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North DBC Appendix G— Transport Outcomes Report

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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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Table of Contents

1	Introduction.....	1
1.1	Purpose and scope of the report	1
1.2	Report Structure	1
2	Recommended Network	2
2.1	Strategic Projects	3
2.2	Local Transport Corridors	3
3	Investment Objectives and KPI's for the North Recommended Network.....	5
3.1	Overall North Outcomes	8
3.1	Aotearoa's New Zealand's First Emissions Reduction Plan.....	14
3.2	Transport Emissions Reduction Pathway (TERP)	16
3.3	Strategic and Local Outcomes.....	19
3.4	Strategic Project Outcomes	20
3.4.1	Rapid Transit Corridor (RTC) Investment Objectives and Associated KPIs and Measures.....	20
3.4.2	State Highway 1 Upgrade (SH1) Investment Objectives and Associated KPIs and Measures.....	23
3.4.3	Silverdale Interchange Investment Objectives and Associated KPIs and Measures.....	25
3.4.4	SH1 Walking and Cycling Path Investment Objectives and Associated KPIs and Measures.....	28
3.4.5	RTC Walking and Cycling Path Investment Objectives and Associated KPIs and Measures.....	30
3.5	Local Project Outcomes.....	32
3.5.1	Wainui Investment Objectives and Associated KPIs and Measures.....	32
3.5.2	Dairy Flat Investment Objectives and Associated KPIs and Measures	37
3.5.3	Silverdale West/Pine Valley Investment Objectives and Associated KPIs and Measures.....	41
4	Transport Analysis.....	46
4.1	Land Use Scenarios	46
4.1.1	Land Use Assumptions	46
4.2	Transport Network Analysis	48
4.2.1	Transport Modelling	48
4.2.2	Roads and Streets Framework (RASf).....	49
4.2.3	Corridor Form Assessment Framework.....	49
4.2.4	Type A Business Case Corridors/Segments	51
4.2.5	Intersection Form and Function	29

Appendices

- Appendix 1. North Form & Function
- Appendix 2. Sidra Intersection Summary
- Appendix 3. Rapid Transit corridor technical note

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Acronyms

Acronym/Term	Description
ADT	Average Daily Traffic (number of vehicles per day)
ALT	Alliance Leadership Team
AMP	Alliance Management Plan
AMT	Alliance Management Team
AT	Auckland Transport
AUP	Auckland Unitary Plan
BFG Legal	Bell Gully Buddle Findlay JV
DBC	North Detailed Business Case
Do-min	Do-Minimum Option
FUZ	Future Urban Zone
FULSS	Future Urban Land Supply Strategy
GIS	Geographic Information System
IBC	North Indicative Business Case
IPAA	Interim Programme Alliance Agreement
KPI	Key Performance Indicator
LOS	Level of Service
MCA	Multi-Criteria Assessment
MSM	Macro Strategic Model
NOP	Non-Owner Participant (AECOM, Beca, Bell Gully, Buddle Findlay)
OP	Owner Participant
PAA	Programme Alliance Agreement
PAB	Programme Alliance Board
PCG	Project Control Group
PMO	Programme Management Office
PT	Public Transport
QoS 1	Quality of Service 1
RT	Rapid Transit

Acronym/Term	Description
RTC	Rapid Transit Corridor
RTN	Rapid Transit Network
SATURN	Meso-simulation modelling software package used for transport assessment – Simulation and Assignment of Traffic to Urban Road Network
Te Tupu Ngātahi	Supporting Growth Alliance
Waka Kotahi	Waka Kotahi New Zealand Transport Agency

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1 Introduction

1.1 Purpose and scope of the report

This Transport Outcomes report has been prepared by Te Tupu Ngātahi for the North Detailed Business Case (North DBC). Te Tupu Ngātahi (the Supporting Growth Alliance) is a collaboration between Waka Kotahi NZ Transport Agency (Waka Kotahi) and Auckland Transport (AT) to carry out the planning phase of the Te Tupu Ngātahi Programme (the Programme) (formerly known as the Transport for Future Urban Growth (TfUG) Programme).

This Transport Outcomes report:

- Details the transport outcomes including Key Performance Indicators (KPIs) of the recommended network for the North.
- Provides an overview of the key transport assessments undertaken to support the optioneering process for the North recommended network including:
 - Corridor Form and Function assessments,
 - Intersection Form and Function assessments
- Provides a technical summary of key transport matters associated with the North recommended network.

As identified, the focus of this report is the transportation outcomes of the recommended package, with a more detailed description of the option development and assessment process provided within Appendix B of the North DBC in the Options Assessment Report.

1.2 Report Structure

The report has been split into several sections, covering the following:

Section 2 summarises the recommended network for the North corridors.

Section 3 summarises the investment objectives identified for the North corridors and the associated Key Performance Indicators (KPIs) set for each of these objectives. These KPIs subsequently measure how well the recommended network performs against the investment objectives.

Section 4 summarises the transport assessment undertaken to reach the recommended network.

There are several appendices to this report that provide further detail, specifically:

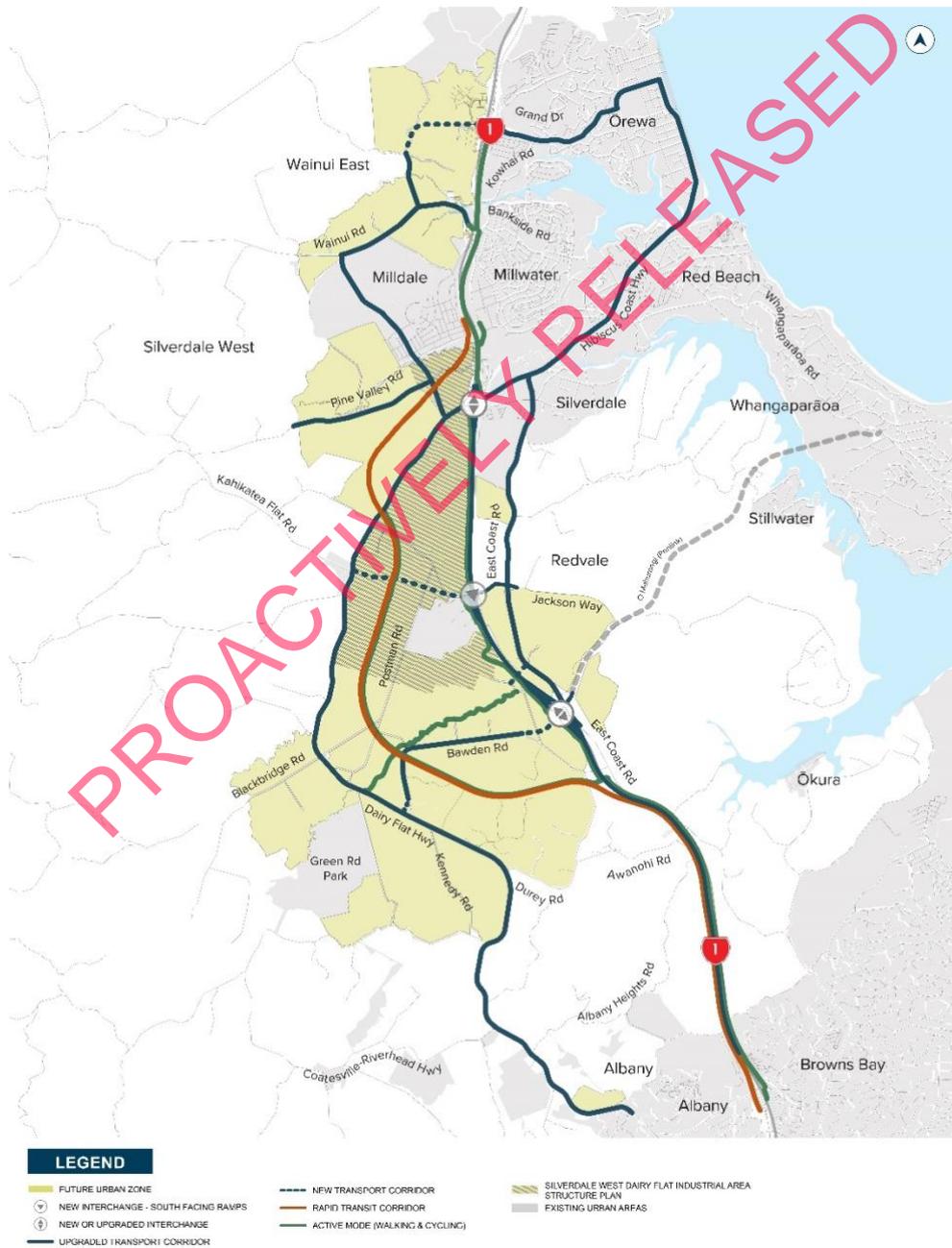
- Appendix 1: North Form & Function – summary of the form and function assessments completed for the North corridors.
- Appendix 2: Intersection Performance Summary – summary of the Sidra performance results for the key intersections on the North network.

2 Recommended Network

The following section outlines the recommended network for the North DBC. The recommended transport network for the North DBC consists of a system of interventions including local corridors and strategic network components. These components include upgrades to existing rural corridors, new urban corridors, and new strategic connections including a rapid transit corridor and dedicated cycleways. Overall, it is considered that the North recommended network provides a safe, reliable transport system that supports growth, offers sustainable travel choice and access to employment and social amenities.

The recommended network is shown in Figure 2-1 below:

Figure 2-1: Recommended transport network



2.1 Strategic Projects

The key strategic projects included in the North recommended network are summarised below:

- **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 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.
- **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.

2.2 Local Transport Corridors

These North local transport corridors include a network of arterials that will support provision for frequent public transport, walking and cycling and general traffic. The specific corridors are detailed below.

- **Upgrade to Wainui Road:** A two-lane arterial road with dedicated walking and cycling facilities. Wainui Road forms an important east-west connection for all modes on the edge of the proposed Milldale town centre. Additionally, the corridor connects to SH1 and the growth area of Millwater.
- **Upgrade to Pine Valley Road:** A two-lane arterial road with dedicated walking and cycling facilities. Pine Valley Road cuts through the centre of the Silverdale West growth area. The corridor forms an east-west connection for all modes between Kahikatea Flat Road and the new Argent Lane Connection that runs through Milldale. The corridor sits just west to the proposed Silverdale West - Dairy Flat Industrial Area.
- **Upgrade to Dairy Flat Highway between Dairy Flat and Albany:** High quality, safe and direct active mode connection between Dairy Flat and Albany Village. The upgrade will also include safety improvements such as median barriers.
- **Upgrade to Dairy Flat Highway between Silverdale Interchange and Dairy Flat:** A four-lane arterial road with dedicated active mode and bus priority facilities. Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.
- **New connection between Dairy Flat Highway and Wilks Road (New Link Road):** A new urban arterial with dedicated with dedicated active mode and bus priority facilities. The corridor provides an east-west connection through the centre of the Silverdale West - Dairy Flat Industrial Area.

Additionally, the corridor forms an important link between the Industrial Area and the strategic transport network (SH1).

- **Upgrade to East Coast Road between Silverdale and Redvale Interchange:** High quality safe and direct active mode connection between the growth areas of Silverdale and Redvale.
- **Upgrade and extension to Bawden Road:** A four-lane arterial road with dedicated active mode and bus priority facilities. Bawden Road provides an east-west connection between the strategic transport network and the Dairy Flat town centre.
- **New Connection between Milldale and Grand Drive (Upper Orewa Extension):** A new two-lane arterial road with dedicated walking and cycling facilities. The corridor provides a north-south connection for all modes between Wainui and the Grand Drive Interchange.
- **Upgrade of Hibiscus Coast Highway and Grand Drive for public transport and active modes:** Provides a strategic transport corridor for all modes through the growth areas of Silverdale, Red Beach and Orewa. The corridor provides a connection between two Town Centres and a variety of other important land uses including employment, Schools and RTN stations.
- **A new SH1 crossing at Dairy Stream (Dairy Stream Motorway Crossing):** Provides an all modes connection across SH1 between Top Road and East Coast Road. Connecting the FUZ on either side of SH1.
- **New Argent Lane and new Pine Valley Road:** Upgrade of an existing two-lane arterial to a four-lane arterial. It should be noted that the project will be provided in part by the developer of the Milldale development (in addition to the Milldale to Highgate bridge over the motorway).
- **Upgrades to the Wainui Interchange for Active Modes:** Provides a high-quality active mode connection across SH1. This will help improve the connectivity between communities on both sides of SH1.
- **A new active mode connection along the Dairy Stream:** Provides a high-quality strategic walking and cycling connection through the growth area of Dairy Flat between the SH1 corridor and a future centre in Dairy Flat and Green Park reserve.
- **Silverdale to Highgate active mode connection:** High-quality active mode connection between Millwater, Milldale and Silverdale Centre.

3 Investment Objectives and KPI's for the North Recommended Network

The following section provides a breakdown of the performance of the North Recommended Network against the Investment Objectives and subsequent KPIs.

The KPI measures compare a 'Do-minimum' transport network against the proposed Te Tupu Ngātahi projects in the recommended North DBC network, using a full build out 2048+ scenario. The DBC has followed the principles of the Te Tupu Ngātahi programme wide approach for the definition of the Do Minimum.¹ The Do Minimum is defined as the least effort to maintain the existing system, including maintenance and operation of the existing system. The 2048+ land use scenario² was agreed with Auckland Council to be the most appropriate scenario for route protection purposes. This is not a specified date but reflects the full build-out (post 2048) of the currently planned development, which then informs the long-term infrastructure needs.

The proposed North DBC projects and improvements have been identified in order to support growth in the North and unlock the future land use. In addition to these projects, there are several key strategic projects that integrate with this network including:

- Argent Lane Extension – Two lane arterial road which has been implemented in part
- Milldale / Highgate Bridge
- Penlink

It is the combination of these projects and the proposed Te Tupu Ngātahi projects that will enable the key transport and land use integration outcomes for the community.

The inclusion of the key inter-dependent strategic projects in the Do-minimum network is to account for the fact that those projects are being developed by Waka Kotahi, so are not included as part of the Te Tupu Ngātahi improvements package.

For each of the projects in the North the following changes between the Do-minimum and recommended transport networks are noted in Table 3-1 below.

¹ SGA Approach to Do Minimum Development_V1

² Modelled land use scenario is I11v.6

Table 3-1: Project differences between the Do-min and Recommended Network

Project	Do minimum	Recommended network
A new Rapid Transit corridor between Albany and Milldale	No RTC corridor. Buses use SH1 and existing HBC station.	RTC provided between Albany and Milldale.
Upgrades to SH1 between Albany and Silverdale with a new interchange at Wilks Road and upgraded interchange at Redvale	Penlink assumed in place, no capacity improvements or bus priority provided on SH1.	Improved capacity and bus priority provided on SH1, three lanes on SH1 between Albany and Silverdale
Improvements to the existing Silverdale Interchange	No improvements to the existing layout at the Silverdale Interchange. No walking and cycling facilities currently.	Walking and cycling facilities provided. Change from dual-lane roundabout form to gyratory interchange layout.
A new walking and cycling path along SH1 (SH1 Walking and Cycling Path)	Not included.	Provided within the Recommended Option.
A new walking and cycling path along the rapid transit corridor (RTC Walking and Cycling Path)	Not included.	Provided within the Recommended Option.
Upgrade to Wainui Road	Two-lane rural arterial, no walking and cycling facilities provided.	Two-lane urban arterial, walking and cycling facilities provided.
Upgrade to Pine Valley Road	Two-lane rural arterial, no walking and cycling facilities provided.	Two-lane urban arterial, walking and cycling facilities provided.
Upgrade to Dairy Flat Highway between Dairy Flat and Albany	Two-lane rural arterial, no walking and cycling facilities provided.	Two-lane rural arterial, walking and cycling facilities provided.
Upgrade to Dairy Flat Highway between Silverdale Interchange and Dairy Flat	Two-lane rural arterial, no walking and cycling facilities provided.	Four/Two-lane predominately urban arterial, walking and cycling facilities provided and bus priority lanes provided.
New connection between Dairy Flat Highway and Wilks Road (New Link Road)	Not Included.	Four/Two-lane urban arterial, walking and cycling facilities provided and bus priority lanes provided.
Upgrade to East Coast Road between Silverdale and Redvale Interchange	Two-lane rural arterial, no walking and cycling facilities provided.	Two-lane predominately urban arterial, walking and cycling facilities provided.

Project	Do minimum	Recommended network
Upgrade and extension to Bawden Road	Two-lane rural arterial, no walking and cycling facilities provided.	Four lane urban arterial, walking and cycling facilities with bus priority lanes provided.
New Connection between Milldale and Grand Drive (Upper Orewa Extension):	Not Included.	Two-lane urban arterial, walking and cycling facilities provided.
Upgrade of Hibiscus Coast Highway and Grand Drive for public transport and active modes:	Two-lane urban arterial, limited walking and cycling facilities.	Two-lane urban arterial, walking and cycling facilities with bus priority lanes provided.
A new SH1 crossing at Dairy Steam (Dairy Stream Motorway Crossing):	Not Included.	New connection for all modes provided across SH1.
New Argent Lane and new Pine Valley Road:	Two-lane urban arterial, walking and cycling facilities provided.	Four-lane urban arterial, walking and cycling facilities with bus priority lanes provided.
Upgrade to the Wainui Interchange for Active Modes:	Not Included.	Walking and cycling connection provided.
A new active mode connection along the Dairy Stream	Not Included.	Walking and cycling connection provided.
Silverdale to Highgate active mode connection	Not Included.	Walking and cycling connection provided.

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3.1 Overall North Outcomes

As detailed above, the North Recommended Network has been developed within the context of a wider network, the following table reports on the overall outcomes of the entire system. The measures reported on are based on the complete network, with the complete build out of projected growth in North.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of population living within travel threshold (5,10,15 mins) of jobs by active modes	<p>In the Recommended Option, the number of jobs that can be accessible within 5 mins by active modes are 28,810 jobs (compared to 22,531 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 10 mins by active modes are 38,761 jobs (compared to 35,558 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by active modes are 51,370 jobs (compared to 46,605 in the Do-min Option).</p>	<p>The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 5 mins the percentage (points) of employment increases by 28%, within 10 mins there is a 9% increase and in 15 mins there is a 10% increase in the Recommended Option compared to the Do-min.</p>
Job Access	Proportion of population living within travel threshold (15,30,45mins) of jobs by PT	<p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 34,808 jobs (compared to 28,764 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by PT are 75,423 jobs (compared to 36,411 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 304,024 jobs (compared to 71,081 in the Do-min Option).</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>

Investment Objective 2: Reliability			
Network Performance	% of vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	22% of vehicle-km travelled in congested conditions in the Do-min scenario 13% of vehicle-km travelled in congested conditions in Recommended Option	There is a 9% (percentage points) reduction of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.
Network Performance	Total VKT for the Te Tupu Ngatahi North Project area (Daily VKT)	3,301,776 total vehicle-km travelled in the Do-min Scenario 3,289,418 total vehicle-km travelled in the Recommended Option	There is a 12,358 vehicle-km travelled reduction in the total VKT in the Recommended Option.
Susceptibility to Climate Change	Kilometres of infrastructure susceptible to Q100 flooding	46.8 km of the road network within the Northern growth area achieves Q100 Flood level immunity. This is the entire improved arterial network proposed by the Alliance. This helps support the overall sustainability and resilience goals of the North transport network.	Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Bawden Road (3.3 km) • Dairy Flat Highway (14.3 km) • East Coast Road (5.7 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km) • Dairy Stream Motorway Crossing (1.7km) • Wilks Road (0.7 km)
Network Performance	Average PT journey time to Albany from the Northern growth area during the AM peak	Average of 66 mins - for PT (Do-min Option) Average of 36 mins - for PT (Recommended Option)	The average travel time reduces by 30 mins in the Recommended Option. This is an 45% reduction (percentage points).
Investment Objective 3: Integration			
Active Mode Access	% of the North with access to high-quality walking and	In the Recommended Option, 3,103 hectares (53%) of the North is within 400m of a dedicated, separated	There is 49% increase (percentage points) in the proportion of the Northern

	cycling facilities (within 400m of a dedicated, separated active mode facility)	active mode facility. Compared to the Do-min Option which has 242 hectares (4%).	growth area within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
RTN Access	% of FUZ land within 800m of the RTN corridor	In the Recommended Option, 1,402 hectares (52%) of the FUZ land within the North is within 800m of the RTN corridor.	N/A
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	74 km of new cycle network. This is more than the network of improved arterial network proposed by the Alliance.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <p>Local Cycling Connections</p> <ul style="list-style-type: none"> • Bawden Road (3.3 km) • Dairy Flat Highway (14.3 km) • East Coast Road (5.7 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km) • Dairy Stream Motorway Crossing (1.7km) • Wilks Road (0.7 km) • Dairy stream active mode connection (3.0km) • Wainui Interchange active mode connection (0.2km) <p>Strategic Cycling Connections</p> <ul style="list-style-type: none"> • RTN walking and cycling path (7.0 km) • SH1 walking and cycling path (17.0 km)
Amenity of the Street	KMs of new and improved transport network with enough space for	46.8 km of new urban street scape space. This is the entire improved	Additionally, this KPI was measured on a per corridor

	street furniture/lighting and tree planting appropriate to the known place function and built form	arterial network proposed by the Alliance.	basis (one-way along the corridor): <ul style="list-style-type: none"> • Bawden Road (3.3 km) • Dairy Flat Highway (14.3 km) • East Coast Road (5.7 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km) • Dairy Stream Motorway Crossing (1.7km) • Wilks Road (0.7 km)
Investment Objective 4: Travel Choice			
Mode Share	% Active (cycling and walking) mode share for local trips within the North <i>AM Peak - % Active mode share</i>	15% - for active modes (Do-min Option) 20% - for active modes (Recommended Option)	There is a 5% increase (percentage points) in active mode share in the Recommended option compared to the Do-min option.
Mode Share	% PT mode share for trips leaving the North <i>AM Peak – %PT mode share</i>	25% - for PT (Do-min Option) 33% - for PT (Recommended Option)	There is an 8% increase (percentage points) in PT share in the Recommended option compared to the Do-min option.
PT Attractiveness	KMs of Dedicated Bus Lanes	10.0 km of dedicated bus lanes. Dedicated bus lanes are provided on arterials with high-frequency bus routes to ensure minimal delays and improve the reliability of services.	Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Bawden Road (3.3 km) • Dairy Flat Highway (5.6km) • New connection between Dairy Flat Highway and Wilks Road (1.1km)

Emissions	Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model	<table border="1"> <thead> <tr> <th>Emission</th> <th>Do-min (Yearly-2048+)</th> <th>Recommended (Yearly-2048+)</th> </tr> </thead> <tbody> <tr> <td>CO₂-eq, t</td> <td>1,879,700</td> <td>1,865,200</td> </tr> </tbody> </table>			Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ -eq, t	1,879,700	1,865,200	According to the VEPM model, there is a 14,500 tonne yearly reduction in CO ₂ eq emissions for the North Recommended transport network in 2048+.
		Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ -eq, t	1,879,700	1,865,200									
Mode Shift	Mode shift from single occupancy private vehicle <i>AM Peak – %Car mode share</i>	78% - Do-min scenario 71% in Recommended Option	There is a 7% mode shift (percentage points) from single occupancy private vehicles in the Recommended Option.								
Investment Objective 5: Safety											
DSI	No. of active mode incidents resulting in serious injury and deaths	2 active mode DSIs in the last 5 year period (2018-2022). However, with the expected growth in the area exposure to risks for active mode users is expected to increase. To accommodate for this increased safety risk, safe and connected walking and cycling facilities will be provided on the majority of corridors in the North.	While the number of previous active mode DSIs are relatively low. The conflict risk for these users will increase in the future as there are more vehicles and active mode users on the network. This risk can be significantly reduced by providing dedicated facilities separated from traffic.								
DSI	DSI Savings in 2048+	Based on the total VKT travelled in the recommended network there is a total of 10 DSI's saved per year in 2048+	N/A								
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	74 km of new cycle network. This is more than the network of improved arterials proposed by the Alliance.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <p>Local Cycling Connections</p> <ul style="list-style-type: none"> • Bawden Road (3.3 km) • Dairy Flat Highway (14.3 km) • East Coast Road (5.7 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) 								

			<ul style="list-style-type: none"> • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km) • Dairy Stream Motorway Crossing (1.7km) • Wilks Road (0.7 km) • Dairy stream active mode connection (3.0km) • Wainui Interchange active mode connection (0.2km) <p>Strategic Cycling Connections</p> <ul style="list-style-type: none"> • RTN walking and cycling path (7.0 km) • SH1 walking and cycling path (17.0 km)
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3.1 Aotearoa’s New Zealand’s First Emissions Reduction Plan

In addition to the above metrics, one of the key priorities of the current government is to reduce emissions over the next 15 years. This will help achieve the initial commitment of getting to net-zero emissions by 2050. This is outlined in New Zealand’s very first emissions reduction plan.

Transport is one of the largest sources of greenhouse gas emissions. It is responsible for approximately 17% of gross domestic emissions and 39% of total domestic carbon dioxide emissions. The emissions reduction plan suggests three focus areas for reducing transport emissions, these include:

- Reducing reliance on cars and support people to walk, cycle and use public transport
- Rapidly adopt low-emission vehicles
- Beginning work to decarbonise heavy transport and freight

The outcomes sought by the Alliance and the North recommended network directly impact the first focus area. This is achieved by improving urban form, travel choice and accessibility to better transport options which all play a role in reducing VKT emissions. Within this focus area there are three key action areas outlined in the emissions reduction plan. These include:

- **Action 10.1.1** – Integrate land-use planning, urban development and transport planning and investments to reduce transport emissions.
- **Action 10.1.2** – Support people to walk, cycle and use public transport
- **Action 10.1.4** – Require roadway expansion and investment in new highways to be consistent with transport targets

Accordingly, the aspects of the recommended network that achieve these individual actions are outlined in Table 3-2 below.

Table 3-2: Alignment between the Recommended Network and Emissions Reduction Plan

Emissions Reduction Plan Focus Area	Aspects of the Recommended Network that achieve the Focus Area
Action 10.1.1	<ul style="list-style-type: none"> • 74 km of new and improved cycling facilities. • There is 49% increase in the proportion of the Northern growth area within 400m of a high-quality, dedicated active mode facility in the Recommended Option. This will include upgrading existing corridors on the network with high-quality walking and cycling facilities and the development of new corridors on the network enabling the provision of active mode facilities within new growth areas.
Action 10.1.2	<ul style="list-style-type: none"> • 74km of new and improved cycling facilities. • Development of a RTC corridor within the Northern growth area. The RTC corridor will also include the development of RTN stations throughout the North, the locations of these stations will be adjacent to proposed local centres, high density residential activity and potential new school sites. This co-location is intended to enable a good walk-up catchment, increasing uptake of public transport.

Emissions Reduction Plan Focus Area	Aspects of the Recommended Network that achieve the Focus Area
	<ul style="list-style-type: none"> • Within 15 mins, the proportion of employment accessible by PT increases by 21%, and within 30/45 mins there is more than a 100% increase in the Recommended Option compared to the Do-min Option. Accordingly, PT becomes a viable option for people travelling to work in the Recommended Option. • Within 5 mins the proportion of employment increases by 28%, within 10 mins there is a 9% increase and in 15 mins there is a 10% increase in the Recommended Option compared to the Do-min. These increases can be attributed to the improvements outlined in Action 10.1.1 for active modes as part of the recommended transport network. Accordingly, the use of active modes becomes a viable option for residents commuting to local jobs in the Recommended Option. • The provision of dedicated active mode facilities on both new and existing corridors results in a 5% increase in active modes trips in the Recommended Option compared to the Do-min option for location trips within the North. • The increased service frequency and improved accessibility to high-frequency PT results in an 8% increase in PT trips in the Recommended Option compared to the Do-min option for trips outside of the North.
Action 10.1.4	<ul style="list-style-type: none"> • Upgrade to SH1 between Albany and Silverdale with a new interchange at Wilks Road and an upgraded interchange at Redvale. • The improvements to SH1 reduces the average travel time from Silverdale to Albany by 14 mins in the AM peak for private vehicles and HOV. In addition, there is a 12% reduction of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option. • The location of the Wilks Road Interchange allows the efficient and reliable movement of freight between the Silverdale West – Dairy Flat Industrial area and other key areas to the South (i.e. Albany). This supports the growth of these industrial areas diverts freight traffic away from the local network and onto strategic corridors and links.

3.2 Transport Emissions Reduction Pathway (TERP)

In 2020, Auckland Council adopted Te Tāruke-ā-Tāwhiri: Auckland’s Climate Plan, with clear emissions reduction targets,

- Halve emissions by 2030 and
- Reach net zero emissions by 2050.

It stated that Auckland’s transport sector emissions must reduce by 64% on 2016 levels by 2030 to reach this target. The plan identifies areas for change such as changing travel behaviour and encouraging shifting to more sustainable modes of transport such as walking, cycling and public transport.

The Transport Emissions Reduction Pathway (TERP) provides the pathway to achieving this 64% reduction. The pathway indicates that this reduction can be achieved by transforming Auckland’s transport system through 11 key areas. These 11 areas are grouped into the same three focus areas outlined in the ERP. While the specific targets outlined in each of the documents differ, the direction of the two documents and the specific actions included in both, are very well aligned. Crucially, both documents recognise mode shift as a primary contributor to emissions reduction in the near-term.

The aspects of the recommended network that achieve these areas of transformation is illustrated in Table 3-3 below.

Table 3-3: Alignment between the Recommended Network and the Transport Emissions Reduction Pathway

Transformational Area		
Reduce reliance on cars and support people to walk, cycle, and use public transport	Supercharge Walking and Cycling	<ul style="list-style-type: none"> • 74km of new and improve walking and cycling facilities. • There is 49% increase in the proportion of the Northern growth area within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
	Massively increase public transport patronage	<ul style="list-style-type: none"> • Increase in public transport mode share from 25% to 33% for trips outside of the North, • 1,402 Ha of FUZ land within a walk-up catchment of the RTC corridor
	Prioritise and resource sustainable transport	<ul style="list-style-type: none"> • No additional vehicle capacity on existing roads

Transformational Area		
		<ul style="list-style-type: none"> Staging plan recommends bus priority measures on SH1 to serve existing area. All corridors include separated and dedicated walking and cycling facilities.
	Reduce travel where possible and appropriate	<ul style="list-style-type: none"> Land use scenario includes provision of heavy and light industrial, and business zoned land to support increased employment opportunities within the North region. RTC corridor is integrated with future centres in the future urban area. Access to services and economic opportunities within the North reduces the need for long distance commuting.
	Slow low traffic neighbourhoods for people	<ul style="list-style-type: none"> Creation of arterial spine routes to support movement of people. Creates opportunity for lower speed local and collector networks.
	Build up not out	The recommended network provides opportunity for quality compact development along a Rapid Transit corridor in the future once development of the FUZ land is required.
Rapidly adopt low vehicle emission vehicles	Electrify private vehicles	Ongoing through wider policy.
	Enable new transport devices	Dedicated and separated walking and cycling facilities to enable transport devices to move quickly and without impediment.
Begin work now to decarbonise heavy transport and freight	Low emission public transport	Public Transport hubs with sufficient space for charging facilities for buses.

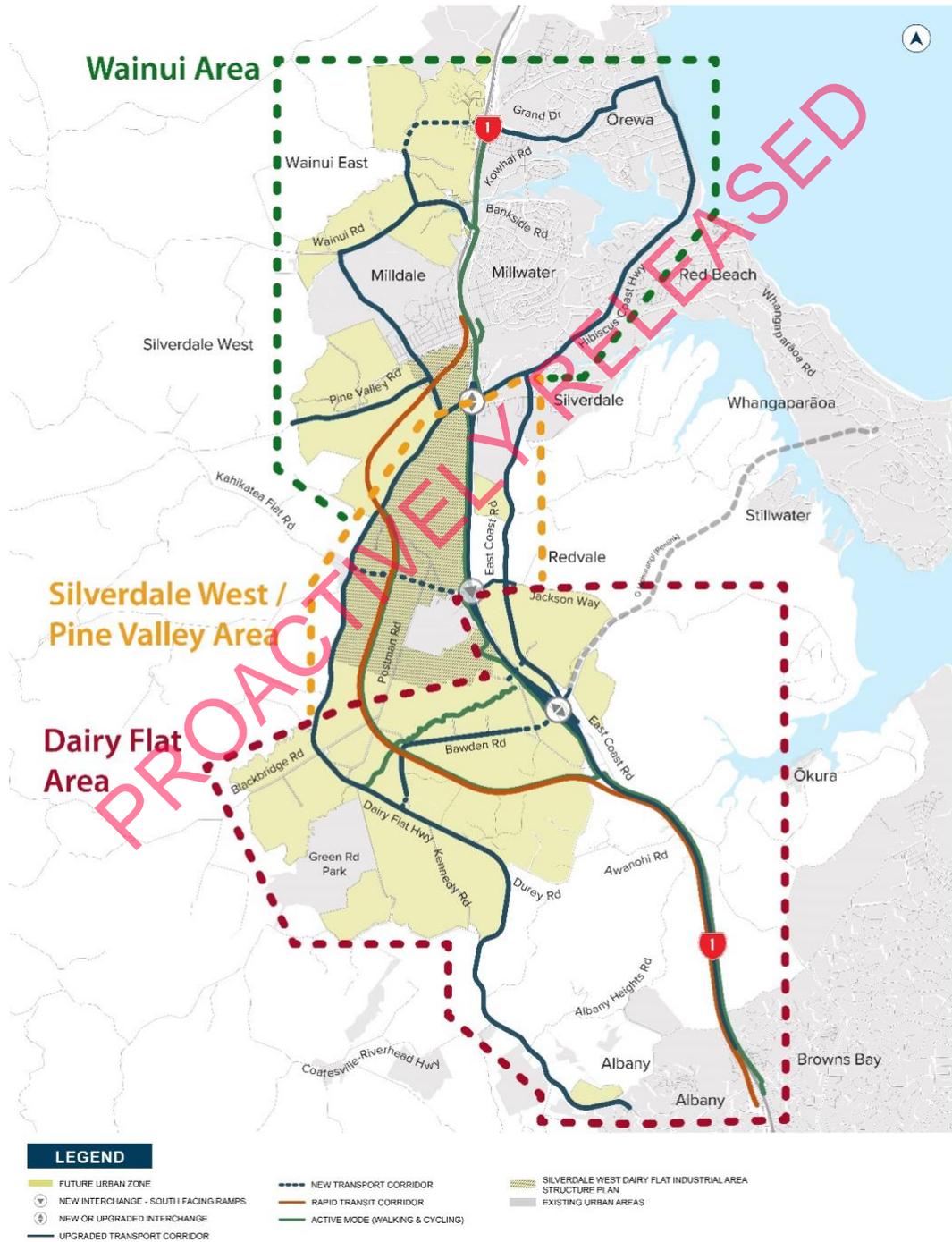
Transformational Area		
	Efficient freight and services	Long term provision of the Wilks Road Interchange to support freight access to the Silverdale West Structure plan area.
Empower Aucklanders to make sustainable transport choices	Empower Aucklanders to make sustainable transport choices	<ul style="list-style-type: none"> The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 5 mins the proportion of employment increases by 28%, within 10 mins there is a 9% increase and in 15 mins there is a 10% increase in the Recommended Option compared to the Do-min. The proportion of employment accessible by PT increases in each of the time intervals assessed. Within 15 mins the proportion 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.

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3.3 Strategic and Local Outcomes

The outcomes of the North strategic projects have been reported separately for each of the individual projects being implemented as part of the North DBC. Whereas the remaining arterial and active mode projects have been grouped together for each of the distinct areas in the North. These areas include Wainui, Silverdale West/Pine Valley and Dairy Flat and are illustrated in Figure 3-1 below. The subsequent outcomes represent the changes to each of these areas as a result of the full recommended network being implemented in the North.

Figure 3-1: Local Packages



3.4 Strategic Project Outcomes

3.4.1 Rapid Transit Corridor (RTC) Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the new rapid transit corridor between Albany and Milldale.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of population living within travel threshold (15,30,45mins) of jobs by PT	<p>The RTC corridor will serve each of the growth areas in the North. Accordingly, this measure was based on the entire Northern growth area which includes Wainui, Silverdale/ Pine Valley and Dairy Flat.</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 34,808 jobs (compared to 28,764 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by PT are 75,423 jobs (compared to 36,411 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 304,024 jobs (compared to 71,081 in the Do-min Option).</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>
Investment Objective 2: Reliability			
PT service reliability	Proportion of RTN route that is separated from conflict with vehicles	<p>Route protection of the RTN corridor will extend from Albany and continue through to Milldale. The alignment of the RTN is such that it runs along a separated, dedicated facility which is decoupled from any road carriageway. Accordingly, there are minimal conflict points. At these intersections the RTC runs on a dedicated phase to avoid conflict with pedestrian and vehicle movements. The general assessment to date has been completed under a mode neutral scenario. Once a mode is finalised at implementation, further consideration for integration/segregation will be required.</p>	N/A
Availability of alternatives to	Every strategic network connection has an appropriate	The current network is dominated by vehicle travel with only two north-south routes heading south. The RTC will provide a step-	N/A

strategic connection	alternative to key destinations	change in people-movement capacity through fast, frequent, high-capacity public transport services. It allows access between Albany and the Northern growth areas and subsequently onwards to the City Centre. The State Highway network and SH1 walking and cycling path provides a suitable alternative within the North and outside in the event of a failure.	
Susceptibility to climate change	Kilometres of RTN infrastructure susceptible to flooding	The full alignment (16.8km) of the RTC corridor will consist of multiple stream and road over bridges achieving a Q100 Flood level immunity. This highlights the resilience of the RTC alignment which helps support the overall sustainability and resilience goals of the North transport network.	N/A
Investment Objective 3: Integration			
Transport integration	Amount of residential growth with access to public transport services	<p>There is approximately 3,109 hectares of FUZ within the North. To unlock the significant urban development occurring within the Northern growth areas, providing fast, frequent and reliable public transport services is a key step in connecting the area to the wider network as well as easing congestion. The Recommended Option includes the RTN travelling through Dairy Flat, Silverdale West/Pine Valley and Milldale which subsequently unlocks this growth and provides residents with a practical transport alternative.</p> <p>A future RTC station in Dairy Flat will integrate with a future town/metro centre. A mix of land use will be provided within a direct walk up catchment enhancing outcomes for the RTC and centre alike.</p> <p>The alignment is such that there will be a network of connector services that feed into the RTN. In comparison, the RTN only travels to Albany in the Do-min Option. Which leaves the North without access to the RTN and leaves a gap in the amount of FUZ that can be unlocked.</p>	N/A
Investment Objective 4: Travel Choice			

<p>Mode Share</p>	<p>% PT share for non - local trips (outside North) <i>AM peak - % PT share</i></p>	<p>33% - for PT (Recommended Option) 25% - for PT (Do-min Option) Additionally, the RTN patronage for the stations in the North is shown in the table below. There are a total of 10,143 passengers that travel from the North towards the CBD</p>	<p>There is an 8% increase (percentage points) in PT trips in the Recommended option compared to the Do-min option. The location of 5 indicative RTN stations within the Northern growth area as part of the Recommended Option allows 10,143 passengers to board within close proximity to their place of residence.</p>						
<p>PT attractiveness</p>	<p>Average public transport journey time in AM peak to City Centre from Northern growth area</p>	<p>Average of 82 mins - for PT (Do-min Option) Average of 68 mins – for PT (Recommended Option)</p>	<p>The average travel reduces by 14 mins in the Recommended Option. This is a 17% reduction (percentage points) in the average travel time.</p>						
<p>Emissions</p>	<p>Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model</p>	<table border="1"> <thead> <tr> <th data-bbox="715 1263 817 1473">Emission</th> <th data-bbox="817 1263 954 1473">Do-min (Yearly-2048+)</th> <th data-bbox="954 1263 1091 1473">Recommended (Yearly-2048+)</th> </tr> </thead> <tbody> <tr> <td data-bbox="715 1473 817 1570">CO₂ - eq /t</td> <td data-bbox="817 1473 954 1570">1,874,500</td> <td data-bbox="954 1473 1091 1570">1,865,200</td> </tr> </tbody> </table>	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ - eq /t	1,874,500	1,865,200	<p>According to the VEPM model, there is a 9,300 tonne yearly reduction in CO₂ -eq emissions for the North Recommended transport network in 2048+.</p>
Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ - eq /t	1,874,500	1,865,200							
<p>Investment Objective 5: Safety</p>									

3.4.2 State Highway 1 Upgrade (SH1) Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the upgrades to SH1 between Albany and Silverdale with a new interchange at Wilks Road and upgraded interchange at Redvale.

Key Performance Indicator	Measure	Outcome	Commentary									
Investment Objective 1: Access												
Job access	Employment accessible within 15 and 30 mins by private vehicles within the Northern growth area	<p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by private vehicles are 63,688 jobs (compared to 50,158 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by private vehicles are 178,670 jobs (compared to 175,078 in the Do-min Option).</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.									
Travel time	Travel time from Silverdale to Albany via SH1 during the AM peak.	<table border="1"> <thead> <tr> <th colspan="3">Private Vehicles / HOV</th> </tr> <tr> <th>Period</th> <th>Do-min (min)</th> <th>Recommended Option (min)</th> </tr> </thead> <tbody> <tr> <td>AM</td> <td>31</td> <td>17</td> </tr> </tbody> </table>	Private Vehicles / HOV			Period	Do-min (min)	Recommended Option (min)	AM	31	17	In the AM peak the travel time reduces by 14 mins . This is a 45% reduction (percentage points) in travel time.
Private Vehicles / HOV												
Period	Do-min (min)	Recommended Option (min)										
AM	31	17										
Investment Objective 2: Reliability												
Network performance	% of vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	<p>47% of vehicle-km travelled in congested conditions in the Do-min scenario</p> <p>34% of vehicle-km travelled in congested conditions in the Recommended Option</p>	There is a 13% reduction of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.									

Investment Objective 3: Integration									
Integration with wider future transport network	Connectivity/Integration with both the transport network and adjacent development	<p>The Silverdale West – Dairy Flat Industrial area is sequenced to be development ready in the period 2018 – 2022. Therefore, providing sufficient motorway and interchange connections is critical to the timely development of the Industrial area.</p> <p>Additionally, the Wilks and Redvale interchanges are important east-west links for those traveling from the growth areas on the eastern side of SH1 (i.e. Silverdale and Redvale) to the Dairy Flat Town Centre and Industrial area on the western side of SH1.</p> <p>Without adequate motorway capacity and interchange connections, the Silverdale West – Dairy Flat Industrial area will be isolated strategic motorway network. The limited accessibility particularly for heavy vehicles may compromise the viability of the area in the long term.</p>	N/A						
Investment Objective 4: Travel Choice									
Emissions	Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model	<table border="1"> <thead> <tr> <th>Emission</th> <th>Do-min (Yearly-2048+)</th> <th>Recommended (Yearly-2048+)</th> </tr> </thead> <tbody> <tr> <td>CO₂ -eq /t</td> <td>1,863,700</td> <td>1,865,200</td> </tr> </tbody> </table>	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ -eq /t	1,863,700	1,865,200	According to the VEPM model, there is a 1,500 tonne yearly increase in CO ₂ - eq emissions for the North Recommended transport network in 2048+.
Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ -eq /t	1,863,700	1,865,200							
Mode Shift	<p>Mode shift from single occupancy private vehicle</p> <p><i>AM Peak – %Car mode share</i></p>	<p>78% - Do-min scenario</p> <p>71% in Recommended Option</p>	There is 7% mode shift (percentage points) from single occupancy private vehicles in the Recommended Option.						
Investment Objective 5: Safety									

3.4.3 Silverdale Interchange Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the improvements to the existing Silverdale Interchange.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Volume movement	Strategic people movement through the Interchange	<p>For the Do-min Option, the interchange takes the form of a dual-lane roundabout which changes to a 'gyratory' form in the Recommended Option. There are no active mode facilities recommended as part of the Do-min Option, which aligns with the existing layout at the interchange.</p> <p>A 'gyratory' configuration removes the potential for re-circulating (u-turning) vehicles that can be associated with roundabouts. This improves the overall efficiency and safety of the interchange. In addition, the interchange form in the Recommended Option includes the grade separation of active modes. Accordingly, this layout outweighs the Do-min Option with regards to active mode treatments. Advantages include:</p> <ul style="list-style-type: none"> • Grade separation of active modes is generally preferred, as it provides the safest option for active modes, by removing conflict with vehicles and enabling uninterrupted journeys. • Removing active modes from intersections enhances the safety and efficiency for all users travelling through the interchange, by removing signal crossing time. 	N/A

Investment Objective 2: Reliability			
Congestion	Average LOS (AM peak)	0.729 degree of saturation – Recommended Option 0.846 degree of saturation Do-min Option	The congestion during the AM peak period is worse in the Do-min Option compared to the Recommended Option. This level of congestion will have a significant adverse effect on the reliability of travel times for all modes through the Interchange. In particular, impacting the movement of freight into the Silverdale West Industrial area. Capacity improvements as part of the Recommended Option alongside the provision of dedicated active mode facilities shows an improvement in the degree of saturation.
Investment Objective 3: Integration			
Investment Objective 4: Travel Choice			
Mode Share	PT and active mode share for non-local (strategic) and local trips in AM peak, leading to reduced reliance on SOV travel.	While the Silverdale Interchange predominantly provides access to the State highway network for vehicles – the design and operation of the interchange must be cognisant of the impacts on the surrounding local road network and the ability for other modes to travel through this interchange in a manner that is safe. Walking and cycling connectivity through the interchange is important to encourage journeys to be taken by these modes – rather than by private vehicle. The provision of dedicated walking and cycling facilities as part of the Recommended Option will facilitate the movement of active modes through the interchange. These facilities will also link to adjacent local arterial	N/A

		connections and strategic facilities such as the SH1 walking and cycling path This allows both non-local and local trips to occur through the interchange to and from each of the Northern growth areas.	
Investment Objective 5: Safety			
DSI's	No. of incidents resulting in serious injury and deaths	0 DSIs in the last 5-year period (2018-2022). This is to be expected given that the current interchange is a roundabout which is the Recommended intersection form for a 'Safe System' which minimises the risk of deaths and serious injuries at the intersection. With the expected growth in the North there is a subsequent increase in traffic volumes through the interchange. This increases the risk for users travelling through the interchange as it increases the exposure to an incident. To accommodate for this increased safety risk, the interchange separates the SH1 walking and cycling path from vehicle conflict at and through the interchange. This particularly benefits vulnerable road users traveling through the interchange.	N/A

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3.4.4 SH1 Walking and Cycling Path Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to a new walking and cycling path along SH1.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job access	Employment within 2km of the SH1 Walking and Cycling Path	In the Recommended Option, the SH1 walking and cycling path allows access to approximately 20,785 jobs.	There is an additional 20,785 jobs accessible within 2km of the SH1 walking and cycling path in the Recommended Option compared to the Do-min Option.
Investment Objective 2: Reliability			
Investment Objective 3: Integration			
Active Mode access	% of residential growth with access to high quality active mode facility	In the Recommended Option, the SH1 walking and cycling path allows access to approximately 363 hectares of FUZ land use compared to 0 hectares in the Do-min Option.	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.
Investment Objective 4: Travel Choice			
Mode Share	Number of people using the SH1 walking and cycling path	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.	N/A
Investment Objective 5: Safety			
DSI	No. of incidents resulting in serious injury and deaths	The SH1 path will be a separated, dedicated walking and cycling facility with no conflict points with	N/A

		vehicles. Accordingly, no DSIs involving vehicles are anticipated.	
Perceived safety	% / KMs of new and improved cycle network achieving required QoS (from AT Sol 2018-21)	17.0 km	Measured one-way over the corridor length

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3.4.5 RTC Walking and Cycling Path Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to a new walking and cycling path along the rapid transit corridor.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job access	Employment within 2km of the RTC Walking and Cycling Path	In the Recommended Option, the RTC walking and cycling path allows access to approximately 1,920 jobs.	There is an additional 1,920 jobs accessible within 2km of the RTC walking and cycling path in the Recommended Option compared to the Do-min Option.
Investment Objective 2: Reliability			
Investment Objective 3: Integration			
Active Mode access	% of residential growth with access to high quality active mode facility	In the Recommended Option, the RTC walking and cycling path allows access to approximately 577 hectares of FUZ land use compared to 0 hectares in the Do-min Option.	There is an additional 577 hectares of FUZ within 400m of the RTC walking and cycling path in the Recommended Option compared to the Do-min Option. This is approximately 18% of the total FUZ within the North.
Investment Objective 4: Travel Choice			
Mode Share	Number of people using the RTN walking and cycling path	It is predicted that there will be 978 trips a day on the RTC walking and cycling path. The RTC 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.	N/A
Investment Objective 5: Safety			
DSI	No. of incidents resulting in serious injury and deaths	The RTC path will be a separated, dedicated walking and cycling facility with no conflict points with	N/A

		vehicles. Accordingly, no DSIs involving vehicles are anticipated.	
Perceived safety	% / KMs of new and improved cycle network achieving required QoS (from AT Sol 2018-21)	7.5 km	Measured one-way over the corridor length

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3.5 Local Project Outcomes

3.5.1 Wainui Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the Northern growth area of Wainui.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of population living within travel threshold (5,10,15 mins) of jobs by active modes	<p>In the Recommended Option, the number of jobs that can be accessible within 5 mins by active modes are 7,430 jobs (compared to 7,430 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 10 mins by active modes are 21,839 jobs (compared to 14,765 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by active modes are 27,318 jobs (compared to 22,413 in the Do-min Option).</p>	<p>The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 5 mins the percentage (points) of employment increases by 0%, within 10 mins there is a 48% increase and in 15 mins there is a 22% increase in the Recommended Option compared to the Do-min.</p>
Job Access	Proportion of population living within travel threshold (15,30,45mins) of jobs by PT	<p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 14,258 jobs (compared to 13,411 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by PT are 30,085 jobs (compared to 20,289 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 68,259 jobs (compared to 60,785 in the Do-min Option).</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 6%, within 30 mins there is a 48% increase and in 45 mins there is a 12% increase in the Recommended Option compared to the Do-min.</p>

Investment Objective 2: Reliability			
Network Performance	% of vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	9% of vehicle-km travelled in congested conditions in the Do-min scenario 5% of vehicle-km travelled in congested conditions in Recommended Option	There is an 4% reduction (percentage points) of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.
Susceptibility to Climate Change	Kilometres of infrastructure susceptible to Q100 flooding	19.1 km of the road network within Wainui achieves Q100 Flood level immunity. This helps support the overall sustainability and resilience goals of the North transport network.	Additionally, this KPI was measured on a per corridor basis: <ul style="list-style-type: none"> • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km)
Network Performance	Average PT journey time to Albany from Wainui during the AM peak	Average of 65 mins - for PT (Do-min Option) Average of 64 mins - for PT (Recommended Option)	There is a slight reduction in the average travel time between the Recommended Option and Do-min option.
Investment Objective 3: Integration			
Active Mode Access	% of Wainui with access to high-quality walking and cycling facilities (within 400m of a dedicated, separated active mode facility)	In the Recommended Option, 1,476 hectares (71%) of Wainui is within 400m of a dedicated, separated active mode facility. Compared to the Do-min Option which has 242 hectares (10%).	There is 61% increase (percentage points) in the proportion of Wainui within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	23.3 km of new cycle network.	Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Pine Valley Road (2.6 km)

			<ul style="list-style-type: none"> • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4km) • Hibiscus-Coast Highway (9.8km) • Wainui Interchange active mode connection (0.2km) • SH1 walking and cycling path (4.0 km)
Amenity of the Street	KMs of new and improved transport network with enough space for street furniture/lighting and tree planting appropriate to the known place function and built form	19.1 km of new urban street scape space.	<p>Additionally, this KPI was measured on a per corridor basis:</p> <ul style="list-style-type: none"> • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4 km) • Hibiscus-Coast Highway (9.8km)
Investment Objective 4: Travel Choice			
Mode Share	<p>% PT and active (cycling and walking) mode share for local trips</p> <p><i>Daily - % active mode share</i></p> <p><i>AM Peak – %PT mode share</i></p>	<p>17% - for active modes (Recommended Option)</p> <p>16% - for active modes (Do-min Option)</p> <p>6% - for PT (Recommended Option)</p> <p>4% - for PT (Do-min Option)</p>	<p>There is a 1% increase (percentage points) in active modes trips in the Recommended option compared to the Do-min option.</p> <p>There is a 2% increase (percentage points) in PT trips in the Recommended option compared to the Do-min option.</p>

Emissions	Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	According to the VEPM model, there is a 400 tonne yearly reduction in CO ₂ -eq emissions for the North Recommended transport network in 2048+.
		CO ₂ -eq /t	1,863,500	1,863,100	
Mode Shift	Mode shift from single occupancy private vehicle <i>AM Peak – %Car mode share</i>	76% - Do-min scenario 74% in Recommended Option			There is 2% mode shift (percentage points) from single occupancy private vehicles in the Recommended Option.
Investment Objective 5: Safety					
DSI	No. of active mode incidents resulting in serious injury and deaths	0 active mode DSIs in the last 5 year period (2018-2022). However, with the expected growth in the area exposure to risks for active mode users is expected to increase. To accommodate for this increased safety risk, safe and connected walking and cycling facilities will be provided on the majority of corridors in Wainui.			While the number of previous active mode DSIs are relatively low. The conflict risk for these users will increase in the future as there are more vehicles and active mode users on the network. This risk can be significantly reduced by providing dedicated facilities separated from traffic.
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	23.3 km of new cycle network.			Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Pine Valley Road (2.8 km) • Upper Orewa Extension (2.2 km) • Wainui Road (1.9 km) • Argent Lane (2.4km) • Hibiscus-Coast Highway (9.8km) • Wainui Interchange active mode

			connection (0.2km) <ul style="list-style-type: none">• SH1 walking and cycling path (4.0 km)
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3.5.2 Dairy Flat Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the Northern growth area of Dairy Flat.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of population living within travel threshold (5,10,15 mins) of jobs by active modes	<p>In the Recommended Option, the number of jobs that can be accessible within 5 mins by active modes are 4,623 jobs (compared to 3,249 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 10 mins by active modes are 14,006 jobs (compared to 6,971 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by active modes are 28,347 jobs (compared to 21,455 in the Do-min Option).</p>	<p>The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 5 mins the percentage (points) of employment increases by 42%, within 10 mins there is more than an 100% increase and in 15 mins there is a 32% increase in the Recommended Option compared to the Do-min.</p>
Job Access	Proportion of population living within travel threshold (15,30,45mins) of jobs by PT	<p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 4,861 jobs (compared to 4,506 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by PT are 58,886 jobs (compared to 7,448 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 301,750 jobs (compared to 22,460 in the Do-min Option).</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 8%, within 30 mins and 45 mins there is more than a 100% increase in the Recommended Option compared to the Do-min.</p>
Investment Objective 2: Reliability			
Network Performance	% of vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	<p>25% of vehicle-km travelled in congested conditions in the Do-min scenario</p> <p>12% of vehicle-km travelled in congested conditions in Recommended Option</p>	<p>There is an 13% reduction (percentage points) of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.</p>

Susceptibility to Climate Change	Kilometres of infrastructure susceptible to Q100 flooding	17 km of the road network within Dairy Flat achieves Q100 Flood level immunity. This helps support the overall sustainability and resilience goals of the North transport network.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • Bawden Road (3.3km) • Dairy Stream Motorway Crossing (1.7 km) • Dairy Flat Highway (9.5 km) • East Coast Road (2.5 km)
Network Performance	Average PT journey time to Albany from Dairy Flat during the AM peak	<p>Average of 81 mins - for PT (Do-min Option)</p> <p>Average of 46 mins - for PT (Recommended Option)</p>	The average travel time from Dairy Flat reduces by 35 mins in the Recommended Option. This is a 43% reduction (percentage points) in the average travel time.
Investment Objective 3: Integration			
Active Mode Access	% of Dairy Flat with access to high-quality walking and cycling facilities (within 400m of a dedicated, separated active mode facility)	In the Recommended Option, 1,355 hectares (59%) of Dairy Flat is within 400m of a dedicated, separated active mode facility. Compared to the Do-min Option which has 205 hectares (9%).	There is 50% increase (percentage points) in the proportion of Dairy Flat within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	30.4 km of new cycle network.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • Bawden Road (3.3km) • Dairy Stream Motorway Crossing (1.7 km) • Dairy Flat Highway (9.5 km) • East Coast Road (2.5 km) • Dairy Stream active mode connection (3.0km) • RTN walking and cycling path (4.0 km)

			<ul style="list-style-type: none"> SH1 walking and cycling path (9.4 km) 						
Amenity of the Street	KMs of new and improved transport network with enough space for street furniture/lighting and tree planting appropriate to the known place function and built form	17 km of new urban street scape space.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> Bawden Road (3.3km) Dairy Stream Motorway Crossing (1.7 km) Dairy Flat Highway (9.5 km) East Coast Road (2.5 km) 						
Investment Objective 4: Travel Choice									
Mode Share	<p>% PT and active (cycling and walking) mode share for local trips</p> <p><i>Daily - % active mode share</i></p> <p><i>AM Peak – %PT mode share</i></p>	<p>29% - for active modes (Recommended Option)</p> <p>17% - for active modes (Do-min Option)</p> <p>6% - for PT (Recommended Option)</p> <p>3% - for PT (Do-min Option)</p>	<p>There is an 12% increase (percentage points) in active modes trips in the Recommended option compared to the Do-min option.</p> <p>There is a 3% increase (percentage points) in PT trips in the Recommended option compared to the Do-min option.</p>						
PT Attractiveness	KMs of Dedicated Bus Lanes	8.9 km of dedicated bus lanes.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> Bawden Road (3.3 km) Dairy Flat Highway (5.6km) 						
Emissions	Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model	<table border="1"> <thead> <tr> <th>Emission</th> <th>Do-min (Yearly-2048+)</th> <th>Recommended (Yearly-2048+)</th> </tr> </thead> <tbody> <tr> <td>CO₂-eq /t</td> <td>1,863,100</td> <td>1,865,200</td> </tr> </tbody> </table>	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ -eq /t	1,863,100	1,865,200	According to the VEPM model, there is a 2,100 tonne yearly increase in CO ₂ -eq emissions for the North Recommended transport network in 2048+.
Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ -eq /t	1,863,100	1,865,200							
Mode Shift	Mode shift from single	78% - Do-min scenario	There is 15% mode shift (percentage points) from						

	occupancy private vehicle <i>AM Peak – %Car mode share</i>	63% in Recommended Option	single occupancy private vehicles in the Recommended Option.
Investment Objective 5: Safety			
DSI	No. of active mode incidents resulting in serious injury and deaths	2 Active mode DSIs in the last 5 year period (2018-2022). However, with the expected growth in the area exposure to risks for active mode users is expected to increase. To accommodate for this increased safety risk, safe and connected walking and cycling facilities will be provided on the majority of corridors in Dairy Flat.	While the number of previous active mode DSIs are relatively low. The conflict risk for these users will increase in the future as there are more vehicles and active mode users on the network. This risk can be significantly reduced by providing dedicated facilities separated from traffic.
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	30.4 km of new cycle network.	Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Bawden Road (3.3km) • Dairy Stream Motorway Crossing (1.7 km) • Dairy Flat Highway (9.5 km) • East Coast Road (2.5 km) • Dairy Stream active mode connection (3.0km) • RTN walking and cycling path (4.0 km) • SH1 walking and cycling path (9.4 km)

3.5.3 Silverdale West/Pine Valley Investment Objectives and Associated KPIs and Measures

The following table provides a summary of the transport outcomes related to the Northern growth area of Silverdale West/Pine Valley.

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of population living within travel threshold (5,10,15 mins) of jobs by active modes	<p>In the Recommended Option, the number of jobs that can be accessible within 5 mins by active modes are 14,573 jobs (compared to 9,668 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 10 mins by active modes are 21,121 jobs (compared to 16,537 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by active modes are 30,359 jobs (compared to 29,484 in the Do-min Option).</p>	<p>The proportion of employment accessible by active modes increases in each of the time intervals assessed. Within 5 mins the percentage (points) of employment increases by 51%, within 10 mins there is a 28% increase and in 15 mins there is a 3% increase in the Recommended Option compared to the Do-min.</p>
Job Access	Proportion of population living within travel threshold (15,30,45mins) of jobs by PT	<p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 15,689 jobs (compared to 10,847 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 30 mins by PT are 27,692 jobs (compared to 18,709 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 142,987 jobs (compared to 29,620 in the Do-min Option).</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 44%, within 30 mins there is a 48% increase and in 45 mins there is more than a 100% increase in the Recommended Option compared to the Do-min.</p>
Investment Objective 2: Reliability			
Network Performance	% of vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	<p>47% of vehicle-km travelled in congested conditions in the Do-min scenario</p> <p>15% of vehicle-km travelled in congested conditions in Recommended Option</p>	<p>There is an 32% reduction (percentage points) of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.</p>

Susceptibility to Climate Change	Kilometres of infrastructure susceptible to Q100 flooding	10.7 km of the road network within Silverdale West/Pine Valley achieves Q100 Flood level immunity. This helps support the overall sustainability and resilience goals of the North transport network.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • Dairy Flat Highway (4.8 km) • East Coast Road (3.2 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Wilks Road (0.7km)
Network Performance	Average PT journey time to Albany from Silverdale West/Pine Valley during the AM peak	<p>Average of 70 mins - for PT (Do-min Option)</p> <p>Average of 56 mins - for PT (Recommended Option)</p>	<p>The average travel time from Silverdale West/Pine Valley reduces by 14 mins in the Recommended Option. This is a 20% reduction (percentage points) in the average travel time.</p>
Investment Objective 3: Integration			
Active Mode Access	% of Silverdale West/Pine Valley with access to high-quality walking and cycling facilities (within 400m of a dedicated, separated active mode facility)	In the Recommended Option, 905 hectares (83%) of Silverdale West/Pine Valley is within 400m of a dedicated, separated active mode facility. Compared to the Do-min Option which has 0 hectares (0%).	There is 83% increase (percentage points) in the proportion of Silverdale West/Pine Valley within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	17.3 km of new cycle network.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • Dairy Flat Highway (4.8 km) • East Coast Road (3.2 km) • New connection between Dairy Flat Highway

			<ul style="list-style-type: none"> and Wilks Road (2.0 km) • Wilks Road (0.7km) • RTN walking and cycling path (3.0km) • SH1 walking and cycling path (3.6 km)
Amenity of the Street	KMs of new and improved transport network with enough space for street furniture/lighting and tree planting appropriate to the known place function and built form	10.7 km of new urban street scape space.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • Dairy Flat Highway (4.8 km) • East Coast Road (3.2 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Wilks Road (0.7km)
Investment Objective 4: Travel Choice			
Mode Share	<p>% PT and active (cycling and walking) mode share for local trips</p> <p><i>Daily - % active mode share</i></p> <p><i>AM Peak – %PT mode share</i></p>	<p>10% - for active modes (Recommended Option)</p> <p>8% - for active modes (Do-min Option)</p> <p>5% - for PT (Recommended Option)</p> <p>2% - for PT (Do-min Option)</p>	<p>There is a 2% increase (percentage points) in active modes trips in the Recommended option compared to the Do-min option.</p> <p>There is a 3% increase (percentage points) in PT trips in the Recommended option compared to the Do-min option.</p>
PT Attractiveness	KMs of Dedicated Bus Lanes	1.1 km of dedicated bus lanes.	<p>Additionally, this KPI was measured on a per corridor basis (one-way along the corridor):</p> <ul style="list-style-type: none"> • New connection between Dairy Flat Highway and Wilks Road (1.1km)

Emissions	Absolute and per capita reduction in transport emissions as a result of the project as measured by the VEPM model	<table border="1"> <thead> <tr> <th data-bbox="601 219 735 432">Emission</th> <th data-bbox="735 219 900 432">Do-min (Yearly-2048+)</th> <th data-bbox="900 219 1088 432">Recommended (Yearly-2048+)</th> </tr> </thead> <tbody> <tr> <td data-bbox="601 432 735 528">CO₂ -eq /t</td> <td data-bbox="735 432 900 528">1,865,100</td> <td data-bbox="900 432 1088 528">1,863,100</td> </tr> </tbody> </table>	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ -eq /t	1,865,100	1,863,100	According to the VEPM model, there is a 2,000 tonne yearly reduction in CO ₂ -eq emissions for the North Recommended transport network in 2048+.
Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ -eq /t	1,865,100	1,863,100							
Mode Shift	Mode shift from single occupancy private vehicle <i>AM Peak – %Car mode share</i>	83% - Do-min scenario 78% in Recommended Option	There is 5% mode shift (percentage points) from single occupancy private vehicles in the Recommended Option.						
Investment Objective 5: Safety									
DSI	No. of active mode incidents resulting in serious injury and deaths	0 active mode DSIs in the last 5 year period (2018-2022). However, with the expected growth in the area exposure to risks for active mode users is expected to increase. To accommodate for this increased safety risk, safe and connected walking and cycling facilities will be provided on the majority of corridors in Silverdale West/Pine Valley.	While the number of previous active mode DSIs are relatively low. The conflict risk for these users will increase in the future as there are more vehicles and active mode users on the network. This risk can be significantly reduced by providing dedicated facilities separated from traffic.						
Perceived Safety	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	17.3 km of new cycle network.	Additionally, this KPI was measured on a per corridor basis (one-way along the corridor): <ul style="list-style-type: none"> • Dairy Flat Highway (4.8 km) • East Coast Road (3.2 km) • New connection between Dairy Flat Highway and Wilks Road (2.0 km) • Wilks Road (0.7km) 						

			<ul style="list-style-type: none">• RTN walking and cycling path (3.0km)• SH1 walking and cycling path (3.6 km)
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4 Transport Analysis

The following transport analysis sets out the transport network planning undertaken to determine the recommended corridors and intersections.

4.1 Land Use Scenarios

This summary provides an overview of the land use scenarios and assumptions used to assess the transport network.

4.1.1 Land Use Assumptions

Land use data was the main input used to inform the expected growth in transport demand, which then informed the network planning. For network planning purposes, a 2048+ (full build-out of planned development) land use scenario was used to develop the recommended network, which reflects the needs for long-term transport infrastructure.

It is acknowledged that land use forecasts have inherent uncertainty, particularly in terms of the specific rate of new growth in specific areas. Currently, there is additional uncertainty around the likely outcomes and rate and location of higher-density development sought through central Government policies such as the National Policy Statement on Urban Development (NPS-UD) and Auckland Council's Plan Change 78.

A key intent of those policies is to enable higher density development, especially around high-quality public transport systems. The specific planning response to those policies is currently being progressed by Auckland Council, and revised land use forecasts reflecting any expected changes were not available at the time of preparing this assessment. Generally, it is considered that this Project is not inconsistent with such policy direction, regarding supporting higher density urban development via more sustainable travel modes. Given this context, the use of a full build out scenario forecasts is considered acceptable for this assessment.

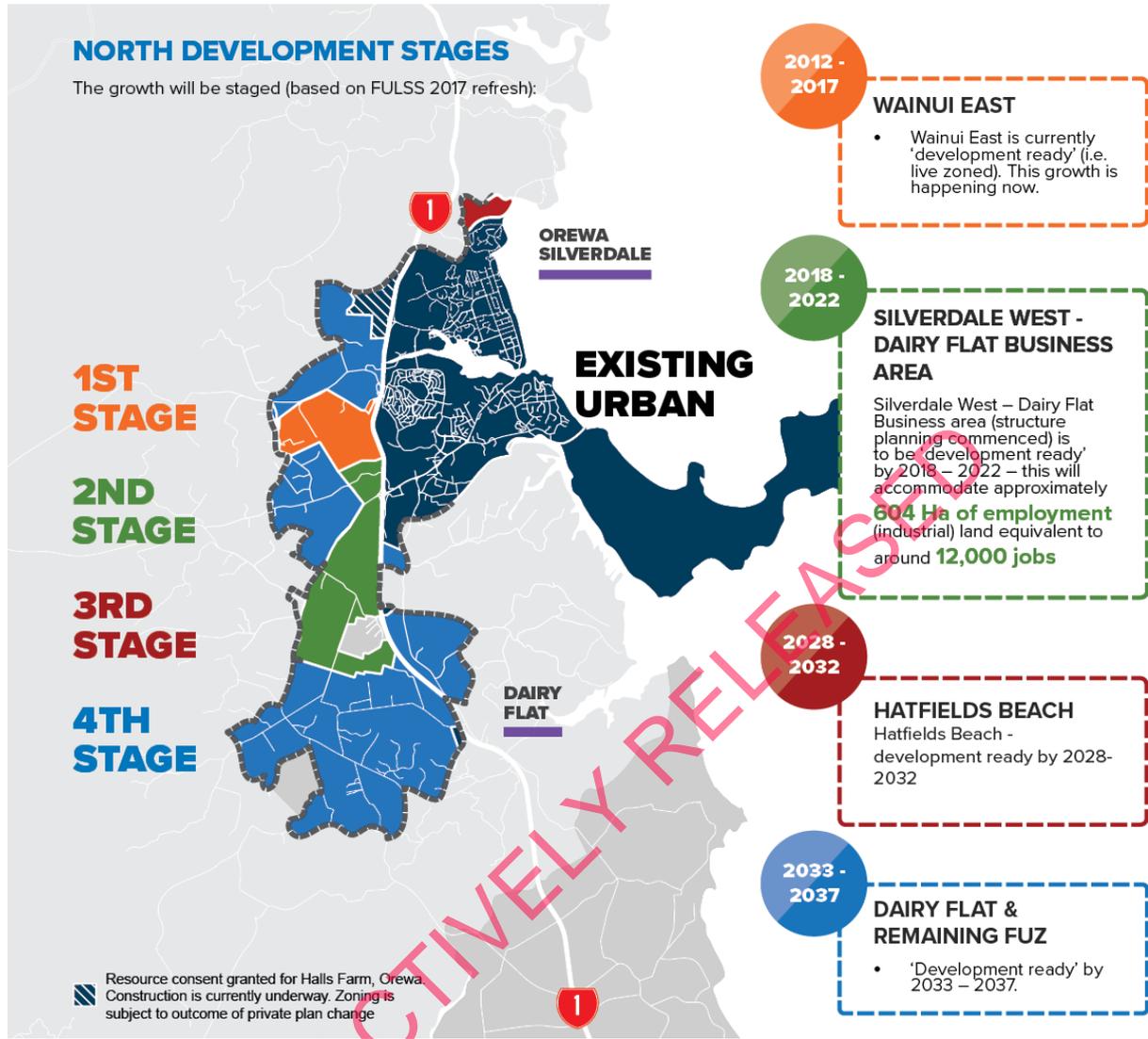
4.1.1.1 Land Use Inputs & Scenarios

The development of the land use scenarios includes inputs from future land use plans, forecasts, and policies, which includes:

- Unitary Plan Zoning
- Precinct Plans
- Council Structure Plans, such as the Silverdale West industrial area
- Outcomes identified in the Auckland Plan 2050, including for Homes and Places; Transport and Access; and Opportunity and Prosperity
- Master Planning by landowners through Private Plan Changes

A summary of planned growth and timing for each growth area in the North is set out below.

Figure 4-1: FULSS for North



4.1.1.2 Assessment Years

The development of the land use scenarios includes different analytical years to inform staging, economic assessments, and the development of the recommended network. The different assessment years and their intended use are summarised below in Table 4-1.

Table 4-1: Summary of Land Use Assessment Years

Assessment Year	Network Planning and Staging	Economic Assessments	Recommended footprint
2016*	√		
2028, 2038 & 2048 (interim years)	√√√	√√√	√
2048+ (full build-out)	√√√	√√√	√√√

relative significance low (\surd), relative significance high ($\surd\surd$) and base year reference (*)

The I-11 land use forecast series was agreed by Waka Kotahi, AT and AC as the most appropriate land use scenarios to use. This also includes the interpretation of the Future Urban Land Supply Strategy (FULSS). The inputs include Stats NZ Medium growth population forecasts and detailed demographic trends, via 64 person categories, 8 household categories, 6 employment types and 3 educational role categories.

Based on the I-11 land use forecast series, the Auckland Forecasting Centre (AFC³) created each forecast scenario used by Te Tupu Ngātahi for the interim and full build-out scenarios.

AFC created the forecasts for the North IBC and North DBC. These include the 2046+ (used in the IBC) and 2048+ (used in the DBC) datasets that include the full build-out in growth areas. Refer to Technical – North DBC Modelling Specifications for further details about the difference between IBC and DBC land use scenarios.

4.2 Transport Network Analysis

The following section describes the transport analysis undertaken to reach the recommended network for the North DBC. This includes the network, corridor and intersection assessments undertaken, including:

- AT's Roads and Streets Framework (RASf)
- The Corridor Form Assessment Framework (CFAF)
- Cross-Section Design
- Intersection Form and Function.
- Intersection Design

4.2.1 Transport Modelling

Throughout the transport network analysis process, a range of different transport modelling tools have been used to undertake quantitative assessments of the transport system. These then inform decisions about planning transport network, corridors, and intersections.

The modelling methodology undertaken for the North DBC options follows a typical hierarchical modelling structure and utilises a range of models as detailed below.

Strategic multi-modal model

- MSM is a regional multi-modal model for Auckland, which translates land use (such as population and employment) to travel patterns (which creates estimates of car, truck and public transport movements) at a strategic and region-wide level.
- MPT is the Regional Public Transport Model linked with MSM to provide public transport forecasts.
- The MSM model provides the demand response for the projects

EMME Traffic model

- This uses the traffic demands from MSM on a more detailed representation of the road network, and much disintegrated zone system

³ AFC = Auckland Forecasting Centre, which is a collaboration between Auckland Council, Auckland Transport and the NZ Transport Agency

- The traffic model in Emme is developed from the MSM network by adding more details to the network from traffic perspective

Active Modes model

- The AFC Strategic Active Modes Model (SAMM) provides strategic-level estimates of walking and cycling demands.
- Te Tupu Ngātahi active modes station access model, this tool is only used to provide estimates of walking and cycling to major stations.

Intersection modelling

- SIDRA modelling has been undertaken to assess the operational performance of key intersections along the project corridors. The demand was informed by the SATURN models.

The North DBC Modelling Specifications provides more model specifications and details for each respective model package used.

4.2.2 Roads and Streets Framework (RASF)

The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority.

The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

Each corridor within the North DBC was assessed based on the following:

- **Place function** – for existing and long term 2048+
- **Movement function** – for existing and long term 2048+
- **Modal priority** – that reflect a 2048+ environment.

The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor. This in turn will be used to inform future development and operation of the corridor. A 'mandate' for each road corridor has been developed by Te Tupu Ngātahi and approved by the RASF Steering Group, comprising senior officers from Auckland Transport and Auckland Council.

RASF mandates were completed for corridors that fall under the jurisdiction of Auckland Transport.

Since the release of the RASF, Waka Kotahi NZ Transport Agency (Waka Kotahi) has released a similar framework called the One Network Framework. The One Network Framework (ONF) can be used to identify the place and movement functions of roads and streets throughout the New Zealand network for both rural and urban environments. The ONF has more tiers when scoring the respective place and movement functions of a corridor. The framework has five tiers for place and movement, while the RASF has three.

4.2.3 Corridor Form Assessment Framework

The Corridor Form Assessment Framework (CFAF) has been designed by Te Tupu Ngātahi to provide a consistent methodology to define the desired corridor form and function requirements and ensure all

modes are considered. The CFAF assessments were completed for all multi-modal corridors within the North recommended network.

The CFAF output recommends traffic capacity, bus priority measures, walking and cycling facilities and other corridor elements which influence the corridor footprint. All modes are considered in the development of the cross-section, however facilities for all modes may not necessarily be provided. The resulting cross-section forms the basis for route protection for the corridor.

The form and function of a corridor is determined using a combination of 'place' and 'movement' significance on the individual setting:

- **Place factors** consider the existing land use, future land use plans and trip generators present in the catchment area. It also includes an assessment of the future density of residential, industrial or mixed land use and local/regional trip attraction areas e.g. metro stations, schools, hospitals.
- **Movement factors** consider the hierarchy of the corridor in the regional road network (PT network, strategic freight network), modal priorities for the corridor and existing and future traffic volumes to determine the future typology and recommendations for a corridor function. Movement is considered at both local and network levels to ensure that duplication of facilities is avoided and the corridors have targeted modal functions.

Table 4-2 provides a summary of the inputs and outputs of the CFAF tool used during the assessment.

Table 4-2: Inputs and Outputs of the CFAF tool

Inputs	Modelling inputs required	Parameters	Outputs	Impact on modelling
Place and corridor function	No	Qualitative assessment based on the Roads and Streets Framework (RASf)	Determines the purpose of the route and feeds into wider modal priority assessment	N/A
Public transport	No	AT Remix File ⁴	Public transport priority	No
Walking and cycling	No	Te Tupu Ngātahi primary and secondary walking and cycling network used, based on urban design framework	Helps with geometric design, determining suitable paths and which sides to include the facility	Chosen facility type for different corridors coded into SAMM
General traffic	Yes	ADT volumes used, extracted from EMME.	If PT priority needed, helps determine whether corridor is route protected for 2 or 4 lanes'	Number of lanes included in MSM, used for EMME outputs

⁴ Te Tupu Ngātahi Remix File refers to the Auckland Transport vision of the 2048+ bus network. Data and routes are subject to change.

Freight	Yes	User Class 3 (heavy vehicles) divided by total of all user classes (all vehicles) to determine the percentage of freight. Data extracted from EMMME.	Informs role within wider freight network and whether specific freight measures are needed along corridor'	Yes
Speed Environment	No	Assumption based on RASF and future land use. Parameters for high and low speed based on the IBC design philosophy	High level assessment concludes a low speed of 50/60km/h or a high speed of 80km/h. These are the base assumptions for the speed, subject to vary through the DBC Optioneering process	Speed along each network included in MSM, used for EMME outputs

4.2.4 Type A Business Case and Constrained Corridors/Segments

The output from the CFAF process indicates the necessary width required to provide a Te Tupu Ngātahi cross section and subsequently meet the outcomes sought by the Alliance. However, due to physical and environmental constraints, not all of the corridors on the North recommended network can accommodate the identified CFAF cross-section.

These corridors include:

- Hibiscus Coast Highway/Grand Drive – **Type A Business Case**
- East Coast Road – **Updated Te Tupu Ngātahi cross section**
- Dairy Flat Highway – Albany to Dairy Flat - **Updated Te Tupu Ngātahi cross section**

For Hibiscus Coast Highway/Grand Drive it was found that there was sufficient width in the carriageway to allow for a reallocation of space to achieve the desired outcomes sought by Te Tupu Ngātahi. However, due to the complex interactions with property access and need to consider compromised design standards, this can be considered as part of a single stage business case with a more detailed level of design.

For East Coast Road and Dairy Flat corridors, the rural sections have significant geometric constraints therefore a constrained cross section was considered for both these projects. It should be noted that NoRs are still proposed for these two corridors.

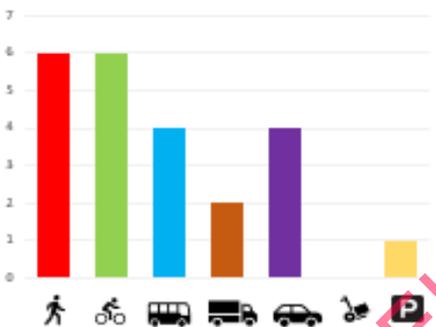
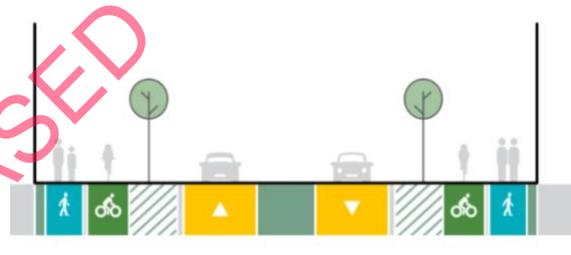
The Jackson Way corridor was considered through the CFAF process, however the expected traffic volumes along the corridor results in the corridor performing a collector function within the network. Hence, the corridor was removed from scope with the expectation that it will be delivered through private developers in conjunction with Auckland Transport.

4.2.4.1 North Local Transport Corridors

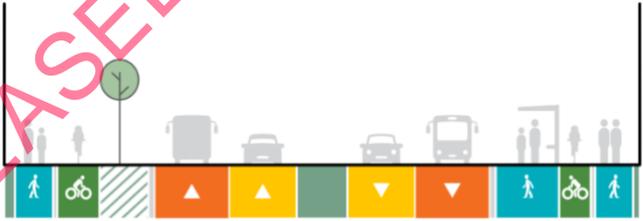
The following table provides a summary of the RASF mandates and CFAF results for the North local transport corridors. The future typology (movement and place value) and future modal priority for each corridor is summarised below, along with the proposed future cross-section from the CFAF process. A fuller description of the CFAF summary can be found in Appendix 1.

Wainui Road – Argent Lane to the Wainui Road Bridge	Future Modal Priority	CFAF Cross-section
<p>Future Typology: P2/M3</p>		<p style="text-align: center;">Indicative 24m cross section</p>
<p>Place Assessment: The supporting rationale is that the corridor sits within the FUZ and adjacent to the Milldale development.</p>		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to the location of the corridor adjacent to the motorway. This will increase the demand along the corridor for strategic trips from adjacent growth areas.</p>		

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Pine Valley Road	Future Modal Priority	CFAF Cross-section
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale is that the corridor sits within the FUZ and adjacent to the Silverdale – West Dairy Flat Industrial Area just to the east. It should also be noted that a proposed RTN station is located along Pine Valley Road.</p> <p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to public transport as the corridor has an RTN station. Accordingly, this will increase the demand along the corridor for strategic trips from adjacent growth areas.</p>		 <p style="text-align: center;">Indicative 24m cross section</p>
<p>Future Typology: P1/M3</p> <p>Place Assessment: The supporting rationale is that this segment of Dairy Flat Highway is expected to be predominately light industry with few major attractors.</p> <p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, for private vehicles due to the location of the Silverdale Interchange and freight due to the adjacent Silverdale West Dairy Flat area.</p>		 <p style="text-align: center;">Indicative 30m cross section</p>

Dairy Flat Highway (2) – Wilks Road to Richards Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p>	<table border="1"> <caption>Future Modal Priority Data (Dairy Flat Highway 2)</caption> <thead> <tr> <th>Mode</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>4</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>4</td> </tr> <tr> <td>Truck</td> <td>6</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Scooter</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority	Pedestrian	4	Bicycle	5	Bus	4	Truck	6	Car	5	Scooter	1	Parking	0	<p>Protect for a Rural Two-Lane – 29m cross-section with swale (provides flexibility for a Four Lane – 30m cross-section if required)</p>
Mode		Priority																
Pedestrian		4																
Bicycle	5																	
Bus	4																	
Truck	6																	
Car	5																	
Scooter	1																	
Parking	0																	
<p>Place Assessment: The supporting rationale is that this segment of Dairy Flat Highway is expected to be predominately light industry with few major attractors.</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, for freight due to the adjacent Silverdale West Dairy Flat area.</p>																		
Dairy Flat Highway (3) – Richards Road to Blackbridge Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p>	<table border="1"> <caption>Future Modal Priority Data (Dairy Flat Highway 3)</caption> <thead> <tr> <th>Mode</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>6</td> </tr> <tr> <td>Bicycle</td> <td>6</td> </tr> <tr> <td>Bus</td> <td>6</td> </tr> <tr> <td>Truck</td> <td>2</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Scooter</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority	Pedestrian	6	Bicycle	6	Bus	6	Truck	2	Car	4	Scooter	1	Parking	0	<p>Indicative 24m cross section</p>
Mode		Priority																
Pedestrian		6																
Bicycle	6																	
Bus	6																	
Truck	2																	
Car	4																	
Scooter	1																	
Parking	0																	
<p>Place Assessment: The supporting rationale is that the majority of this segment of Dairy Flat Highway is expected to be residential.</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to public transport and active modes serving the town centre.</p>																		

Dairy Flat Highway (4) – Blackbridge Road to Bawden Road	Future Modal Priority	CFAF Cross-section
<p>Future Typology: P1/M3 (P2/M3 - adjacent to the town centre)</p>		 <p style="text-align: center;">Indicative 30m cross section</p>
<p>Place Assessment: Given, the lack of structure planning within the area. The assessment of place along the corridor does lack some granularity as the specific location of the town centre is still to be defined. Hence, an overall score of P1 was selected for this segment, as the majority of the corridor is P1 (residential) with a small portion of P2 (town centre).</p>		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to public transport and active modes serving the town centre.</p>		

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Dairy Flat Highway (5) – Bawden Road to Durey Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3 (P2/M3 - adjacent to the town centre)</p>	<table border="1"> <caption>Future Modal Priority Scores</caption> <thead> <tr> <th>Mode</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>6</td> </tr> <tr> <td>Bicycle</td> <td>6</td> </tr> <tr> <td>Bus</td> <td>6</td> </tr> <tr> <td>Truck</td> <td>2</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Score	Pedestrian	6	Bicycle	6	Bus	6	Truck	2	Car	4	Motorcycle	1	Parking	0	<p>Indicative 30m cross section</p>
Mode		Score																
Pedestrian		6																
Bicycle	6																	
Bus	6																	
Truck	2																	
Car	4																	
Motorcycle	1																	
Parking	0																	
<p>Place Assessment: Given, the lack of structure planning within the area. The assessment of place along the corridor does lack some granularity as the specific location of the town centre is still to be defined. Hence, an overall score of P1 was selected for this segment, as the majority of the corridor is P1 (residential) with a small portion of P2 (town centre).</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to public transport and active modes serving the town centre.</p>																		

PROACTIVELY RELEASED

Dairy Flat Highway (6) – Durey Road to Albany Village	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Value</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>3</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>3</td> </tr> <tr> <td>Truck</td> <td>2</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority Value	Pedestrian	3	Bicycle	5	Bus	3	Truck	2	Car	5	Motorcycle	1	Parking	0	<p>Rural Two-Lane Arterial – 19.1m (agreed with AT-constrained sections)</p> <p>Rural Two-Lane Arterial – 25m (agreed with AT-unconstrained sections)</p>
Mode		Priority Value																
Pedestrian		3																
Bicycle	5																	
Bus	3																	
Truck	2																	
Car	5																	
Motorcycle	1																	
Parking	0																	
<p>Place Assessment: The supporting rationale is that this segment of Dairy Flat Highway is predominately comprised of rural land use.</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth to the north and south of the segment there will be an increased throughput for all modes travelling along this segment of Dairy Flat Highway.</p>																		

PROACTIVELY RELEASED

New Link Road connecting Kahikatea Road to Postman Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale is that the corridor sits within the heart of the Silverdale – West Dairy Flat Industrial Area and includes land uses such as light and heavy industry.</p> <p>Movement Assessment: The rationale for the M3 assessment is that the corridor forms an east-west connection through the centre of the Silverdale West - Dairy Flat Industrial Area. Hence, the link has a high strategic significance for freight and general traffic.</p>	<table border="1"> <caption>Future Modal Priority Data (Kahikatea Road to Postman Road)</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>3</td> </tr> <tr> <td>Bicycle</td> <td>4</td> </tr> <tr> <td>Bus</td> <td>4</td> </tr> <tr> <td>Truck</td> <td>6</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	3	Bicycle	4	Bus	4	Truck	6	Car	4	Motorcycle	1	Parking	1	<p style="text-align: center;">Indicative 24m cross section</p>
Mode	Priority Score																	
Pedestrian	3																	
Bicycle	4																	
Bus	4																	
Truck	6																	
Car	4																	
Motorcycle	1																	
Parking	1																	
New Link Road connecting Postman Road to Wilks Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale is that the corridor sits within the heart of the Silverdale – West Dairy Flat Industrial Area and includes land uses such as light and heavy industry.</p> <p>Movement Assessment: The rationale for the M3 assessment is that the corridor forms an east-west connection through the centre of the Silverdale West - Dairy Flat Industrial Area. Hence, the link has a high strategic significance for freight and general traffic.</p>	<table border="1"> <caption>Future Modal Priority Data (Postman Road to Wilks Road)</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>3</td> </tr> <tr> <td>Bicycle</td> <td>4</td> </tr> <tr> <td>Bus</td> <td>1</td> </tr> <tr> <td>Truck</td> <td>6</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	3	Bicycle	4	Bus	1	Truck	6	Car	5	Motorcycle	1	Parking	1	<p style="text-align: center;">Indicative 30m cross section</p>
Mode	Priority Score																	
Pedestrian	3																	
Bicycle	4																	
Bus	1																	
Truck	6																	
Car	5																	
Motorcycle	1																	
Parking	1																	

East Coast Road (1) – Hibiscus Coast Highway to Newman Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>5</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>4</td> </tr> <tr> <td>Truck</td> <td>4</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	4	Truck	4	Car	4	Motorcycle	1	Parking	0	<p style="text-align: center;">Indicative 24m cross section</p>
Mode		Priority Score																
Pedestrian		5																
Bicycle	5																	
Bus	4																	
Truck	4																	
Car	4																	
Motorcycle	1																	
Parking	0																	
<p>Place Assessment: The place function has been assessed as P2. The land use within this segment of East Coast Road is not expected to dramatically change over the next 30 years. There is uncertainty around the levels of intensification that is expected within the area.</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. East Coast Road will remain an important north-south connection between Silverdale and Albany. In addition, the corridor provides an alternative connection between these areas without the need to travel via SH1.</p>																		

PROACTIVELY RELEASED

East Coast Road (2) -Newman Road to Jackson Way	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>4</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>3</td> </tr> <tr> <td>Truck</td> <td>2</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Motorcycle</td> <td>1</td> </tr> <tr> <td>Other</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	4	Bicycle	5	Bus	3	Truck	2	Car	4	Motorcycle	1	Other	1	<p>Indicative 29m cross section</p>
Mode		Priority Score																
Pedestrian		4																
Bicycle	5																	
Bus	3																	
Truck	2																	
Car	4																	
Motorcycle	1																	
Other	1																	
<p>Place Assessment: The supporting rationale is that this segment of East Coast Road is predominately comprised of rural land use.</p>																		
<p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth to the north and south of this segment, there will be an increased throughput for all modes accessing these areas. East Coast Road will remain an important north-south connection between Silverdale and Albany. In addition, the corridor provides an alternative connection between these areas without the need to travel via SH1.</p>																		

PROACTIVELY RELEASED

East Coast Road (3) – Jackson Way to Penlink Interchange	Future Modal Priority	CFAF Cross-section														
<p>Future Typology: P2/M2</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>5</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>1</td> </tr> <tr> <td>Truck</td> <td>2</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	1	Truck	2	Car	4	Parking	1	<p style="text-align: center;">Indicative 24m cross section</p>
Mode		Priority Score														
Pedestrian		5														
Bicycle	5															
Bus	1															
Truck	2															
Car	4															
Parking	1															
<p>Place Assessment: Given, the lack of structure planning within the area. The assessment of place along this segment of East Coast Road lacks some granularity. It is expected that within the future urban land use there will be several attractors that attract people from other areas within the Northern growth area.</p>																
<p>Movement Assessment: The rationale for the M2 assessment is that with the expected urban growth (sub-regional attractors) adjacent to the corridor there will be increased demand for all modes along the segment. East Coast Road will remain an important north-south connection between Silverdale and Albany. In addition, the corridor provides an alternative connection between these areas without the need to travel via SH1.</p>																

PROACTIVELY RELEASED

Bawden Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: Given, the lack of structure planning within the area. The assessment of place along the corridor does lack some granularity as the specific location of the RTN station is still to be defined. Hence, an overall score of P2 was selected for Bawden Road, as some portions of the corridor will be P1 (residential) and P3 (RTN station).</p> <p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be an increased throughput for all modes. Particularly, in regard to public transport as the corridor is an FTN and will have an RTN station. Accordingly, this will increase the demand along the corridor for strategic trips from adjacent growth areas.</p>	<table border="1"> <caption>Future Modal Priority Scores</caption> <thead> <tr> <th>Mode</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>Walking</td> <td>6</td> </tr> <tr> <td>Bicycling</td> <td>6</td> </tr> <tr> <td>Public Transport</td> <td>6</td> </tr> <tr> <td>Trucks</td> <td>1</td> </tr> <tr> <td>Cars</td> <td>5</td> </tr> <tr> <td>Motorcycles</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Score	Walking	6	Bicycling	6	Public Transport	6	Trucks	1	Cars	5	Motorcycles	1	Parking	0	<p>Indicative 30m cross section</p>
Mode	Score																	
Walking	6																	
Bicycling	6																	
Public Transport	6																	
Trucks	1																	
Cars	5																	
Motorcycles	1																	
Parking	0																	

PROACTIVELY RELEASED

Grand Drive to Wainui Road –Hall Farm development Town Centre to Wainui Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M2</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>4</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>4</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Stroller</td> <td>1</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	4	Bicycle	5	Bus	4	Truck	1	Car	4	Stroller	1	Parking	0	<p style="text-align: center;">Indicative 24m cross section</p>
Mode		Priority Score																
Pedestrian		4																
Bicycle	5																	
Bus	4																	
Truck	1																	
Car	4																	
Stroller	1																	
Parking	0																	
<p>Place Assessment: The supporting rationale is that the corridor sits within the FUZ. It should be noted that a large residential development is proposed at the northern end of the corridor.</p>																		
<p>Movement Assessment: The rationale for the M2 assessment is that with the expected urban growth (sub-regional attractors) adjacent to the corridor there will be an increased throughput for all modes. The adjacent growth will increase the demand for both local trips within Milldale and strategic trips from adjacent growth areas.</p>																		

PROACTIVELY RELEASED

Wilks Road	Future Modal Priority	CFAF Cross-section
<p>Future Typology: P1/M2</p> <p>Place Assessment: The supporting rationale is that there are no major trip attractors along the corridor.</p> <p>Movement Assessment: The rationale for the M2 assessment is that the corridor will form a direct connection between the FUZ on the eastern side of SH1 to the SH1 on-ramp at the Wilks Road Interchange.</p>		<p style="text-align: center;">Indicative 30m cross section</p>
<p>Future Typology: P1/M2</p> <p>Place Assessment: The place function has been assessed as P1, which the (draft) RASF Refresh describes as a 'Predominantly local function, with a small catchment of users (number and distance travelled). The corridor is expected to serve residential growth within the FUZ.</p> <p>Movement Assessment: The rationale for the M2 assessment is that with the expected urban growth (FUZ) adjacent to the corridor there will be an increased throughput for all modes. In addition, the corridor provides a key east-west link between the FUZ on both sides of SH1.</p>		<p style="text-align: center;">Indicative 24m cross section</p>

4.2.5 Intersection Form and Function

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

For the purposes of the intersection assessment the following factors were considered:

- Safety.
- Transport network function (movement) and land use function (place).
- Form and Level of Service (LOS)/ Quality of service required for different modes.
- Land use integration.
- Site specific constraints.
- Design constraints.
- Roundabout vs signals guidance.
- Network staging and route protecting.
- Future land used assumptions.
- Future transport network assumptions.

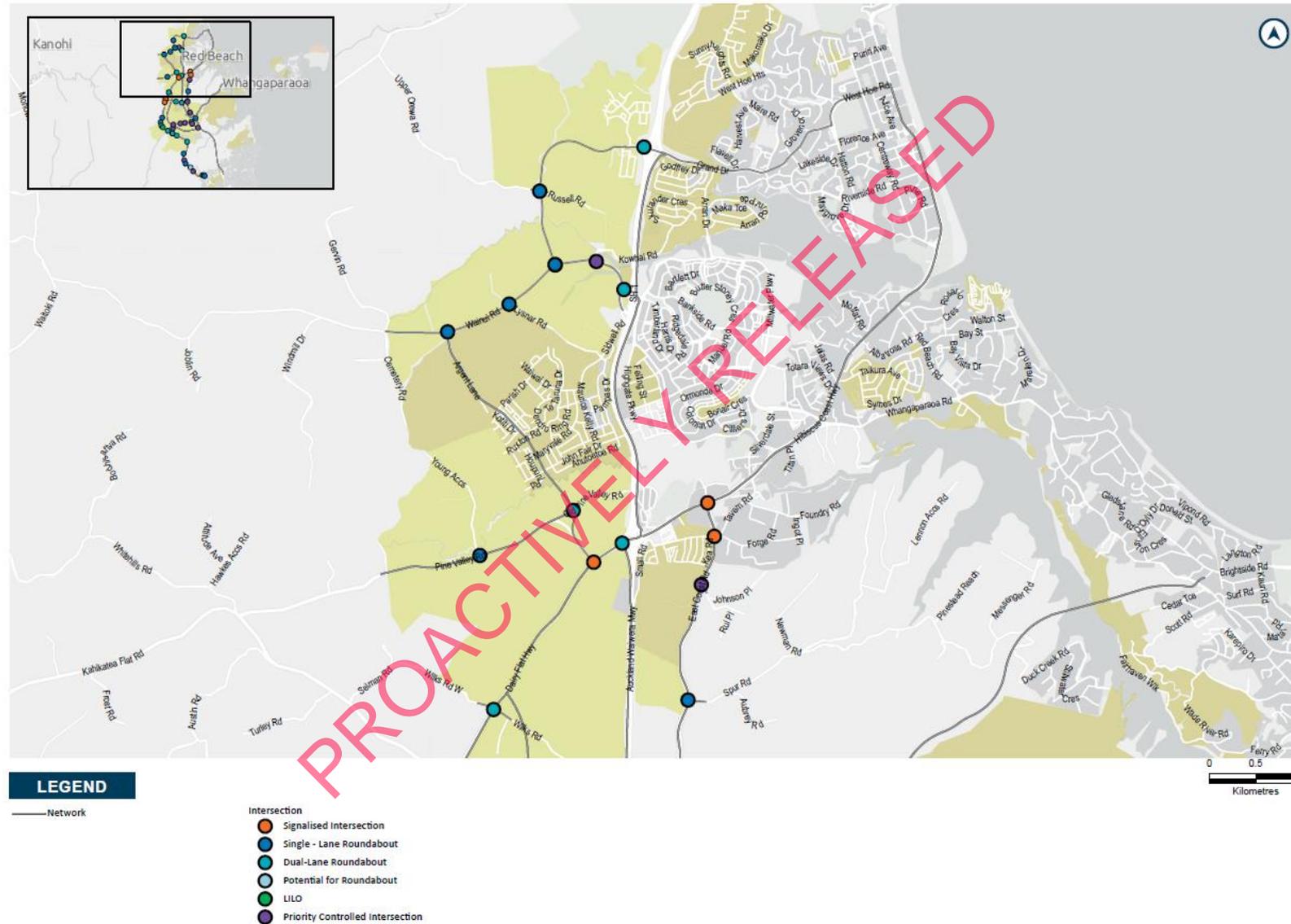
For each intersection control chosen, design features were also considered to ensure that the intersection meets the needs of different users safely and effectively and responds to the site-specific factors. The guidance adopts a 'Safe System' approach and recommends roundabouts as the first choice for at-grade intersections due to the safety benefits for vehicular traffic resulting from slowing down through traffic and reducing the number of conflict points. However, where roundabouts are not considered appropriate for example due to engineering constraints or land use implications, signalised intersections were then considered.

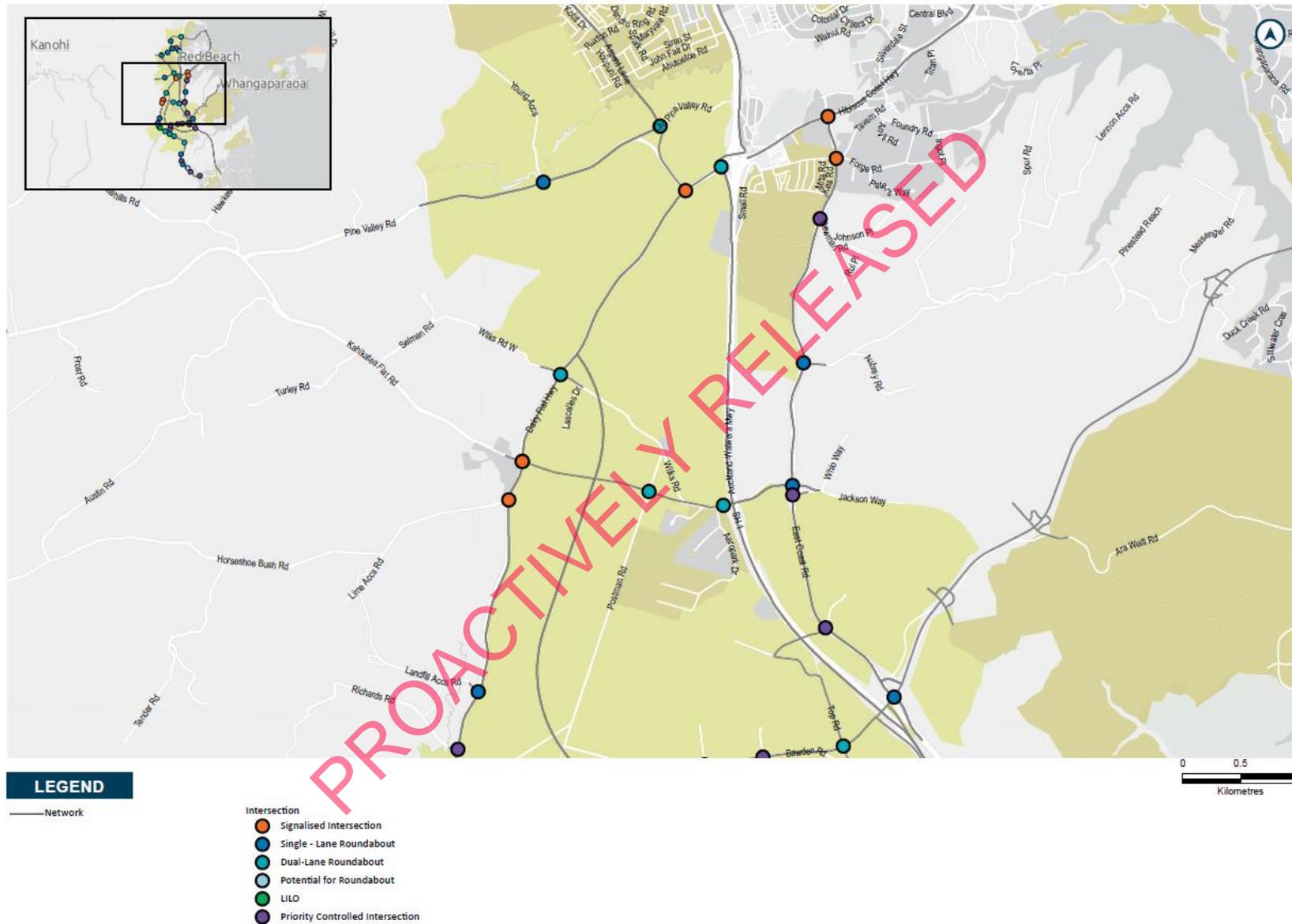
Currently, there are approximately 52 intersections within the extents of the North DBC corridors. The intersection assessments have been consolidated to consider the key intersections – specifically Arterial to Arterial or Arterial to Collector roads. Intersections with a local road are generally priority-controlled intersections and are assumed to remain priority-controlled intersections in the future.

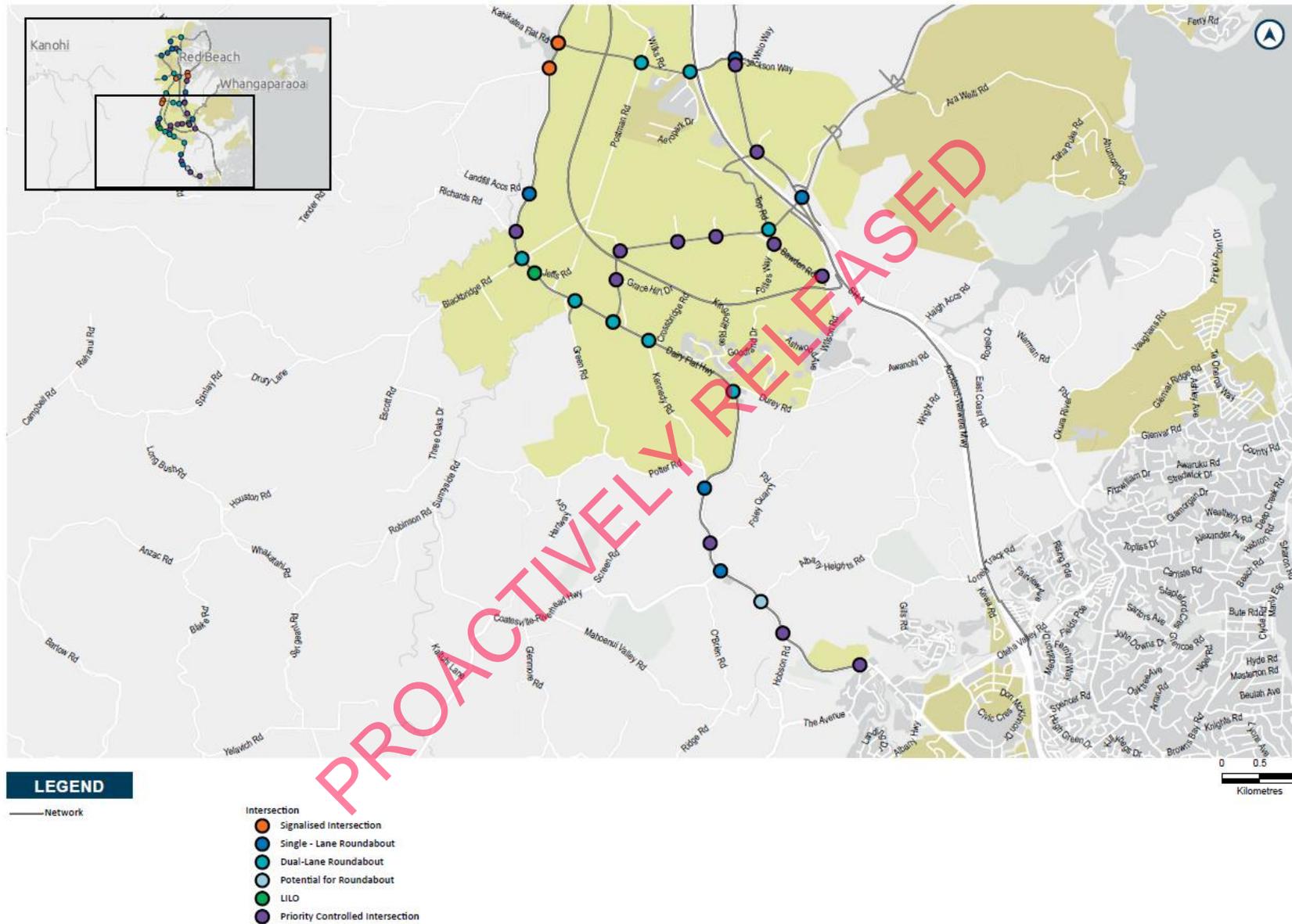
SIDRA modelling was undertaken to inform the intersection size requirements. It should be noted that in some cases modelling constraints resulted in limited turning volumes. In these cases, high level assumptions on likely turning movements were utilised.

Appendix 2 offers a summary of the proposed intersection forms and the associated modelling results for 2048+ for the relevant intersections that have been tested.

4.2.5.1 North Intersections



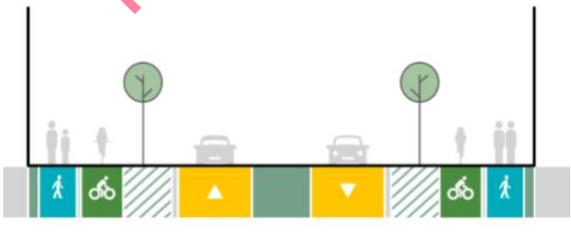




Appendix 1: North Form & Function

Form & Function for North Local Corridors

Table A1.1: Form & Function for Local North Transport Corridors

Wainui Road – Argent Lane to Wainui Road Bridge	CFAF Summary
 <p style="text-align: center;">Indicative 24m cross section</p>	<p>Purpose of Corridor: Wainui Road forms an important east-west connection for all modes on the edge of the proposed Milldale town centre. Additionally, the corridor connects to SH1 and the growth area of Millwater.</p> <p>General Vehicle Volume: ADT 13,800 in 2048</p> <p>Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Not expected to have significant freight role in the future</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>
Pine Valley Road	CFAF Summary
 <p style="text-align: center;">Indicative 24m cross section</p>	<p>Purpose of Corridor: Pine Valley Road cuts through the centre of the Silverdale West growth area. The corridor forms an east-west connection for all modes between Kahikatea Flat Road and the new Argent Lane Connection that runs through Milldale. Additionally, the corridor provides connects to the rural towns of Helensville and Kaukapakapa.</p> <p>General Vehicle Volume: ADT 16,800 in 2048</p> <p>Priority Vehicle: 0 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Not considered to have a key strategic freight role</p>

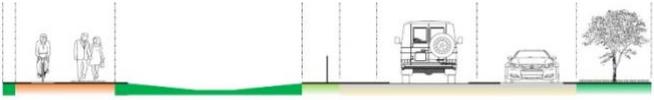
	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>
<p>Dairy Flat Highway (1) – Silverdale Interchange to Wilks Road</p>	<p>CFAF Summary</p>
 <p>Indicative 30m cross section</p>	<p>Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p> <p>General Vehicle Volume: ADT 20,200 in 2048</p> <p>Priority Vehicle: 18 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Level 1B freight route as part of AT strategic freight plan</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>
<p>Dairy Flat Highway (2) – Wilks Road to Richards Road</p>	<p>CFAF Summary</p>
 <p>Protect for a Rural Two-Lane – 29m cross-section with swale (provides flexibility for a Four Lane – 30m cross-section if required)</p>	<p>Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p>

	<p>General Vehicle Volume: ADT 15,700 in 2048</p> <p>Priority Vehicle: 12 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Level 1B freight route as part of AT strategic freight plan</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on one side</p> <p>Speed Environment: 60kph</p> <p>Parking and Access: Property access; no parking</p>
<p>Dairy Flat Highway (3) –Richards Road to Blackbridge Road</p>	<p>CFAF Summary</p>
 <p style="text-align: center;">Indicative 24m cross section</p>	<p>Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p> <p>General Vehicle Volume: ADT 15,700 in 2048</p> <p>Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Recommended that this corridor be considered by AT as part of freight network as the corridor provides access to the Silverdale West-Dairy Flat Industrial area.</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>

Dairy Flat Highway (4) –to Blackbridge Road to Bawden Road	CFAF Summary
 <p data-bbox="379 770 708 797">Indicative 30m cross section</p>	<p>Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p>
	<p>General Vehicle Volume: ADT 24,800 in 2048</p>
	<p>Priority Vehicle: 16 buses per hour under indicative 2048 AT bus network</p>
	<p>Freight: Recommended that this corridor be considered by AT as part of freight network as the corridor provides access to the Silverdale West-Dairy Flat Industrial area. Additionally, this portion of Dairy Flat Highway also includes access to Bawden Road which connects to Penlink and north/south facing ramps to SH1.</p>
	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p>
	<p>Active Modes: Separated cycle lanes and footpaths on both sides</p>
	<p>Speed Environment: 50kph</p>
<p>Parking and Access: Property access; no parking</p>	

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Dairy Flat Highway (5) –Bawden Road to Durey Road	CFAF Summary
 <p data-bbox="379 768 708 792">Indicative 30m cross section</p>	<p data-bbox="906 282 1390 584">Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. The corridor forms the boundary of the western portion of the FUZ and Silverdale West - Dairy Flat Industrial Area. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p> <p data-bbox="906 618 1358 678">General Vehicle Volume: ADT 24,800 in 2048</p> <p data-bbox="906 712 1366 772">Priority Vehicle: 20 buses per hour under indicative 2048 AT bus network</p> <p data-bbox="906 806 1385 1077">Freight: Recommended that this corridor be considered by AT as part of freight network as the corridor provides access to the Silverdale West-Dairy Flat Industrial area. Additionally, this portion of Dairy Flat Highway also includes access to Bawden Road which connects to Penlink and north/south facing ramps to SH1.</p> <p data-bbox="906 1111 1358 1171">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p data-bbox="906 1205 1366 1265">Active Modes: Separated cycle lanes and footpaths on both sides</p> <p data-bbox="906 1299 1219 1328">Speed Environment: 50kph</p> <p data-bbox="906 1361 1369 1422">Parking and Access: Property access; no parking</p>
Dairy Flat Highway (6) –Durey Road to Albany Village	CFAF Summary
 <p data-bbox="268 1816 836 1877">Rural Two-Lane Arterial – 19.1m (agreed with AT-constrained sections)</p>	<p data-bbox="916 1529 1377 1765">Purpose of Corridor: Dairy Flat Highway forms an important north-south connection on the North network. Additionally, the connection provides a good level of resilience to the rest of the network, as it can be used as an alternative to SH1 if needed.</p> <p data-bbox="916 1798 1366 1859">General Vehicle Volume: ADT 18,500 in 2048</p> <p data-bbox="916 1892 1377 1953">Priority Vehicle: 12 buses per hour under indicative 2048 AT bus network</p>

 <p>Rural Two-Lane Arterial – 25m (agreed with AT-unconstrained sections)</p>	<p>Freight: Not considered to have a key strategic freight role</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on one side</p> <p>Speed Environment: 60kph</p> <p>Parking and Access: Property access; no parking</p>
<p>New Link Road – Kahikatea Flat Road to Postman Road (1) CFAF Summary</p>	
 <p>Indicative 24m cross section</p>	<p>Purpose of Corridor: The corridor provides an east-west connection through the centre of the Silverdale West - Dairy Flat Industrial Area. Additionally, the corridor forms an important link between the Industrial Area and SH1.</p> <p>General Vehicle Volume: ADT 16,000 in 2048</p> <p>Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Recommended that this corridor be considered by AT as part of freight network as the corridor provides access to SH1 from Silverdale West-Dairy Flat Industrial area.</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>

PROACTIVELY REVIEWED

New Link Road – Postman Road to Wilks Road (2)

CFAF Summary



Indicative 30m cross section

Purpose of Corridor: The corridor provides an east-west connection through the centre of the Silverdale West - Dairy Flat Industrial Area. Additionally, the corridor forms an important link between the Industrial Area and SH1.

General Vehicle Volume: ADT 30,400 in 2048

Priority Vehicle: 0 buses per hour under indicative 2048 AT bus network

Freight: Recommended that this corridor be considered by AT as part of freight network as the corridor provides access to SH1 from Silverdale West-Dairy Flat Industrial area.

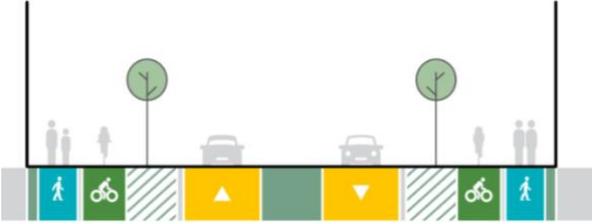
Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (None/None) (Potential freight lanes)

Active Modes: Separated cycle lanes and footpaths on both sides

Speed Environment: 50kph

Parking and Access: Property access; no parking

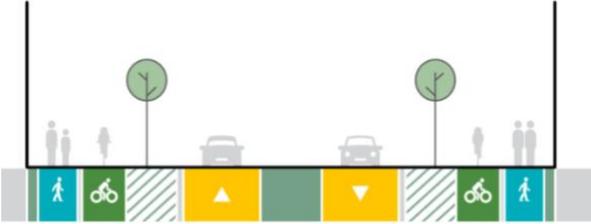
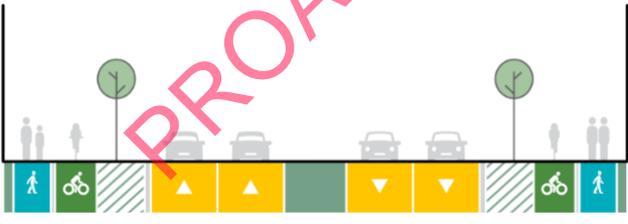
PROACTIVELY REVIEWED

East Coast Road (1) – Hibiscus Coast Highway to Newman Road	CFAF Summary
 <p data-bbox="384 775 715 801">Indicative 24m cross section</p>	<p data-bbox="919 304 1378 533">Purpose of Corridor: East Coast Road is an important north-south connection for all modes between the growth areas of Silverdale and Redvale. In addition, the corridor provides an alternative connection between these two growth areas without the need to travel via SH1.</p> <p data-bbox="919 568 1366 629">General Vehicle Volume: ADT 14,400 in 2048</p> <p data-bbox="919 665 1362 725">Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p data-bbox="919 761 1331 822">Freight: Not considered to have a key strategic freight role</p> <p data-bbox="919 857 1374 918">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p data-bbox="919 954 1378 1014">Active Modes: Separated cycle lanes and footpaths on both sides</p> <p data-bbox="919 1050 1230 1077">Speed Environment: 50kph</p> <p data-bbox="919 1113 1378 1173">Parking and Access: Property access; no parking</p>
East Coast Road (2) –Newman Road to Jackson Way	CFAF Summary
 <p data-bbox="384 1682 715 1709">Indicative 29m cross section</p>	<p data-bbox="919 1267 1378 1496">Purpose of Corridor: East Coast Road is an important north-south connection for all modes between the growth areas of Silverdale and Redvale. In addition, the corridor provides an alternative connection between these two growth areas without the need to travel via SH1.</p> <p data-bbox="919 1532 1366 1592">General Vehicle Volume: ADT 15,500 in 2048</p> <p data-bbox="919 1628 1362 1688">Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p data-bbox="919 1724 1331 1785">Freight: Not considered to have a key strategic freight role</p> <p data-bbox="919 1821 1374 1881">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p data-bbox="919 1917 1378 1977">Active Modes: Separated cycle lanes and footpaths on one side</p>

	<p>Speed Environment: 60kph</p> <p>Parking and Access: Property access; no parking</p>
<p>East Coast Road (3) –Jackson Way to Redvale Interchange</p>	<p>CFAF Summary</p>
<div data-bbox="256 629 850 853"> <p>The diagram shows a 24m wide road cross-section. From left to right, it features a sidewalk with a person icon, a green bicycle lane with a bicycle icon, a hatched area, a yellow lane with an upward-pointing triangle, a green lane, a yellow lane with a downward-pointing triangle, another hatched area, another green bicycle lane, and another sidewalk with a person icon. Two trees are positioned above the road.</p> </div> <p>Indicative 24m cross section</p>	

	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>
<p>Upper Orewa Extension (1) – Grand Drive Interchange to Hall Development Town Centre</p>	<p>CFAF Summary</p>
 <p style="text-align: center;">Indicative 30m cross section</p>	<p>Purpose of Corridor: The corridor provides a north-south connection for all modes from the growth area of Milldale to Grand Drive and Orewa.</p> <p>General Vehicle Volume: ADT 14,000 in 2048</p> <p>Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Not considered to have a key strategic freight role</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>

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Upper Orewa Extension –Hall Development Town Centre to Wainui Road	CFAF Summary
 <p data-bbox="384 786 715 815">Indicative 24m cross section</p>	<p data-bbox="919 304 1366 432">Purpose of Corridor: The corridor provides a north-south connection for all modes from the growth area of Milldale to Grand Drive and Orewa.</p> <p data-bbox="919 468 1366 528">General Vehicle Volume: ADT 13,200 in 2048</p> <p data-bbox="919 564 1366 624">Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p data-bbox="919 660 1366 721">Freight: Not considered to have a key strategic freight role</p> <p data-bbox="919 757 1366 817">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p data-bbox="919 853 1366 913">Active Modes: Separated cycle lanes and footpaths on both sides</p> <p data-bbox="919 949 1230 978">Speed Environment: 50kph</p> <p data-bbox="919 1014 1382 1075">Parking and Access: Property access; no parking</p>
Wilks Road	CFAF Summary
 <p data-bbox="384 1617 715 1646">Indicative 30m cross section</p>	<p data-bbox="919 1169 1382 1296">Purpose of Corridor: The corridor forms a direct east-west connection between the Wilks Road Interchange and East Coast Road.</p> <p data-bbox="919 1332 1366 1393">General Vehicle Volume: ADT 18,000 in 2048</p> <p data-bbox="919 1429 1366 1489">Priority Vehicle: 0 bus routes proposed under indicative 2048 AT bus network</p> <p data-bbox="919 1525 1382 1688">Freight: Recommended that this corridor be considered by AT as part of freight network as it provides access from the Silverdale West - Dairy Flat Industrial Area to Penlink.</p> <p data-bbox="919 1724 1366 1816">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Intersection proximity to interchange (~400m.))</p> <p data-bbox="919 1852 1366 1912">Active Modes: Separated cycle lanes and footpaths on both sides</p> <p data-bbox="919 1948 1230 1977">Speed Environment: 50kph</p>

	<p>Parking and Access: Property access; no parking</p>
<p>Argent Lane</p>	<p>CFAF Summary</p>
 <p>Indicative 30m cross section</p>	<p>Purpose of Corridor: The corridor cuts through the centre of the Milldale development and links Pine Valley Road and Wainui Road.</p> <p>General Vehicle Volume: ADT 28,000 in 2048</p> <p>Priority Vehicle: 18 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Level 3 freight route short term recommendation as part of AT strategic freight plan</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 4 (Yes/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>
<p>Dairy Stream Motorway Crossing</p>	<p>CFAF Summary</p>
 <p>Indicative 24m cross section</p>	<p>Purpose of Corridor: Provides a connection across SH1 between Top Road and East Coast Road. Connecting the FUZ on either side of SH1.</p> <p>General Vehicle Volume: ADT 1,400 in 2048</p> <p>Priority Vehicle: 6 buses per hour under indicative 2048 AT bus network</p> <p>Freight: Not considered to have a key strategic freight role</p> <p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p>Active Modes: Separated cycle lanes and footpaths on both sides</p> <p>Speed Environment: 50kph</p> <p>Parking and Access: Property access; no parking</p>

Appendix 2: Intersection Performance Summary

Intersection Operational Performance

Table A2.1: Intersection SIDRA Results

Intersection Summary									
Area	Intersection	Proposed Form	AM			PM			Commentary
			LOS	DOS	Delay (s)	LOS	DOS	Delay (s)	
North	Wainui Road – Argent Lane	Roundabout	B	0.727	12	B	0.849	16	Acceptable
	Wainui Road – Upper Orewa Extension	Roundabout	A	0.476	7	A	0.579	8	Acceptable
	Bawden Road – Dairy Flat Highway	Dual-lane Roundabout	A	0.682	9	C	1.021	27	Acceptable
	East Coast Road – Hibiscus Coast Highway	Signalised Intersection	C	0.834	26.4	D	0.925	54	Acceptable
	East Coast Road – Forge Road	Signalised Intersection	D	0.734	42	D	0.916	53	Acceptable
	East Coast Road – Spur Road	Roundabout	A	0.420	5	A	0.661	6	Acceptable
	East Coast Road – Wilks Road	Dual-lane Roundabout	A	0.323	7	A	0.599	9	Acceptable
	East Coast Road - Penlink	Roundabout	A	0.722	9	A	0.637	8	Acceptable
	Pine Valley Road – Argent Lane	Dual-Lane Roundabout	A	0.875	10	A	0.717	9	Acceptable
	New Link Arterial (Industrial Arterial_ Dairy Flat Highway)	Signalised Intersection	D	0.795	38	D	0.922	45	Acceptable
	New Link Arterial (Industrial Arterial_ Postman Road)	Dual-Lane Roundabout	A	0.537	9	B	0.624	11	Acceptable
	Dairy Flat Highway – Pine Valley	Signalised Intersection	D	0.714	37	D	0.924	52	Acceptable
	Dairy Flat Highway – Wilks Road	Dual-Lane Roundabout	A	0.409	6	A	0.705	8	Acceptable
	Dairy Flat Highway – Horseshoe Bush Road	Signalised Intersection	B	0.506	19	B	0.708	20	Acceptable

Intersection Summary									
Dairy Flat Highway – Blackbridge Road/Postman Road	Dual-Lane Roundabout	A	0.405	7	A	0.380	7	Acceptable	
Dairy Flat Highway – Green Road	Dual-Lane Roundabout	A	0.637	7	A	0.530	8	Acceptable	
Dairy Flat Highway – Kennedy Road	Dual-Lane Roundabout	A	0.853	5	A	0.743	7	Acceptable	
Dairy Flat Highway – Durey Road	Roundabout	A	0.848	6	B	0.797	12	Acceptable	
Dairy Flat Highway – Potter Road	Roundabout	A	0.251	7	A	0.251	5	Acceptable	
Dairy Flat Highway – Coatesville-Riverhead Highway	Dual-Lane Roundabout	B	0.950	13	B	0.813	11	Acceptable	
Dairy Flat Highway – Albany Heights Road	Roundabout	A	0.679	5	A	0.786	6	Acceptable	
Dairy Flat Highway – Hobson Road	Roundabout	A	0.696	6	A	0.664	8	Acceptable	

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