

# Warkworth Detailed Business Case for Route Protection

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FINAL

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Appendix L: Warkworth Route Protection Strategy

Appendix M: Warkworth Risk Register

Appendix N: Warkworth Staging Considerations

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

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

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



# 1 Executive Summary

## 1.1 Warkworth Growth

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

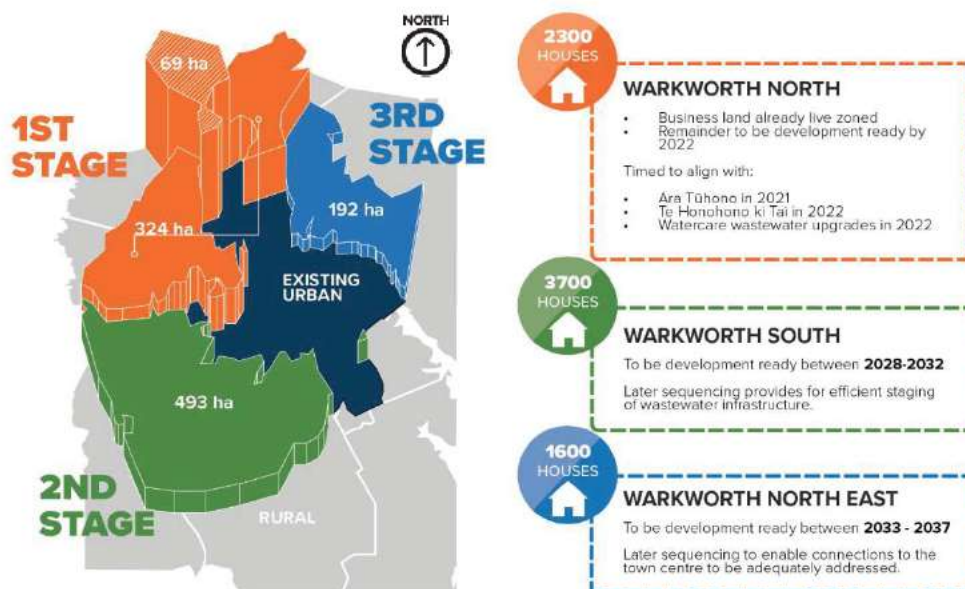
The Warkworth FUZ area will be less than 5km north-south and east-west resulting in compact future urban form. The 1000ha of currently rural land has been rezoned to support significant business and residential growth. The growth is based on the Future Urban Land Supply Strategy (FULSS) and at full build out this growth is anticipated to reach<sup>1</sup>:

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

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

The Future Urban Land-use Supply Strategy (FULSS) has assumed the following staging as shown in Figure 1-1 and has formed the basis of the DBC assumptions. It is noted that recent policy changes support further intensification within planned growth areas.

Figure 1-1 Warkworth planned land use release



Warkworth has been identified as a Satellite Town in the Auckland Plan and will act as a rural node. It will service the surrounding rural communities with a large rural catchment as well as connecting to

<sup>1</sup> 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.

urban Tāmaki Makaurau /Auckland through State Highway 1(SH1) and will support significant business and residential growth.

A key feature of a Satellite Town is to be largely self-sufficient with the ability for people to live and work within Warkworth, which provides opportunity to reduce the distance and number of trips for employment. The ability for Warkworth to provide a suitable range and quantum of employment is a key criterion underpinning the achievement of a Satellite Town. As such it is critical that zoning provides for industrial, commercial and business which has been addressed through the 2019 Warkworth Structure Plan. It is therefore the role of this DBC to enable sustainable transport access to this identified land use to increase its viability and attractiveness and support the vision of a compact town. This aspect of land use and transport integration is critical to the development of the Warkworth transport network.

## 1.2 Scope of the project

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

The DBC encompasses 12 projects from the IBC Indicative Strategic Transport Network as shown in Figure 1-2.

Figure 1-2 Warkworth IBC Recommended Network (2019)



Projects to be considered in the DBC:

- New Northern Public Transport Hub and Park and Ride.
- New Southern Public Transport Hub.
- New Southern Motorway Interchange on Ara Tūhono.
- Upgrade to SH1.
- Upgrade to Woodcocks Road.
- Metakana Road Upgrade.
- Sandspit Road Upgrade.
- New Western Link Road – North.
- Western Link Road – Central Upgrade.
- New Western Link Road – South.
- New Wider Western Link Road.
- New Sandspit Link Road.

Together these projects form a cohesive transport response for Warkworth to respond to planned future growth.

The transport investment identified in the IBC will enable an integrated transport system with a range of strategic and local elements supporting mode choice in Warkworth. It is predicated on creating a connected walking and cycling network and supporting an enhanced local and regional public transport system. The timing for implementation will vary and will be dependent on the release of surrounding land use.

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

### 1.3 Why is investment needed?

The proposed growth in Warkworth is a significant increase from the existing population of 5,500<sup>2</sup> and employment in an area that is presently predominantly rural in character. With the realisation of the Medium Density Residential Standards (MDRS) this intensification could be even more than is currently estimated. The existing transport system is not appropriate and this growth will exacerbate existing transport problems resulting in the current network being unsuitable to support this planned future growth.

The planned population growth in Warkworth will on its own generate more trips in the future. Without any investment in alternative modes, the majority of these additional trips will continue to be undertaken by private vehicles and the Vehicle Kilometres Travelled (VKT) would be expected to significantly increase. The future challenge for Warkworth therefore, is not if the greenfield growth will or should occur, but rather what needs to be done so when this growth happens the transport network is best positioned to respond to support mode shift. The desired outcome is that the majority of these new future trips are undertaken using alternative modes to private vehicles. Otherwise without investment, urban growth will continue to contribute to transport emissions rather than supporting the government policy to avoid emissions when growth occurs.

Without significant transport investment Warkworth will experience:

- **Poorly integrated land use** which will result in reduced access to social and economic opportunities, reduced viability of industrial land, compromised liveability and reduced opportunities to maximise transport catchments to increase mode share for public transport, walking and cycling.
- **Reduced climate change outcomes** resulting in an inability to shift to low emission transport modes with a continual reliance on private, low occupancy vehicles. The network will remain susceptible to climate change risks such as flooding.
- **Limited transport choice** which will compromise transformational mode shift targets and not deliver the benefits of a compact town.
- **Reduced resilience** arising from a single access to Warkworth via Ara Tūhono and limited local alternative routes within Warkworth itself.
- **Decreased safety** including additional conflict between active modes and increasing traffic as well as rural roads which are not safe or efficient for future multimodal travel.

<sup>2</sup> Current population in Warkworth, 2018 census



- **Unmanaged growth in demand for private vehicle travel** which will cause severe congestion on the local network.
- **Reduced reliability** for bus networks which will be delayed in the congestion.

Therefore, it is critical that the transport requirements for Warkworth are planned for to match the intended growth. Route protection is the first and critical step for ensuring the transport enhancements needed can be provided. The intent of route protection is to identify and appropriately protect the land corridor necessary to enable the future construction, operation and maintenance of the recommended network options.

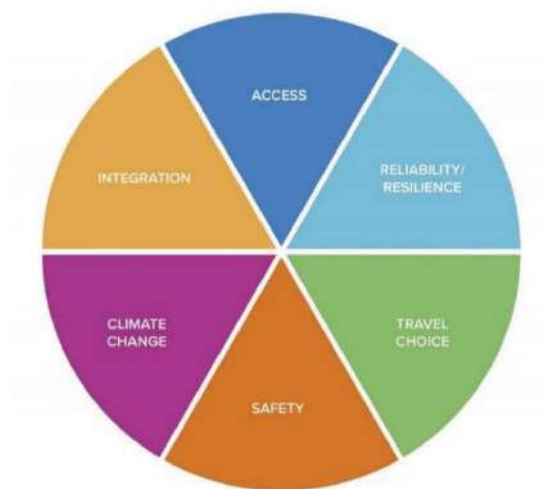
Route protection provides the mechanism to protect the network in advance as opposed to retrospectively making the transport interventions fit the existing urban form. The key benefits of route protections are that it:

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

## 1.4 Problems and benefits of investment

Six investment areas have been reconfirmed for Warkworth as shown in Figure 1-3. Investment in these elements was determined to maximise land use and transport integration and align with the Ministry of Transport (MoT) Transport Outcomes Framework and GPS 2021.

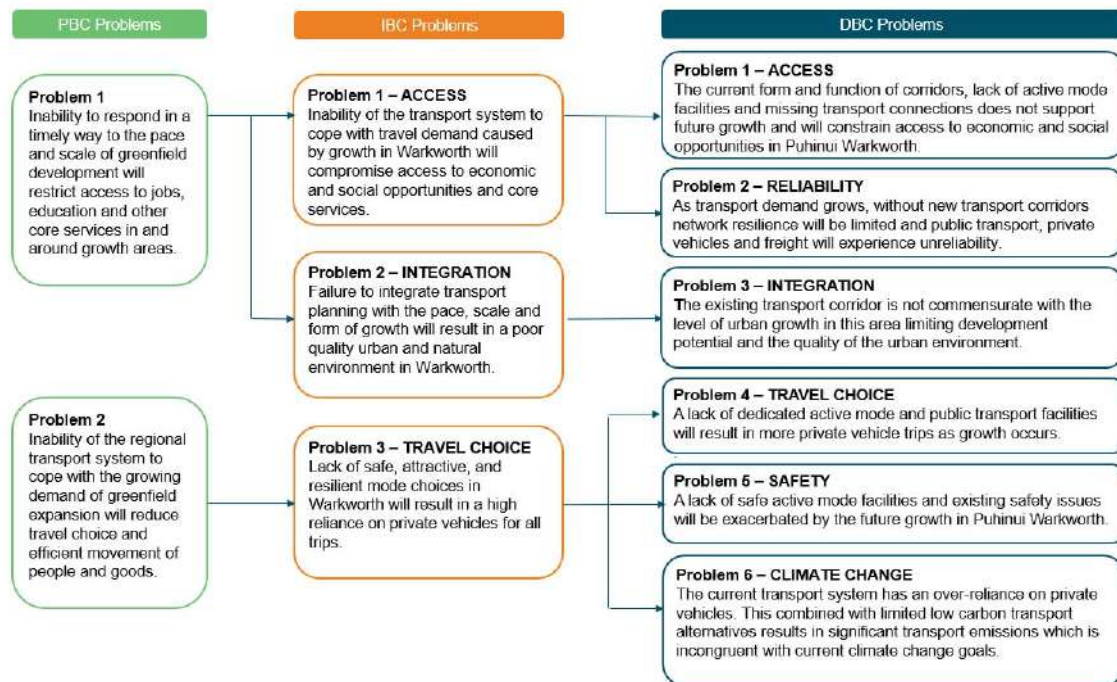
Figure 1-3 Problem areas for investment in Warkworth



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

A summary of the problems and how they map across the previous business cases is shown in Figure 1-4.

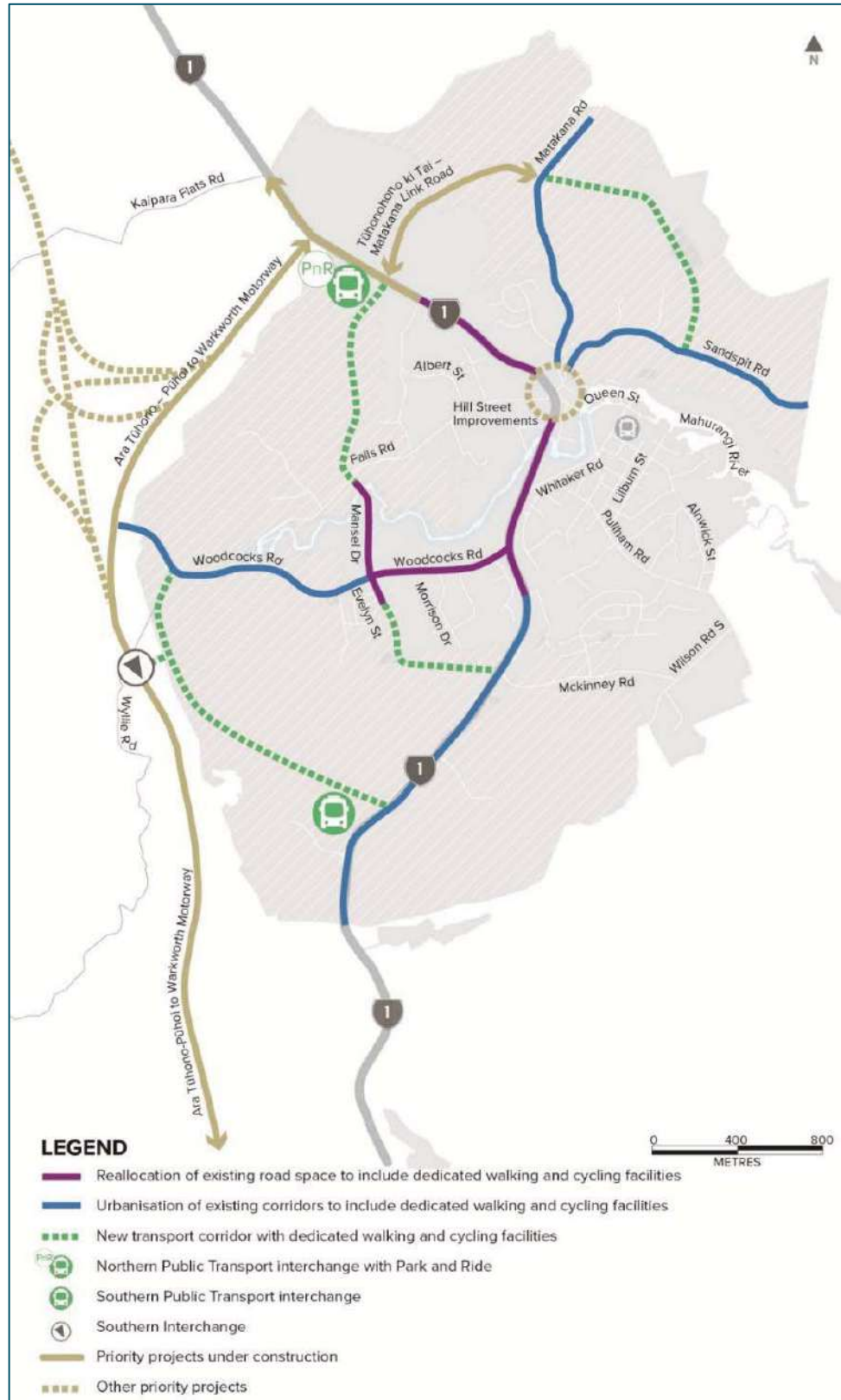
Figure 1-4 Warkworth problem mapping



## 1.5 Recommended Warkworth Transport Network

The recommended Warkworth transport package is shown in Figure 1-5.

Figure 1-5 Recommended Warkworth Transport Network



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

- Long term development of a low carbon transport system to support future growth and facilitates mode shift from private vehicles to public transport and active modes to reduce greenhouse gas emissions.
- People living and working in Warkworth as part of the Satellite Town vision with direct freight connections to planned industrial land use and improved access to employment and social amenities.
- Urbanisation and intensification of adjacent land uses, particularly high density housing. Transport corridors maximise opportunities for walk up catchments to public transport interchanges and a high frequency local bus network.
- Increased reliability for public transport and additional resilience via urbanised alternative routes.
- Real travel choice with high quality, attractive alternatives to the private vehicle. This includes a contiguous, legible active mode network that connects people to key destinations and encourages active mode trips within the compact urban area.
- An areawide focus on safety through a holistic set of measures including Road to Zero safety principles, fully separated cycling facilities, well designed intersections and sufficient space for all modes to interact safely.

The outcomes will be achieved by targeted investment in:

- Timely implementation of public transport interchanges to support the operation and patronage of a high frequency local bus service.
- Implementation of long term Park and Ride facilities to support mode shift for trips from the surrounding rural areas.
- Provision of active mode facilities on all corridors to complete an integrated active mode network. This includes 19km of new and improved cycle facilities. The suite of cycling measures includes separated cycle lanes on new urban corridors, bi-directional cycle facilities or wide footpaths on existing urban corridors and an offline cycle connection on Sandspit Road.
- Four new corridors ( Western Link Road North, Western Link Road South, Wider Western Link Road and Sandspit Link Road) to provide access to growth areas and resilient alternative routes for Warkworth.
- Additional motorway interchange on Ara Tūhono – Puhoi to Warkworth Motorway to provide direct access for freight to planned heavy industrial land, relieve a future bottleneck at the intersection with Ara Tūhono/SH1 and reduce vehicle kilometres travelled for southern growth area trips.

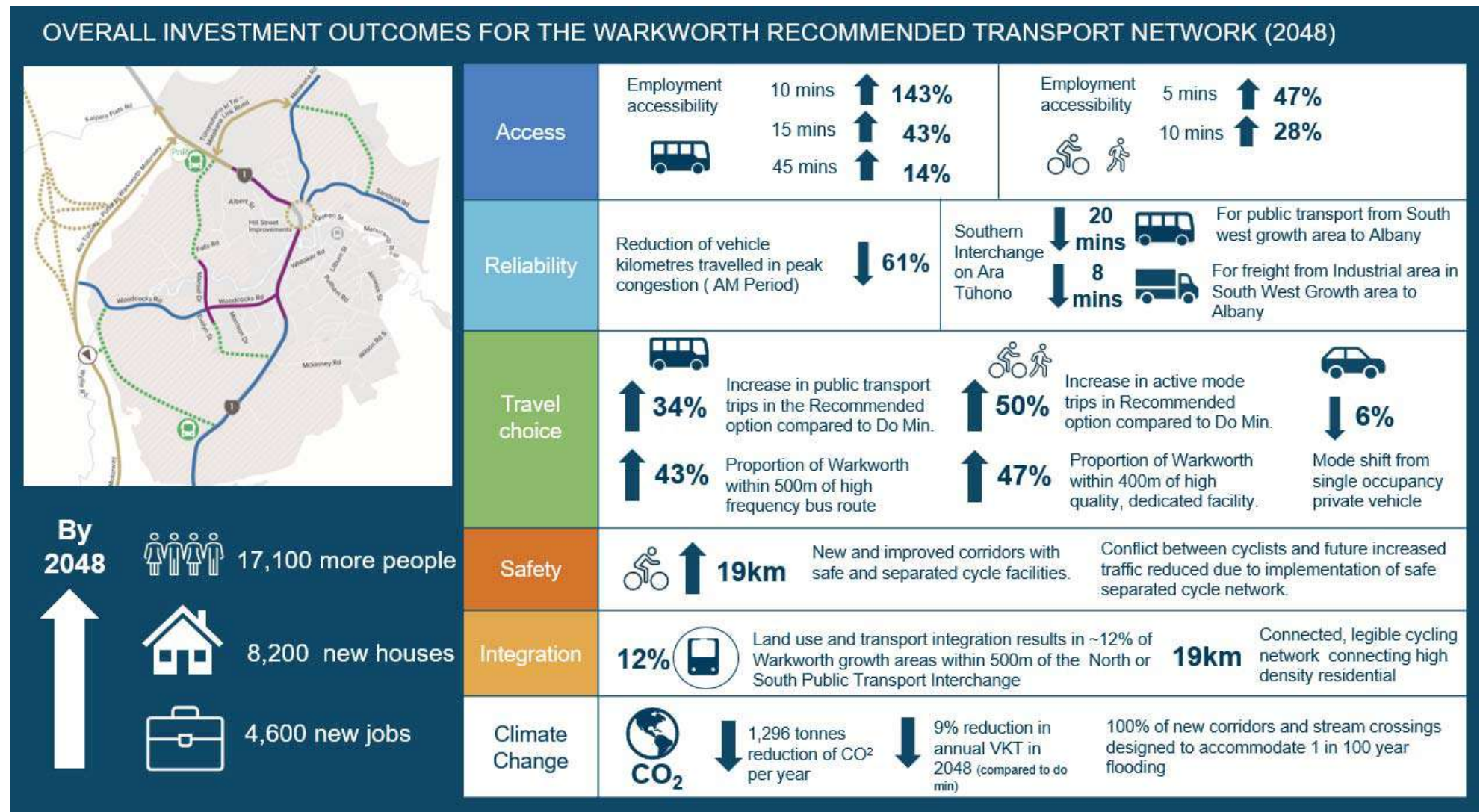
It is noted that this recommended network will also require supporting measures to maximise the benefit realisation of the network including ongoing land use integration, travel demand management, operational funding to provide increased bus frequencies and implementation of a collector local network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

## 1.6 Outcomes achieved

The key outcomes for this recommended network are shown in Figure 1-6.



Figure 1-6 Warkworth DBC Transport Network Outcomes



## 1.7 Staging

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

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

The suggested principles for Warkworth staging can be summarised as:

- Prioritise facilities that are on existing, brownfield corridors to enable the network to immediately receive and connect with the new greenfield developments.
- Programme public transport and active mode facilities and services from the start of urban development to support a shift to more sustainable travel.
- Consider potential interrelationships between transport projects to achieve overall outcomes.
- Consider staging of elements of a project to match likely development stages and system needs, whilst also considering pathways to achieve the full built elements.
- Consider the needs to support place function, not solely movement function.
- Provide safe travel by all modes.
- Staging that can respond to the timing, scale and form of urban development.

Considering all these principles and the current understanding of how the land use is planned to develop, the recommended staging for Warkworth is therefore shown in Figure 1-7

Figure 1-7 Proposed Warkworth Staging



## 1.8 Costs and benefits

The overall estimated cost (P50 undiscounted) for the full Warkworth programme is **\$1.1bn** of which **\$122M** is associated with property purchase.

The Base Estimate Benefit Cost Ratio (BCR) for the package is shown in Table 1-1. The BCR for the full Warkworth programme is **0.6** with and without Wider Economic Benefits (WEBs).

**Table 1-1 National and Government BCRs for Warkworth DBC**

Projects	National BCR	Government BCR
<b>Full Recommended Transport Network</b>	0.6	0.6
<b>Southern Interchange</b>	2.3	2.6
<b>South West Arterials</b>	0.7	0.8
<b>North West Arterials</b>	0.8	0.9
<b>North East Arterials</b>	0.4	0.4

The Warkworth recommended transport programme underpins the whole premise for growth in Warkworth and without it growth would be constrained. The evaluation is based on the standard evaluation methods for transport infrastructure, which is typically dominated by travel time savings. The purpose of many of the Warkworth schemes are primarily about providing the basic infrastructure to make growth happen such as urbanising existing rural roads. These types of corridors (e.g., Woodcocks Road, Sandspit Road and Matakana Road) have high costs but relatively small transport benefits (primarily walk/cycle benefits), and exclude other, un-monetised benefits that would also arise from 'urbanisation'. The bulk of transport benefits for the Warkworth network therefore come from completing new links to enable the land use to develop. This heavy investment in urbanisation in Warkworth results in the BCR for the full programme being estimated at 0.6 which is noted to be less than 1.

Despite the lower BCR, the recommended programme is still needed to respond to the planned growth and realise the wider transport outcomes and therefore the DBC continues to recommend the full programme is route protected to enable the growth sought. However, the DBC has also shown that the North East Warkworth growth area in particular is expected to have the lowest yields due to topographical and ecological constraints as well as some of the most expensive infrastructure costs (the New Sandspit Link Capex estimated to be \$188M (P50) and Sandspit Upgrade estimated to be \$112M (P50)). Therefore, there is opportunity to carefully consider the timing and scale of the planned North East growth and consider value engineering in future Implementation DBCs.



## 1.9 Proposed route protection

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

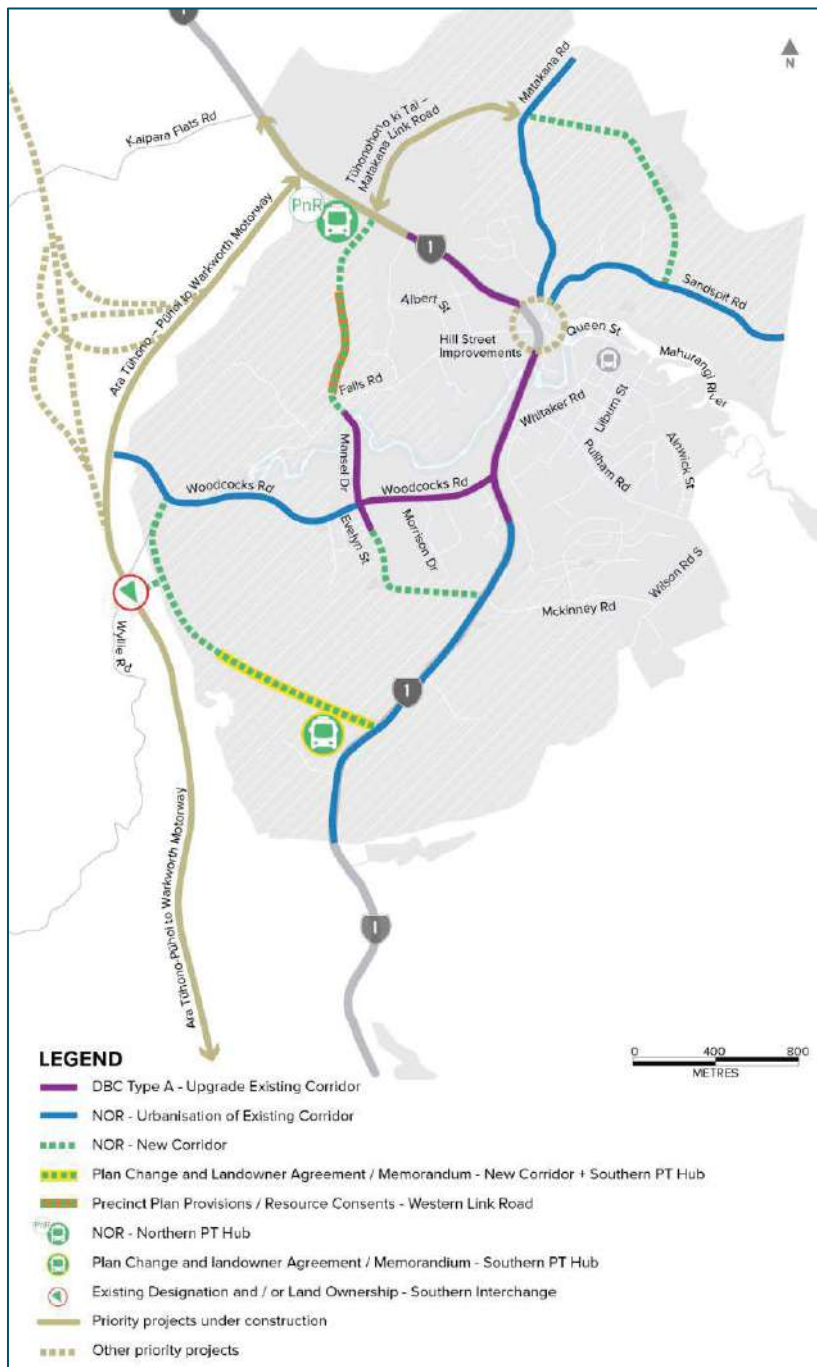
The proposed route protection strategy is shown in Figure 1-8.

The corridors in the Warkworth DBC are split into four types of route protection:

- **“Type A”** - No route protection as the corridor upgrade does not require additional land
- **Notice of Requirement** - Development of a Notice of Requirement (NoR) for route protection
- **Land Retention** – Existing designation and/or Land Ownership. This is to be route protected by not selling the land.
- **Plan Change and Landowner Agreements/Memorandum** – Delivery assumed by third parties and will be route protected via standard Plan Change processes or individual infrastructure agreements.

A Warkworth Route Protection Strategy has also been developed to support the Warkworth DBC and makes recommendations on the prioritisation, packaging and preferred planning mechanism to secure route protection for the Warkworth recommended network. A separate consenting strategy will be prepared as part of the NoR process which will confirm consenting pathways, technical assessments and NoR staging. Processes will be put in place to manage the non NoR route protection pathways.

Figure 1-8 Warkworth Route Protection Strategy



## 1.10 Property

There is a potential property cost implication for the nine projects where a NoR will be lodged or strategic acquisition is desirable. A total of 236 property interests have been identified for acquisition in Warkworth.

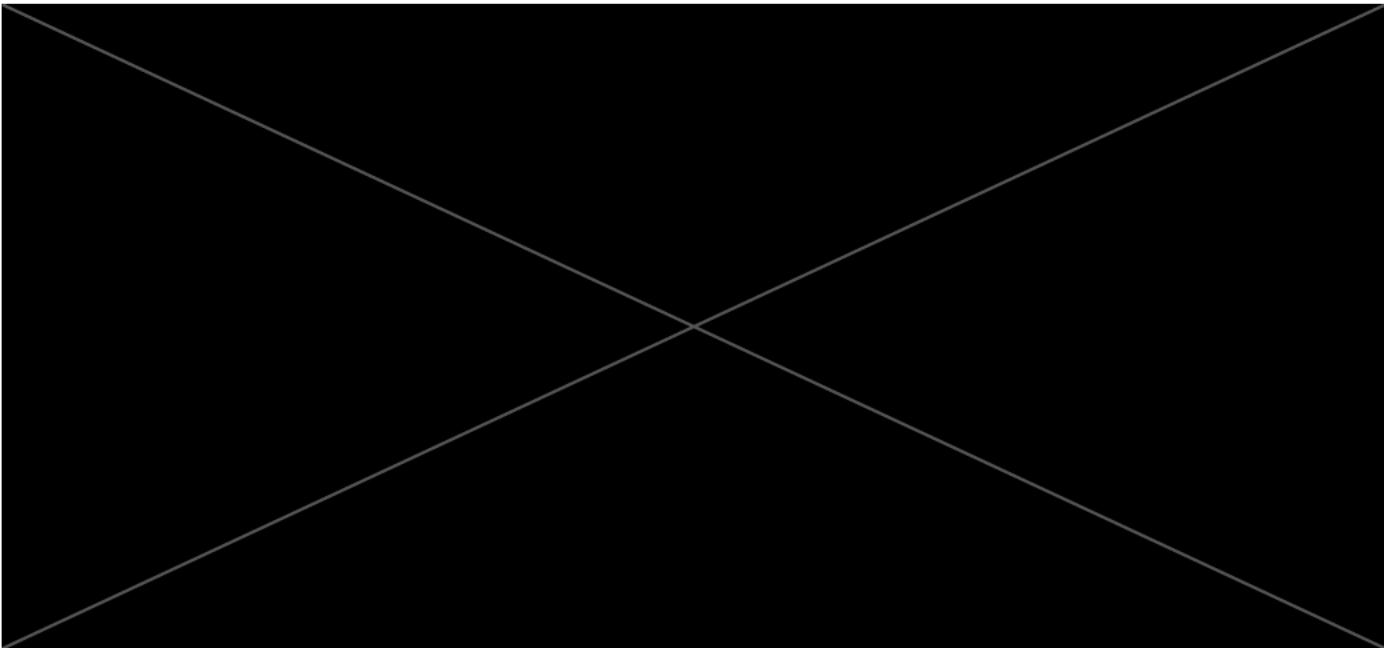
While the vast majority (80%) of property purchase is typically anticipated in the three years prior to implementation of a particular project, this acquisition could occur prior to route protection being enacted, or during the route protection process.

NoR route protection costs consist of three components:

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

The overall cashflow associated with the cost of route protection ( NoR Post lodgement, Early property acquisition and property implementation) is shown in Figure 1-9.

Figure 1-9 Cashflow for cost of route protection- NoR Post Lodgement Costs, Early Property Acquisition, Property Implementation



The graph illustrates the initial cost for route protection, with the NoR costs incurred in 2023/2024

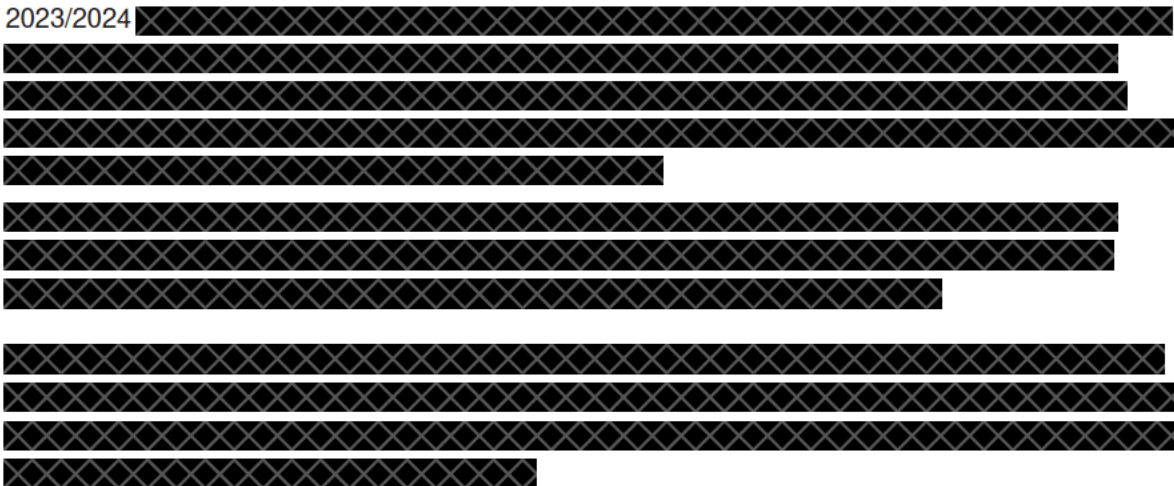
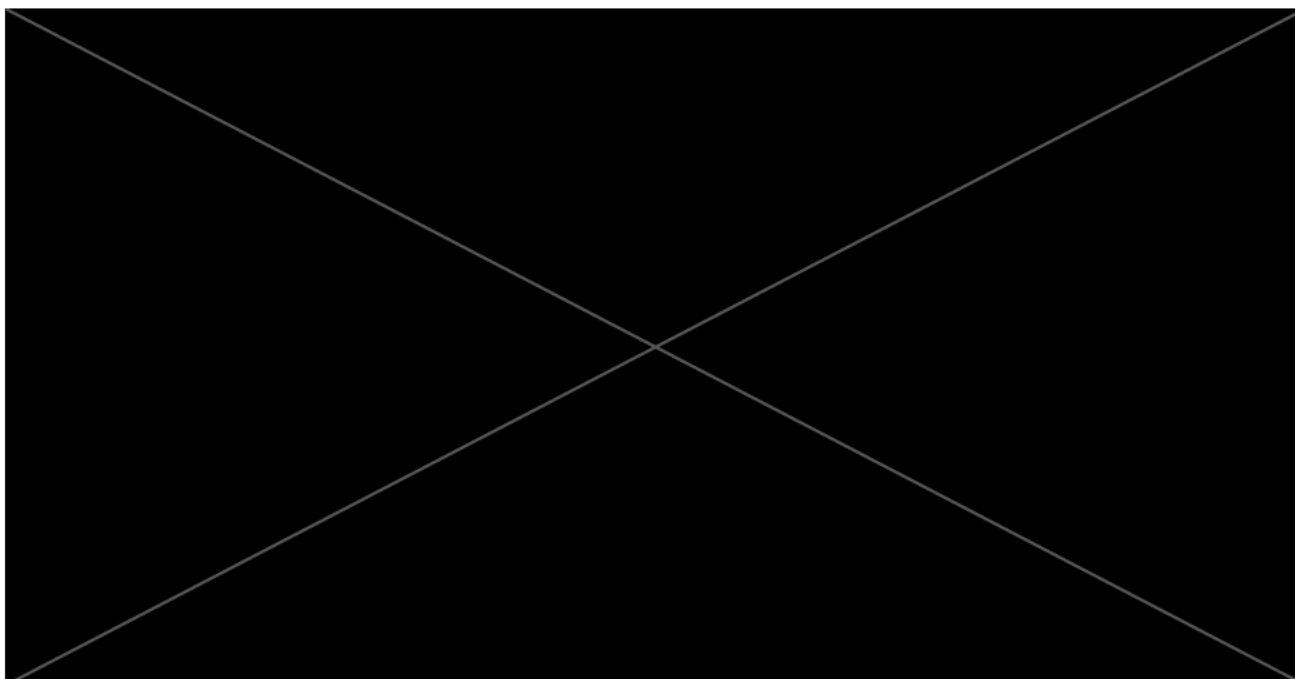


Figure 1-10 First decade (2023-2032) cashflow for cost of route protection – NOR Post Lodgement Costs, Early Property Acquisition



## 1.11 Funding share

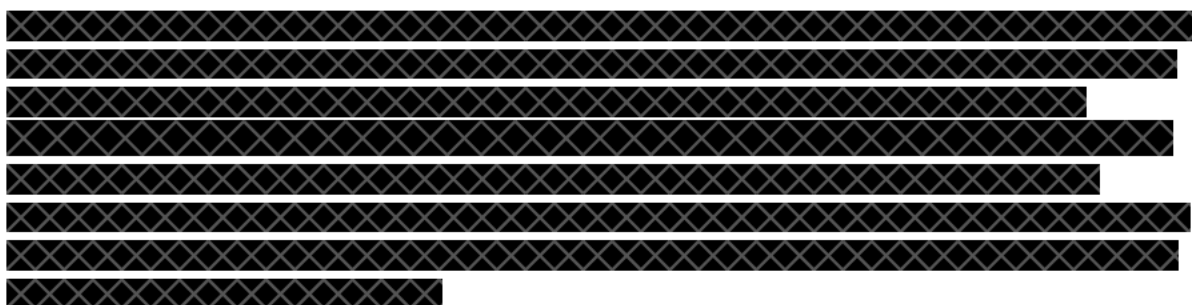


Figure 1-11 Funding Split for Warkworth Projects (P50 Costs)

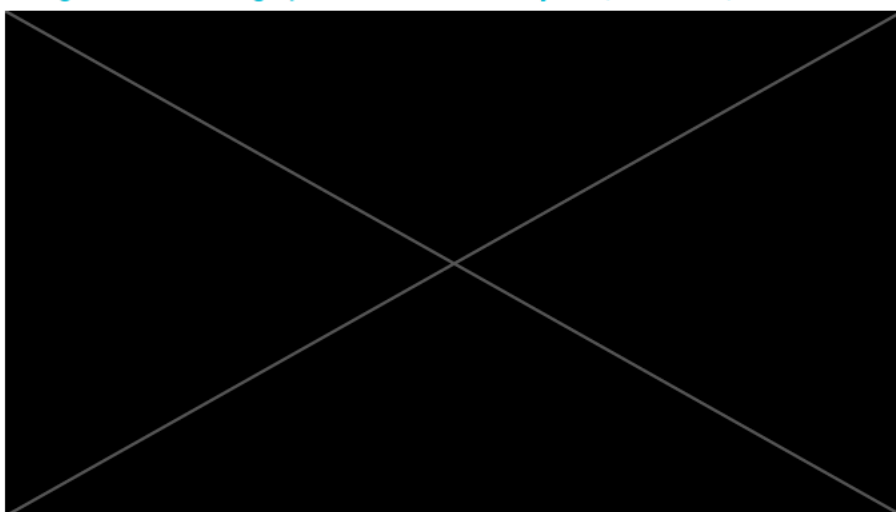
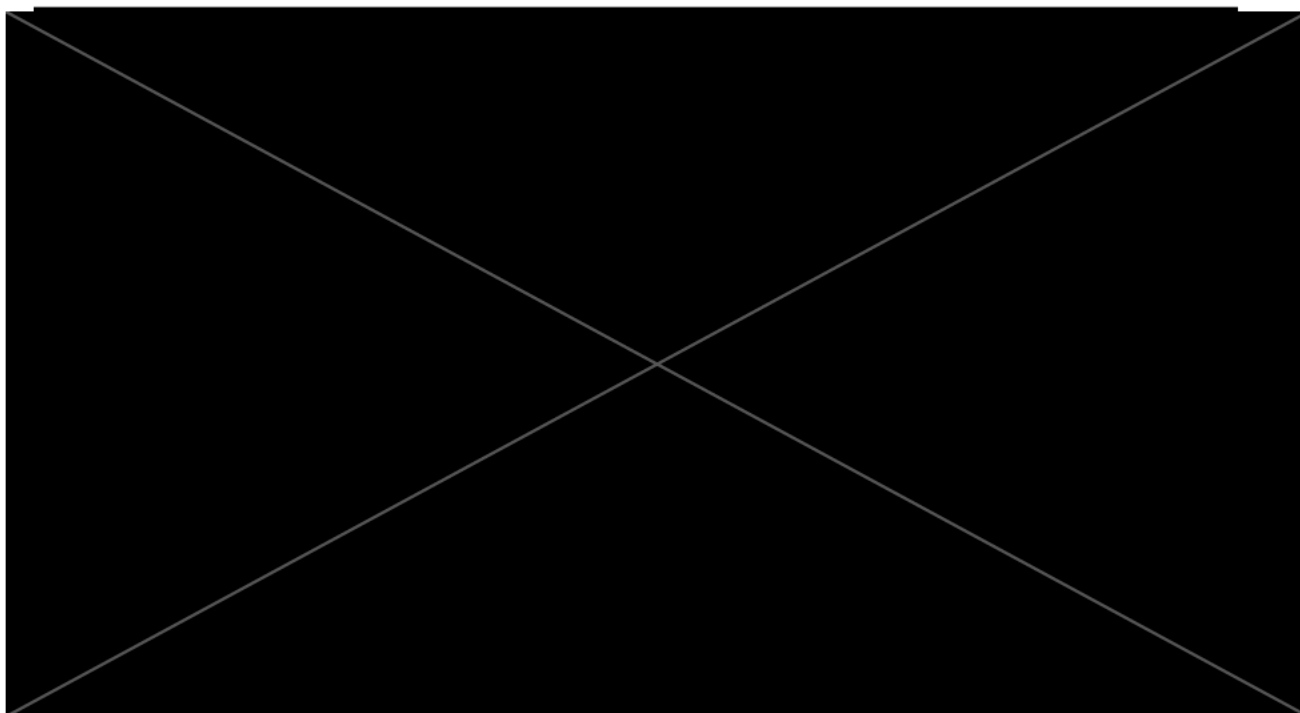


Figure 1-12 Funding Split for Warkworth Projects by Project Area (P50 Costs)



This is a substantial transport investment programme (\$1.1Bn Capex P50) to support the planned Warkworth growth. [REDACTED]

[REDACTED]

[REDACTED]

It is acknowledged that there is a cost to flexibility and route protection and the work undertaken to date for Warkworth has concentrated on balancing the future needs of the corridors and desired design flexibility against the property requirements to facilitate the infrastructure. As a result, this DBC recommends only 65% of the network (by distance) to proceed to NoR and its associated financial liabilities.

The cost analysis by area shows that developer contributions are most likely for South Warkworth growth area including Wider Western Link Road and Western Link Road South as these are new corridors that unlock access to future land use.

The North East growth area is achieving the lowest value for money in Warkworth due to the high cost and lowest benefits. This could suggest it is not a great investment as fully funded by Auckland Transport. However, there is a case for Auckland Transport funding key elements (such as bridges and end point intersections) with developers constructing other parts adjacent or accessing their growth. The advantage would be that Auckland Transport would then get a completed link (and

strategic benefit) , with a moderate contribution. These benefits however won't be achieved unless an agreed corridor is identified and protected (i.e., Auckland Transport funding priority could be low, but need for route protection needed to achieve the desired outcome).

## 1.12 Key risks and opportunities

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

- Affordability and availability of funding.
- Property impacts of route protection as a result of longer lapse times sought on designations.
- Lack of certainty around growth pace, growth form, zoning and timing.
- Impact of climate change policies on project development.
- Ongoing and consistent messaging to stakeholders and property owners to avoid local opposition to proposals.
- Development proceeding without protection of the recommended network, resulting in increased land values, potentially adversarial NoR processes and sub-optimal outcomes in terms of transport and land use integration.
- Political perspective change staging and or priorities.
- Property development pressure prior to route protection or implementation.

Specific additional Warkworth DBC risks and opportunities include:

- **Interface uncertainties with parallel projects** – Western Link Road North, Southern Interchange, Matakana Road, Sandspit Road, Wider Western Link Road.
- **Complex engineering and environmental constraints** – Greenfield corridors, Northern Public Transport Interchange and Park and Ride, Matakana Road and Sandspit Road.
- **Regional consenting complexities** – greenfield corridors and mostly associated with wetlands, flooding and ecological areas.
- **Implementation and or/funding not prioritised** – particularly for upgrades of existing urban roads ( Woodcocks Road, SH1, Western Link Road Central) which could result in new growth areas not connecting efficiently with the existing network.
- **Southern Interchange on Ara Tūhono** – risks around land being prematurely sold thus eliminating the route protection, contractual complexities with NX2 contracts and risks related to changing land use and funding prioritisation.
- **Sandspit Road** – risk around the Vipond culvert at the western end requiring early replacement due to increased flooding levels and the interaction with the proposed boardwalk solution.
- **North East Growth timing and value for money** – opportunity to improve the value proposition for Sandspit Link Road and Sandspit Road as part of responding to North East growth. This might include timing, value engineering, housing density provisions and developer collaborations.



## 1.13 Recommendations sought for approval

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

1. **Approval of the Warkworth recommended transport network.**
2. **Approval to implement the Route Protection Strategy up to lodgement of NoRs (Approval for lodgement to be sought separately)**
3. **Approval for funding release for the Warkworth post lodgement activities.**
4. **Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended Warkworth Package.**

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

This business case does not seek to resolve issues surrounding the funding required for the delivery of the recommended new infrastructure and services. [REDACTED]

[REDACTED]

[REDACTED]

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Age Group	Percentage Vaccinated
18-24	95%
25-34	90%
35-44	85%
45-54	98%
55-64	92%
65-74	88%
75-84	80%
85+	45%

Age Group	Gender	Percentage Vaccinated
18-24	Male	~15%
	Female	~10%
25-34	Male	~25%
	Female	~20%
35-44	Male	~35%
	Female	~30%
45-54	Male	~45%
	Female	~40%
55-64	Male	~55%
	Female	~50%
65+	Male	~65%
	Female	~60%

Age Group	Gender	Percentage Vaccinated
18-24	Male	~85%
18-24	Female	~80%
25-34	Male	~90%
25-34	Female	~85%
35-44	Male	~88%
35-44	Female	~82%
45-54	Male	~92%
45-54	Female	~88%
55-64	Male	~95%
55-64	Female	~90%
65+	Male	~98%
65+	Female	~95%



## 2 Introduction

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

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

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

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

It is important to note that the scope of this DBC is limited to outlining the case for **route protection** only of the projects within it. As projects progress for funding consideration and construction, separate implementation business cases will need to be prepared.

### 2.1 The Warkworth growth area

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

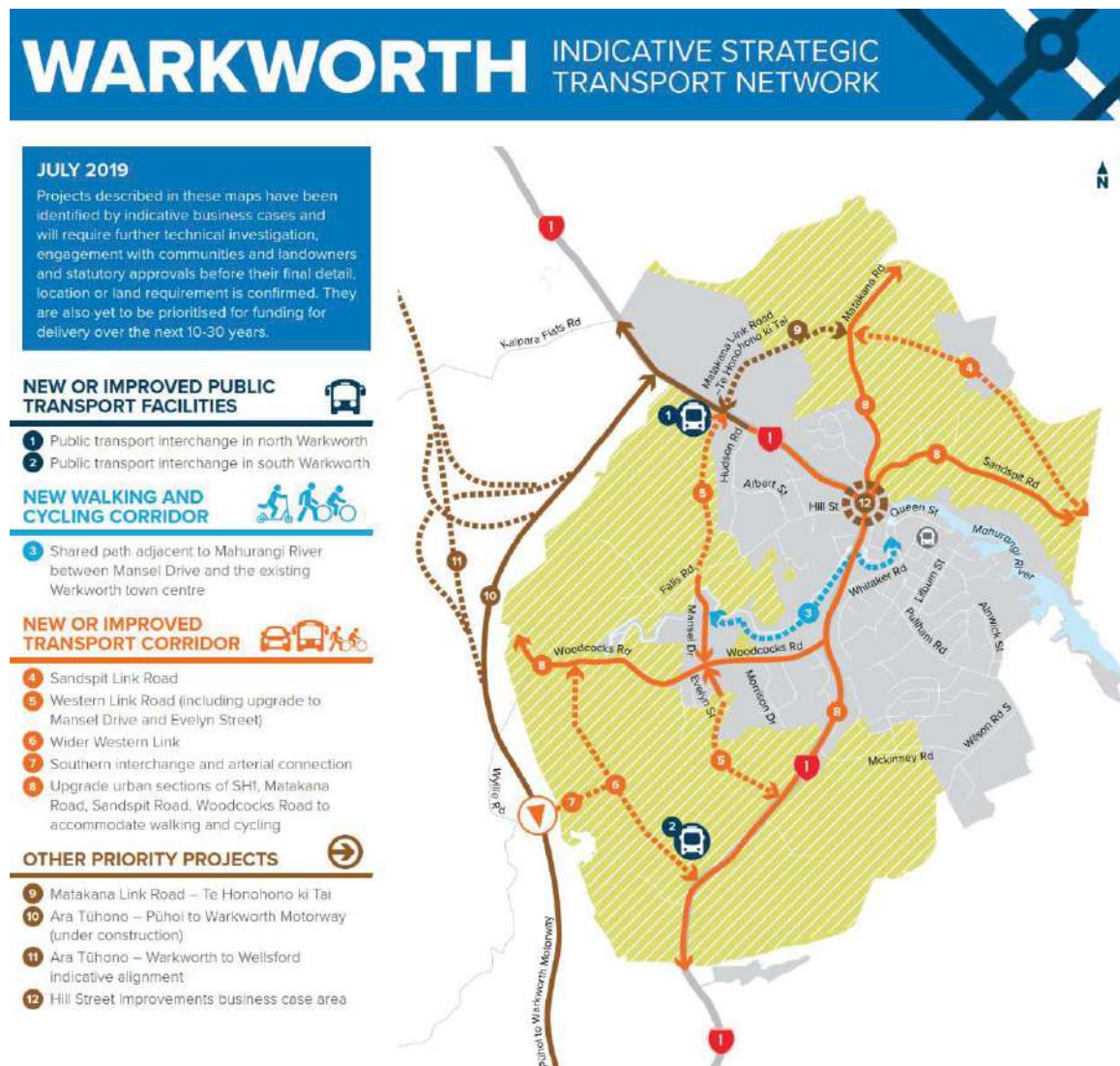
The Warkworth FUZ area will be less than 5km north-south and east-west resulting in compact future urban form. The 1000ha of currently rural land has been rezoned to support significant business and residential growth. The growth is based on the Future Urban Land Supply Strategy (FULSS) and at full build out this growth is anticipated to reach<sup>3</sup>:

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

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

<sup>3</sup> 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.

Figure 2-1 Warkworth Indicative Strategic Transport Network



## 2.2 Warkworth as a Satellite Town

Warkworth has been identified as a Satellite Town in the Auckland Plan and will act as a rural node. It will service the surrounding rural communities with a large rural catchment as well as connecting to urban Tāmaki Makaurau /Auckland through State Highway 1 and will support significant business and residential growth.

A key feature of a Satellite Town is for Warkworth to be largely self-sufficient with the ability for people to live and work within Warkworth, which provides opportunity to reduce the distance and number of trips for employment. Therefore, a high functioning local public transport and well connected walking and cycling network will best support a low carbon transport response for future residents. It is acknowledged that the rural catchments are not likely to be sufficiently served by high quality public transport in the future so rural connections to Warkworth are important considerations for the Warkworth transport network.

The ability for Warkworth to provide a suitable range and quantum of employment is a key criterion underpinning the achievement of a Satellite Town. As such it is critical that zoning provides for industrial, commercial and business which has been addressed through the 2019 Warkworth Structure Plan. It is therefore the role of this DBC to enable sustainable transport access to this identified land use to increase its viability and attractiveness and support the vision of a compact town. This aspect of land use and transport integration is critical to the development of the Warkworth transport network.

## 2.3 Future land use

Recent policy changes include the introduction of the Medium Density Residential Standards (MDRS). The intention of the MDRS is to enable housing choice in main urban areas. These standards support the development of three homes up to three storeys on each site, without the need for resource consent. To enable this, the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS) requires Tier 1 territorial authorities in greater Auckland, Hamilton, Tauranga, Wellington and Christchurch to incorporate the MDRS into every relevant residential zone in their district plan.

In the case of Warkworth, this is currently being progressed by Plan Change 78. The proposed changes are shown below in Figure 2-2 and Figure 2-3.

Figure 2-2: Existing Land Use (AUP)

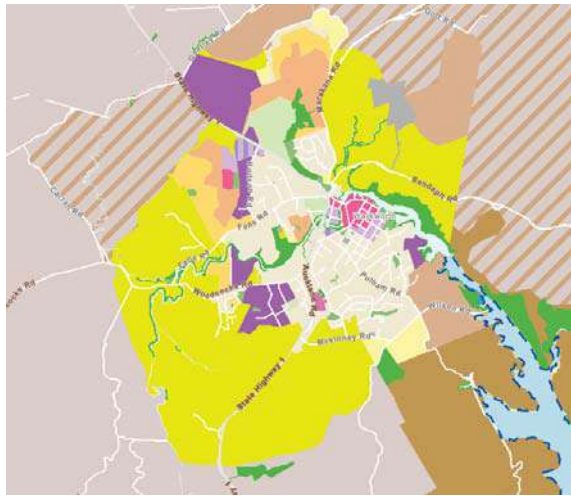
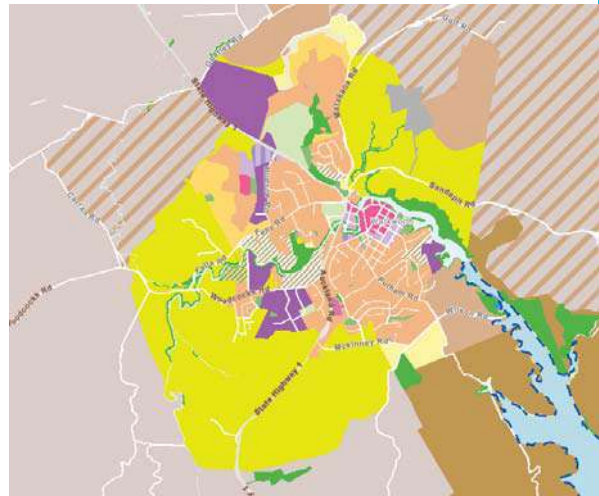


Figure 2-3 Proposed Land Use (Plan Change 78)



### Residential

- Residential - Large Lot Zone
- Residential - Rural and Coastal Settlement Zone
- Residential - Single House Zone
- Residential - Mixed Housing Suburban Zone
- Residential - Mixed Housing Urban Zone
- Residential - Terrace Housing and Apartment Buildings Zone



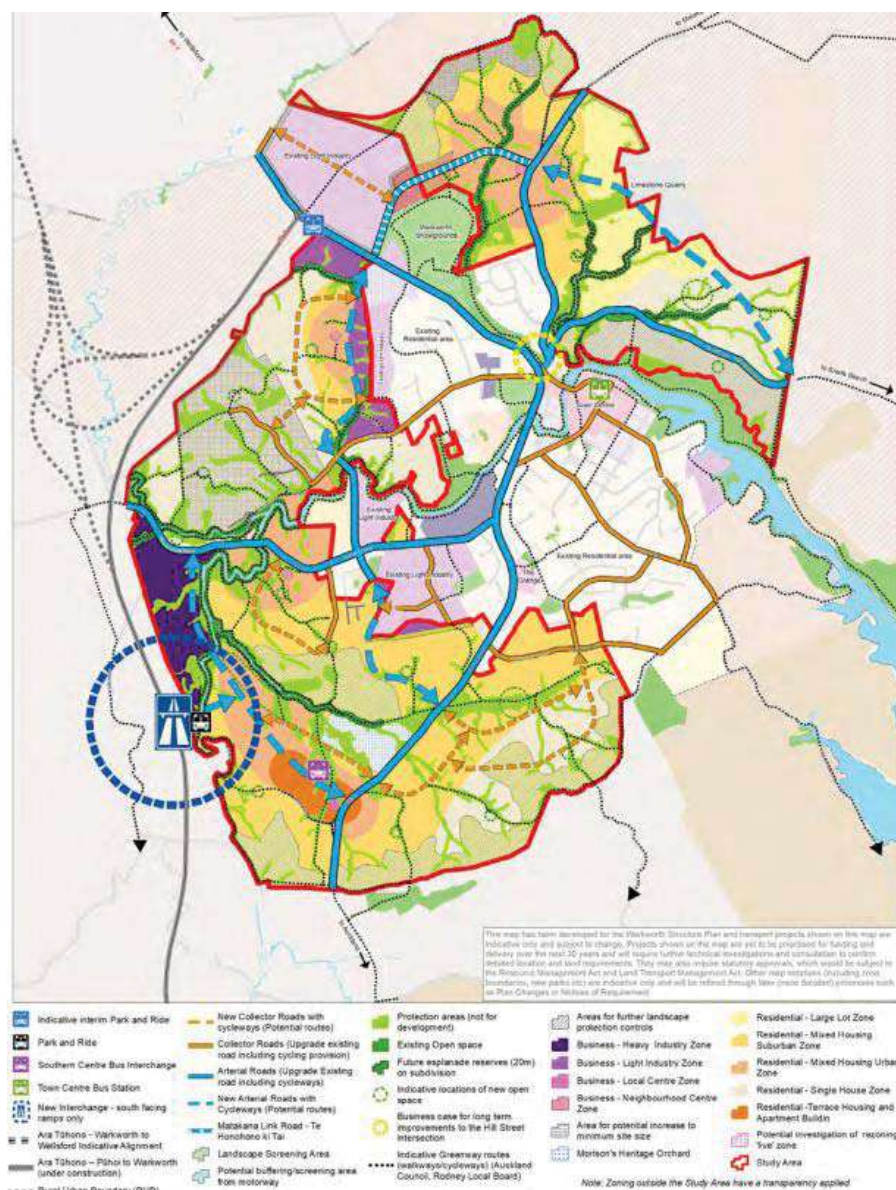
As shown, Plan Change 78 enables greater densities within the existing urban areas in Warkworth. This will support walking and cycling catchments to the exiting town centre. The expected level of uptake for increased density in the areas shown is still unclear in the Warkworth area.

### 2.3.1 Rezoning and Plan Change Processes

In addition to the land use uncertainties that have arisen from policy direction, there is ongoing uncertainty inherent in the process from Structure Plan to Plan Change, to zoned land.

The Warkworth Structure Plan was adopted by Auckland Council in June 2019 and sets out the pattern of land uses and supporting infrastructure network for the future growth of Warkworth as shown in Figure 2-4.

Figure 2-4 Warkworth Structure Plan

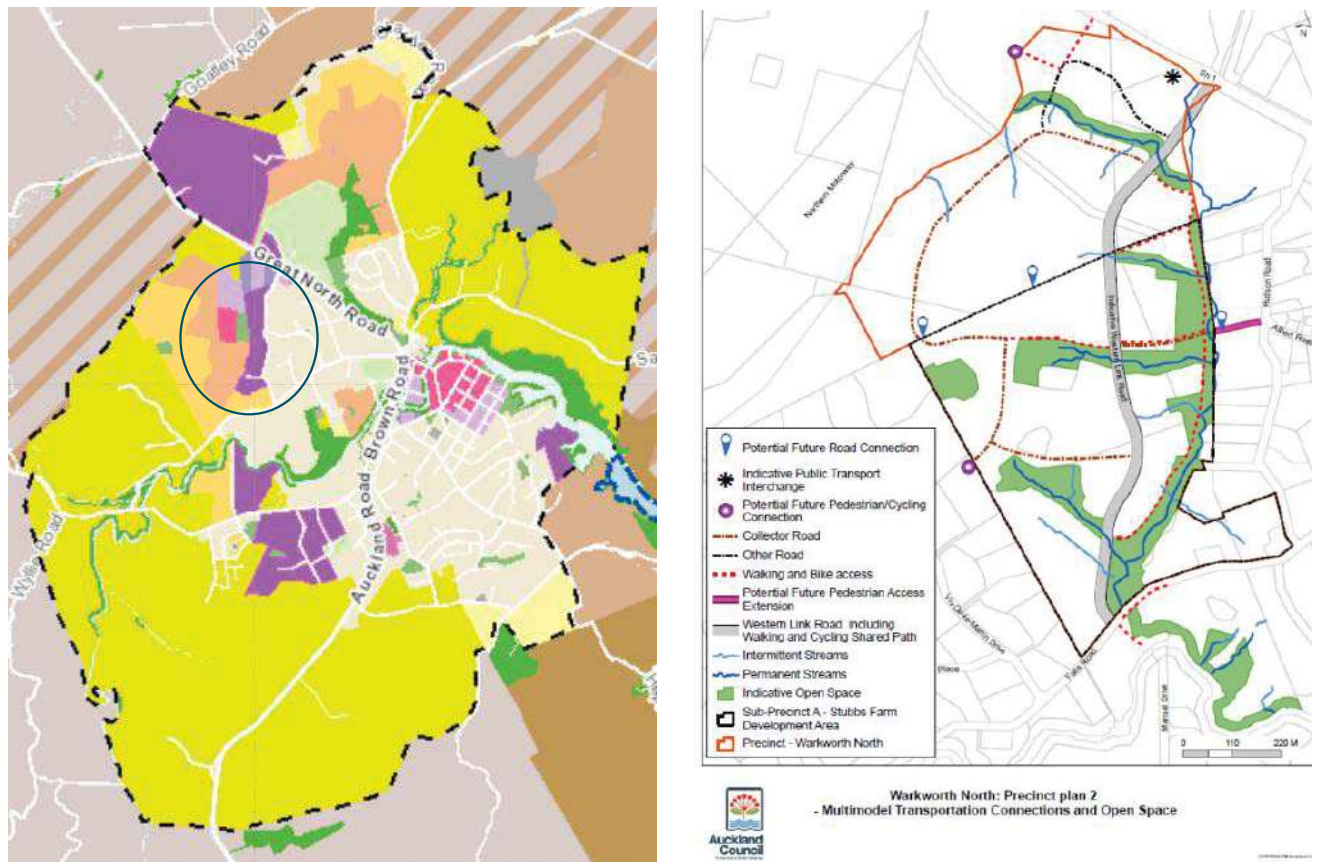


The Warkworth North Private Plan Change (PPC) rezoned approximately 99 hectares of Future Urban zoned land to a mix of business and residential zones to provide for 1,000-1,200 dwellings, 13 hectares of industrial/commercial land and a new neighbourhood centre of 2,500m<sup>2</sup>. The resultant

zoning has a higher density than previously expected, a local centre and additional mixed-use zoned land. This is reflective of the ongoing trends towards mixed use zoning due to its flexible provisions and higher density provisions to enable greater development yields. The Plan Change was approved on 26 March 2020. Results of recent appeals have confirmed that the residual FUZ zoning in the Plan Change adjacent SH1 will remain as general business zoning. The proposed section of the Western Link Road as part of this Plan Change remains consistent with assumptions made in the Warkworth IBC. The proposed alignments will be used as a basis for further optioneering of the Western Link Road in the Warkworth DBC.

The new land use has been incorporated into the Unitary Plan as shown in Figure 2-5.

**Figure 2-5 Unitary Plan zoning including Plan Change 25**



Generally, the DBC responds to growth as currently identified in the FULSS. However, throughout the development of the DBC there has been evidence of ongoing development pressure in Warkworth of varying natures.

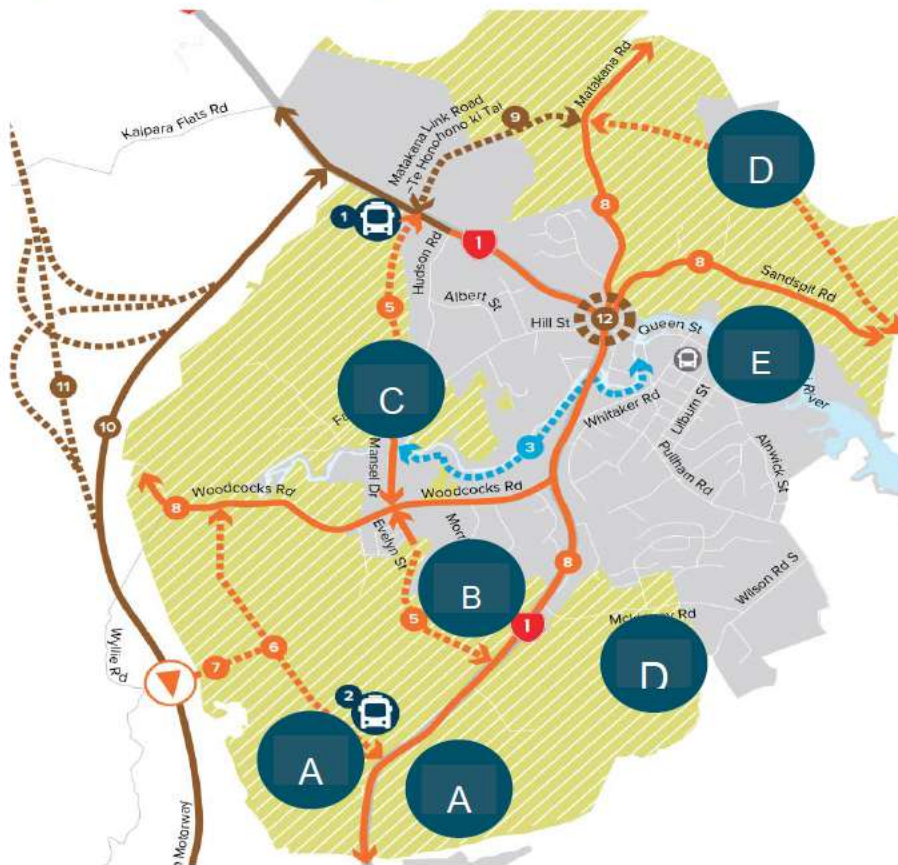
At the time of producing this report, the project team is aware of the following significant land developments as shown on Figure 2-6:

- A. Plan change in development in South Warkworth. The Warkworth South (Waimanawa) Vision Document has been prepared which includes the land use adjacent the eastern half of the New Wider Western Link Road. Part of this Plan Change extends to the eastern side of SH1
- B. Future Plan Change aspirations and discussions with the landowner adjacent New Western Link Road – South.



- C. Visibility of future plan change for Stubbs Farm Development which incorporates land access to Western Link Road – North.
- D. Potential for plan changes in FUZ land east of SH1 (i.e., Proposed PPC - McKinney Road (33, 37 and 43 McKinney Road) and North East Warkworth.
- E. Private Plan Change is being prepared South of Sandspit Road.

Figure 2-6 Proposed Plan Changes



These will have varying degrees of impact on the future transport network. Where the proposed plan changes are within the existing future urban zoned land – these impacts would largely be expected to focus on the staging and sequencing impacts and the resulting pressure on strategic transport infrastructure. It is noted that recent policy changes enable additional intensification and as such higher yields might be realised through development. These plan changes also provide opportunity to help deliver parts of the future transport network.

The project team is not aware of any development proposals identified outside the FUZ which could have a wider implication on the proposed network.

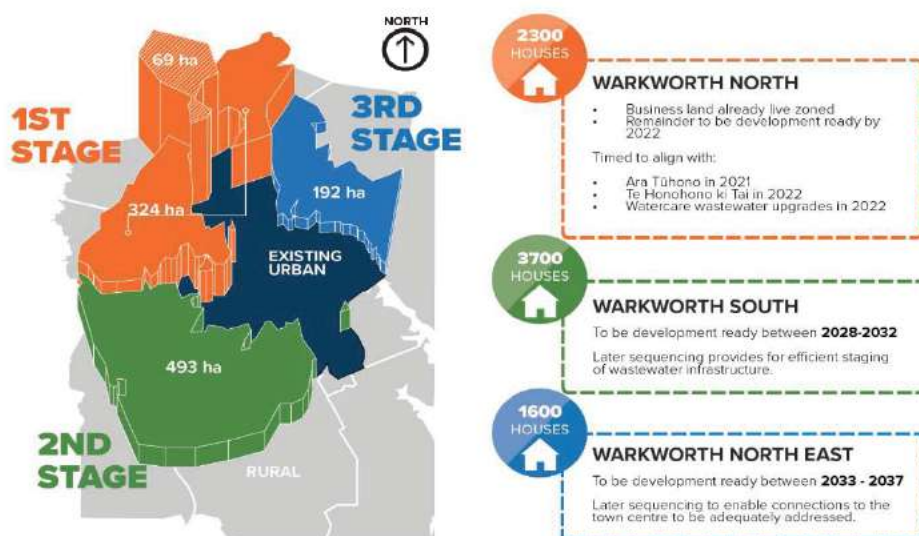
## 2.4 Timing of Growth

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

The Future Urban Land-use Supply Strategy (FULSS) has assumed the following staging as shown in Figure 2-7 and has formed the basis of the DBC assumptions. It is noted that the FULSS was prepared before recent climate change legislation and associated emission reduction plans which creates some uncertainty for longer term growth forecasts.

It is also acknowledged that due to recent changes to land use policies (such as the Medium Density Residential Standards) Auckland Council is currently revisiting the land use strategy and the Future Development Strategy (FDS) is being completed in parallel to this DBC. It is not expected to significantly change the quantum and location of future land available, but increased intensification, different housing typology and refined staging could be expected. An outcome of policy changes may increase 'out of sequence' plan changes by third parties. The DBC has considered these changing land use scenarios at a high level to consider any impacts on the recommended infrastructure, however only a single land use scenario has been modelled. Land use modelling has inherent uncertainties with respect to factors such as yield, attractiveness as well as macro factors that will also influence where growth occurs such as level of developer contributions applied to areas, net migration to Auckland, brownfield versus greenfield development uptake. At this stage the FULSS remains the best regional forecast available that considers how growth might be realised in Auckland.

Figure 2-7 FULSS land release and indicative housing yield<sup>4</sup>



The FULSS identified that the Warkworth North sequencing aligns with the development of a new wastewater treatment plant at Snells Beach and the completion of the Ara Tūhono Puhoi to Warkworth Motorway. The later sequencing of the Warkworth South provides for the efficient staging of wastewater infrastructure. Warkworth North East is sequenced later to enable connections to the town centre to be adequately addressed.

<sup>4</sup> Total number of houses in the FULSS was 7,600. This has since been reduced to 7,300.



## 2.5 Business Case change history

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

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

**Table 2-1 History of the Warkworth Business Case**

Stage	Detail	Growth	Policy
Programme Business Case (2016-2017)	<p>TFUG considered a programme of intervention for the North, Warkworth and South growth areas. The possible Warkworth interventions included:</p> <ul style="list-style-type: none"> <li>• New north south links and links from Matakana and Sandspit.</li> <li>• Motorway access to the south</li> <li>• Walking and cycling links</li> <li>• Park and ride</li> </ul>	<ul style="list-style-type: none"> <li>• Responds to the pace, scale and staging of growth identified in the AUPOIP and FULSS 2015.</li> <li>• FULSS 2015 greenfield growth assumptions: Dwellings 7,700-7,900 Jobs 4,040.</li> </ul>	<ul style="list-style-type: none"> <li>• FULSS (2015).</li> <li>• AUPOIP (2015).</li> <li>• I9 Land Use Scenario.</li> <li>• ATAP first revision.</li> <li>• GPS on Land Transport (2015-2018)</li> </ul>
Indicative Business Case (2018 - 2019)	<p>IBC focused on Warkworth area only:</p> <ul style="list-style-type: none"> <li>• Cycling network</li> <li>• Two public transport interchanges including park and ride in the south.</li> <li>• New southern motorway interchange</li> <li>• Upgrade to 5 existing roads</li> <li>• Four new corridors</li> <li>• Shared path along Mahurangi River</li> </ul>	<ul style="list-style-type: none"> <li>• Response to the pace of the updated FULSS 2017.</li> <li>• FULSS 2017 greenfield growth assumptions: Dwellings 7,600 Jobs 5,400</li> <li>• Modelled growth assumptions* – Dwellings 7,300 Jobs 5,400</li> <li>• Total Population 22,700.</li> </ul>	<ul style="list-style-type: none"> <li>• Updated FULSS (2017).</li> <li>• I11.4 Land Use Scenario.</li> <li>• Updated ATAP.</li> <li>• New GPS (2018-2021).</li> <li>• New Auckland Plan 2050.</li> <li>• <b>Outcome:</b> new GPS and Auckland Plan reinforces a balanced, mode neutral response in the Warkworth. Focusing on greater mode choice and consideration of modal priorities.</li> </ul>
Detailed Business Case	<p>DBC investigated interventions identified during the IBC:</p> <ul style="list-style-type: none"> <li>• Hierarchy of cycling infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• North Warkworth Precinct ( Plan change 25) became operative.</li> <li>• Response to the pace of the updated FULSS 2017.</li> </ul>	<ul style="list-style-type: none"> <li>• I11.5 Land Use Scenario</li> <li>• New GPS (2021-2024)</li> <li>• Vision Zero 2019.</li> </ul>



Stage	Detail	Growth	Policy
(2020-2021)	<ul style="list-style-type: none"> <li>Two public transport interchanges including park and ride in the south.</li> <li>New southern motorway interchange</li> <li>Upgrade to 5 existing roads</li> <li>Four new corridors</li> <li><i>Shared path along Mahurangi River excluded.</i></li> </ul>	<ul style="list-style-type: none"> <li>Similar modelled growth to IBC numbers so ultimate transport response is commensurate.</li> <li>Modelled growth assumptions* – Dwellings 8,200 (7,300 in FUZ)</li> <li>Jobs 4,600</li> <li>Total Population 22,600 (existing 5,500 + 17,100 people)</li> <li>Additional 5 years for full build out. Could affect timing of infrastructure. Using 2048+ scenario for modelling.</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Climate Change Response (Zero Carbon) Amendment Act 2019</li> <li>NPS Urban development (NPS-UD).</li> <li>NPS Freshwater Management (NPS-FM).</li> <li><b>Outcome:</b> Continued focus on mode shift and choice. Increased focus on achieving climate change response and intensification of development at transport nodes.</li> </ul>

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

## 2.6 Warkworth DBC Scope

The DBC encompasses 12 projects from the IBC Indicative Strategic Transport Network. Together these projects form a cohesive transport response for Warkworth to respond to planned future growth.

The transport investment identified in the IBC will enable an integrated transport system with a range of strategic and local elements supporting mode choice in Warkworth. It is predicated on creating a connected walking and cycling network and supporting an enhanced local and regional public transport system. The timing for implementation will vary and will be dependent on the release of surrounding land use.

The DBC considers the case for investment and refinement of options for the following projects noting that the collective benefit of the network as a whole outweighs the individual benefits to each element.

- New Northern Public Transport Hub and Park and Ride.
- New Southern Public Transport Hub.
- New Southern Motorway Interchange on Ara Tūhono.
- Upgrade to SH1.
- Upgrade to Woodcocks Road.
- Matakana Road Upgrade.
- Sandspit Road Upgrade.
- New Western Link Road – North.
- Western Link Road – Central Upgrade.
- New Western Link Road – South.
- New Wider Western Link Road.
- New Sandspit Link Road.

These projects form the arterial roads for Warkworth but it is acknowledged that there will also need to be a complementary collector road network and other cycle connections. The Mahurangi recreational walking and cycling connection is excluded from this DBC scope and will be progressed as part of other transport programmes. It is expected that these complementary measures will be considered as land use develops.

The investment decisions sought at this stage are:

1. **Approval of the Warkworth recommended transport network.**
2. **Approval of lodgement of route protection for Warkworth.**
3. **Approval for funding release for the Warkworth post lodgement activities.**
4. **Acknowledgement of the potential early property acquisition and associated risk arising from route protection of the recommended Warkworth Package.**

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

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

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

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

**Table 2-2 Warkworth Business Case Type**

Corridor		Business Case Type			Commentary
		Type A	Type B	Type C	
1	Northern Public Transport Hub and Park and Ride		✓		Will require land to be protected for the PT hub.
2	New Southern Public Transport Hub		✓		Will require land to be protected for the PT hub.
3	New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway		✓		Will require land to be protected for the interchange.
4	Woodcocks Road Upgrade – SH1 to Mansel Drive	✓			No route protection investment is being sought for this corridor. No additional land is required and the project has been costed for future reallocation of existing space for walking and cycling facilities.
	Woodcocks Road Upgrade – west of Mansel Drive		✓		Will require land to be protected to enable the corridor urbanisation.
5	SH1 Upgrade – Hill Street to Te Ara Tūhono	✓			No route protection investment is being sought for this corridor. Project has been costed for future reallocation of existing space for walking and cycling facilities.
	SH1 Upgrade – Hill Street to Fairwater Road	✓			No route protection investment is being sought for this corridor. No additional land is required and the project has been costed for future reallocation of existing space for walking and cycling facilities.

Corridor		Business Case Type			Commentary
		Type A	Type B	Type C	
	SH1 Upgrade – Fairwater Road to southern end of FUZ		✓		Will require land to be protected to enable the corridor urbanisation.
6	Matakana Road Upgrade		✓		Will require land to be protected to enable the corridor urbanisation.
7	Sandspit Road Upgrade		✓		Will require land to be protected to enable the corridor urbanisation.
8	New Western Link Road – North		✓		This corridor will be delivered by the developers as part of the North Warkworth Precinct conditions. The exception is the northern section which will need route protection for to support the Northern Public Interchange and Park and Ride Project. These two projects will be rolled together for purposes of route protection.
9	New Western Link Road – Central	✓			No route protection investment is being sought for this corridor. No additional land is required and the project has been costed for reallocation of existing space for walking and cycling facilities.
10	New Western Link Road – South		✓		Will require land to be protected to enable the new connection.
11	New Wider Western Link Road		✓		Will require land to be protected to enable the new connection.
12	New Sandspit Link Road		✓		Will require land to be protected to enable the new connection.

This DBC has undertaken sufficient design detail and assessment to confirm the footprint required to provide for future infrastructure. This footprint strikes a balance of minimising land requirement whilst maintaining flexibility for future decisions over the next 10-30 years. Examples of how flexibility has been managed is shown in Table 2-3.

**Table 2-3 Management of flexibility in the Warkworth DBC**

Item	How flexibility has been managed
Road space allocation	The cross sections provide sufficient space to provide for the individual modal elements – but how this road space might ultimately be allocated will be confirmed during the future individual implementation DBCs and will reflect the design standards at that time.
Intersections	Generally, where possible, design has allowed for flexibility in intersection type for future design in particular roundabouts and signals to provide for future decision making. It is expected that in some instances the intersection form could be confirmed during NoR discussions and may be added as part of the condition set.
Stormwater treatment	Each corridor has had stormwater analysis undertaken to understand the stormwater treatment and attenuation requirements including impacts from future climate change. This has informed the footprint for stormwater measures including identification of wetlands where appropriate. The Waka Kotahi standard is NZTA P46 Stormwater Specification and the AT specification is “Guidance Document 2017/001 Stormwater Management Devices in the Auckland Region (GD01).
Management of greenhouse gas (GHG) emissions.	<p>A number of factors will encourage mode shift in time with development to support the management of GHG emissions associated with future growth:</p> <ul style="list-style-type: none"> <li>• Flexibility in road space allocation and longevity of the programme provides sufficient opportunities to realise future design changes or use of materials to best support low carbon infrastructure throughout the lifecycle of the project.</li> <li>• Flexibility for programme staging to allow re-prioritisation of elements to best respond to mode shift targets as interdependent factors such as funding and changing land use occurs.</li> </ul>
Bridges	Where corridors anticipate a bridge replacement will be required in the lifetime of the designations, sufficient space has been allowed for in the designation to support construction of the bridge.

## 2.7 Structure of Warkworth DBC

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

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

All appendices are formatted similarly with reporting ordered as follows:

- Generic or process orientated information.
- Strategic project information.
- Local projects ordered by public transport projects, upgraded existing roads and new corridors.



The economic case has been prepared for the overall Warkworth with an additional assessment lens by development area e.g. North Warkworth, South Warkworth and North East Warkworth. In addition, there is an assessment for the strategic project of the New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway.

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

**Table 2-4 Warkworth DBC appendices**

Appendix	Summary of purpose
A: Warkworth Strategic Case	Strategic Case for the DBC including specific evidence for each project corridor. Identifies any changes to the policy and strategic direction since the completion of the IBC.
B: Warkworth Climate Change Response	Summary of the work undertaken to consider the role of each corridor in supporting the Warkworth climate change response and the identification of future opportunities.
C: Warkworth Options Assessment Report	Summary of option assessment process for the DBC. Includes detailed documentation for each corridor individually.
D: Warkworth Technical Assessments	Range of technical notes to support the Warkworth DBC:  D1: Warkworth Public Transport Approach  D2: Warkworth Walking, Cycling and Micro-mobility strategy  D3: Warkworth Transport Modelling including form and function and modelling assumptions.  D4: Warkworth Southern Interchange  D5: Mahurangi Shared Path  D6: Sandspit Link Road  D7: Western Link Road North
E: Engagement Summary	Summary of results from the 2022 Warkworth engagement.
F: Urban Design Evaluation	Urban design evaluation for all projects in the DBC using the Te Tupu Ngātahi Design Framework principles.
G: Warkworth Transport Outcomes	Specific information on transport outcomes for the recommended transport network.
H: Warkworth Design Report	Engineering report that documents assumptions and decisions for the recommended network for each project.

Appendix	Summary of purpose
I: Warkworth Property Overview	Assumptions and methodology for the estimate of property costs.
J: Warkworth Cost Report	Assumptions and methodology for costing. Costs prepared for each project.
K: Warkworth Economics Assessment	Economic assessment for Warkworth. Includes assumptions and outcomes.
L: Warkworth Route Protection Strategy	Strategy to route protect for the Warkworth.
M: Warkworth Risk Register	Key overall Warkworth and individual project risks.
N: Warkworth Staging Considerations	Potential staging for the Warkworth network. Includes qualitative commentary of both land use and transport factors for staging and commentary on triggers. Includes an alternative staging assessment for consideration.



# Strategic Case

### 3 Why is investment needed?

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

Over the next 30 or more years, the Warkworth growth areas are expected to accommodate:

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

This is a significant increase from the existing population of 5,500<sup>5</sup> and employment in an area that is presently predominantly rural in character. With the realisation of the Medium Density Residential Standards (MDRS) this intensification could be even more than is currently estimated. The existing transport system is not appropriate and this growth will exacerbate existing transport problems resulting in the current network being unsuitable to support this planned future growth.

The planned population growth in Warkworth will on its own generate more trips in the future. Without any investment in alternative modes, the majority of these additional trips will continue to be undertaken by private vehicles and the Vehicle Kilometres Travelled (VKT) would be expected to significantly increase. By 2048, the additional VKT would result in significant congestion on existing routes such as Woodcocks Road, SH1 and Hill Street intersection and further reduce access to social and employment destinations within Warkworth.

The future challenge for Warkworth therefore, is not if the greenfield growth will or should occur, but rather what needs to be done so when this growth happens the transport network is best positioned to respond to support mode shift. The desired outcome is that the majority of these new future trips are undertaken using alternative modes to private vehicles. Otherwise without investment, urban growth will continue to contribute to transport emissions rather than supporting the government policy to avoid emissions when growth occurs.

Warkworth is uniquely located as a Satellite Town on the northern geographical edge of Auckland City. It has an important role as a hub for the smaller surrounding settlements such as Wellsford and along the Kowhai Coast. With the completion of Ara Tūhono motorway ( which will not have additional fare tolls) there will be improved vehicle access to Auckland however there remains limited transport choice for internal or regional trips.

The Future Urban Zoned (FUZ) land in Warkworth is currently served by a transport network that has existing rural and urban transport corridors. A snapshot of the existing Warkworth network performance is:

- 93% of Warkworth commute mode share is made by private vehicle, 2% by public transport, 3% by foot and 1% by bicycle<sup>6</sup>
- Existing cycleway provision is localised and does not create a connected network to key destinations.
- Low existing bus frequencies and limited route choice.

<sup>5</sup> Current population in Warkworth, 2018 census

<sup>6</sup> 2018 census data

- Significant congestion on sections of existing SH1 such as Hill Street and within the town centre with specific pressure on parking. It is noted that some of the State highway congestion is expected to decrease once Ara Tūhono is completed.

The current form of the transport network is not capable of supporting the significant growth and in some places does not yet exist. The existing network will be unable to support the overall climate change goals of shifting trips to lower emission travel options including public transport and active transport. It is critical that the transport system supports and shapes the scale of growth proposed. Table 3-1 shows the most likely issues to develop in Warkworth if investment does not occur.

**Table 3-1 Key issues for Warkworth without transport investment**

Key issues	Potential outcome
Existing transport network cannot accommodate additional transport demands.	<ul style="list-style-type: none"> <li>• The current transport network is already under pressure (e.g., SH1 and Hill Street intersection) and future transport demands will exacerbate existing issues thus limiting Warkworth's growth potential. Ara Tūhono will alleviate some of the pressure, however this infrastructure alone will be insufficient to address future growth demands and local access issues.</li> <li>• The existing network does not provide suitable access to future land uses, resulting in indirect/longer trips between existing and future key destinations.</li> </ul>
Poor land use integration	<ul style="list-style-type: none"> <li>• Limited opportunities to encourage public transport, walking and cycling, resulting in private car use to continue at existing levels.</li> <li>• Does not support the delivery of the desired compact urban form for Warkworth.</li> <li>• Inability to match employment land with the transport network will not enable Warkworth to have more local employment options and limit its ability to operate as a sub-regional economic and employment hub.</li> <li>• Place making within the urban extents will be compromised if the land uses and transport infrastructure are not integrated. This could also result in reduced protection of the scale and character of the rural township which is critical to the identity and ongoing profile of Warkworth.</li> <li>• Inability of the transport network to respond flexibly to changing densities from land use policies such as the NPS:UD and MDRS resulting in residential intensification that is not supported by low carbon transport network options and reinforces the current private vehicle preferences.</li> <li>• Opportunity to provide lead infrastructure which supports mode shift, i.e., walking and cycling, is lost due to unconnected development.</li> <li>• Warkworth's growth potential is limited.</li> <li>• Liveability outcomes are compromised.</li> </ul>
Limited travel choice	<ul style="list-style-type: none"> <li>• Limited investment in public transport to key locations reinforces high private vehicle dependence.</li> <li>• Limited investment in active mode facilities will result in a network which is not legible, unsafe and not well connected.</li> <li>• Unmanaged growth in demand for private vehicle travel, which will result in traffic volumes on existing roads above their designed capacity</li> </ul>



Key issues	Potential outcome
	<p>resulting in severe congestion, severance, and high stress for all modes.</p> <ul style="list-style-type: none"> <li>Limited urbanisation of the currently rural road network (such as Matakana Road, Sandspit Road and Woodcocks Road) which will have negative outcomes for safety, urban form, and active travel.</li> <li>Strategic network resilience risk associated with limited access to Warkworth via Ara Tūhono. Over-reliance of this connection for both strategic and local activities compromise both functions. It is acknowledged that the existing SH1 will continue to provide access, however it is not as attractive or as safe as Ara Tūhono.</li> </ul>
Contribution to emissions reduction	<ul style="list-style-type: none"> <li>Without investment in transport choice, private cars will continue to be the dominant mode in Warkworth. With growth this will increase the number of private vehicle trips and potentially increase transport emissions depending on the vehicle fleet. This does not support the development of a low carbon transport system for Warkworth.</li> <li>A poorly connected walking and cycling network, or a network with missing links will reduce the potential for mode shift and miss the opportunity to capitalise on the small footprint of Warkworth ( 5km wide) and capture new active mode users for short internal trips.</li> </ul>
Safety	<ul style="list-style-type: none"> <li>Existing safety risks are likely to increase on key corridors such as SH1 as traffic volumes increase with limited investment in safe solutions.</li> <li>Active mode safety issues will be exacerbated without investment in suitable and safe walking and cycling facilities.</li> </ul>
Environmental challenges	<ul style="list-style-type: none"> <li>Warkworth has localised poor ground conditions, drainage issues, extensive floodplains, streams and identified Significant Ecological Areas (SEA's). These challenges could limit opportunities for north-south and east-west corridor provision resulting in severance within the future transport network.</li> <li>Without consideration, the transport network may not be able to adapt to climate change challenges like increased severity and occurrence of flooding.</li> </ul>

### 3.1 Why route protect?

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

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

- **Provides certainty and direction for future land use.** This supports key land use integration measures such as future structure planning processes and intensification around stations and public transport routes.
- **Provides a mechanism for AT and Waka Kotahi to plan for future financial investment while retaining flexibility** on the detailed development of the recommended future network, enabling it to respond to the pace, scale, and exact location of future urban growth.
- **Allows for major infrastructure to be implemented at the right time**, integrated with the urban development driving the desired transport and urban outcomes. This means that projects can be delivered to meet project objectives, with the transport network in mind and gives certainty that the transport system can be operated.
- **Reduces future cost risk.** If the corridor is protected by either early acquisition or notices of requirement, then there is an opportunity to reduce some land costs. This is in part associated with the increasing land values that occur as 'live zones' are implemented, and costs savings associated with the control or management that route protection can place on development on the land.
- **Protects project feasibility.** Route protection prevents the land from being developed in a manner which makes projects more expensive, has compromised outcomes or in the worst case the project is no longer feasible. This is particularly important with pressure for private plan changes creating potential for live zoning to occur prior to route protection. It is noted that when development occurs before projects are provided for in the Regional Land Transport Plan (RLTP), developers currently do not contribute to the cost of projects which they benefit from and contribute traffic to but do not require for their development to proceed.

Warkworth is seeing increased development pressure which further supports the need for timely route protection as detailed in this DBC.

## 4 What has changed since the IBC?

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

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

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

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

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

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

Change Since Warkworth IBC	DBC Response
<p>Land Use policy and strategic alignment</p> <ul style="list-style-type: none"> <li>• Auckland 2050</li> <li>• National Policy Statement (NPS-UD) on Urban Development</li> <li>• Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021.</li> <li>• NPS on Freshwater Management (NPS-FM).</li> <li>• Proposed NPS for Indigenous Biodiversity.</li> <li>• Proposed NPS for Highly Productive Land.</li> <li>• Waka Kotahi Arataki</li> </ul> <p>Future changes in progress</p> <ul style="list-style-type: none"> <li>• The Plan Change 78 for intensification is being progressed but seeks to intensify existing land use.</li> <li>• Future Development Strategy FDS is under development and is reassessing growth.</li> </ul>	<p>The investment objectives for the DBC align well with the overall Auckland Plan 2050 outcomes.</p> <p>The optioneering process to date has used multi criteria analysis (MCA) to assess a wide range of social and environmental impacts. The impact of the new NPS criteria will be considered further during the options assessment phase.</p> <p>Generally, the DBC responds to growth as currently identified in the FULSS. However, there is evidence of ongoing development pressure in Warkworth and the expectation is that future land use could be more intensely developed than first assumed. The initial results from the FDS work being undertaken by Auckland Council show limited changes for location of growth in Warkworth.</p> <p>The NPS-UD requires councils to plan for growth and ensure a well-functioning urban environment for all people, communities, and future generations with a key requirement to enable intensification along public transport routes. The Resource Management Amendment Act strengthens the NPS:UD and includes a new Medium Density Residential Standards (MDRS) which allow development up to three homes of three storeys on most sites without a resource consent. This differs from the Auckland Unitary Plan which has designated zones for Mixed House Urban which is the most similar zoning to the proposed MDRS. Council expects this will result in more intensified residential development in Warkworth than first envisaged in the structure plan.</p> <p>This is obviously less coordinated than through a Structure Plan process and is harder to predict where intensification might occur as it depends on public and private developer appetites and availability of suitable sites. It is understood that the MDRS is seeking to build new houses faster, rather than increasing the population in Auckland, so the overall growth assumptions for Auckland remain valid, it is potentially the timing and location of the growth which is uncertain.</p> <p>To manage this uncertainty in the DBC it is intended that each corridor in the recommended DBC network will be assessed at a high level to consider how the recommended footprint might change should higher intensification materialise in the adjacent land use. For example, could a change in</p>

Change Since Warkworth IBC	DBC Response
	<p>residential land use intensification adjacent the corridors change the recommendation from a 2 lane cross section to a 4 lane cross section.</p> <p>Wetlands are a key feature in Warkworth and the implications of the NPS-FM and NES for Freshwater have been accounted for in the optioneering process.</p> <p>It is noted that the Arataki view for Auckland Urban Roads is there is likely to be a short term reduced demand for personal travel which could improve journey reliability in the short term, returning to pre covid levels in the medium term with growth in the long term. This will be considered as part of the staging strategy for Warkworth.</p>
<p>Climate Change</p> <p>The Climate Change Response (Zero Carbon) Amendment Act 2019 set a framework and targets to reduce emissions and to prepare for, and adapt to, the effects of climate change. The key documents are:</p> <ul style="list-style-type: none"> <li>• Te hau Mārohi ki anamata Towards a productive, sustainable and inclusive economy: Aotearoa New Zealand's first emissions reduction plan (the ERP),</li> <li>• Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi Adapt and thrive: Building a climate-resilient New Zealand – New Zealand's first national adaptation plan (NAP).</li> <li>• Auckland Council's Te Tāruke-ātāwhiri: Auckland's Climate Plan.</li> </ul>	<p>The IBC was built on the premises of:</p> <ul style="list-style-type: none"> <li>• <b>Transport and land use integration</b> – a guiding principle to provide a transport network that supports land use development and good urban form.</li> <li>• <b>Prioritising mode choice</b> – specifically focusing on improved public transport reliability and services and creation of a well-connected walking and cycling network.</li> </ul> <p>The result is a recommended transport system which reduces the reliance on private vehicles and shifts trips to low carbon alternatives. The DBC also continues to build on demand management principles adopted in the IBC and does not provide for unconstrained demand but rather seeks opportunities to influence and reduce demand alongside the recommended infrastructure. The MfE emissions document details the proposed approach to reducing emissions such as reducing VKT by integrating land use and transport and providing travel choice and specific measures are discussed in the TERP. The premise of this DBC aligns well to these goals and as such, the DBC is well positioned to respond to emission reduction outcomes.</p> <p>Specific actions to be undertaken in the DBC will include a Te Tupu Ngātahi emissions assessment of the corridors to ensure proposed investment is consistent with climate change targets. In addition, the staging of the programme will consider climate change goals.</p>

Change Since Warkworth IBC	DBC Response
<p>Land Use Assumptions and development pressures.</p> <ul style="list-style-type: none"> <li>Formal land use assumption changes include:</li> <li>The Warkworth Structure Plan was adopted in 2019.</li> <li>Plan Change 25 (PPC 25) The PPC 25 – Warkworth North Precinct area was made Operative in Part in the AUP-OP as of 12 Nov 2021.</li> </ul> <p>Increasing development pressure has been identified in Warkworth including:</p> <ul style="list-style-type: none"> <li>Plan change in development in South Warkworth. The Warkworth South (Waimanawa) Vision Document has been prepared which includes the land use adjacent the eastern half of the New Wider Western Link Road. This has had a recent change of owner but the intent to develop early and out of sequence remains.</li> <li>Future plan change aspirations and discussions with the landowner adjacent New Western Link Road – South.</li> <li>Visibility of future plan change for Stubbs Farm Development which incorporates land access to Western Link Road – North. It is noted this project is currently on hold.</li> <li>Potential for plan changes in FUZ land east of SH1</li> <li>Potential for future plan changes for North East Warkworth.</li> </ul>	<p>The DBC is cognisant of any changes in the land use assumptions and utilises the most current land use assumptions available. Of those identified to date, there are no significant changes to base land use assumptions from the IBC. It is noted that the Plan Change 78 signals further intensification.</p> <p>These will have varying degrees of impact. Where the proposed plan changes are within the existing future urban zoned land these impacts would largely be focused on the staging and sequencing impacts and the resulting pressure on strategic transport infrastructure. There is currently no evidence of any development proposals that are located outside the FUZ which could have a wider implication on the proposed network as it generates additional demand where previously there were none.</p> <p>Approximately 34% of the 2,500 consents issued over the last 10 years in the Kōwhai Coast have been for Warkworth showing organic land use development is already occurring. Issuing of consents has generally doubled since completion of the IBC.</p> <p>Where some certainty of information is available e.g., for Plan Change 25 and the South Warkworth proposal, the DBC has considered the proposed land use changes to understand how this might impact the proposed transport network. Where possible the team has spoken with developers and landowners directly.</p>



Change Since Warkworth IBC		DBC Response
Modelled Growth Assumptions	<ul style="list-style-type: none"> <li>Overall growth projections in Warkworth remain generally consistent in terms of full build out quantum.</li> <li>Growth projections are expected to be slightly slower and more linear in terms of full build realisation.</li> </ul>	<p>The overall quantum of growth in land use model i11.6 remains largely the same as i11.4 which was used in the IBC. As these growth assumptions were the basis on which the transport network was developed, the overall conclusions of the Warkworth IBC remain valid. Potential impacts from the MDRS have not been included in AFC land use models as yet so the impact of intensification will be considered qualitatively for each corridor during the optioneering process.</p> <p>The change in growth timing could potentially impact the recommended timing of implementation of transport projects in the DBC.</p>
Transport Policy and Strategic Alignment	<ul style="list-style-type: none"> <li>Ministry of Transport Outcomes Framework.</li> <li>An updated GPS on Land Transport has been released, which places increased focus on climate change objectives and freight connections rather than broader environmental outcomes and value for money.</li> <li>Road to Zero</li> <li>Removal of onsite parking minimums</li> </ul>	<p>There have been some key changes to the policy and strategic direction since the IBC. These changes are however still consistent with the overarching outcomes sought from the IBC. These include access, mode shift, environmental sustainability, and safety. The GPS also has a greater focus on climate change.</p> <p>With these continuing objectives it is considered that the IBC conclusions are well aligned with the current transport strategic and policy directions. The problems and assessment in the DBC have been refined to accommodate these GPS changes. More details on how the network will support addressing climate change will be included.</p>
Transport Projects	<ul style="list-style-type: none"> <li>Ara Tūhono (Puhoi to Warkworth Motorway) – under construction</li> <li>Ara Tūhono (Warkworth to Wellsford Motorway)</li> <li>Tūhonohono ki Tai (Matakana Link Road) – under construction.</li> <li>Hill Street Improvements – Detailed Business case endorsed and detailed design has funding to commence.</li> <li>Interim Public transport hub – implemented by Rodney Local board.</li> </ul>	<p>From the IBC there has been little change that would have demonstrable effect on the conclusions in the IBC. There has been no additional funding identified since the IBC that would change the indicative staging of these investments. The DBC will interface with the designs of these complementary transport projects.</p> <p>There have been some changes to the future public transport network which will require further investigation to the roles and functions of the north and south PT hubs. This will be considered during the option development phase. Ara Tūhono is being delivered by a Private Public Partnership (PPP) between the Government and a private consortium, the Northern Express Group (NX2). NX2 are responsible for financing, designing, building, maintaining and operating the motorway for 25 years. This contractual arrangement may have implications on the ability to implement the proposed</p>

Change Since Warkworth IBC		DBC Response
		Southern Motorway Interchange. This issue will need to be investigated during option development and addressed in the management case of the DBC.
COVID19	<p>The impact of COVID19 on the transport system has three key impacts.</p> <ul style="list-style-type: none"> <li>• Resilience of public transport operations.</li> <li>• Change in funding levels and type.</li> <li>• A kick-start for working from home.</li> </ul>	<p>While the response to COVID19 has had a direct and immediate impact on public transport and transport demand, it is expected in the longer-term horizon, such as that assessed in the DBC that transport demands will return to projected levels.</p> <p>The realisation of work from home opportunities following COVID19 is considered important for Warkworth's role as a satellite town where a future aspiration might be for residents to live in Warkworth and commute some days to urban Tāmaki Makaurau. COVID19 has shown that this type of flexible working can be possible. Additional uptake in work from home will have an impact consistent with longer term aspirations for reduced travel demand, which is already predicated in the base modelling assumptions.</p> <p>Given the long-term nature of the DBC no specific COVID19 related changes to land use and travel demand assumptions are considered necessary.</p>

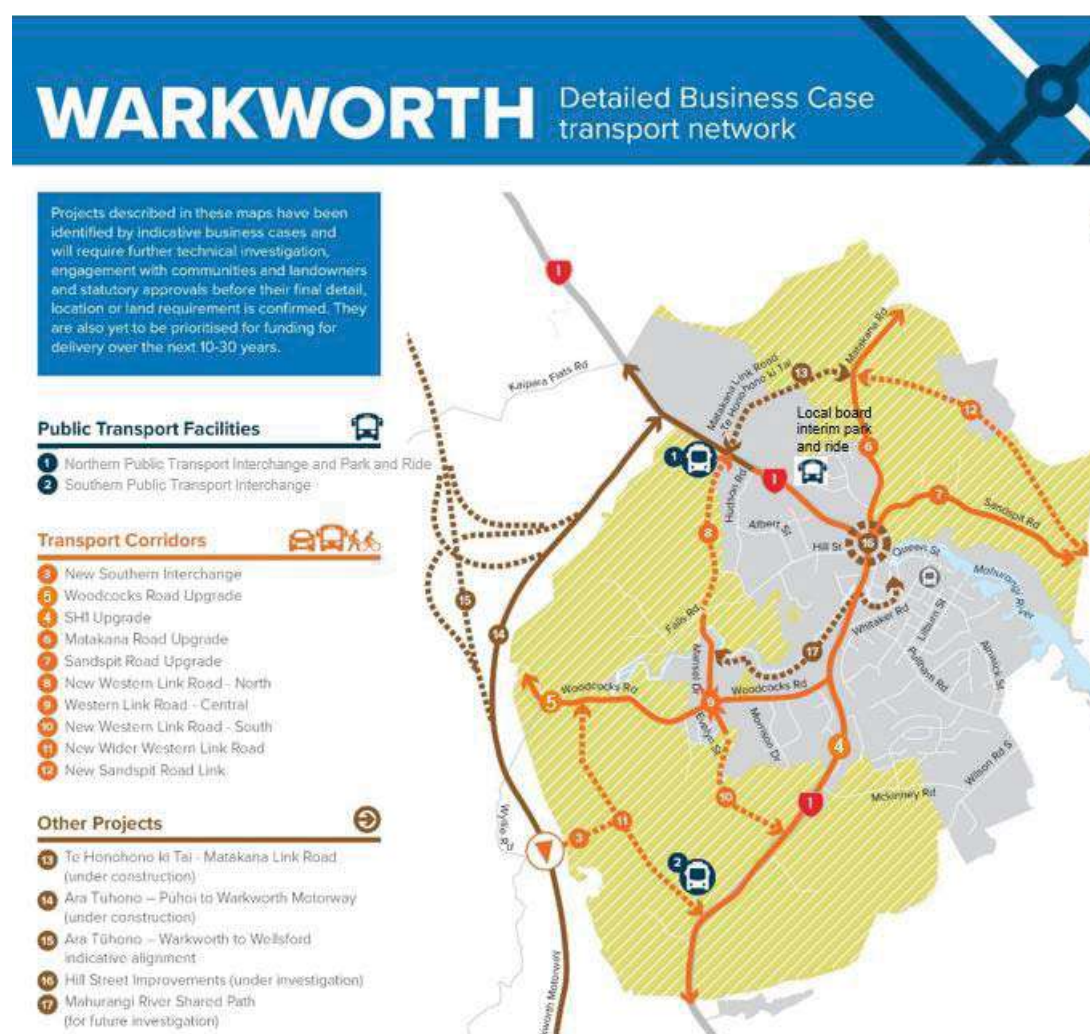
## 5 Warkworth projects

This DBC proposes an integrated transport network to support the expected future growth in Warkworth. The network includes provision for frequent public transport, improved walking and cycling, and general traffic connections. Overall, the package seeks to improve connectivity for Warkworth and support transformational mode shift by providing high quality, safe and attractive transport environments.

Twelve corridors from the recommended Warkworth IBC programme were considered as part of this Warkworth DBC as shown in Figure 5-1 below.

The Mahurangi Shared Path between Mansel Drive and the existing town centre is excluded from this DBC and remains part of the Rodney Local Paths Plan (formerly known as the Greenways project). The Hill Street improvements project is being progressed by a separate business case in parallel to this DBC.

Figure 5-1 Warkworth IBC projects proceeding to DBC



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

## 5.1 DBC projects

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

**Table 5-1 Projects assessed in Warkworth DBC**

Project		Project Description and desired outcomes	DBC Interdependencies
1	New Northern Public Transport Interchange and Park and Ride	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Western Link Road-North</li> <li>Existing SH1 Upgrade</li> </ul>
2	New Southern Public Transport Interchange	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Wider Western Link Road</li> <li>Existing SH1 Upgrade</li> </ul>
3	New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Wider Western Link Road</li> <li>Ara Tūhono Puhoi to Warkworth</li> <li>Ara Tūhono Warkworth to Wellsford</li> </ul>
4	SH1 Upgrade	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Woodcocks Road Upgrade</li> <li>Western Link Road – North and South</li> </ul>

Project		Project Description and desired outcomes	DBC Interdependencies
		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.	<ul style="list-style-type: none"> <li>Wider Western Link Road</li> <li>Northern Public Transport Interchange and Park and Ride</li> <li>Southern Public Transport Interchange</li> <li>Hill Street Intersection Improvements</li> </ul>
5	Woodcocks Road Upgrade	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Western Link Road – Central</li> <li>Existing SH1 Upgrade</li> </ul>
6	Matakana Road Upgrade	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Sandspit Link Road</li> <li>Hill Street Intersection Improvements</li> <li>Tūhonohono ki tai - Matakana Link</li> </ul>
7	Sandspit Road Upgrade	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Sandspit Link Road</li> <li>Hill Street Intersection Improvements</li> </ul>
8	New Western Link Road – North  Mansel Drive to SH1	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Northern Public Transport Interchange and Park and Ride</li> <li>Existing SH1 upgrade</li> </ul>
9	New Western Link Road – Central	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>New Western Link Road – North</li> <li>New Western Link Road – South</li> </ul>



Project		Project Description and desired outcomes	DBC Interdependencies
	Mansel Drive and Evelyn Street	continuous access between the future western residential areas and the local centre and employment opportunities.	<ul style="list-style-type: none"> <li>Woodcocks Road Upgrade</li> <li></li> </ul>
10	New Western Link Road – South  Evelyn Street to SH1	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New Western Link Road – Central</li> <li>Existing SH1 upgrade</li> </ul>
11	New Wider Western Link Road  Woodcocks Road to SH1	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Woodcocks Road Upgrade</li> <li>Existing SH1 upgrade</li> <li>New Southern Motorway Interchange</li> </ul>
12	New Sandspit Road Link  Between Matakana Road and Sandspit Road	<ul style="list-style-type: none"> <li>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.</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Matakana Road Upgrade</li> <li>Sandspit Road Upgrade</li> <li>Hill Street Intersection Improvements</li> <li>Tūhonohono ki tai - Matakana Link</li> </ul>

## 5.2 Complementary Projects

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

**Table 5-2 Complementary Warkworth Projects**

Project	Integration with Warkworth DBC
<p><b>Ara Tūhono Puhoi to Warkworth Motorway – Section 1</b></p> <ul style="list-style-type: none"> <li>Extension of motorway from Johnstone’s Hill to Warkworth</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>The project will provide a safer, more resilient and reliable route between Pūhoi and Warkworth.</li> </ul>	<ul style="list-style-type: none"> <li>Currently this motorway is being constructed to provide a new route between Puhoi and Warkworth. It is expected this will reduce traffic on existing SH1 and allow this to provide an arterial function. Expected opening is 2023.</li> <li>DBC proposing a new interchange on Ara Tūhono to provide direct access to the southern growth area and provide additional resilience for Warkworth.</li> <li>DBC exploring how the existing Ara Tūhono designation and land holdings could be used for the new interchange.</li> </ul>
<p><b>Ara Tūhono Warkworth to Wellsford Motorway – Section 2</b></p> <ul style="list-style-type: none"> <li>Extension of motorway from Warkworth to Wellsford</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>The project will provide a safer, more resilient and reliable route between Warkworth and Wellsford.</li> </ul>	<ul style="list-style-type: none"> <li>Waka Kotahi NZ Transport Agency continues to work towards securing land designation and resource consents for the Warkworth to Wellsford project. NoR appeals have been filed with the Environment Court in July 2021.</li> <li>The future form and function of the northern interchange will be of importance for access to the future growth areas in Warkworth.</li> <li>DBC needs to integrate with current designs for Northern Interchange and ensure there is sufficient space between this and the planned new southern interchange.</li> </ul>
<p><b>Tūhonohono ki Tai – Matakana Link Road</b></p> <ul style="list-style-type: none"> <li>New road connecting Matakana Road and SH1</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>Facilitate future growth and improve safety and resilience for access to eastern beaches.</li> </ul>	<ul style="list-style-type: none"> <li>Construction substantially complete.</li> <li>DBC is exploring a new Sandspit Road Link which will connect to the eastern end of Tūhonohono ki Tai.</li> <li>DBC considering urbanisation upgrades for Matakana Road which intersects with the roundabout at the eastern end of Tūhonohono ki Tai – Matakana Link Road.</li> </ul>

Project	Integration with Warkworth DBC
<p><b>Hill Street Improvements</b></p> <ul style="list-style-type: none"> <li>Improvements to Hill Street/SH1 intersection</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>Reduce congestion and improve efficiency</li> </ul>	<ul style="list-style-type: none"> <li>A single stage business case for long term improvements to the Hill Street intersection has been progressed in parallel with Te Tupu Ngātahi in partnership with Auckland Transport and Waka Kotahi. The business case was completed in late-2019 and a recommended option identified. Current work has value engineered this design from a dual lane roundabout to a single lane roundabout solution which the DBC will tie into.</li> <li>Future Warkworth network relies on improvements at this intersection to maintain reliable access to Warkworth Town Centre.</li> <li>DBC corridor upgrades on Matakana Road, Sandspit Road and SH1 need to be integrated with the preferred roundabout solution at Hill Street.</li> </ul>
<p><b>Mahurangi Shared Path</b></p> <ul style="list-style-type: none"> <li>Shared path adjacent the Mahurangi River between Mansel Drive and SH1.</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>New recreational active mode connection that connects community and improves access to the Mahurangi River.</li> </ul>	<ul style="list-style-type: none"> <li>A priority route in the Rodney Greenways Paths and Trails Plan: Puhoi to Pakari.</li> <li>DBC needs to consider how proposed cycleway improvements on Woodcocks Road, Mansel Road and SH1 will integrate with this future recreational facility.</li> <li>Note as part of the gaps analysis process, this DBC has re-tested the IBC decision to exclude the Mahurangi Shared Path from the Te Tupu Ngātahi network.</li> </ul>
<p><b>Warkworth Community Transport Hub</b></p> <ul style="list-style-type: none"> <li>Interim Park and Ride facilities</li> </ul> <p>Expected outcomes:</p> <ul style="list-style-type: none"> <li>Support mode shift in Warkworth.</li> </ul>	<ul style="list-style-type: none"> <li>Construction completed in 2022 by Auckland Transport for Rodney Local Board.</li> <li>Facility will provide a range of facilities including 137 parks, bus layovers, bike parking and toilets.</li> <li>DBC needs to consider the long term location for park and ride and a northern public transport hub. This facility to be considered as part of the optioneering process.</li> </ul>

## 6 Guiding Principles for Warkworth

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

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

For existing roads identified for upgrade in this DBC, detail was developed around supporting the adjacent future land use, managing demand through supporting road space to maximise people throughput (e.g., on buses) and reallocation of road space to provide for corridor specific modal priorities such as dedicated cycle and walking facilities. The transport network does identify new pieces of infrastructure such as four new multimodal corridors and a new Southern Interchange on the Ara Tūhono Puhoi to Warkworth motorway. These have been recommended to provide an integrated and legible local network that supports access between key future land uses such as employment, residential and local centres. The provision for additional vehicle capacity has been very carefully considered and all new routes are intended to be multimodal.

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



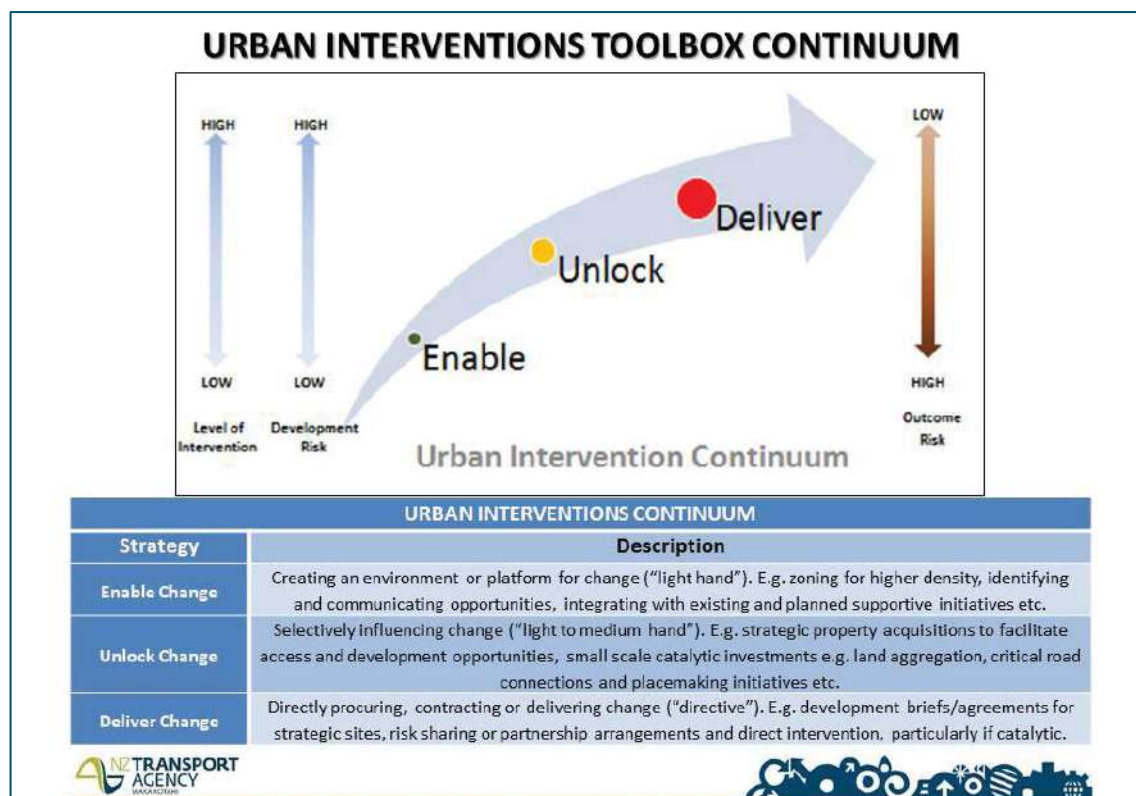
## 6.1 Land use integration

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

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

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

Figure 6-2 Urban intervention principles



Examples that will enable and unlock change in Warkworth include:

- Warkworth is a Satellite Town with a clear vision for people to live and work locally. Land use and transport integration is critical to help achieve this balance between employment and housing. Achieving this land use integration will reduce the need for longer distance trips to access employment and allow the transport network to provide alternative and more sustainable transport options for the resulting shorter trips. Examples include:



- High frequency public transport services and interchanges located with walk up access from the highest intensity residential development.
- The New Southern Interchange to support viability of industrial land by supporting direct freight access from the motorway to industrial zoning.
- Creation of a legible walking and cycle network that connects key destinations throughout Warkworth such as local centres, schools, employment areas and makes active mode a real transport choice for the short journeys.
- Design of public transport interchanges to provide the supporting bus infrastructure like layovers and charging to remove this from Warkworth Town Centre and return space in the town centre to place making and improving access to the river.
- Understanding future social infrastructure requirements such as schools, parks, town centres and the transport connections required to serve these customers. Conversely, using the proposed transport infrastructure to inform future land purchases for new social infrastructure to maximise outcomes. Wark
- Use of the arterial network to form key spines within growth areas to enable better and more coherent land use integration by multiple developers. An example of this is New Sandspit Link Road which has a dual role as a strategic link as well as an arterial to provide local access to future residential in a challenging topography which may otherwise never achieve local connectivity via ad hoc development.
- Use of the road hierarchy of State Highways and local roads to better manage freight movements and reduce trips through residential areas.
- Use of form and function to balance placemaking and modal needs on the corridors. For example, consideration/provision of bus priority facilities on primary bus routes.

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

Given there is an adopted structure plan for Warkworth, this higher level of land use certainty has allowed land use conversations to be focused on rapidly changing land uses and high development activity. Land use integration discussions with Auckland Council informed Te Tupu Ngātahi on existing land uses and how these land uses might be expected to change, including potential intensification in response to the new National Policy Statement on Urban Development 2020 and the MDRS. Additional discussions have also been held with a range of active developers to better understand how new developments are progressing and types of densities that can be expected. As part of the iterative nature of land use, key route refinement decisions such as which side to widen on existing corridors and impacts on competing land uses were discussed with Auckland Council. This has allowed the impacts of transport infrastructure on the existing land uses to be carefully balanced.

Table 6-1 Land Use integration discussions in Warkworth

Stage of analysis	Auckland Council	Government Partners <sup>7</sup>	Private Developers
Preliminary assessment Gap analysis. Constraint mapping. Form and Function.	<ul style="list-style-type: none"> <li>Understanding existing land use.</li> <li>Potential impacts of the National Policy Statement: Urban Development and future areas of intensification as part of the MDRS, Plan change 78 and FDS.</li> <li>Discussion about adopted structure plan and Auckland Councils vision. This included understanding how land use/intensification is changing between the Structure plan and Plan Changes that are coming through.</li> <li>Land use implications for the New Southern Interchange, particularly employment land.</li> <li>Ongoing discussions about developer activity and Plan Change progression.</li> </ul>	<ul style="list-style-type: none"> <li>Strategic planning of key social assets.</li> <li>Planned upgrades to existing assets.</li> </ul>	<ul style="list-style-type: none"> <li>Consented developments.</li> <li>Future plans of large landowners particularly upcoming “soft lodgement” of Plan Changes and Plan Changes under development.</li> </ul>
Option development and assessment	<ul style="list-style-type: none"> <li>Land use interface with rural versus FUZ alignment for New Sandspit Link Road.</li> <li>Land use interface with proposed locations for the park and ride and public transport interchanges.</li> <li>Opportunities and challenges with residual land i.e., existing industrial land adjacent New Western Link Road South</li> <li>Connectivity and access to future land uses.</li> <li>Discussion on trade-offs for competing land uses on existing constrained corridors.</li> </ul>	<ul style="list-style-type: none"> <li>Understanding potential impacts on existing facilities or assets.</li> <li>Preferences for corridor widening.</li> </ul>	<ul style="list-style-type: none"> <li>Understanding potential impacts on existing and future developments.</li> <li>Opportunities for staging or collective delivery.</li> </ul>

Specific land use integration outcomes and opportunities are detailed throughout the DBC and supporting appendices, in particular, **Appendix C: Option Assessment** and **Appendix F: Urban Design Evaluation**.

The Management Case in Section 14 of this DBC includes more detail about next steps for projects with identified land use opportunities.

<sup>7</sup> Government partners include Ministry of Education, New Zealand Defence Force

## 6.2 Te Tupu Ngātahi Urban Design Framework

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

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

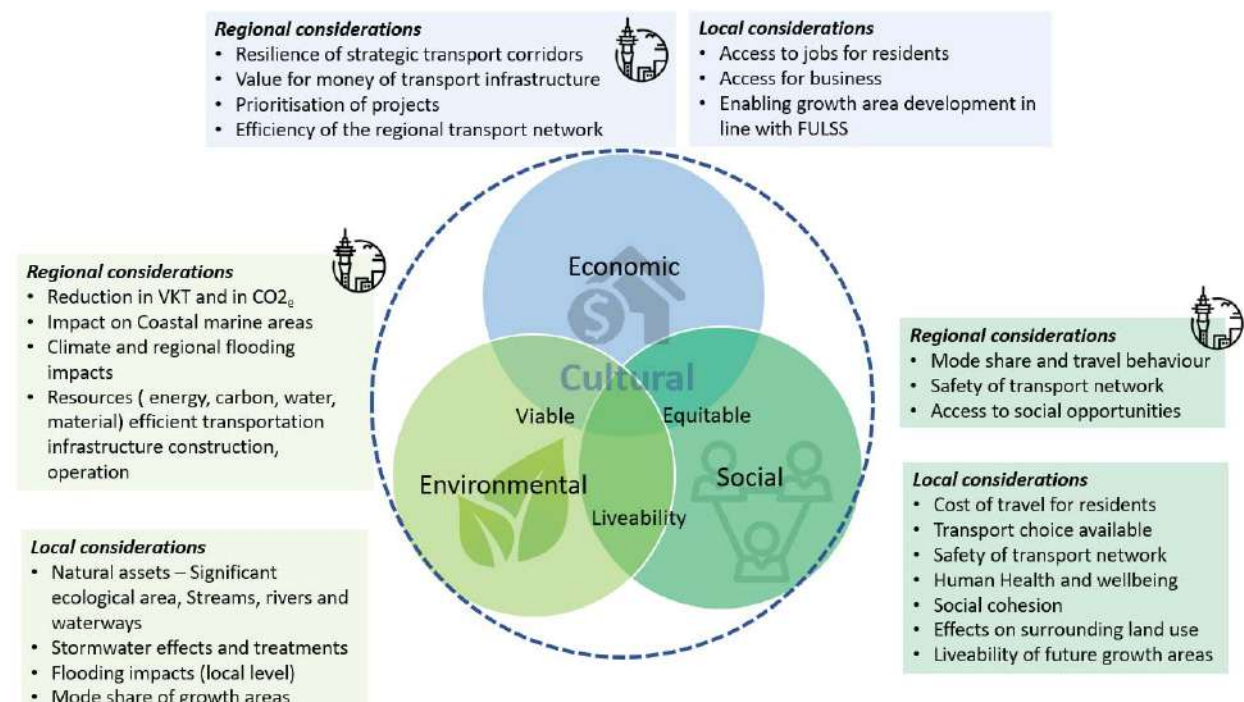
## 6.3 Sustainable outcomes

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

The Te Tupu Ngātahi Programme has identified four factors that work in partnership to achieve sustainable outcomes as shown in Figure 6-3. These pillars of sustainability include:

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



Figure 6-3 Sustainability principles




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

The outcomes can be achieved at both the local and regional level and the application to the Warkworth transport network is shown in Table 6-2.

**Table 6-2 Sustainability applications in Warkworth**

Sustainability factor	Measures	Applied in the Warkworth DBC
Cultural	Extent and effects on sites and places of cultural heritage value to manawhenua and built heritage.	<ul style="list-style-type: none"> <li>Regular manawhenua engagement and feedback, particularly in the development and assessment of options.</li> <li>Heritage specialist reviewed option alignments.</li> </ul>
Environmental 	Responding to climate change by providing a transport system that supports a reduction in emissions, is responsive to flooding impacts and limits impacts on our key natural assets such as wetlands and ecological habitats.	<ul style="list-style-type: none"> <li>Appropriate stormwater treatment including provision for green infrastructure in rural areas and suitable treatment and attenuation. Full details of stormwater infrastructure are included in <b>Appendix H: Design Report</b>.</li> <li>Priority focus on completing a core cycling network.</li> <li>Public transport priority facilities to improve the reliability and quality of services. PT facilities to be planned, designed, constructed and operated to significantly reduce not only operational but also whole of life emissions.</li> <li>Identification of location and quality of wetlands, streams and ecological areas during constraint mapping to inform option selection.</li> <li>Flood mapping to inform option selection and assess potential impacts of new corridors on the landscape.</li> <li>Assessment of reduction of emissions on whole of life basis in the economic analysis for the recommended programme.</li> <li>Protect and restore the environment across the construction, operation and maintenance of the transport network.</li> </ul>
Social 	Transport has key role to improve people's wellbeing and liveability of places.	<ul style="list-style-type: none"> <li>DBC focuses on safety improvements, particularly for existing corridors.</li> <li>DBC priority is improving transport choice and is reflected in modal priority assessments, rapid transit, walking and cycling network.</li> <li>Liveability addressed primarily through our urban design specialists who input at all stages of the corridor development.</li> <li>Social cohesion and human health are specific MCA assessment criteria so impacts considered in detail for all corridors.</li> </ul>
Economic	Access to jobs and businesses and enabling growth. At the regional level this includes resilience of	<ul style="list-style-type: none"> <li>Warkworth investment objective and associated KPIs specifically measure improvements in access.</li> <li>Land use assessment for all corridors includes consideration of trip destinations as well as an understanding of future land uses and impacts of intensification.</li> </ul>



Sustainability factor	Measures	Applied in the Warkworth DBC
	the network, value for money and prioritisation	<ul style="list-style-type: none"> <li>• Specific analysis to better understand the outcomes of each corridor and to inform prioritisation for implementation.</li> <li>• Through option development the future cross section has been challenged from an efficiency perspective to:               <ul style="list-style-type: none"> <li>- Balance flexibility</li> <li>- Maintain transport outcomes – seeking to balance land requirements with outcomes achieved e.g., does the additional land provide step change in outcomes or can the outcomes be maintained with a reduction in cross section which minimises property impacts.</li> <li>- These decision points have been tested with stakeholders and trade-offs clearly discussed to achieve a balanced network.</li> </ul> </li> </ul>

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

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

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

## 6.4 Climate change response

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

Reducing transport emissions is an important contributor to meeting New Zealand's emissions targets. It is recognised that transport plays a key role and the Climate Change Commission reflects *"We need to change the way we build and plan our towns and cities and the way people and products move around. This includes making walking and cycling easier with good cycleways and footpaths. It means moving freight off the road and onto rail and shipping. It means reliable and affordable public and shared transport systems. And it means an electric or low emissions transport fleet."*<sup>8</sup>

<sup>8</sup> He Pou a Rangi the Climate Change Commission, 31 January 2021 Draft Advice to Government



This aligns well with the GPS 2021 and by extension, to the development of this Warkworth DBC which itself aligns closely to the goals of the GPS 2021.

The climate change response strategies for Warkworth can be split into two types:

- **Mitigation** - aimed at minimising the possible impacts of climate change including the reduction of Vehicle Kilometres Travelled (VKT) and future Green House Gas (GHG) emissions. These mitigation strategies are underpinned by the guiding principles of transport and land use integration (Section 6.1) and the prioritisation of mode choice specifically focusing on public transport reliability and the creation of a well-connected walking and cycling network.
- **Adaptation** – considered at a high level in the DBC optioneering process to identify adaptation opportunities such as avoidance of natural hazard areas and flood measures such as raising at risk future bridges. It is expected that adaptation measures will be considered in more detail as the projects progress through future design and implementation processes.

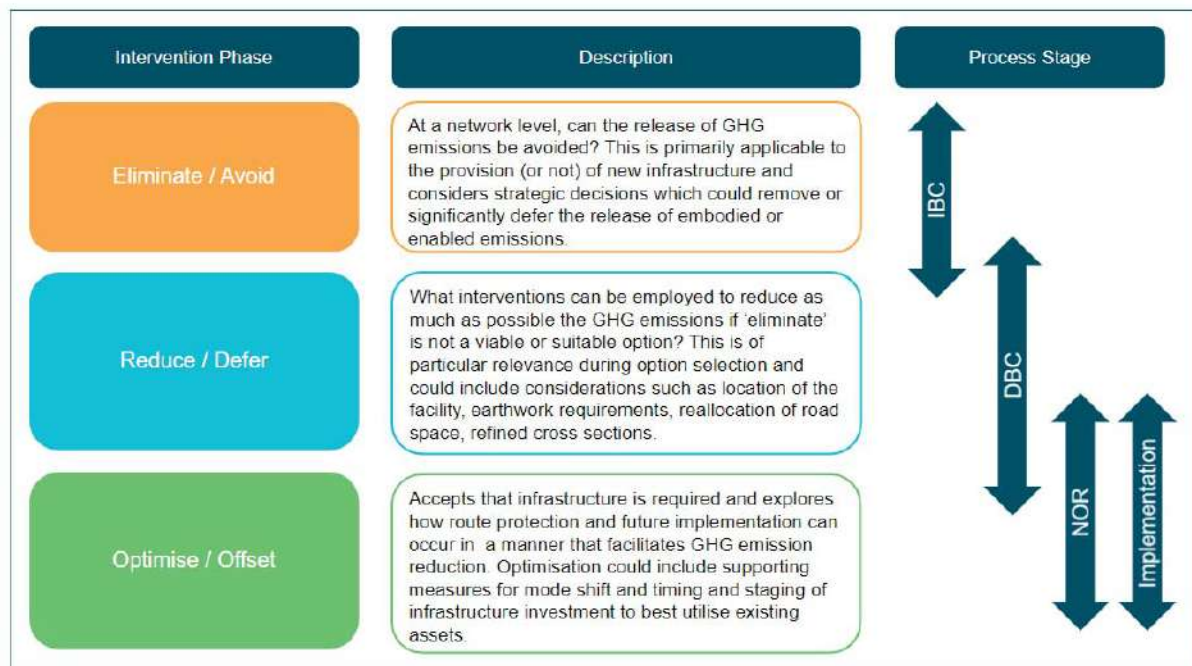
Decisions for the corridors have been focused on getting the corridor in the 'right' place to best support land use, providing lower-emission travel options through enabling public transport and active transport infrastructure. A summary of the type of climate mitigation strategies identified and applied in the development of this Warkworth DBC include:

- Assessment of modal priorities for each project to understand the corridors road function. This has then informed the allocation of road space to best support sustainable mobility modes such as bus, walking and cycling. By way of example, 100% of corridors provide new or improved active facilities.
- Focus on proximity of public transport to population density and social infrastructure. This is particularly relevant for the identification of public transport interchanges and maximise walk up catchments through land use integration.
- Location of Park and Ride to intercept trips from the rural hinterland and reduced addition VKT through Warkworth.
- Development of a connected cycle network that provides both regional and local cycle links and maximises the ability of people to access public transport or key destinations.
- Restriction of the provision of additional vehicle capacity. Only one corridor, Western Link Road North has been confirmed as requiring additional lane capacity and this would be to support bus reliability. The rest of the network remains as two lane multimodal corridors.
- Location of new corridors to reduce construction and embodied emissions e.g., reduced earthworks and smaller/less structures.
- Best use of existing corridors by reallocating road space for alternative modes rather than widening for active modes e.g., upgrades of Woodcocks Road urban, SH1 and Western Link Road-Central reallocated existing road reserve. This reduces impacts on surrounding land use and a potential reduction in embodied carbon and construction emissions.
- On highly constrained corridors using a refined cross section to provide the transport outcomes but balance impacts on constraints such as Significant Ecological Areas (SEA) and future ability for sequestration or reduced embodied carbon in smaller structures or removing the need for new retaining walls.

- Using route protection to provide a suitable footprint to allow future flexibility in design to best accommodate climate mitigation measures and enable future choices to be made on materials.

In establishing these principles and considering each corridor individually, the Warkworth DBC has undertaken a series of climate focused workshops for the corridors. This process occurred as part of preliminary assessment activities and applied an Eliminate-Reduce-Optimise intervention framework to consider impacts for each corridor as shown in Figure 6-4.

**Figure 6-4 Eliminate-Reduce-Optimise Intervention Framework**



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

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

## 6.5 Demand management

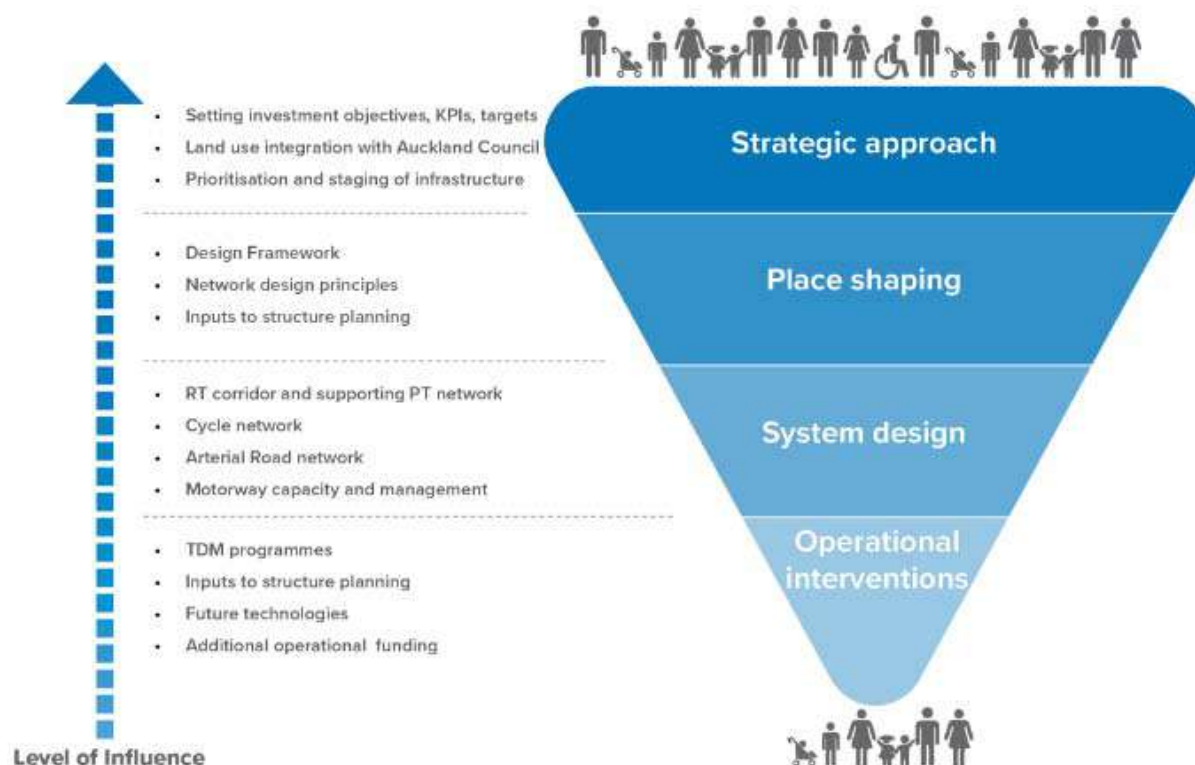
As previously mentioned, a guiding principle of this DBC is sustainable urban mobility, which seeks to develop an urban transport system that fosters a balanced development of all relevant transport modes and encourages a shift to more sustainable modes. The other aspect within this response is to improve the performance of the land transport system by changing transport demand and travel behaviour. Demand management activities influence how, when and where people and freight travel and has the following objectives:

- Shaping transport demand to better balance with supply.
- Shaping travel behaviour to ease pressure on the transport network and environment.

- Delivering economic benefits to businesses, communities or Aotearoa as a whole.<sup>9</sup>

Therefore, the Warkworth DBC continues to build on demand management principles adopted in the IBC and does not provide for unconstrained demand but rather seeks opportunities to influence and reduce demand alongside the recommended infrastructure. A four-step approach to Travel Demand Management (TDM) and influencing travel behaviour has been used, as shown in Figure 6-5. This includes consideration of an integrated set of policy-based, soft measures to achieve the desired goal.

**Figure 6-5 Te Tupu Ngātahi Demand management influence**



Specific applications of the TDM approach within this DBC are detailed in Table 6-3. Commensurate with the purpose of this DBC, a significant focus of the TDM tasks has been in maximising outcomes within the system design part of the hierarchy. However, there have still been significant strategic and place shaping opportunities that have been realised throughout the overall development of the recommended programme and these have typically been associated with the larger strategic pieces of transport infrastructure such as the New Southern Interchange on Ara Tūhono or new greenfield routes.

**Table 6-3 Demand management applications**

Demand management influence	Warkworth DBC Response
Strategic approach	<ul style="list-style-type: none"> <li>• Confirmed investment objectives and KPIs which are consistent with TDM principles focusing on safety, access, mode shift (particularly reducing single</li> </ul>

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

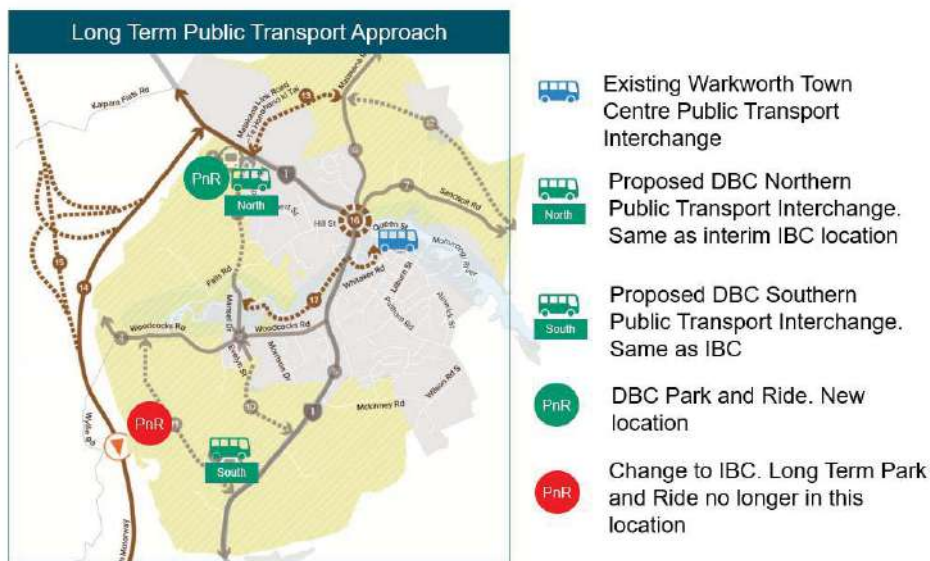
Demand management influence	Warkworth DBC Response
<p>Decisions have a broader effect and have the potential to significantly alter transport demand at a regional level.</p>	<p>occupancy vehicles), reliability and land use integration. These investment objectives align with the Ministry for Environment climate change goals to develop a low carbon transport network. Also align with the MoT Transport Outcomes Framework that includes environmental sustainability.</p> <ul style="list-style-type: none"> <li>• Collaboration with Auckland Council to understand about land use impacts arising from planned upgrades including residual land and access to planned industrial land uses.</li> <li>• Specific workshops to understand the role of the New Southern Interchange on the wider travel patterns and contribution to emission reductions.</li> <li>• Consideration of staging and interdependencies in the DBC.</li> </ul>
<p><b>Place shaping</b></p> <p>Developing good urban form to influence travel behaviour e.g., provision of good quality, frequent public transport service to key destinations</p>	<ul style="list-style-type: none"> <li>• The DBC has built on IBC recommended key connections and corridors.</li> <li>• Place shaping has been further developed for key infrastructure such as the public transport interchange and park and ride locations. Provision of these new facilities releases land from within Warkworth Town Centre for place making activities.</li> <li>• Consideration of how changes in intensification will happen for land use near proposed frequent transit networks and changing needs of corridors e.g., location of southern public transport interchange co-located with the local centre.</li> <li>• Impacts on social infrastructure such as a planned school on Woodcocks Road.</li> <li>• Legible and well connected active mode network focusing on connecting key destinations.</li> </ul>
<p><b>System design</b></p> <p>Areas of focus for infrastructure design</p>	<ul style="list-style-type: none"> <li>• Rigorous application of iterative Corridor Form and Function process to balance place and movement functions on corridor.</li> <li>• Focusing on public transport priority, connected cycle networks and minimisation of additional capacity for private vehicles.</li> <li>• Redesign of the public transport strategy and resultant investigation of Park and Ride site location.</li> </ul>
<p><b>Operational interventions</b></p> <p>Operational measures to support targeted mode shifts</p>	<ul style="list-style-type: none"> <li>• Restricted parking on arterial corridors.</li> <li>• Potential pricing of the Park and Ride site.</li> <li>• Assessment of complementary operational design measures for the recommended programme e.g., end of trip facilities, travel behaviour change schemes, promotions and monitoring. These types of opportunities have been identified where applicable during this DBC, but more detail is expected to be developed as corridors progress from route protection to funding and implementation business cases.</li> <li>• Although out of scope for this DBC, it is acknowledged that investment in public transport infrastructure alone will not influence demand. Instead, additional funding will be required for more public transport services to put buses and rapid transit vehicles onto the network to achieve better frequency and longer hours of operation.</li> </ul>

## 6.6 Public Transport Approach

A frequent, efficient and well connected public transport system is critical to supporting local and regional trips to/from Warkworth. At the commencement of the DBC, the overall public transport strategy was reassessed to understand if further refinement would better support place making and land use integration for the town. Both the individual public transport elements (public transport interchange and Park and Ride facilities) as well as the location of these facilities were reassessed due to policy changes since the IBC. Full details of this assessment are included in **Appendix D1: Public Transport Approach**.

The changes between the IBC and DBC Public Transport approach is shown in Figure 6-6 below.

**Figure 6-6 Changes between IBC and DBC for the Public Transport Approach.**



In summary, the key items to note are as follows:

- Southern Public Transport Interchange does not change from the IBC and is recommended to co-locate with the planned local centre in South Warkworth. This will include primary back of house bus facilities such as drivers facilities, charging infrastructure and layover spacing that cannot be provided in the Warkworth Town Centre due to space constraints.
- Interim Park and Ride in the north becomes long term Park and Ride infrastructure in the DBC and the proposed IBC Park and Ride adjacent to the Southern Interchange is not progressed. The reason for this change is so that the Park and Ride can better intercept the rural trips from the hinterland (that will not have a future public transport service) and avoid additional vehicle trips through Warkworth to access the facility. This will support the reduction in enabled carbon and reduce vehicle trips within Warkworth.
- Provision of a northern public transport interchange is to be co-located with the Park and Ride infrastructure to provide attractive modal transfer. This will also provide some secondary back of house facilities to support the higher frequency service and relieve pressure in the Warkworth Town Centre. It also supports longer distance coaches between Auckland and the Far North that will call at this facility due to no provision of north facing on/off ramps at the Southern Interchange.

This public transport approach was used as the basis for site selection in the DBC optioneering.





## 7 Warkworth investment case

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

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

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

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

**Figure 7-1: Warkworth problem themes**



## 7.1 Problem definition

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

**Table 7-1: Summary of evidence**

Problem	DBC Problem description	Evidence presented in IBC
Access	The current form and function of corridors, lack of active mode facilities and missing transport connections does not support future growth and will constrain access to economic and social opportunities in Warkworth.	Transport network is not of the right form and function and capacity to provide for future demands. Existing provision does not connect future land uses. MDRS intensification will further exacerbate this problem.
Reliability/ Resilience	As transport demand grows, without new transport corridors network resilience will be limited and public transport, private vehicles and freight will experience unreliability.	There is currently no alternative to SH1. The completion of Ara Tūhono will provide strategic resilience, but the trip generation from unmanaged growth will exceed capacity on the existing network resulting in congestion and severance. Local road alternatives are not suitable for future transport requirements.
Travel Choice	A lack of dedicated active mode and public transport facilities will result in more private vehicle trips as growth occurs	Geographical size of Warkworth is compact which supports public transport and active mode share. 91% of trips are currently by private vehicle. Limited walking and cycling facilities that do not connect trip generating activities, aren't continuous and have limited crossing opportunities. Infrequent public transport routes.
Safety	A lack of safe active mode facilities and existing safety issues will be exacerbated by the future growth in Warkworth.	Existing crash risks on Woodcocks Road, SH1 and Matakana Road. Additional risk for active mode users with a lack of safe and separated facilities which results in users feeling unsafe, even for short trips. High vehicle speeds on existing rural road form which will continue unless it is urbanised.
Integration	The existing transport corridor is not commensurate with the level of urban growth in this area limiting development potential and the quality of the urban environment.	Provision of local employment is critical to achieving the desired mode share and transport connections important for land use viability. Current urban form does not support public transport and active mode travel.

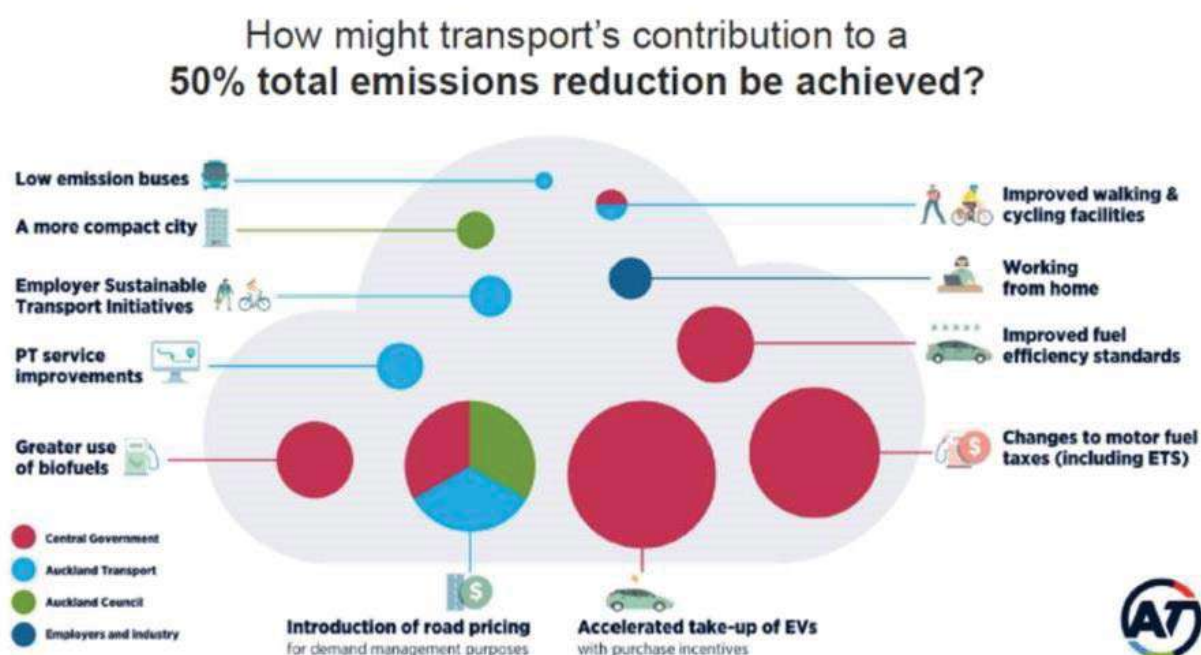
Climate change is however a new problem since the IBC and has been defined for this DBC as:

*“The current transport system has an over-reliance on private vehicles. This combined with limited low carbon transport alternatives results in significant transport emissions which is incongruent with current climate change goals”.*

The IBC had a premise of mode shift and was focused on creating a future network that reduced reliance on private vehicles. As part of this development, it already considered which parts of the network would be required to support this mode shift which forms part of the mitigation response for the impact of Climate Change. The IBC principles of land use integration, travel demand management, transport hierarchy and sustainable outcomes all supported the underlying desire for a low carbon transport network. Therefore, this new problem was already being considered implicitly as part of the IBC. The DBC does however take the opportunity to specifically highlight climate change.

It is noted that the transport response to the reduction of transport emissions is made up of many factors as shown in Figure 7-2. This shows that the concepts of a compact town and improved walking and cycling facilities or bus services are just smaller parts of the overall response and in fact the movement to the use of biofuels, electrification of the fleet and road pricing are considered the heavy lifters in addressing GHG emissions.

**Figure 7-2: Transports contribution to transport emission reduction ( source: Auckland Transport)**



The DBC cannot influence these wider policy decisions but it can support with contributions through network provisions to support mode shift and associated reductions in VKT and management of embodied carbon.

Therefore, it was decided to focus the climate change problem for this DBC on a response to maximise mode shift to public transport or active modes and to reduce future private vehicles trips. The reduction in emissions of the remaining private vehicles trips will need to be addressed through

biofuels or fleet electrification. The DBC will also consider the impacts of embodied carbon during the optioneering stages.

Warkworth is heavily reliant on private vehicles with a current mode share of 91%. Without alternative low carbon travel choices, this mode share will not change in the future. By addressing the other five problems this over reliance on private vehicles will in fact be reduced. The provision of better access for all modes, land use integration with the transport infrastructure, improved reliability for the network and provision of active mode and bus facilities will collectively encourage mode shift in Warkworth. Growth itself will increase the number of transport trips in Warkworth, but the measure of success will be how many of these new (and existing) trips can be undertaken on a low carbon transport network.

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

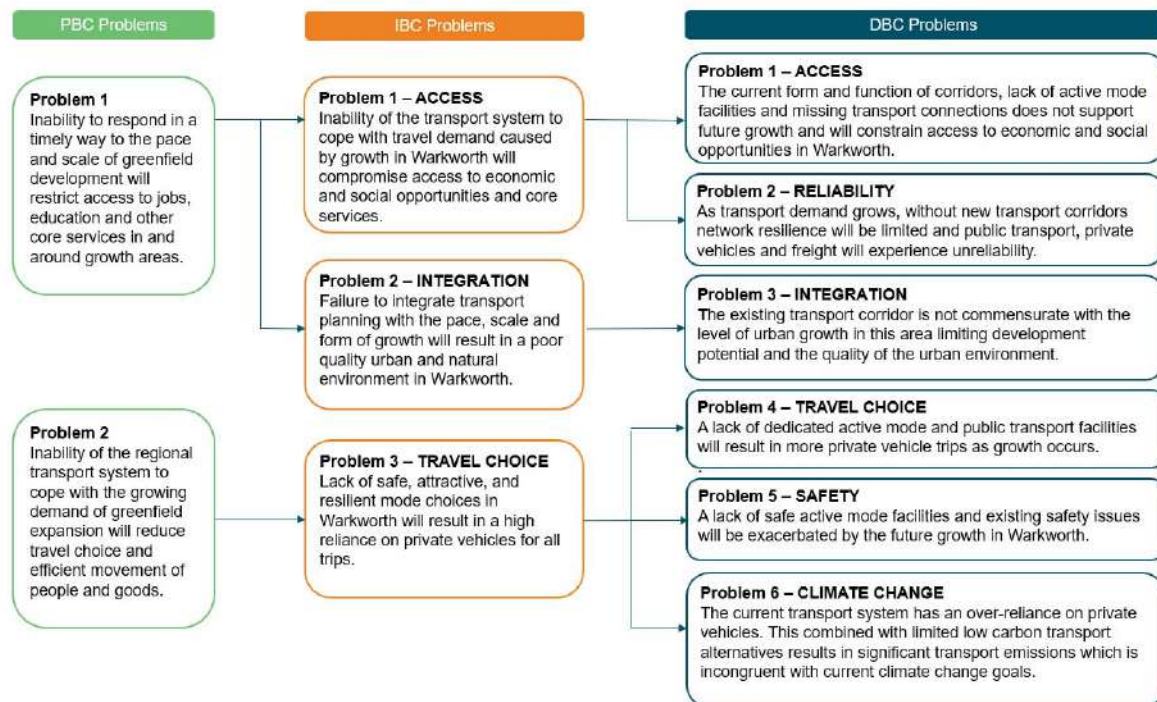
- Each project has been considered during gap assessment against an emissions reduction lens to understand the corridors role in developing a low carbon transport network. This has been of particular importance to the strategic infrastructure of the proposed Southern Interchange. Refer to **Appendix B: Climate Change Response** for further details on this assessment.
- The resilience problem includes provision for the consideration of responses to other climate change issues like 100 year flooding and the resulting availability of alternative routes. This is primarily for new greenfield corridors and will factor into the location of new alignments and was considered during option assessment. In addition, any new infrastructure that is required on existing roads such as bridges have had their footprint considered with respect to flooding levels.

## 7.2 Problem Mapping

There is a direct line of sight between the IBC and DBC problems themes as shown in Figure 7-3. This confirms that the problems identified in the IBC and in the DBC continue to be valid and applicable at both an area level for Warkworth. The **Appendix A: Strategic Case** includes additional details for corridors on an individual basis and maps how the corridors collectively contribute to project outcomes.

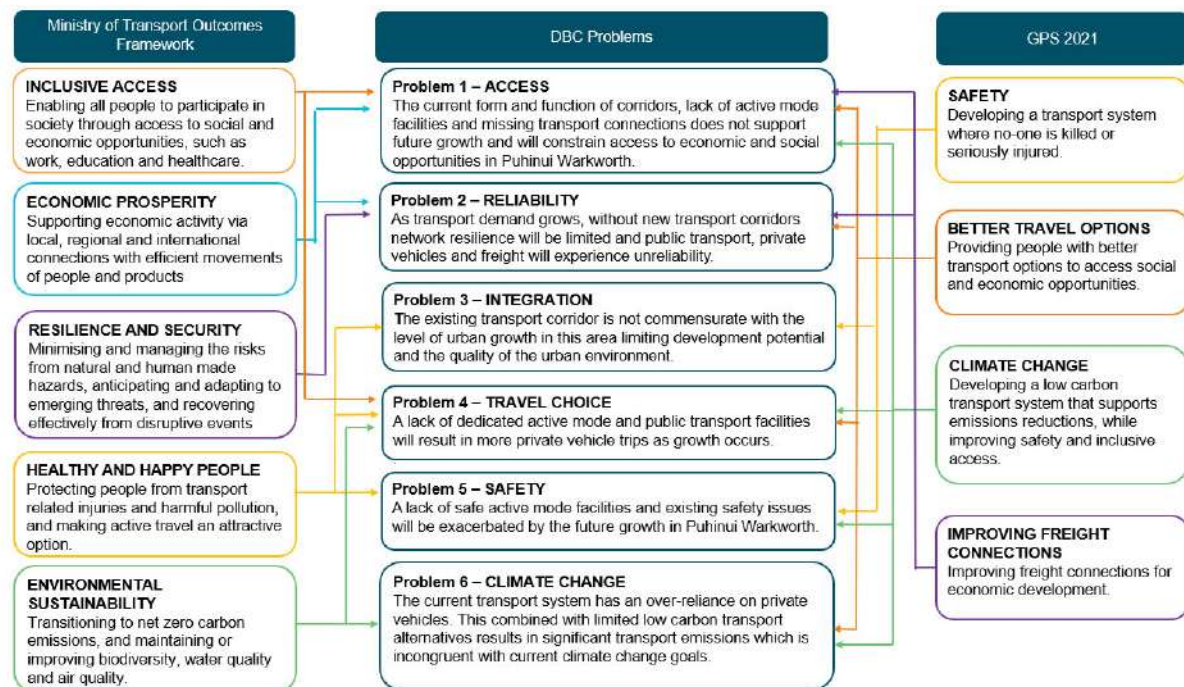


Figure 7-3: IBC and DBC problem mapping



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

Figure 7-4: Mapping of DBC Problems to Current Strategic Policy Direction



The mapping shows that the identified problems map closely to the four strategic priorities of the GPS. Safety and Better Travel Options remain cornerstones of the Warkworth network. The renewed emphasis on improving freight connections is particularly relevant for the proposed Southern Interchange and Western Link Road connecting the Ara Tūhono to industrial land use.

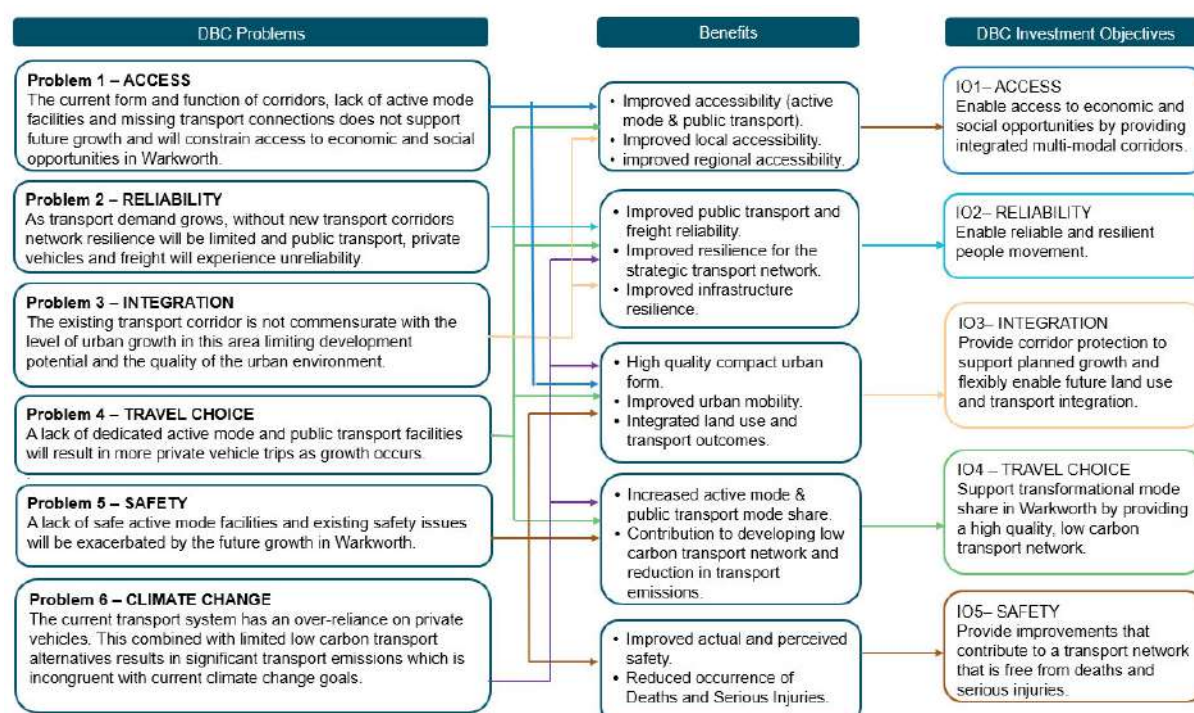
The mapping to the MoT Transport Outcomes Framework also confirms alignment with the five key outcomes to improve wellbeing and liveability through inclusive access, healthy and safe people, economic prosperity, environmental sustainability and resilience and security.

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

## 7.3 Investment Logic Map

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

Figure 7-5 Warkworth ILM



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

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

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

The key benefits for Warkworth from addressing these problems are:

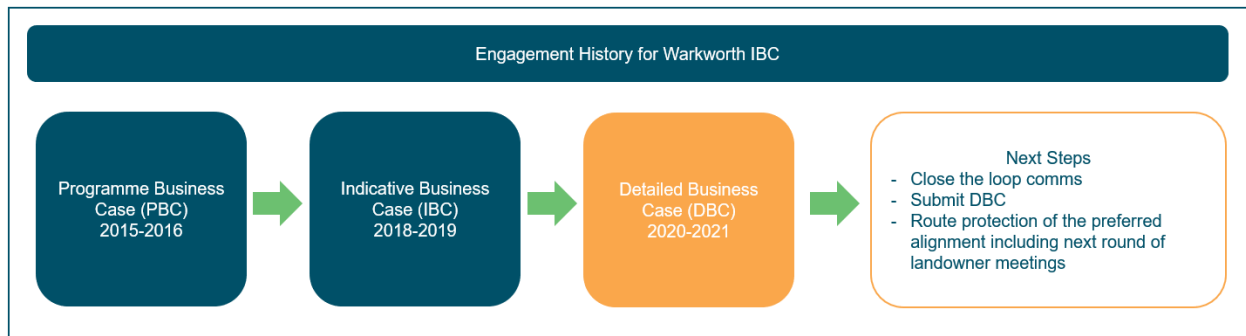
- Improved accessibility for local and interregional trips.
- Improved network reliability and resilience for the strategic transport network.
- Improved infrastructure resilience.
- High quality compact urban form with improved urban mobility.
- Integrated land use and transport outcomes.
- Reduced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

## 8 Partner and stakeholder engagement

This section summarises engagement undertaken with Partners, key stakeholders, and the community by Te Tupu Ngātahi for the Warkworth DBC.

The engagement undertaken to support the DBC is a continuation of previous engagement that took place during the PBC and IBC phases as illustrated in Figure 8-1 below:

**Figure 8-1 Warkworth engagement process**



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

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

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

A summary of who we engaged with is included in Table 8-1. A full engagement summary report is included in **Appendix E: Engagement Summary**.



Table 8-1 Warkworth DBC engagement

Who we engaged	How we engaged
Owners	<p>Te Tupu Ngātahi has had ongoing engagement with Waka Kotahi and Auckland Transport throughout the development of this DBC. Led by Owner Interface Managers, the project team has collaborated regularly with a team of key technical representatives from the organisations to ensure technical and strategic alignment of the DBC. Forums have included:</p> <ul style="list-style-type: none"> <li>• Regular technical sessions to discuss emerging preferred options and any subsequent changes following design.</li> <li>• Specific sessions to discuss design assumptions, key principles or locational design issues.</li> <li>• Technical review at 30% and 70% design stages to identify emerging issues.</li> <li>• Regular briefings on complementary projects to ensure alignment between workstreams.</li> </ul>
Partners	<ul style="list-style-type: none"> <li>• <b>Auckland Council Partnership Forum</b> – twice monthly meetings to update Council on Te Tupu Ngātahi projects (including Warkworth).</li> <li>• <b>Northern manawhenua</b>– Te Tupu Ngātahi recognises the responsibilities and commitments of engagement with manawhenua as a Treaty Partner. We maintain a manawhenua forum (for operational and kaitiaki level interaction) and enable linkages with the wider governance level relationships of Waka Kotahi and AT via the Tāmaki Transport Table and Auckland Council Kaitiaki Governance Table. The focus of this group is Programme-wide delivery, particularly seeking consistency across projects. Throughout the DBC there has been ongoing monthly hui with the project teams from all North Te Tupu Ngātahi projects. Manawhenua partners also attended Multi Criteria Analysis workshops. Feedback obtained from manawhenua was incorporated in the development of options and to confirm the emerging preferred options.</li> <li>• <b>Auckland Council Plans and Places</b> – ongoing and regular meetings. Representatives were invited to all technical stakeholder sessions to comment on the emerging preferred design. Key topics of discussion included land use transport integration, the impacts of the Medium Density Residential Standards (MDRS) and future intensification on Warkworth, discussion on industrial zoning and interaction with the Southern Interchange and rural versus Future Urban Zone alignments for Sandspit Link.</li> </ul>
Elected members	<ul style="list-style-type: none"> <li>• <b>Rodney Ward Councillor Greg Sayers</b> - meeting held on 28 March to seek feedback on the engagement approach</li> <li>• <b>Local Board engagement</b> – a presentation with the Rodney Local Board was held on 22 April to inform them of the preferred routes prior to the start of the wider public engagement period. A joint memo was sent to the Rodney, Upper Harbour, and Hibiscus Coast and Bays local boards on 2 May providing an update on Warkworth, North, and Northwest projects. A presentation to the Rodney Local Board on 6 July provided an update on the engagement and next steps.</li> </ul>
Stakeholders	<ul style="list-style-type: none"> <li>• <b>One Mahurangi Business Association</b> - two meetings were held 6 and 16 May 2022. Meetings with this group are ongoing.</li> <li>• <b>Matakana Coastal Trail Trust</b> - meeting held on 26 May 2022 and the Trust also provided a written submission.</li> <li>• <b>Ministry of Education</b> - ongoing bi-monthly meetings are held to provide an overview of the Te Tupu Ngātahi programme. The Ministry also provided formal written feedback.</li> </ul>



Who we engaged	How we engaged
	<ul style="list-style-type: none"> <li>• <b>Infrastructure interface meetings</b> – regular ongoing meetings are held with Watercare, Vector and First gas to provide updates on all Te Tupu Ngātahi projects.</li> </ul>
Potentially affected landowners	<ul style="list-style-type: none"> <li>• <b>Letters</b> - 455 letters were sent to landowners near the proposed routes at the beginning of May 2022 inviting them to contact us to discuss projects further and provide feedback.</li> <li>• <b>Landowner interactions</b> - 20 landowners got in touch with the project team and seven meetings were held.</li> <li>• Regular meetings have been held with some landowners including those potentially affected by the Western Link Road and the Wider Western Link Road. This provided an opportunity to better understand the development plans and seek opportunities for alignment as well as discuss interfaces between proposed projects. Developers provided feedback via face-to-face meetings and email submissions. Feedback was generally supportive of the Warkworth projects with some site specific details to be considered. Te Tupu Ngātahi will continue to engage with developers as the projects progress.</li> </ul>
Community	<ul style="list-style-type: none"> <li>• <b>Advertising and social media campaign</b> to promote the consultation to the wider community. Information was shared on Twitter and Facebook by AT, Rodney Local Board and One Mahurangi Business Association. The project also featured in articles in Local Matters, Greater Auckland and Mahurangi Matters.</li> <li>• <b>Online interactive engagement platform</b> - During the engagement period there were 1,388 unique visitors to the project site. 30 comments were added to the social map and 37 responses to the survey.</li> </ul>

## 8.1 Summary of feedback

The Te Tupu Ngātahi approach to protect land now for future transport options was supported by the majority of community feedback respondents. Partner, key stakeholder and community feedback was generally supportive of the preferred transport network, but there were many requests in community feedback for projects to be implemented faster. People felt that improvements were needed now because development is already happening in and around the Warkworth area.

Specific feedback relating to the projects was received and is summarised in Table 8-2 to Table 8-4 below. Following the engagement period, the feedback was carefully analysed and used by the project team to either confirm the emerging preferred option for each corridor or, where appropriate, consider additional alignments or refinements to further inform option selection.

**Table 8-2: Key feedback on public transport and strategic interchanges**

Project	What we heard	What we did in the DBC
<b>New Northern Public Transport Interchange and Park and Ride</b>	<ul style="list-style-type: none"> <li>• Strong support for better public transport options and sufficient park and ride facilities</li> <li>• Some concern that the Park &amp; Ride is too small.</li> <li>• Provision for access by walking and cycling is important</li> <li>• Proximity and access to the Catholic cemetery is desirable</li> </ul>	<i>Continued development of concept plans to inform the DBC that consider access, location and integration with the wider network.</i>

Project	What we heard	What we did in the DBC
	<ul style="list-style-type: none"> <li>Provision of cycle and walking access including underpasses through to Warkworth town</li> </ul>	
<b>New Southern Public Transport Interchange</b>	<ul style="list-style-type: none"> <li>Strong support for a southern public transport hub and access to the hub by walking and cycling is important</li> <li>Location adjacent to the new local centre and services is important</li> <li>Integration with the surrounding road network and local bus services is important in the medium and long term</li> <li>Not suitable unless further on/off ramps are added to the motorway extension. Could be accommodated in a larger Northern Public transport Interchange if the current layout to the motorway applies</li> <li>Include Park &amp; Ride and don't charge for parking</li> </ul>	<i>Continued development of concept plans to inform the DBC that consider access, location and integration with the wider network.</i>
<b>New Ara Tūhono Southern Interchange</b>	<ul style="list-style-type: none"> <li>Strong support for a southern interchange</li> <li>Preference for a location slightly more north</li> <li>Concern that north-facing ramps are excluded</li> </ul>	<i>Reviewed the location of the interchange and how it interfaced with the Warkworth local network</i>

Table 8-3 Key feedback on new corridors

Project	What we heard	What we did in the DBC
<b>New Western Link Road - North</b>	<ul style="list-style-type: none"> <li>Intersection upgrades that support access for existing and new growth</li> <li>Move on/off ramps further north to cross Mahurangi River once</li> </ul>	<i>Proceeded with concept plans that provide for final footprint that allows for flexible intersection upgrades as needed.</i>
<b>New Western Link Road - South</b>	<ul style="list-style-type: none"> <li>Route needs to respond to terrain and future land use</li> </ul>	<i>Reviewed and refined the route to consider access to SH1 and integrating with existing and future land forms.</i>
<b>New Wider Western Link Road</b>	<ul style="list-style-type: none"> <li>Preference for route that travels adjacent to the Morrison Orchard</li> <li>Crossings of the Mahurangi should be minimised</li> <li>Need to be aware of environmental impacts including bats</li> </ul>	<i>Reviewed and refined the route of the Wider Western Link to reconsider environmental and urban form feedback</i>
<b>New Sandspit Link Road</b>	<ul style="list-style-type: none"> <li>Strong support for this link</li> <li>Consider a crossing of the Mahurangi river east of the town centre</li> </ul>	<p><i>Reviewed proposed intersection locations to support access and connectivity for all modes.</i></p> <p><i>We considered a connection across the Mahurangi in the Indicative Business Case in 2019. This link was found to have extensive environmental impacts and a very high cost. As such it was not included in the Indicative Strategic Transport Network endorsed by the Auckland Transport and Waka Kotahi Boards</i></p>

Table 8-4:

## Upgrades to existing corridors

Project	What we heard	What we did in the DBC
<b>Woodcocks Road Upgrade</b>  <b>SH1 Upgrade</b>  <b>Matakana Road Upgrade</b>  <b>Sandspit Road Upgrade</b>  <b>Western Link Road Central</b>	<ul style="list-style-type: none"> <li>• Support for walking and cycling facilities on these corridors</li> <li>• Support for the ability for people to cross the road safely</li> <li>• Support for access to local facilities and town centres</li> <li>• Desire to retain on-street parking</li> <li>• Issues with current road condition as Matakana Village will remain a choke point</li> <li>• May need to consider further traffic control methods at Sharps Rd Intersection with increased growth</li> <li>• Need to be aware of environmental areas identified including native bush and existing sensitive areas</li> <li>• Support to upgrade the bridge on State Highway 1</li> <li>• Support for road widening in some locations</li> </ul>	<p><i>Proceeded with designs that provide dedicated walking and cycling facilities on all key arterial roads</i></p> <p><i>Proceeded with concept designs that ensure a final footprint allows for flexible intersection upgrades as needed.</i></p> <p><i>Where possible in the existing urban area, we reallocated road space to minimise environmental and property impacts</i></p> <p><i>Reviewed proposed intersection locations to support access and connectivity for all modes</i></p> <p><i>Reviewed transport inputs to ensure corridor capacity is sufficient to meet future demands</i></p>

## Economic Case

## 9 Option Development and Assessment

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

- Establishment of the Do Minimum.
- Option development process.
- Assessment undertaken to identify the recommended network.
- Overall outcomes of the recommended network.

A summary of the recommended option for each of the 12 projects is included in this section including a high-level assessment of how the projects will operate as a key part of the transport system. More detailed option assessment is contained in **Appendix C: Option Assessment Report**.

### 9.1 Do Minimum option

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

The assumption includes the same quantum of land use development between all scenarios.

Following discussions with Waka Kotahi and Auckland Transport, the Do Minimum network for Warkworth was agreed to include:

- **Public Transport services:** Three services 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.
- **Active Mode Connections:** Existing/planned facilities along SH1 between Hudson Road and Woodcocks Road.
- **Road Network:** Existing arterial and local road connections currently within Warkworth.

In addition to these projects, there are several key strategic projects that integrate with the Warkworth network that are being delivered separately by Auckland Transport and Waka Kotahi. These have also been included in the Do Minimum scenario:

- Tūhonohono ki Tai - Matakana link road
- Ara Tūhono – Pūhoi to Warkworth Motorway
- Single lane roundabout upgrades to the Hill Street intersection

More information on the development of the Do Minimum is included in **Appendix D3: Transport Report**.

<sup>10</sup> SGA Approach to Do Minimum Development\_V1



## 9.2 Option development and assessment methodology

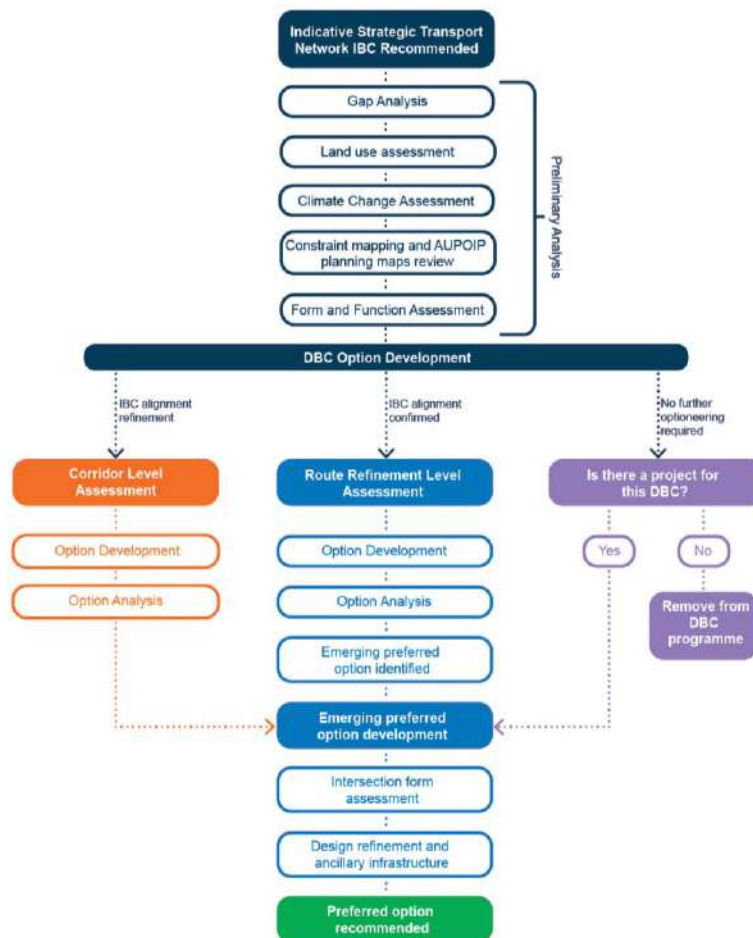
The optioneering process is summarised in Figure 9-1. The process adopted was developed to be fit-for-purpose for each corridor within Warkworth and is informed by the previous stage of assessment (i.e., the PBC informed the options for the IBC and the IBC informed the options for the DBC). The result of the optioneering process was to confirm an emerging preferred option to be developed into the recommended option for route protection.

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

Note the following definitions used in this section:

- Corridor assessment – this is referring to the location of the infrastructure within a study area. For a corridor assessment a number of different locations or connection points may be tested. Generally, applies to greenfield routes.
- Route refinement – assumes the specific corridor has been confirmed. Optioneering is then refined to localised widening options or minor alignment variations to avoid identified constraints. Generally, applies to upgrades on existing routes.
- Alignment – this is used to describe how one particular option connects two points in the corridor. There may be several different alignments in a single corridor.

Figure 9-1: Option assessment process




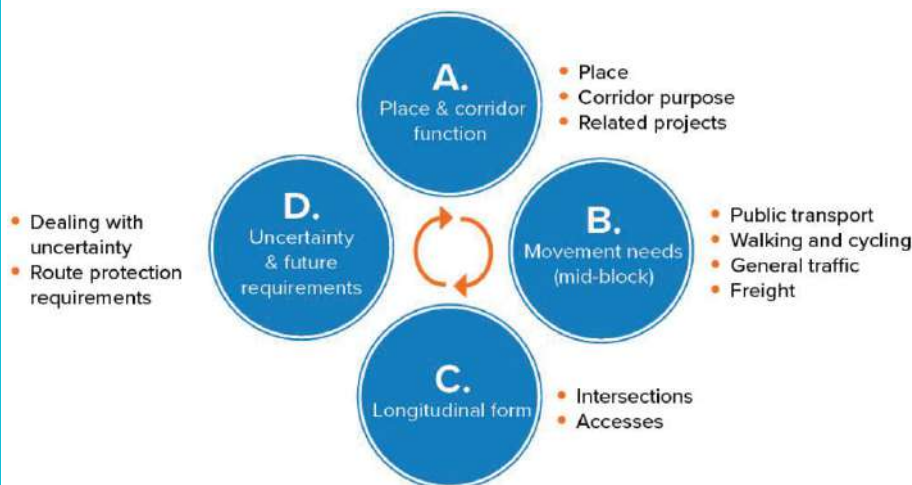
## 9.2.1 Preliminary Analysis

There were five key steps in this preliminary analysis as summarised in Table 9-1.

**Table 9-1 Preliminary analysis**

Step	Description
Gap analysis	<p>The gap analysis and background reviews were undertaken to ensure an understanding of how the Indicative Strategic Transport Network was identified, to check if anything had changed since the IBC including policy direction and statutory documents (for example, plan changes or National Policy Statements), and to identify gaps or issues that require further consideration during the DBC phase.</p> <p>The gap analysis included the following:</p> <ul style="list-style-type: none"> <li>• Review of previous Supporting Growth PBC and IBC documents including option assessments, recommendations and identified opportunities.</li> <li>• Alignment of the recommended options with relevant policy documents (for example, Government Policy Statement on Land Transport 2021, AUPOIP) with a focus to confirm if anything has changed since the Warkworth IBC recommendations.</li> <li>• Alignment with strategic plans, other statutory documents and developer aspirations that may have progressed since the IBC. For example, structure plans, plan changes (or appeals), recent Notices of Requirement and developer plans.</li> <li>• Interaction with other projects in the area.</li> </ul>
Land use assessment	<p>The future land use adjacent to each corridor was individually assessed to understand the transport requirements to best service the intended land use as well as the identification of opportunities to enhance land use and transport integration. This was done using the Unitary Plan (AUPOIP) including the recent amendment to include the Plan Change 25 North Warkworth Precinct, the 2019 Warkworth Structure Plan and any known developer plans. Land use assessment was then used as an input into the general constraint mapping process to understand opportunities to maximise the integration between land use and transport.</p>
Climate Change Response	<p>Two workshops were held to consider the climate change impacts from each of the twelve projects. This assessment:</p> <ul style="list-style-type: none"> <li>• Confirmed that the corridor could not be eliminated.</li> <li>• Identified opportunities to reduce climate impact to be considered during the optioneering process.</li> <li>• Identified opportunities for further optimisation at later stages in the project.</li> </ul> <p>Refer to <b>Appendix B: Climate Change Response</b> for detailed corridor information.</p>
Constraint mapping	<p>Corridor mapping was undertaken by manawhenua and Subject Matter Experts to understand potential constraints to inform the refinement of the DBC options. Areas of assessment included:</p>

Step	Description
	 <p>These constraints were then used as direct inputs into the option development process.</p> <p>Constraints were mapped on GIS and their significance recorded. The constraints and their significance were reviewed and discussed at a workshop attended by manawhenua, Subject Matter Experts (both owner and independent specialists) and the Project team.</p>
Corridor Form and Function Assessment	<p>The Corridor Form and Function (CFAF) process was used primarily for the purpose of assessing multi-modal corridors in Warkworth. The CFAF framework is a tool which formalises the optioneering process and provides consistent decision-making across the wider Te Tupu Ngātahi programme. It is based on the Auckland Transport Roads and Streets Framework (RASf) guidance.</p> <p>The iterative nature of the process allowed for high stakeholder and owner engagement and an efficient design process. Note that during the development of this DBC, the CFAF assessment was revisited as necessary to address identified constraints and design considerations. Any modifications were taken back through the endorsement process.</p> <p>The key principles are related to place and movement as shown below.</p>

Step	Description
	 <p> <ul style="list-style-type: none"> <li>• Dealing with uncertainty</li> <li>• Route protection requirements</li> </ul> </p> <p> <b>A.</b> Place &amp; corridor function         <ul style="list-style-type: none"> <li>• Place</li> <li>• Corridor purpose</li> <li>• Related projects</li> </ul> </p> <p> <b>B.</b> Movement needs (mid-block)         <ul style="list-style-type: none"> <li>• Public transport</li> <li>• Walking and cycling</li> <li>• General traffic</li> <li>• Freight</li> </ul> </p> <p> <b>C.</b> Longitudinal form         <ul style="list-style-type: none"> <li>• Intersections</li> <li>• Accesses</li> </ul> </p> <p> <b>D.</b> Uncertainty &amp; future requirements         <ul style="list-style-type: none"> <li>• Dealing with uncertainty</li> <li>• Route protection requirements</li> </ul> </p> <p>In Warkworth, the CFAF was applied to all local road corridors but was not immediately applicable to the Southern Interchange on Ara Tūhono or the Northern and Southern Public Transport Interchanges which required different considerations. Each of these projects had bespoke consideration to understand the modal priorities. In addition, the Te Tupu Ngātahi Design Framework Principles and Auckland Transport Parking Strategy and Design Manual were used to develop the functional requirements for the public transport interchanges and Park and Ride infrastructure.</p> <p>Full details of the Warkworth CFAF can be found in <b>Appendix D3: Transport Report</b>.</p>

## 9.2.2 DBC Option development and assessment

The preliminary analysis identified whether the IBC recommended option for each project required additional reconsideration in light of any new information relating to that project. The analysis also identified whether the IBC options assessment had sufficiently considered alternatives proportional to the scale of potential effects of each project. Further consideration was then given to the nature and significance of identified constraints and the land use context at the option development and option assessment phase. The choice of pathway depended on the individual needs of the corridor and the Warkworth decisions are summarised in Table 9-2.

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

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

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

**Table 9-2 Option development pathways**

Pathway	Option development	Option Assessment
<b>Corridor Level Assessment</b>	<p>Undertaken if the gap analysis identified that the IBC recommended option for the corridor required additional reconsideration.</p> <p>This assessment:</p> <ul style="list-style-type: none"> <li>• Impacted Warkworth greenfield corridors and the Southern Interchange on Ara Tūhono.</li> <li>• Included development of additional options occupying different locations within a defined study area and potentially connecting to the transport network at different points.</li> <li>• Tested options at sufficient detail to develop an emerging preferred option, so no additional route refinement was required for these sections.</li> </ul>	MCA Assessment with Subject Matter Expert input
<b>Route Refinement Assessment</b>	<p>Undertaken for corridors that had the IBC alignment confirmed during preliminary analysis.</p> <p>This assessment:</p> <ul style="list-style-type: none"> <li>• Focused on localised widening options of the IBC recommended option.</li> <li>• Involved widening on one side or both sides or a bespoke approach to avoid or mitigate identified constraints.</li> </ul>	MCA Assessment with Subject Matter Expert input and/or Project Team Option Assessment
<b>No Options Developed</b>	<p>Preliminary analysis showed that the existing designation was sufficient to allow potential reallocation of road space at a future time to achieve the desired transport outcomes. This therefore required no additional land for route protection.</p> <p>A concept plan was then developed to demonstrate how the road space could be reallocated and to allow the project to be costed for the DBC.</p>	Project Team Option Assessment



### 9.2.4 Emerging preferred option development

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

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

Designs were issued to a wider technical stakeholder group at 50% design levels to ensure early identification of issues and timely decision making for design choices such as intersection treatments, stormwater principles and constraints to the cross sections.

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

## 9.3 Summary of Warkworth option development and assessment

A summary of the option development and assessment process as well as the preferred options for the full Warkworth network is summarised in Table 9-3 below. A more detailed summary for each project is included in Sections 9.5.

Table 9-3 Summary of Warkworth option assessment

Project	Purpose	Assessment type			Low carbon transport network Facilities			Preferred option	Objective alignment	Included in Recommended network
		Corridor Assessment	Route Refinement	Road space reallocation	Bus Lanes	Bus Priority	Active modes (upgrade or new)			
1	New Northern Public Transport Interchange and Park and Ride	<ul style="list-style-type: none"> <li>Supports regional and interregional public transport access for northern Warkworth.</li> <li>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.</li> <li>Will also include cycle storage, electric charging facilities and bus layover spaces to support Warkworth Town centre services.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Combined public transport interchange and park and ride co-located on the same site.</li> <li>Located at the confluence of northern bus services at SH1 and Western Link Road North</li> <li>Design to include secondary back of house facilities to support Warkworth town centre i.e., layover and charging facilities as well as cycling storage.</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift for interregional public transport travel and supports access from the rural surrounding areas.</li> <li>Reduces vehicle trips through Warkworth to access the Park and Ride facilities.</li> <li>Cornerstone of network response to provide a high frequency, attractive local and interregional bus network to support the reduction in enabled carbon emissions.</li> </ul>	Yes
2	New Southern Public Transport Interchange	<ul style="list-style-type: none"> <li>Provide public transport access for southern Warkworth land uses including high density residential and the new local centre.</li> <li>Future layover facilities will provide facilities that cannot be provided in the Warkworth Town Centre due to space constraints</li> </ul>		✓			✓	<ul style="list-style-type: none"> <li>Public transport interchange co-located with the proposed southern local centre.</li> <li>Design to include back of house facilities to support Warkworth town centre i.e., layovers, driver facilities and charging facilities as well as cycling storage.</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift from private vehicles to public transport to support the reduction in enabled carbon emissions.</li> <li>Improves access to social and economic activities through land use integration to maximise walk up catchment from planned high density housing and proximity to local centre activities.</li> <li>Primary back of house facilities to relieve pressure on Warkworth Town Centre and allow reallocation of space in the town centre back to placemaking.</li> </ul>	Yes
3	New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>Connect buses to the proposed southern public transport interchange to support people wishing to commute between Auckland and Warkworth.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>South facing ramps located ~800 m south of Woodcocks Road.</li> <li>Connects to the Wider Western Link Road with an arterial connection.</li> </ul>	<ul style="list-style-type: none"> <li>Supports Satellite Town vision through land use integration by providing direct access for heavy vehicles to the planned future industrial zoning to support viability of employment land.</li> <li>Provides a second resilient access to connect the southern growth areas with the strategic road network and minimise future congestion on SH1.</li> <li>Enables the long term future bus services to Auckland to increase local walk up catchment and therefore improve the overall attractiveness of the 995 service and support mode shift for longer inter regional trips.</li> </ul>	Yes
4	Woodcocks Road Upgrade	<ul style="list-style-type: none"> <li>Improve active mode facilities along the existing urban section ( SH1 to Mansel Drive)</li> <li>Urbanise the existing rural section including new separated active mode facilities. (Mansel Drive to Ara Tūhono)</li> <li>Connects to wider active mode network.</li> </ul>		✓	✓		✓	<ul style="list-style-type: none"> <li>Provision of active mode facilities along the length of this corridor.</li> <li>Rural corridor urbanises the existing road, replaces a one way bridge and provides active modes both sides.</li> <li>The constrained urban section uses road space reallocation to provide bi directional facilities to support</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift and reduction of enabled carbon emissions through the provision of 2.5km new and improved active mode facilities.</li> <li>Improves active mode access to key educational and employment land use opportunities.</li> </ul>	Yes



Project	Purpose	Assessment type			Low carbon transport network Facilities			Preferred option	Objective alignment	Included in Recommended network
		Corridor Assessment	Route Refinement	Road space reallocation	Bus Lanes	Bus Priority	Active modes (upgrade or new)			
								access to the school and industrial land zoning		
5	SH1 Upgrade	<ul style="list-style-type: none"> <li>Upgrade road to function as a multimodal central north-south urban spine for Warkworth.</li> <li>Improve access to and from South Warkworth Growth area.</li> </ul>	✓	✓			✓	<ul style="list-style-type: none"> <li>Hudson Road to Hill Street – Road space reallocation to provide majority of length as a bi directional cycleway with small central section of shared path.</li> <li>Hill Street to Fairwater Road – Road space reallocation to provide bidirectional active mode facilities on the western side. Upgrade to only one side of the Mahurangi River bridge.</li> <li>Fairwater Road to Edge of FUZ – urbanisation of rural road through centreline widening . Note some localised sections of widening to avoid known constraints.</li> </ul>	<ul style="list-style-type: none"> <li>Improved access to future social and employment opportunities i.e., Between southern growth area and Town Centre.</li> <li>Develops multimodal access to support shift from private vehicle to bus and active modes and reduce enabled carbon emissions. Includes ~5km of new or upgraded active mode network.</li> <li>Reduction in road hierarchy to an arterial function and reduced speed environment to de-tune SH1 and support improved east -west pedestrian permeability.</li> <li>Supports reduction of embodied carbon through making best use of the existing asset and reallocating road space where possible and minimising new structures.</li> </ul>	Yes
6	Matakana Road Upgrade	<ul style="list-style-type: none"> <li>Urbanise 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</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Bespoke widening from Hill Street for ~750 metres to avoid significant ecological and topographical constraints. Bidirectional active modes provided.</li> <li>Remainder of corridor is centreline widening with provision of separated active modes on both sides.</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift to active modes and reduction in enabled carbon emissions through the provision of new, safe active modes facilities for the length of the corridor.</li> <li>Support new active mode access to the Warkworth Town Centre and wider active mode network.</li> </ul>	Yes
7	Sandspit Road Upgrade	<ul style="list-style-type: none"> <li>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.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Separate active mode bridge for ~350m from Hill Street ( southern side only)</li> <li>Remainder of corridor is centreline widening with provision of separated active modes on both sides.</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift to active modes and reduction in enabled carbon emissions through the provision of new, safe active modes facilities for the length of the corridor.</li> <li>Supports new active mode access to the Warkworth Town Centre and wider active mode network.</li> <li>Provides for climate change adaptation through the future upgrade of the Sandspit Road Bridge adjacent Hill Street.</li> </ul>	Yes
8	New Western Link Road – North Mansel Drive to SH1	<ul style="list-style-type: none"> <li>New link designed to enable access to North Warkworth Precinct.</li> <li>Part of alternative north-south route to SH1 which will reduce the pressure on the existing SH1/Hill Street intersection</li> <li>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.</li> </ul>	✓			✓	✓	<ul style="list-style-type: none"> <li>Connects at the northern end with Tūhonohono ki Tai-Matakana Link Road.</li> <li>Southern connection at Falls Road and will be designed and delivered by developers as part of precinct plan conditions.</li> </ul>	<ul style="list-style-type: none"> <li>Provides access to North Warkworth growth area including the local centre.</li> <li>Supports mode shift by enabling reliable bus access to the planned Northern Public Transport Interchange and Park and Ride. Corridor futureproofed for bus lanes in the future if required to improve bus reliability.</li> <li>Provides safe and connected active mode facilities to support active mode access</li> </ul>	Yes



Project	Purpose	Assessment type			Low carbon transport network Facilities			Preferred option	Objective alignment	Included in Recommended network
		Corridor Assessment	Route Refinement	Road space reallocation	Bus Lanes	Bus Priority	Active modes (upgrade or new)			
9	New Western Link Road – Central Mansel Drive and Evelyn Street	<ul style="list-style-type: none"> <li>Upgrade of the existing Mansel Drive and Evelyn Street corridors to provide improved walking and cycling infrastructure.</li> <li>Central section of alternative north-south route to SH1 which will reduce the pressure on the existing SH1/Hill Street intersection.</li> </ul>		✓			✓	<ul style="list-style-type: none"> <li>Reallocates road space to provide a bidirectional cycle facility on the western side and a shared path over the new bridge.</li> </ul>	<ul style="list-style-type: none"> <li>Supports mode shift to active modes and reduction in enabled carbon emissions by providing a safe, contiguous active mode connection which connects in with the wider Warkworth network.</li> <li>Provides access between North Warkworth growth area and schools and employment opportunities.</li> <li>Supports reduction of embodied carbon through making best use of the existing asset and reallocating road space where possible.</li> </ul>	Yes
10	New Western Link Road – South Evelyn Street to SH1	<ul style="list-style-type: none"> <li>A new multimodal corridor to enable development in south Warkworth and provide access to future urban land and industrial areas.</li> <li>Part of alternative north-south route to SH1 which will reduce the pressure on Woodcocks Road between Mansel Drive and SH1.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Alignment connects at McKinney Road to the east and Evelyn Street to the west.</li> <li>Alignment provides a buffer between existing industrial land use and future residential zoning.</li> </ul>	<ul style="list-style-type: none"> <li>Provides access for all modes to the southern growth area and enables efficient east-west access across SH1 for all modes. This will connect high density residential land use to schools and employment.</li> <li>Completes the Western Link Road active mode network. Contributes to the mode shift from private vehicle to active modes for short trips thus supporting a reduction in enabled carbon emissions.</li> <li>Improved resilience for Warkworth with an alternative direct north south route to SH1.</li> </ul>	Yes
11	New Wider Western Link Road Woodcocks Road to SH1	<ul style="list-style-type: none"> <li>New north-south multimodal connection between Woodcocks Road and SH1 connecting the western growth areas and reducing the severance from the Mahurangi River.</li> <li>Connects to the proposed Southern Interchange on Ara Tūhono – Pūhoi to Warkworth motorway via a new arterial connection to provide direct access to the southwestern area of Warkworth including industrial area.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Reuses existing Wyllie Road alignment for northern connection with Woodcocks Road.</li> <li>Crosses the Mahurangi River at the shortest location</li> <li>Western location minimises disruption to future industrial zoned land</li> <li>Aligns with developer plans to the east of the Mahurangi River.</li> </ul>	<ul style="list-style-type: none"> <li>Provides access for all modes to the western growth areas and in particular connects high density residential land use to local centres and schools as well as provide access to key future heavy industrial land which supports the satellite town concept of providing local employment.</li> <li>Provision of a contiguous active mode facility to connect into the wider Warkworth active mode network. Key local bus route along this corridor to connect south Warkworth to the rest of the public transport network. The corridor supports access to the proposed southern public transport interchange.</li> </ul>	Yes
12	New Sandspit Road Link Between Matakana Road and Sandspit Road	<ul style="list-style-type: none"> <li>New corridor to enable development and provide multimodal access to future urban land north east of Warkworth.</li> <li>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.</li> </ul>	✓				✓	<ul style="list-style-type: none"> <li>Alignment is through the FUZ with connections at Tūhonohono ki Tai - Matakana Link Road and the existing Quarry Road</li> <li>Alignment avoids ecological areas and minimises stream and wetland crossings.</li> <li>Shortest route minimising structures and embodied carbon emissions.</li> </ul>	<ul style="list-style-type: none"> <li>New multimodal infrastructure provides a dual role enabling both local connectivity through north east growth area as well as improving regional connection to Kowhai Coast and Mahurangi Peninsula.</li> <li>Supports good urban form in this growth area due to fragmented land holding and challenging topography which may otherwise not be achieved organically.</li> <li>Improved resilience for the Hill Street intersection.</li> <li>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.</li> </ul>	Yes

## 9.4 Description of option development and assessment structure

The Warkworth DBC is large and complex with 12 project corridors in the study area. This has presented challenges in creating accessible documentation. In order to streamline reporting, the option development and assessment section has been summarised for each corridor and presented as slides in the following sections.

Each individual summary follows the option development methodology process described as in Section 9.2 and provides an overview of the option development process, option assessment and resulting preferred option. Each of these steps are supported by comprehensive detail which is included in the appendices to this report. Note that all appendices are split by projects so the reader can access particular corridor information if desired.

A guide is shown in Table 9-4 for the readers that wish to access the next level of detail behind decisions and option development.

**Table 9-4 Guide to additional option assessment information**

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



# Warkworth Network Option Development

## 9.5 Warkworth network options development and assessment

The Warkworth projects are shown in Figure 9-2 below. Note this is the starting point from the IBC network and the optioneering process refined the designs from here to the recommended network in Section 10.

Figure 9-2 Warkworth IBC Projects - starting point for option assessment



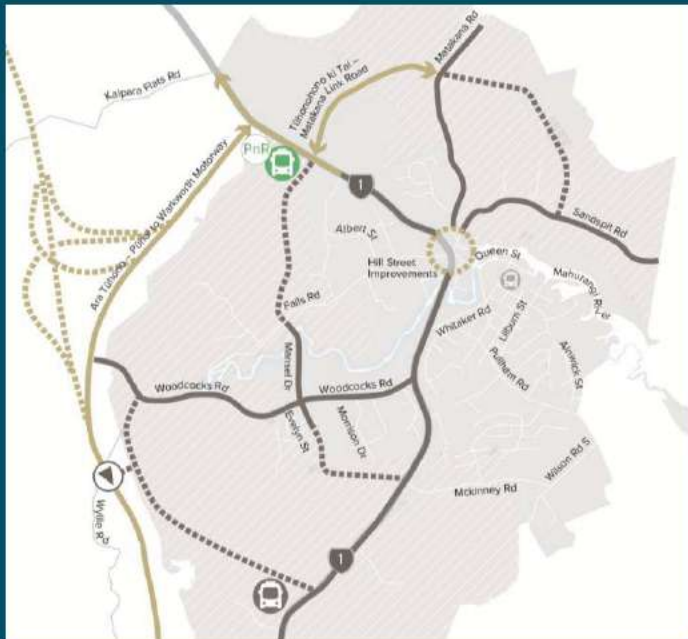
These have been assessed for option development as described in Table 9-5.

**Table 9-5 Option development for strategic projects**

Project		Commentary
1	New Northern Public Transport Interchange and Park and Ride	<ul style="list-style-type: none"> <li>Location for this facility has been independently assessed. Note it would be delivered in conjunction with the Western Link Road North to enable access to this site.</li> </ul>
2	New Southern Public Transport Interchange	<ul style="list-style-type: none"> <li>Location for this facility has been independently assessed.</li> </ul>
3	New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway	<ul style="list-style-type: none"> <li>Location for interchange assessed separately but high interdependence with the connection to Wider Western Link and design of the two elements were undertaken together.</li> </ul>
4	Woodcocks Road Upgrade	<ul style="list-style-type: none"> <li>Assessed in two sections – urban and rural</li> </ul>
5	SH1 Upgrade	<ul style="list-style-type: none"> <li>Assessed in three sections – two urban and one rural</li> </ul>
6	Matakana Road Upgrade	<ul style="list-style-type: none"> <li>Assessed independently although design considered tie in with Tūhonohono ki Tai Matakana Link Road and Hill Street upgrades</li> </ul>
7	Sandspit Road Upgrade	<ul style="list-style-type: none"> <li>Assessed independently although design considered tie in with Hill Street upgrades</li> </ul>
8	New Western Link Road – North Mansel Drive to SH1	<ul style="list-style-type: none"> <li>Considered in conjunction with the Warkworth North Precinct</li> </ul>
9	New Western Link Road – Central Mansel Drive and Evelyn Street	<ul style="list-style-type: none"> <li>Assessed as a single link</li> </ul>
10	New Western Link Road – South Evelyn Street to SH1	<ul style="list-style-type: none"> <li>Assessed independently although design considered interfaces with SH1 and Evelyn Street</li> </ul>
11	New Wider Western Link Road Woodcocks Road to SH1	<ul style="list-style-type: none"> <li>Assessed independently although design considered interfaces with New Southern Interchange</li> </ul>
12	New Sandspit Road Link	<ul style="list-style-type: none"> <li>Assessed independently although design considered interfaces with Tūhonohono ki Tai Matakana Link Road</li> </ul>

# New Northern Public Transport Interchange and Park and Ride

## Project 1





# NEW NORTHERN PUBLIC TRANSPORT INTERCHANGE & PARK AND RIDE – PRELIMINARY ASSESSMENT

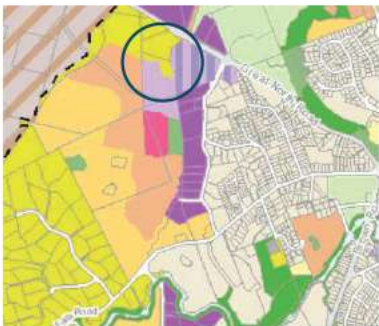
## PROJECT #1



## PURPOSE

- Enable access to local and long-distance public transport services.
- Park and Ride facilities to support trips from outside Warkworth that will not have regular future public transport feeder services.
- Support bus services that travel to Warkworth town centre where there is limited space for layovers and future charging for electric buses

## LAND USE



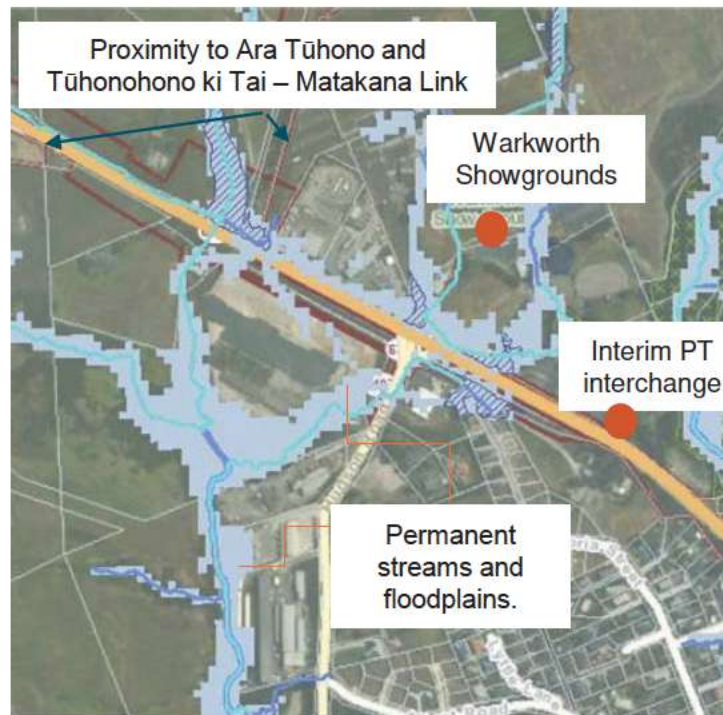
- Future Urban Zone
- Residential - Terrace Housing and Apartment Buildings Zone
- Mixed House Urban Zone
- Business - Light Industry Zone

- Land use in the catchment includes, Light Industry, Local Centre, Mixed Use, Residential and Future Urban Zones.
- North West Warkworth is live zoned with recent adoption of the North Warkworth Precinct.

## GAP ANALYSIS

- Warkworth public transport strategy reviewed.
- Park and Ride facilities moved from the southern location in the IBC to this northern site.
- Northern location intercepts commuters from northern and eastern communities and surrounding hinterland and reduces traffic travelling through Warkworth.
- Leverages the demand from the interim interchange being developed adjacent the Warkworth Showgrounds by the Rodney Local Board.

## CONSTRAINTS



## FORM AND FUNCTION ASSESSMENT

- Facility to provide cycle storage parking, bus layovers, active bus stops, charging infrastructure and park and ride with ~250 spaces.
- Will need to provide future flexibility for a range of solutions such as local and long distance AT metro services and potentially other private coaches, interregional services and shuttles

## CLIMATE CHANGE ASSESSMENT

- Public transport interchange is integral to the ability to operate a high quality, attractive bus service and needed to support mode shift and reduce VKT as well as future enabled carbon emissions.
- Park and Ride supports mode shift for rural catchment who will not have local bus feeders, optimise location to reduce length of trips in Warkworth.

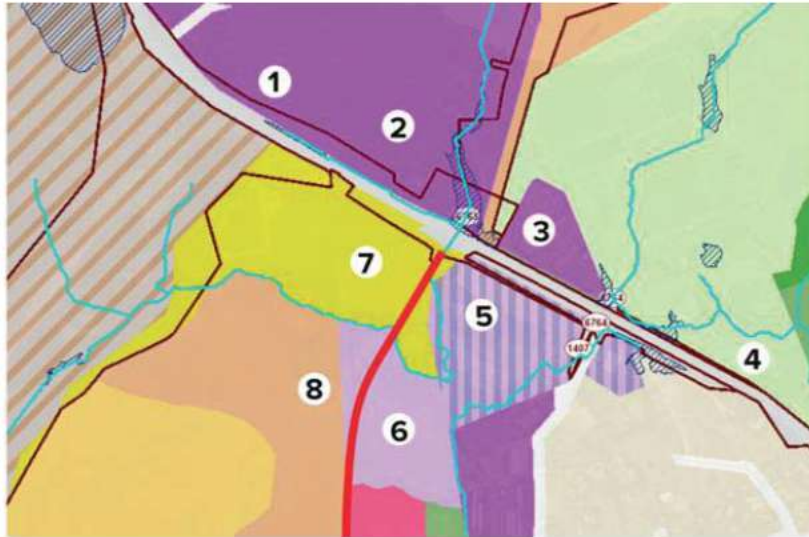
## DBC OPTION DEVELOPMENT

1. Assessment undertaken to decide emerging preferred study area for the facility.
2. Detailed site assessment to choose the preferred location.
3. Iterative development of a future public transport service to support high frequency, legible routes to maximise active mode catchments to the interchange and surrounding land use.



# NEW NORTHERN PUBLIC TRANSPORT INTERCHANGE & PARK AND RIDE – STUDY AREA ASSESSMENT

## STUDY AREA ASSESSMENT



### EMERGING PREFERRED STUDY AREA

- Study area 7 was initially the emerging preferred quadrant for operational and land use reasons.
- Study area 6 and 8 had opportunities identified for integration with the local town centre and were retained for further consideration as part of the specific site location process.

	KEY IMPACTS									Preferred
	IO1: Access	IO2: Resilience	IO3: Integration	Active mode connectivity	Active mode catchment	PT & Vehicle Access	Land use	Footprint	Environment	
1	✓	✓	✓							✗
2	✓	✓	✓							✗
3	✓	✓	✓							✗
4	✓	✓	✓							✗
5	✓	✓	✓							✗
6	✓	✓	✓							✓
7	✓	✓	✓							✓
8	✓	✓	✓							✓



# NEW NORTHERN PUBLIC TRANSPORT INTERCHANGE & PARK AND RIDE – SITE LOCATION ASSESSMENT

## SITE LOCATION ASSESSMENT

- Four site areas were identified in the preferred study area.
- Indicative layout concepts were prepared to allow specialist assessment as part of MCA.
- First round of MCA highlighted Opt 2 and 4 were initially preferred and there were site refinement opportunities to further improve ecological, stormwater and access outcomes.
- Option 2A and Opt 4A were developed to respond to identified impacts and reassessed using the MCA.



## EMERGING PREFERRED – OPTION 2A

- Supports efficient bus operations through location at the confluence of multiple services.
- Supports connectivity for services to the existing Warkworth town centre including Warkworth to Wellsford services.
- Park and ride facilities located to intercept trips from the hinterland and reduce car trips into the residential areas. Carpark located near industrial land use minimising impact on future urban form.
- Location has lower impacts on ecology and stormwater constraints.
- Lower risk of ground instability and reduced earthworks compared to other options.

		IO1: Access	IO2: Resilience	IO3: Integration	Land Use	Urban	Land requirement	Stormwater	Ecology	Natural Hazards	Construction	KEY DIFFERENTIATORS			Preferred
												<div></div> High impact	<div></div> Medium impact	<div></div> Low impact	
												R Proceed further for refinement			
FIRST MCA	1	✓	✓	✓								Limited land use integration opportunities. Reduced access compared with other options. Lower construction cost but higher impacts on network.			x
	2	✓	✓	✓								Dual access onto SH1 and Western Link Road. Best urban outcomes with Park and Ride at confluence of services. Current layout impacts stormwater and ecological areas on north east of site – opportunity to refine. Some construction complexity due to topography.			R
	3	✓	✓	✓								Integration and urban form opportunities with local centre. Impacts from proximity of Park and Ride to residential land use.			x
	4	✓	✓	✓								Best integration and urban form opportunities with local centre. Conceptual layout doesn't integrate bus entry with local centre – refinement possible. Park and Ride location providing additional parking adjacent local centre which could be detriment to mode shift to this destination. Could be moved to back of site to reduce impacts. Current layout impacts stormwater and ecological areas on north east of site – opportunity to refine. Construction complexity due to topography and geology.			R
SECOND MCA	2A	✓	✓	✓								Same transport outcomes as option 2. New site location now avoids the stormwater and ecological areas to the north east of the site. Residual land can be used for access road to adjacent land. Supports efficient local bus network as “on the way” along planned routes.			✓
	4A	✓	✓	✓								Same transport outcomes as option 4. Improved urban form with bus facilities adjacent local centre. More southerly aspect avoids ecological and wetland areas to the north of the site.			x

Opt 2A



Indicative initial concept

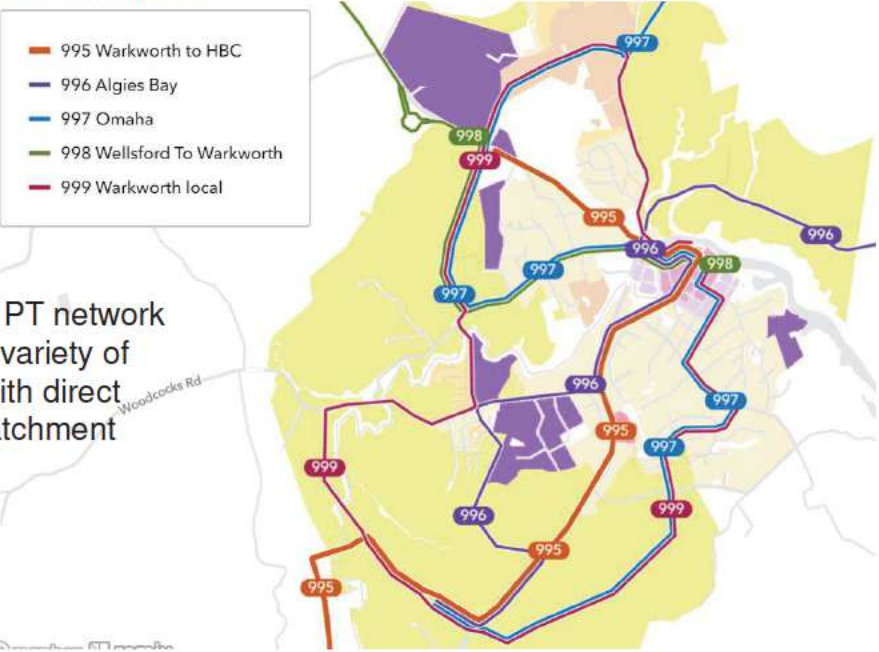


# NEW NORTHERN PUBLIC TRANSPORT INTERCHANGE & PARK AND RIDE – EMERGING PREFERRED OPTION DEVELOPMENT

## DESIGN REFINEMENTS

- **Identified as Type B design**
- Movement of site layout to minimise impact on culvert and ecological features.
- Optimisation of site layout to improve bus and private vehicle access.
- Allocation of space to provide for an access road to rear lots as an alternative to SH1 access.
- Expansion of site to the west to allow for provision of suitable stormwater treatment and optimisation of site operation to minimise earthworks.
- Integration with Tūhonohono ki Tai – Matakana Link Road intersection and the expected tie in for the Western Link Road.
- Further optimisation of the future PT network to support increased walk up catchment to multiple bus services for residential areas.

### Indicative future PT plan



## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Modal priorities are for buses and active modes at the interchange and private vehicles to the Park and Ride.
- Provision of facilities to support efficient bus interchanges, particularly with regional and long distance services.
- Provides back of house facilities (e.g. bus layovers, charging facilities) that are unable to be provided within Warkworth Town Centre due to space constraints.
- Provision of cycle storage and associated facilities to support cycle trips to the PT interchange.
- Park and Ride facilities at the edge of Warkworth supports people outside Warkworth access public transport options, particularly from low density settlements where high frequency local services are not planned for the future.

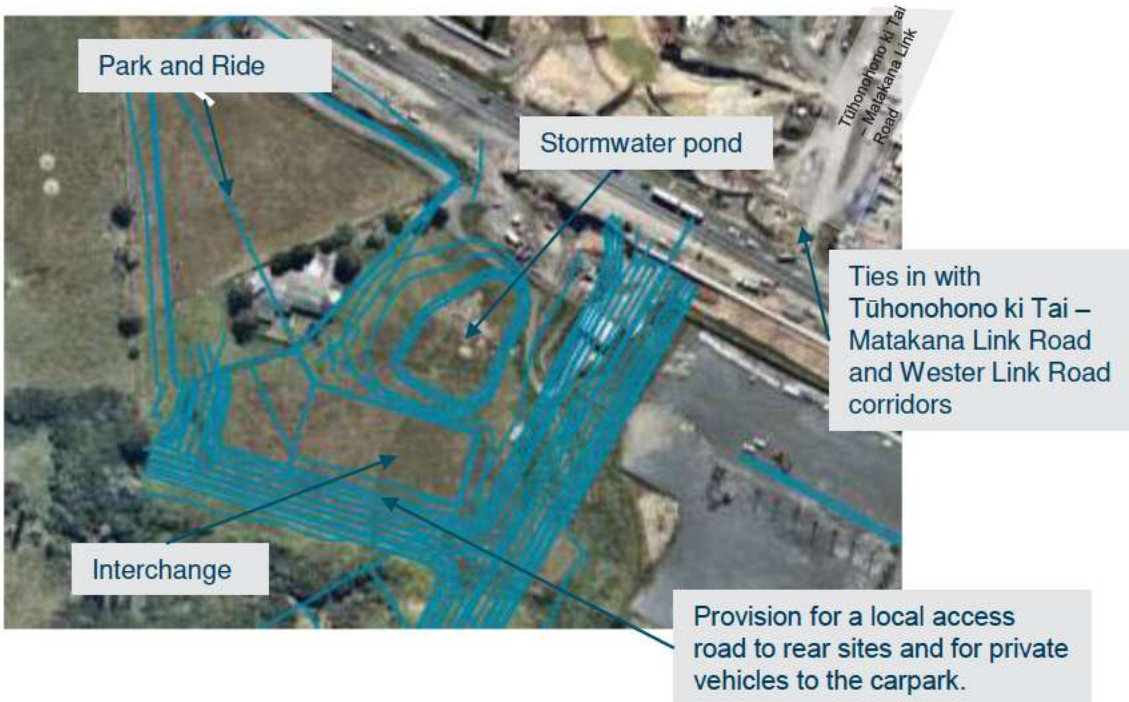
## MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Matters	Complexity Rating
Detailed design of the Interchange including final number of carparks and bus operational spaces.	M
Site levels to optimise connection with Western Link Road and Tūhonohono ki Tai – Matakana Link Road intersection	M
Stormwater management /ecological enhancement opportunity	M



# NEW NORTHERN PUBLIC TRANSPORT INTERCHANGE & PARK AND RIDE – RECOMMENDED OPTION

## RECOMMENDED OPTION



## RISKS

- Significant development occurring along the live zoned corridor.
- Integration with existing culvert and stream.

## OPPORTUNITIES

- Deliver in conjunction with northern section of Western Link Road to ensure the interchange can be built in a timely manner and access can always be provided irrespective of the pace of development.

## INTERDEPENDENCIES

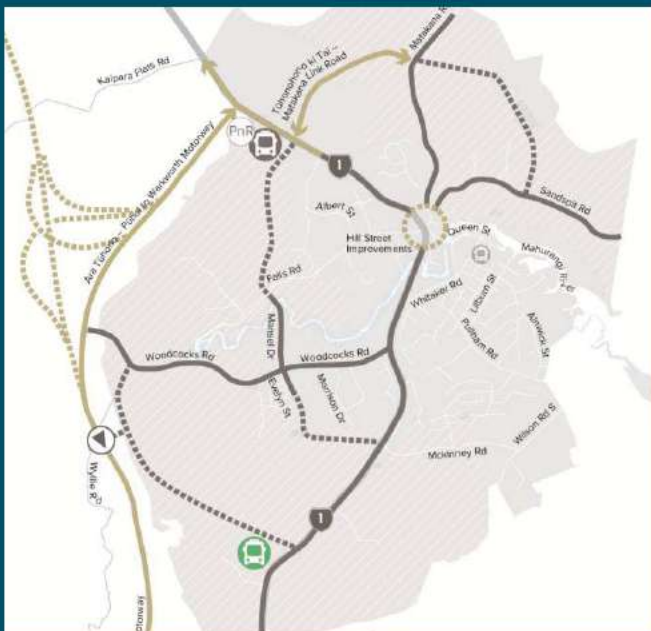
- Western Link Road.
- Intersection with Tūhonohono ki Tai – Matakana Link Road and Great North Road (existing SH1) intersection

## PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Provide effective and attractive Public Transport access to economic and social opportunities for Puhinui Warkworth.	Interchange located at the confluence of bus services from Wellsford, Matakana and Kōwhai Coast to maximise operational efficiency and enable seamless transfers onto local Warkworth or wider regional services e.g. to Albany and beyond. The Park and Ride facilities will support trips from the hinterland that will not be well served by public transport in the future resulting in less traffic traversing through future residential areas.
Travel Choice	Enable a transformational public transport mode share for trips between Puhinui Warkworth and key centres to support a low carbon transport network.	Supports the efficient operation of the Warkworth bus network. Interchange will provide bike storage areas to support cycle up catchment to the interchange. Provides a key node for both local and hinterland services to access wider regional bus services.
Integration	Provide a public transport interchange which supports high quality integrated communities.	Location has good urban outcomes with park and ride facilities located in predominately industrial land use. Integrates with existing hinterland bus services for efficient interchange. Provides layover and charging facilities that cannot be provided in Warkworth Town Centre due to space constraints.
Contribution to climate change response		
Climate Change	Supporting transformation to a low carbon transport system and reduced VKT in Warkworth by enabling an efficient public transport network and mode shift from the outset of development. Enabled through the provision of dedicated bus interchange facilities including back of house infrastructure such as electric charging facilities and layover spaces for interchanging services. Park and ride facilities located to best support mode shift from surrounding hinterland areas.	

# New Southern Public Transport Interchange

## Project 2





# NEW SOUTHERN PUBLIC TRANSPORT INTERCHANGE – PRELIMINARY ASSESSMENT

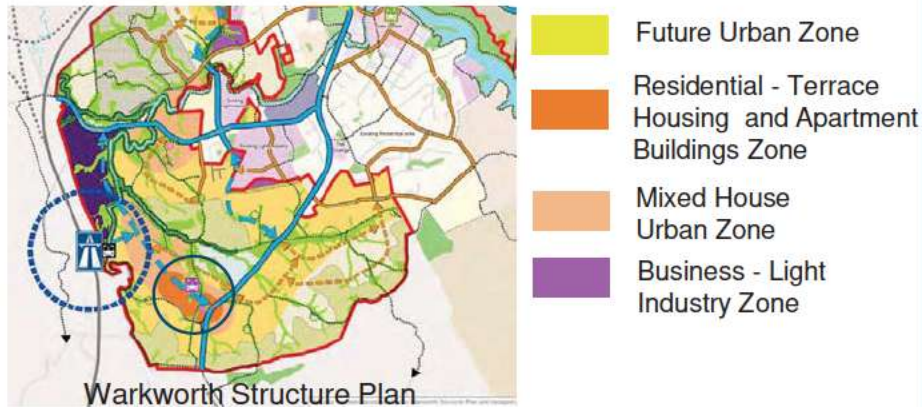
## PROJECT #2



## PURPOSE

- Enable walk up catchment for high density residential land use to access local and long-distance public transport services.
- Operates in tandem with Warkworth Town Centre bus facilities.

## LAND USE

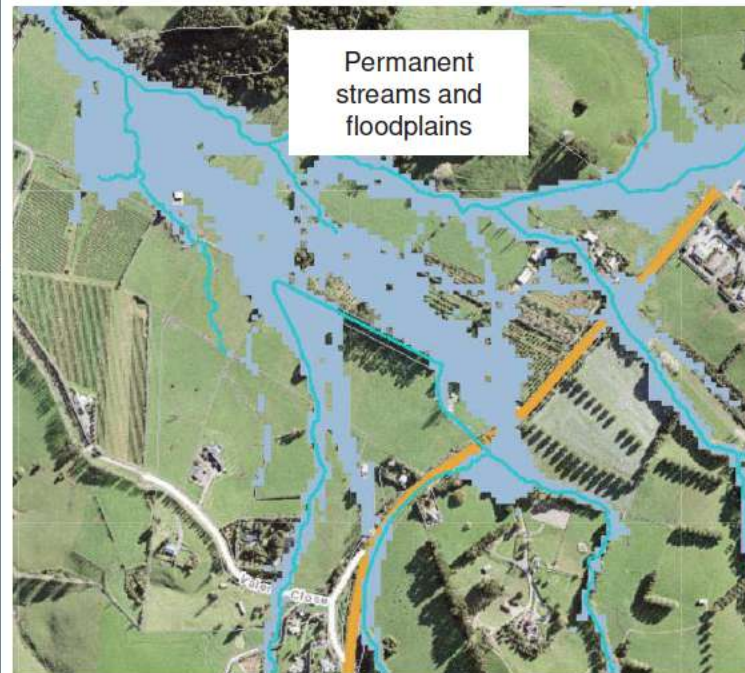


- Land use in the catchment is Future Urban Zone.
- Structure Plan indicates high density residential and a local centre in the vicinity of the public transport interchange.

## GAP ANALYSIS

- Warkworth public transport strategy reviewed.
- **No change to the Southern public transport interchange to provide a key facility for walk up catchment and back of house facilities to support the overall Warkworth network.**
- Park and Ride facilities moved from the southern location in the IBC to the Northern Interchange location to intercept commuters from northern and eastern communities and surrounding hinterland and reduce traffic travelling through Warkworth.

## CONSTRAINTS



Flooding and permanent streams are the main constraints.

## FORM AND FUNCTION ASSESSMENT

- Offline facility to serve both starting/terminating services as well as through services.
- Site to provide:
  - Driver facilities including breakroom and toilets
  - Layover spaces with charging facilities.
  - Kiss and ride drop off facilities
  - Cycle parking and storage.
  - ~2500m2 in area.
  - No reverse movements within the hub.
- Will need to provide for a range of solutions such as local and long distance AT metro services and potentially other private coaches, interregional services and smaller shuttle services. Facility will need to provide future flexibility.

## CLIMATE CHANGE ASSESSMENT

- Public transport interchange is integral to the ability to operate a high quality, attractive bus service.
- Needed to support mode shift and reduce future enabled carbon emissions.
- Embodied carbon and construction emissions are offset by the ongoing mode shift attainments.
- Optimisation of the location to increase walk up catchment is desirable.



NEW SOUTHERN PUBLIC TRANSPORT INTERCHANGE – OPTION DEVELOPMENT & EMERGING PREFERRED

DBC OPTION DEVELOPMENT

Assessment against Te Tupu Ngātahi Design Framework and AT principles **concluded that co-location with the proposed local centre is the preferred location for the interchange** due to:

1. Maximisation of the walk-up catchment to the interchange from the planned high density housing land use.
2. Site to be integrated with the local centre to support public transport use to a key social/ economic destination.
3. Will link to the alignment of the Western Link Road.

EMERGING PREFERRED DEVELOPMENT

- Active plan change being prepared for the southern growth area in parallel to this DBC. It is understood that the draft proposed plan change makes some provision for the public transport interchange to be located within the local centre.
- As the Plan Change will ultimately confirm the location of the local centre and co-location of the interchange and local centre is desired, no optioneering is required for this DBC.
- Within its scope, the DBC has therefore focused on understanding the required footprint of the facility to ensure sufficient space is provided through the plan change process.

HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Modal priorities are for buses and active modes.
- Provision of facilities to support efficient bus interchanges, particularly with regional and long distance services.
- Works in tandem with the Warkworth Town Centre facilities and provides back of house facilities (e.g. bus layovers, charging facilities) that are unable to be provided in the town centre due to space constraints.
- Provision of cycle storage and associated facilities to support cycle trips to the PT interchange.

MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

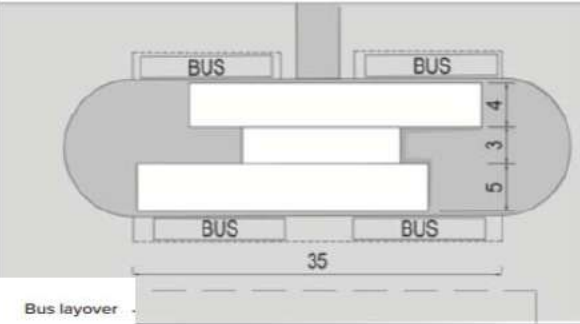
Design Matters	Complexity Rating
Future design to preclude reverse manoeuvring on site and provides sufficient offline turning facilities.	L
Location is proximate to the local centre and links directly into the local walking and cycling network.	L
Opportunity to consider on-line bus stops once final location is understood.	L



# NEW SOUTHERN PUBLIC TRANSPORT INTERCHANGE – RECOMMENDED OPTION

## RECOMMENDED OPTION

### Indicative interchange layout (~2100m2)



### Indicative Plan Change location



- ★ Indicative location for a future public transport hub
- Proposed local centre location

## OPPORTUNITIES

- Expected to be delivered in conjunction with Wider Western Link Road to provide strong public transport connections at the outset of southern Warkworth land use development.

## RISKS

- Interchange is dependent on developer timing for delivery. However it is noted that the land use and transport function are mutually dependent in this instance i.e. the need for the transport interchange is contingent on land use generating demand to use the interchange.
- Preference for AT to own the land to ensure maximum future flexibility for operations.

## INTERDEPENDENCIES

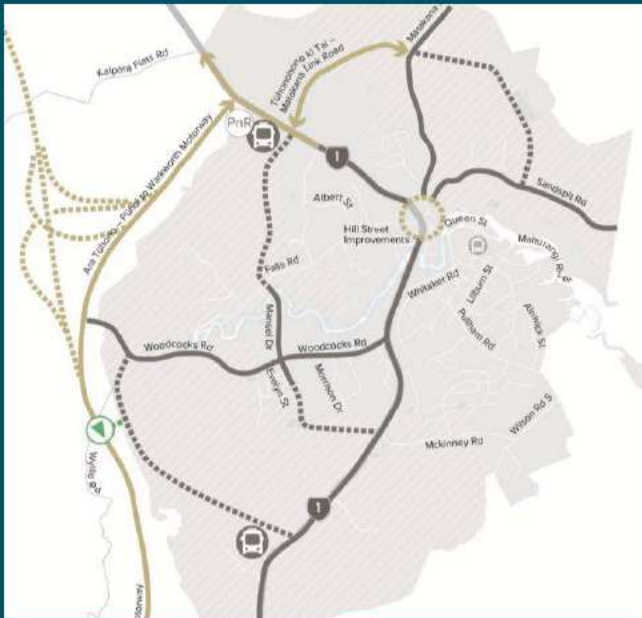
- Wider Western Link Road.

## PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Provide effective and attractive Public Transport access to economic and social opportunities for Puhinui Warkworth.	Interchange located to maximise public transport access for southern Warkworth at the outset of development. Co-location with the propose local centre will support public transport access to this key social/economic destination.
Travel Choice	Enable a transformational public transport mode share for trips between Puhinui Warkworth and key centres to support a low carbon transport network.	Supports the efficient operation of the Warkworth bus network. Interchange provides the driver facilities for the whole Warkworth bus network. Provides a key node for both local and hinterland services to access wider regional bus services.
Integration	Provide a public transport interchange which supports high quality integrated communities.	Location has good urban outcomes maximising walk up catchments from high density residential. Interchange will work in symbiosis with the Warkworth Town Centre bus interchange and the Northern public transport and park and ride facilities to provide a holistic bus network in Warkworth.
Contribution to climate change response		
Climate Change	Supporting transformation to a low carbon transport system and reduction in emissions by enabling an efficient public transport network and mode shift from the outset of development. Overall Warkworth bus network supported through the provision of dedicated bus interchange facilities including back of house infrastructure such as electric charging facilities and layover spaces for interchanging services.	

# New Southern Interchange on Ara Tūhono

## Project 3





# NEW SOUTHERN INTERCHANGE ON ARA TŪHONO – PRELIMINARY ASSESSMENT

## PROJECT #3



## PURPOSE

- Provide resilience for Warkworth Transport Network through an alternative access to strategic network on Ara Tūhono.
- Provide direct connections between Ara Tūhono and the planned heavy industrial area minimising heavy vehicles through residential areas and supporting employment viability.

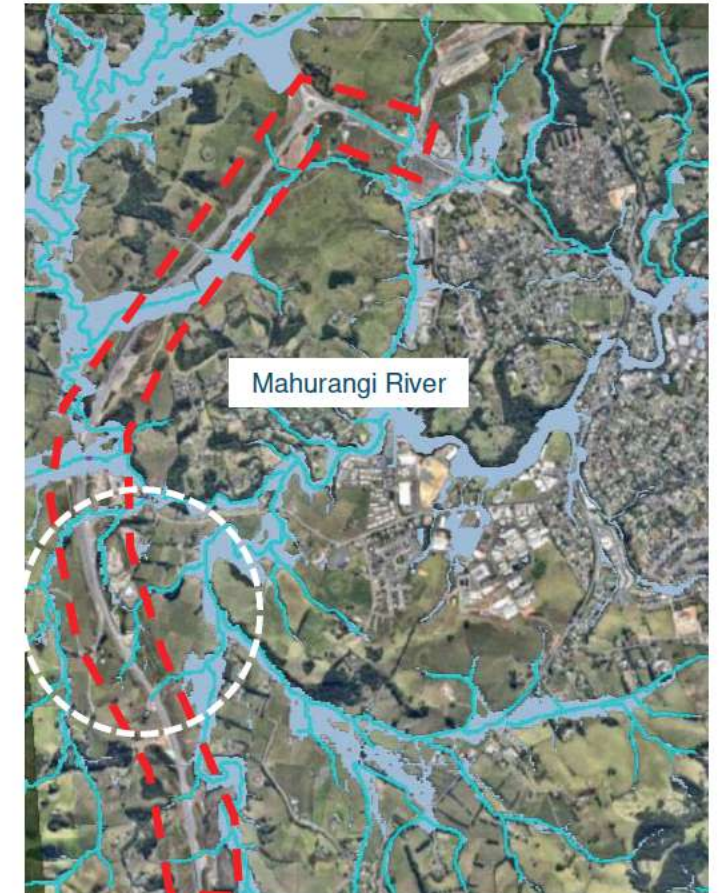
## GAP ANALYSIS

- Additional work required to confirm the need for this motorway infrastructure with respect to climate change and VKT targets. If still required then interchange location to be reconfirmed.

## FORM AND FUNCTION ASSESSMENT

- South facing ramps with provision for roundabout controls at the ramps
- Consideration if bus priority measures would be required.

## CONSTRAINTS



## PLANNED LAND USE

Auckland Unitary Operative Plan



- Future Urban Zone
- Open Space – Conservation Zone

Warkworth Structure Plan (2019)



- Planned heavy industrial land adjacent Ara Tūhono – Puhoi to Warkworth motorway
- Residential with high density planned adjacent the planned local centre to the south of the interchange

- Newly constructed Ara Tūhono motorway forming a western boundary and constraints for land use and interchange connection points. Will be operated by the Public Private Partnership NX2 for 25 years following opening
- Permanent streams and floodplains including Mahurangi River throughout the study area.



# NEW SOUTHERN INTERCHANGE ON ARA TŪHONO – CLIMATE CHANGE ASSESSMENT

## What happens to the future Warkworth network with or without the interchange?

- The Emission Reduction Plan requires careful consideration for the provision of new motorway connectivity or capacity to support the reduction in Vehicle Kilometres Travelled (VKT) and reduce emissions.
- The need for the interchange was assessed against a range of criteria including if the investment objectives for Warkworth could be met without the interchange.

Criteria	With Interchange	Without Interchange	Can we meet investment objectives/outcomes without the project?
Supporting Growth	<ul style="list-style-type: none"> <li>• Potential for growth sprawl to the west and south</li> <li>• Risk of supporting private vehicle dependence for longer trips</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced attractiveness of industrial land - Job to household deficiency increasingly likely</li> <li>• Undermine land use/integration for Warkworth (Satellite centre)</li> </ul>	No
Access	<ul style="list-style-type: none"> <li>• Overall VKTs in the Warkworth area are similar under both scenarios – with a slight decrease in VKTS with the inclusion of the Southern Interchange (~0.5%). A result of induced trips being balanced by shorter trips from the southern growth areas.</li> </ul>	<ul style="list-style-type: none"> <li>• State Highway 1 west of Tūhonohono ki Tai (Matakana Link Road) has 20% higher traffic volumes</li> <li>• Corridor very near to capacity (28,550 vpd/four lanes). Could be under further pressure due to MDRS intensification. Would need additional investment in the transport network if the interchange did not proceed.</li> </ul>	Partially. Network under pressure and would need additional network investment
Mode Shift	<ul style="list-style-type: none"> <li>• Supports bus movements and access to strategic network from southern growth area</li> <li>• Improved vehicle access could undermine mode shift (noting an untolled motorway link exists in both scenarios)</li> </ul>	<ul style="list-style-type: none"> <li>• Supports bus movements and access to strategic network from northern growth area</li> <li>• Bus improvements likely needed at Ara Tūhono access (Operational limitations via PPP)</li> </ul>	Yes. Additional PT Priority required
Safety	<ul style="list-style-type: none"> <li>• Volumes forecast to remain below current levels on SH1.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased volumes travelling on SH1 with known safety risks compared to with interchange. Technology improvements to vehicles could mitigate risk</li> </ul>	Yes
Freight	<ul style="list-style-type: none"> <li>• Key land use /transport integration with the heavy industrial land located in proximity to interchange.</li> <li>• Availability of employment land</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced viability of heavy industrial land</li> <li>• Increased heavy vehicle movements on local network</li> <li>• Proposed corridors have no additional capacity for freight lanes, or heavy vehicle priority</li> </ul>	No
Resilience	<ul style="list-style-type: none"> <li>• Alternative access to/from Warkworth area reducing dependency on one key access point from Strategic Network</li> </ul>	<ul style="list-style-type: none"> <li>• The confluence of Te Ara Tūhono with SH1 and land use including large scale retail, future business land use, an existing and future park and ride will place significant pressure on SH1.</li> </ul>	No

# NEW SOUTHERN INTERCHANGE ON ARA TUHONO – CLIMATE CHANGE ASSESSMENT CONTINUED

## Can we eliminate this link from the Warkworth network?

The analysis showed that without the interchange:

- **Overall VKTs in the Warkworth would be similar under both scenarios.** It is noted there is a slight decrease of 0.5% with the Southern Interchange which reflects the balance between the shorter trip length from the southern growth areas offset by new induced vehicle trips.
- **Reduced land use integration and ability to support growth.** A cornerstone of the Warkworth structure plan is that Warkworth will continue to operate as a satellite town which supports local employment to avoid longer distance trips to other parts of Auckland for employment. Without the Southern Interchange, there would be no direct access from the motorway to the planned heavy industrial land which could result in reduced viability of this industrial land and a deficiency in job to household numbers. Less employment in Warkworth could undermine the satellite principle and increase enabled emissions for people needing to travel further for employment opportunities.
- **Longer trip lengths for the southern growth area.** Travel related to heavy industry would need to take more circuitous routes through residential areas which would increase trip lengths and potentially enabled emissions. This could also reduce amenity and active mode attractiveness around high density residential, local centres and schools which could impact mode shift. Trip lengths would also be longer for private vehicle access to the southern growth area. Whilst the option remains for people to exit Ara Tūhono early at Puhoi and use SH1 for access, this existing route is not considered as efficient or safe as the new motorway and will remain a less attractive option resulting in additional pressure at the northern interchange and its confluence with SH1 and adjacent land uses such as large-scale retail, business land and a Park and Ride
- **Reduced resilience.** Warkworth will only have a single access to the strategic motorway network, with the nearest alternative choice approximately 14km away via SH1 at Puhoi. The single access point is expected to experience bottlenecks and congestion as the growth in Warkworth is realised which would be further exacerbated during summer and holiday peak periods leading to likely increases in enabled emissions.
- **Additional wider investment in additional local road upgrades would be expected** i.e., it is not a “do nothing” scenario if the interchange is not progressed. Without the interchange, SH1 west of Tūhonohono ki Tai - Matakana Link Road could expect 20% higher traffic volumes which brings the corridor near to capacity at 29,000 vpd / four lanes. With the application of Medium Residential Density Standards (MDRS) this could be further exacerbated resulting in congestion for all traffic including freight and buses. This congestion would impact the attractiveness and reliability for buses and amenity for active modes on SH1 leading to increased enabled emissions from the congestion or increased embodied emissions due to subsequent additional local road upgrades.

**Therefore, it was concluded that whilst the interchange itself will require an embodied and construction emission investment to support the planned growth, the project retains an important role in the network supporting land use integration and resilience and should be retained.**

## What other options or improvements could be considered to further support climate change?

- Consider timing for implementation to align with growth and invest first in other mode shift based investment .
- Opportunity to collaborate with the Northern Expressway Group NX2 PPP Team to time implementation of the interchange to support the NX2 performance KPIs for SH1 i.e. balancing sweating the assets with new infrastructure.
- Opportunity to work with designers for Ara Tūhono-Warkworth to Wellsford motorway interchange to explore other opportunities that may influence timing or provide the desired connection
- Future proofing for active modes through the interchange should western land use change in the future.



# NEW SOUTHERN INTERCHANGE ON ARA TUHONO – ROUTE REFINEMENT AND ASSESSMENT

## INTERCHANGE LOCATION

Indicative connection options



		IO1: Access	IO2: Resilience	IO3: Integration	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction	KEY IMPACTS	Preferred
		<div> <div>High impact</div> <div>Medium impact</div> <div>Low impact</div> </div>											
1	IBC location	✓	✓	✓	Low impact	Low impact	Medium impact	Medium impact	Low impact	Low impact	Low impact	Good access to future heavy industrial area. Minimal traversing for industrial traffic through residential or local centre zoning, reducing time on local road network. Maps well with adopted structure plan land use. Avoids SEA. Shortest link to connect to Wider Western Link Road – lower costs and land requirement. Some of the interchange is within existing designation.	✓
2	North of IBC - Woodcocks Road	✓	✓	✓	Low impact	Medium impact	Medium impact	Medium impact	Low impact	High impact	Medium impact	Too close to the Te Ara Tuhono northern interchange and design difficulties with locating in proximity to future WW2W interchange and ramp distance. Impacts of an interchange directly loading onto school road near the schools on Woodcocks Road. Low dispersion and all interchange traffic on one route. Potential impact on SEA depending on size of footprint.	✗
3	Connecting to Wider Western Link between IBC location and SH1	✓	✓	✓	Low impact	Medium impact	High impact	Medium impact	Low impact	Medium impact	Medium impact	Severing proposed residential land use including high density housing. Flooding risks. More land required. Wider crossing of the Mahurangi, plus impacts on tributaries and contiguous SEA. All traffic into an area where “place function” is higher.	✗
4	Between South of FUZ/ Western collector (SH1 intersection)	✓	✓	✓	Low impact	Medium impact	High impact	High impact	Low impact	Medium impact	Medium impact	Severance of residential but is lower impact than Opt 3. Almost double the distance so higher construction costs to link to Wider Western Link Road. Impacts on tributaries and contiguous SEA, could possibly avoid SEA if go south enough but would still have wider ecological and landscape issues. All heavy vehicles likely to go past planned local centre. Large flood plains.	✗
5	South of FUZ (SH1 intersection)	✓	✓	✓	Low impact	Medium impact	High impact	High impact	Low impact	Medium impact	Medium impact	Similar to Opt 4 but greater distance for connection and consequently construction costs higher again, larger floodplains to cross, additional landscape and land use consideration (rural zoned land, natural heritage landscape overlay), other feasible options that could better avoid these impacts.	✗

## EMERGING PREFERRED LOCATION – OPTION 1 INDICATIVE BUSINESS CASE INTERCHANGE LOCATION

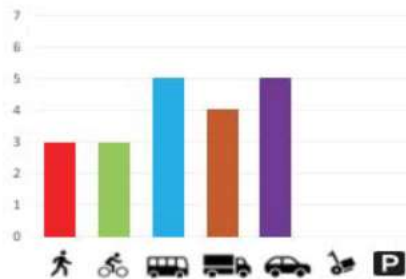
- Best integration with planned employment and heavy industrial land use.
- Provides direct access to the southern growth area with least severance on residential land use.
- Integrates with the current planned Ara Tuhono Warkworth to Wellsford northern interchange.



# NEW SOUTHERN INTERCHANGE ON ARA TUHONO – EMERGING PREFERRED OPTION DEVELOPMENT

## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Link to southern interchange caters for all modes, but primarily freight and private vehicles.
- Noting that there is no active mode access on Ara Tūhono at this stage.



## NX2 – ARA TUHONO PUBLIC PRIVATE PARTNERSHIP (PPP)

- Discussions with NX2 confirmed it is very complex to vary the PPP contract once operational. This could impact the ability to implement the interchange before 25 years after the 2023 opening (estimated to be 2048).
- Operational boundaries are currently being finalised. This will result in the designation being rolled back and land currently owned by Waka Kotahi potentially being available for surplus.
- Ara Tūhono consent conditions require mitigation planting which is expected to utilise Waka Kotahi owned land adjacent the Mahurangi River.
- Not realistic that Te Tupu Ngātahi can influence the operational boundary and mitigation planting at this late stage of the project.
- It is noted that the interchange will fit within the existing Waka Kotahi land ownership and integration with NX2, and mitigation issues will need be considered further during implementation.

## INTERSECTION FORM ASSESSMENT

Intersection	Existing	Future design assumptions
Link to the Southern Interchange	N/A	Single-Lane Roundabout
Link to the Southern Interchange and Wider Western Link Road	N/A	Single-Lane Roundabout

## DESIGN REFINEMENTS

- Location moved ~300m north to minimise impact to the streams and provide suitable on ramp and off ramp taper lengths.
- Reduced spacing between the interchange roundabouts and the intersection with Wider Western Link to reduce residual land parcels between the interchange and the Wider Western Link.
- Sufficient space provided to provide for a bridge structure at the intersection with Wider Western Link.

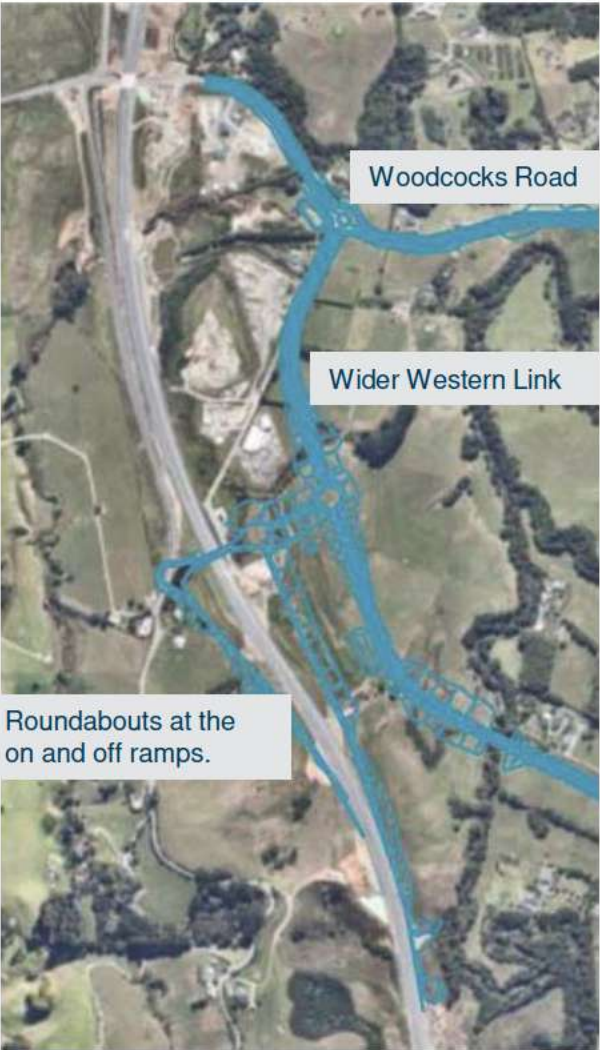
## MATTERS TO CONSIDER FURTHER IN DETAILED DESIGN

Design Parameters	Complexity Rating
Impacts on the final mitigation planting as part of the Ara Tūhono resource consent conditions to be minimised.	H
Interface with motorway levels to inform next stage of design.	M
Explore opportunities with NX2 or Ara Tūhono Warkworth to Wellsford design team to provide a southern growth area connection as part of these projects.	H
Design will need to consider the future Wyllie road connection.	M



# NEW SOUTHERN INTERCHANGE ON ARA TUHONO – RECOMMENDED OPTION

## RECOMMENDED OPTION



### OPPORTUNITIES

- Collaboration with NX2 Group
- Design opportunities with Ara Tūhono – Warkworth to Wellsford interchange design

### RISKS

- Land owned by Waka Kotahi is sold as surplus precluding the development of this interchange.
- Uncertainty about NX2 interface due to limited design information being made available.

### INTERDEPENDICES

- Wider Western Link Road
- Ara Tūhono/SH1 future upgrades
- Ara Tūhono – Warkworth to Wellsford future project

## PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Improve the access of people to economic and social opportunities in the southern section of Warkworth through the Southern Interchange	New interchange will provide additional vehicle access, including public transport, to the southern growth area. The link will provide direct access for heavy vehicles to the planned heavy industrial area. This supports the viability of industrial land and contributes to achieving a job to household ratio that will achieve the overarching concept of the Satellite Town. The interchange will enable inter-regional bus services (such as 995) to include multiple local stops within Warkworth and further increase direct walkable catchment to access the service.
Resilience/Reliability	Enables network resilience for Warkworth and improved reliability for the southern growth area.	Removes the outcome of a single point of failure to the network by providing an additional access on Ara Tūhono between Puhoi and Warkworth/SH1. The interchange will relieve the pressure on existing SH1 north of Hill Street which is expected to be near capacity and will also reduce the light and heavy traffic through the residential areas adjacent Western Link Road North and schools in Woodcocks Road.
Contribution to climate change response		
Climate Change	Enhances viability of industrial employment land thus supporting the Satellite Town concept of living and working in Warkworth thus reducing longer vehicle trips and future enabled emissions. Supports the long term interregional bus services to have wider walk up catchments thus improving attractiveness and mode shift of these longer bus trips to Auckland. Reduces length of vehicle trips from the southern growth area, whilst not having a significant impact on new induced vehicles trips. Reduces embodied carbon impacts on the wider network that would be required if this infrastructure does not proceed.	

# SH1 Upgrade

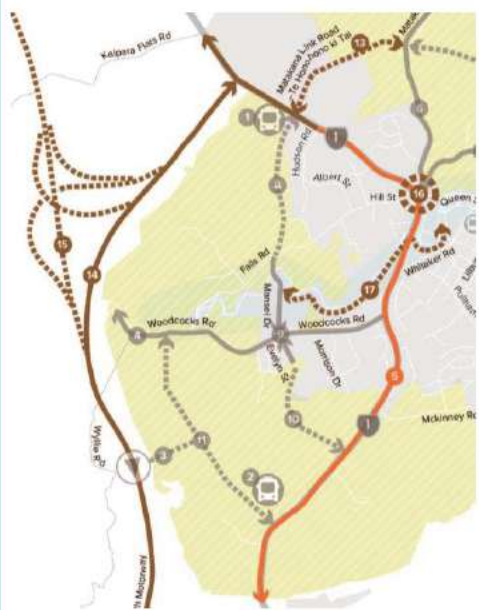
## Project 4





# SH1 UPGRADE – PRELIMINARY ASSESSMENT

## PROJECT #4



## PURPOSE

- When Ara Tūhono – the Pūhoi to Warkworth motorway opens the role of the existing State Highway 1 will change to operate as an urban arterial.
- Future role will be as a central route for public transport to connect local communities and town centres as well as the key spine for active mode transport choices.

## GAP ANALYSIS

- Warkworth DBC reconfirms IBC Indicative Transport Network alignment and role in the future Warkworth transport network.

## LAND USE



- Segments 1 and 2 are existing urban areas with primarily single house residential zoning.
- Segment 1 has significant ecological and open space areas to the north side.
- Segment 3 is primarily Future Urban zoning with a small area of single house residential zoning to the north of the segment.
- Note that Residential-Single House Zone is proposed to be rezoned to Residential – Mixed housing Urban under Plan Change 78 intensification plan

## CLIMATE CHANGE ASSESSMENT

- Upgrade is integral to the overall Warkworth active mode network and resulting mode shift and cannot be eliminated.
- Active mode upgrades support mode shift and a reduction in future enabled carbon emissions
- Opportunities to reallocate road space to reduce embodied carbon emissions.

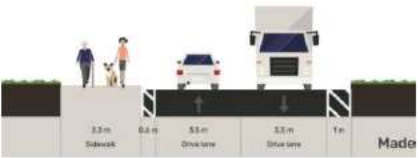
## DBC OPTION DEVELOPMENT

Due to differing land uses and constraints, corridor was split into three segments for localised option assessment.

- Segment 1: Hudson Road to Hill Street
- Segment 2: Hill Street to Fairwater Road
- Segment 3: Fairwater Road to edge of FUZ

## FORM AND FUNCTION ASSESSMENT

### EXISTING CROSS SECTIONS



SEGMENT 1

Varies from 2- 4 lanes with a shared path on western side. No footpath on most of eastern side

SEGMENT 2



SEGMENT 3



FUTURE



INITIAL FUTURE CROSS SECTION



# SH1 UPGRADE – CONSTRAINT MAPPING

## Segment 1: SH1 Hudson Road to Hill Street



\* SEA Special Environmental Area.

### Segment 1 is highly constrained.

Segment 1 constraints are primarily:

- Ecological, flood plains and permanent stream constraints
- Key social infrastructure on northern side of the corridor
- Established single house zone on the southern side with steep topography and embankments.
- Steep topography on north side near SEA.

## Segment 2: SH1 Hill Street to Fairwater Road



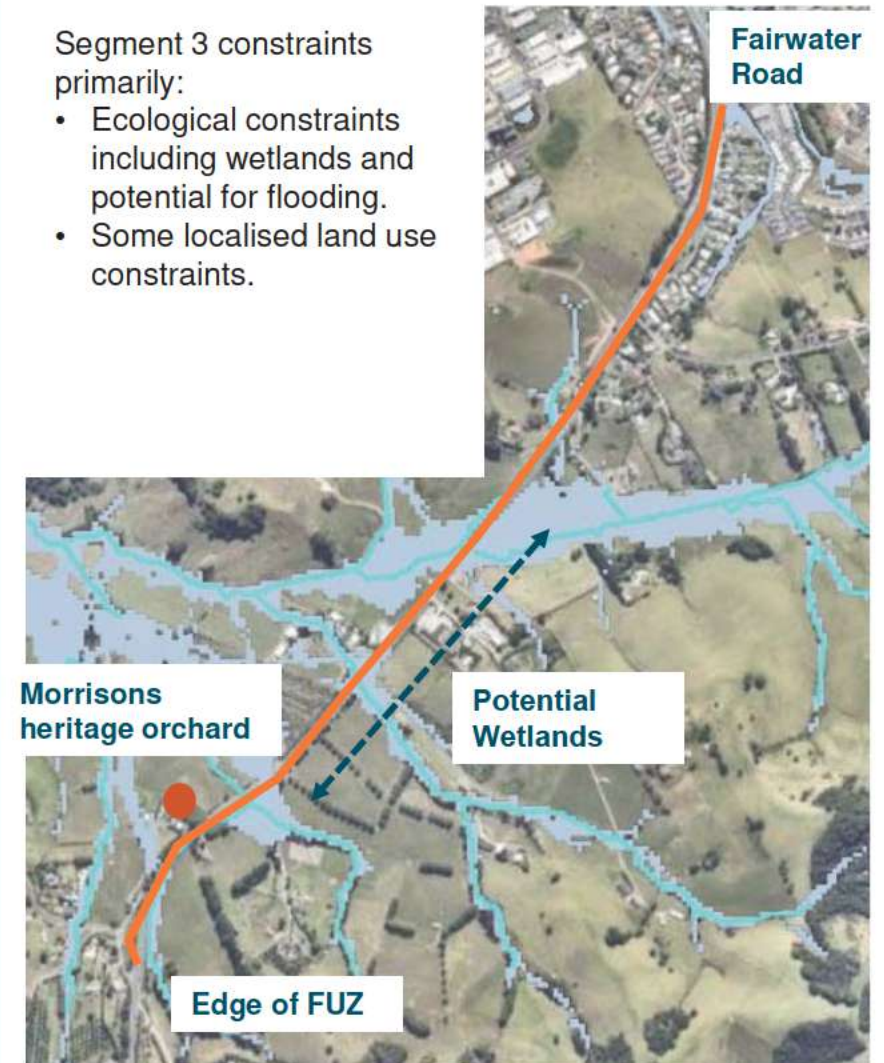
Segment 2 constraints are primarily:

- Ecological, flood plains and Mahurangi River.
- Established commercial, residential, public/open space and community land uses adjacent both sides of the corridor.
- Existing road reserve is >24M in this central section.

## Segment 3: Fairwater Road to edge of FUZ

Segment 3 constraints primarily:

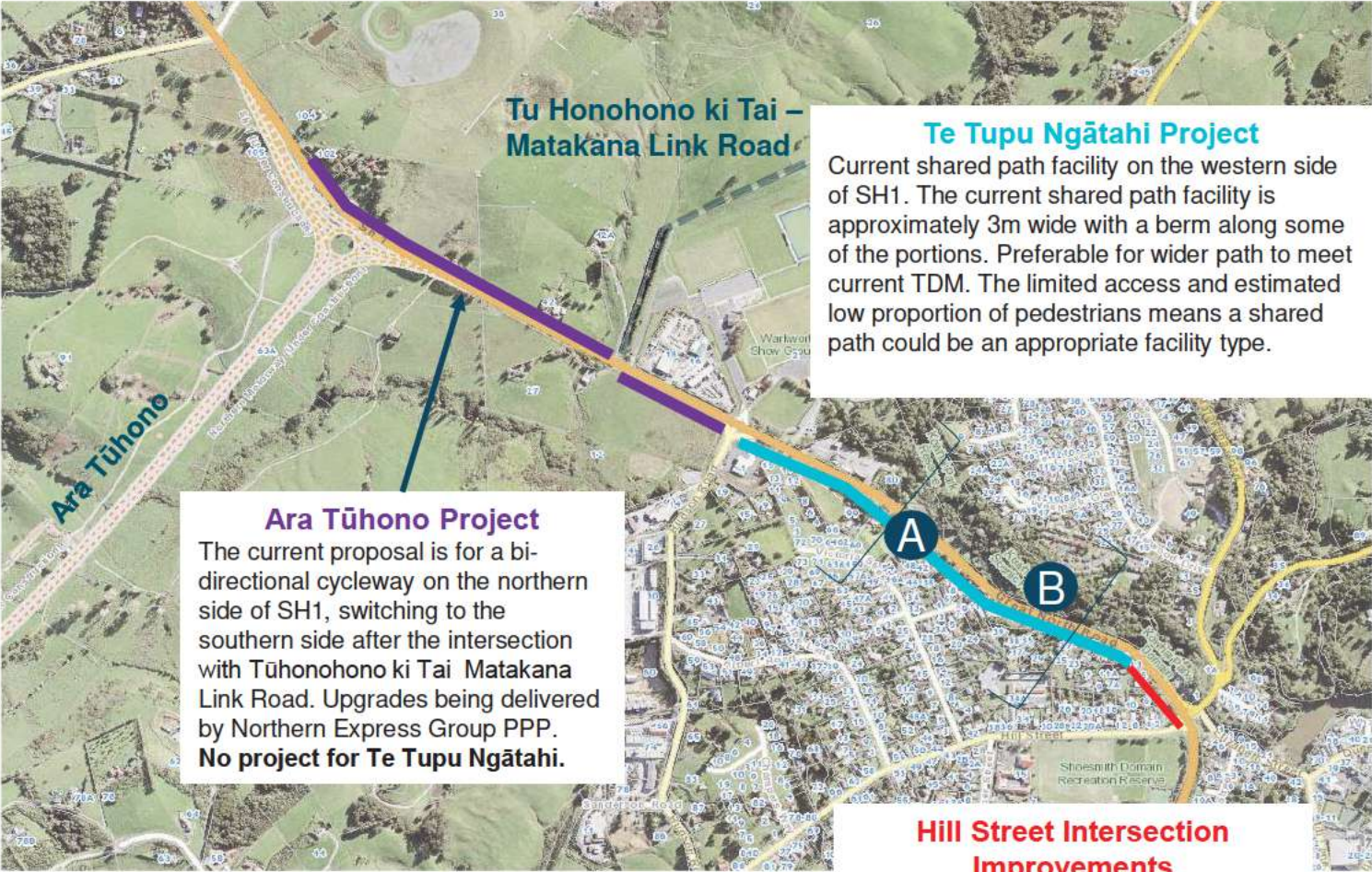
- Ecological constraints including wetlands and potential for flooding.
- Some localised land use constraints.





# SH1 SEGMENT 1 (HUDSON ROAD TO HILL STREET) – ROUTE REFINEMENT AND ASSESSMENT

## SEGMENT 1 INTEGRATION WITH COMPLEMENTARY PROJECTS



- This DBC needs to integrate active mode facilities with two complementary committed projects.
- No further vehicle capacity or bus priority measures are required.
- Te Tupu Ngātahi project extents defined to between Hill Street and Hudson Road.



Existing Cross section A



Existing Cross section B



# SH1 SEGMENT 1 (HUDSON ROAD TO HILL STREET) – ROUTE REFINEMENT AND ASSESSMENT

		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction	KEY IMPACTS	Preferred	
		<div><div></div> High impact<div></div> Medium impact<div></div> Low impact</div>													
1	Fit for purpose - use existing and planned facilities (under construction)	✓	✓	✓	✓								Partially achieves transport outcomes with actual and perceived safety compromised in places. No land required. Makes best use of parallel transport investment in the corridor.	✗	
2	Existing and planned facilities with localised reallocations of existing road reserve.	✓	✓	✓	✓								Fully achieves transport outcomes. No property required. Improves Option 1 by addressing issues of user conflict and safety by modifying existing shared path facilities on one side of the carriageway. Minor redundancy for parallel projects.	✓	
3	SGA 20m Constrained Cycle lane in each direction, keeping within existing road reserve	✓	✓	✓	✓								Achieve the transport outcomes. Major rework for newly constructed connections. Could require localised land where designation narrows. Significant earthwork options.	✗	
4	SGA 24m cross section Holding centreline	✓	✓	✓	✓								Achieves transport outcomes. Impact on SEA and driveway access on the southern side of eastern section. Potential for redundant facilities from newly built infrastructure	✗	
5	SGA 24m cross section Widening to the east	✓	✓	✓	✓								Achieves transport outcomes. Significant impact on SE.. Potential for redundant facilities from newly built infrastructure	✗	
6	SGA 24m cross section Widening to the west	✓	✓	✓	✓								Achieves transport outcomes. Significant impacts driveway access on the southern side.. Large retaining structures likely to be required. Potential for redundant facilities from newly built infrastructure.	✗	

## EMERGING PREFERRED – OPTION 2 – ROAD REALLOCATION WITHIN THE EXISTING ROAD 20M RESERVE

- Existing and planned cycle network provides a legible route that connects destinations such as the showgrounds and Warkworth Town centre with proposed residential development in the north-western FUZ. Alternative lower volume cycling routes also exist to connect the growth area to the town centre.
- Makes best use of committed infrastructure and avoids redundant infrastructure spend. Also reduces expensive retaining structures.
- Localised improvements to the shared paths will further improve user conflict and safety and better achieve the transport objectives. Bi-directional facilities to be investigated to fit within the road reserve which would integrate with Hill Street Intersection Improvement project.



# SH1 SEGMENT 2 (HILL STREET TO FAIRWATER ROAD) – ROUTE REFINEMENT AND ASSESSMENT

- Form and function specified 24m width for this section. No additional vehicle capacity is required.
- No requirement for additional widening as already corridor segment >24m width . Localised exception is the existing Mahurangi Bridge road crossing which is ~7m and pedestrian bridge over Mahurangi River ~1.2m This will need to be appropriately addressed during detail design in all options assessed.
- Optioneering therefore focused on appropriate cycling facilities for this section of SH1 to promote legibility, safety and connectivity to land use.



		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction	KEY IMPACTS	Preferred
													<div>High impact</div> <div>Medium impact</div> <div>Low impact</div>	
1	Single direction cycle lane on both sides of SH1. Existing Road reserve.	✓	✓	✓	✓								Would need two structures to cross the Mahurangi River ( one each side). Increased crossing requirements to integrate with bidirectional lanes planned at Hill Street and Woodcocks Road.	x
2	Bidirectional cycle lanes on west side of SH1. Existing Road reserve.	✓	✓	✓	✓								Connectivity and legibility with key local land uses and planned upgrades on Woodcocks Road and at Hill Street. Intersections allow safe crossing facilities to land use on eastern side. Connects two schools ( Mahurangi College and Warkworth School)	✓
3	Bidirectional cycle lane on east side of SH1. Existing Road reserve.	✓	✓	✓	✓								Does not provide direct connectivity to key land uses such as schools or planned facilities on Woodcocks Road and Hill Street.	x
4	Parallel shared path along Mahurangi River	✓	✓	✓	✓								Future function is primarily recreational. Lower access to land uses thus reducing the potential catchment. Poor personal safety and limited passive surveillance. Off-road nature of the path and proximity to the river does not support commuters or variety of users including retirement village and school students. Located in an riparian environment.	x

## EMERGING PREFERRED – OPTION 2

- Existing road reserve to be reallocated to provide bidirectional cycle lanes on the western side of SH1.
- Provides connectivity and legibility with land use and with the wider active mode network. Integrates with planned bidirectional facilities on SH1 Segment 1, Woodcocks Road and the Hill Street Intersection Improvement project.



# SH1 SEGMENT 3 (FAIRWATER ROAD TO EDGE OF FUZ) – ROUTE REFINEMENT AND ASSESSMENT

- Greenfield development with future residential land use on both sides that would benefit from the standard 24m Te Tupu Ngātahi cross section with cycling on both sides of the corridor.
- Constraint mapping informed the consideration of three options in this segment.



		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction	KEY IMPACTS	Preferred
													<div>High impact</div> <div>Medium impact</div> <div>Low impact</div>	
1	SGA 24m cross section Holding centreline	✓	✓	✓	✓								Achieves transport outcomes. Equitable property requirement. Potential impact on open space area and SEA. Potential impact on the Morrisons Orchard. Potential flooding risk along corridor. Least disruption to existing carriageway.	✓
2	SGA 24m cross section Widen to the west (Hold eastern boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. Potential impact on the Morrisons Orchard. Potential flooding risk along corridor. Some disruption to existing carriageway due to widening on one side.	✗
3	SGA 24m cross section Widen to the east (Hold western boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. Potential flooding risk along corridor. Some disruption to existing carriageway due to widening on one side	✗

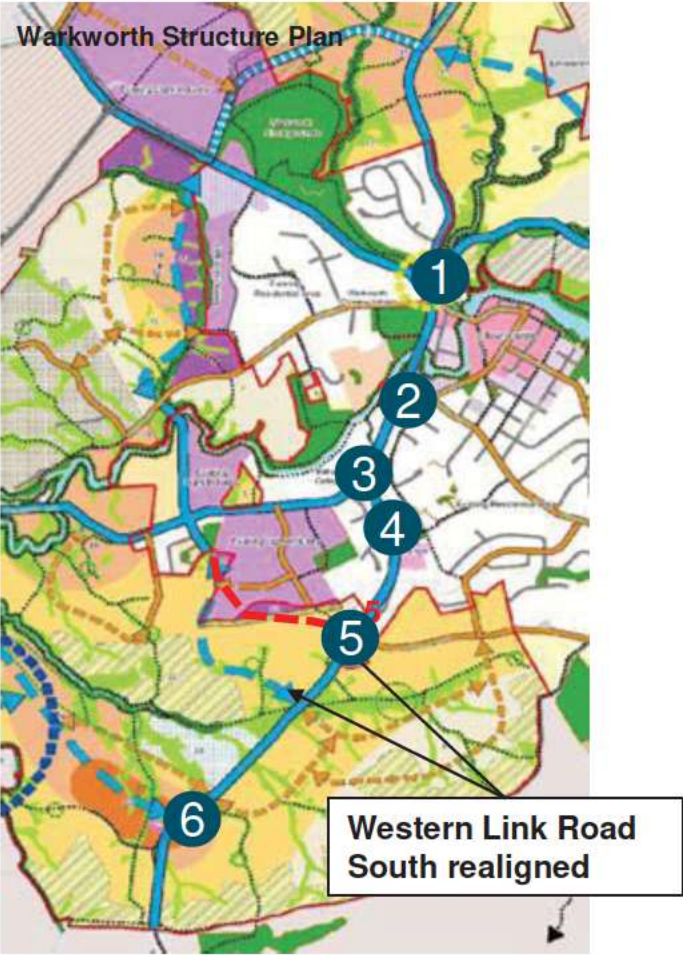
## EMERGING PREFERRED – OPTION 1

- A “ best fit for constraints” approach, primarily using centreline widening.
- Centreline option generally avoids most constraints, has the most equitable property impact and minimises realignment of the carriageway.
- Note minor localised widening to the east to be required to minimise localised impacts to the Morrisons Orchard.

# SH1 UPGRADE – EMERGING PREFERRED OPTION DEVELOPMENT

## INTERSECTION FORM ASSESSMENT

Intersection	Existing	Future design assumptions
1 – SH1 and Hill Street	Signalised intersection	Roundabout design assessed as part of Hill Street Intersection Upgrade design.
2 – SH1 and Whitaker Road	Signalised intersection	Retain signalised intersection.
3 – SH1 and Woodcocks Road	Signalised intersection	Signalised intersection
4 – SH1 and Fairwater Road	Give way controlled priority intersection	Signalised intersection
5 – SH1 and Western Link Road South/ McKinney Road	Stop controlled priority intersection	Single lane roundabout with McKinney Road
6 – SH1 and Wider Western Link Road	N/A	Single lane roundabout



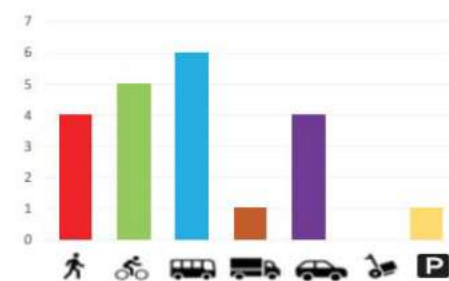


# SH1 UPGRADE – EMERGING PREFERRED OPTION DEVELOPMENT

## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Provision for dedicated, contiguous cycle facilities along the length of the corridor.
- Intersections to have suitable capacity for both vehicles and bus reliability.

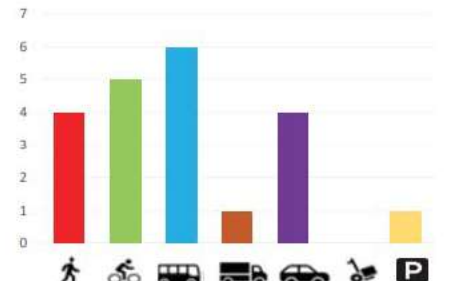
Segment 1: Hudson Road to Hill Street



Segment 2: Hill Street to Fairwater Road



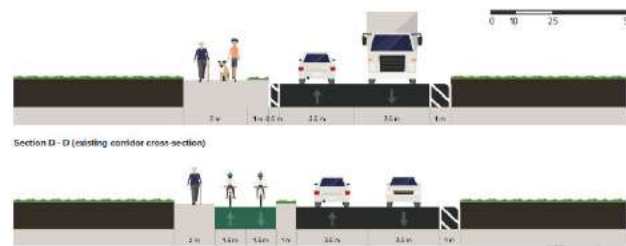
Segment 3: Fairwater Road to Edge of FUZ



## DESIGN REFINEMENTS

- Identified as Type A design.
- Concept developed. No additional land required.
- Design confirmed bidirectional lanes on the western side within existing road reserve. Minor central section remains shared path due to topographical constraints. No property required and no change to existing gabion walls.

## FINAL INDICATIVE GENERAL CROSS SECTIONS



## MATTERS TO CONSIDER FURTHER IN DETAILED DESIGN

- Localised areas where edge of seal will need to be held e.g. adjacent the SEA and steep topographical areas.
- Localised narrowing of footpath to 2.5 (as per existing facilities).
- Future general undergrounding of utilities not included in this project.

- Identified as Type A design.
- Concept developed. No additional land required.
- Design confirmed bidirectional cycle facilities to integrate with latest Hill Street Intersection Improvement single lane roundabout design.
- Provides for new 4m wide pedestrian bridge over Mahurangi river.



- Design for new active mode bridge over Mahurangi to allow for reconstruction of walkway under bridge.
- Retain vector substation. Relocation of specific overhead power poles
- Future general undergrounding of utilities not included in this project.

- Identified as Type B design
- Widening generally from centreline with localised single sides to reduce impact on wetlands
- Lowering of SH1 to reduce the crest of existing hill near McKinney Road and improve sight distance.

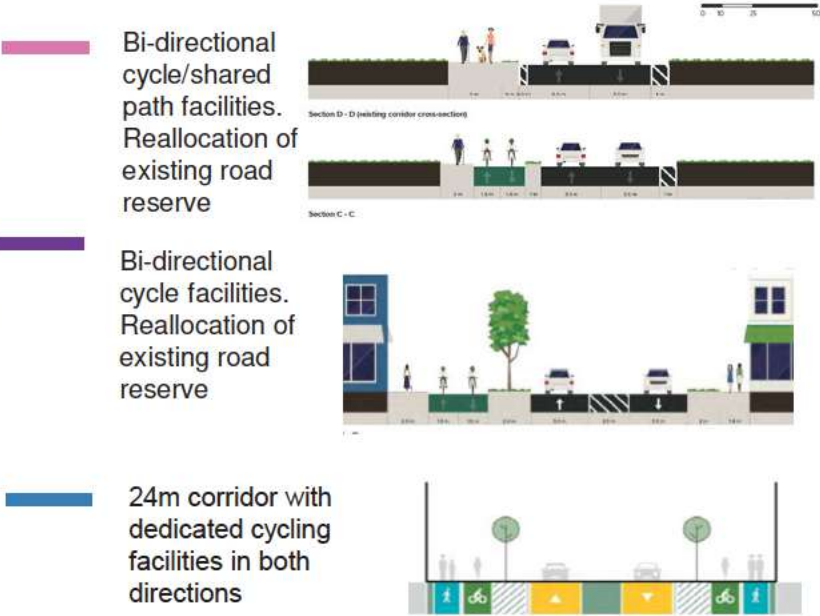
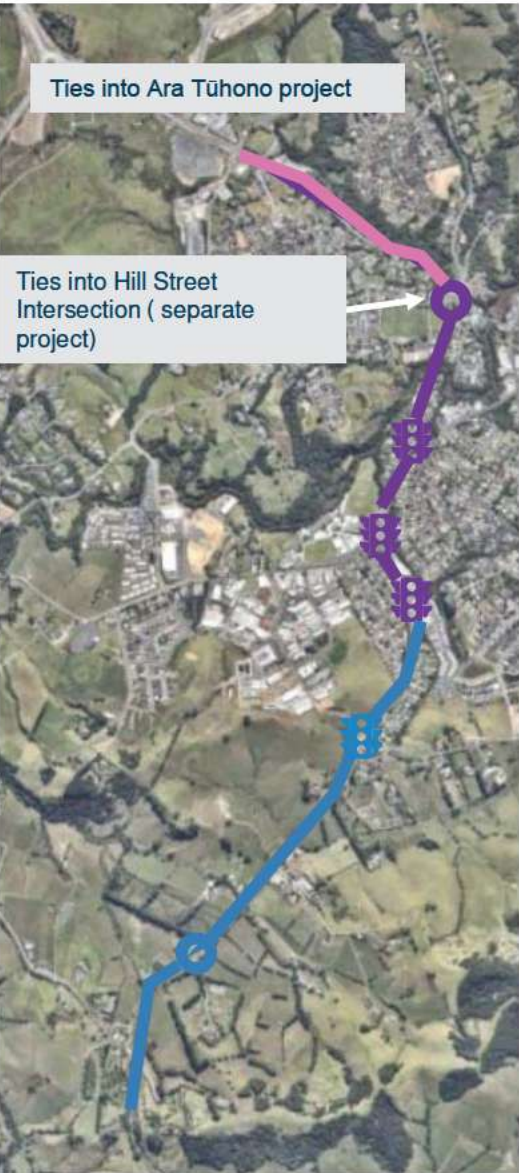


- Necessity and design of passing lane at edge of FUZ to be reassessed prior to implementation.



SH1 UPGRADE – RECOMMENDED OPTION

RECOMMENDED OPTION



OPPORTUNITIES

- Urban extents of SH1 upgrade could be delivered early to support early mode shift for growth on the western side of Warkworth and new growth emerging on Tūhonohono ki Tai-Matakana Link Road.

RISKS

- Hill Street integration and performance
- Complexity for consent of active mode bridge over the Mahurangi River.

INTERDEPENDICES

- Hill Street Intersection Improvement Design
- Ara Tūhono SH1 upgrades
- Western Link Road South
- Wider Western Link Road
- Woodcocks Road Upgrade

PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Improve access to economic and social opportunities by providing an integrated multi-modal corridor along SH1.	Forms a legible and connected active mode spine for Warkworth. Existing rural sections urbanised to support access for southern Warkworth to access key community infrastructure i.e. schools and town centre.
Travel Choice	Enable transformational mode share in Puhinui Warkworth by providing a high quality, low carbon transport network.	Provision of a contiguous active mode facility to provide the core of the Warkworth active mode network. Provide connections between new growth areas.
Safety	Provide improvements on SH1 that contribute to a transport network that is free from deaths and serious injuries.	Improved active mode safety through dedicated facilities. Geometric improvements near McKinney road to improve sight distances.
Integration	Provide corridor protection to support planned growth and flexibly enable future land use and transport integration.	Intersection upgrades to support active mode permeability across the corridor. Integrates with planned/ constructed projects at Tūhonohono ki Tai- Matakana Link Road and Hill Street.
Contribution to climate change response		
Climate Change	Supporting transformation to a low carbon transport system by providing the core north south active mode network for Warkworth. No additional vehicle capacity provided and urban upgrades to be accommodated within existing designations using road space reallocation.	

# Woodcocks Road Upgrade

## Project 5





# WOODCOCKS ROAD UPGRADE – PRELIMINARY ASSESSMENT

## PROJECT #5



## PURPOSE

- East west connection to provide multimodal access for the western Warkworth growth areas.
- Improved active mode access to key social and economic destinations including Mahurangi College, future planned schools and Woodcocks industrial area.

## GAP ANALYSIS

- Warkworth DBC reconfirms IBC Indicative Transport Network alignment.

## LAND USE

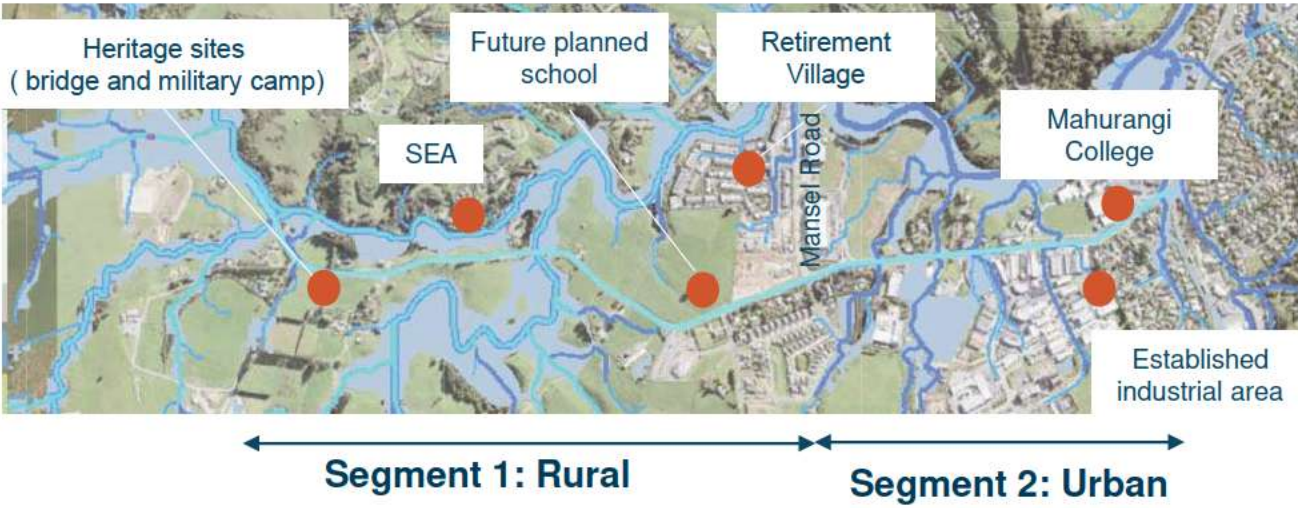


- Variety of land use in the catchment including existing Light Industry, Residential and Future Urban Zones. With new policy would expect residential zones to further intensify.
- Note that Residential-Single House Zone is proposed to be rezoned to Residential – Mixed housing Urban under Plan Change 78 intensification plan

## FORM AND FUNCTION ASSESSMENT



## CONSTRAINTS



- Urban section highly constrained with existing industrial and education land use.
- Rural section has localised flooding and Significant Ecological Area (SEA) constraints.

## CLIMATE CHANGE ASSESSMENT

- Critical east west component of active mode network and cannot be eliminated.
- Opportunities to consider reduced cross sections in urban areas to reduce embodied carbon emissions

## DBC OPTION DEVELOPMENT

- Due to differing land uses and constraints, corridor split into two segments for option assessment.



# WOODCOCKS ROAD UPGRADE – SEGMENT 1 RURAL ROUTE REFINEMENT AND ASSESSMENT



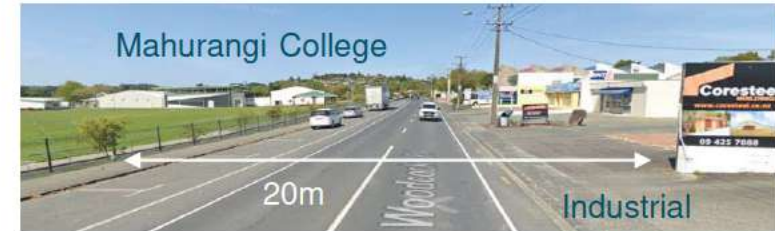
		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction		Preferred
1	<b>SGA 24m cross section</b> Holding centreline	✓	✓	✓	✓								Achieves transport outcomes. Equitable property requirement. Potential impact on open space area and SEA. Potential flooding risk along corridor. Least disruption to existing carriageway.	✓
2	<b>SGA 24m cross section</b> Widen to the south (Hold northern boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. No impact on open space area or SEA. Potential flooding risk along corridor. Some disruption to existing carriageway due to widening on one side.	✓
3	<b>SGA 24m cross section</b> Widen to the north (Hold southern boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. Highest impact on open space area and SEA. Potential flooding risk along corridor. Some disruption to existing carriageway due to widening on one side	x

## EMERGING PREFERRED OPTION – HYBRID OPTION 1 & 2

- A “best fit for constraints” approach, generally using centreline widening which avoids most constraints, has the most equitable property impact and minimises realignment of the carriageway.
- Where specific constraints have been identified such as SEA, flooding and open space areas then localised widening to be considered to the south.



# WOODCOCKS ROAD UPGRADE – SEGMENT 2 URBAN ROUTE REFINEMENT AND ASSESSMENT



		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction	KEY IMPACTS	Preferred
													<div>High impact</div> <div>Medium impact</div> <div>Low impact</div>	
1	<b>SGA 24m cross section</b> Holding centreline	✓	✓	✓	✓								Achieves transport outcomes. Land acquisition would impact both Mahurangi college and existing industrial land use. Construction disruption would be significantly increased for those land uses.	✗
2	<b>SGA 24m cross section</b> Widening to north	✓	✓	✓	✓								Similar to Option 1. Property impacts would be confined to Mahurangi college which would have high social impact.	✗
3	<b>SGA 24m cross section</b> Widening to south	✓	✓	✓	✓								Similar to Option 1. Property impacts would be confined to industrial businesses with potential high economic impact.	✗
4	<b>SGA 20m cross section</b> Within existing road reserve. One cycling lane in each direction.	✓	✓	✓	✓								Achieves transport outcomes. No land acquisition or impact on social or economic land uses.	✗
5	<b>SGA 20m cross section</b> Within existing road reserve. Bi-directional cycling lane in each direction.	✓	✓	✓	✓								Achieves transport outcomes. No land acquisition or impact on social or economic land uses. Preference for bidirectional facilities as avoids conflict with industrial land use, minimises crossing points and best connects to cycling destinations.	✓

## EMERGING PREFERRED OPTION – OPTION 5 20M CROSS SECTION WITH BIDIRECTIONAL CYCLE FACILITIES

- Balances the land use with transport outcomes with no additional land required.
- Walking and cycling connectivity still achieved with dedicated facilities, but limited impact on key existing social and economic attractors.
- Bi-directional cycle lane supports safe access to school, minimises conflict with industrial land use. Note still flexibility to implement Option 4 in the future if desired.

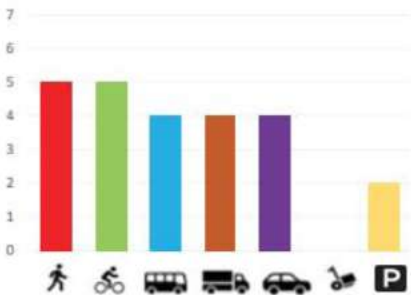


# WOODCOCKS ROAD UPGRADE – EMERGING PREFERRED OPTION DEVELOPMENT

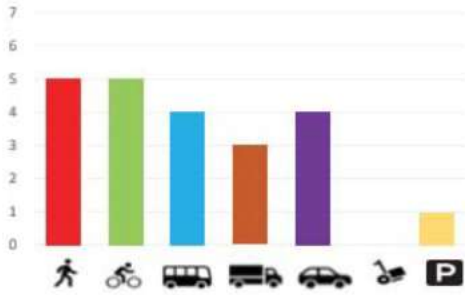
## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Provision for separated cycle facilities and footpaths along the length of the corridor to connect key destinations.
- Retention of existing level of traffic capacity i.e. one lane in each direction.

Segment 1: FUZ to Mansel Drive



Segment 2: SH1 to Mansel Drive



## INTERSECTION FORM ASSESSMENT

Intersection	Existing	Future design assumptions
Woodcocks Road and Wylie Road	Give way controlled priority intersection	Roundabout ( As per Western Link Road Design)
Woodcocks Road and Wider Western Link Road	N/A	Single-Lane Roundabout
Woodcocks Road and Mansel Drive/Evelyn Street	Stop controlled priority intersection	Single-Lane Roundabout
Woodcocks Road and SH1	Signalised intersection	Signalised Intersection

## SEGMENT 1 DESIGN REFINEMENTS

- Identified as **Type B design for this business case**
- Replacement of one way bridge in rural section, avoiding SEA to the north.
- Integration between the two cross sections at Mansel Drive.
- Reusing existing Wylie Road intersection location with Wider Western Link Road

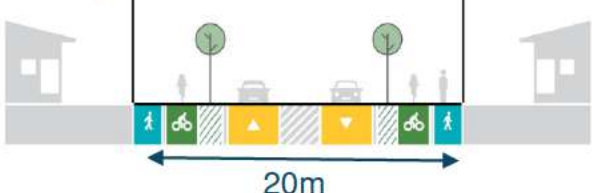
## SEGMENT 2 DESIGN REFINEMENTS

- Identified as a **Type A design for this business case.**
- Type A concept developed. Proposed cross-section was reduced to a 20m two-lane arterial which can be accommodated within the existing road reserve. Design retains flexibility for two feasible cross sections for the reduced 20m cross section although bidirectional facilities are preferred.

Segment 2: Bidirectional facilities



Segment 2: Facilities each side



## MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Final decision to be made on cycle facilities for the urban section during implementation designs i.e. bidirectional or lane in each direction	M
Carbon and resource efficiency during bridge and road construction	L
Consideration of flood mitigation at western tie in with Ara Tūhono	M



# WOODCOCKS ROAD UPGRADE – RECOMMENDED OPTION

## RECOMMENDED OPTION FOR WOODCOCKS ROAD



## PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Improve access to economic and social opportunities by providing an integrated multi-modal corridor along Woodcocks Road.	Existing urban corridor is upgraded to improve active mode connections and the rural section is upgraded to a multimodal urban arterial. Together this route directly connects the new growth area to existing and planned future destinations such as local centres, employment and schools.
Travel Choice	Enable transformational mode share in Puhinui Warkworth by providing a high quality, low carbon transport network.	Provision of a contiguous active mode facility to connect into the wider Warkworth active mode network. Connects to wider roading network to extend the future bus service offerings and further support mode shift.
Safety	Provide improvements on Woodcocks Road that contribute to a transport network that is free from deaths and serious injuries.	Improved active mode safety through dedicated facilities. Decreases conflict between industrial land use and active modes through separated facilities and clear demarcation of road space.
Integration	Provide corridor protection to support planned growth and flexibly enable future land use and transport integration.	Intersection upgrades to support active mode permeability across the corridor. Urban cross section avoids permanent impacts on existing educational and industrial land uses.

## Contribution to climate change response

Climate Change	Supporting transformation to a low carbon transport system by connecting the new growth areas to the bus and core active mode networks to enable real travel choice. Reallocation of road space in urban section to make best use of assets and reduce new embodied and construction carbon emissions.
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## RISKS/OPPORTUNITIES

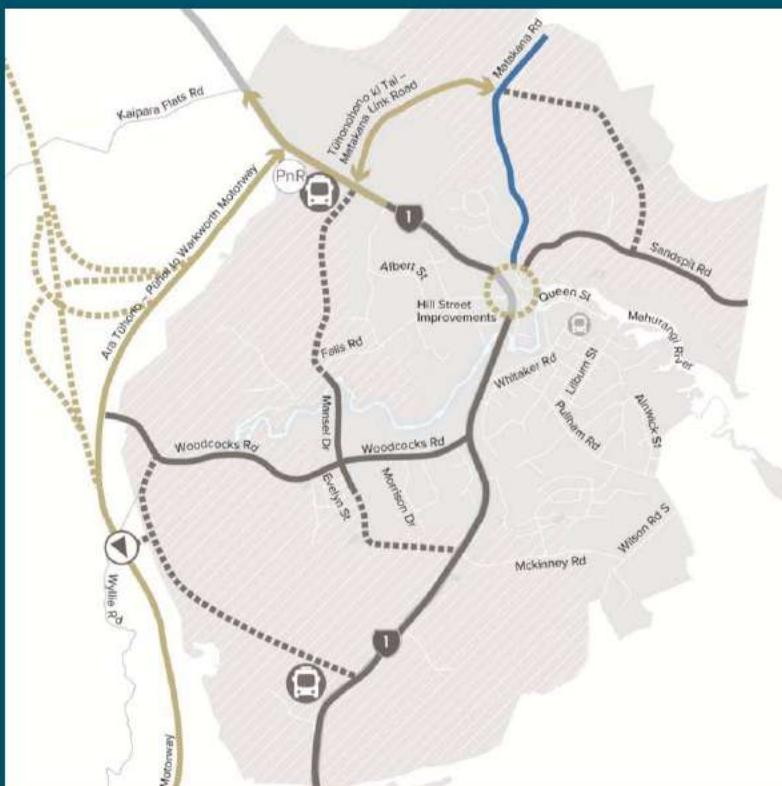
- Impacts on schools and industrial areas during construction.
- Timely upgrade in the urban section so the rural section can integrate as development occurs.

## INTERDEPENDENCES

- SH1 Upgrades – Hill Street to Fairwater Road
- Western Link Road Central and South
- Wider Western Link Road

# Matakana Road Upgrade

## Project 6





# MATAKANA ROAD UPGRADE – PRELIMINARY ASSESSMENT

## PROJECT #6



## PURPOSE

- Key north-south connection for all modes between the growth area of Puhinui Warkworth and the towns of Matakana and Omaha.
- Improved active mode access to key social and economic destinations such as Warkworth Town Centre.

## GAP ANALYSIS

- Warkworth DBC reconfirms IBC Indicative Transport Network alignment.

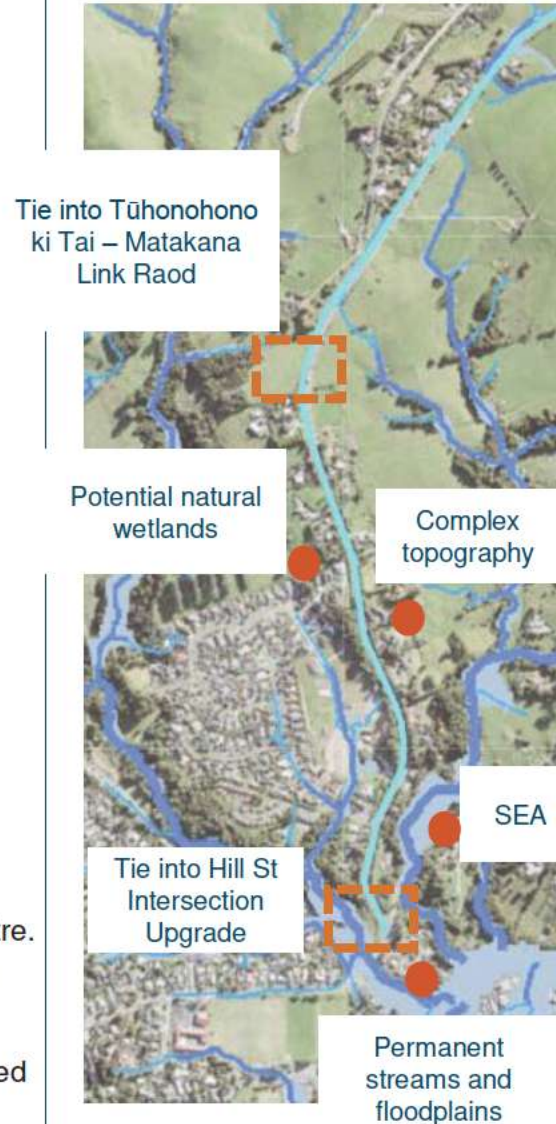
## LAND USE



- Future Urban Zone
- Residential Mixed House Suburban Zone
- Residential Mixed House Suburban Zone
- Residential – Single House
- Open Space – Conservation Zone

- Land use primarily residential or FUZ
- Close proximity to the Warkworth Town Centre.
- Limestone Quarry currently operating to the east of the road
- Note that Residential-Single House Zone is proposed to be rezoned to Residential – Mixed housing Urban under Plan Change 78 intensification plan

## CONSTRAINTS



- SEA Special Environmental Area.

## FORM AND FUNCTION ASSESSMENT

### EXISTING CROSS SECTION



### FUTURE CROSS SECTION



## CLIMATE CHANGE ASSESSMENT

- Active mode upgrade critical to overall Warkworth active mode shift and cannot be eliminated.
- Opportunities to consider type of active mode form to use existing carriageway in highly constrained sections and reduce additional earthworks, structures and embodied carbon impacts.

## DBC OPTION DEVELOPMENT

Constraint mapping informed the consideration of three options:

1. Holding centreline and widening both sides
2. Widening west side
3. Widening east side





# MATAKANA ROAD UPGRADE – EMERGING PREFERRED OPTION DEVELOPMENT

## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Provision for separated cycle facilities and footpaths along the length of the corridor to connect active modes to key destinations of Warkworth Town Centre.
- Retention of existing level of traffic capacity i.e. one lane in each direction.



## INTERSECTION FORM ASSESSMENT

Intersection	Existing	Future design assumptions
Matakana Road and Sandspit Road	Give way controlled priority intersection	Roundabout. Design assessed as part of Hill Street Intersection Upgrade Project.
Matakana Road and Tūhonohono ki Ta/ Matakana Link Road	N/A	Roundabout. Design assessed and designed as part of Tūhonohono ki Ta/ Matakana Link Road Project.
Matakana Road/Clayton Road	Give way controlled priority intersection	Give way controlled priority intersection

## DESIGN REFINEMENTS

- Identified as **Type B design for this DBC**
- **Section 1**: Highly constrained between Hill Street and North of Melwood Drive with SEA, steep topography and existing houses ( not in the FUZ). Decision was made to reduce the cross section at this location to 16m to provide bidirectional facilities and minimise impacts.
- **Section 2**: between Melwood Drive and FUZ on western side has very steep topography. To avoid significant retaining structures and impact on existing new builds, widening has been confined to the eastern side. This section continues the bidirectional facilities with a 20m cross section and provides the transition between the other two sections
- **Section 3**: From the commencement of the FUZ on the western side to the edge retain 24m centreline widening



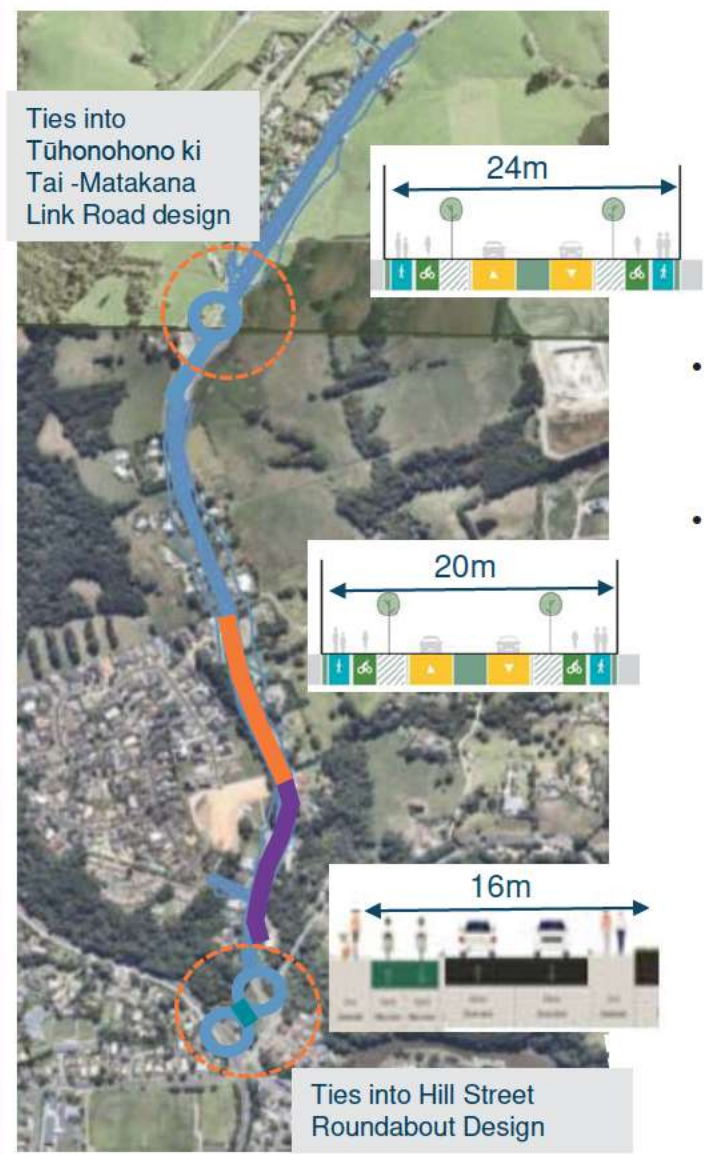
## MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Driveway access for existing properties	M
Integration of cycling facilities between proposed Hill Street Intersection upgrade and transitional from bidirectional cycle facilities to two way cycle facilities	M
Carbon and resource efficiency during road construction	L
Proximity to SEA and QEII covenanted area to be considered during implementation and construction phases	M



# MATAKANA ROAD UPGRADE – RECOMMENDED OPTION

## RECOMMENDED OPTION



- 24m corridor with dedicated cycling facilities in both directions
- 20m corridor with dedicated cycling facilities in both directions
- 16m corridor with bidirectional facilities on western side

## OPPORTUNITIES

- Could be delivered early to support early mode shift for growth on the western side and pending on Tūhonohono ki Tai-Matakana Link Road.
- During construction could use Tūhonohono ki Tai- Matakana Link Road as a diversion to expedite construction on Matakana Road.

## RISKS

- Topographically challenging construction environment.
- Timing and integration with Hill Street Upgrades

## INTERDEPENDICES

- Intersection with Tūhonohono ki Tai – Matakana Link Road
- Hill Street Intersection Design
- Sandspit Road

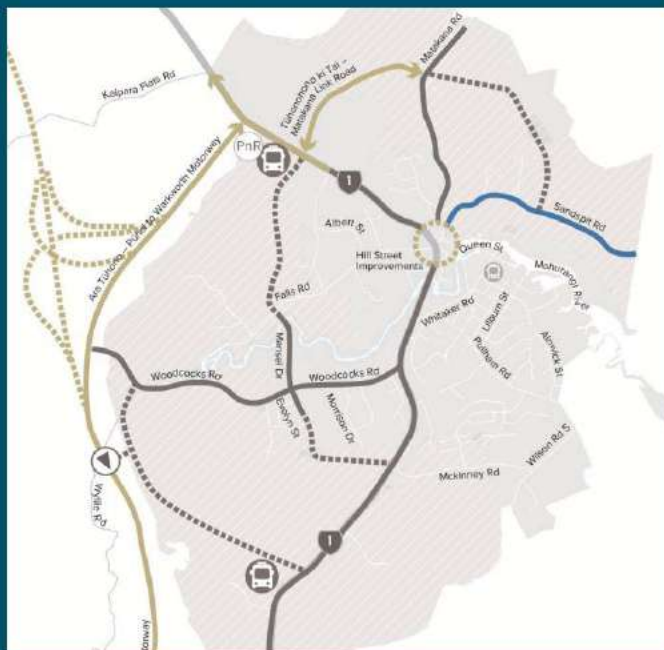
## PROJECT ALIGNMENT

Investment Objectives		Alignment
Access	Improve access to economic and social opportunities by providing an integrated multi-modal corridor along Matakana Road	Existing rural corridor is upgraded to a multimodal urban arterial. The walking and cycling paths will improve access between the new and existing residential zoning to the Warkworth Town centre helping to reduce the need for private vehicle trips for short distances.
	Travel Choice	Enable transformational mode share in Puhinui Warkworth by providing a high quality, low carbon transport network. Provision of a contiguous active mode facility to connect into the wider Warkworth active mode network and directly access Warkworth Town Centre by active mode.
Safety	Provide improvements on Matakana Road that contribute to a transport network that is free from deaths and serious injuries.	Improved active mode safety through dedicated facilities.
	Integration	Provide corridor protection to support planned growth and flexibly enable future land use and transport integration. Intersection upgrades to support active mode permeability across the corridor. Integrates with planned/ constructed projects at Tūhonohono ki Tai- Matakana Link Road and Hill Street.
Contribution to climate change response		
Climate Change	Supporting transformation to a low carbon transport system by connecting the new growth areas to the core active mode networks and support travel choice to Warkworth Town Centre.	



# Sandspit Road Upgrade

## Project 7



# SANDSPIT ROAD UPGRADE – PRELIMINARY ASSESSMENT

## PROJECT #7



## PURPOSE

- East west connection to urbanise the existing rural road to provide multimodal access for the north-eastern Warkworth growth area and Mahurangi peninsula to the Warkworth Town Centre.
- Improved active mode access to key social and economic destinations including Warkworth Town Centre.

## GAP ANALYSIS

- Warkworth DBC reconfirms IBC Indicative Transport Network alignment.

## CLIMATE CHANGE ASSESSMENT

- Active mode upgrade critical to overall Warkworth active mode shift and cannot be eliminated.
- Opportunities to consider type of active mode form to use existing carriageway in highly constrained sections and reduce additional earthworks, structures and embodied carbon impacts

## FORM AND FUNCTION ASSESSMENT



EXISTING CROSS SECTION



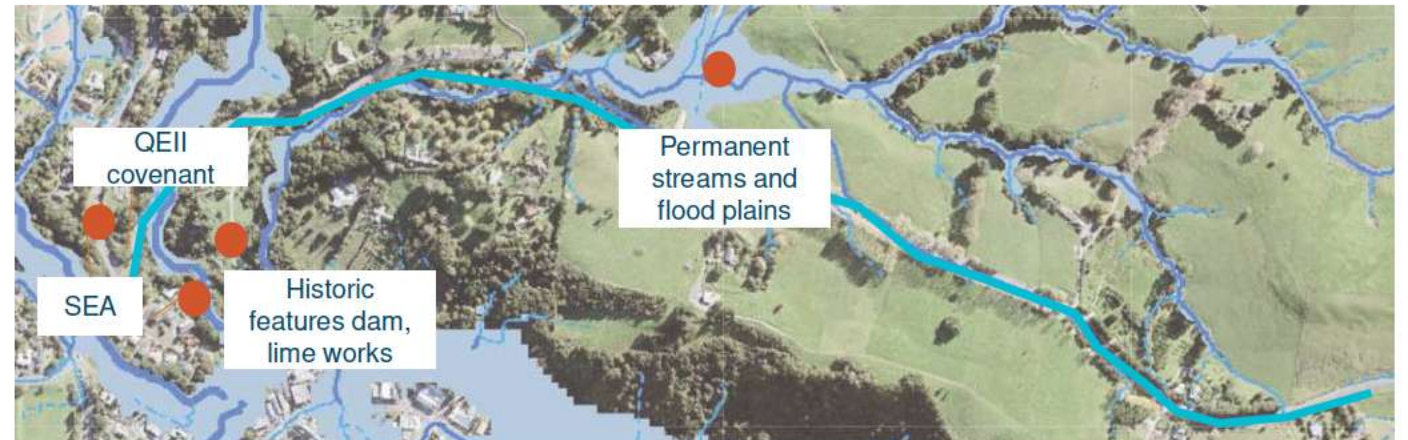
FUTURE CROSS SECTION

## LAND USE

- Primarily FUZ zoning on either side of Sandspit road.
- Noted that a Private Plan Change has been submitted for the south side of Sandspit Road. With new land use policies this is expected to include higher density residential.



## CONSTRAINTS



- Western end has Significant Ecological Area (SEA), QEII covenant and flooding constraints.
- Topography either side of Sandspit Road is steep with large existing retaining walls and possible localised subsidence issues on the north side.

## DBC OPTION DEVELOPMENT

Constraint mapping informed the consideration of three options:

1. Holding centreline and widening both sides.
2. Widening west side.
3. Widening east side.



# SANDSPIT ROAD UPGRADE – ROUTE REFINEMENT AND ASSESSMENT

														KEY IMPACTS			Preferred
														High impact	Medium impact	Low impact	
		IO1: Access	IO2: Integration	IO3: Travel Choice	IO4: Safety	Heritage	Land Requirement	Ecology	Stormwater	Social cohesion	Transport	Construction					
1	<b>SGA 24m cross section</b> Holding centreline	✓	✓	✓	✓								Achieves transport outcomes. Equitable property requirement. Potential flooding considerations and Significant Ecological Area at western edge of corridor. Least disruption to existing carriageway.	✓			
2	<b>SGA 24m cross section</b> Widen to the north (Hold southern boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. Some disruption to existing carriageway due to widening on one side. Potential impact on SEA. Steep topography on western section.	x			
3	<b>SGA 24m cross section</b> Widen to the south (Hold northern boundary)	✓	✓	✓	✓								Achieves transport outcomes. Less equitable property requirement. Potential flooding risk at western end. Some disruption to existing carriageway due to widening on one side. Potential impact on SEA.	x			

## EMERGING PREFERRED OPTION – OPTION 1 CENTRELINE WIDENING

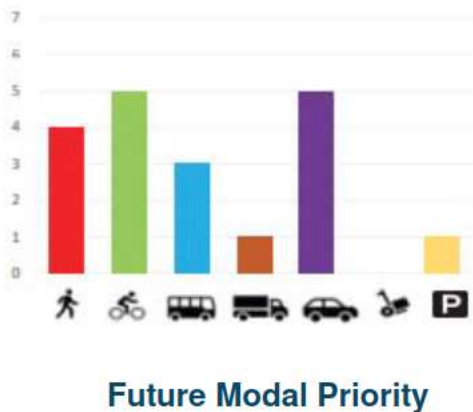
- A “ best fit for constraints” approach, generally using centreline widening.
- Centreline option generally avoids most constraints, has the most equitable property impact and minimises realignment of the carriageway.
- Localised widening to be used on the western section to minimise localised impacts to the Significant Ecological Area and QEII covenanted area.



# SANDSPIT ROAD UPGRADE – EMERGING PREFERRED OPTION DEVELOPMENT

## HOW SOLUTION MEETS FUTURE MODAL PRIORITY

- Provision for separated cycle facilities and footpaths along the length of the corridor to connect key destinations.
- Retention of existing level of traffic capacity i.e. one lane in each direction.



## DESIGN REFINEMENTS

- Identified as **Type B design for this DBC**
- Design process further highlighted the severity of constraints at the western end due to topography, QEII covenanted area ( which is a hard constraint) and high quality vegetation. There is an existing stream running parallel to the road which would require long bridging for any widening option.
- The existing culvert at the western end was identified as having vulnerability to future flood events but there has not been reported instances currently and the bridge itself is of average condition with around 30 years expected design life left. If the culvert is opened there could be potential of downstream flooding or upstream dewatering in the QEII area.
- Consideration given to the form of active mode facilities in this location given there is very limited future adjacent land use reducing the need for urbanisation
- Even with a reduced cross section, widening the road and providing separate active mode facilities would cause significant impacts to the ecology and QEII areas and would have affordability issues for the active mode project.
- Decision was made to leave the road in its current alignment and provide a parallel high quality boardwalk active mode solution on the southern side of the road. With composite surfacing this will provide the desired active mode connection but minimise impacts. The upgrade of the culvert will require a multi organisation future approach.

## INTERSECTION FORM ASSESSMENT

Intersection	Existing	Future design assumptions
Sandspit Road and SH1	Signalised intersection	Roundabout. Design assessed as part of Hill Street Intersection Upgrade Project.
Sandpit Road and Matakana Road	Give way controlled priority intersection	Roundabout. Design assessed as part of Hill Street Intersection Upgrade Project
Sandspit Road and Sandspit Link Road	Existing priority intersection	Roundabout. Location decided by the Te Tupu Ngātahi Sandspit Link Road Project

## MATTERS TO CONSIDER FURTHER IN FUTURE DETAILED DESIGN

Design Parameters	Complexity Rating
Consideration of parallel upgrade of existing bridge at western end subject to bridge condition and design life.	H
Proximity to SEA and QEII covenanted area to be considered during implementation and construction phases	M
Retain driveway access to existing properties	M
Carbon and resource efficiency during bridge and road construction	L