

Warkworth 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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- Appendix 3. Warkworth Type A Corridor and Intersection Design Plans

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	Warkworth Detailed Business Case
Do-min	Do-Minimum Option
FUZ	Future Urban Zone
FULSS	Future Urban Land Supply Strategy
GIS	Geographic Information System
IBC	Warkworth 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
SATURN	Meso-simulation modelling software package used for transport assessment – Simulation and Assignment of Traffic to Urban Road Network

Acronym/Term	Description
Te Tupu Ngātahi	Supporting Growth Alliance
Waka Kotahi	Waka Kotahi New Zealand Transport Agency

1 Introduction

1.1 Purpose and scope of the report

This Transport Outcomes report has been prepared by Te Tupu Ngātahi (the Supporting Growth Alliance) for the Warkworth Detailed Business Case (Warkworth DBC). Te Tupu Ngātahi 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 Warkworth.
- Provides an overview of the key transport assessments undertaken to support the optioneering process for the Warkworth recommended network including:
 - Corridor Form and Function assessments,
 - Intersection Form and Function assessments
- Provides a technical summary of key transport matters associated with the Warkworth 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 Warkworth 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 Warkworth corridors.

Section 3 summarises the investment objectives identified for the Warkworth 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:

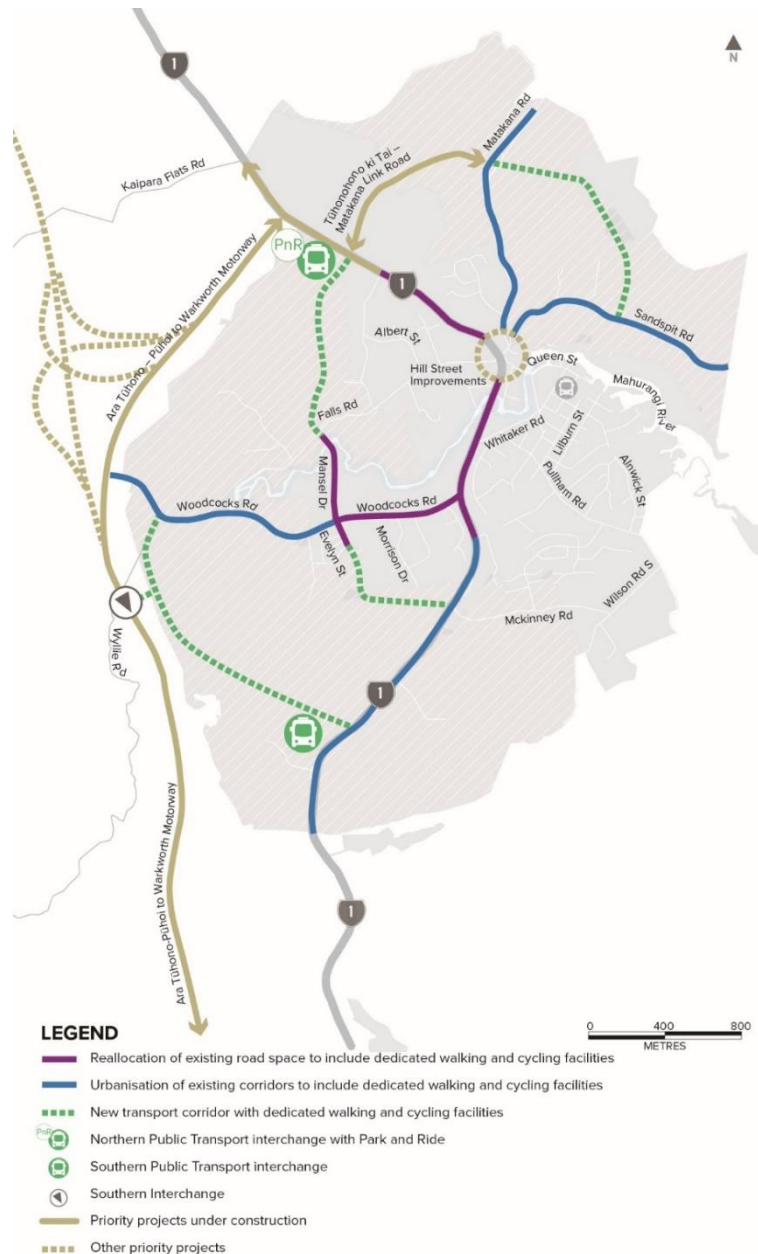
- Appendix 1: Warkworth Form & Function – summary of the form and function assessments completed for the Warkworth corridors.
- Appendix 2: Intersection Performance Summary – summary of the Sidra performance results for the key intersections on the Warkworth network.
- Appendix 3: Warkworth Type A Corridor and Intersection Design Plans – indicative corridor and intersection designs for the Warkworth Type A corridors identified through the Warkworth DBC.

2 Recommended Network

The following section outlines the recommended network for the Warkworth DBC. The recommended transport network for the Warkworth 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 infrastructure such as the Southern Interchange and Public Transport Hubs. These interventions are in response to the planned growth within Warkworth, which includes 17,100 additional people, 8,200 new houses (~7,300 in the FUZ area) and 4,600 new jobs. Further detail on the specific features of these interventions are provided in the following section.

Overall, it is considered that the Warkworth 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 below in Figure 2.1.

Figure 2-1: Warkworth Recommended Transport Network



2.1 Project Descriptions of the Warkworth Recommended Network

Table 2-1: Individual Project Descriptions of the Warkworth Recommended Transport Network

Project	Project Description and Outcome
New Northern Public Transport Interchange and Park and Ride	<ul style="list-style-type: none"> Long term provision of a public transport interchange to support a more resilient public transport system and transition to a low carbon transport network. Supports regional and interregional public transport access for northern Warkworth. Interchange to include park and ride facility to support the wider rural catchments of the Kōwhai Coast to use public transport for longer interregional trips. Will also include cycle storage, electric charging facilities and bus layover spaces to support Warkworth Town centre services.
New Southern Public Transport Interchange	<ul style="list-style-type: none"> Long term provision of a public transport interchange to support a more resilient public transport system and transition to a low carbon transport network. Interchange will provide public transport access for southern Warkworth land uses including high density residential and the new local centre. Future layover facilities will further support Warkworth Town centre services.
New Southern Interchange on Ara Tūhono Pūhoi to Warkworth Motorway	<ul style="list-style-type: none"> The new connection will provide a resilient, alternative access between the southern FUZ area and the motorway, to relieve pressure on the northern interchange, Hill Street intersection and SH1 itself. This interchange with south facing ramps will provide the opportunity to connect buses to the proposed southern public transport interchange to support people wishing to commute between Auckland and Warkworth. Additionally, it supports the Satellite Town concept of living and working locally through enabling viability of industrial land with direct motorway access for freight to future zoned industrial. It would primarily serve the southern future growth areas, while Ara Tūhono - Pūhoi to Warkworth northern connection at SH1 will continue to serve northern Warkworth, the central township and Northland-bound through traffic.
SH1 Upgrade	<ul style="list-style-type: none"> When Ara Tūhono – the Pūhoi to Warkworth motorway opens the role of the existing SH1 will change. Much of the existing traffic through Warkworth will shift from the current route and the Hill Street intersection in the central Warkworth township, allowing this part of the road to function as an urban arterial. That means it will become the main central route for public transport to connect local communities and town centres as well as the central spine for active transport choices to encourage safer cycling, and greater pedestrian access.
Woodcocks Road Upgrade	<ul style="list-style-type: none"> Urbanisation of the rural section and improvement of the existing urban sections to enable mode shift. This will be achieved through provision of safe walking and cycling facilities that connect key land uses such as Mahurangi College and contribute to a connected active mode network in Warkworth. Improved active mode facilities enables the transition to a low carbon transport network and supports the desired compact urban form.

Project	Project Description and Outcome
Matakana Road Upgrade	<ul style="list-style-type: none"> Urbanisation of the existing corridor through the provision of walking and cycling facilities to support mode choice and improve active mode safety and access from Matakana Road to Warkworth. Close integration with the Hill Street improvements to create a well-connected active mode network.
Sandspit Road Upgrade	<ul style="list-style-type: none"> Urbanisation of the existing corridor through the provision of walking and cycling facilities to support mode choice and improve active mode safety and access from Sandspit Road to Warkworth. Close integration with the Hill Street improvements to create a well-connected active mode network.
New Western Link Road – North (Mansel Drive to SH1)	<ul style="list-style-type: none"> New link designed to enable access to North Warkworth Precinct. The multimodal corridor will provide for all modes including walking and cycling facilities and potential bus priority to support its function as a public transport link. The corridor provides an alternative north south route to SH1 which will reduce the pressure on the existing SH1/Hill Street intersection. It will also provide direct connectivity to Tūhonohono ki Tai-Matakana Link Road to improve access to the Kōwhai coast and surrounding rural areas.
New Western Link Road – Central (Mansel Drive and Evelyn Street)	<ul style="list-style-type: none"> Upgrade of the existing Mansel Drive and Evelyn Street corridors to provide improved walking and cycling infrastructure. Corridor connects the north and south Western Link roads to enable continuous access between the future western residential areas and the local centre and employment opportunities.
New Western Link Road – South (Evelyn Street to SH1)	<ul style="list-style-type: none"> A new corridor to enable development in south west Warkworth and provide access to future urban land and industrial areas. This link will provide an alternative north south corridor to SH1 and help to reduce the pressure on Woodcocks Road between Mansel Drive and SH1. The multimodal corridor will have dedicated walking and cycling facilities designed to integrate with the proposed active mode facilities on SH1.
New Wider Western Link Road (Woodcocks Road to SH1)	<ul style="list-style-type: none"> The Wider Western Link is proposed as a new north-south connection between Woodcocks Road and SH1. It also connects to the proposed Southern Interchange on Ara Tūhono – Pūhoi to Warkworth motorway via a new arterial connection. The multimodal corridor would provide direct access to the southwestern area of Warkworth and the associated high intensity residential, commercial, heavy industrial and employment activity and future local centre. It would also serve as a public transport route connecting to the Southern Public Transport Interchange and enabling regional bus services within Warkworth as well interregional bus trips via the Southern Interchange.
New Sandspit Road Link (Between Matakana Road and Sandspit Road)	<ul style="list-style-type: none"> New corridor to enable development and provide access to future urban land north east of Warkworth. This direct connection will provide an alternative route between Ara Tūhono - Pūhoi to Warkworth Motorway and the wider coastal settlements such as Sandspit and Snells Beach, avoiding the Hill Street intersection and increasing resilience. At a local level the new dedicated walking and cycling facilities will support mode shift for the north eastern growth area and improve active mode access to Warkworth Town Centre.

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

The following section provides a breakdown of the performance of the Warkworth 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 Warkworth 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 Warkworth DBC projects and improvements have been identified in order to support growth in Warkworth and unlock the future land use. In addition to these projects, there are several key strategic projects that integrate with this network including:

- Te Honohono ki Tai - Matakana link road
- Ara Tūhono – Pūhoi to Warkworth Motorway
- Hill Street Roundabout Upgrade

It should be noted that the portion of Ara Tūhono between Warkworth and Wellsford has been excluded from the modelling networks in both the Do-min and Recommended options as it is outside of the scope of the investigation area for the Warkworth DBC.

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 Warkworth 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.

The following changes between the Do-minimum (Do-min) and recommended transport network (Recommended Option) are noted below:

- **Road Network:** The Do-minimum network includes the existing arterial and local road connections within Warkworth. The recommended network includes the existing network and new links along the Wider Western Link Road, Western Link Road – South, Western Link Road – North and Sandspit Road Link.
- **PT Services:** The PT network within the Do-minimum consists of three routes that travel along SH1, Matakana Road and Sandspit Road respectively. The frequency of these routes ranges between 30 minutes and 60 minutes during the weekday. In comparison, there are several high-frequency routes (10 minutes to 15 minutes during the weekday) within the recommended transport network. These routes cover most of the urban area within Warkworth and travel along both the existing and new corridors within the network.

¹ SGA Approach to Do Minimum Development_V1

² Modelled land use scenario is I11v.6

- **Active Mode Connections:** There is a full cycle network along both existing and new connections within the Warkworth recommended transport network. The connections present in the Do-minimum network are existing/planned facilities along SH1 between Hudson Road and Woodcocks Road.

3.1 Overall Warkworth Outcomes

As detailed above, the Warkworth 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 Warkworth.

Given the relatively small size of Warkworth (approximately 5km wide), the modelling areas within MSM (Macro Strategic Model) and SAMM (Strategic Active Modes Model) are relatively large. This lack of granularity makes it difficult to assess Warkworth transport outcomes on a sub-area basis. Accordingly, the transport outcomes for the Warkworth Recommended Network have been reported for the whole of Warkworth. In addition, any key measures specific to individual projects have also been reported and included under the relevant investment objectives.

Table 3-1: Overall Warkworth Outcomes

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 1: Access			
Job Access	Proportion of employment accessible within 10 and 15 mins by PT	<p>As Warkworth is relatively isolated from the rest of Auckland, the Warkworth Structure Plan has planned for large-scale employment within the area to facilitate the creation of a satellite town where residents can live and work close by without the need to travel far for employment opportunities. Given the size of Warkworth (5km wide), a reasonable journey time for a local trip within Warkworth would typically be range between 10 and 15 minutes. Therefore, these two journey times have been selected for this measure. In addition, a longer journey threshold (45 minutes) has been used to measure the differences in accessibility to larger employment hubs to the south of Warkworth (i.e. Silverdale).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 10 mins by PT are 5,449 jobs (compared to 2,238 in the Do-min Option).</p> <p>In the Recommended Option, the number of jobs that can be accessible within 15 mins by PT are 7,701 jobs (compared to 5,391 in the Do-min Option).</p>	<p>Within 10 mins the proportion of employment increases by 143%* and in 15 mins there is a 43% increase in the Recommended Option compared to the Do-min. For a 45 mins threshold, the proportion of employment increases by 14% in the Recommended Option.</p> <p>*The 143% increase represents the substantial improvements made to the PT network in the Recommended Option. These improvements include new corridors as well as increased service</p>

Key Performance Indicator	Measure	Outcome	Commentary
		<p>In the Recommended Option, the number of jobs that can be accessible within 45 mins by PT are 8,803 jobs (compared to 7,701 in the Do-min Option).</p>	<p>frequency and coverage. This represents the upper limit of the expected improvements to PT accessibility. This percentage will decrease if only certain improvements (i.e. increased service frequency or new corridors) are made to the Do-min network.</p> <p>*It should be noted that the journey times selected (10, 15 and 45 mins) is inclusive of delays such as walking to bus stops, wait times and transferring onto additional services. Therefore, the proportion of jobs accessible by PT is less than that accessible by active modes for similar journey times.</p>
<p>Job access</p>	<p>Proportion of employment accessible within 5 and 10 mins by active modes</p>	<p>Similarly, for active modes an appropriate journey time within Warkworth would typically range between 5 and 10 minutes. Accordingly, these journey times have been used for this measure.</p> <p>In the Recommended Option, the number of jobs that can be accessible within 5 mins by active modes are 5,229 jobs (compared to 3,553 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 7,701 jobs (compared to 6,025 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 proportion of employment increases by 47% and in 10 mins there is an 28% increase in the Recommended Option compared to the Do-min.</p>

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 2: Reliability			
Network performance	Vehicle kilometres travelled in peak congestion (>90% v/c) in AM peak	475 vehicle-km travelled in congested conditions in the Do-min scenario 185 vehicle-km travelled in congested conditions in Recommended Option	There is an 61% reduction of vehicle kilometres travelled in peak congestion (>90% v/c) in the AM peak in the Recommended Option.
Network Performance (Southern Interchange)	Average public transport journey time to Albany from South-West Warkworth during the AM peak	98 mins - for PT (Do-min Option) 78 mins - for PT (Recommended Option)	The average travel time from South-West Warkworth reduces by 20 mins in the Recommended Option. The location of the Southern Interchange is crucial to allowing PT services to access Ara Tūhono quickly from South – West Warkworth. This makes PT an efficient and effective means of travel for trips outside of Warkworth.
Network Performance (Southern Interchange)	Average freight journey time to Albany from the Industrial area in South-West Warkworth during the AM peak	29 mins - for freight (Do-min Option) 21 mins - for freight (Recommended Option)	The average travel time from the Heavy Industrial area in South-West Warkworth reduces by 8 mins in the Recommended Option. The location of the Southern Interchange allows the efficient and reliable movement of freight between Warkworth and other key areas to the South (i.e. Albany and Silverdale). This supports the growth of these industrial areas in Warkworth

Key Performance Indicator	Measure	Outcome	Commentary
			and diverts freight traffic away from the local network and onto strategic corridors and links.
Susceptibility to Climate Change	Kilometres of infrastructure susceptible to Q100 flooding	19.3 km of the road network within Warkworth achieves Q100 Flood level immunity. This helps support the overall sustainability and resilience goals of the Warkworth transport network.	<p>Additionally, this KPI was measured on a per corridor basis:</p> <ul style="list-style-type: none"> • Woodcocks Road (2.8km) • Matakana Road (2.0km) • Sandspit Road (2.0km) • SH1 (5.0km) • Western Link Road - Central (0.8km) • Western Link Road - South (1.0km) • Western Link Road - North (1.4km) • Wider Western Link Road (2.3km) • Sandspit Road Link (1.9km) • Link to Southern Interchange (0.1km)

Key Performance Indicator	Measure	Outcome	Commentary
Investment Objective 3: Integration			
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	19.2 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"> • Woodcocks Road (2.8km) • Matakana Road (2.0km) • Sandspit Road (1.9km) • SH1 (5.0km) • Western Link Road - Central (0.8km) • Western Link Road - South (1.0km) • Western Link Road - North (1.4km) • Wider Western Link Road (2.3km) • Sandspit Road Link (1.9km)
PT Access (Southern PT Hub)	% of South-West Warkworth with access to public transport services (within 500m of the hub)	In the Recommended Option, 79 hectares (12%) of South-West Warkworth is within 500m of a of a public transport interchange. Compared to the Do-min Option which has 0 hectares.	Significant increase in PT accessibility from no parts of South-West Warkworth being within 500m of a PT interchange to 12% of the growth within 500m of an interchange.

Key Performance Indicator	Measure	Outcome	Commentary
PT Access (Northern Park and Ride)	% of North-East Warkworth with access to public transport services (within 500m of the hub)	In the Recommended Option, 79 hectares (11%) of North-East Warkworth is within 500m of a of a public transport interchange. Compared to the Do-min Option which has 0 hectares.	Significant increase in PT accessibility from no parts of South-West Warkworth being within 500m of a PT interchange to 11% of the growth within 500m of an interchange.
Investment Objective 4: Travel Choice			
Mode Share	% PT and active (cycling and walking) mode share for local trips within Warkworth <i>Daily - % active mode share</i> <i>AM Peak – %PT mode share</i>	15% - for active modes (1,633 trips) (Recommended Option) 10% - for active modes (1,086 trips) (Do-min Option) 5% - for PT (547 trips) (Recommended Option) 4% - for PT (409 trips) (Do-min Option)	There is a 50% increase in active modes trips in the Recommended option compared to the Do-min option. There is a 34% increase in PT trips in the Recommended option compared to the Do-min option.
PT attractiveness	% of Warkworth with access to public transport services (within 500m of a high frequency bus route)	In the Recommended Option, 1,706 hectares (86%) of Warkworth is within 500m of a of a high frequency bus route. Compared to the Do-min Option which has 849 hectares (43%).	There is 43% increase in the proportion of Warkworth within 500m of a high frequency bus route in the Recommended Option.
Active Mode Attractiveness	% of Warkworth with access to high-quality walking and cycling facilities (within 400m of a dedicated, separated active mode facility)	In the Recommended Option, 1,267 hectares (64%) of Warkworth is within 500m of a of a high frequency bus route. Compared to the Do-min Option which has 335 hectares (17%).	There is 47% increase in the proportion of Warkworth within 400m of a high-quality, dedicated active mode facility in the Recommended Option.
Provision of High-Quality Active Modes Network	% / KMs of new and improved cycle network achieving required QoS	19.2 km of new cycle network	Additionally, this KPI was measured on a per corridor basis

Key Performance Indicator	Measure	Outcome	Commentary						
	(from AT Sol 2018-21)		<p>(one-way along the corridor):</p> <ul style="list-style-type: none"> • Woodcocks Road (2.8km) • Matakana Road (2.0km) • Sandspit Road (1.9km) • SH1 (5.0km) • Western Link Road - Central (0.8km) • Western Link Road - South (1.0km) • Western Link Road - North (1.4km) • Wider Western Link Road (2.3km) • Sandspit Road Link (1.9km) 						
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>4,212</td> <td>2,916</td> </tr> </tbody> </table>	Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)	CO ₂ -eq /t	4,212	2,916	According to the VEPM model, there is a 1,296 tonne yearly reduction in CO ₂ -eq emissions for the Warkworth Recommended transport network in 2048+.
Emission	Do-min (Yearly-2048+)	Recommended (Yearly-2048+)							
CO ₂ -eq /t	4,212	2,916							
Mode Shift	Mode shift from single occupancy private vehicle for local trips	80% - Do-min scenario 74% in Recommended Option	There is 6% mode shift from single occupancy private vehicles in the						

Key Performance Indicator	Measure	Outcome	Commentary
	within Warkworth <i>AM Peak – %Privat Vehicle mode share</i>		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 Warkworth.	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.
Provision of High-Quality Active Modes Network	% / KMs of new and improved cycle network achieving required QoS (from AT Statement of Intent 2018-21)	19.2 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"> • Woodcocks Road (2.8km) • Matakana Road (2.0km) • Sandspit Road (1.9km) • SH1 (5.0km) • Western Link Road - Central (0.8km) • Western Link Road - South (1.0km) • Western Link Road -

Key Performance Indicator	Measure	Outcome	Commentary
			North (1.4km) <ul style="list-style-type: none"> • Wider Western Link Road (2.3km) • Sandspit Road Link (1.9km)

3.2 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, the sector 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 supporting 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 Te Tupu Ngātahi and the Warkworth recommended network directly impact the first focus area. This is achieved by improving urban form, travel choice and accessibility to improve 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 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"> • 19.2 km of new and improved cycling facilities. • There is 43% increase in the proportion of Warkworth within 500m of a high frequency bus route in the Recommended Option. This can be attributed to the updated PT network as well as the development new corridors which will allow bus routes to access new growth areas significantly improving the catchment size of Warkworth with access to high frequency bus routes. • There is 47% increase in the proportion of Warkworth 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"> • 19.2km of new and improved cycling facilities. • Increasing the capacity of the Northern Park and Ride PT Hub. • Development of a Southern PT Interchange. The new southern hub will be located near the proposed local centre, high density residential activity and potential new school sites. This co-location is intended to enable a good walk-up catchment, increasing uptake of public transport. • Within 10 mins, the proportion of employment accessible by PT increases by 143% and within 15 mins there is a 43% increase between the Recommended and Do-min Option. These increases can be attributed to the improvements outlined in Action 10.1.1 for PT as part of the recommended transport network. Accordingly, PT becomes a viable option for people travelling to work in the Recommended Option. • Within 5 mins, the proportion of employment accessible by active modes increases by 47% and within 10 mins there is an 28% increase between the Recommended and Do-min Option. 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 50% increase in active modes trips in the Recommended Option compared to the Do-min option. • The increased service frequency and improved accessibility to high-frequency bus routes results in a 34% increase in PT trips in the Recommended Option compared to the Do-min option.
Action 10.1.4	<ul style="list-style-type: none"> • The location of the Southern Interchange allows PT services to access Ara Tūhono quickly from South – West Warkworth. This makes PT an efficient and effective means of travel for trips outside of Warkworth. The average travel time for PT from South-West Warkworth to Albany reduces by 20 mins in the Recommended Option compared to the Do-min. • The location of the Southern Interchange allows the efficient and reliable movement of freight between Warkworth and other key areas to the South

Emissions Reduction Plan Focus Area	Aspects of the Recommended Network that achieve the Focus Area
	<p>(i.e. Albany and Silverdale). This supports the growth of these industrial areas in Warkworth and diverts freight traffic away from the local network and onto strategic corridors and links. The average travel time from the Heavy Industrial area in South-West Warkworth to Albany reduces by 8 mins in the Recommended Option compared to the Do-min.</p>

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 Plan Changes, such as the Proposed Plan Change 25
- Council Structure Plans, such as the Warkworth Structure Plan
- 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

The Warkworth FUZ area will be less than 5km north-south and east-west resulting in compact future urban form. The 1000ha of currently rural land has been rezoned to support significant business and

residential growth. The growth is based on the Future Urban Land Supply Strategy (FULSS) and at full build out this growth is anticipated to reach³:

- 17,100 additional people.
- 8,200 new houses. (~7,300 in the FUZ area).
- 4,600 new jobs.

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 **Error! Reference source not found.**

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 (√), relative significance high (√√√) 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 (AFC⁴) created each forecast scenario used by Te Tupu Ngātahi for the interim and full build-out scenarios.

AFC created the forecasts for the Warkworth IBC and Warkworth 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 D3 – Warkworth DBC Modelling Specifications for further details about the difference between IBC and DBC land use scenarios.

³ This full build out is based on the Future Urban Land Supply Strategy modelled as per the 2048+ modelling scenario which uses Land use scenario i11.6.

⁴ AFC = Auckland Forecasting Centre, which is a collaboration between Auckland Council, Auckland Transport and the NZ Transport Agency

4.2 Transport Network Analysis

The following section describes the transport analysis undertaken to reach the recommended network for the Warkworth 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 Warkworth 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.

SATURN model

- The SATURN model is a mesoscopic traffic model, which loads the forecasted vehicle trip patterns from MSM onto the road network to investigate the traffic effects at a more detailed level.

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.

Technical Note D3 – Warkworth DBC Modelling Specifications provides more 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 Warkworth 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.

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 Warkworth recommended network, except for the Wider Western Link Road, Western Link Road – North and Western Link Road – South. The corridor form and function requirements for these corridors were endorsed during early works, a summary of the findings from this work is summarised in the below section.

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 ⁵	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 SATURN.	If PT priority needed, helps determine whether corridor is route protected for 2 or 4 lanes'	Number of lanes included in MSM, used for SATURN outputs
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 SATURN.	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 SATURN outputs

⁵ Te Tupu Ngātahi Remix File refers to the Auckland Transport vision of the 2048+ bus network. Data and routes are subject to change.

4.2.4 Updated CFAF cross-sections

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 significant physical and environmental constraints, not all of the corridors on the Warkworth recommended network can accommodate the initial identified CFAF cross-section.

These corridors include:

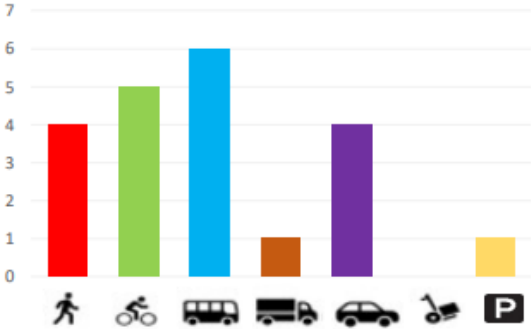

- Woodcocks Road (SH1 to Mansel Drive)
- Mansel Drive
- SH1 (between Hudson Road and Fairwater Road)
- Matakana Road
- Sandspit Road

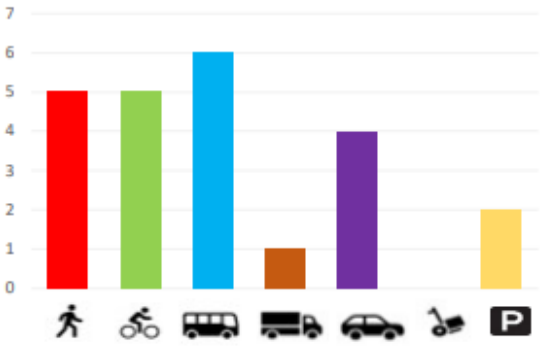
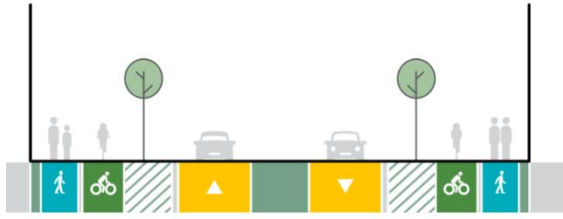
Due to identified constraints along these corridors, bespoke cross-sections were developed and are illustrated in the below tables.

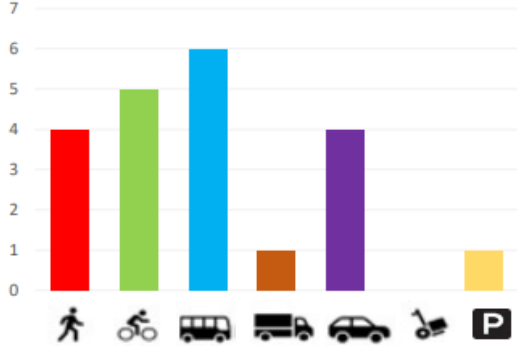
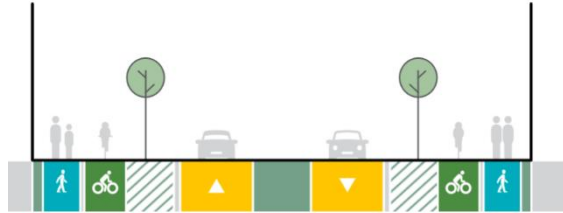
For Woodcocks Road, Mansel Drive and SH1 (between Hudson Road and Fairwater Road), the developed cross-sections are attached in Appendix 3. These corridors will go through a “Type A” business case process. This process has been developed for corridors where no route protection is required as there is sufficient width within the carriageway to accommodate the developed cross-sections. Subsequently, no options were developed as part of this DBC for these corridors.

4.2.4.1 Warkworth Transport Corridors

The following table provides a summary of the RASF mandates and CFAF results for the Warkworth 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.

SH1 (Hudson Road to Hill Street)	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p> <p>Place Assessment: The overall classification for the corridor is P1 due to the relatively local catchment within this segment of SH1.</p> <p>Movement Assessment: The rationale for the M3 assessment is that the corridor will provide a connection to/from strategic connections such as Matakana Road Link and Ara Tūhono (Puhoi - Warkworth) for those travelling from Matakana and Sandspit.</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>4</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>6</td> </tr> <tr> <td>Truck</td> <td>1</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 Value	Pedestrian	4	Bicycle	5	Bus	6	Truck	1	Car	4	Scooter	1	Parking	0	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant property residential/commercial property impacts on both sides of the corridor.</p> <p>Updated CFAF:</p> <p>Bespoke cross-sections developed, illustrated in Appendix 3.</p>
Mode	Priority Value																	
Pedestrian	4																	
Bicycle	5																	
Bus	6																	
Truck	1																	
Car	4																	
Scooter	1																	
Parking	0																	

SH1 (Hill Street to Fairwater Road)	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p> <p>Place Assessment: The supporting rationale is the adjacent residential land use along the majority of the section.</p> <p>Movement Assessment: The movement function has been assessed as M3, which the RASF describes as having a 'high strategic significance with a high volume of users'. The corridor has a strategic regional function but is also a spine connecting Urban Warkworth.</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>6</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>2</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	6	Truck	1	Car	4	Scooter	0	Parking	2	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant property impacts on both sides of the corridor.</p> <p>Updated CFAF:</p> <p>Bespoke cross-sections developed, illustrated in Appendix 3.</p>
Mode	Priority Score																	
Pedestrian	5																	
Bicycle	5																	
Bus	6																	
Truck	1																	
Car	4																	
Scooter	0																	
Parking	2																	

SH1 (Fairwater Road to Valerie Close)	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M3</p> <p>Place Assessment: The supporting rationale is the adjacent residential land use along the majority of the section.</p> <p>Movement Assessment: The movement function has been assessed as M3, which the RASF describes as having a 'high strategic significance with a high volume of users'. There will be a significant increase in buses traveling along the corridor to the PT Interchange and Local Centre. In addition, a high proportion of active mode users are expected adjacent to the high-density residential growth at the Wider Western Link Road intersection.</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>4</td> </tr> <tr> <td>Bicycle</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>6</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Scooter</td> <td>1</td> </tr> <tr> <td>Parking (P)</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority Value	Pedestrian	4	Bicycle	5	Bus	6	Truck	1	Car	4	Scooter	1	Parking (P)	0	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section: N/A</p> <p>Updated CFAF: No change to initial CFAF.</p>
Mode	Priority Value																	
Pedestrian	4																	
Bicycle	5																	
Bus	6																	
Truck	1																	
Car	4																	
Scooter	1																	
Parking (P)	0																	

Woodcocks Road (SH1 to Mansel Drive)	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 existing urban area of Warkworth and includes land uses such as light industry. There isn't a significant change in 'place' between the current form and future form as the land use is already urban.</p> <p>Movement Assessment: The rationale for the M3 assessment is the increased throughput of all modes due to the intensified land use along the first segment of Woodcocks Road and the new urban growth adjacent to the second segment.</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>Scooter</td> <td>2</td> </tr> <tr> <td>Parking</td> <td>2</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	4	Truck	4	Car	4	Scooter	2	Parking	2	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant property impacts on both sides of the corridor.</p> <p>Updated CFAF:</p> <p>Bespoke cross-sections developed, illustrated in Appendix 3.</p>
Mode	Priority Score																	
Pedestrian	5																	
Bicycle	5																	
Bus	4																	
Truck	4																	
Car	4																	
Scooter	2																	
Parking	2																	

Woodcocks Road (Mansel Drive to Edge of FUZ)	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 urban growth of the Warkworth Structure Plan and includes land uses such as heavy industry, single house, and mixed housing urban zoning. Additionally, the Warkworth Structure Plan identifies a Neighbourhood Centre along the second segment of Woodcocks 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. The corridor is also expected to be a strategic route for freight and cycling.</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>3</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 Score	Pedestrian	5	Bicycle	5	Bus	4	Truck	3	Car	4	Scooter	1	Parking	0	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section: N/A</p> <p>Updated CFAF: No change to initial CFAF.</p>
Mode	Priority Score																	
Pedestrian	5																	
Bicycle	5																	
Bus	4																	
Truck	3																	
Car	4																	
Scooter	1																	
Parking	0																	

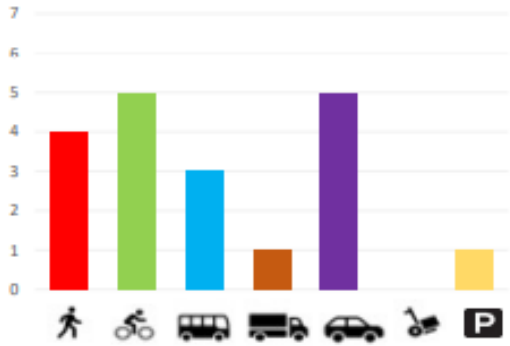
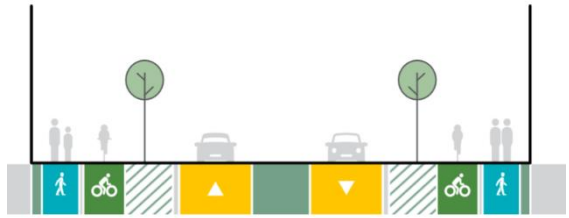

Matakana Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M2</p> <p>Place Assessment: Adjoining areas sit within the urban growth zones of the Warkworth Structure Plan which is overwhelmingly residential (mixed housing urban/ suburban zoning and residential large lot zoning).</p> <p>Movement Assessment: The corridor will remain an important connection in the Warkworth transport network for trips between Warkworth and Matakana/Omaha.</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>3</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	3	Truck	1	Car	5	Scooter	0	Parking	1	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant geometric and environmental constraints on both sides of the corridor.</p> <p>Updated CFAF:</p> <p>Indicative 18m cross section (Hill Street to Melwood Drive)</p>
Mode	Priority Score																	
Pedestrian	5																	
Bicycle	5																	
Bus	3																	
Truck	1																	
Car	5																	
Scooter	0																	
Parking	1																	



Indicative 20m cross section (middle portion of Matakana Road)



Indicative 24m cross section (adjacent to Matakana Link Road through to the edge of the FUZ)

Sandspit Road	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M2</p> <p>Place Assessment: The supporting rationale is that the corridor sits adjacent to predominately low-density residential growth such as residential large lot zoning and single house zoning.</p> <p>Movement Assessment: The corridor will remain an important connection in the Warkworth transport network for trips between Warkworth and Sandspit.</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>1</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	4	Bicycle	5	Bus	3	Truck	1	Car	5	Scooter	0	Parking	1	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant geometric and environmental constraints on both sides of the corridor.</p> <p>Updated CFAF</p>  <p>Indicative 18m cross section (Hill Street to first bridge)</p>
Mode	Priority Score																	
Pedestrian	4																	
Bicycle	5																	
Bus	3																	
Truck	1																	
Car	5																	
Scooter	0																	
Parking	1																	

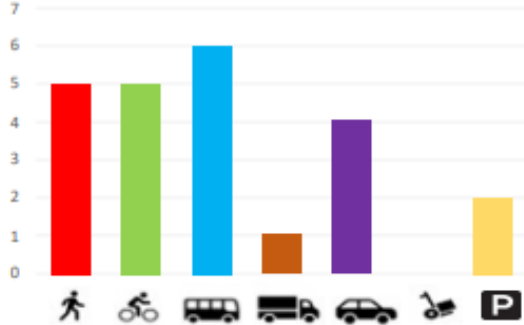
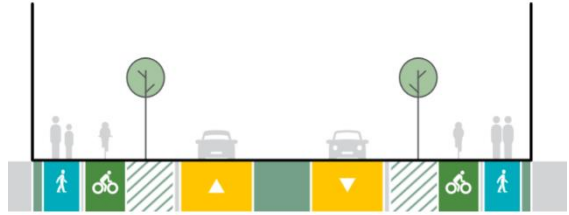


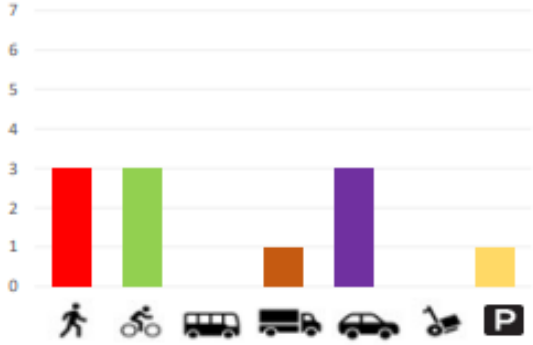

Western Link Road - Central	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale is that the corridor sits within the existing urban area of Warkworth and includes land uses such as light industry and mixed housing suburban zoning. There isn't a significant change in 'place' between the current form and future form as the land use is already urban..</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. The corridor forms one part of the Western Link Road, which will carry the majority of north-south trips through Warkworth as SH1 is detuned to a predominately walking and cycling connection as part of the Warkworth Structure Plan.</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Walking</td> <td>5</td> </tr> <tr> <td>Cycling</td> <td>5</td> </tr> <tr> <td>Bus</td> <td>3</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	Walking	5	Cycling	5	Bus	3	Truck	4	Car	4	Motorcycle	1	Parking	0	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>Significant residential and commercial property impacts on both sides of the corridor.</p> <p>Updated CFAF:</p> <p>Bespoke cross-sections developed, illustrated in Appendix 3.</p>
Mode	Priority Score																	
Walking	5																	
Cycling	5																	
Bus	3																	
Truck	4																	
Car	4																	
Motorcycle	1																	
Parking	0																	

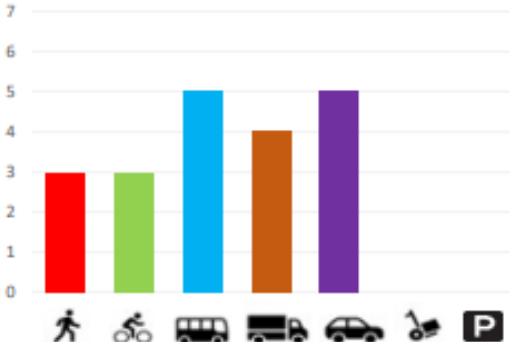

Western Link Road - North	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale is that according to the Warkworth Structure Plan, there is a proposed Neighbourhood Centre located adjacent to the corridor. There is also a mix of residential and light industry land use adjacent to the corridor.</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. The corridor forms one part of the Western Link Road, which will carry the majority of north-south trips through Warkworth as SH1 is detuned to a predominately walking and cycling connection as part of the Warkworth Structure Plan. Additionally, the corridor links through to the new Matakana Link Road. This provides an alternative connection for those traveling to Matakana without the need to travel through the Hill Street intersection.</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>Walking</td> <td>5</td> </tr> <tr> <td>Cycling</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>Scooter</td> <td>2</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority	Walking	5	Cycling	5	Bus	4	Truck	4	Car	4	Scooter	2	Parking	0	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 30m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>N/A</p> <p>Updated CFAF:</p> <p>No change to initial CFAF.</p>
Mode	Priority																	
Walking	5																	
Cycling	5																	
Bus	4																	
Truck	4																	
Car	4																	
Scooter	2																	
Parking	0																	

Western Link Road - South	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M2</p> <p>Place Assessment: The supporting rationale is that the main attractor along the corridor is the small portion of industrial land use.</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 corridor forms one part of the Western Link Road, which will replace SH1 as the north-south spine for vehicle movement on the Warkworth transport network. The corridor forms one part of the Western Link Road, which will carry the majority of north-south trips through Warkworth as SH1 is detuned to a predominately walking and cycling connection as part of the Warkworth Structure Plan.</p>	<table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority Score</th> </tr> </thead> <tbody> <tr> <td>Walking</td> <td>4</td> </tr> <tr> <td>Cycling</td> <td>4</td> </tr> <tr> <td>Bus</td> <td>3</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>3</td> </tr> <tr> <td>Motorcycle</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Walking	4	Cycling	4	Bus	3	Truck	1	Car	3	Motorcycle	0	Parking	1	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>N/A</p> <p>Updated CFAF:</p> <p>No change to initial CFAF.</p>
Mode	Priority Score																	
Walking	4																	
Cycling	4																	
Bus	3																	
Truck	1																	
Car	3																	
Motorcycle	0																	
Parking	1																	

Wider Western Link Road (North)	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 urban growth of the Warkworth Structure Plan and includes land use such as heavy industry, mixed housing urban and terrace housing and apartment zoning.</p> <p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be significant demands for all modes. The corridor will also connect the proposed Southern Interchange to Woodcocks Road in the North.</p>	<table border="1"> <caption>Future Modal Priority Data</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>4</td> </tr> <tr> <td>Bus</td> <td>3</td> </tr> <tr> <td>Truck</td> <td>4</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>2</td> </tr> </tbody> </table>	Mode	Priority	Pedestrian	4	Bicycle	4	Bus	3	Truck	4	Car	4	Scooter	0	Parking	2	<p>Initial Cross-Section identified from CFAF Assessment:</p> <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section: N/A</p> <p>Updated CFAF: No change to initial CFAF.</p>
Mode	Priority																	
Pedestrian	4																	
Bicycle	4																	
Bus	3																	
Truck	4																	
Car	4																	
Scooter	0																	
Parking	2																	

Wider Western Link Road (South)	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 urban growth of the Warkworth Structure Plan and includes land use mixed housing urban and terrace housing and apartment zoning. The corridor also includes a Local Centre and PT Interchange.</p> <p>Movement Assessment: The rationale for the M3 assessment is that with the expected urban growth adjacent to the corridor there will be significant demands for all modes. The corridor will also connect the proposed Southern Interchange to SH1 in the South.</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>6</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>4</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>2</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	5	Bicycle	5	Bus	6	Truck	1	Car	4	Scooter	0	Parking	2	<p>Initial Cross-Section identified from CAFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CAFAF Cross-Section: N/A</p> <p>Updated CAFAF: No change to initial CAFAF.</p>
Mode	Priority Score																	
Pedestrian	5																	
Bicycle	5																	
Bus	6																	
Truck	1																	
Car	4																	
Scooter	0																	
Parking	2																	

New Sandspit Road Link	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P1/M1</p> <p>Place Assessment: The supporting rationale is that proposed link is positioned on the fringe of the urban growth in Warkworth, with rural land use to the north of the corridor and low-density residential growth to the south.</p> <p>Movement Assessment: The rationale for the M1 assessment is that there are no strategic connections proposed along the corridor. Accordingly, the corridor will serve a predominately local function for residential growth in the Northeastern quadrant of Warkworth. Additionally, the link will allow an alternative connection between the rural towns of Sandspit and Matakana without the need to travel through the Hill Street intersection.</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>3</td> </tr> <tr> <td>Bicycle</td> <td>3</td> </tr> <tr> <td>Bus</td> <td>0</td> </tr> <tr> <td>Truck</td> <td>1</td> </tr> <tr> <td>Car</td> <td>3</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>1</td> </tr> </tbody> </table>	Mode	Priority Score	Pedestrian	3	Bicycle	3	Bus	0	Truck	1	Car	3	Scooter	0	Parking	1	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section:</p> <p>N/A</p> <p>Updated CFAF:</p> <p>No change to initial CFAF.</p>
Mode	Priority Score																	
Pedestrian	3																	
Bicycle	3																	
Bus	0																	
Truck	1																	
Car	3																	
Scooter	0																	
Parking	1																	

Link to Southern Interchange	Future Modal Priority	CFAF Cross-section																
<p>Future Typology: P2/M3</p> <p>Place Assessment: The supporting rationale for the place function is the expected heavy industrial land use along the corridor which is expected to attract a large number of trips from adjacent areas.</p> <p>Movement Assessment: The rationale for the M3 assessment is that the corridor provides an east-west connection from the new Southern Interchange to the Wider Western Link Road. This provides better access to the southern growth area of Warkworth and improves the resilience of the overall Warkworth network by having multiple connections to the motorway.</p>	 <table border="1"> <caption>Future Modal Priority Data</caption> <thead> <tr> <th>Mode</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>Pedestrian</td> <td>3</td> </tr> <tr> <td>Bicycle</td> <td>3</td> </tr> <tr> <td>Bus</td> <td>5</td> </tr> <tr> <td>Truck</td> <td>4</td> </tr> <tr> <td>Car</td> <td>5</td> </tr> <tr> <td>Scooter</td> <td>0</td> </tr> <tr> <td>Parking</td> <td>0</td> </tr> </tbody> </table>	Mode	Priority	Pedestrian	3	Bicycle	3	Bus	5	Truck	4	Car	5	Scooter	0	Parking	0	<p>Initial Cross-Section identified from CFAF Assessment:</p>  <p>Indicative 24m cross-section</p> <p>Constraints requiring update to Initial CFAF Cross-Section: N/A</p> <p>Updated CFAF: No change to initial CFAF.</p>
Mode	Priority																	
Pedestrian	3																	
Bicycle	3																	
Bus	5																	
Truck	4																	
Car	5																	
Scooter	0																	
Parking	0																	

4.2.5 Intersection Form and Function

A process was undertaken to identify likely intersection forms for the recommended network. 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 are 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.
- Urban Form
- 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. This check was done by the engineering and urban design teams following the initial selection process completed by the transport planning team.

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.

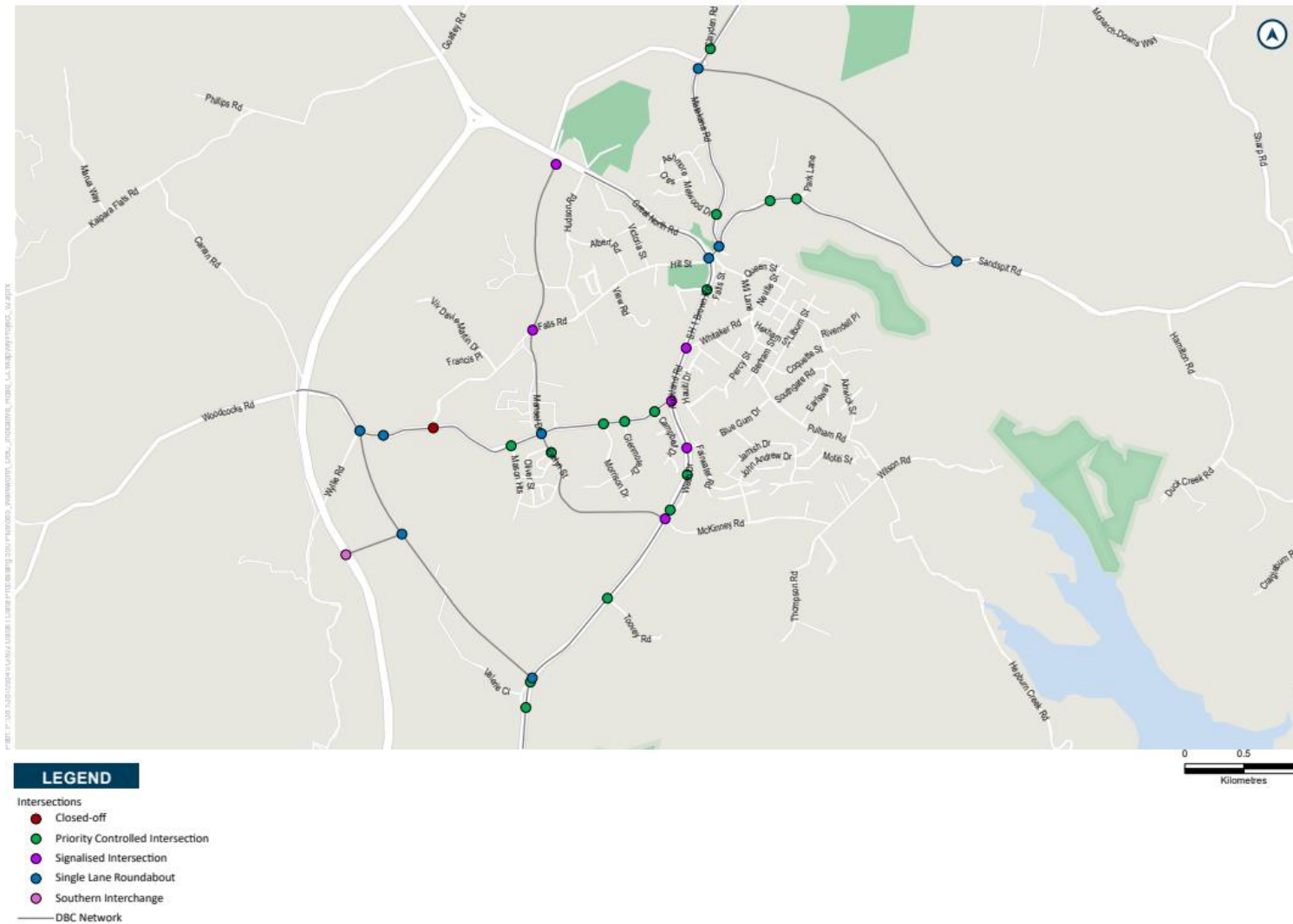
Currently, there are approximately 36 intersections within the extents of the Warkworth DBC corridors. The intersection assessments have been consolidated to consider the key intersections – specifically Arterial to Arterial or Arterial to Collector roads. Intersections with a local road are generally 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 Warkworth Intersections


Figure 4-1: Indicative Intersection Forms for Warkworth

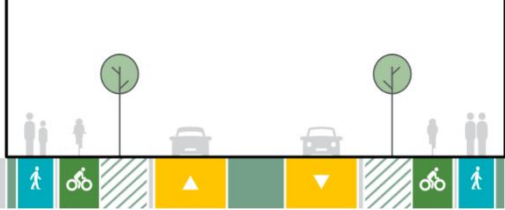





Appendix 1: Warkworth Form & Function




Form & Function Summary with Required Cross-Sections


Table A1.1: Form & Function Summary with Required Cross-Sections for the Warkworth Recommended Network

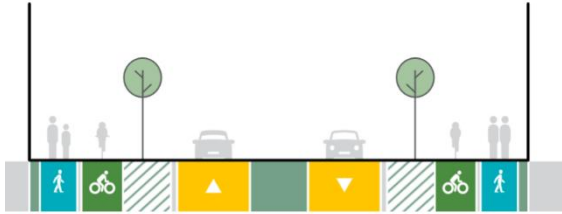
SH1 (Hudson Road to Valerie Close)	CFAF Summary
<p>Bespoke cross-sections developed (Hudson Road to Woodcocks Road, illustrated in Appendix 3.</p>  <p>Indicative 24m cross section (Woodcocks Road to Valerie Close)</p>	<p>Purpose of Corridor: With additional traffic capacity enabled via the Western Link Road and Ara Tūhono, it is expected that this corridor will continue to provide a north south link through Warkworth as a key arterial. With the provision of dedicated walking and cycling facilities along the corridor SH1 will become the key north-south active mode corridor in Warkworth.</p>
	<p>General Vehicle Volume: ADT 15,000 in 2048</p>
	<p>Priority Vehicle: 6-10 buses per hour under indicative 2048 AT bus network</p>
	<p>Freight: Level 1A freight level currently, likely to play supplementary role in the future as majority of freight gets re-routed to Ara Tūhono (Puhoi - Warkworth) motorway.</p>
	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p>
	<p>Active Modes: Separated cycle lanes and footpaths provided along the corridor</p>
	<p>Speed Environment: 50kph</p>
<p>Parking and Access: Property access; no parking</p>	

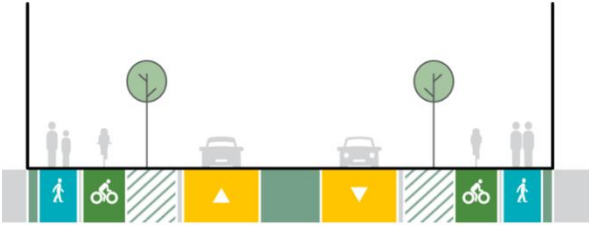

Woodcocks Road (SH1 to the Edge of FUZ)	CFAF Summary
<p data-bbox="220 488 719 546">Bespoke cross-sections developed (SH1 to Mansel Drive), illustrated in Appendix 3.</p>  <p data-bbox="220 898 719 956">Indicative 24m cross section (Mansel Drive to Edge of the FUZ)</p>	<p>Purpose of Corridor: The corridor forms an east-west connection for all modes between existing SH1 and the western growth area in Warkworth. Additionally, the corridor connects to several key north-south links such as the Western Link Road and the Wider Western Link Road.</p>
	<p>General Vehicle Volume: ADT 12,000 in 2048</p>
	<p>Priority Vehicle: 4 buses per hour under indicative 2048 AT bus network</p>
	<p>Freight: Likely to play a strategic freight function due to adjacent industrial land use.</p>
	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p>
	<p>Active Modes: Separated cycle lanes and footpaths provided along the corridor</p>
<p>Speed Environment: 50kph</p>	
<p>Parking and Access: Property access; no parking</p>	

Matakana Road	CFAF Summary
 <p data-bbox="236 510 831 573">Indicative 17m cross section (Hill Street to Melwood Drive)</p>	<p data-bbox="890 271 1382 398">Purpose of Corridor: The corridor forms a north-south connection for all modes between the growth area of Warkworth and the towns of Matakana and Omaha.</p>
 <p data-bbox="264 835 807 898">Indicative 20m cross section (middle portion of Matakana Road)</p>	<p data-bbox="890 439 1337 495">General Vehicle Volume: ADT 10,000 in 2048</p>
 <p data-bbox="212 1200 858 1263">Indicative 24m cross section (adjacent to Matakana Link Road through to the edge of the FUZ)</p>	<p data-bbox="890 528 1337 584">Priority Vehicle: 4 buses per hour under indicative 2048 AT bus network</p>
	<p data-bbox="890 624 1337 719">Freight: Will not have a strategic freight function, although does provide access to Matakana and Eastern Beaches.</p>
	<p data-bbox="890 759 1337 815">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p>
	<p data-bbox="890 848 1350 904">Active Modes: Separated cycle lanes and footpaths provided along the corridor</p>
	<p data-bbox="890 938 1198 972">Speed Environment: 50kph</p>
	<p data-bbox="890 1005 1350 1061">Parking and Access: Property access; no parking</p>

Sandspit Road	CFAF Summary
 <p data-bbox="209 566 879 595">Indicative 18m cross section (Hill Street to the first bridge)</p>	<p data-bbox="906 282 1388 414">Purpose of Corridor: The corridor forms an east-west connection for all modes between the growth area of Warkworth and the towns of Sandspit and Snells Beach.</p>
 <p data-bbox="225 875 863 943">Indicative 20m cross section (first bridge to the second bridge)</p>	<p data-bbox="906 450 1358 510">General Vehicle Volume: ADT 12,000 in 2048</p>
 <p data-bbox="376 1249 711 1279">Indicative 24m cross section</p>	<p data-bbox="906 546 1366 607">Priority Vehicle: 4 buses proposed under indicative 2048 AT bus network</p>
	<p data-bbox="906 642 1385 775">Freight: Will not have a strategic freight function, although freight will need to access the settlements at Snells Beach and Sandspit.</p>
	<p data-bbox="906 808 1362 869">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p>
	<p data-bbox="906 904 1366 965">Active Modes: Separated cycle lanes and footpaths provided along the corridor</p>
	<p data-bbox="906 1001 1219 1030">Speed Environment: 50kph</p>
	<p data-bbox="906 1064 1369 1124">Parking and Access: Property access; no parking</p>

Western Link Road - Central	CFAF Summary
<p style="text-align: center;">Bespoke cross-sections developed, illustrated in Appendix 3.</p>	<p>Purpose of Corridor: The corridor forms a key north-south connection and connects the North and South Western Link Roads. Additionally, the corridor provides an alternative to access Falls Road from Woodcocks Road without the need to travel along SH1.</p>
	<p>General Vehicle Volume: ADT 12,000 in 2048</p>
	<p>Priority Vehicle: 4 buses proposed under indicative 2048 AT bus network</p>
	<p>Freight: Likely to play a strategic freight function due to adjacent industrial land use.</p>
	<p>Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p>
	<p>Active Modes: Separated cycle lanes and footpaths provided along the corridor</p>
	<p>Speed Environment: 50kph</p>
<p>Parking and Access: Property access; no parking</p>	
Western Link Road - North	CFAF Summary
 <p style="text-align: center;">Indicative 30m cross section</p>	<p>Purpose of Corridor: The corridor forms a key north-south connection in the Warkworth network. The Western Link Road has been designed to enable development in west Warkworth and provide access to FUZ land and industrial areas while taking pressure off the existing SH1 and Hill Street intersection.</p>
	<p>General Vehicle Volume: ADT 12,000-15,000 in 2048</p>
	<p>Priority Vehicle: 12 buses per hour under indicative 2048 AT bus network</p>
	<p>Freight: Likely to play a strategic freight function due to adjacent industrial land use.</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>Western Link Road - South</p>	<p>Parking and Access: Property access; no parking</p>
 <p style="text-align: center;">Indicative 24m cross section</p>	<p>CFAF Summary</p> <p>Purpose of Corridor: The corridor forms a key north-south connection in the Warkworth network. The Western Link Road has been designed to enable development in west Warkworth and provide access to FUZ land and industrial areas while taking pressure off the existing SH1 and Hill Street intersection.</p>
	<p>General Vehicle Volume: ADT 9,000 in 2048</p>
	<p>Priority Vehicle: 4 buses per hour under indicative 2048 AT bus network</p>
	<p>Freight: Will not have a strategic freight function 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>	

Wider Western Link Road	CFAF Summary
 <p data-bbox="379 730 708 757">Indicative 24m cross section</p>	<p data-bbox="906 282 1390 555">Purpose of Corridor: The Wider Western Link Road serves two purposes. Firstly, it connects the Southern Interchange to both Woodcocks Road in the north and SH1 in the south. Additionally, the road also provides access deep into the southern FUZ, where access will otherwise be difficult to provide due to topography and streams.</p> <p data-bbox="906 584 1358 645">General Vehicle Volume: ADT 10,000 in 2048</p> <p data-bbox="906 678 1366 739">Priority Vehicle: 10 buses per hour under indicative 2048 AT bus network</p> <p data-bbox="906 772 1366 902">Freight: Likely to play a strategic freight function due to the corridor's connection to the Southern Interchange and Woodcocks Road which is a freight Level 1B route.</p> <p data-bbox="906 936 1362 996">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p data-bbox="906 1030 1366 1090">Active Modes: Separated cycle lanes and footpaths on both sides</p> <p data-bbox="906 1124 1219 1153">Speed Environment: 50kph</p> <p data-bbox="906 1187 1369 1247">Parking and Access: Property access; no parking</p>
Sandspit Link Road	CFAF Summary
 <p data-bbox="379 1794 708 1821">Indicative 24m cross section</p>	<p data-bbox="906 1350 1382 1509">Purpose of Corridor: The primary purpose of this corridor is to provide for strategic east-west movements to Matakana and Kowhai Coasts avoiding Hill Street intersection.</p> <p data-bbox="906 1561 1342 1621">General Vehicle Volume: ADT 4,000 in 2048</p> <p data-bbox="906 1655 1362 1715">Priority Vehicle: No bus routes proposed under indicative 2048 AT bus network</p> <p data-bbox="906 1749 1342 1809">Freight: Will not have a strategic freight function.</p> <p data-bbox="906 1843 1362 1904">Vehicle Lanes Total (Priority Lanes/ PT Priority at intersections): 2 (None/None)</p> <p data-bbox="906 1937 1366 1998">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>Link to Southern Interchange</p>	<p>CFAF Summary</p>
<div data-bbox="261 678 855 902" data-label="Diagram"> <p>The diagram shows a 24m wide cross-section of a road. From left to right, it features: a blue lane for pedestrians, a green lane for cyclists, a yellow lane with a triangle pointing up for vehicles, a yellow lane with a triangle pointing down for vehicles, another green lane for cyclists, and another blue lane for pedestrians. There are trees and buildings in the background.</p> </div> <p data-bbox="379 943 708 969">Indicative 24m cross section</p>	<p>Purpose of Corridor: Provides an east-west connection from the new Southern Interchange to the Wider Western Link Road. This provides better access to the southern growth area of Warkworth and improves the resilience of the overall Warkworth network by having multiple connections to the motorway.</p> <p>General Vehicle Volume: ADT 8,000 in 2048</p> <p>Priority Vehicle: 6 buses proposed under indicative 2048 AT bus network</p> <p>Freight: Likely to play a strategic freight function due to the corridor's connection to the Southern Interchange and heavy industrial land use to the North.</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 A2.3: Intersection SIDRA Results

Intersection Summary									
Area	Intersection	Proposed Form	AM			PM			Commentary
			LOS	DOS	Maximum Queue (m)	LOS	DOS	Maximum Queue (m)	
Warkworth	Matakana Road – Sandspit Road Link	Single-Lane Roundabout	A	0.343	17.7	A	0.474	29.4	Acceptable
	Sandspit Road – Sandspit Road Link	Single-Lane Roundabout	A	0.407	24.5	A	0.374	20.2	Acceptable
	Woodcocks Road – Wider Western Link Road	Single-Lane Roundabout	A	0.202	9.8	A	0.276	12.5	Acceptable
	Woodcocks Road – Mansell Drive	Single-Lane Roundabout	A	0.334	17.1	A	0.539	35.0	Acceptable
	Woodcocks Road – SH1	Signalised Intersection	D	0.683	114.5	C	0.908	90.6	Acceptable
	Whitaker Street – SH1	Signalised Intersection	C	0.604	127.7	D	0.735	145.2	Acceptable
	Fairwater Road – SH1	Signalised Intersection	B	0.265	46.7	B	0.224	40.6	Acceptable
	Western Link Road South – SH1	Signalised Intersection	C	0.683	115.0	C	0.685	117.9	Acceptable
	Wider Western Link Road – Link to the	Single- Lane Roundabout	A	0.339	18.0	A	0.363	21.9	Acceptable

Intersection Summary									
	Southern Interchange								
	Wider Western Link Road – SH1	Single- Lane Roundabout	A	0.413	26.8	A	0.540	34.1	Acceptable
	Falls Road – Mansell Drive	Signalised Intersection	C	0.778	71.7	D	0.860	104.8	Acceptable
	Matakana Link Road – Western Link Road	Signalised Intersection	C	0.522	71.2	C	0.545	71.1	Acceptable
	Hudson Road – SH1	Signalised Intersection	C	0.577	71.3	C	0.827	80.4	Acceptable

Appendix 3: Warkworth Type A Corridor and Intersection Design Plans

