surrounding area, so future traffic volumes are far higher than existing levels. The scope of Te Tupu Ngātahi is not to implement projects. Once route protection is in place, implementation can occur when funding is available. Noise effects and any necessary mitigation will be considered through the AEE phase.



PROACTIVELY RELEASED

Economic Case

10 Option development and Assessment

This section describes the development of the recommended North transport network and includes:

- IBC recommended network that informed the scope of the DBC.
- Establishment of the Do Minimum.
- Option development process.
- Assessment undertaken to identify the recommended network.
- Overall outcomes of the recommended network.

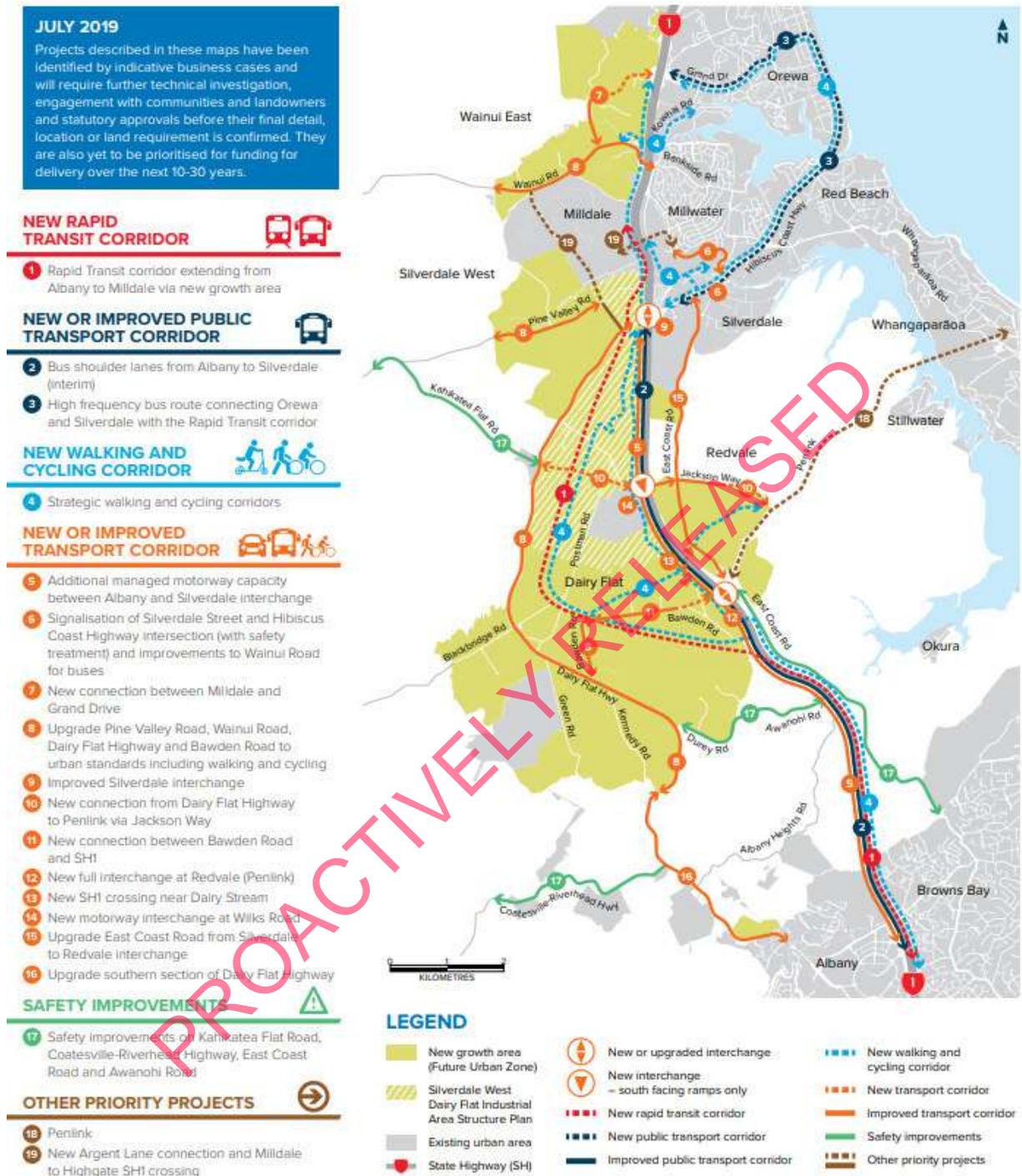
A summary of the recommended option for each of the 22 projects is included in this section including a high-level assessment of how the projects will operate as a key part of the transport system. More detailed option assessment is contained in **Appendix C: Option Assessment Report**.

10.1 North Indicative business case network

The IBC recommended network for the North area is shown in Figure 10-1 below. The IBC recommended network formed the starting point and the optioneering process refined the designs from here to the DBC recommended network in Section 11.

PROACTIVELY RELEASED

Figure 10-1: North IBC Projects - starting point for option assessment



10.2 Do Minimum option

The DBC has followed the principles of the Te Tupu Ngātahi programme wide approach for the definition of the Do Minimum.¹⁰ The Do Minimum is defined as the least effort to maintain the existing system, including maintenance and operation of the existing system.

The assumption includes the same quantum of land use development between all scenarios. Following discussions with Waka Kotahi and Auckland Transport, the Do Minimum network for the North was agreed to include:

- **Public Transport services:**
 - Strategic bus services between Hibiscus Coast Station and Whangaparāoa peninsula to the City via SH1
 - A variety of local bus services making use of existing roads
- **Active Mode Connections:** Cycling provided on road with no specific facilities.
- **Road Network:**
 - Existing roads provide two lanes
 - Ō Mahurangi Penlink is complete
 - Existing SH1 access assumed (Silverdale and south facing ramps at Redvale)
 - Existing arterial and local road connections currently within the North
 - Dairy Flat Highway safety upgrades are implemented.

More information on the development of the Do Minimum is included in **Appendix G: Transport Outcomes Report**.

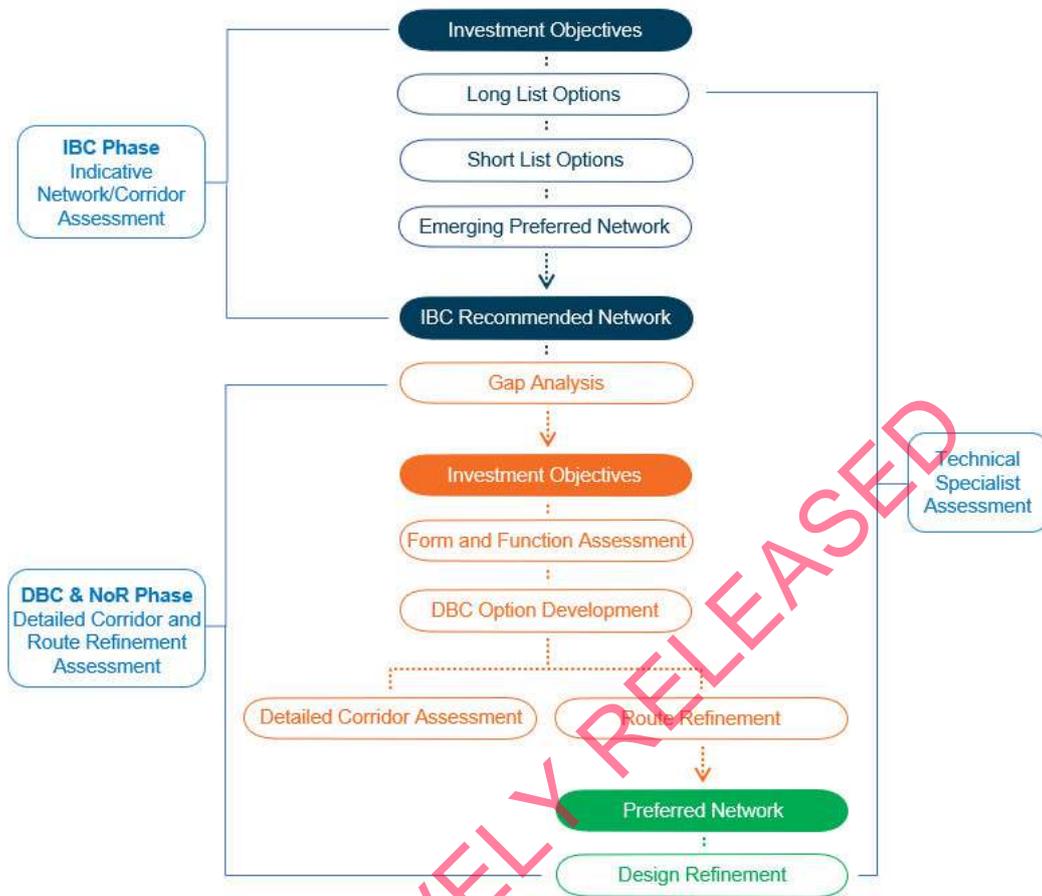
10.3 Option development and assessment methodology

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

The option assessment methodology is summarised in the following sections. For a full description of the process refer to **Appendix C: Options Assessment Report**.

¹⁰ SGA Approach to Do Minimum Development_V1

Figure 10-2: Option assessment process



10.3.1 Preliminary Analysis

There were five key steps in this preliminary analysis as summarised in Table 10-1.

Table 10-1 Preliminary analysis

Step	Description
Gap analysis	<p>At the start of the DBC Phase, a gap analysis was completed to check whether the recommended corridor option for each project required reconsideration due to any relevant new information or assumptions that had changed since the IBC Indicative Corridor Assessment.</p> <p>The gap analysis included the following:</p> <ul style="list-style-type: none"> Review of previous Supporting Growth PBC and IBC documents including option assessments, recommendations and identified opportunities. Alignment of the recommended options with relevant policy documents (for example, Government Policy Statement on Land Transport 2021, AUPOIP) with a focus to confirm if anything has changed since the North IBC recommendations.

Step	Description
	<ul style="list-style-type: none"> Alignment with strategic plans, other statutory documents and developer aspirations that may have progressed since the IBC. For example, structure plans, plan changes (or appeals), recent Notices of Requirement and developer plans. Interaction with other projects in the area.
Land use assessment	<p>The future land use adjacent to each corridor was individually assessed to understand the transport requirements to best service the intended land use as well as the identification of opportunities to enhance land use and transport integration. This was done using the Unitary Plan (AUPOIP), the Silverdale West Structure Plan and any known developer plans. Land use assessment was then used as an input into the general constraint mapping process to understand opportunities to maximise the integration between land use and transport .</p>
Climate Change Assessment	<p>Two workshops were held to consider the climate change impacts from each of the North projects. This assessment:</p> <ul style="list-style-type: none"> Confirmed that the corridor could not be eliminated. Identified opportunities to reduce climate impact to be considered during the optioneering process. Identified opportunities for further optimisation at later stages in the project. Refer to Appendix B: Climate Change Response for detailed corridor information.
Constraint mapping	<p>Corridor mapping was undertaken by Manawhenua and Subject Matter Experts to understand potential constraints to inform the refinement of the DBC options. Areas of assessment included:</p> <div data-bbox="363 1108 1390 1780" style="text-align: center;"> <p>The diagram shows 'SUBJECT MATTER EXPERTS' at the center, surrounded by eight constraint areas: PROPERTY, ECOLOGY, LANDSCAPE AND VISUAL, ARCHAEOLOGY / BUILT HERITAGE, STORMWATER AND FLOODING, PLANNING/ LAND USE/ SOCIAL COHESION, CULTURAL, and URBAN DESIGN.</p> </div> <p>These constraints were then used as direct inputs into the option development process.</p> <p>Constraints were mapped on GIS and their significance recorded. The constraints and their significance were reviewed and discussed at a workshop attended by Manawhenua, Subject Matter Experts (both owner and independent specialists) and the Project team.</p>

Step	Description
<p>Corridor Form and Function Assessment</p>	<p>The Corridor Form and Function (CFAF) process was used primarily for the purpose of assessing multi-modal corridors in the North. The CFAF framework is a tool which formalises the optioneering process and provides consistent decision-making across the wider Te Tupu Ngātahi programme. It is based on the Auckland Transport Roads and Streets Framework (RASf) guidance.</p> <p>The iterative nature of the process allowed for high stakeholder and owner engagement and an efficient design process. Note that during the development of this DBC, the CFAF assessment was revisited as necessary to address identified constraints and design considerations. Any modifications were taken back through the endorsement process.</p> <p>The key principles are related to place and movement as shown below.</p> <div data-bbox="367 694 1276 1523" style="text-align: center;"> </div> <p>In the North, the CFAF was applied to all arterial road corridors but was not immediately applicable to the single use corridors such as the Rapid Transit Corridor, State Highway upgrade or strategic cycleway projects. Each of these projects had bespoke consideration to understand the modal priorities. In addition, the Te Tupu Ngātahi Design Framework Principles and Auckland Transport Parking Strategy and Design Manual were used to develop the functional requirements for the public transport interchanges and Park and Ride infrastructure.</p> <p>Full details of the North CFAF can be found in the Appendix G: Transport Outcomes Report.</p>

10.3.2 DBC Option development and assessment

The gap assessment identified whether the IBC recommended option for each project required additional reconsideration in light of any new information relating to that project. The analysis also identified whether the IBC options assessment had sufficiently considered alternatives proportional to the scale of potential effects of each project. Further consideration was then given to the nature and significance of identified constraints and the land use context at the option development and option assessment phase. The choice of pathway depended on the individual needs of the corridor and the North decisions are summarised in Table 10-2.

Options developed for both the Corridor Assessment and Route Refinement pathways were developed to the same design standard and sufficiently detailed to allow a comprehensive assessment. Note some project corridors were segmented to allow a more localised assessment. In some cases, different approaches to option development were adopted in different segments of the same project corridor. This allowed a fit for purpose assessment of the North network.

The option assessment for each corridor was fit for purpose and included either a full MCA assessment with Subject Matter Expert input and/or a project team option assessment. Full details of this methodology are included in **Appendix C : Options Assessment Report**.

During development of the corridors, the principles from the Te Tupu Ngātahi Urban Design Framework have been applied during the MCA and the subsequent design development stages. This has been particularly important for the corridors where space constraints have required amendments to be explored and the framework has been used to help inform these decisions.

Table 10-2 Option assessment methodology

Pathway	Option development	Option Assessment
Detailed Corridor Assessment	identification and assessment of options occupying different locations (sites or corridors) within a defined study area and potentially connecting to the network at different points. The Project team decided that (based on the gap analysis and constraints mapping) these corridors/projects required development of multiple route (or site) options, with assessment through full scored MCA analysis. Some of these projects also proceeded to Route Refinement (prior to Option Development) where part of the corridor comprised an upgrade to an existing corridor or more refined assessment was required.	Full MCA scoring of multiple options
Route Refinement Assessment	identification and assessment of route options based on (or within close proximity to) an IBC indicative corridor or the outcome of a detailed corridor assessment), and considering the effects, constraints and opportunities present (for road upgrades this included consideration of widening the corridor on either side, both sides, or a combination). These projects either comprised upgrades to existing corridors, new sections of corridor that connect two defined points, or projects where only one practicable option/footprint existed.	Full MCA scoring of multiple options And / or Targeted MCA analysis and constraints-led design of a single option
No Options Developed	Preliminary analysis showed that the existing road corridor was sufficient to allow potential reallocation of road space at a future time to achieve the desired transport outcomes. This therefore required no additional land for route protection. A concept plan was then developed to demonstrate how the road space could be reallocated and to allow the project to be costed for the DBC.	N/A

10.3.3 Emerging preferred option development

Following the option development process, the emerging preferred option was identified for each corridor and confirmed with stakeholders and owners. These options were also included as part of the wider public engagement period and feedback was collated and used by the project team in the next stage of design. The design included the consideration of:

- Vertical alignment.
- Horizontal alignment.
- Identification of future intersection form and function using the Te Tupu Ngātahi process.
- Property access – in particular driveway access for existing corridors.
- Stormwater requirements including location of future stormwater ponds.
- Further development of walking and cycling arrangements.

Designs were issued to a wider technical stakeholder group at 70% design levels to ensure early identification of issues and timely decision making for design choices such as intersection treatments, stormwater principles and constraints to the cross sections.

Full details of the design process for each corridor are detailed in **Appendix H: Design Report**

10.4 Summary of North option development and assessment

A summary of the option development and assessment process as well as the preferred options for the full North network is summarised in Table 10-3 below. A more detailed summary for each project is included in Sections 9.5.

PROACTIVELY RELEASED

Table 10-3 Summary of North option assessment

Project	N O R	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
Rapid Transit Corridor – Albany to Milldale (including new walking and cycling path along RTC)	1	Segment 1: Albany to Awanohi		✓	✓			Multiple options. Optioneering combined with Upgrades to SH1 and New Walking and Cycling path on SH1. Team considered segments 1 and 2 together in making decision
	1	Segment 2: Awanohi to Bawden (SH1 cross over)		✓	✓			As above
	1	Segment 3: Dairy Flat FUZ	✓		✓			Multiple options. Assessment occurred in parallel with the Dairy Flat integration workstream to assist with land use and transport integration
	1	Segment 4: Postman Road and Future industrial area	✓		✓			Multiple options. Interdependencies with segments 3 and 5 meant the decision this segment was made following decisions in Segment 3 and 5
	1	Segment 5: Silverdale West area	✓		✓			Multiple options considered either side of Dairy Flat Highway
	1	Segment 6: Milldale		✓			✓	Single option developed - Fixed termination point at Milldale Station site and multiple corridors looked at in IBC

Project	N O R	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
New Milldale Station	2	N/A		✓			✓	Single option developed – site set aside by developer
New Pine Valley Station	3	N/A	✓		✓			Multiple options
Upgrades to SH1 between Albany and Silverdale	4 A	Segment 1: Albany to Awanohi		✓	✓			Multiple options. Optioneering combined with RTC and New Walking and Cycling Path on SH1. Team considered segments 1 and 2 together in making decision
		Segment 2: Awanohi to Bawden	✓		✓			As above
		Segment 3: Bawden to Silverdale		✓			✓	Single option developed as mostly within designation and no significant constraints
New Walking and Cycling path along SH1	4 B	Segment 1: Albany to Awanohi		✓	✓			Multiple options. Optioneering combined with RTC and Upgrades to SH1. Team considered segments 1 and 2 together in making decision
		Segment 2: Awanohi to Bawden	✓		✓			As above
		Segment 3: Bawden to Silverdale		✓	✓			MCA comparing west versus east side. Some interaction with Upgrade to SH1 Project

Project	N O R	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
		Segment 4: Silverdale to Wainui		✓	✓			MCA comparing west versus east side. Some interaction with RTC Project
		Segment 5: Wainui to Grand Drive		✓	✓			Some wider options qualitatively assessed. Then MCA comparing west versus east side
Upgrade to Silverdale Interchange	4 C			✓		✓	✓	Included: interchange form assessment qualitative assessment of active mode bridge crossing locations
New Wilks Interchange	4 D	N/A	✓	✓	✓	✓		As well as full MCA of locations and alignments to connect to East Coast Road, assessment included: interchange spacing assessment considering Wilks and Redvale Interchanges together interchange form assessment qualitative assessment of active mode bridge crossing locations
Upgrade to Redvale Interchange	4 E	N/A		✓		✓	✓	Included:

Project	N O R	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
								interchange spacing assessment considering Wilks and Redvale Interchanges together interchange form assessment qualitative assessment of active mode bridge crossing locations
Wainui Interchange Active Mode Upgrade	4 F	-		✓		✓	✓	Targeted MCA comprising qualitative assessment of refined crossing locations, then single option developed
Silverdale to Highgate Active Mode Connection	4 G	-	✓		✓			MCA scoring of multiple options
New Crossing of SH1 at Dairy Stream	5	-		✓		✓	✓	Targeted MCA comprising qualitative assessment of refined crossing locations, then single option developed
New Connection between Milldale and Grand Drive	6	Segment 1 – Upgrade of Upper Ōrewa Road		✓		✓	✓	Targeted MCA comprising qualitative assessment of which side of road to widen. Then single option developed
		Segment 2 – New connection through to Ara Hills		✓	✓			Two route options compared using full MCA analysis

Project	NOR	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
Upgrade to Pine Valley Road	7	-		✓		✓	✓	Targeted MCA comprising qualitative assessment of which side of road to widen. Then single option developed
Upgrade to Dairy Flat Highway between Silverdale and Dairy Flat	8	-		✓		✓	✓	Targeted MCA comprising qualitative assessment of which side of road to widen. Then single option developed
Upgrade to Dairy Flat Highway between Durey Road and Albany Village	9	-		✓	✓		✓	Full MCA of widening options, then single option developed
Upgrade to Wainui Road	10	Segment 1 – western end		✓		✓	✓	Full MCA of widening options around bridge crossing, followed by targeted MCA of other segments comparing which side of road to widen
		Segment 2 – bridge segment		✓	✓			
		Segment 3 – eastern end		✓		✓	✓	
New Connection between Dairy Flat	11	-		✓		✓	✓	Targeted MCA assessing where to locate corridor within defined study area; followed by single option developed

Project	N O R	Segment	Assessment type		Assessment method			Comments
			Detailed corridor assessment	Route refinement	Full MCA scoring	Targeted MCA analysis	Constraints-led design of a single option	
Highway and Wilks Road								
Upgrade and Extension to Bawden Road	12	Segment 1 – western end connecting to Dairy Flat Highway	✓	✓		✓		Full MCA of multiple options with different connection points to Dairy Flat Highway, followed by targeted MCA assessing which side of road to widen
		Segment 2 – eastern end connecting to Redvale interchange		✓		✓	✓	Road upgrade, then new corridor connecting to fixed point at Redvale interchange.
Upgrade to East Coast Road	13			✓	✓	✓	✓	Full MCA of road upgrade options; Followed by further targeted MCA comparing which side of road to widen, and single option developed

10.5 Description of option development and assessment structure

The North DBC is large and complex with 22 project corridors in the study area. This has presented challenges in creating accessible documentation. In order to streamline reporting, the option development and assessment section has been summarised for each corridor and presented as slides in the following sections.

Each individual summary follows the option development methodology process described as in Section 10.3 and provides an overview of the option development process, option assessment and resulting preferred option. Each of these steps are supported by comprehensive detail which is included in Appendix C: Assessment of alternatives to this report. Note that all appendices are split by projects so the reader can access individual corridor information if desired.

A guide is shown in Table 10-4 for the readers that wish to access the next level of detail behind decisions and option development.

Table 10-4 Guide to additional option assessment information

Step	Option Process	Associated appendices
1. Preliminary analysis	Gap Analysis Land Use Assessment Constraint Mapping/ AUPOIP Planning Maps Review	Appendix C: Options Assessment Report
	Form and Function Assessment	Appendix G: Transport Outcomes Report
	Climate Change Assessment	Appendix B: Climate Change Assessment
2. Option refinement and assessment	Option development Option Assessment	Appendix C: Options Assessment Report
3. Emerging preferred option development	Options Assessment Design Refinement	Appendix C: Options Assessment Report Appendix H: Design Report
	Intersection Form Assessment	Appendix G: Transport Outcomes Report
4. Recommended Option	Outcome of option assessment	Appendix C: Options Assessment Report
	Risks	Appendix M: Risk

PROACTIVELY RELEASED

North Network Option Development

A new Rapid Transit corridor between Albany and Milldale

- NOR 1 – A new Rapid Transit Corridor between Albany and Milldale
- NOR 2 – New Milldale Station and associated facilities
- NOR 3 – New Pine Valley Station and associated facilities

PROACTIVELY RELEASED

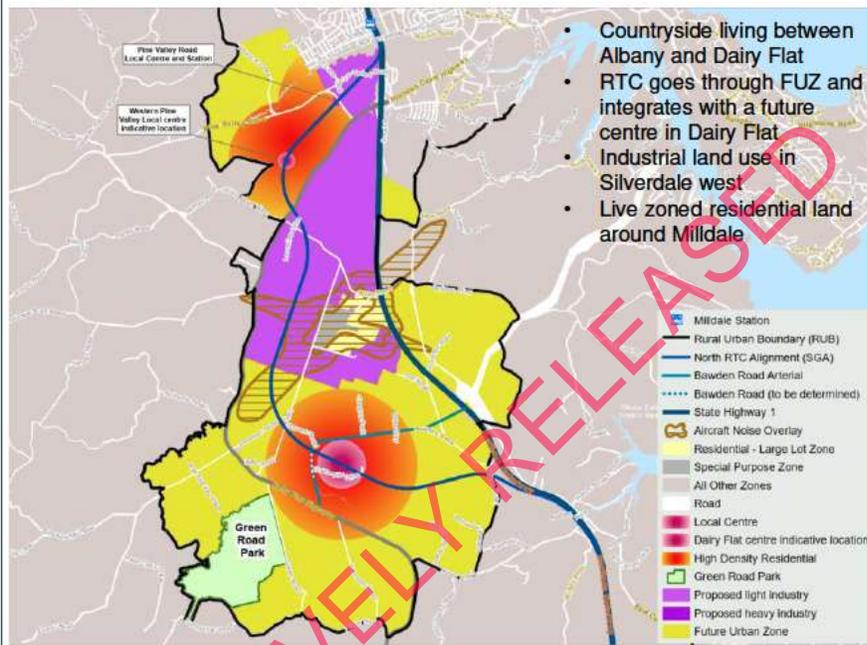
A new Rapid Transit Corridor between Albany and Milldale

PURPOSE

To provide a strategic public transport corridor to serve the growth in the North between Albany and Milldale, leading to an increase in PT mode share and improved accessibility to social and economic opportunities.



LAND USE



Spatial Land Use Strategy Silverdale Dairy Flat



- Countryside living between Albany and Dairy Flat
- RTC goes through FUZ and integrates with a future centre in Dairy Flat
- Industrial land use in Silverdale west
- Live zoned residential land around Milldale

- Council Structure Plan covers Silverdale West Industrial area and was adopted in 2019
- Council is currently progressing a plan change in northern portion of industrial land
- Pine Valley area to west of DFH is not structure planned yet – but likely to be urban residential
- Council draft Spatial Land Use Strategy proposes a Local Centre in Pine Valley Area and a large Town Centre / Metro centre in Dairy Flat

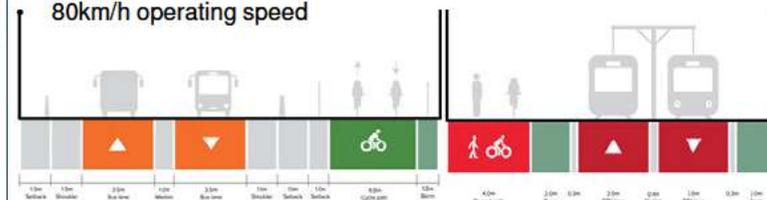
GAP ANALYSIS

The gap analysis assessment made the following findings:

- RTC corridor between Albany (just south of Oteha Valley Road) via the Dairy Flat FUZ and terminating at Milldale, remained appropriate
- More detailed corridor assessment through the Dairy Flat FUZ in partnership with Council, considering the high uncertainty around land uses and the future town centre location
- Opportunities to avoid or minimise impacts on the Weiti River SEA and QEII covenant area.
- Potential changes in transport network tie in/mode assumptions.
- Design refinement to determine best SH1 cross over location, minimise effects on existing urban area north of Oteha Valley, more detailed assessment through Silverdale West with Council.

CORRIDOR FORM AND FUNCTION

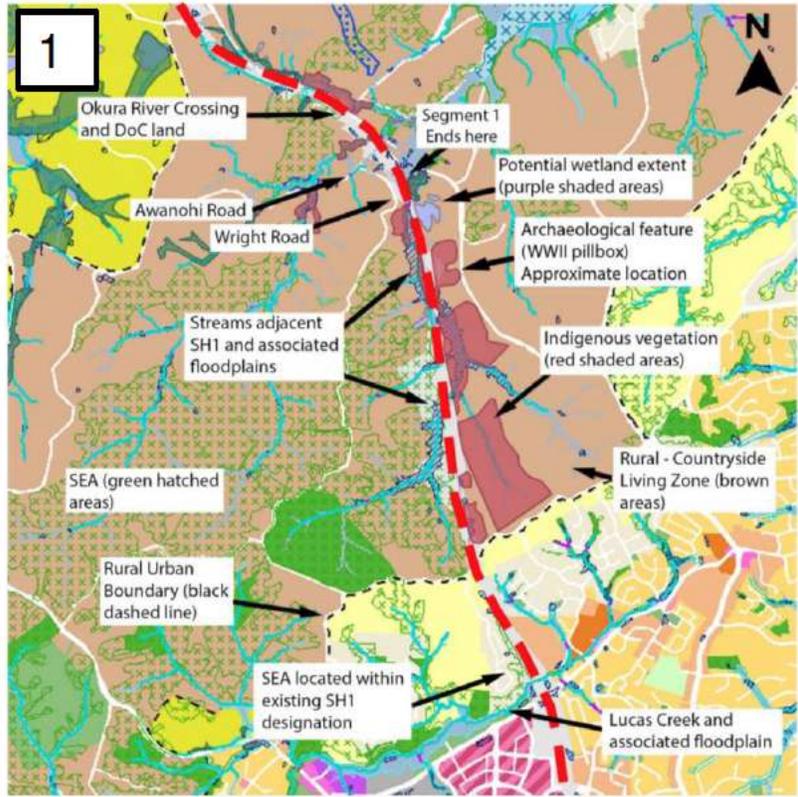
- Separated public transport corridor capable of accommodating BRT or LRT
 - Dedicated walking and cycling facilities will be provided along the corridor.
- 80km/h operating speed



OPTION ASSESSMENT PROCESS

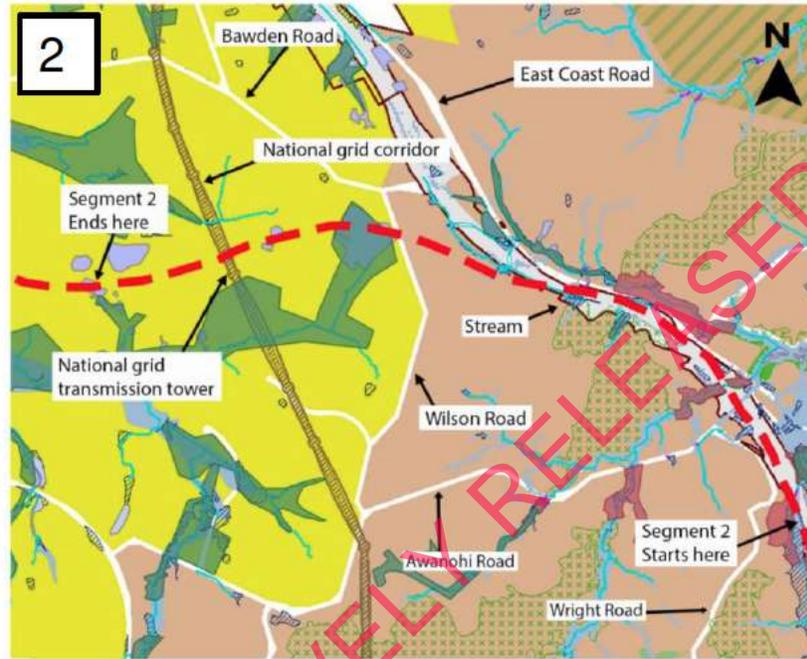
- Multi criteria analysis undertaken on Segments 1-5
- Segment 6 – single option developed
- Segment 3 – further land use integration process undertaken with Council to consider future land use and transport together
- Consideration of adjoining sections when selecting preferred options

A new Rapid Transit corridor between Albany and Mildale – Constraint mapping



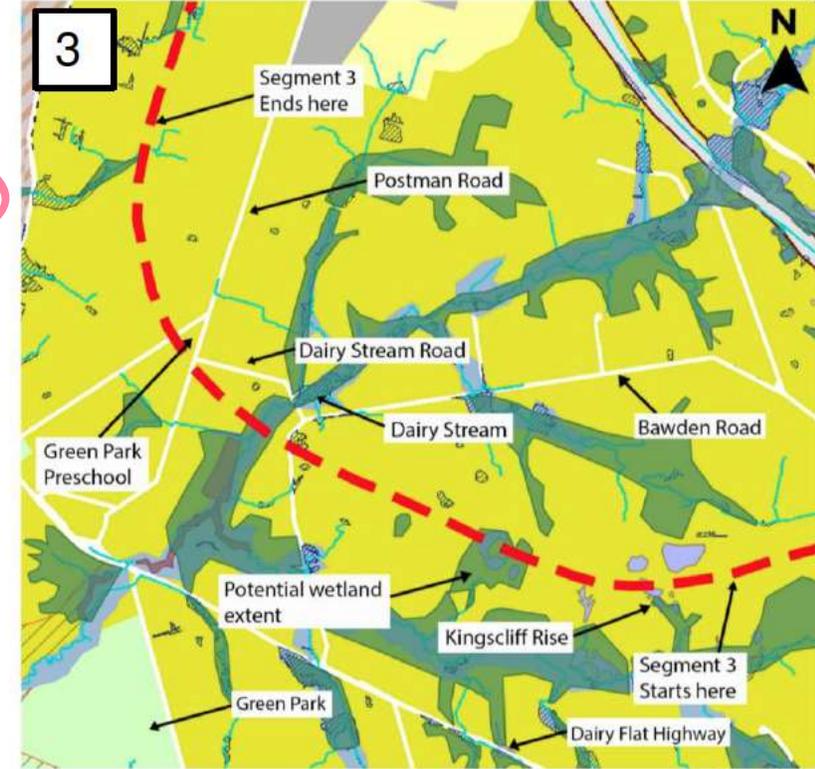
Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- National Grid Yard Uncompromised
- Significant Ecological Areas Overlay
- Open Space - Conservation Zone
- Open Space - Informal Recreation Zone
- Residential - Terrace Housing and Apartment Building Zone
- Business - Local Centre Zone
- Business - General Business Zone
- Future Urban Zone
- Residential - Large Lots Zone
- Rural - Countryside Living Zone
- Business - Heavy Industry Zone
- Business - Light Industry Zone
- Residential - Mixed Housing Urban Zone
- Special Purpose Zone
- Business - Metropolitan Centre Zone
- Residential - Mixed Housing Suburban Zone
- Residential - Single House Zone
- Business - Neighbourhood Centre Zone



Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Business - General Business Zone
- Future Urban Zone
- Residential - Large Lots Zone
- Rural - Countryside Living Zone
- Flood Prone Areas
- Significant Ecological Areas Overlay

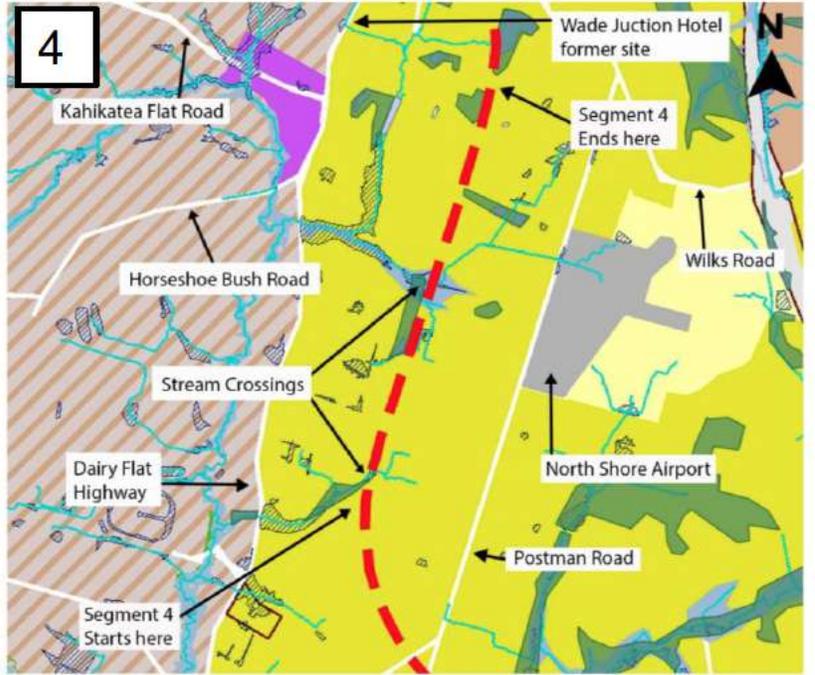


Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Flood Prone Areas
- Significant Ecological Areas Overlay
- Designations
- Future Urban Zone
- Residential - Large Lots Zone
- OpenSpace - Sport and Active Recreation Zone
- Special Purpose Zone
- Rural - Mixed Rural Zone
- Outstanding Natural Landscape

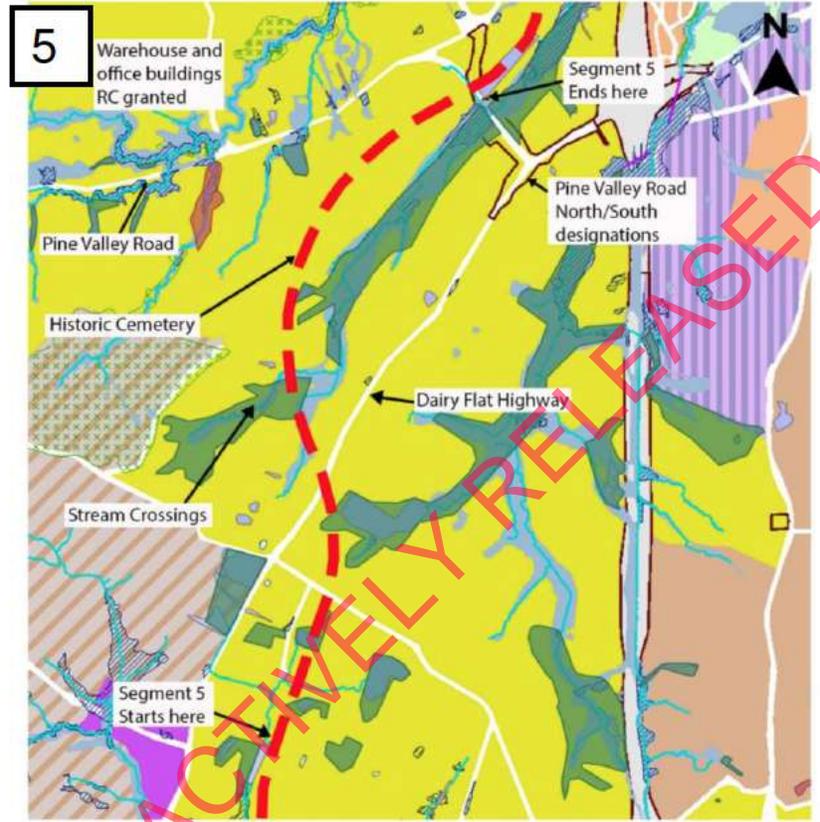


A new Rapid Transit corridor between Albany and Mildale – Constraint mapping



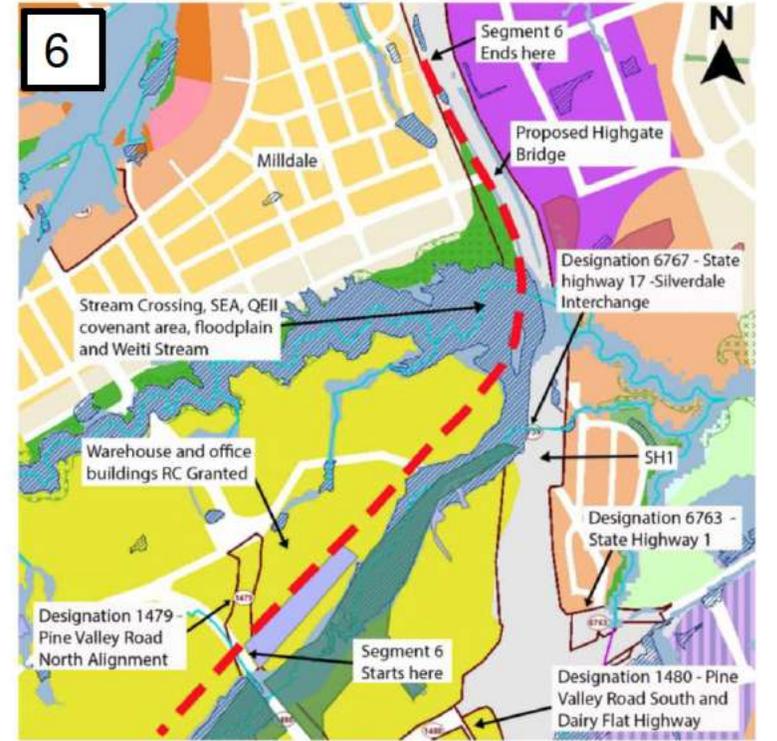
Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Flood Prone Areas
- Significant Ecological Areas Overlay
- Designations
- Business - Light Industry Zone
- Future Urban Zone
- Residential - Large Lots Zone
- OpenSpace - Sport and Active Recreation Zone
- Special Purpose Zone
- Rural - Mixed Rural Zone
- Rural - Countryside Living Zone



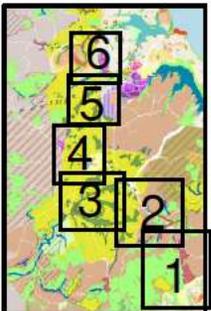
Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Flood Prone Areas
- Significant Ecological Areas Overlay
- Open Space - Sport and Active Recreation Zone
- Business - General Business Zone
- Future Urban Zone
- Residential - Large Lots Zone
- Rural - Countryside Living Zone
- Business - Heavy Industry Zone
- Business - Light Industry Zone
- Residential - Mixed Housing Urban Zone
- Special Purpose Zone
- Rural - Mixed Rural Zone



Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Designations
- Significant Ecological Areas Overlay
- Flood Prone Areas
- Open Space - Sport and Active Recreation Zone
- Business - General Business Zone
- Future Urban Zone
- Business - Neighbourhood Centre Zone
- Residential - Terrace Housing and Apartment Buildings Zone
- Residential - Mixed Housing Suburban Zone
- Business - Light Industry Zone
- Residential - Mixed Housing Urban Zone
- Rural - Rural Production Zone
- Open Space - Informal Recreation Zone
- Open Space - Conservation Zone



A new Rapid Transit corridor between Albany and Milldale – Segment 1 and 2

Options Considered:

Two Staged process undertaken:

Stage 1: Assuming an eastern tie-in at Oteha Valley –

- Two options developed between Albany and Awanohi (Segment 1)
- 9 options considered through MCA process for Awanohi to Bawden for the SH1 cross over section (Segment 2)

Stage 2 - Tie in assumption challenged

- Two additional options developed for Albany to Awanohi assuming western tie-in for RT at Albany bus station
- Sections 1 and 2 combined and MCA assessments from both sections considered in decision making

Albany tie in - A change in context

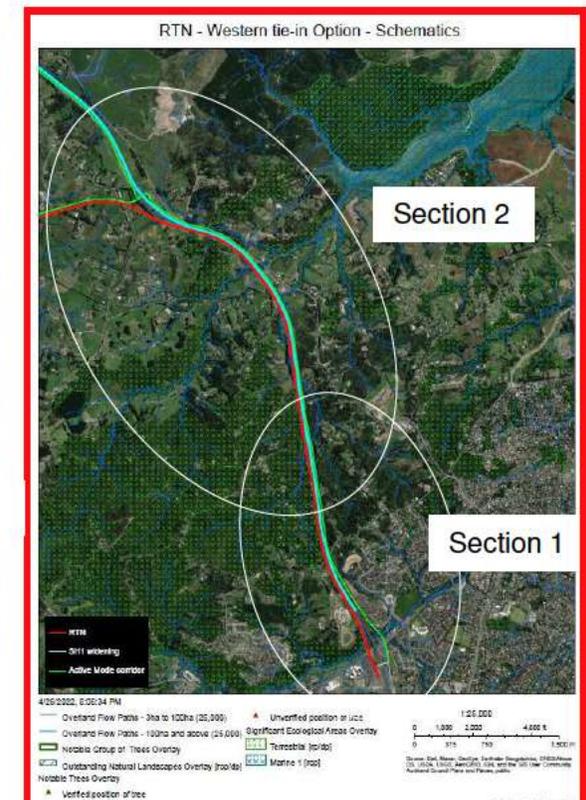
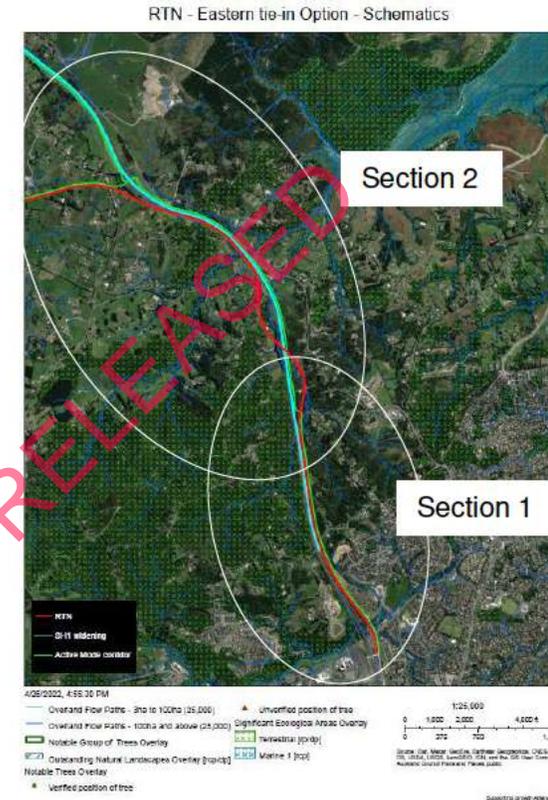
The IBC recommended tie in to the northern busway to the east of SH1. A tie in to the west has been considered in light of the following:

- Thinking has changed recently in relation to the wider RT network in Auckland - light rail is more likely
- Recent work confirms a future RT station (bus or LRT) would be on the **west** at or near the existing Albany bus station site (previous thinking from NCI was that this could be on the east)
- An RT station on the west would enable better integration with the Metro Centre and TOD opportunity
- This is supported by national policy direction - NPS-Urban Development
- RT on the west would enable direct interchange with existing (new) Albany bus station on the west
- Light rail vehicles could not use the existing bus bridge to access the bus station site
- An RT crossover from east to west (Segment 2) has potentially high adverse effects

Western option is preferred

Key differentiating factors from the assessment can be summarised as follows:

- No difference in investment objectives scoring – but new option (with RT on west) is **preferred because of more direct access to future RT station on west and existing bus station**
- Scores better for land use futures and urban design - mainly because it 'hugs' the existing motorway corridor and avoids effects on Wright Road properties
- Option avoids need for large SH1 crossover structures and the associated earthworks, flooding, landscape/visual and ecological effects (as well as construction disruption)
- Scores better for construction impacts on utilities/infrastructure as it avoids large crossover structure(s). No significant difference in cost (within 5%)
- The western option better provides for a potential LRT mode in the future
- **Manawhenua supported the western option** assuming mitigation can be provided for effects on SEA
- **Implications on staging** – difficult and more expensive to implement the RTC project if SH upgrades have not been completed. This will be considered in detail in the next phase.

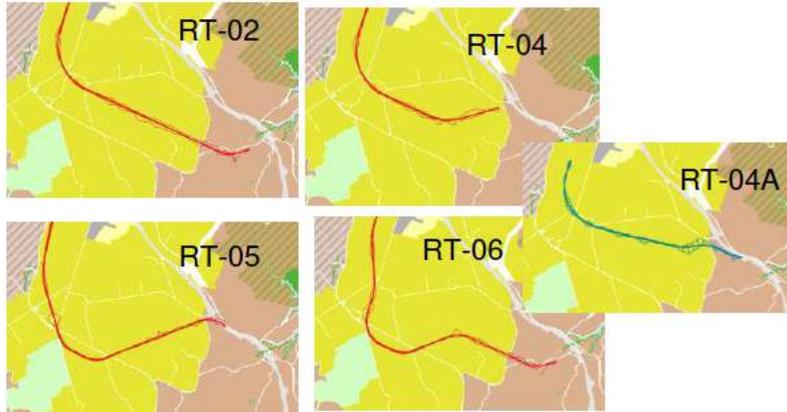


A new Rapid Transit corridor between Albany and Milldale – Segment 3

Process undertaken:

- Gap analysis showed the need to consider a broad area through Dairy Flat
- Constraints mapping process
- Seven alignments identified
- Assessment undertaken considering two different town centre locations
- Parallel Dairy Flat integration process (next page considering land use and transport integration)

Route Refinement Options:



Non scored criteria:

- **Policy:** Options RT04, RT-04A and RT05 are preferred overall due to the minimal impacts on overlays in the AUP:OP
- **Value for Money:** RT-04, RT-04A and RT-02 preferred
- **Manawhenua** – Manawhenua involved in monthly hui indicated preference for RT-04

MCA assessment summary:

MCA Criteria	Option A (RT-01)	Option B (RT-02)	Option C (RT-03)	Option D (RT-04)	Option E (RT-05)	Option F (RT-06)	Option G (RT-04A)
Investment Objective 1: <u>Access</u>	3	4	3	4	3	3	4
Investment Objective 2: Resilience	3	4	4	4	4	4	4
Investment Objective 3: Integration	3	4	3	4	3	3	4
Investment Objective 4: Mode Choice	3	4	4	4	4	4	4
Investment Objective 5: Safety*	3	3	3	3	3	3	3
1a. Heritage	-2	-1	-1	-1	-1	-1	-1
2a. Land use futures	-2	-2	-3	-1	-1	-2	-1
2b. Urban design	-2	-2	2	2	2	1	2
2c. Land requirement	-2	-2	-4	-2	-2	-2	-3
2d. Social cohesion	-3	-3	-4	-2	-2	-3	-2
2e. Human health and wellbeing	-2	-2	-4	-2	-2	-2	-2
3a. Landscape / visual	-3	-3	-4	-2	-3	-3	-2
3b. Stormwater/flooding	-3	-1	-2	-1	-2	-3	-1
3c. Ecology	-4	-3	-4	-2	-3	-3	-3
3d. Natural hazards	-2	-3	-1	-1	0	-2	-1
5a. Construction impacts on utilities / infrastructure	-2	-1	-1	-1	-1	-2	-1
5b. Construction disruption	-4	-3	-4	-3	-4	-3	-3
6a. Construction costs / risk	-3	-3	-3	-2	-3	-3	-2

MCA assessment showed a clear preference for RT-04:

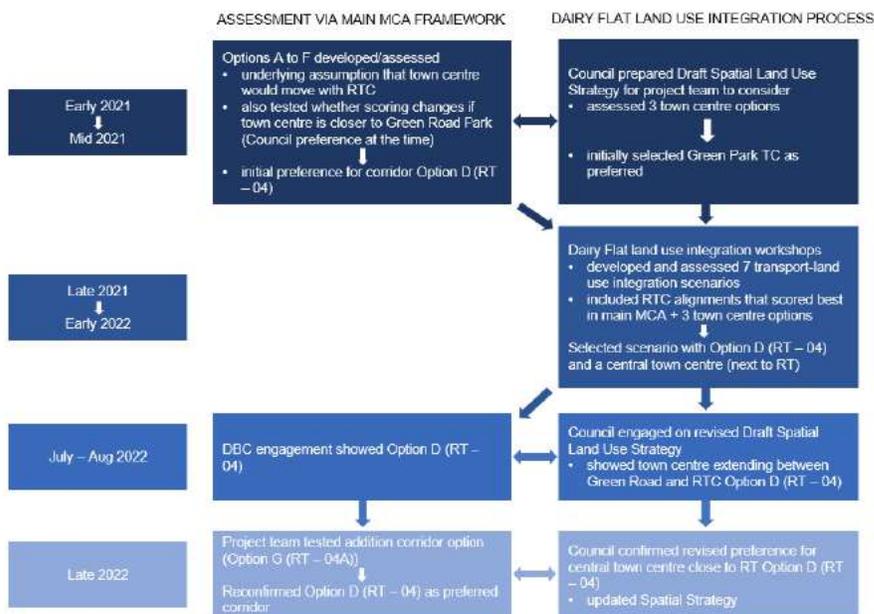
- Best performance against investment objectives
- Lowest cost
- Lowest effects

Conclusion that no decision can be made without further consideration of land use.

A new Rapid Transit corridor between Albany and Milldale – Segment 3

Land use integration process

The Dairy Flat integration workstream undertaken with input from Auckland Transport, Waka Kotahi, Te Tupu Ngatahi, Auckland Council and Manawhenua



Options Considered

- Short list of 7 scenarios identified
- Each represented a combination of a RTC alignment and centre location
- Options were assessed against a set of joint land use and transport criteria

		Green Park Centre options			Central centre options		East centre	Dual Town Centres
Categories	Short list Criteria	SCENARIO 1: Green Park centre and Southern RTC (RT-06)	SCENARIO 2: Green Park centre and south central RTC	SCENARIO 3: Green Park and Central RTC (RT-04)	SCENARIO 4: Central centre and south central RTC	SCENARIO 5: Central centre and central RTC (RT-04)	SCENARIO 6: East centre and Eastern RTC (MT1-1)	SCENARIO 7: Dual Town Centre and eastern RTC (MT1-1)
Ranking by category	Te Ao Māori					P		
	Environmental			P				
	Town centre	P						
	Transport outcomes							
	Development around stations					P		
	Social				P			
	Cost / staging						P	P
Overall ranking	Overall ranking					P		

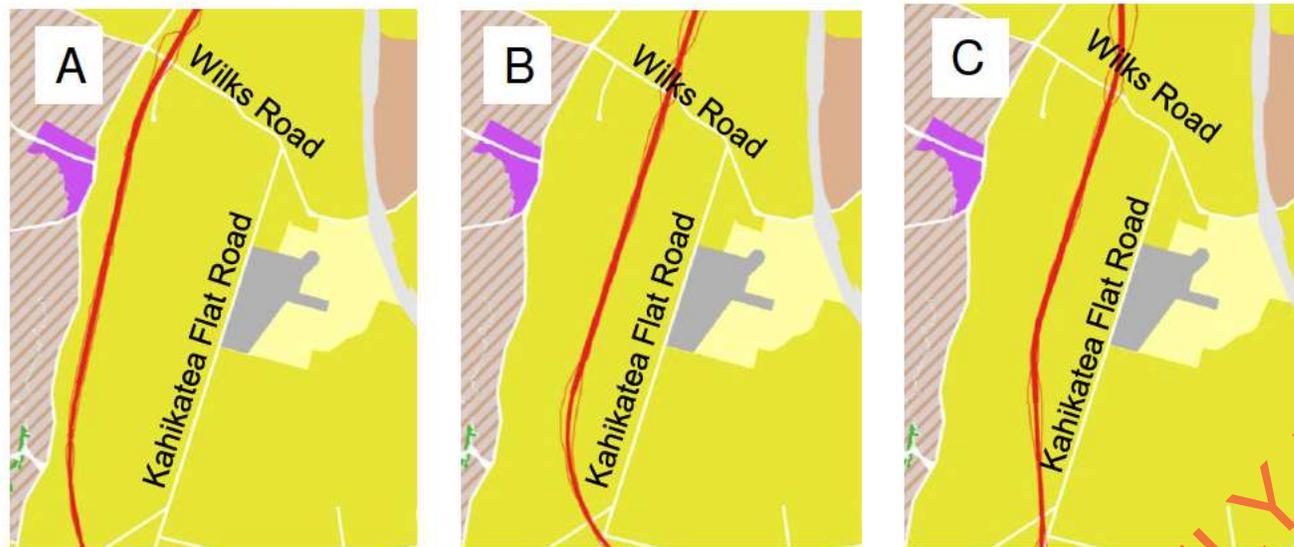


The Dairy Flat integration workstream concluded:

- Scenario 5 (Central alignment and central centre) was the best scoring option followed by Scenario 3.
- The central RTC alignment continued to perform best from a transport perspective and confirmed the project team's preference as it was compatible with multiple land use scenarios
- Consultation on the land use strategy and RTC route is required.

A new Rapid Transit corridor between Albany and Milldale – Segment 4

3 Options considered



- Option B (RT-04) and Option C (RT-06) score the same as the alignments are very similar
- An alignment more central to the industrial area (i.e.. Option B - RT-04) was preferred from an urban design perspective as it would provide the highest level of access to the employment area, and would be easier to integrate with the surrounding industrial land use relative to Option A
- Option B aligned with Manawhenua preferences
- Option B scores better than Option A for heritage as there are no known archaeological/heritage constraints
- Option B scores better than Option A for social cohesion
- Option B scores better than Option A for stormwater/flooding as it would have less flooding risk.
- Both Manawhenua and Council prefer Option B

Option B (RT-04) is the emerging preferred

MCA assessment

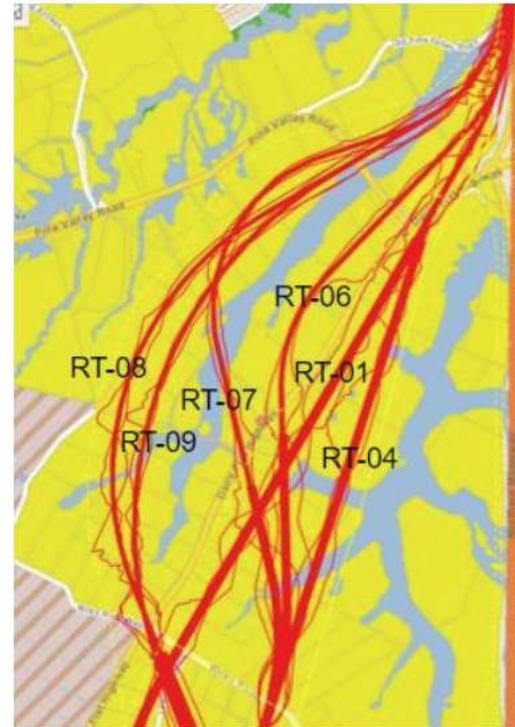
MCA Criteria	Option A (RT-01)_	Option B – RT-04	Option C – RT-06
Investment Objective 1	4	4	4
Investment Objective 2	4	4	4
Investment Objective 3	3	4	4
Investment Objective 4	3	3	3
Investment Objective 5	3	3	3
1a. Heritage			
	-2	0	0
2a. Land use futures			
	-2	-2	-2
2b. Urban design			
	-2	2	2
2c. Land requirement			
	-1	-1	-1
2d. Social cohesion			
	-2	-1	-1
2e. Human health and wellbeing			
	-1	-1	-1
3a. Landscape / visual			
	-2	-2	-2
3b. Stormwater			
	-2	-1	-1
3c. Ecology			
	-1	-1	-1
3d. Natural hazards			
	-1	-1	-1
5a. Construction impacts on utilities / infrastructure			
	-1	-1	-1
5b. Construction disruption			
	-1	-1	-1
6a. Construction costs / risk / value capture			
	-2	-2	-2

A new Rapid Transit corridor between Albany and Milldale – Segment 5 Silverdale West

Process undertaken:

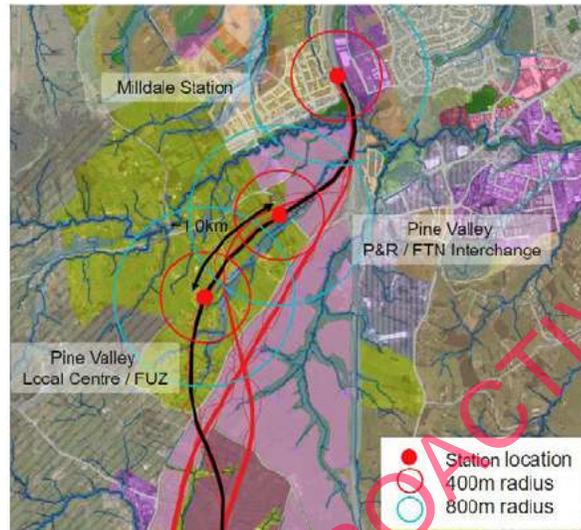
- Gap analysis showed the need to consider options to the north of Dairy Flat Highway
- Constraints mapping process undertaken
- Six alignments developed in route refinement and assessed using MCA
- Assessment considered provision of one or two stations through this section (3 further options added)

Options assessed:



Non scored criteria:

- **Policy analysis** – Option A, B and C are more preferred in relation to NPS-Freshwater, but Options C to I are more preferred in relation to NPS-Urban Development
- **Value for money** – Options H and I score best
- **Manawhenua preference** - Options A or F/I were the preference of those Manawhenua that stated a preference



Recommended option is Option I (RT-09):

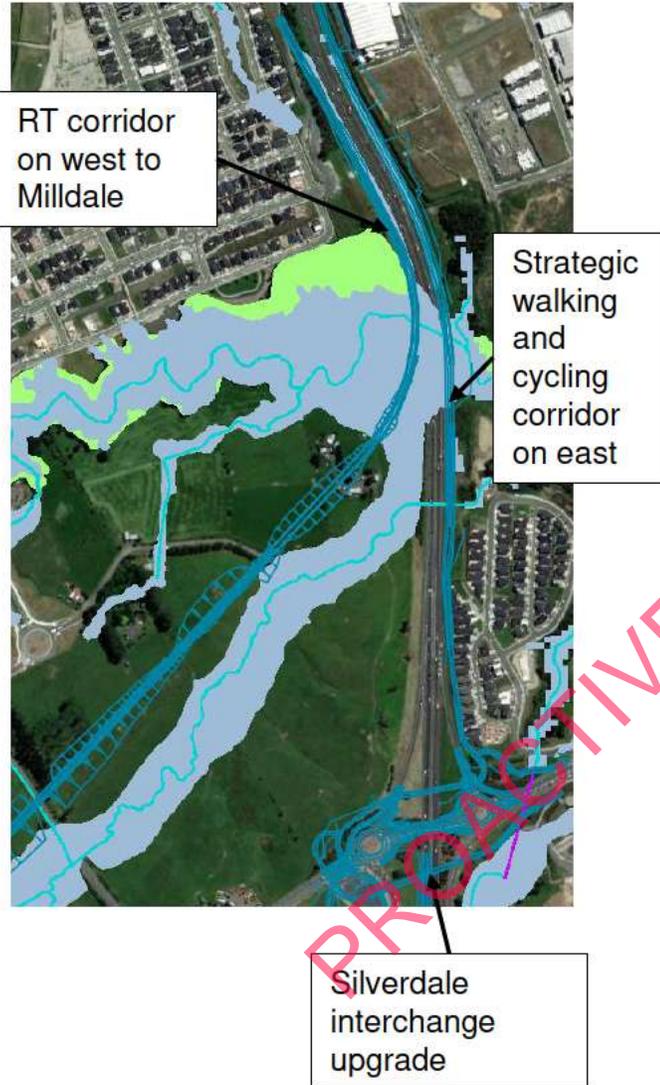
- Stated preference of some Ngā Manawhenua
- Preferred in relation to investment objectives
- Opportunity to provide 1 or 2 stations
- Preferred from a land use and urban design perspective

MCA Criteria	Option A (RT-01, 1 station)	Option B – RT-04, 1 station)	Option C – RT-06, 1 station)	Option D – RT-07, 1 station)	Option E (RT-08, 1 station)	Option F (RT-09, 1 station)	Option G (RT-01, 2 stations)	Option H (RT-07, 2 stations)	Option I (RT-09, 2 stations)
Investment Objective 1	4	4	4	4	4	4	3	4	4
Investment Objective 2	4	4	4	4	4	4	4	4	4
Investment Objective 3	3	3	3	4	4	4	3	4	4
Investment Objective 4	3	3	4	4	4	4	3	4	4
Investment 5	3	3	3	3	3	3	3	3	3
1a. Heritage	-3	-2	-3	-2	-5	-3	-3	-2	-3
2a. Land use futures	-2	-2	0	2	1	3	-1	1	3
2b. Urban design	0	0	-2	2	2	2	1	2	3
2c. Land requirement	-1	-1	-1	-1	-1	-1	-1	-1	-1
2d. Social cohesion	-2	-1	-2	-1	-2	-2	-2	-2	-2
2e. Human health and wellbeing	-1	0	-1	-1	-1	-1	-1	-1	-1
3a. Landscape / visual	-2	-2	-2	-3	-3	-3	-3	-3	-3
3b. Stormwater	-1	-2	-2	-2	-3	-3	-1	-2	-3
3c. Ecology	-1	-3	-2	-3	-3	-3	-1	-3	-3
3d. Natural hazards	-1	-1	-2	-1	-1	-1	-1	-1	-1
5a. Construction impacts on utilities / infrastructure	-1	-1	-1	-1	-1	-1	-1	-1	-1
5b. Construction disruption	-1	-1	-2	-2	-2	-2	-1	-2	-2
6a. Construction costs / risk / value capture	-2	-2	-2	-3	-3	-3	-2	-3	-3

A new Rapid Transit corridor between Albany and Milldale – Section 6

Process undertaken:

- IBC (2019) considered a range of options in this area and identified a preferred alignment on Western side of SH1 recognising need to tie into proposed RT station at Milldale.
- Constraints mapping and sub options looked at to minimise (and potentially avoid) effects on the SEA, QEII covenant, cultural effects and NSMA overlay.
- Options were considered to shift active mode facilities to the east (see SH1 active mode project)
- Confirmed **RT on western side** as emerging preferred option - but to **separate the strategic cycleway from the RT from Silverdale northwards** (so cycleway crosses to the east around Silverdale interchange. See SH1 cycleway)



Overall RTC risks:

- **Mode uncertainty** – The mode of the RTC corridor south of Albany is uncertain at this stage. The DBC has adopted a mode agnostic approach to corridor protection but has not provided for heavy rail.
- **Opportunity for value capture around stations** – There is significant opportunity for value capture around the future RTC stations as land is currently in a rural undeveloped state.
- **Enhanced property liability** – Due to the alignment of the RTC, the effects on property, and the long-term implementation date, there is a higher potential for the need for early property purchase along the corridor which is an affordability risk.
- **The timing of land use** – Growth timing in the north is uncertain. The regional forecasts predict growth in this area could occur after 2048. If growth occurs later than predicted, the uncertainty over the solution and affordability of route protection risks are amplified.

Overall interdependencies:

- **RTC corridor to the south** – The project is interdependent with the RTC corridor to the south of the study area and needs to integrate with whatever solution is provided in the future. The Albany Station is the proposed tie in point and will be the interface between this corridor and the remaining RTN network.
- **Outcomes are dependent on land use** – A Rapid Transit corridor's success is dependent on the land use in the vicinity of the corridor and connections to the corridor. The form of land use in and around stations will help to deliver outcomes and this is reliant on council planning and the market delivering appropriate development.

A new Rapid Transit Corridor between Albany and Milldale – SH1 alignment consideration

Recap of the previous phase

The Indicative Business Case phase considered a range of corridor options for the RTC through the Northern Growth area. The key recommendation within the IBC was for the RTC to traverse through the Dairy Flat and Silverdale West future urban growth areas instead of alongside State Highway 1 (SH1). By travelling through growth areas, the RTC would help to unlock urban growth in the Dairy Flat and Silverdale West growth areas and help shape a new town centre in Dairy Flat. This decision was endorsed by the Waka Kotahi and AT Boards in 2019.

Gap Assessment

During the Gap assessment phase, this recommendation was reconfirmed as the recommended corridor:

- enables increased urban development density within walkable catchments along the RTC to support a compact, high-quality urban environment, as envisaged in the National Policy Statement on Urban Development 2020 (NPS:UD); and
- encourage use of public transport (via the RTC) by future communities to improve access and contribute towards a reduction in greenhouse gas emissions.

Figure: Recommended RTC route from IBC (2019)



Reconsideration of SH1 alignment through integration workstream

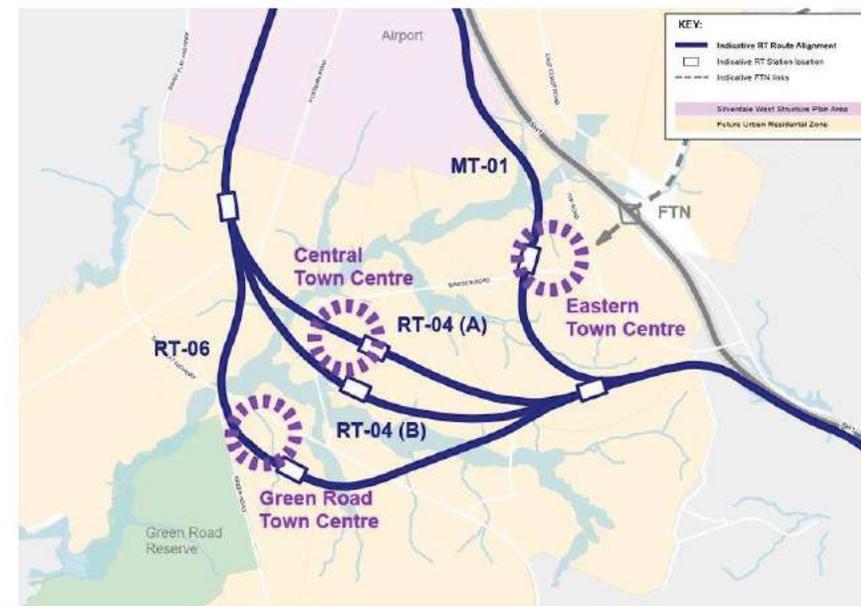
The Dairy Flat integration workstream considered land use and transport options for the Dairy Flat area in a collaboration between Auckland Council, Waka Kotahi, Auckland Transport and Manawhenua.

- The workstream considered three potential locations for future centres in Dairy Flat
- As integration with a centre was seen as a key benefit of the IBC recommendation for the RTC, wider RTC alignments were considered as part of this workstream
- The workstream considered four RTC alignments including a RTC alignment which follows the SH1 corridor as considered in the IBC phase (IBC alignment MT-01).
- A joint land use and transport assessment of the options was undertaken.

The Dairy Flat integration workstream concluded:

- The Central alignment and central centre was the best scoring option followed by a central alignment with a centre at Green Road.
- The central RTC alignment continued to perform best from a transport perspective and confirmed the project team's preference as it was compatible with multiple land use scenarios

Figure: Transport and Land use options considered as part of the Dairy Flat integration workstream



A new Rapid Transit corridor between Albany and Milldale – EMERGING PREFERRED OPTION DEVELOPMENT

DESIGN REFINEMENTS

The following key refinements were made during the design refinement process:

RTC Segment	Summary of changes during design refinement
RTC and SH1 Upgrade Segment 1 – Albany to Awahoi	<ul style="list-style-type: none"> Bridge over Lucas Creek (both RTC on west and Walking and cycling path on east) – to reduce stormwater/flooding, ecological and cultural effects. Pier locations are assumed to avoid the stream.
RTC and SH1 Upgrade Segment 2 – Awahoi to Bawden	<ul style="list-style-type: none"> Horizontal changes to the alignment to minimise impacts on an Okura Creek tributary on western side south of Wright Road – by SH1 widening more to east in this area. As recommended by ecology and stormwater/flooding specialists. Severance of Wilson Road to reduce extent of earthworks.
RTC Segment 3 – Dairy Flat FUZ	<ul style="list-style-type: none"> Refinements to vertical alignment and consideration of station platforms to allow appropriate opportunity for future stations.
RTC Segment 4 – Postman Road Industrial Area	<ul style="list-style-type: none"> Revisions to tie in with Segment 5.
RTC Segment 5 – Silverdale West	<ul style="list-style-type: none"> Revisions to alignment at the northern part of the segment to avoid wetland areas (as much as practicable) and reduce the size of structure for the Dairy Flat Highway over the RTC corridor. This also helps to avoid impacts on the Wade Junction Hotel. Changes to the alignment to minimise impacts on stormwater/flooding (and potentially ecology/wetlands) by shifting the alignment north to the east of Pine Valley Road to avoid the floodplain/wetland. A reduction in assumed speed on the approach to Milldale to enable tighter horizontal alignment.
RTC Segment 6 - Milldale	<ul style="list-style-type: none"> Design was refined around Kathy's Thicket (QEII) to reduce impacts on the QEII covenant area and SEA through changes in vertical alignment and proposed physical works (i.e. provision of a viaduct).

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Optimisation of the vertical alignment to integrate with neighbouring development levels once development plans are known.	M
Treatment through the town centre area could be altered to either provide a lower speed at grade corridor or grade separated to ground level to reduce severance effects from the corridor.	H
Position and frequency of stations (with the exception of Milldale and Pine Valley) needs to be considered further in parallel with structure planning	H
Design of stations to be reconsidered once certainty on the mode is obtained.	M
Consideration of land use within station catchments through structure planning and plan changes to optimise future catchment and ridership.	H

NOR 2: Milldale Station – EMERGING PREFERRED OPTION

Station requirements

The proposed Milldale station is identified as a primary station with the following function/purpose:

- RT end of line
- Frequent transit network (FTN) public transport interchange (for buses).

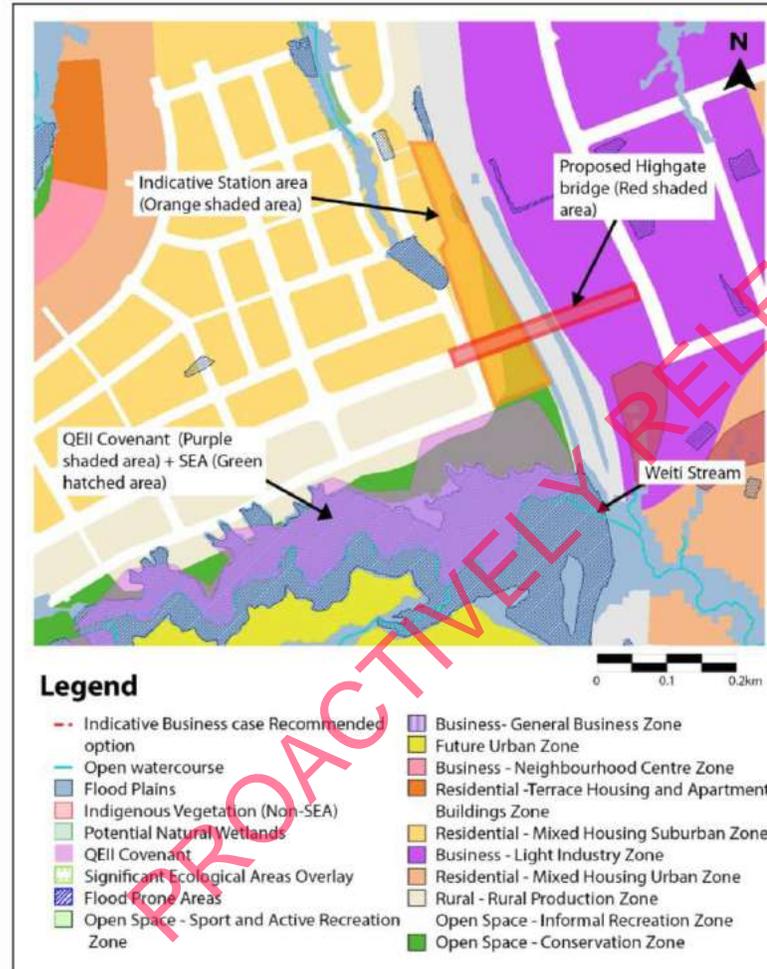
Station spatial and functional requirements include:

- Station facilities (240m²)
- Bus layover -5000m²
- Drop-off /pickup and accessible spaces
- Cycle parking (500 spaces)
- Local bus connection (bus bays) – local bus drop-off (3Xterminating and 2Xthrough services)
- Parking bays for on-demand vehicles and station operations/services

Process followed

- IBC recommended the RTC corridor terminates at a station in Milldale
- Concept design has been developed circa 2018 for the station (Done by AT). This was used as a basis for option design.
- Single option developed given land availability and ownership structure

Constraints and opportunities



Indicative Station layout



The single option for the Milldale Station was developed for the following reasons:

- The site comprises land set aside by the landowner/developer for the station
- The station needs to be along the alignment developed for the RTC and at an appropriate grade (no more than 0.5%)
- The site is very constrained with a QEII covenanted SEA area to the south (Kathy's Thicket), a steep embankment down to the motorway to the east, new residential development to the west, a newly consented bridge across the Motorway (Highgate Bridge).

NoR 3 – New Pine Valley East Station and Associated Facilities – EMERGING PREFERRED OPTION

Station requirements

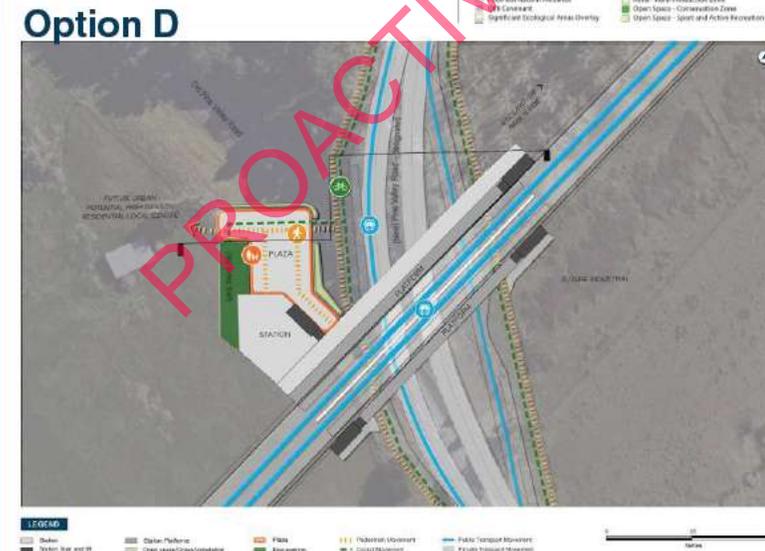
The proposed Pine Valley Road Station was identified as a primary station with the following function/purpose:

- Park and ride (500 spaces)
- Frequent transit network (FTN) public transport interchange (for buses)
- Local centre opportunity.
- Station facilities (240m²), bus layover and Drop-off /pickup, accessible spaces, cycle parking (350 spaces), station operations parking and local bus bays

Process followed

- Six options developed and assessed by MCA

Option Reference	Option Name/Description
Option A1	Station and Park-n-ride west of new Pine Valley Road – variant A1 Includes station building/platforms just west of new Pine Valley Road with bus layover and park-and-ride areas to the north adjoining Pine Valley Road
Option A2	Station and park-n-ride west of new Pine Valley Road variant A2 Includes station building/platforms commencing approx. 200m west of new Pine Valley Road with bus layover and park-and-ride areas to the north adjoining Pine Valley Road
Option A3	Station and Park-n-ride west of new Pine Valley Road – variant A3 Includes station building/platforms commencing approx. 200m west of new Pine Valley Road with bus layover and park-and-ride areas to the north/north-east adjoining Pine Valley Road
Option B	Station west of new Pine Valley Road with Park-n-ride to north-east Includes station building/platforms and bus layover areas immediately west of new Pine Valley Road with park-and-ride areas to the east of new Pine Valley Road, north of the RTC -with a bridge connecting over new Pine Valley Road
Option C	Station west of new Pine Valley Road with Park-n-ride to south-east Includes station building/platforms and bus layover areas immediately west of new Pine Valley Road with park-and-ride areas to the east of new Pine Valley Road, south of the RTC -with a bridge connecting over new Pine Valley Road
Option D	Station over New Pine Valley Road with Park-n-ride and bus layover to north-east Includes station buildings/platforms raised above the New Pine Valley Road, with park-n-ride and bus layover areas to north-east

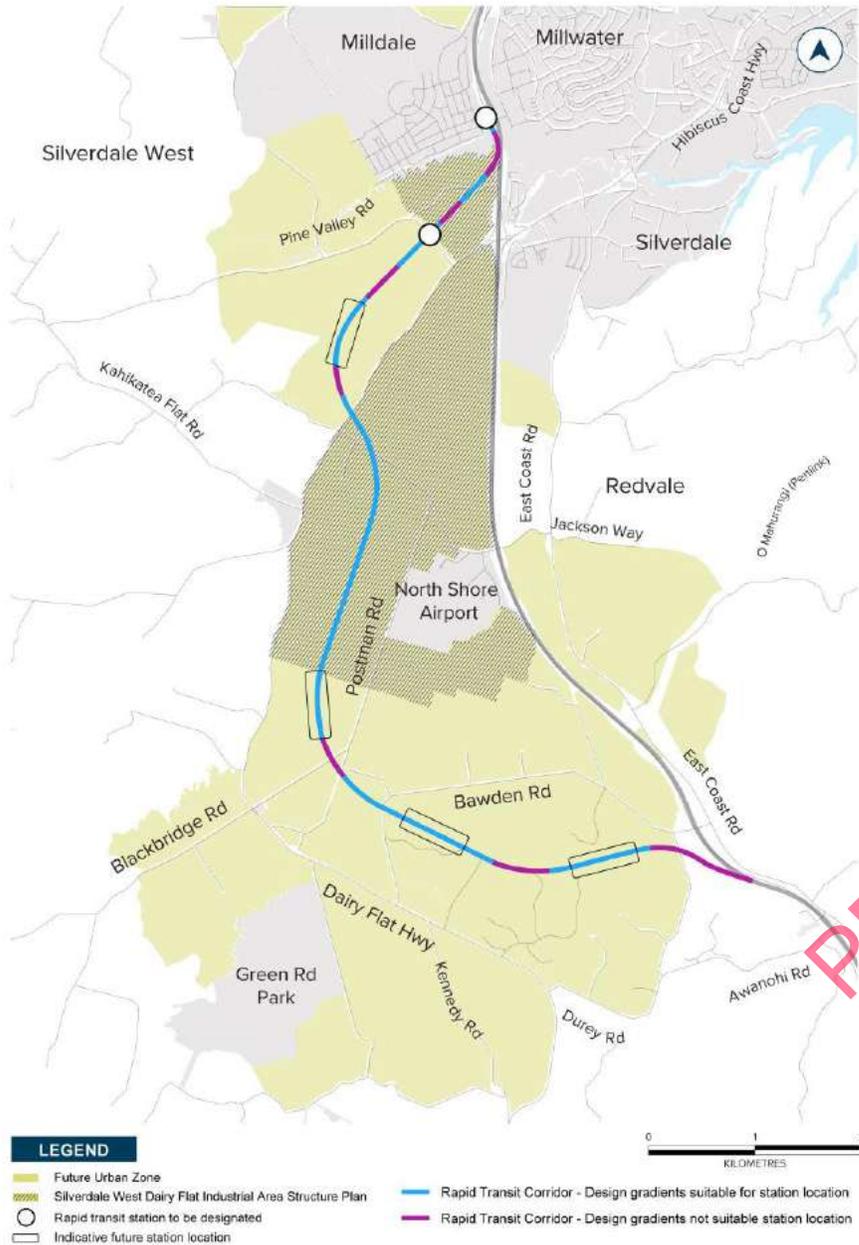


MCA Criteria	Option A1	Option A2	Option A3	Option B	Option C	Option D
Investment Objective 1: Access	3	2	2	3	2	3
Investment Objective 2: Integration	3	2	3	2	1	3
1a. Heritage	-1	-1	-1	-1	-1	-1
2a. Land use futures	2	2	1	2	3	3
2b. Urban design	3	3	2	1	1	3
2c. Land requirement	-1	-1	-1	-1	-1	-1
2d. Social cohesion	3	3	3	1	1	2
2e. Human health and wellbeing	-2	-2	-2	-1	-1	-1
3a. Landscape / visual	-2	-2	-2	-3	-3	-2
3b. Stormwater/flood	-1	-1	-1	-2	-3	-1
3c. Ecology	-1	-1	-1	-1	-2	-2
3d. Natural hazards	0	0	0	0	-1	-1
5a. Construct. impacts on utilities / infrastructure	-1	-1	-1	-1	-1	-1
5b. Construction disruption	-2	-2	-2	-1	-1	-3
6a. Construction costs / risk	-2	-2	-2	-2	-3	-3

Option D is the preferred option for the following reasons:

- Best performing option against investment objectives
- Preferred from land use and urban design perspective
- Preferred option from policy and value for money perspectives
- Supported by Council and Manawhenua

A new Rapid Transit corridor between Albany and Milldale – Overall RTC corridor and supporting network



PROJECT ALIGNMENT

Investment Objectives	Alignment
<p>Access</p> <p>Access: Provide effective and attractive Public Transport access to economic and social opportunities for the Northern Growth area</p>	<p>The proportion of employment accessible by PT increases in each of the time intervals assessed. Within 15 mins the percentage (points) of employment increases by 21%, within 30 mins and 45 mins there is more than a 100% increase in the Recommended Option compared to the Do-min.</p>
<p>Resilience</p> <p>Enable reliable and resilient public transport trips between the Northern Growth area and Albany</p>	<p>The RTC corridor provides a completely separated transport corridor to provide access to the Northern Growth area. The corridor is resilient to incidents on the wider transport network.</p>
<p>Travel Choice</p> <p>Enable transformational public transport mode share for trips between the North and key centres to support a low carbon transport network</p>	<p>The RTC corridor is expected to accommodate a significant mode share (an 8% increase (percentage points) in PT trips) for trips to and from the Northern Growth area.</p> <p>Patronage in AM peak hour (south of Dairy Flat):</p> <ul style="list-style-type: none"> • 11,100 people (2-hour period) • 50,000 passengers per day (south of Dairy Flat)
<p>Integration</p> <p>Provide a Rapid Transit corridor that is integrated with land use and the transport system</p>	<p>Overall the RTC route supports the longer-term catchment and intensification opportunities within FUZ. 5-6 new stations offer opportunity for high quality TOD style development and provide a significant area of developable land (650-750 Ha) within a walking catchment of a RT station (800m).</p>

Contribution to climate change response

<p>Climate Change</p>	<p>The RTC corridor provides a lever to enable transformational mode shift within the northern growth area and influence the land use throughout the Future Urban Zone to drive a quality compact urban form.</p>
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Upgrades to SH1 between Albany and Silverdale

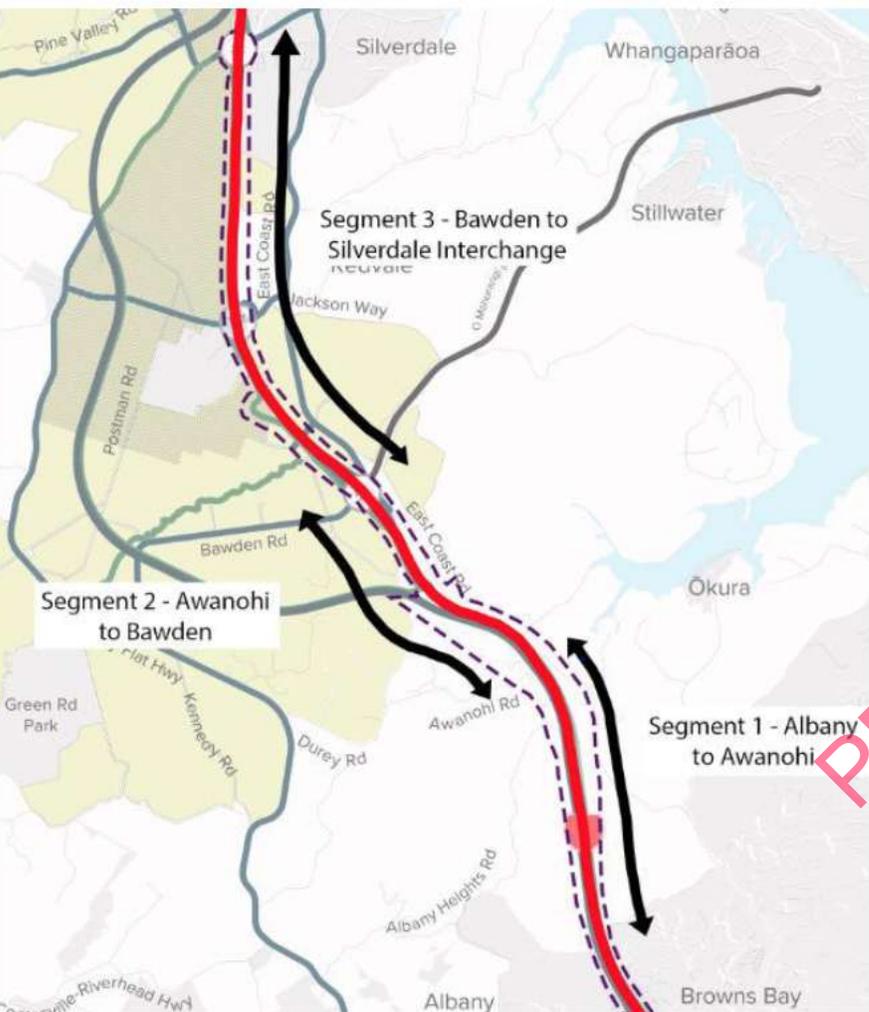
Part of NOR 4 – SH1 improvements package

PROACTIVELY RELEASED

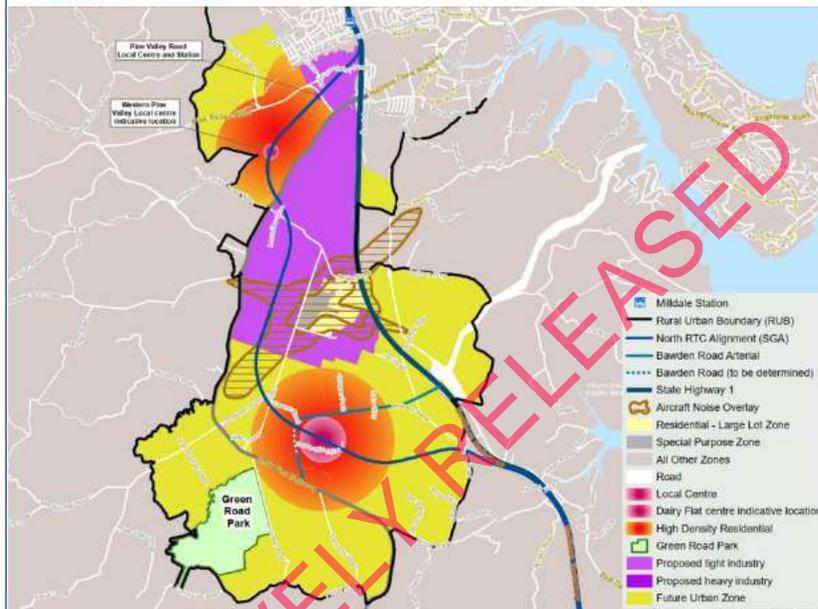
Upgrades to SH1 between Albany and Silverdale

PURPOSE

Widening to SH1 will provide bus shoulder lanes from Albany to Silverdale in the interim with managed motorway capacity between Albany and Silverdale in the long term.



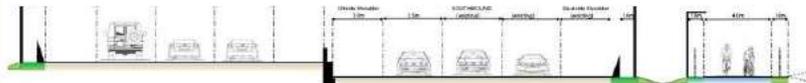
LAND USE



- Countryside living between Albany and Dairy Flat
- Likely to be future residential between Bawden Road and Dairy Stream
- Industrial land use in Silverdale west area (Purple on map)
- A small section of rural land to east of SH1 north of Wilks
- Live zoned business zone to the east of SH1 at the Silverdale interchange
- Council is currently progressing a plan change in northern portion of industrial land

CORRIDOR FORM AND FUNCTION

- Single use corridor
- Additional lane added to provides 3 lanes in total
- Nearside and roadside shoulders included
- 100 / 110 KPH speed environment



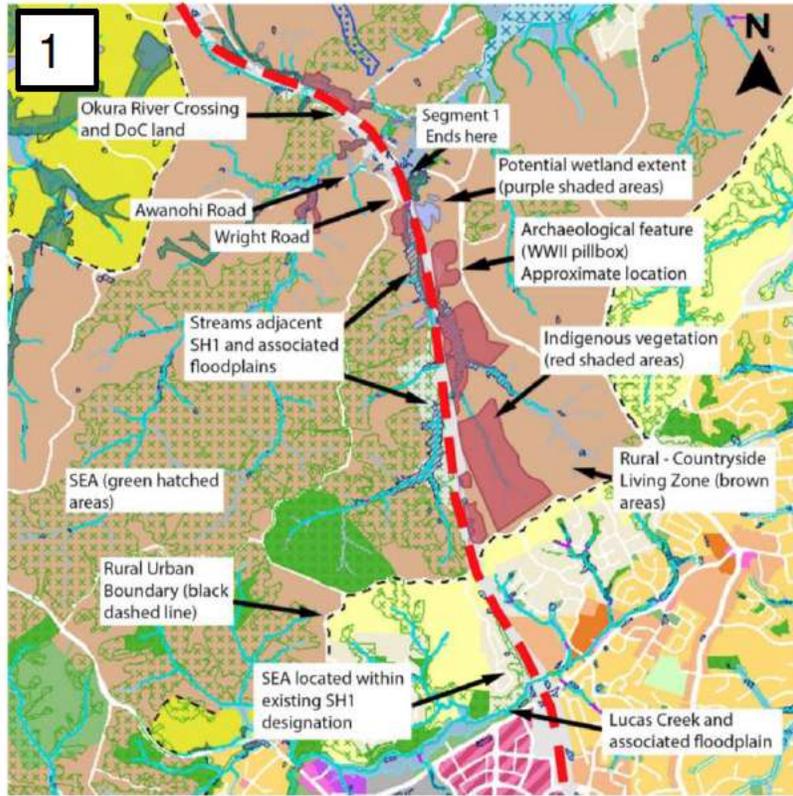
GAP ANALYSIS

- The gap analysis also recommended that the DBC optioneering should include further consideration of widening on either or both sides of SH1 (in tandem with consideration of RTC/strategic cycling options along SH1).
- Significant constraints were also noted along the SH1 corridor between Albany and Bawden Road (including SEAs either side and mainly rural zoning), with less constraints, mainly FUZ zoning and a generally wider SH1 designation between Bawden and Silverdale.
- It was also noted that the DBC optioneering should consider the new NPSs, including the NPS:FW and NPS:UD (as discussed in Part A).

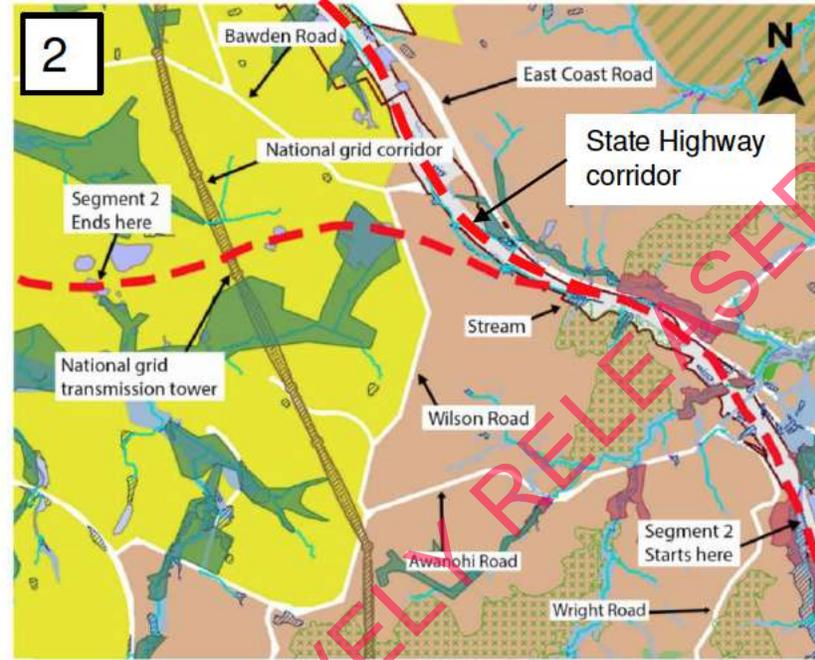
OPTION ASSESSMENT: PROCESS

- Constraints mapping undertaken for a wider study area
- Segment 1: Consideration of long list options during scoping. MCA assessment of two options in conjunction with RTC and Active modes (segment 1 of RTC) through this section.
- Segment 2: Consideration of options for widening in conjunction with RTC (segment 2 of RTC). 10 options assessed through an MCA process.
- Consideration of long list options during scoping. Design of a single option between Redvale and Silverdale, considering less constraints in this segment

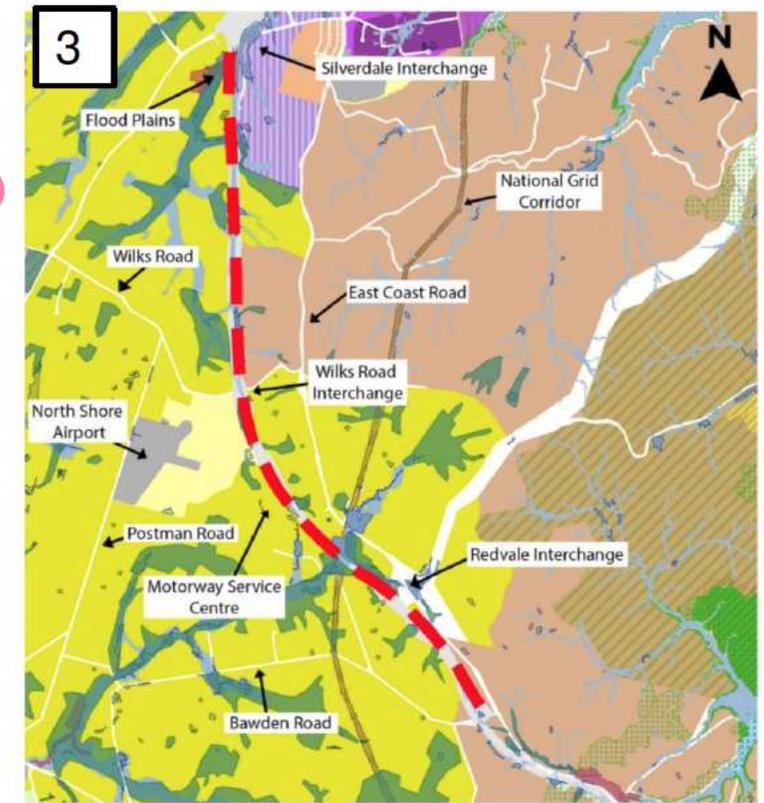
Upgrades to SH1 between Albany and Silverdale – Constraints mapping



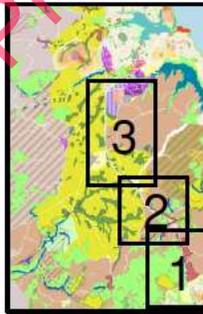
- Legend**
- - - Indicative Business case Recommended option
 - Open watercourse
 - Flood Plains
 - Indigenous Vegetation (Non-SEA)
 - Potential Natural Wetlands
 - National Grid Yard Uncompromised
 - Significant Ecological Areas Overlay
 - Open Space - Conservation Zone
 - Open Space - Informal Recreation Zone
 - Residential - Terrace Housing and Apartment Building Zone
 - Business - Local Centre Zone
 - Business - General Business Zone
 - Future Urban Zone
 - Residential - Large Lots Zone
 - Rural - Countryside Living Zone
 - Business - Heavy Industry Zone
 - Business - Light Industry Zone
 - Residential - Mixed Housing Urban Zone
 - Special Purpose Zone
 - Business - Metropolitan Centre Zone
 - Residential - Mixed Housing Suburban Zone
 - Residential - Single House Zone
 - Business - Neighbourhood Centre Zone



- Legend**
- - - Indicative Business case Recommended option
 - Open watercourse
 - Flood Plains
 - Indigenous Vegetation (Non-SEA)
 - Potential Natural Wetlands
 - Business - General Business Zone
 - Future Urban Zone
 - Residential - Large Lots Zone
 - Rural - Countryside Living Zone
 - Flood Prone Areas
 - Significant Ecological Areas Overlay



- Legend**
- - - Indicative Business case Recommended option
 - Open watercourse
 - Flood Plains
 - Indigenous Vegetation (Non-SEA)
 - Potential Natural Wetlands
 - National Grid Corridor
 - Significant Ecological Areas Overlay
 - Open Space - Conservation Zone
 - Open Space - Informal Recreation Zone
 - Business - General Business Zone
 - Future Urban Zone
 - Residential - Large Lots Zone
 - Rural - Countryside Living Zone
 - Business - Heavy Industry Zone
 - Business - Light Industry Zone
 - Residential - Mixed Housing Urban Zone
 - Special Purpose Zone
 - Residential - Mixed Housing Suburban Zone



PROMPTLY RELEASED

Upgrades to SH1 – Segment 1 Albany to Awanohi

Options have been considered along with the RTC project in this segment. Options considered include:

- **Option A** – RTC on east with SH1 widened on both sides
- **Option B** – RTC on east; SH1 widen to the east
- **Option C** – RTC on east (including cycleway) with western tie-in; SH1 widen to the east
- **Option D** - RT on west with western tie-in; cycleway on east; SH1 widen to east

EMERGING PREFERRED – OPTION D

- Avoids impacts on the identified SEA to the west.
- Less impacts on landscape and visual amenity, stormwater and flooding.
- Less cost and construction risk due to the reduced scope of works and infilling.
- Performs well against the Investment Objectives.
- Slightly worse value for money, but this is outweighed by impact considerations (less effects for most criteria).

MCA Criteria	Option A (SH-01A)	Option B (SH-03A)	Option C (SH-11)	Option D (SH-12)
Investment Objective 1: Access	4	4	4	4 (P)
Investment Objective 2: Resilience	4	4	4	4
Investment Objective 3: Integration	4	4	4	4 (P)
Investment Objective 4: Mode Choice	4	4	4	4
Investment Objective 5: Safety*	4	4	4	4
2a. Land use futures	-1	-1	0	0
2b. Urban design	-1	-1	0	1
2c. Land requirement	0	0	-2	0
2d. Social cohesion	0	0	-2	-1
2e. Human health and wellbeing	1	1	-3	0
3a. Landscape / visual	-4	-3	-3	0
3b. Stormwater/flooding	-3	-2	-3	-3
3c. Ecology	-4	-3	0	0
3d. Natural hazards	-2	-1	-4 (P)	-4
5a. Construction impacts on utilities / infrastructure	-2	-3	-1	0
5b. Construction disruption	-1	-1	-2	-3
6a. Construction costs / risk	-3	-2	-3	-3

Segment 2: Awanohi to Bawden

Segment considered as part of RTC Segment 2.

Options considered include:

- **Option A** – Widen both sides
- **Option B** – Widen to west
- **Option C** – Widen to east

EMERGING PREFERRED – OPTION A (Widen both sides) for the following reasons:

- Decision was made in conjunction with RTC options in this area (RTC section 2).
- All options performed similarly against investment objectives.
- Widening on both sides offers better value for money and is easier to construct.
- Due to the RTC recommendation to be on the west in this location (see RTC section 2), cumulative effects of widening on both sides are minor.

Segment 3: Bawden to Silverdale

- No significant constraints present
- Existing designation provides opportunity to avoid private property
- Single Option developed assuming **widening on both sides** of the corridor

EMERGING PREFERRED – Widen both sides for the following reasons:

- Best value for money
- Least construction cost and disruption

DESIGN REFINEMENTS

The following key refinements were made during the design refinement process:

Segment 1

- Consideration of options around Lonely Track Road to minimise effects on the surrounding property. The recommended option minimises property impact.
- Southbound SH1 level is adjusted to reduce extent of earthworks south of Awanohi Road.
- Retaining added in numerous locations to limit the extent of earthworks and impacts on property and vegetation.

Segment 2

- Southbound SH1 level is adjusted to reduce extent of earthworks south of Bawden Road.

Segment 3

- N/A

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Consideration of using retaining walls to minimise impacts on adjacent property	M
Consideration of how a managed lane will operate and integrate with the rest of the motorway network.	H
Construction methodology and staging will need to ensure that SH1 remains open to vehicles.	H
Consideration of how buses can use lanes in the interim and priority can be provided for bus services at Silverdale and Oteha Valley interchanges.	H

Risks and Opportunities

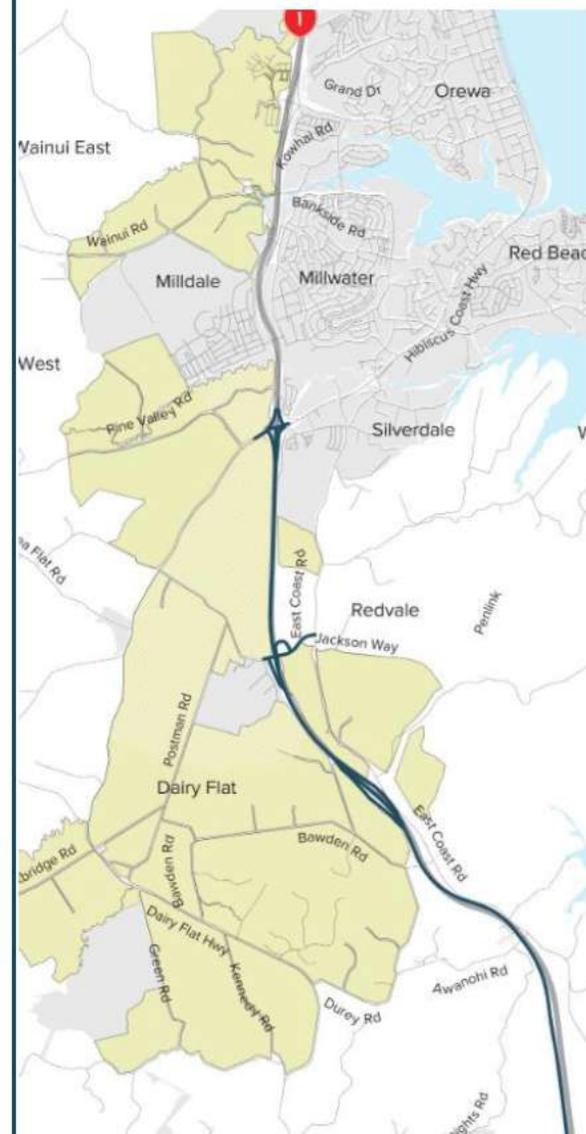
- **Opportunity for a staged implementation** – The staging considerations appendix sets out the delivery of the project as a PT priority project in the short-medium term to improve PT service to the existing area.
- **The timing of land use** – Growth timing in the north is uncertain. The regional forecasts predicts growth in this area could occur after 2048. If growth occurs later than predicted, the uncertainty over the solution and affordability of route protection risks are amplified.
- **Environmental impacts** – The project passes several areas of high environmental value. The physical effects are a risk of the project and will be a focus of future design work.

Interdependencies

- Construction has a level of dependency with RTC southern section and Active mode corridor. The RTC corridor will eventually make use of some of the existing corridor space. There is an opportunity to do earthworks once to accommodate all three projects through the southern section.
- Interchange upgrades are another key interdependency and would likely be implemented at a similar time.

Upgrades to SH1 between Albany and Silverdale – Project outcomes

PROJECT ALIGNMENT



Investment Objectives		Alignment
Access	Improve productivity of the SH1 corridor between Albany and Silverdale.	<p>The proportion of employment accessible by private vehicles increases in each of the time intervals assessed. Within 15 mins there is a 27% (percentage points) increase and within 30 mins there is a 2% (percentage points) increase.</p> <p>In the AM peak the travel time reduces by 14 mins. This is a 45% reduction (percentage points) in travel time.</p>
Resilience	Resilience: Improve reliability and resilience of the SH1 corridor between Albany and Silverdale for general vehicles and freight.	There is a 13% reduction of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.
Travel Choice	Support the transition to a reduced reliance on high carbon SOV travel by providing a high-quality transport network.	There is 7% mode shift (percentage points) from single occupancy private vehicles in the Recommended Option.
Integration	Integration with both the transport network and the timing and pace of development in the area.	<p>A staged approach to provide PT benefits for the existing communities in the northern area.</p> <p>Longer term improvements to improve accessibility for the Growth area and support urbanisation.</p>
Contribution to climate change response		
Climate Change	A staged implementation strategy is expected to influence travel behaviour and reduced enabled carbon for the transport network by getting people out of private vehicles and onto lower carbon transport options. In the longer term, road space is proposed to be managed for priority vehicle which will continue to reduce enabled carbon for the network while still providing accessibility for the significant increase in population in the northern area.	

A new walking and cycling path along SH1

Part of NOR 4 – SH1 improvements

PROACTIVELY RELEASED

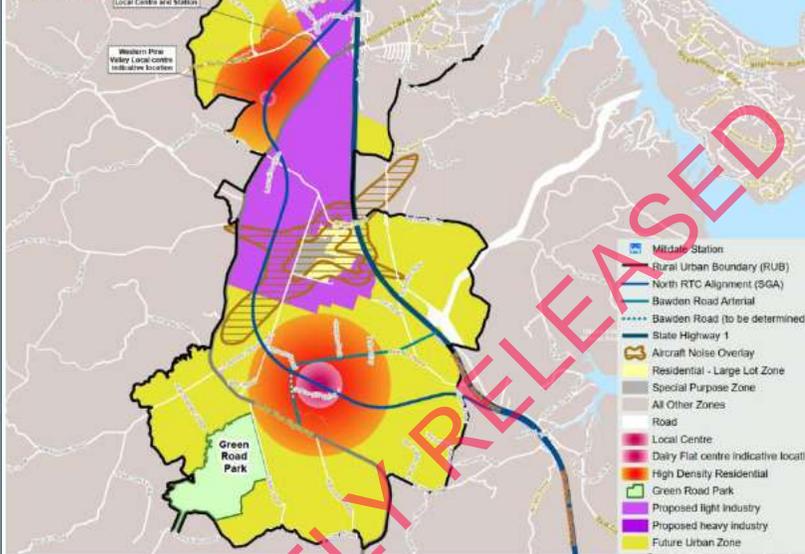
A NEW WALKING AND CYCLING PATH ALONG SH1

PURPOSE

Strategic active mode connection adjacent to SH1 between Albany and Grand Drive

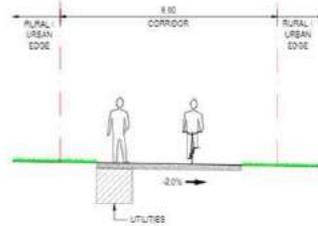


LAND USE



- Ties into an existing urban area at Albany
- Countryside Living between Albany and Dairy Flat
- Industrial land use in Silverdale west area (Purple on map)
- Existing urban areas to the north of Silverdale on east, A mix of live zoned and FUZ residential land on west

CORRIDOR FORM AND FUNCTION



- Provision for walking and cycling
- Grade separation at interchanges

GAP ANALYSIS

- Consideration of options to avoid or mitigate effects on an area of SEA and coastal marine area at Orewa River and look at wider alternatives between Silverdale and Grand Drive.
- Consideration of tie into the local road network at Oteha Valley Road and Wainui Road.
- Consideration of options to avoid or mitigate effects of the facility on an SEA and QEII covenant in the northern section of the alignment next to Wēiti Stream (in tandem with consideration of the RTC alignment in this area)
- Consideration of the wider active mode network in the North

OPTION ASSESSMENT: PROCESS

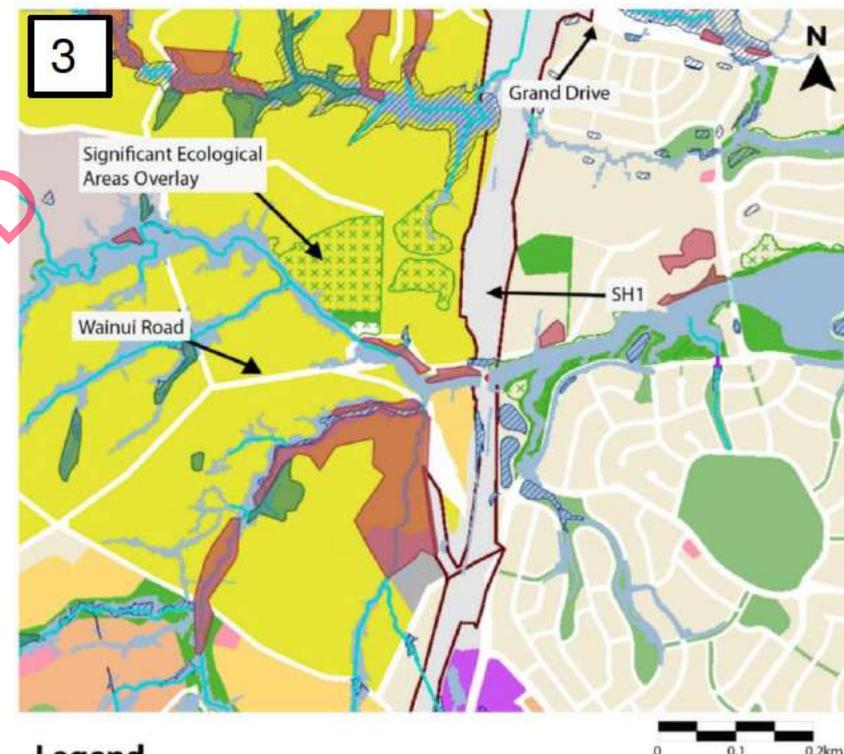
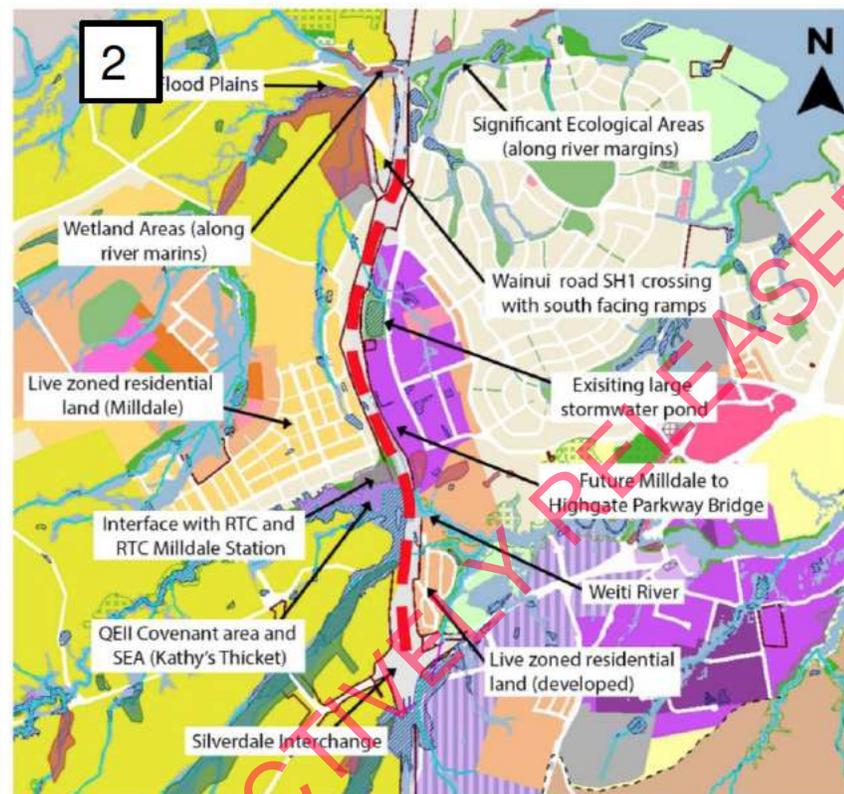
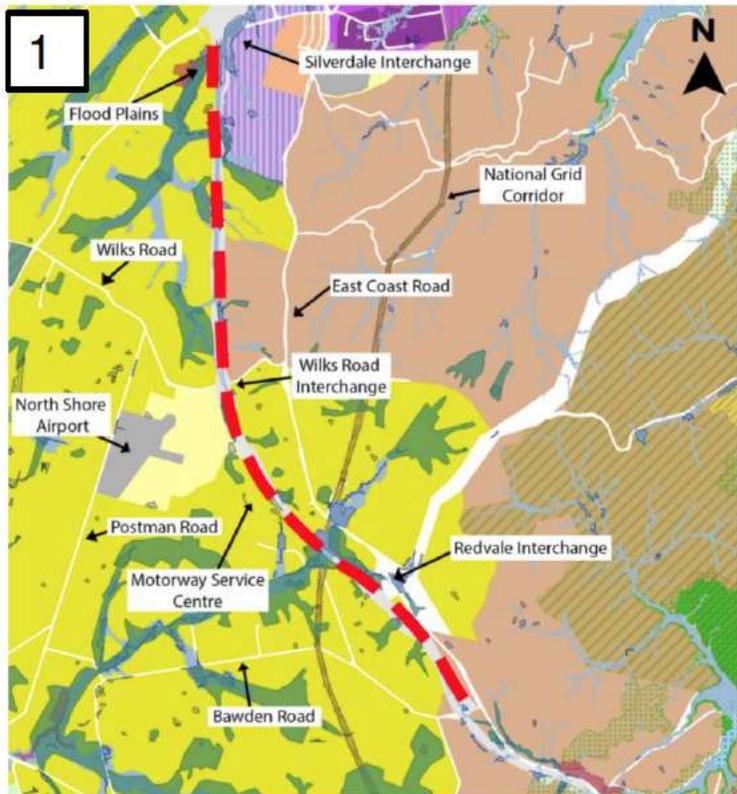
Consider as part of RTC:

- **Segment 1 and 2: Albany to Awanohi and Awanohi to Bawden:** Included in the MCA for Segment 1 and 2 of the RTC and SH1 upgrades.

Considered here:

- **Segment 3: Bawden to Silverdale Interchange:** Considered in separate MCA to determine east vs west alignment.
- **Segment 4: Silverdale Interchange to Wainui Road:** Considered in separate MCA to determine east vs west alignment.
- **Segment 5: Wainui Road to Grand Drive:** Long list offline alignments considered in file note. MCA undertaken to compare east vs west alignment
- **Local connections:** Options considered at Oteha Valley and Wainui interchange for connections to the local road network

A new walking and cycling path along SH1 – Constraints mapping

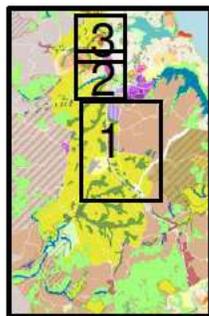


Legend

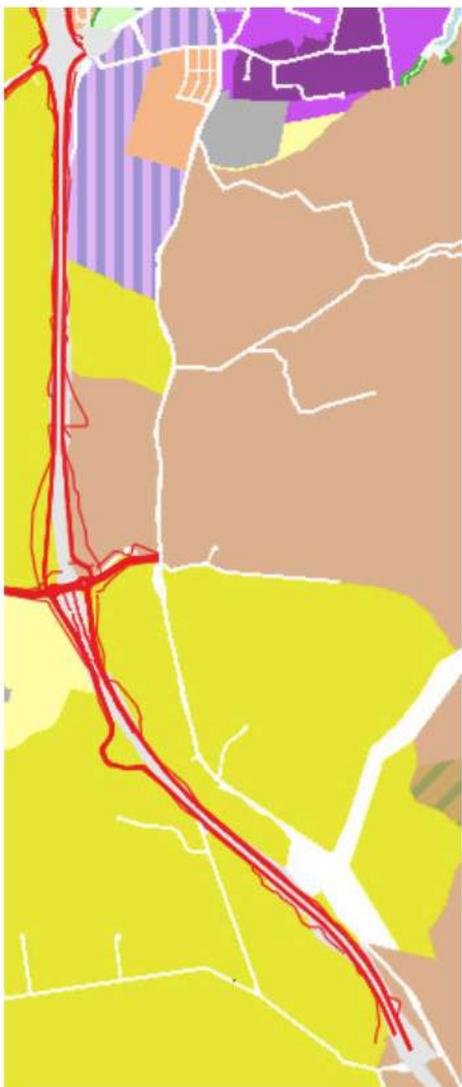
- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- Designations
- Significant Ecological Areas Overlay
- Flood Prone Areas
- Open Space - Sport and Active Recreation Zone
- Business- General Business Zone
- Future Urban Zone
- Business - Neighbourhood Centre Zone
- Residential -Terrace Housing and Apartment Buildings Zone
- Residential - Mixed Housing Suburban Zone
- Business - Light Industry Zone
- Residential - Mixed Housing Urban Zone
- Rural - Rural Production Zone
- Open Space - Informal Recreation Zone
- Open Space - Conservation Zone

Legend

- - - Indicative Business case Recommended option
- Open watercourse
- Flood Plains
- Indigenous Vegetation (Non-SEA)
- Potential Natural Wetlands
- QEII Covenant
- Significant Ecological Areas Overlay
- Flood Prone Areas
- Open Space - Sport and Active Recreation Zone
- Business- General Business Zone
- Future Urban Zone
- Business - Neighbourhood Centre Zone
- Residential -Terrace Housing and Apartment Buildings Zone
- Residential - Mixed Housing Suburban Zone
- Business - Light Industry Zone
- Residential - Mixed Housing Urban Zone
- Rural - Rural Production Zone
- Open Space - Informal Recreation Zone
- Open Space - Conservation Zone



A NEW WALKING AND CYCLING PATH ALONG SH1 – Segment 3 Bawden to Silverdale



Options considered included:

- **Option A:** Cycleway on West of SH1
- **Option B:** Cycleway on East of SH1

Non-scored criteria:

- Both options similar in Value for money criteria
- SH-04 West preferred from Policy perspective

Emerging preferred is Option A: Cycleway on West for the following reasons:

- Performed best against access and integration investment objective
- Performed best from a land use and urban design perspective
- Less impacts on heritage and ecology and stormwater
- Best in non-scored criteria

Summary of MCA assessment

MCA Criteria	Option A: SH-04 Cycleway on the west	Option B: SH-04 Cycleway on the east
Investment Objective 1: Access / Integration	4	3
Investment Objective 2: Mode Choice	3	3
Investment Objective 3: Safety	4	4
1a. Heritage	0	-2
2a. Land use futures	0	-3
2b. Urban design	3	2
2c. Land requirement	-1	-1
2d. Social cohesion	-1	0
2e. Human health and wellbeing	-1	0
3a. Landscape / visual	-2	-2
3b. Stormwater/flooding	-1	-3
3c. Ecology	-1	-2
3d. Natural hazards	-1	-1
5a. Construction impacts on utilities / infrastructure	-1	-1
5b. Construction disruption	-1	-1
6a. Construction costs / risk	-2	-2

A NEW WALKING AND CYCLING PATH ALONG SH1 – Segment 4 Silverdale to Wainui



Options considered included:

- **Option A:** Cycleway on West of SH1
- **Option B:** Cycleway on East of SH1

Non-scored criteria:

- Both options similar in Value for money criteria
- Option B (East) preferred from Policy perspective

Emerging preferred is Option B Cycleway on east for the following reasons:

- Reduced environmental effect around Kathys Thicket and QEII covenant area
- Scores better against land requirement criteria
- Scores better from a landscape visual perspective
- Scores better for Cost and Construction Risk as it is on the downstream end of the floodplain
- Preferred option from a policy perspective

Summary of MCA assessment

MCA Criteria	Option A: SH-04 Cycleway on the west	Option B: SH-04 Cycleway on the east
Investment Objective 1: Access / Integration	3	3
Investment Objective 2: Mode Choice	3	3
Investment Objective 3: Safety	4	4
1a. Heritage	-1	-1
2a. Land use futures	-1	-1
2b. Urban design	3	2
2c. Land requirement	-3	-1
2d. Social cohesion	-1	-1
2e. Human health and wellbeing	1	1
3a. Landscape / visual	-3	-2
3b. Stormwater flooding	-2	-2
3c. Ecology	-4	-2
3d. Natural hazards	0	-1
5a. Construction impacts on utilities / infrastructure	-1	-1
5b. Construction disruption	-1	-1
6a. Construction costs / risk	-3	-2

A NEW WALKING AND CYCLING PATH ALONG SH1 – Segment 5 Wainui to Grand Drive



Options considered included:

- **Option A:** Cycleway on West of SH1
- **Option B:** Cycleway on East of SH1

Long list assessment included consideration of offline routes via Local roads however these were excluded prior to MCA assessment as they did not meet the investment objectives.

Emerging Preferred is Option B: Cycleway on east for the following reasons:

- Not much differentiation between scores overall.
- Slight preference for western side in scores is outweighed by the fact the eastern side option aligns better with decision for cycleway on east in segment south of here (Silverdale to Wainui Road) which has significant constraints to the west.
- There is a desire to minimise crossings of SH1 as this impacts the overall safety and attractiveness of the project.

Summary of MCA assessment

MCA Criteria	Option A:SH-04 Cycleway on the west	Option B: SH-04 Cycleway on the east
Investment Objective 1: Access / Integration	3	3
Investment Objective 2: Mode Choice	3	3
Investment Objective 3: Safety	4	4
1a. Heritage	-3	-3
2a. Land use futures	-1	-1
2b. Urban design	3	3
2c. Land requirement	0	0
2d. Social cohesion	0	-1
2e. Human health and wellbeing	1	1
3a. Landscape / visual	-3	-3
3b. Stormwater/flooding	-2	-2
3c. Ecology	-2	-3
3d. Natural hazards	0	0
5a. Construction impacts on utilities / infrastructure	-1	-1
5b. Construction disruption	-1	-2
6a. Construction costs / risk	-3	-2

A NEW WALKING AND CYCLING PATH ALONG SH1 - EMERGING PREFERRED OPTION DEVELOPMENT

Local Road connectivity

Location	SGA Recommendation
Oteha Valley Road	Connection to Oteha Valley Road following existing NCI connection
Dairy Stream crossing	Connection to Dairy Stream SH1 crossing
Highgate / Milldale connection	Connection to Highgate-Milldale Parkway
Wainui Road	Connection across SH1 to south of Wainui Road SH1 over bridge and Milldale Parkway.

Interchange treatment

Location	SGA Recommendation
Redvale interchange	Walking and cycling path goes under interchange, Grade separated active modes on southern side of interchange.
Wilks Road interchange	Walking and cycling path goes under interchange, Fully separated active modes on northern side of interchange.
Silverdale interchange	Walking and cycling path goes under interchange, Grade separated active modes on north and south of the interchange.

DESIGN REFINEMENTS

The following changes were made during design refinement:

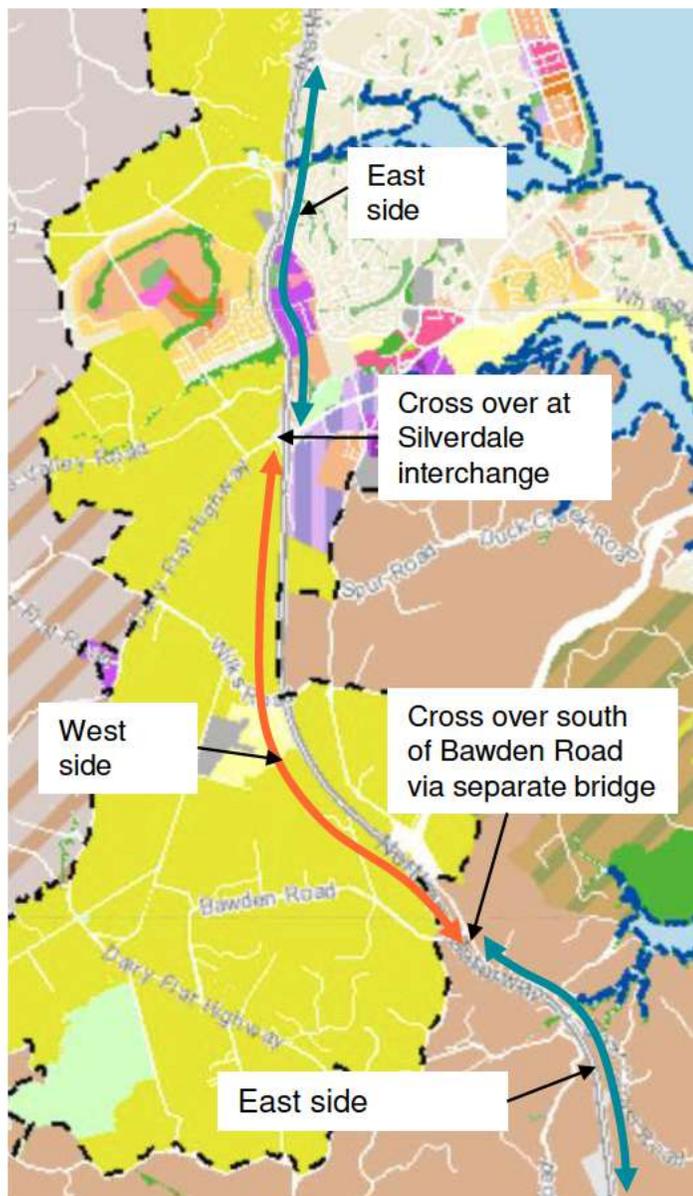
- Refinements to the Oteha Valley connections including connectivity to Masons Road.
- Refinements of path to reduce impacts on Retirement village north of Oteha Valley Road.
- Bawden Road E-W connection was integrated with the replacement of the road bridge required as part of the SH1 improvements project.
- Retaining walls and bridges assumed in a number of locations to reduce the extent of earthworks.
- Active mode connections at interchanges refined following form and function process.
- Active mode connections made to Millwater Parkway and Kowhai Road to enhance connectivity.

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Provide a more direct connection to the Ō Mahurangi – Penlink facility	M
Consideration of interim walking and cycling connections at the Silverdale interchange to serve the Silverdale West industrial development in the short to medium term.	M
Consider additional connection points to the local road network once structure planning / more details on road network are known.	M

A NEW WALKING AND CYCLING PATH ALONG SH1 – RECOMMENDED OPTION

RECOMMENDED OPTION



Interdependencies

- Project is interdependent with the SH1 upgrade project as works are located on the outside of this project between Albany and Silverdale.
- Bawden Road E-W crossing requires replacement of the existing Bawden Road bridge required as part of the SH1 project.

Risks and Opportunities

- Project affordability and opportunity to implement early is limited as the project shares the same corridor as SH1 and RTC in southern section.

PROJECT ALIGNMENT

Investment Objectives		Alignment
Access / Integration	Improve access to economic and social opportunities through a direct and attractive active mode facility between Albany and Grand Drive.	The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 15 mins the proportion of employment increases by 10%, in 30 mins there is a 1% (1,375 jobs) increase and in 45 mins there is a 1% (1,081 jobs) increase. There is an additional 363 hectares of FUZ within 400m of the SH1 walking and cycling path in the Recommended Option compared to the Do-min Option. This is approximately 12% of the total FUZ within the North.
Travel Choice	Provide a high quality, low carbon strategic active mode facility between Albany and Grand Drive	It is predicted that there will be 410 trips a day on the SH1 walking and cycling path. The path is a fully separated, high-quality, high-speed facility that allows users the ability to travel away from vehicles and other safety hazards otherwise present on a typical road carriageway.
Safety	A safe facility which separates vulnerable users from conflict with vehicles.	A 17km separated facility with no conflict points with vehicles. Accordingly, no DSIs involving vehicles are anticipated.
Contribution to climate change response		
Climate Change	The proposed project provides a high quality active mode corridor and is expected to drive mode share in the northern growth area (20% for active modes) and existing areas reducing enabled emissions.	

**A new walking and cycling path
along SH1 - Local connections:**

**Silverdale to Highgate active mode
connection**

Part of NOR 4 – SH1 improvements

PROACTIVELY RELEASED

Silverdale to Highgate active mode connection

PURPOSE

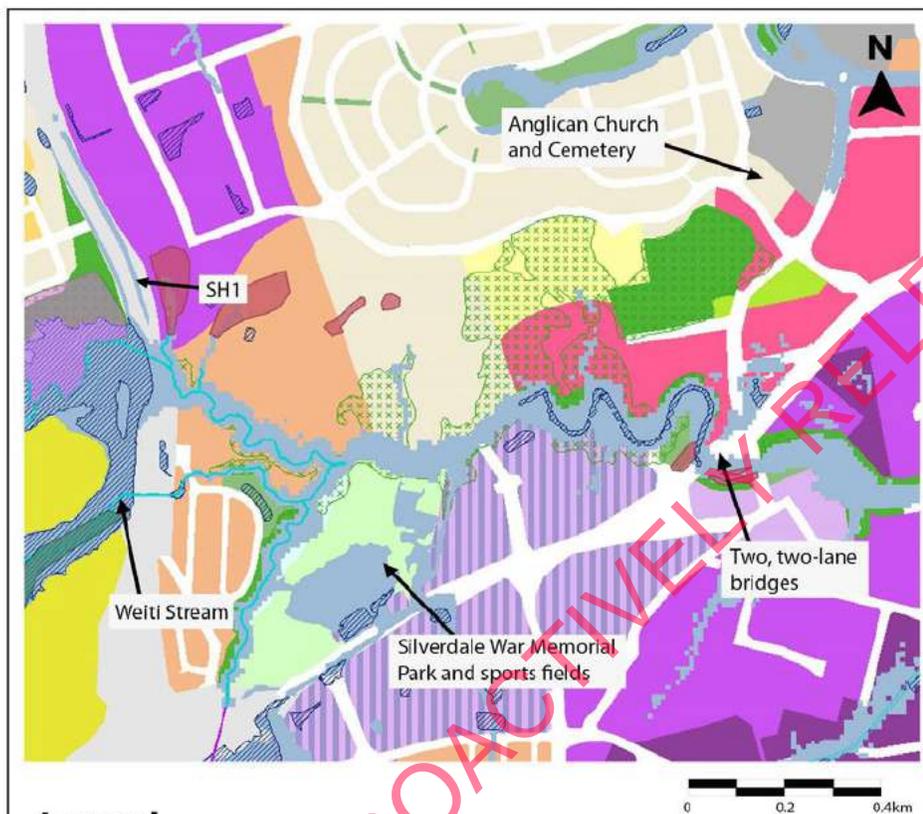
To allow people to access jobs, amenities and homes within the growth areas of Millwater, Milldale and Silverdale using high-quality active mode connections



Previous phases:

- The IBC phase considered a range of options to provide this connection for all modes.
- Recommendation for an offline Active mode connection (Blue line above).
- Further ecological surveys showed potential high value SEA within the area.

CONSTRAINTS



Legend

Indicative Business case Recommended option	Business- General Business Zone
Open watercourse	Future Urban Zone
Flood Plains	Business - Town Centre Zone
Indigenous Vegetation (Non-SEA)	Residential -Terrace Housing and Apartment Buildings Zone
Potential Natural Wetlands	Residential - Mixed Housing Suburban Zone
QEII Covenant	Business - Light Industry Zone
Significant Ecological Areas Overlay	Residential - Mixed Housing Urban Zone
Flood Prone Areas	Rural - Rural Production Zone
Open Space - Sport and Active Recreation Zone	Open Space - Community Zone
Open Space - Conservation Zone	Open Space - Conservation Zone

GAP ANALYSIS

The gap analysis concluded:

- Considering the potentially high adverse effects on ecology and cultural values, a wide study area was recommended.
- There is a separate strategic cycleway proposed up the eastern side of SH1 in the vicinity of Curley Ave – it was recommended that the DBC looked at options to tie into this broader connection instead of a separate local connection.
- New NPSs must be considered within DBC optioneering.

OPTION ASSESSMENT: PROCESS

A total of 7 options developed including:

- Option A and B – use of the existing Wainui Road corridor
- Option C, D And E – Variations of offline active mode connections
- Option F and G – Connections to the SH1 facility

Silverdale to Highgate active mode connection

DBC Options considered:

Seven – Options were considered through the DBC option assessment process:



Option A



Option B



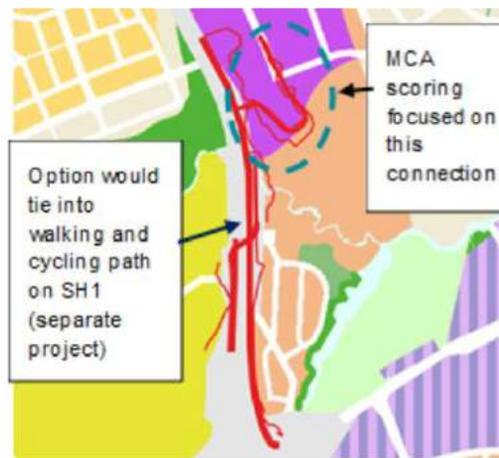
Option C



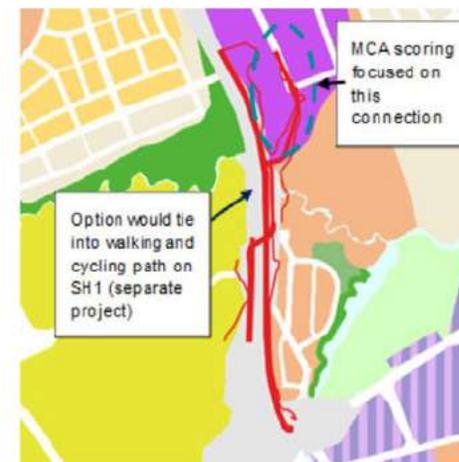
Option D



Option E



Option F



Option G

Silverdale to Highgate active mode connection



Option G is the emerging preferred option for the following reasons:

- Avoids SEA areas and mapped areas of non-SEA indigenous vegetation
- Ngā Manawhenua noted a very strong preference to avoid any options that add another crossing of the Wēiti (which is waahi tapu) and/or cross through the high value SEA areas of the study area (this includes Options C, D and E). Option G was preferred by Manawhenua who stated a preference between the options.
- While the option scored worse than others against investment objectives it is still considered to provide some positive impacts
- Preferred from a policy perspective as it avoids SEAs
- Preferred from a value for money perspective as it has lower overall costs of construction

Summary of MCA assessment

MCA Criteria	Options						
	Option A	Option B	Option C	Option D	Option E	Option F	Option G
Investment Objective 1: Access	1	1	3	2	2	1	1
Investment Objective 2: Travel choice	1	1	3	2	3	0	0
Investment Objective 3: Safety	2	1	3	3	3	3	3
1a. Heritage	-4	0	-1	-1	-1	0	0
2a. Land use futures	0	0	-1	-1	-1	0	1
2b. Urban design	1	1	1	1	0	0	0
2c. Land requirement	-3	-1	-2	-2	-2	-1	-1
2d. Social cohesion	-3	0	2	2	2	1	1
2e. Human health and wellbeing	1	1	1	1	1	1	1
3a. Landscape / visual	-3	-3	-4	-3	-4	-3	-2
3b. Stormwater / flooding	0	0	-2	-1	-3	-1	0
3c. Ecology	-3	-3	-5	-4	-5	-4	-2
3d. Natural hazards	-2	-3	-4	-3	-3	-2	-1
5a. Construction impacts on utilities / infrastructure	-2	-2	-1	-1	-1	-2	-2
5b. Construction disruption	-2	-1	0	0	0	-2	-1
6a. Construction costs / risk	-2	-2	-3	-3	-3	-2	-2

**A new walking and cycling path
along SH1 - Local connections:**

**Upgrades to the Wainui interchange for
active modes**

Part of NOR 4 – SH1 improvements package

PROACTIVELY RELEASED

Upgrades to the Wainui Interchange for active modes

PURPOSE

To enable active mode users to cross east to west across SH1 and provide access to the strategic active mode corridor that runs north/south between Albany and Upper Orewa and Grand Drive.



Gap analysis

- No gaps were identified with optioneering for this project.
- Interdependencies with SH1 walking and cycling facility were noted.

OPTION ASSESSMENT: OPTIONS CONSIDERED

Three options were identified:

- **Option A** - Active mode Connection (new bridge) from SH1 strategic corridor over the south bound on-ramp.
- **Option B** - Active mode Facility (new bridge) against the northern side of the existing Wainui Ramp including link to north-south facility from Millwater Parkway.
- **Option C** - Active mode Facility (new bridge) against the southern side of existing Wainui Ramp including link to north-south facility from Millwater Parkway.



Option C – Active Mode Facility (new bridge) against the southern side of existing Wainui Ramp + link to north-south facility from Millwater Parkway was the preferred route refinement option for the following reasons:

- Provides a connection of a similar distance to Option A with the additional benefit of safer and more direct connection to the school and existing facilities on Sidwell Road.
- Safer and more direct connection to the existing school and Milldale development than Option A, which provides additional social and mode shift benefits.
- Does not impact additional properties outside of the existing SH1 designation.

Project has been incorporated into the design for the overall Walking and Cycling connection along SH1.

Upgraded interchange at Redvale and New Interchange at Wilks Road

Part of **NOR 4 – SH1 improvements package**

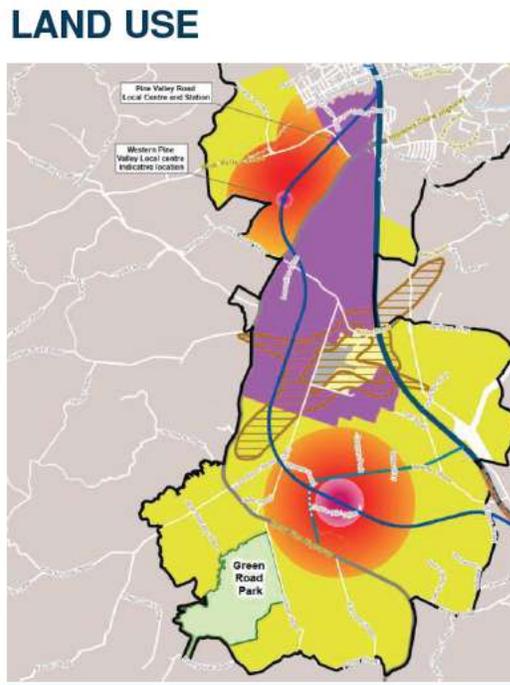
PROACTIVELY RELEASED

Upgraded interchange at Redvale / New Interchange at Wilks Road



PURPOSE

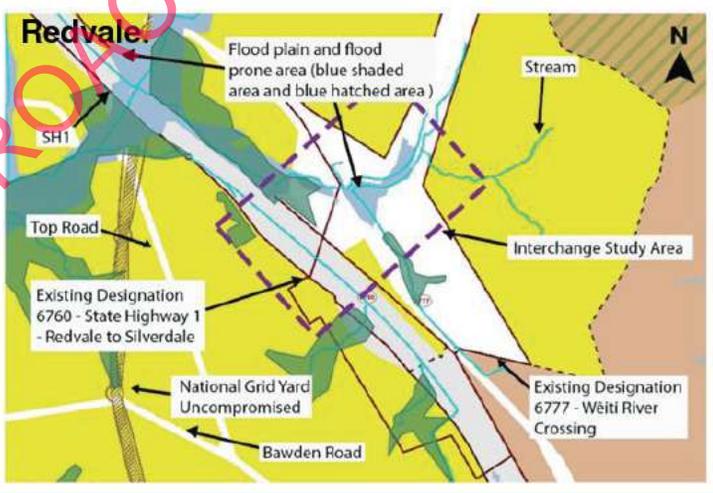
New Wilks Road and upgraded Redvale motorway interchanges to integrate adjacent FUZ with the strategic motorway network.



Redvale – FUZ land anticipated to be developed with residential uses.

Wilks Road – Light industrial land to West, FUZ to south east and Countryside Living to North east

CONSTRAINTS



GAP ANALYSIS

- No gaps identified. Optioneering considered adequate to progress to route refinement
- A need to revisit provision of access to the motorway service centre (MSC) identified through route refinement

OPTION ASSESSMENT: PROCESS

1. Constraints mapping undertaken.
2. Interchange spacing option development - focusing on consideration of high level Wilks and Redvale interchange arrangement options that enable access to the motorway service centre (MSC) to be retained in future.
3. Interchange location option development –a full MCA was undertaken for Wilks Road interchange to consider options. Only considered necessary for the New Wilks Interchange as the location of the other interchanges is fixed.
4. Interchange configuration option development – undertaken for all three interchanges. This included options for which side of the interchange active mode bridges should locate.

Redvale and Wilks Road – Interchange arrangement options

Process undertaken

- Consideration of interchange arrangements at Wilks Road and Redvale
- Options considered the Dairy Flat Motorway service centre access and location
- 10 options considered with various interchange configurations and locations
- Assessment undertaken on each

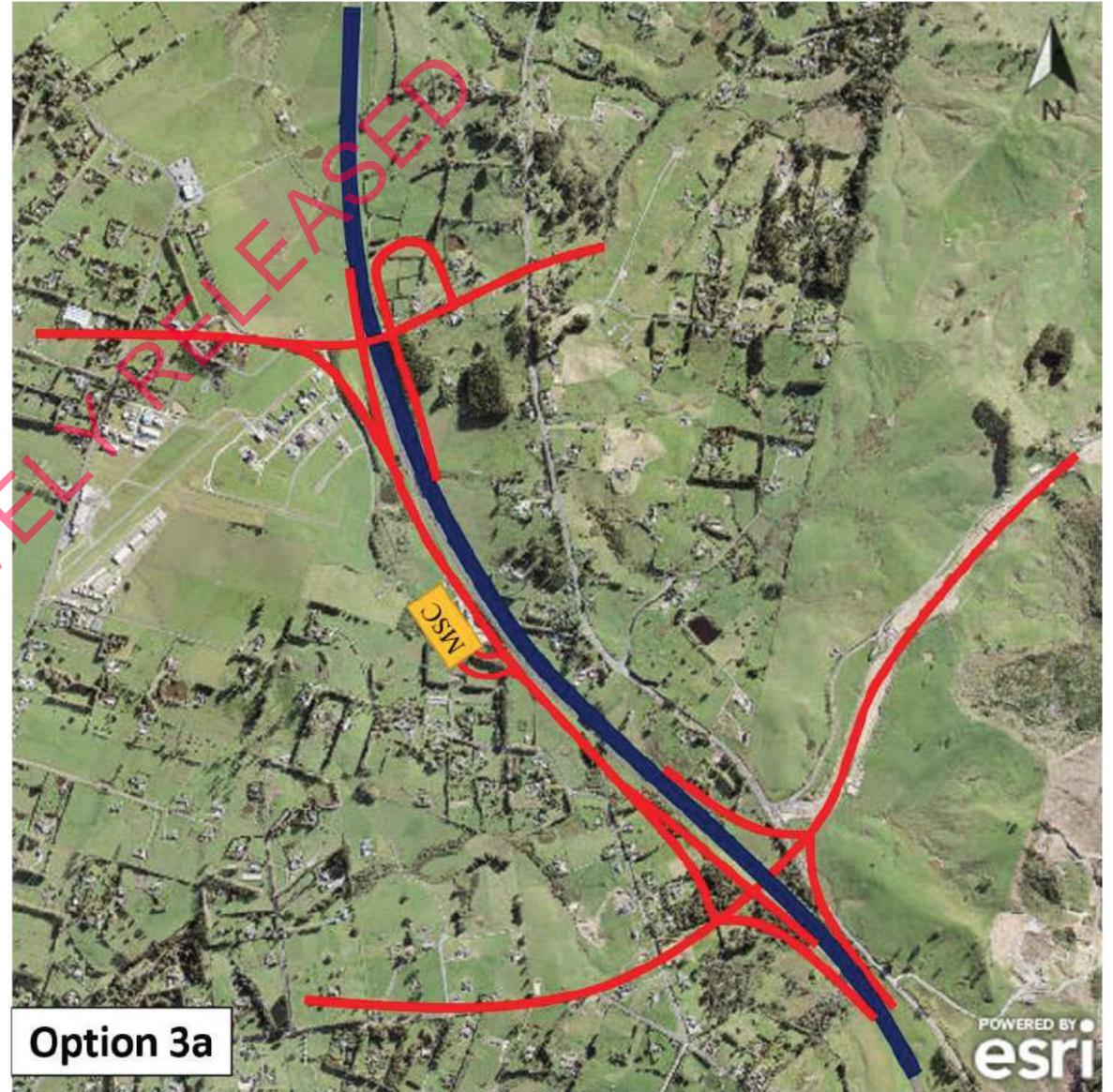
The recommended option was **Option 3a**. This option involves:

- A full interchange at Redvale
- Access to the Motorway service centre via an access road
- South facing ramps at Wilks Road at the existing overbridge

A summary of key outcomes of the assessment is as follows:

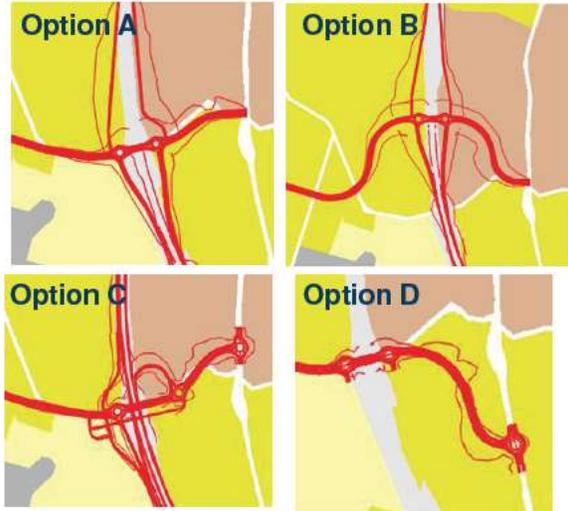
- Option 3a scores highest against investment objectives for access, network resilience and integration.
- Option 3a scores highest against the safety investment objective, providing access to the motorway service centre.
- Option 3a provides the best overall performance of the options considered while retaining access to the Motorway service centre.
- Option 3a involves an increase in cost compared with Options 1 and 5, leading to a moderate reduction in value for money.

Preferred Interchange configuration

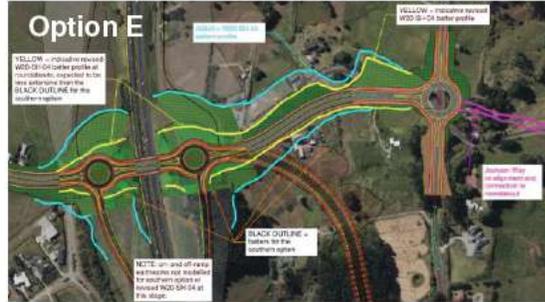


New interchange at Wilks Road – Interchange location options

Options considered



5 options considered through MCA



Non-scored criteria:

- **Value for money** – Option 4 provides best value for money
- **Policy** – Option D is most aligned with policy

Recommended option:

Option D is the recommended option

- Similar transport outcomes to other options
- Lowest overall effects
- Best in non-scored policy and value for money criteria
- Scores best from an urban design perspective
- Access to Service centre can be retained with service lane arrangement.

MCA Criteria	Option A (W20_SH-04)	Option B (W20_SH-05)	Option C (W42_SH-12)	Option D (W20_SH-04) (Option 1 variant)	Option E (W68_SH-04)
Investment Objective 1: Access / Integration	3	3	3	3	3
Investment Objective 2: Resilience	3	3	3	3	3
Investment Objective 3: Integration	2	2	2	2	2
Investment Objective 4: Mode choice	0	0	0	0	0
1a. Heritage	-1	-1	-1	-1	-1
2a. Land use futures	-1	-3	-2	-1	-1
2b. Urban design	0	-2	-1	0	-1
2c. Land requirement	-1	-1	-1	-1	-2
2d. Social cohesion	-1	-3	-2	-1	-1
2e. Human health and wellbeing	-3	-2	-3	-3	-3
3a. Landscape / visual	-2	-3	-3	-3	-2
3b. Stormwater/flooding	-1	-2	-1	-1	-1
3c. Ecology	-2	-3	-2	-2	-2
3d. Natural hazards	-1	-1	-1	0	-1
4b. Transport - User safety	1	1	1	1	1
5a. Construction impacts on utilities / infrastructure	-2	-2	-2	-1	-1
5b. Construction disruption	-3	-3	-3	-3	-3
6a. Construction costs / risk /	-2	-3	-2	-2	-2

PROACTIVELY RELEASED

New interchange at Wilks Road – EMERGING PREFERRED OPTION DEVELOPMENT

ACTIVE MODE TREATMENT

New Wilks Road Interchange – active mode bridge options

No bridge – at grade	-As this interchange is south-facing ramps only, active modes may not need to cross roads through the interchange – depending on the arrangement selected (i.e.. they can travel on northern side and ramps on south side)	✓ (if active modes do not need to cross roads through interchange)
North side of main interchange	-This option is preferred as it is located further away from the existing North Shore Airport facility. Additional bridge structures (and the height associated with them) are a potential hazard for planes landing and departing from the airport. In addition, providing a facility on the northern side, would avoid the south-facing ramps for the Interchange.	✓ (if active modes do need to cross roads through interchange)
South side of main interchange	-A bridge on the southern side of the interchange would impact access onto Aeropark Drive and is therefore not preferred.	✗
Both sides side of main interchange	-A bridge on the southern side of the interchange would impact access onto Aeropark Drive and is therefore not preferred.	✗

INTERCHANGE FORM ASSESSMENT

Wilks Road Interchange

Roundabouts	-Performs wells from an operational perspective -Selection of roundabouts or a gyratory with grade separated active modes would provide flexibility in the footprint to accommodate future signalisation, if necessary. -Potential for vehicles to use roundabouts for u-turning.	✗
Gyratory	-Preferred from an operational and safety perspective -Selection of roundabouts or a gyratory with grade separated active modes would provide flexibility in the footprint to accommodate other intersection forms if required. -A 'gyratory' configuration was preferred by SME's, as this removed the potential for re-circulating (u-turning) vehicles that can be associated with roundabouts.	✓
Traffic signals	-Less preferred than roundabouts and gyratory configurations from an operational perspective. -Less opportunity to accommodate roundabout or gyratory configurations within a traffic signal designated footprint.	✗

DESIGN REFINEMENTS

During option refinement the following changes were made:

- Adjustments to vertical geometry of the interchange and the eastern approach to the interchange to reduce impact on adjacent property.
- Provision of access road to maintain access to property to the north of Wilks Road.
- Changes to the intersection between Wilks Road and East Coast Road including realignment of the western end of Jackson Way.
- Active mode facility integrated with main structure on northern side.

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Access to Aeropark Drive to be maintained via a potential realignment or changes to current access provision	M
Design of access road and access to Motorway Service Centre to be refined	H

Upgraded interchange at Redvale – EMERGING PREFERRED OPTION DEVELOPMENT

ACTIVE MODE TREATMENT

Upgrade to Redvale Interchange – active mode bridge options		
North side of main interchange	•This option would not directly connect to the proposed Pen link shared path (the Pen link path will be located on the southern side of the interchange).	✘
South side of main interchange	•This option would directly connect to the Pen link shared path (which will be on the southern side of the interchange) – and hence is preferred	✓
Both sides side of main interchange	•Only the southern bridge would connect to the Pen link shared path. The northern side would not connect to an active mode facility. Therefore, this option is not preferred.	✘

INTERCHANGE FORM ASSESSMENT

Wilks Road Interchange		
Roundabouts	<ul style="list-style-type: none"> •Performs well from an operational perspective •Selection of roundabouts or a gyratory with grade separated active modes would provide flexibility in the footprint to accommodate future signalisation, if necessary. •Potential for vehicles to use roundabouts for u-turning. 	✘
Gyratory	<ul style="list-style-type: none"> •Preferred from an operational and safety perspective •Selection of roundabouts or a gyratory with grade separated active modes would provide flexibility in the footprint to accommodate other intersection forms if required. •A 'gyratory' configuration was preferred by SME's, as this removed the potential for re-circulating (u-turning) vehicles that can be associated with roundabouts. 	✓
Traffic signals	<ul style="list-style-type: none"> •Less preferred than roundabouts and gyratory configurations from an operational perspective. •Less opportunity to accommodate roundabout or gyratory configurations within a traffic signal designated footprint. 	✘

DESIGN REFINEMENTS

The following refinement were made:

- New design information was made available from the ŌMahurangi Penlink project. This included shifting of the active mode facility to the southern side of the corridor. This required change to the proposed design to tie in with an active mode facility to the south of the interchange.
- A section of East Coast Road has been included in the design due to a need for a realignment based on conflict with the structure as a result of the proposed roundabout.

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Make best use of existing infrastructure provided by the Ō Mahurangi Penlink Project	M
Realignment of East Coast road is to be considered against alternative options	M

Upgrade to Redvale Interchange – RECOMMENDED OPTION

RECOMMENDED OPTION FOR Redvale interchange



Interdependencies

- The project is interdependent on the Redvale interchange being delivered by the Ō Mahurangi - Penlink project
- Wider SH1 upgrade project
- Level of dependency on the Wilks Road interchange due to the access road arrangement in the northbound direction.

Risks and Opportunities

- Risk of rework from the short term implementation of the Ō Mahurangi - Penlink project.
- Opportunity to minimise earthworks through integration with surrounding development.

PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Improve productivity of the SH1 corridor between Albany and Silverdale.	Provides accessibility for residents in the Dairy Flat area to connect to SH1 and Whangaparaoa via Penlink. Contributes to an increase in the proportion of employment accessible by private vehicles increases in each of the time intervals assessed. Within 15 mins there is a 27% increase and within 30 mins there is a 2% increase.
Resilience	Improve reliability and resilience of the SH1 corridor between Albany and Silverdale for general vehicles and freight.	Provides connectivity to the SH1 corridor for residents of Dairy Flat providing a strategic connection.
Travel Choice	Support the transition to a reduced reliance on SOV travel by providing a high quality, low carbon transport network	Interchange provides for all transport modes including separated active mode facilities.
Integration	Integration: Integration with both the transport network and the timing and pace of development in the area.	Project enables the development of the FUZ area by providing access in line with the timing of development of the surrounding FUZ land.

Contribution to climate change response

Climate Change	Considered as part of the wider upgrades of SH1. A single option was developed due to the need to tie in with the Redvale interchange. Elimination of the project would result in increased travel in congestion and pressure at existing interchanges.
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