

# Warkworth – Detailed Business Case

## Appendix B – Options Assessment Report

December 2022

Version 1.1

## Document Status

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## Disclaimer

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

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## Glossary

Acronym/Term	Description
<b>AT</b>	Auckland Transport
<b>AUP-OP</b>	Auckland Unitary Plan: Operative in Part
<b>Council</b>	Auckland Council
<b>CHI</b>	Cultural Heritage Inventory
<b>DBC</b>	Detailed Business Case
<b>FULSS</b>	Future Urban Land Supply Strategy
<b>FUZ</b>	Future Urban Zone
<b>IBC</b>	Indicative Business Case
<b>MCA</b>	Multi-Criteria Assessment
<b>NoRs</b>	Notices of Requirement
<b>Partner</b>	Mana whenua, Auckland Council, Auckland Transport, and Waka Kotahi
<b>PBC</b>	Preliminary Business Case
<b>PT</b>	Public Transport
<b>QEII</b>	Queen Elizabeth II National Trust Covenant
<b>SEA</b>	Significant Ecological Area
<b>SH1</b>	State Highway 1
<b>SME</b>	Subject Matter Expert
<b>Te Tupu Ngātahi</b>	Te Tupu Ngātahi Supporting Growth Alliance
<b>Waka Kotahi</b>	Waka Kotahi New Zealand Transport Agency

# 1 Introduction

## 1.1 Purpose of this Report

The purpose of the Te Tupu Ngātahi Supporting Growth Programme is to identify the recommended transport networks for route protection to support Auckland's planned greenfield growth over the next 30 years.

The Warkworth Detailed Business Case (DBC) follows on from the outcomes identified at both the Programme Business (PBC) and Indicative Business Case (IBC) stages and further investigates and confirms a fit-for-purpose transport network for Warkworth to advance to route protection. An overview of the stages is provided below:



The Warkworth 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.
- Develops the economic case and measures expected benefits and outcomes.
- Identifies the arrangements needed for delivery and route protection.

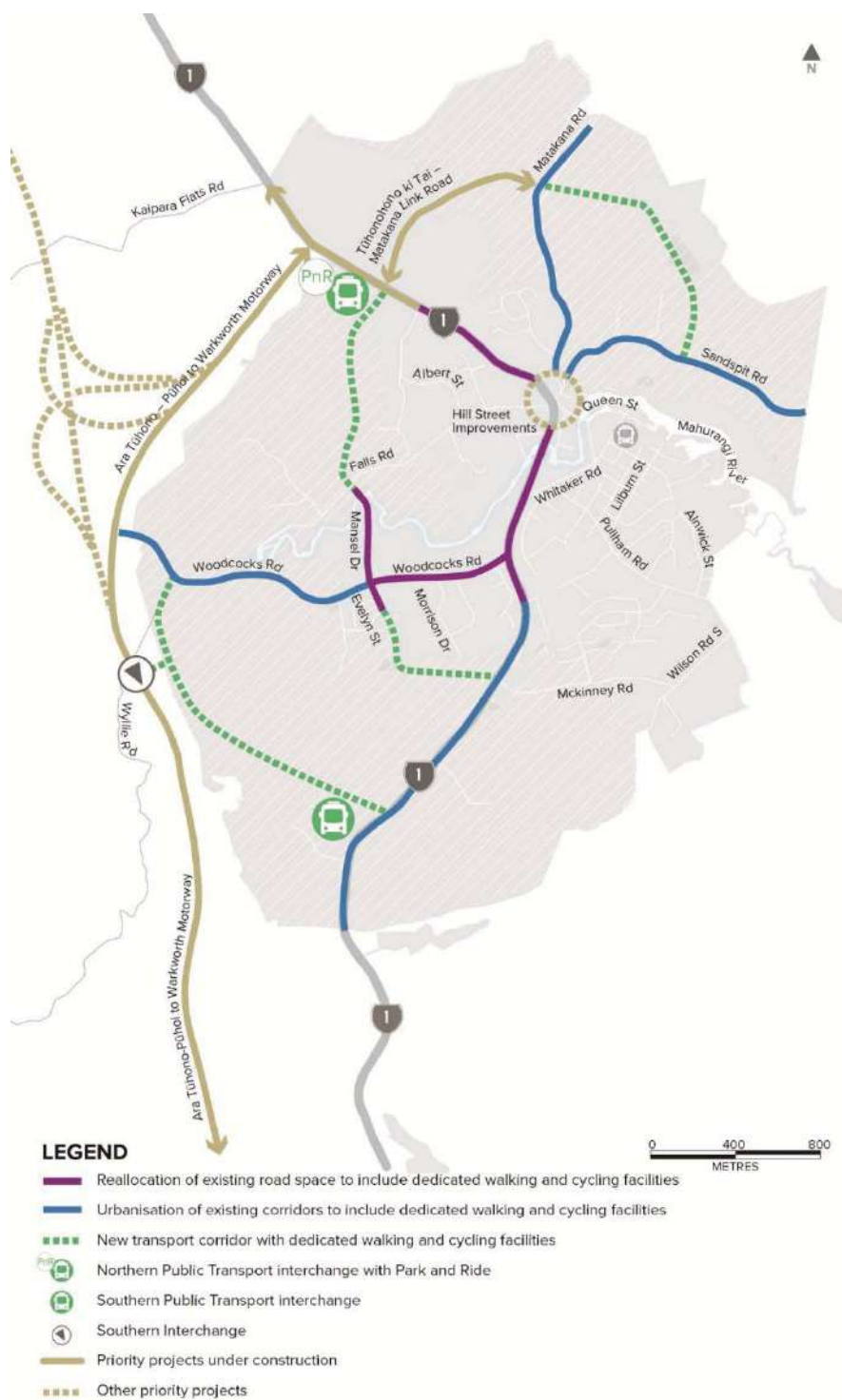
This Options Assessment Report outlines the option development and assessment process, and outcomes for the DBC being prepared for the Warkworth growth area. In identifying the preferred strategic transport network, a wide range of options have been developed and evaluated, including public transport interchanges, upgrading of existing corridors, and new transport corridors to be protected via designations (or other planning measures). The projects that are the subject of this DBC are identified in

Figure 1-1 below, and include:

- Northern Public Transport Hub and Park and Ride.
- Southern Public Transport Hub.
- Southern Motorway Interchange.
- State Highway 1 Upgrade
- Woodcocks Road Upgrade.
- Matakana Road Upgrade.
- Sandspit Road Upgrade.
- Western Link Road – North.
- Western Link Road – Central.
- Western Link Road – South.
- Wider Western Link Road.
- Sandspit Link Road.

This report forms an Appendix to the main DBC document for the Warkworth Strategic Transport Network.

Figure 1-1. Warkworth Indicative DBC network



## 1.2 Background

Auckland is New Zealand's largest city, home to approximately 1.69 million people. The city is growing rapidly; driven by both natural growth (more births than deaths) and migration from overseas and from other parts of New Zealand. In 2017, Auckland attracted 36,800 new residents; more than the rest of the country combined. The Auckland Plan Development Strategy (2050) signals that Auckland could grow by another 720,000 people to reach 2.4 million over the next 30 years.

The Auckland Plan anticipates that this growth will generate demand for an additional 313,000 dwellings and require land for approximately 263,000 additional employment opportunities. In response to this demand, the Auckland Unitary Plan – Operative in Part (AUP-OP) identified 11,000 hectares (ha) of predominantly rural land for future urbanisation. This land is equivalent to an area 1.5 times the size of urban Hamilton.

To enable urban development on this land, appropriate bulk infrastructure needs to be planned and enabled. To provide clarity and certainty about when the land identified in the AUP-OP will be 'development ready', Auckland Council (the Council) developed the Future Urban Land Supply Strategy (FULSS) in 2015. The FULSS provides for sequenced and accelerated greenfield growth in the following areas of Auckland:

- Warkworth
- North: Orewa-Silverdale, Dairy Flat
- Northwest: Whenuapai-Redhills, Westgate, Kumeū, and Huapai
- South: Takaanini, Drury – Ōpāheke and Pukekohe - Paerata

In July 2017, the FULSS was updated in line with the AUP-OP zoning, with an increase to 15,000 hectares of land allocated for future urbanisation.

In response to the FULSS, Auckland Transport (AT), Waka Kotahi New Zealand Transport Agency (Waka Kotahi), and the Council (collectively referred to as the partners) identified a need to determine the most appropriate transport responses to support this envisioned urban growth. A tripartite governance group was formed to develop a response to two key issues:

- Inability to respond in a timely way to the pace and scale of greenfield development will restrict access to jobs, education, and other core services around and in growth areas.
- Inability of the regional transportation system to cope with the growing demand of greenfield expansion will reduce travel choice and efficient movement of people and goods.

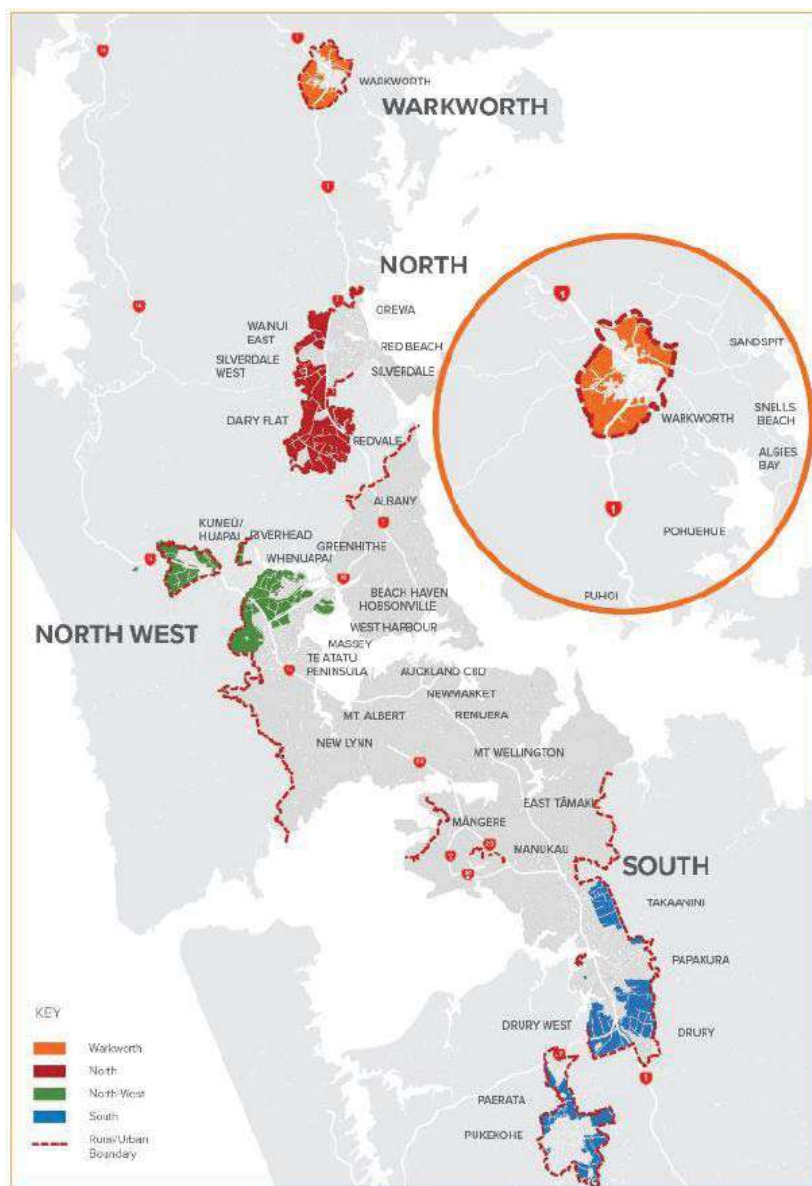
This joint approach recognised that the proposed growth is likely to require significant new additions to the arterial, local, and public transport network, and integration of such networks with new and existing urban form. It will also likely have impacts on and require improvements to the existing arterial, public transport, and state highway network, and to planning frameworks and/or policy.

Te Tupu Ngātahi is a collaboration between AT and Waka Kotahi to plan transport investment in Auckland's future urban zoned areas over the next 10 to 30 years. AT and Waka Kotahi have partnered with Auckland Council, Mana whenua and KiwiRail Holdings Limited (KiwiRail) and are working closely with stakeholders and the community to develop the strategic transport network to support Auckland's growth areas.

### 1.3 The Warkworth Growth Area

Warkworth is located at the northernmost extent of the Auckland region, approximately 60km from the Auckland City Centre, and 30km north of Orewa. It is identified as a satellite town in the Auckland Plan and will act as a rural node that serves both the surrounding rural communities as well as connecting to urban Tāmaki Makaurau / Auckland. A key feature of a satellite town is 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 supports a low carbon transport response for future residents. The Warkworth growth area is shown in the wider future urban zones planned in Auckland in Figure 1-2.

Figure 1-2: Warkworth Growth Area



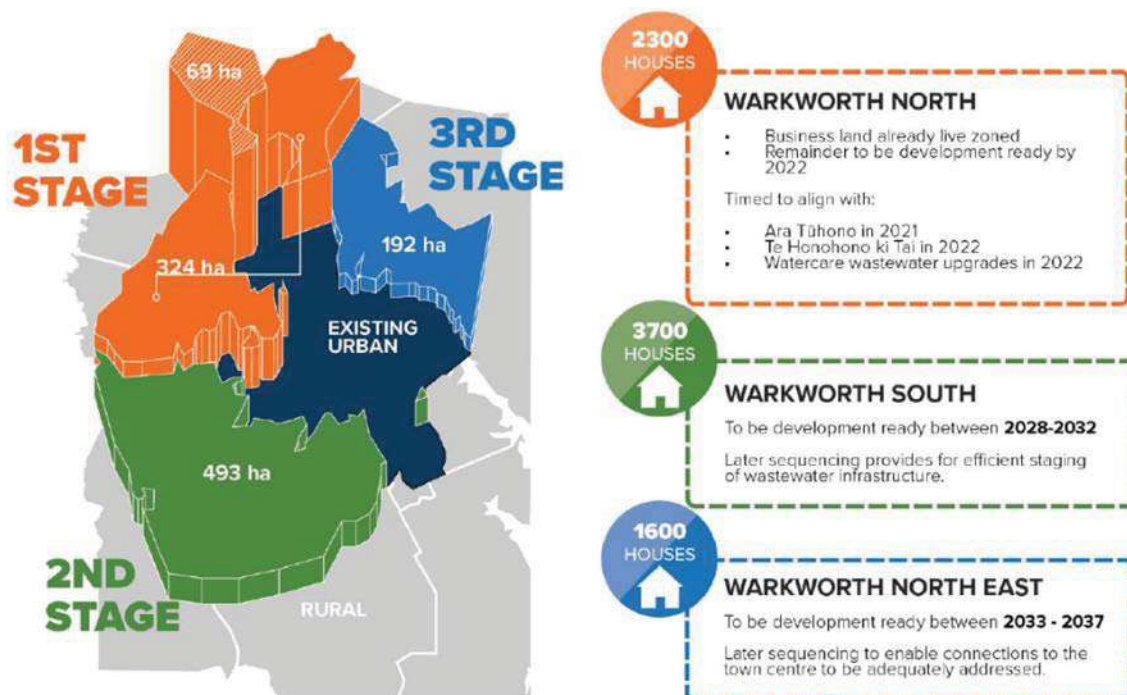


The Warkworth Future Urban Zone (FUZ) area where the majority of the future growth is anticipated will be in an area extending less than 5km to the northern-southern extent and eastern-western extent, resulting in compact future urban form. The 1000ha of currently rural land has been rezoned to support 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:

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

The FULSS land release and housing yield for the Warkworth growth area is identified in Figure 1-3.

**Figure 1-3. FULSS Warkworth land release and indicative housing yield**

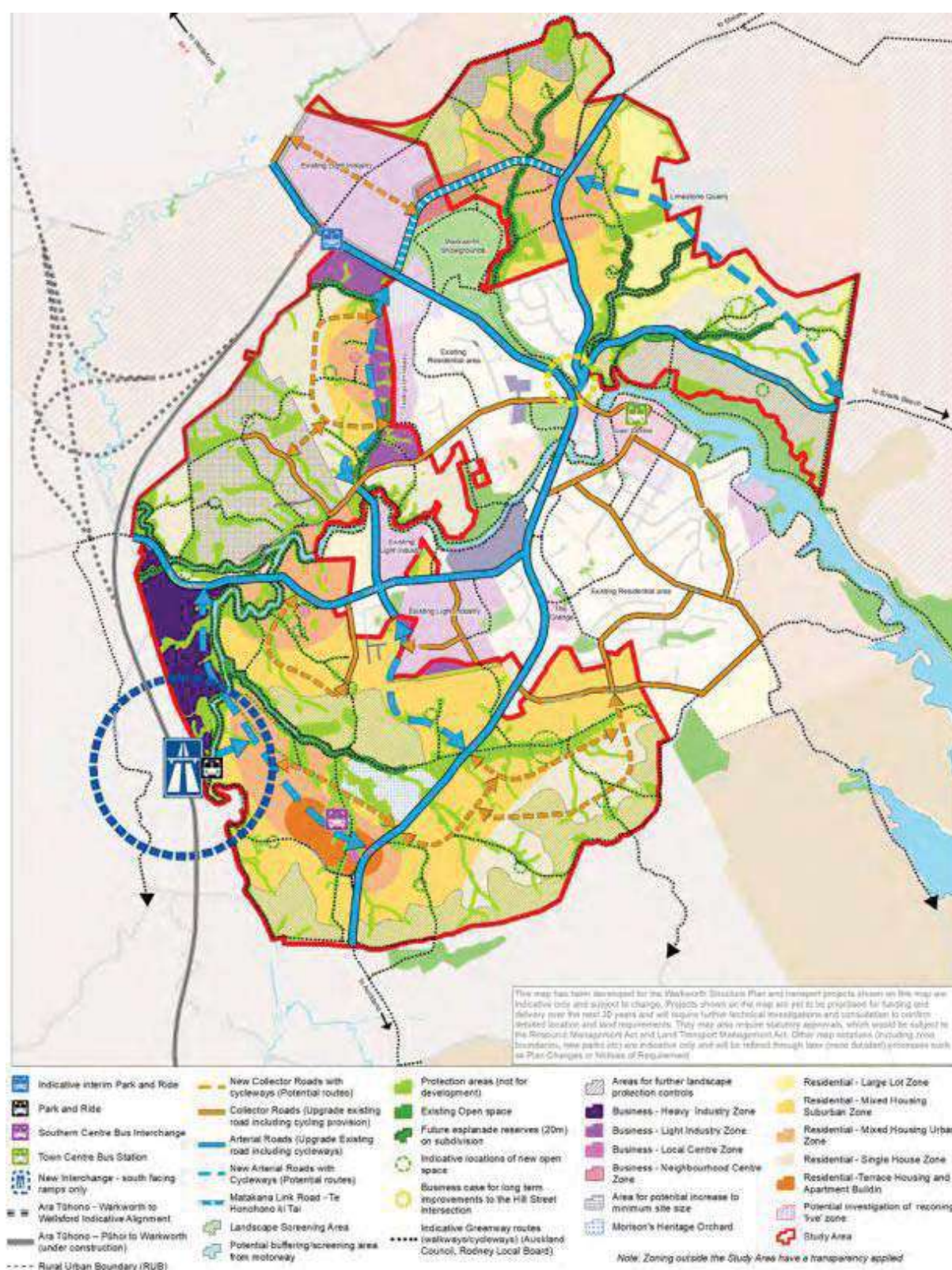


It is understood that Council is currently progressing a workstream to review and update the existing FULSS. However, at the time of writing no specific details on the outcomes of this process, so far as is relevant to the Warkworth area, have been released.

## 1.4 Future land use

The Warkworth Structure Plan was adopted by Auckland Council in June 2019 and sets out the pattern of land use and supporting infrastructure network for the future growth of Warkworth and is outlined below in Figure 1-4.

Figure 1-4: Warkworth Structure Plan



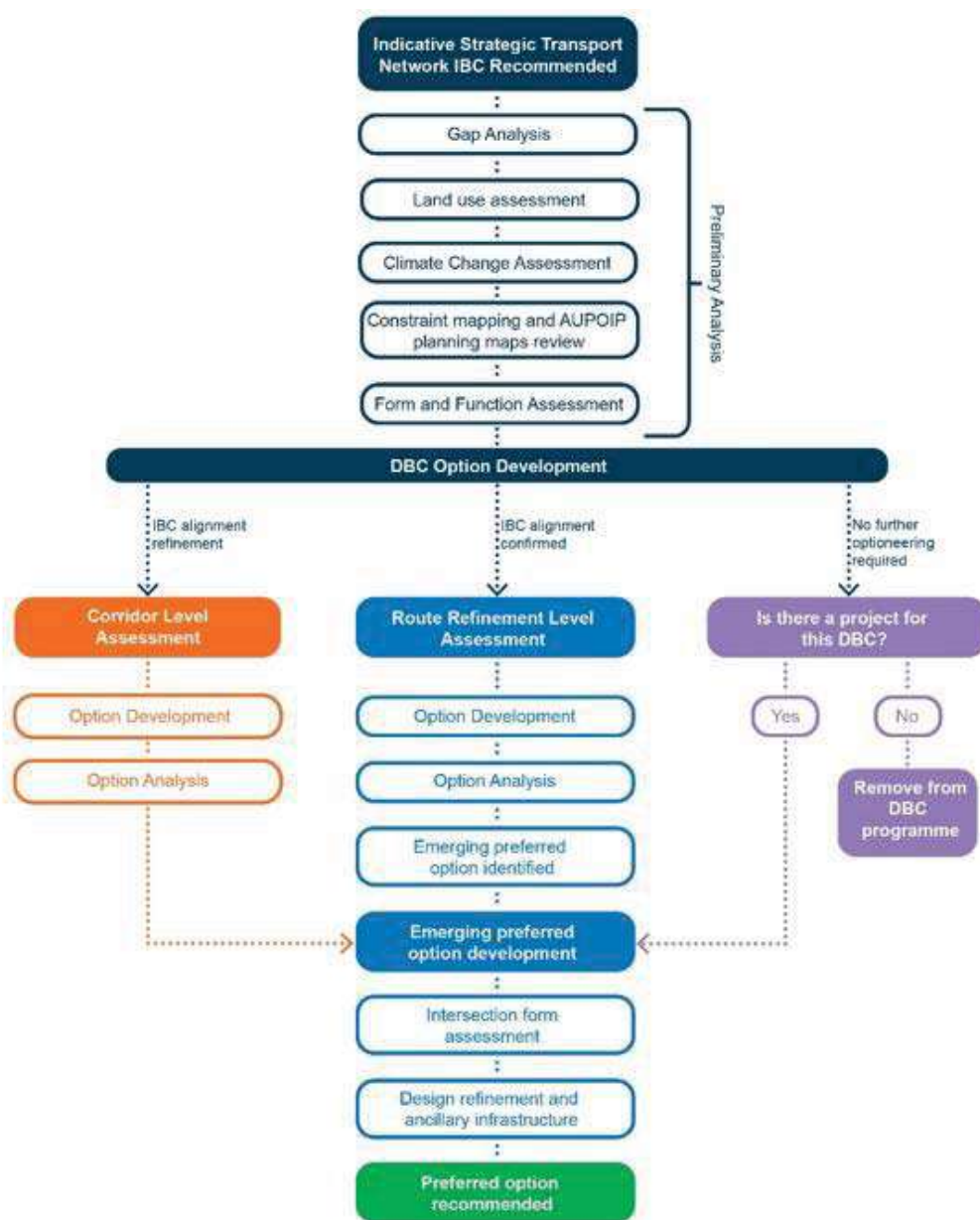


## 2 DBC Option Development and Assessment Process Summary

In 2022, the DBC commenced for the Warkworth Strategic Package. The DBC continued the previous work undertaken at the Preliminary Business Case (PBC) and Indicative Business Case (IBC).

The Warkworth DBC is comprised of 12 projects and the following section provides a summary of the DBC option development and assessment process. An overview of the process is outlined in Figure 2-1 below.

Figure 2-1. Overview of the options development and assessment process



## 2.1 Preliminary Analysis

A preliminary analysis was completed for each project in the Warkworth Strategic Package to inform the option development and assessment process. The assessments included in the preliminary analysis and the purpose of the exercise is outlined below.

**IBC to DBC Gap Analysis** was undertaken to ensure an understanding of how the Indicative Strategic 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 may change the need for a project or require further consideration during the DBC phase. Additionally, the gap analysis provided an indication as to whether any of the recommended components should be subject to further optioneering through a corridor assessment process or whether the components could go straight to a route refinement process.

A corridor assessment process was recommended as opposed to a route refinement process where the gap analysis determined that new information, for example, land use changes, new growth projections and any issues and opportunities identified through engagement with stakeholders and landowners, since the completion of the corridor assessment at the IBC phase, had the potential to influence the recommended IBC network option(s) for a particular corridor(s). Therefore, a reassessment of the previous, or of new, corridor options in the context of this new information was required.

A route refinement process was determined as being appropriate, as opposed to a corridor assessment process, where the gap analysis had determined that there was no new information known since the completion of the corridor assessment at the IBC phase that would influence the preferred option for a particular corridor(s). And therefore, there was not an identified need to revisit the previous assessment, or undertake further assessment, of the recommended IBC network option(s).

These processes are summarised as follows:

- The **corridor assessment process** involves the development of additional alignment options to the IBC recommended option. Several different locations and connection points may be tested within the study area and may deviate significantly from the IBC recommended option.
- The **route refinement process** assumes the specific corridor alignment has been confirmed and that there is no identified need to revisit the alignment. Optioneering is then refined to localised widening options or minor alignment variations to avoid identified constraints. This process generally applies to upgrades of existing corridors.

The gap analysis identified the corridors specified in Table 2-1 as progressing to either a corridor level assessment or a route refinement level assessment in the DBC.

**Table 2-1: Warkworth Projects Option Assessment Process**

Warkworth Project	Corridor Level Assessment	Route Refinement Level Assessment
Northern Public Transport Hub and Park and Ride	✓	

Warkworth Project	Corridor Level Assessment	Route Refinement Level Assessment
New Southern Public Transport Hub	✓	
Woodcocks Road Upgrade		✓
SH1 Upgrade		✓
Matakana Road Upgrade		✓
Sandspit Road Upgrade		✓
New Western Link Road – North		✓
New Western Link Road – Central		✓
New Western Link Road – South	✓	
New Wider Western Link Road	✓	
New Sandspit Link Road	✓	
New Southern Motorway Interchange	✓	

**Land use assessment** assessed the current and future land uses within the project area to understand the transport requirements to best service the intended land use and opportunities for transport integration.

**Constraint mapping** identified potential constraints and considerations to inform the refinement of a specific project and was undertaken by the Project team, with input from Mana whenua and Subject Matter Experts (SMEs). These constraints were mapped on GIS and used as direct inputs into the option development process.

**Climate change assessment** was undertaken at the start of the project. Workshops considered how the IBC network responded to reductions in enabled and embodied carbon. All corridors were assessed against the Eliminate- Reduce-Optimise network to identify opportunities for the DBC to enable better climate outcomes. These opportunities were then incorporated into the optioneering process. Full documentation of the climate change response is included in Appendix B of the main DBC.

**Form and function assessment** identified the overall strategic function of the network and provided relevant engineering matters including the indicative cross-section and road typology.

## 2.2 DBC Option Development Process

Option development at the DBC phase was informed by the previous stage of assessment (i.e., the IBC informed the options for the DBC) and the preliminary analysis findings. An iterative process was undertaken when developing options with an increasing level of detail and refinement occurring depending on the stage of assessment.

Options developed for a “corridor level assessment” were developed as wide corridors across extensive geographical areas, whereas “route refinement” options were constraints-based design options within an identified preferred corridor.

Potential options for each corridor were developed in a group/workshop setting with representatives of the Project Team and where relevant, technical experts. Each workshop considered the following:

- Any new information identified since the previous options assessment process (e.g., through a Gap Analysis);
- The anticipated typology for that option;
- Known physical constraints that would influence the consideration of options (for example, topography and geology);
- Mapped features, including Auckland Unitary Plan Operative in part (AUP-OP) zones, precincts, overlays and controls;
- Known community facilities and places of significance as identified by Mana whenua.
- New information obtained during site visits with the Project Team and technical experts, Mana whenua and AT/Waka Kotahi.
- Emission reduction opportunities identified in the Climate Change Workshop.
- The outcomes from previous and ongoing engagement (including stakeholder and community); and
- The overall strategic function of the network, and relevant engineering matters including the indicative cross-section and road typology.

## 2.3 DBC Option Assessment Process

In the Warkworth DBC, the option assessment methodology was determined by the IBC-DBC gap analysis findings. As noted above, the gap analysis outlined which projects were subject to further optioneering through a corridor assessment process or whether the components could go straight to a route refinement process.

### 2.3.1 Corridor Assessment

To compare and evaluate projects subject to the corridor assessment process, a programme-wide assessment framework which included a Multi-Criteria Assessment (MCA), was utilised by the Project Team alongside consultation with AT, Waka Kotahi and Mana whenua.

The MCA framework was developed to be used throughout Te Tupu Ngātahi and has been used in both the IBC and DBC option assessment process. The MCA framework is a common tool that is often used to assist in the decision-making process and provides an opportunity to understand how different options compare against a set of standard and grouped criteria. The MCA framework used by the Project Team involved the following:

- Assessment criteria: Investment Objectives and the four well-beings: Cultural, Social, Environmental and Economic. Several sub-criteria were developed under each wellbeing grouping which were assessed by technical specialists.
- Opportunities: identifying opportunities that can be taken forward in developing the options. These were identified by the relevant technical specialist.

- Additional inputs: Partner and landowner feedback, policy analysis, value for money and resilience.

Options were assessed, using the MCA framework set out in Table 2-2, and scored on an eleven-point scale, as summarised in Table 2-3, at each stage by a multi-disciplinary team. Constraints mapping and existing evidence from desktop research were the main sources of information to assist with scoring. In scoring the criteria, particular guidance was provided by the AUP-OP (e.g., overlays), which could place constraints and considerations on the various options identified.

The appropriateness of scoring options was determined by the Project Team based on the design of the options being assessed and whether scoring the options would provide a clear and beneficial differentiation between the options.

**Table 2-2: MCA Framework**

Investment Objective			Measure
	Investment Objectives vary for each Project as identified in the sections below		Options assessed against the investment objectives. Key themes include: Access Integration Travel Choice
MCA topic	#	Criteria	Measure
Cultural	Heritage	1a	Heritage Extent of effects on: sites and places of valued heritage buildings, scheduled trees (with heritage value) and places. sites and places of archaeological value. sites and places of European cultural heritage value
		1b	Mana whenua Extent of effects on sites and places of cultural heritage value to Mana whenua (including Sites and Places of Significance to Mana Whenua Schedule, Auckland Unitary Plan) Note: At the request of Mana whenua, this criterion was not scored and was replaced by a qualitative analysis within the non-scored criteria using feedback from Mana whenua at hui.
Social	Socio – economic impacts	2a	Land use futures / integration with planned land use To what extent will the option impact on the future development of land (within the corridor, adjacent to it and impacted by it – i.e. consider all 3 scales), in relation to: Integration with the future land use scenario (including any Structure Plans or Plan Changes) Size and shape of potential development parcels to enable appropriate building typologies Ability to consolidate residual land Access that does not prevent neighbouring development
		2b	Urban design To what extent does the option support a quality urban environment (both current and future planned state)? particularly relating to: Context and planned place making considerations An inviting, pleasant and high amenity public realm

Investment Objective			Measure
			<p>Open space integration</p> <p>Active interface between public and private realm</p> <p>Scale of long-term impact on the amenity and character of the surrounding environment.</p>
		2c	<p>Land requirement</p> <p>Scale of public / private land (m<sup>2</sup> / number of properties / special status of impacted property) required to deliver the option.</p>
		2d	<p>Social cohesion</p> <p>Impact on, use, connectivity / accessibility for and to the existing urban areas including use and access to:</p> <p>Employment</p> <p>Other communities or within the same community</p> <p>Shops / services / other community and cultural facilities / 'attractors'</p> <p>Severance of the existing community (including consented)</p> <p>Scale of effect on existing community facilities community and open space</p> <p>Public access to the coast, rivers and lakes</p>
		2e	<p>Human Health and Wellbeing</p> <p>Will the option potentially affect any sensitive land uses nearby or consented (adjacent residential, childcare centres, hospitals, rest homes, marae and schools)? particularly relating to:</p> <p>Air Quality</p> <p>Contaminated land</p> <p>Noise and vibration</p>
Environment	Natural Environment	3a	<p>Landscape / visual</p> <p>The extent of effects on:</p> <p>The natural landscape and features such as streams, coastal edges, natural vegetation and underlying topography – acknowledging planned changes to area in light of urban land use / zoning</p> <p>Natural character and outstanding natural features/landscapes including geological features (mapped and protected features)</p>
		3b	<p>Stormwater</p> <p>Impact of operational stormwater (both quantity and quality) on the receiving environment, including:</p> <p>Potential flooding effects of the option within the catchment</p> <p>Extent and consequences of likely mitigation measures</p> <p>Consideration of future climate change scenarios</p>
		3c	<p>Ecology</p> <p>Extent of effects on:</p> <p>Significant indigenous flora;</p> <p>Significant habitats of indigenous fauna;</p> <p>Indigenous biodiversity;</p> <p>Stream / waterway ecology</p> <p>Marine ecology</p>
		3d	<p>Natural Hazards</p> <p>Extent of effect on adverse geology; steep slopes; seismic impacts; other resilience risks (low level infrastructure near coastlines, inundation areas)</p>



Investment Objective			Measure
		4a	Embodied carbon emissions
			Consider the following design requirements: Length (in km) Area of impervious surface/volume of earthworks Specific infrastructure requirements (e.g. bridges, viaducts, tunnels etc.)
Economic	Construction impacts	4b	Construction impacts on utilities / infrastructure
			Requirements for relocation / design of existing infrastructure, including: Consideration of safety impacts Risk of continuity of service over construction Opportunities for integration with other bulk infrastructure
		4c	Construction Disruption
			Construction impacts on people and businesses regarding: Traffic & noise Earthworks related effects including dust Quality of life and amenity Economic impacts on businesses / community / town centres
	Cost & Construction Risk	5a	Construction costs / risk / value capture
			Assessed cost for construction of options including: Complexity and risk in construction (including consideration of constructability, earthworks cut/fill balance and material reuse) Complexity in programme Cost and complexity of safely undertaking works (including works on contaminated land) Extent to which the option can utilise a value capture mechanism to offset construction costs.

Table 2-3: MCA Scoring Scale

Effects criteria	Scoring
Very high adverse impact	-5
High adverse impact	-4
Moderate adverse impact	-3
Low adverse impact	-2
Very low adverse impact	-1
Neutral impact	0
Very low positive impact	1
Low positive impact	2
Moderate positive impact	3

High positive impact	4
Very high positive impact	5
-	Not scored

Assessment of criteria was completed by subject matter experts and discussed at MCA workshops. Prior to each workshop, experts were provided with a briefing pack, which contained the MCA framework and guidelines, a description of each of the options, a link to the Te Tupu Ngātahi GIS web viewer, and an assessment template where they documented their approach and key assumptions that informed their assessment. On the day of a workshop, the assessments and recommendations were respectfully challenged in a group setting. Experts then considered the issues raised and finalised their assessment and recommendations. Where appropriate and in some instances, additional refined options were developed to address impacts identified during these sessions.

The MCA was not the sole means of assessing options but was a tool that informed and was complementary to the decision-making process. The process also incorporated input from AT and Waka Kotahi, feedback from the consultation and engagement process, subject-matter experts, and the Project Team. Mana whenua representatives have expressed views, provided specialist advice, and raised key issues through workshops and hui held throughout the options assessment process.

Inputs included in the assessment framework are detailed in Table 2-4 below.

**Table 2-4: Other inputs in the MCA framework**

<b>Project Partner and Landowner Feedback</b>	Project partner feedback for each option identifying scale / validity of objections; identified preference/proposed changes to options etc.  Feedback provided by other key partners and landowners
<b>Policy Analysis</b>	Options alignment with the strategic policy framework including the Unitary Plan, the Auckland Plan and the Warkworth Structure Plan where it assisted in differentiating between options
<b>Indicative Value for Money</b>	High level indication of costs and benefits (including construction and property purchase) where it assisted in differentiating between options
<b>Mana whenua</b>	Provide a qualitative assessment including: <ul style="list-style-type: none"> <li>• Identification / assessment of cultural issues (Customary practice / Te Taiao (Air, Land, water, Taonga) / Māori communities, and wellbeing / Māori land) associated with an option.</li> <li>• Options Assessment commentary including testing criterion scoring for an option.</li> <li>• Other matters related to an option associated with the Mana whenua position.</li> </ul>



### 2.3.2 Route Refinement

A project was recommended to proceed to the route refinement phase in the DBC where the project had already undergone an assessment through the MCA process (including scoring) at the IBC corridor assessment phase and the preliminary analysis identified no need to revisit the corridor assessment phase in the DBC. Projects identified to undergo assessment through the route refinement assessment process were evaluated and compared by the project team and technical specialists, where required, through a constraints-based design process.

Option development for this process assumed that the specific corridor had been confirmed (through the previous IBC corridor assessment), and optioneering was then refined to localised widening either to the east, west, north, or south, or from the centreline. Minor alignment variations to the preferred option occurred where required to avoid identified constraints during the option assessment stage.

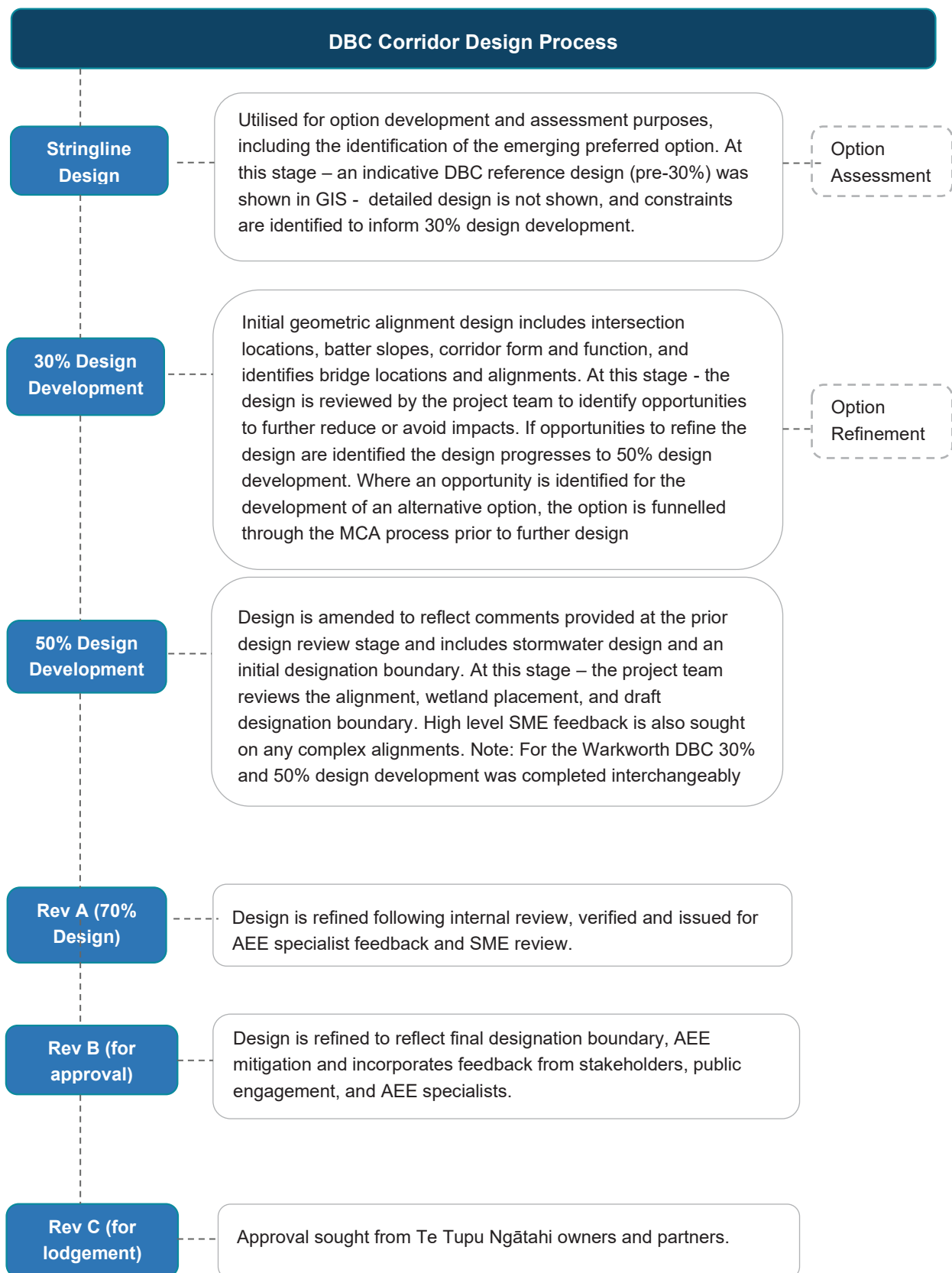
Option assessment was primarily informed by the constraint mapping completed by the technical specialists and project team for each corridor. The assessment process adhered to the same principals and programme wide framework of the MCA process as set out above, and the projects were assessed against the same investment objectives. For the route refinement process the MCA framework was targeted and specific to the relevant constraints or considerations for the corridor under assessment. For example, some projects did not have any specific identified heritage constraints or considerations, as a result this criterion was omitted from the MCA framework for the particular project as it was considered that further detailed assessment (from that previously undertaken at the IBC corridor assessment phase) of the project against this criterion was not required in order to inform the route refinement assessment process. In applying the criteria, particular guidance was provided by the AUP-OP (e.g., overlays) and Te Tupu Ngātahi GIS viewer which mapped the constraints on the various corridors.

This was not the sole means of assessing options but was a tool that informed and was complementary to the decision-making process. The process also incorporated input from AT and Waka Kotahi, Mana whenua, feedback from the consultation and engagement process, and SME's.

## 2.4 DBC Option Design Process

Corridor design for the Warkworth DBC was a sequential process with the design detail for each project increasing parallel to the optioneering stage of the project. Figure 2-2 below provides a general overview of the corridor design process for the Warkworth DBC alongside the optioneering phase each design stage applied to.

Figure 2-2. DBC Corridor Design Process



### 3 DBC Project Option Development and Assessment

The following section sets out the option development and assessment outcomes for each project included in the Warkworth DBC.

#### 3.1 Northern Public Transport Hub and Park and Ride

##### 3.1.1 Overview

The new Northern Public Transport (PT) Hub and Park and Ride in the indicative DBC Warkworth transport network is shown in Figure 3-1 below.

**Figure 3-1: Northern PT Hub and Park and Ride**



The purpose of the Northern PT Hub is the long-term provision of a Public Transport Hub to support a more resilient public transport system and transition to a low carbon transport network. The PT Hub is proposed to support regional and interregional public transport access for northern Warkworth and will include a park and ride facility to support the wider rural catchments of the Kowhai Coast to utilise public transport for longer interregional trips. The DBC identified the Northern PT Hub is to include the

following facilities: cycle storage, electric charging facilities and bus layover spaces to support services for the Warkworth Town Centre.

The Park and Ride co-location with the PT Hub will enable access to local and long-distance public transport services for residents in Warkworth and the surrounding Kowhai Coast and provide park and ride facilities to support trips from surrounding towns that will not have regular public transport feeder services in the future.

### 3.1.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Northern PT Hub and Park and Ride to inform the option development and assessment process.

#### 3.1.2.1 Gap analysis

The gap analysis identified that changes in policy and the availability of additional guidance (identified below) resulted in the need for the DBC to re-evaluate the public transport facilities required to support planned future growth in Warkworth.

The following changes in policy and additional guidance informed the gap analysis recommendation:

- Warkworth Structure Plan (2019) which sets out the land use pattern for future growth in Warkworth over the next 30 years.
- AT Transport Design Model (2019) requires park and ride facilities to service a broader variety of uses including being accessible to areas of residential density (origin) to maximise active mode catchment potential.
- Te Tupu Ngātahi Design Framework and Tool Kit (2019)

#### 3.1.2.2 Warkworth DBC Public Transport System Review

In response to the outcome of the gap analysis, the approach to PT in the Warkworth DBC and the key public transport facilities required to support future planned growth in Warkworth was given further consideration by the project team. As a result, a PT system review (refer to Appendix D of the DBC) was completed by the project team with input from SME's to confirm the future strategy for the Warkworth PT network.

The PT system review:

- Completed a review of the IBC recommendations against the Te Tupu Ngātahi Design Framework and Tool Kit (2019), updated policy as outlined in section 3.1.2.1, and the Draft AT Parking Strategy (2022).
- Confirmed the required public transport facilities for the Warkworth PT network.
- Identified study areas for public transport facilities.
- Outlined public transport interchange and park and ride specifications.
- Identified integration with the wider public transport network.

The recommended IBC network identified the following PT facilities were required in Warkworth as part of the recommended Warkworth transport network:

- An interim PT Hub / Park and Ride in the north near the intersection of SH1 and Ara Tūhono to enable convenient access to the high frequency bus route between Warkworth and the Hibiscus Coast Station (995 bus route) whilst the Ara Tūhono – Puhoi to Warkworth was under construction.

- A PT Hub in the south to encourage walk-up public transport from the high-density Terrace House and Apartment Buildings zone and the Local Centre zone as indicated in the Warkworth Structure Plan.
- A longer-term park and ride near the southern interchange to Ara Tūhono as it complements adjacent future land uses such as the local centre and high density living and supports an efficient public transport network and service pattern which minimises the need for strategic long distances services to enter Warkworth.

The PT system review concluded that based on policy direction from the Draft AT Parking Strategy, AT Transport Design Manual, and the Te Tupu Ngātahi Design Framework and Tool Kit, and in consideration of the travel demand profile of Warkworth, that there was now a greater need than previously identified at the IBC phase, in terms of the key public transport facilities required to support future planned growth in Warkworth, for a long-term PT Hub and park and ride facility located in the north, with an opportunity for integration of the two facilities through co-locating them, with a Park and Ride Facility no longer required in the south.

The PT system review identified that the recommendations for the Park and Ride component of the PT network as proposed in the IBC, would result in a reduced public transport product for residents and employees in the north growth area, and would require people from outlying settlements around Warkworth to traverse through a large part of the local network to access public transport services therefore contributing to congestion, delays in local bus services, while also reducing the amenity/safety for active mode users. Whereas, a long-term northern PT hub and park and ride facility was preferred as would better provide for planned residential and business land use in the north by maximising walk up catchment and connectivity to key destinations such as the Warkworth Showgrounds and the planned town centre in the Warkworth north precinct (previously identified as a neighbourhood centre under the structure plan), in addition to intercepting private vehicle users from outlying settlements prior to them traversing the local transport network to access PT facilities.

As a result, the PT system review proposes a long-term PT Hub and Park and Ride facility in the north, as opposed to the south, as it will achieve the following outcomes:

- Encompasses a planned residential land use to maximise walk up catchment.
- Encompasses a planned local centre to connect key destinations and encourage use of the local bus network.
- Captures travel to/from all major settlements via four main corridors including SH1 (north) through to Wellsford, Te Honohono ki Tai - Matakana Link Road, Matakana Road, and Sandspit Road. Capturing vehicles from these settlements before they traverse the local network is a key objective and aligns with the Design Framework and AT policies.
- Similar to the above a northern site is located on the edge of Warkworth at the confluence of several corridors connecting outlying settlements – therefore intercepting people in vehicles before they traverse a large area of local network.
- Supports efficient bus access to Ara Tūhono in the interim and future and has the greatest potential to widen the local catchment for the 995 bus route.

The PT system review with guidance from the Te Tupu Ngātahi Design Framework & Tool Kit <sup>1</sup>, the Draft AT Parking Strategy, and the AT Transport Design Manual identified a broad geographic study

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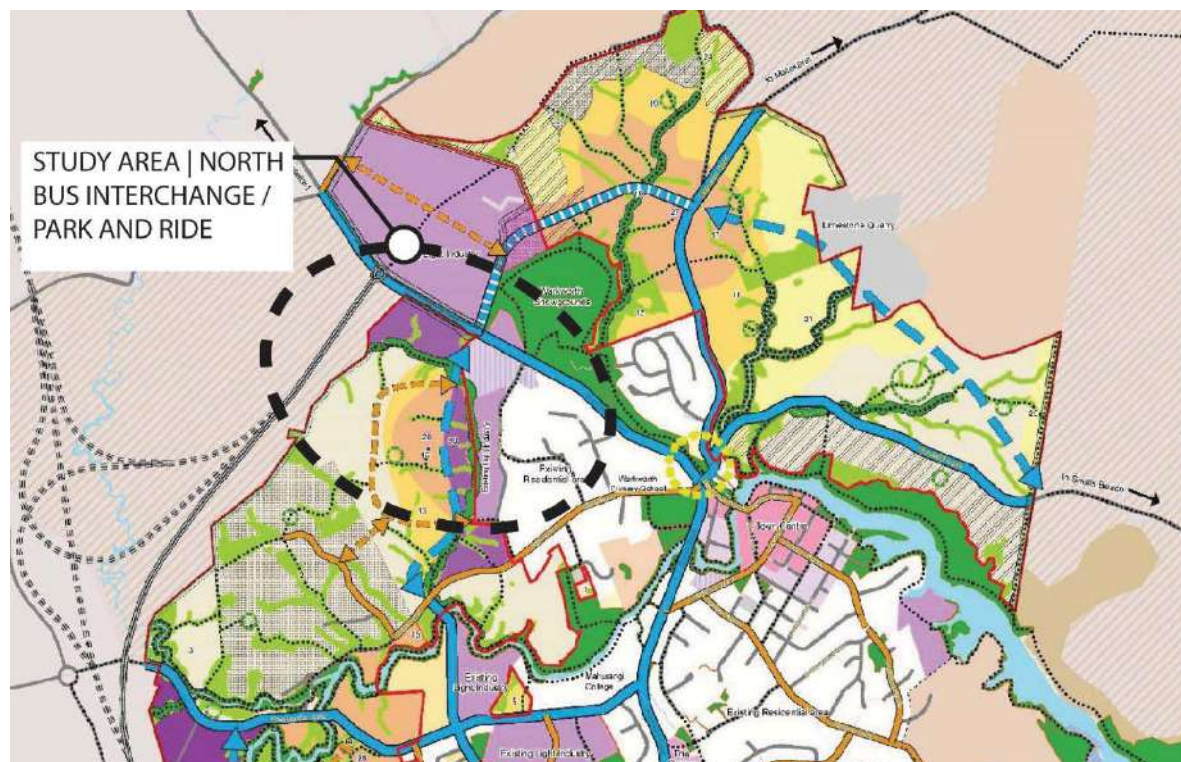
<sup>1</sup> Te Tupu Ngātahi Design Framework & Tool Kit



area in the north for the Northern PT Hub and Park and Ride facility to be located within. The study area shown in Figure 3-2 below was recommended for the following reasons:

- Proximity to a planned local centre and surrounding high density living – this maximises the walk-up catchment to the public transport network.
- Intercepts people travelling to and from outlying settlements around Warkworth i.e. Matakana, Snells Beach and colocation with the PT Hub will improve access to public transport.
- Serves a dual function by intercepting vehicle-based trips and maximising accessibility to active mode catchment.
- Connects directly to a separated cycling and micro-mobility facility network.
- It supports local service interchange and potentially links to the Western Link Road which is an important north south corridor and key bus route in the future.

**Figure 3-2. Recommended study area for the Northern PT Hub and Park and Ride circled in black**



The assessment concluded the Northern Public Transport Hub and park and ride would require the following facilities:

- Cycle parking
- Capacity for at least five services (terminating and travelling through)
- Layover spaces
- Active bus stops
- Drop off stops
- Long distance coaches to Northland

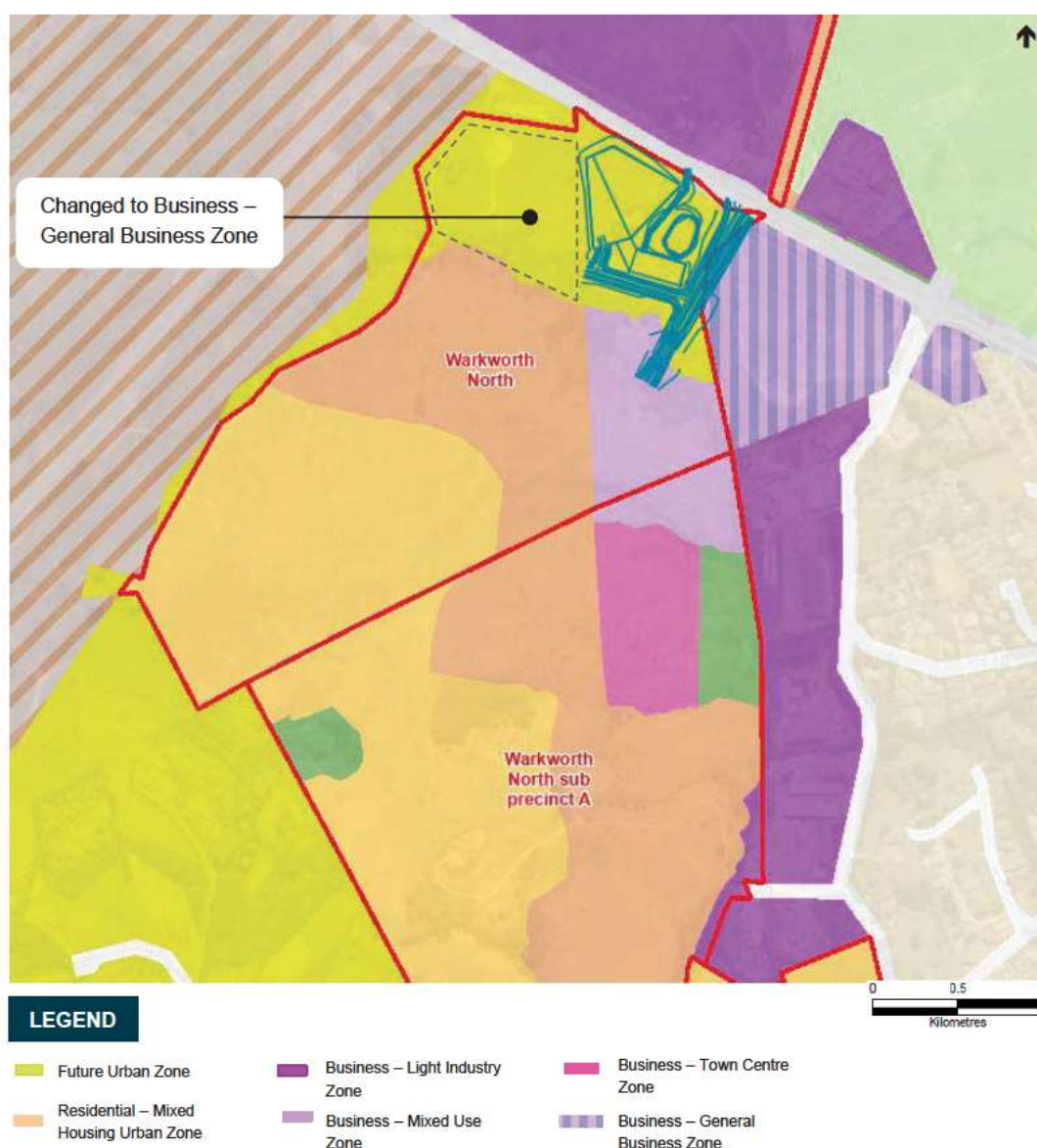
### 3.1.2.3 Land use assessment

Current zoning within the Northern PT Hub and Park and Ride geographic study area is shown in Figure 3-3 below. The study area currently encompasses various residential, commercial/industrial and future urban zoning. The operative Warkworth North Precinct is located in the southern quadrant

of the study area. Zoning within the Warkworth North Precinct is a combination of future urban, residential – mixed housing urban, business - town centre, mixed use and general business zoning. The recent environment court decision on the final outstanding appeal relating to the Precinct<sup>2</sup> confirmed the western section of FUZ land within the Precinct as general business zone. The Precinct is covered by I553.10.1. Precinct Plan 1 - Warkworth North Precinct Plan and Precinct Plan 2 - Multi Modal Transportation Connections and Open Space – refer Figure 3-3 and Figure 3-4 below.

The eastern boundary of the precinct is adjacent to general business and industrial zoning. Industrial zoning additionally carries over to the opposite side of the road in the northwest with the Warkworth Showgrounds located to the east of the industrial zoned land which is dissected by Te Honohono ki Tai (Matakana Link Road) which is currently under construction.

**Figure 3-3: Northern PT Hub AUP-OP zoning**

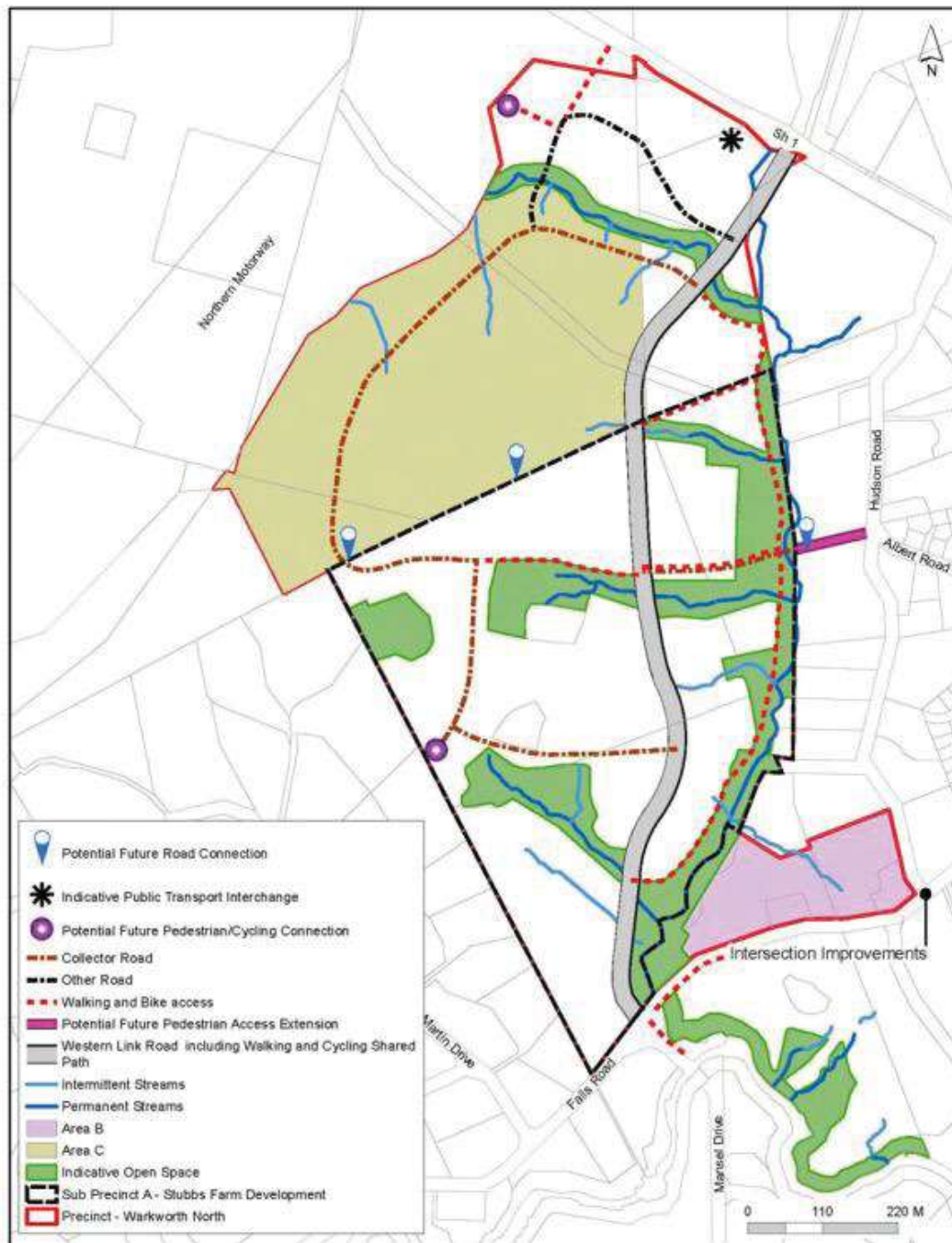


<sup>2</sup> ENV-2020-AKL-000048 Middle Hill Limited v Auckland Council



Figure 3-4. Warkworth North Precinct Plan overview

**1553.10.2. Precinct Plan 2 - Multi Modal Transportation Connections and Open Space [ENV-2020-AKL-000048: Middle Hill Limited as trustee of the Tyne Trust]**



Indicative future zoning for the remaining FUZ land within the study area as indicated in the Warkworth Structure Plan are shown in Figure 3-5 below. The structure plan indicates that whilst zoning in the north will remain the same, future urban zoning in the south of the study area is likely to change to industrial zoning, or potentially general business (or similar) in line with the adjacent zoning to the west, with the addition of the Western Link Road – North to the east of the industrial zoned land. A local road is also identified on the Precinct Plan to connect to the Western Link Road – North in the west to support commercial/residential land uses within the area.



Figure 3-5. Northern PT Hub and Park and Ride Structure Plan Zoning



### 3.1.2.4 Climate change assessment

The climate change assessment concluded the Northern PT Hub and Park and Ride project cannot be eliminated from the Warkworth transport network for the following reasons:

- Park and Ride facility intercepts trips from the hinterland and reduces additional vehicle trips through Warkworth.
- PT Hub facilitates transfers from the Park and Ride facility, builds on existing demand being generated at the interim transport hub facility and supports the walk-up public transport catchment for the northern growth areas. This site would also provide layover spaces for converging services from Wellsford and Mahurangi Peninsula.
- The assessment recommends the option development and assessment process consider the following opportunities:
- Maximise walk up catchments through land use integration i.e., facility located where dense residential development is planned or is adjacent to key economic or social destinations such as local centres.
- Consider location attributes to reduce major structures, earthworks, and construction complexity.
- Optimise footprint to enable mode shift.

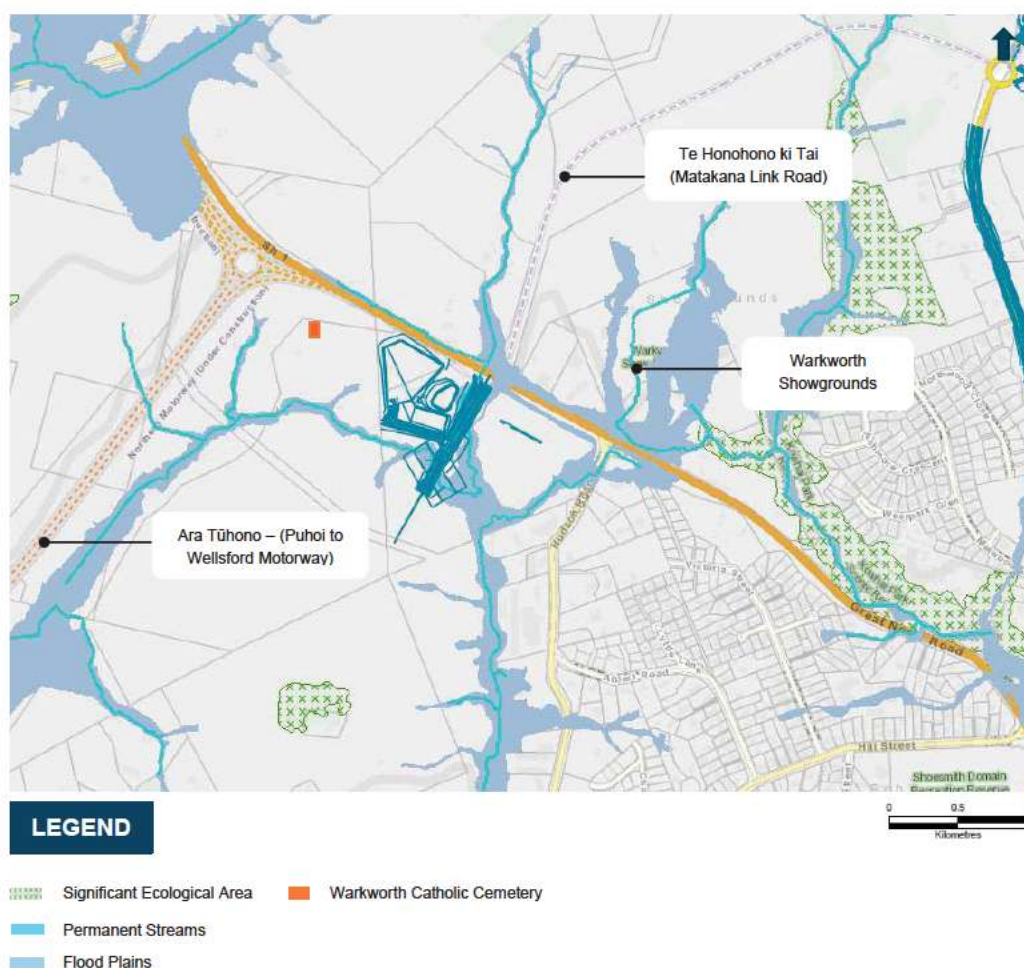
For further information refer to Appendix B of the DBC.

### 3.1.2.5 Constraints mapping

Constraints mapping was undertaken for the Northern PT Hub and Park and Ride by the Project team with input from Mana whenua and SMEs. Key constraints and considerations for the project study area are outlined in Figure 3-6 below and include:

- Warkworth Catholic Cemetery in the western section.
- Interim community transport hub station located adjacent to the Warkworth Showgrounds.
- Floodplains particularly in the western and eastern sections.
- SEA in the north-eastern section.
- Permanent streams and stormwater and flooding risk around the extent of Te Honohono ki Tai (Matakana Link Road).
- Warkworth Showgrounds and the Mahurangi Rugby Club located in the northern section.
- Proximity to the intersection with Te Honohono ki Tai (Matakana Link Road) and the Ara Tūhono (Puhoi to Wellsford motorway) intersection in the west.

**Figure 3-6: Study area constraints mapping**





### 3.1.2.6 Form and function assessment

The form and function assessment indicates that the Northern PT Hub will be serving both starting and terminating services as well as through services. The spatial area required will be between 2,000 - 2400m<sup>2</sup> and will include the following facilities:

- Four active bus stops
- Capacity for at least five services (terminating and through) Note: no reverse movements within the transport hub, so turning facilities to be considered in overall shape and dimensions
- Two layover spaces - includes long distance coaches to Northland
- Three kiss and ride drop off facilities
- Bus Driver/Staff facilities to be provided for including a break room and a toilet which could be integrated with public toilets potentially.
- Cycle parking integrated/built into buildings/shelters

The park and ride component of the facility will have 220 – 250 car park spaces and approximately 8,500m<sup>2</sup> of space is required for the provision of car park spaces, circulation for vehicles, and pathways for people walking through to the hub.

### 3.1.3 Northern PT Hub and Park and Ride Location Option Development

The option development process for the Northern PT Hub and Park and Ride facility was informed by an initial assessment based on the principles and outcomes of the Te Tupu Ngātahi Design Framework and Tool Kit and the findings of the preliminary analysis including the recommendations of the climate change assessment.

A longlist of eight potential locations for the Northern PT Hub and Park and Ride was identified as shown in Figure 3-7 below and tested access to Ara Tūhono, proximity to Te Honohono ki Tai (Matakana Link Road) and the Warkworth Showgrounds, and proximity to areas of future development as indicated in the Warkworth Structure Plan and AUP:OP.

A summary of the principles and outcomes of the Te Tupu Ngātahi Design Framework and Tool Kit relevant to the development of location options is listed below:

- Active mode catchments and walkability
- Local identity - Placemaking potential and local identity
- Land use and future growth: Respond and integrate with adjacent and future land use/growth, respect natural features
- Modal Priority: efficient connectivity between transport modes
- Cross corridor connectivity and accessibility to/between facilities
- Environmental – impact on the environment

**Figure 3-7: Location options for Northern PT Hub & Park and Ride**

### 3.1.3.1 Location longlist option assessment

The long list of location options for the facility was considered against the Te Tupu Ngātahi Design Framework and Tool Kit, including catchments, access, connectivity, transport, environmental and land use outcomes with consideration also given to the DBC project investment objectives and constructability i.e. footprint, at a workshop with the project team, technical specialists, and SME's to identify a shortlist of location options for the Northern PT Hub and Park and Ride.

Table 3-1 below provides a heat map summarising the outcome of the long-list assessment. The heat map illustrates a strong difference in design outcomes between the options located to the north of SH1 and those located to the south. Options north of SH1 (Option 1,2,3 and 4) were assessed as either unlikely to achieve or moderately achieving active mode connectivity and catchment, PT and vehicle access, and future land use outcomes. Option 1 and 3 were also the only options north of SH1 that achieved environmental outcomes. In comparison, options south of SH1 (Option 5, 6, 7 and 8) generally achieved all outcomes with the exception of Option 5 which was assessed as unlikely to achieve land use and footprint outcomes. As a result, options north of SH1 were discounted and options 6,7, and 8 which are located south of SH1 in the western quadrant of the study area were progressed to the facility location shortlist.

**Table 3-1: Northern PT Hub and Park & Ride Location Assessment**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
I.O.1 – Access								
I.O.2 – Resilience								
I.O.3 – Integration								
Active mode connectivity								
Active mode catchment								
PT & Vehicle Access								
Land use								
Constructability (Footprint)								
Environment								

A qualitative summary of the assessment outcomes for the shortlisted and discounted options are provided in Table 3-4 and Table 3-5 below.

**Table 3-2. Northern PT Hub and Park and Ride Qualitative Summary – Shortlisted Options**

Location	Assessment Outcome
Option 6	<ul style="list-style-type: none"> <li>Option connects people and modes directly to key destinations such as the future town centre, Warkworth Showgrounds, and places of employment in the industrial area.</li> <li>Requires park and ride vehicles to traverse through Western Link Road – North.</li> <li>Achieves active mode catchment and connectivity outcomes.</li> <li>Option has future redevelopment potential however impacts on deliverability of the Mixed-Use Zone as the Warkworth North Precinct Plan shows that mixed use zoned land will be split into three by the Western Link Road, future local road, and the walking and cycling connection.</li> <li>Location aligns with density in the area.</li> </ul>
Option 7	<ul style="list-style-type: none"> <li>Dual accessibility ability to SH1 (left exit only) and the Western Link Road - North.</li> <li>Walk up catchment is impacted by industrial land use in the north and the severance of SH1.</li> <li>Distance the town centre is an issue (more than 500m)</li> <li>Indicative PT Hub location noted in PC25/Warkworth North Precinct Plan is within this quadrant.</li> </ul>
Option 8	<ul style="list-style-type: none"> <li>Requires park and ride vehicles to traverse through Western Link Road – North.</li> <li>Option aligns with density in the area and is in proximity to the town centre.</li> <li>Option has future redevelopment potential.</li> <li>Park and ride facility is located closer to the town centre.</li> </ul>

**Table 3-3. Northern PT Hub and Park and Ride Qualitative Summary - Discounted Options**

Study Area	Assessment Outcomes
Option 1	<ul style="list-style-type: none"> <li>Option conflicts with the Ara Tūhono interchange.</li> <li>Within industrial zoned land and as a result reduces walk up catchment from residential and recreational land uses.</li> <li>Flooding outcome is more extensive in the northern area.</li> <li>Impacts on industrial land which is in short supply.</li> </ul>
Option 2	<ul style="list-style-type: none"> <li>Reduced active mode catchment due SH1 severance and industrial zoning in the area.</li> <li>Flooding outcome is more extensive in the northern area.</li> <li>Impacts industrial land which is in short supply.</li> <li>Requires a more circuitous route for local buses.</li> </ul>
Option 3	<ul style="list-style-type: none"> <li>Reduced active mode catchment due to SH1 severance and industrial zoning to the west.</li> <li>Has a potential conflict with the Te Honohono ki Tai (Matakana Link Road) intersection.</li> <li>Impacts on Warkworth Showgrounds and industrial land use to the west which is in short supply.</li> </ul>
Option 4	<ul style="list-style-type: none"> <li>The expanded footprint of the facility in this location will likely impact on the Warkworth Showgrounds.</li> <li>Reduced active mode catchment due to land use including the SEA and limited property access due to topography.</li> <li>SEA and permanent streams are adjacent to the location.</li> </ul>
Option 5	<ul style="list-style-type: none"> <li>Pak N Save development is located on the corner site.</li> <li>Creates conflict with Te Honohono ki Tai (Matakana Link Road) and SH1 intersection causing safety concerns for active mode users.</li> </ul>

### 3.1.3.2 Location shortlist option assessment

Upon identification of the shortlisted location options for the Northern Public Transport Hub and Park and Ride, four facility concept layouts, indicatively located within the shortlisted locations were developed to assist in the option assessment process.

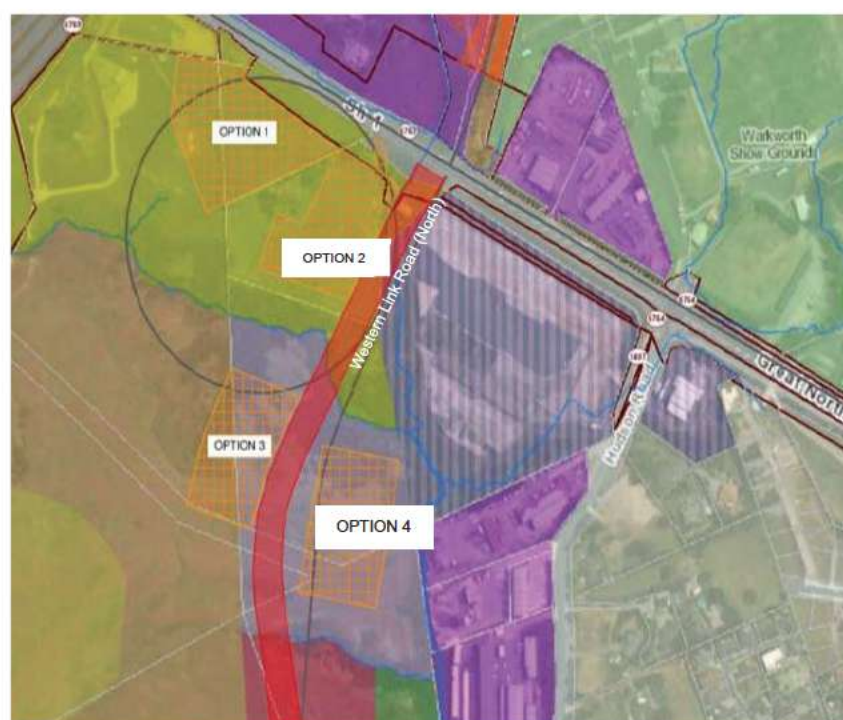
The concept layout is indicative only and the layout and design of these could be revised/refined to take on various typologies within each location. Each of the concept layouts differed in size due to the area of the location it was situated in and as a result had differing numbers for car park spaces.

Table 3-4 below provides details of the options to be assessed and Figure 3-8 provides an overview of the option locations.



**Table 3-4: Northern PT Hub options shortlist**

Option	Description
1	North-west of Western Link Road (approximately 238 carparks)
2	North-west (directly adjacent) to Western Link Road (approximately 229 carparks)
3	South-west of Western Link Road (approximately 214 carparks)
4	South-east of Western Link Road (approximately 221 carparks)

**Figure 3-8: Indicative Northern PT Hub and Park & Ride options**

Indicative facility concept layouts for the four options are shown in Figures 3-9 to 3-12 below.

**Figure 3-9: Option 1 Indicative Concept Layout**



**Figure 3-10. Option 2 Indicative Concept Layout**

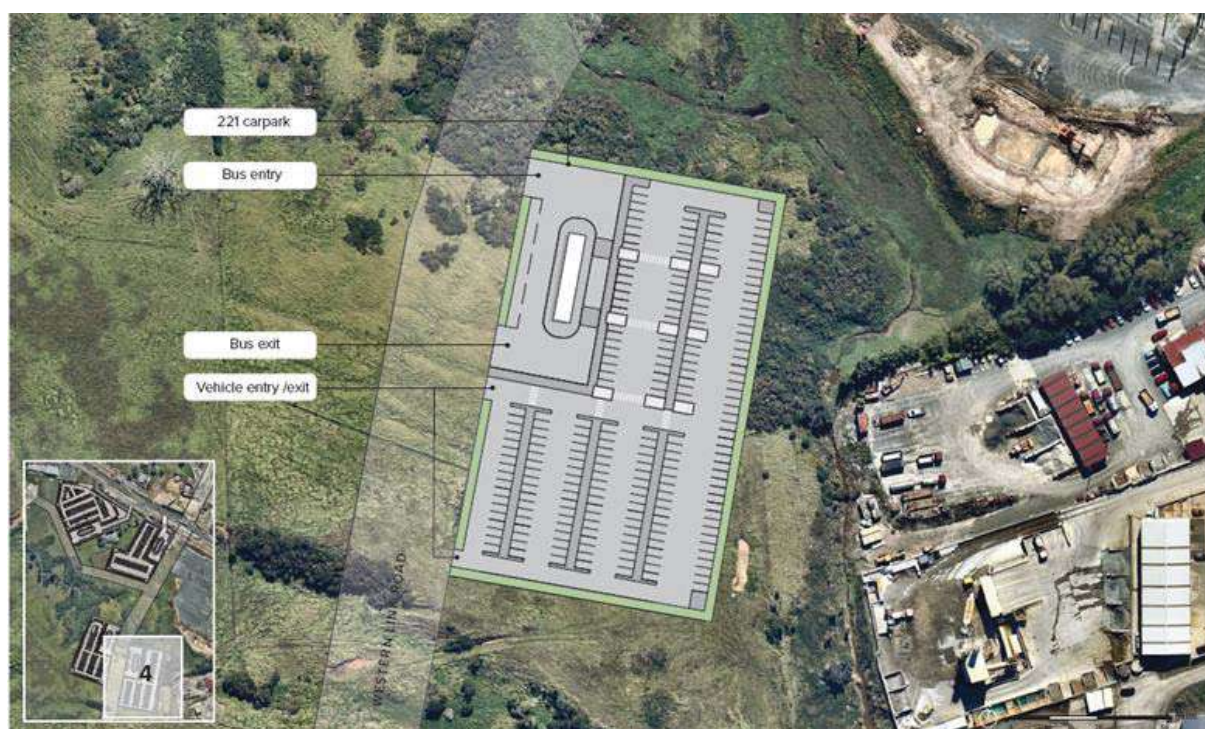




**Figure 3-11. Option 3 Indicative Concept Layout**



**Figure 3-12: Option 4 Indicative Concept Layout**



The short-list options developed for the Northern PT Hub and Park and Ride facility were assessed utilising the MCA process outlined in section 2.3.1. For the Northern PT Hub and Park and Ride facility, MCA options were not uploaded to the Te Tupu Ngātahi GIS viewer. Instead, the Specialist Briefing Pack contained indicative concept designs of each option which had the following mapped for specialists to utilise when prescoring:

- AUP-OP Management layers
- AUP-OP Zoning
- Flood plains
- Streams and rivers

Table 3-5 below shows a heat map and the outcomes of the technical specialists MCA scoring for each option considered. Options adjacent to Western Link Road (Option 2, 3 and 4) generally scored higher for the investment objectives (and transport) in comparison to Option 1, due to higher integration and travel choice opportunities, but were also assessed as having more potential for greater adverse stormwater, ecology, and natural hazard impacts, and construction costs. However, it was noted by the specialist in the workshop that minor refinements to the location and layout of the concept designs for Options 2 and 4 would likely result in improved scoring, for these options, particularly with regard to ecology and stormwater.

In comparison Option 1 had less potential for adverse impacts with the exception of a higher adverse land requirement, but also had decreased positive impacts in comparison to the other options particularly for urban design and social cohesion outcomes. Option 3 follows a similar pattern to Option 1, in that the option generally results in lower adverse impacts but does have lower positive access and human health and wellbeing outcomes.

As a result, due to the lower positive effects and outcomes, particularly in relation to urban design land requirement criteria, the technical specialists and project team discounted Option 1 and 3 and selected Option 2 and 4 as the preferred options for further assessment. However, this was subject to confirmation of the ability to achieve suggested refinements to the concept design layout and footprint, to address the adverse ecological and stormwater effects.

**Table 3-5: Northern PT Hub MCA workshop 1 scoring**

MCA Criteria	Option 1	Option 2	Option 3	Option 4
I.O.1 – Access				
I.O.2 – Integration				
I.O.3 – Travel Choice				
Heritage				
Land use				
Urban Design				
Land Requirement				
Social Cohesion				
Human health and wellbeing				
Landscape/Visual				
Stormwater				
Ecology				
Natural Hazards				
Construction impacts				
Construction disruption				
Construction cost/risk				

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-6 and Table 3-7 below alongside suggested refinements for the preferred options.



**Table 3-6: Assessment outcomes for preferred options**

Option	Assessment outcome	Suggested refinements
2  North-west (directly adjacent) to Western Link Road (approximately 229 carparks)	<ul style="list-style-type: none"> <li>Increased operational efficiency for buses with the facility located at the confluence of multiple bus services.</li> <li>Supports connectivity for services to the existing Warkworth town centre including Warkworth to Wellsford services.</li> <li>Facility's proximity to SH1 and Te Honohono ki Tai (Matakana Link Road) intercepts private vehicle trips from the hinterland well and the park and ride component of the facility integrates well with the surrounding commercial / industrial land use.</li> <li>Results in slightly lower walk-up catchment compared to some other options due to the adjacent industrial land use (north of SH1).</li> <li>Option has opportunity for integration with future commercial developments on adjacent General Business land.</li> <li>Impacts on stream and there is a possibility of a natural wetland occurring within the footprint of the facility.</li> <li>Part brownfields development and there is an existing culvert and retaining wall which has adverse construction impacts.</li> </ul>	<ul style="list-style-type: none"> <li>Shift location west to avoid stormwater and ecological areas north-east of the site.</li> <li>Improve ability to repurpose residual land.</li> </ul>
4  South-east of Western Link Road (approximately 221 carparks)	<ul style="list-style-type: none"> <li>Option has an increased walking and cycling catchment due to proximity to the future local centre.</li> <li>High amenity values due to proximity to the local centre.</li> <li>Increased vehicle trips into the residential and local centre to access the Park and Ride.</li> <li>Potential for natural wetlands occurring within the footprint and facility is likely to encroach into the riparian yard.</li> <li>Option is potentially located within floodplain alongside the stream.</li> </ul>	<ul style="list-style-type: none"> <li>Shift location south to avoid ecological and wetland areas to the north of the site.</li> <li>Redesign conceptual layout to position bus entry to the south of the facility improve bus interface with the local town centre</li> </ul>

**Table 3-7: Assessment outcomes for discarded Northern PT Hub and Park & Ride options**

Option	Assessment Outcome
1	<ul style="list-style-type: none"> <li>Has limited land use integration opportunities due to the distance from Western Link Road – North.</li> </ul>

Option	Assessment Outcome
North-west of Western Link Road (approximately 238 carparks)	<ul style="list-style-type: none"> <li>Reduced access and connectivity for all transport modes from the northern Warkworth growth area as option is furthest from WLR-North and closer to industrial zoning north of SH1 and the Ara Tūhono intersection to the west.</li> <li>Has the largest footprint and land requirement.</li> </ul>
3 South-west of Western Link Road (approximately 214 carparks)	<ul style="list-style-type: none"> <li>Proximity of park and ride component to residential zones has both positive and negative impacts.</li> <li>There is a likelihood of natural wetlands occurring within the site footprint.</li> <li>Location results in access barriers for public transport and town centre, access would require pedestrians and cyclists to cross the Western Link Road – North and PT and private vehicles to traverse Western Link Road to get to the PT Hub and Park and Ride.</li> <li>Large extent of earthworks and a longer Western Link Road – North corridor is required.</li> </ul>

### 3.1.4 Engagement

The following section provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to Appendix E of the DBC.

Project	Feedback
Northern PT Hub and Park and Ride facility	<ul style="list-style-type: none"> <li>Strong support for better public transport options and sufficient park and ride facilities – community feedback noting desire for larger park and ride facility.</li> <li>Provision for access by walking and cycling is important.</li> <li>Proximity and access to the Catholic cemetery is desirable.</li> <li>Preference for park and ride facility to be in the northern location.</li> <li>Study areas 1,6,8 too far away for efficient bus operation.</li> </ul>

### 3.1.5 Option Refinement

Following feedback at the MCA workshop on potential refinements to the concept layout that may address initial concerns from the specialists regarding the stormwater and ecological impacts of Options 2 and 4, the project team completed refinements the layout of the initial concept design, to test if this would potentially minimise their development and environmental impacts. Post refinement two further options were developed in Option 2a and Option 4a with these then taken through the MCA process. The refined concept layouts of each of the options is shown below in Figure 3-13 and Figure 3-14.

**Figure 3-13. Option 2a - Northeast Western Link Road**



**Figure 3-14. Option 4a - Southeast Western Link Road**



### 3.1.5.1 MCA Workshop 2

The project team and technical specialists participated in a second interdisciplinary MCA workshop after the development of refined options 2a and 4a.

Table 3-8 below demonstrates a heat map and outcomes of the technical specialists MCA scoring for the options considered. Overall, both options achieve land use, urban design, and social cohesion outcomes. Both options continue to have a neutral impact on heritage and landscape outcomes and the key differentiators between the two options are stormwater and natural hazard impacts. While the refined option 4a has less adverse stormwater and natural hazard impacts, the option still has higher



adverse impacts for these criteria compared to option 2a. As a result, the technical specialists and project team discounted option 4a and identified option 2a as the preferred option.

**Table 3-8: Northern PT Hub MCA Workshop 2 scoring**

MCA Criteria	Option 2a	Option 4a
I.O.1 – Access		
I.O.2 – Integration		
I.O.3 – Travel Choice		
Heritage		
Land use		
Urban Design		
Land Requirement		
Social Cohesion		
Human health and wellbeing		
Landscape/Visual		
Stormwater		
Ecology		
Natural Hazards		
Construction impacts		
Construction disruption		
Construction cost/risk		

A qualitative summary of the assessment outcomes for the preferred and discounted option are provided in Table 3-9 and Table 3-10 below.

**Table 3-9: Assessment outcomes for emerging preferred option**

Option	Assessment Outcomes
<b>2a</b>  North-west (directly adjacent) to Western Link Road (approximately 228 carparks)	<ul style="list-style-type: none"> <li>• Supports efficient bus operations through location of facility at the confluence of multiple services.</li> <li>• Supports connectivity for services to the existing Warkworth town centre including Warkworth to Wellsford services.</li> <li>• Park and ride facilities still located to intercept trips from the hinterland and reduce car trips into the residential areas. Carpark located near business land use minimising impact on future urban form.</li> <li>• Results in slightly lower walk-up catchment compared to some other options due to the adjacent industrial land use (north of SH1). However, this can be managed through improved bus services along the Western Link Road North and SH1.</li> <li>• Option has opportunity for integration with future commercial developments on adjacent General Business land.</li> <li>• Refined layout/location has reduced impacts on ecology and stormwater constraints.</li> <li>• Lower extent of earthworks required compared to option 4a.</li> <li>• Residual land to be utilised as access road to adjacent land uses.</li> </ul>

**Table 3-10: Assessment outcomes for the discounted option**

Option	Assessment Outcomes
4a  South-east of Western Link Road (approximately 223 carparks)	<ul style="list-style-type: none"> <li>• Option continues to have an increased walking and cycling catchment due to proximity to the future local centre</li> <li>• Site is located to the north of the future town centre and will take up additional space (than Option 4), continues to impact on ability future use of developable (mixed use) land</li> <li>• Larger footprint compared to Option 2a resulting in a higher acquisition cost.</li> <li>• Refined layout/location has reduced impacts on ecology and stormwater constraints - presence of floodplains alongside the stream are still likely.</li> <li>• Evidence of land instability near the Park and Ride location.</li> </ul>

### 3.1.6 Emerging Preferred

Option 2a has been identified as the emerging preferred option as the option's location at the confluence of multiple services supports efficient bus operations, accessibility for active mode users and removes the need for private vehicle users from surrounding settlements from traversing through residential areas to access the park and ride facility. In addition, any residual land will be utilised as an access road for business/residential land uses in the area, with the option having lower impacts on identified ecological and stormwater constraints. Whilst Option 4a has an increased walk and cycling catchment due to its proximity to the future local centre and is similar to Option 2a in that it has reduced ecological and stormwater impacts, it is not preferred compared to Option 2a because of the likely presence of floodplains alongside the stream adjacent to the option, evidence of land instability near the park and ride location, and the option's higher acquisition cost due to having a larger footprint.

### 3.1.7 Option refinement – Post stormwater design

Following the identification of the emerging preferred option (Option 2a) stormwater design works were undertaken as part of the 30 – 50% design development stage as outlined in section 2.4 of this report to identify the potential stormwater treatment options for the PT Hub and Park and Ride facility. These works concluded that due to uneven topography in the area, stormwater treatment could not be provided for the Option 2a layout as it currently existed, with a location to the north-east resulting in adverse construction impacts, including on the planned local road connection from the WLR North. As a result, alternative facility layouts, within the general location of the emerging preferred option, were considered at Project team workshops, which would allow for the provisions of the required stormwater infrastructure in accordance with AT stormwater guidelines, while also continuing to achieve the facility outcomes achieved in this location, as well as maintaining local road access. The facility concept layout was subsequently refined, shifting the facility further to the west slightly in order to provide for the required stormwater treatment pond to be accommodated to the east of the facility, in a location that naturally dipped and operated as per the abovementioned stormwater guidelines.

As an alternative, the project team completed a design review on the second preferred option (Option 4a) to investigate whether the option would be more suitable however this option was dismissed due to the steep topography of the area and difficult stormwater wetland constructability.

### 3.1.8 Refined Emerging Preferred Option

Following the option refinement process the preferred location for the DBC Northern PT Hub and Park & Ride facility was confirmed and is illustrated in Figure 3-15 below.

**Figure 3-15. DBC Recommended Northern PT Hub and Park and Ride Facility [design indicative only]**



## 3.2 New Southern Public Transport Hub

### 3.2.1 Overview

The new Southern Public Transport (PT) Hub in the DBC Warkworth transport network is shown in Figure 3-16 below.

**Figure 3-16: Southern Public Transport Hub**



The Southern PT Hub is located within an area subject to the proposed draft Warkworth South Plan Change which provides an indicative Wider Western Link Road alignment, town centre location, and PT Hub location. The PT Hub is intended to support the proposed local centre and high-density housing in south Warkworth and is expected to operate in tandem with bus facilities connected to the proposed town centre.

### 3.2.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Southern PT Hub.

### 3.2.2.1 Gap analysis

The gap analysis identified that changes in policy and the availability of additional guidance (identified below) resulted in the need for the DBC to re-evaluate the public transport facilities required to support planned future growth in Warkworth.

The following changes in policy and additional guidance informed the gap analysis recommendation:

- Warkworth Structure Plan (2019) which sets out the land use pattern for future growth in Warkworth over the next 30 years.
- AT Transport Design Model (2019) requires park and ride facilities to service a broader variety of uses including being accessible to areas of residential density (origin) to maximise active mode catchment potential.
- Te Tupu Ngātahi Design Framework and Tool Kit (2019)

In response to this, in the DBC phase work was completed (PT system review) to confirm the future strategy for the Warkworth PT network. This assessed the IBC recommendations and considered the types of facilities needed, specified infrastructure requirements, identified a broad location for the facilities, and identified how the individual PT elements integrated with the Warkworth public transport network.

The IBC recommended a PT hub in the southern growth area to support a planned town centre and high-density housing near the intersection of SH1 and the new Wider Western Link Road. The PT review in the DBC confirmed the inclusion of the IBC Southern PT Hub in the DBC network and assessed that the IBC recommendation aligned with the Te Tupu Ngātahi design framework and wider policy considerations.

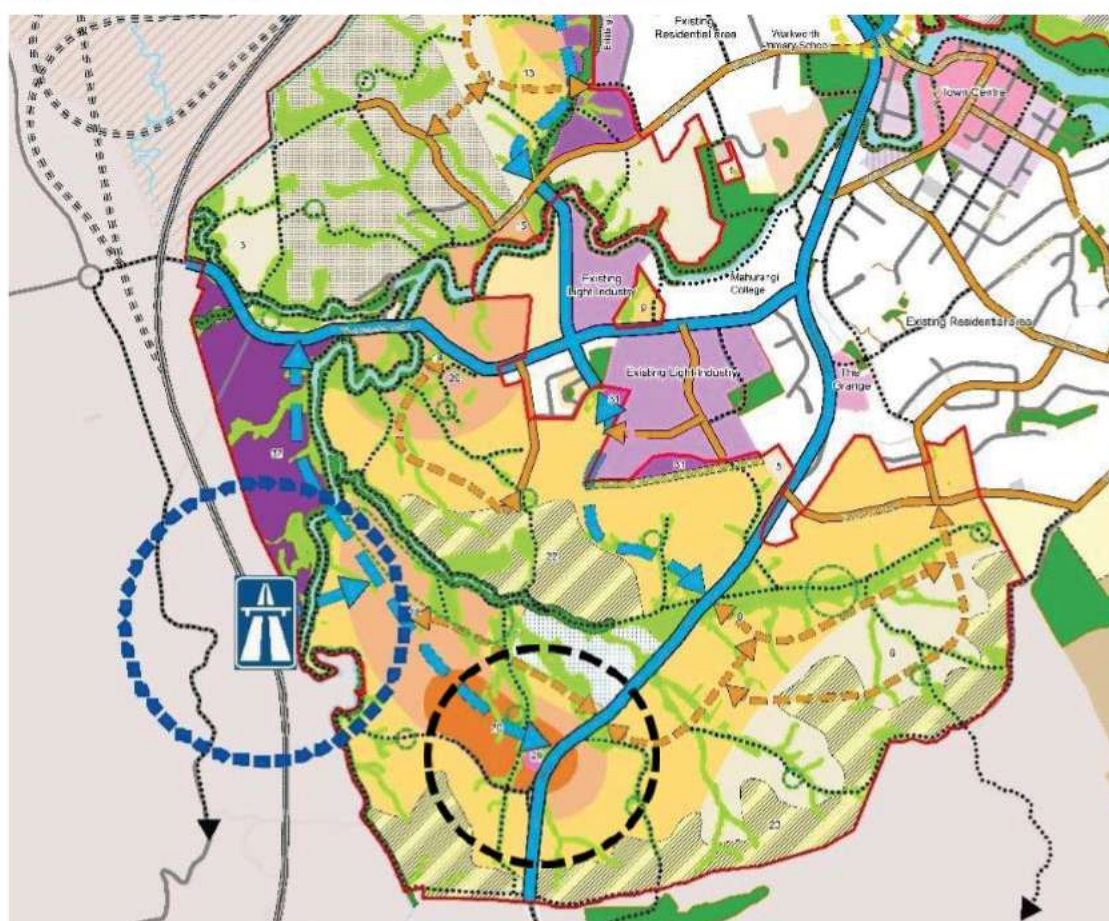
The PT strategy recommends a PT Hub in the southern growth area, in particular adjacent to the planned town centre for the following reasons:

- Integration with the planned local centre and future medium/higher density housing in the area
- Integrating with development in the south will significantly improve the walking and cycling catchment therefore encouraging the use of active modes to travel to the transport hub.
- Will connect active mode users to planned cycling and micro-mobility facilities
- Links to the Wider Western Link Road which is an important corridor and key bus route in the future.

The recommended study area for the location of the Southern PT Hub as per the PT system review is illustrated in Figure 3-17 below. For further details refer to Appendix D1 of the DBC.



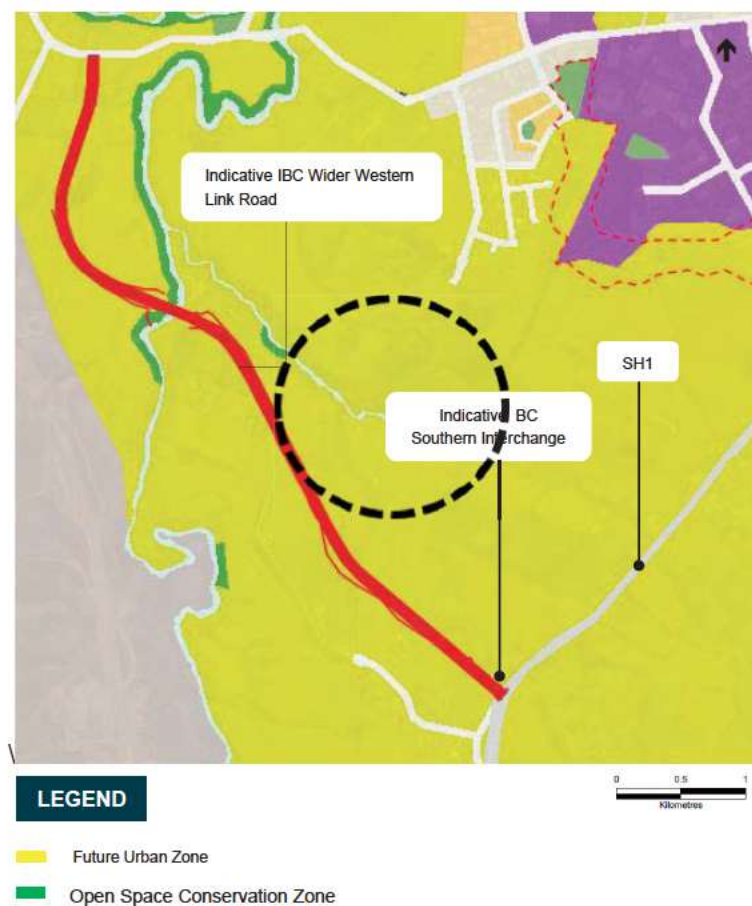
**Figure 3-17. Study area for Southern PT Hub outlined in black**



### 3.2.2.2 Land use assessment

An overview of current zoning within the study area is illustrated in Figure 3-18 below. The area is currently primarily rural and is entirely future urban zoned. Current land uses in the area is the Morrison's Heritage Orchard located on the northern boundary of study area and large lot residential properties to the north and south of Valerie Close.

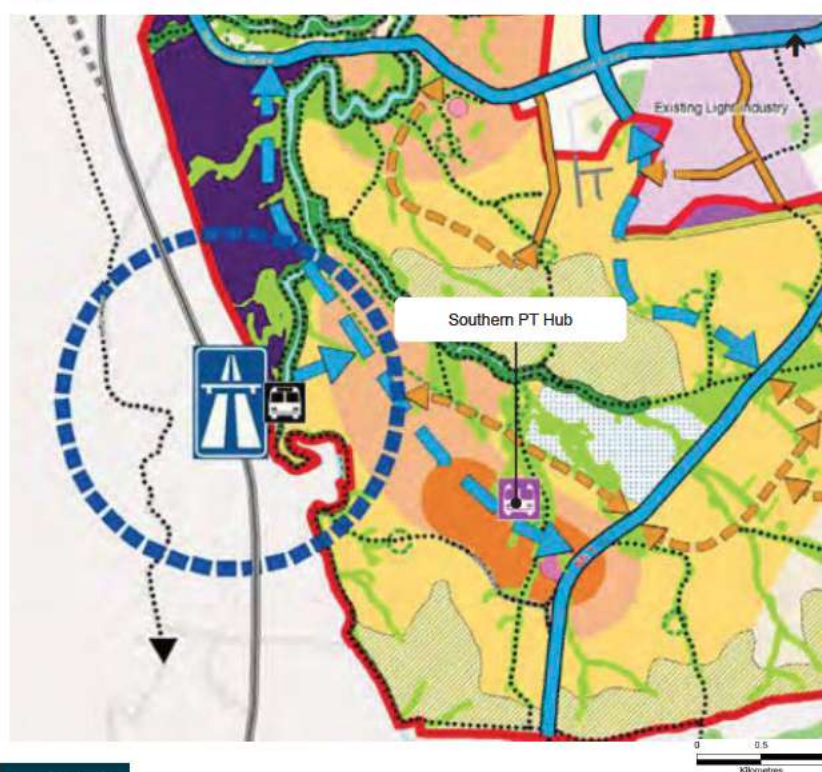
**Figure 3-18: Southern PT Hub AUP-OP Zoning**



Future zoning within the study area as indicated in the Warkworth Structure Plan is shown in Figure 3-19 below. The structure plan identifies changes within the FUZ to residential zoning (both medium and high density) and the development of a local centre in centre of the study area.



Figure 3-19 Southern PT Hub Warkworth Structure Plan land uses

**LEGEND**

- |   |   |
|---|---|
| <span style="color: orange;">■</span> Residential – Terrace Housing and Apartment Buildings | <span style="color: purple;">■</span> Business – Local Centre Zone          |
| <span style="color: lightorange;">■</span> Residential – Mixed Housing Urban Zone           | <span style="color: green;">■</span> Protection areas (not for development) |
| <span style="color: yellow;">■</span> Residential – Large Lot Zone                          |   |

### 3.2.2.3 Climate change assessment

The climate change assessment concluded the Southern PT Hub project cannot be eliminated from the Warkworth transport as it supports access to public transport for growth areas and back of house services such as layover parking, charging facilities, and driver amenities.

The assessment recommends the option development and assessment process consider the following opportunities:

- Maximise walk up catchments through land use integration i.e., facility located where dense residential development is planned or is adjacent to key economic or social destinations such as local centres.
- Consider location attributes to reduce major structures, earthworks, and construction complexity.

### 3.2.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the Southern PT Hub are outlined in Figure 3-20 below and include:

- Proposed draft Warkworth South PC – large area of land south of Mahurangi River under ownership of one party.

- Large floodplains, permanent streams, the Mahurangi River and its tributaries, native and/or exotic woodland, riparian vegetation.
- IBC location - bridge over adjoining stream required with 2,445Ha upstream catchment and flooding.
- Large planar landslides.
- SEA's in the south
- Natural wetlands, including wetland floodplain system constrained by riparian features of Mahurangi River
- Indicative Warkworth South 'local centre' shown on the Warkworth Structure Plan
- The Ara Tūhono (Puhoi to Warkworth) Project to the northwest
- Urban motorway interchanges to be 2km apart to avoid weaving issues between ramps.
- Tie in with Ara Tūhono designation

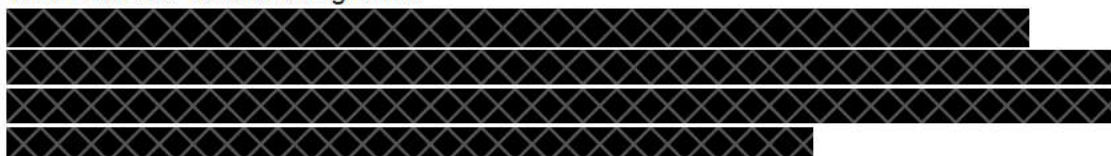
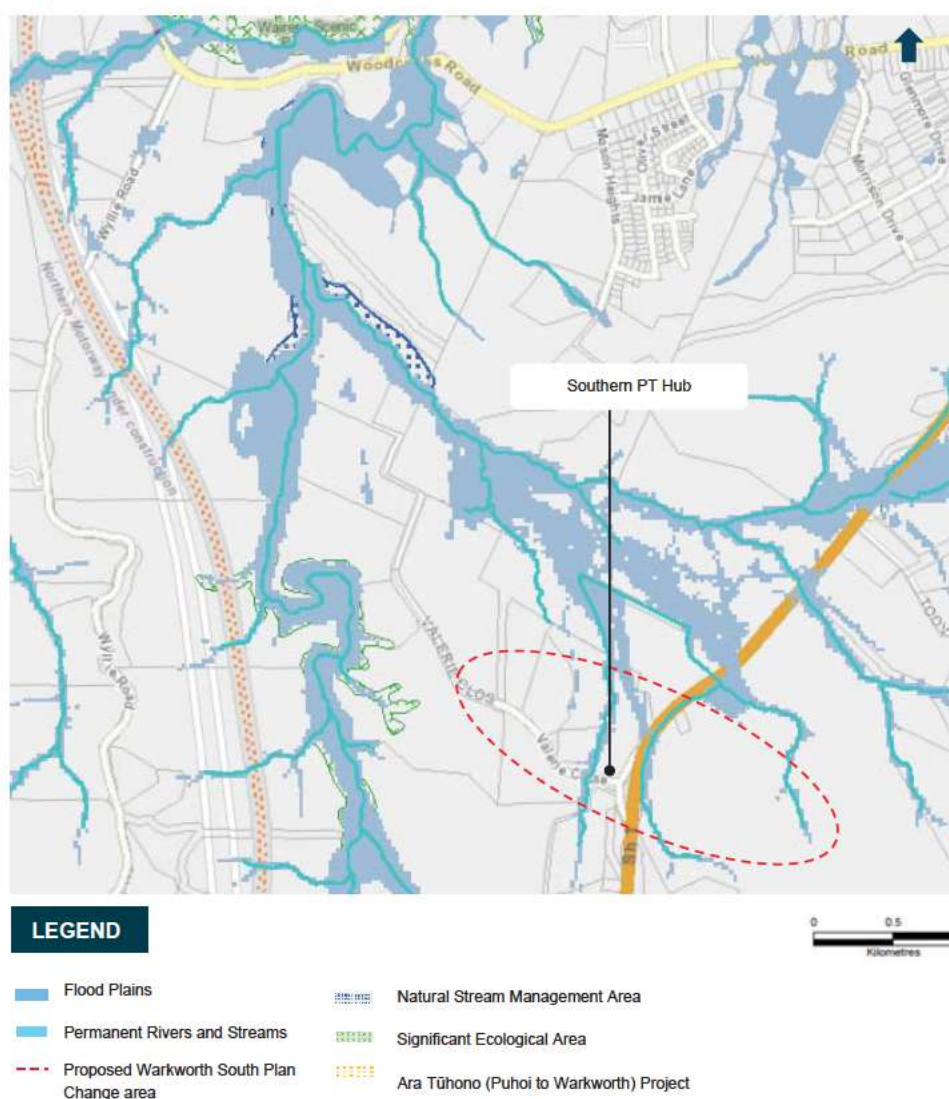


Figure 3-20. Constraints Map - Southern PT Hub



### 3.2.2.5 Form and function assessment

The form and function assessment indicated that the Southern PT Hub will be an offline facility serving both starting and terminating services as well as through services. The site will be approximately 2500m<sup>2</sup> in area and will provide:

- Driver facilities including breakroom and toilets.
- Layover spaces with charging facilities and five active bus stops
- Kiss and ride drop off facilities.
- Cycle parking and storage.
- Capacity for at least six services (terminating and travelling through)

### 3.2.3 Option Development/Emerging Preferred Location

As outlined in the Warkworth Structure Plan it is anticipated that a local centre will be established in the Warkworth South growth area. It is understood from discussions with SME's that there is a strong desire for the Southern PT Hub to be integrated with this local centre, as well as with the new Wider Western Link Road (Wider WLR) corridor. It is considered that a future plan change for the development of the Warkworth South area will confirm the location of the planned local centre and therefore also the adjacent public transport interchange.

Note: The Warkworth South Plan Change is an active plan change in the pre-lodgement phase currently being prepared for the southern Warkworth growth area in parallel to the Warkworth DBC. It is understood that the PT Hub is proposed to be integrated with the local centre in line with the structure plan provisions.

As the ultimate location of the PT Hub is intrinsically linked to the future land use (residential, local centre, open space) and transport (Wider Western Link Road) outcomes in the Warkworth South area, and with these outcomes to be determined by the third-party development plans through the Plan Change process, it was determined by the Project team that no further optioneering was required for this project. Within its scope, the DBC focussed on understanding the required footprint of the facility to ensure sufficient space is provided for through the plan change process.

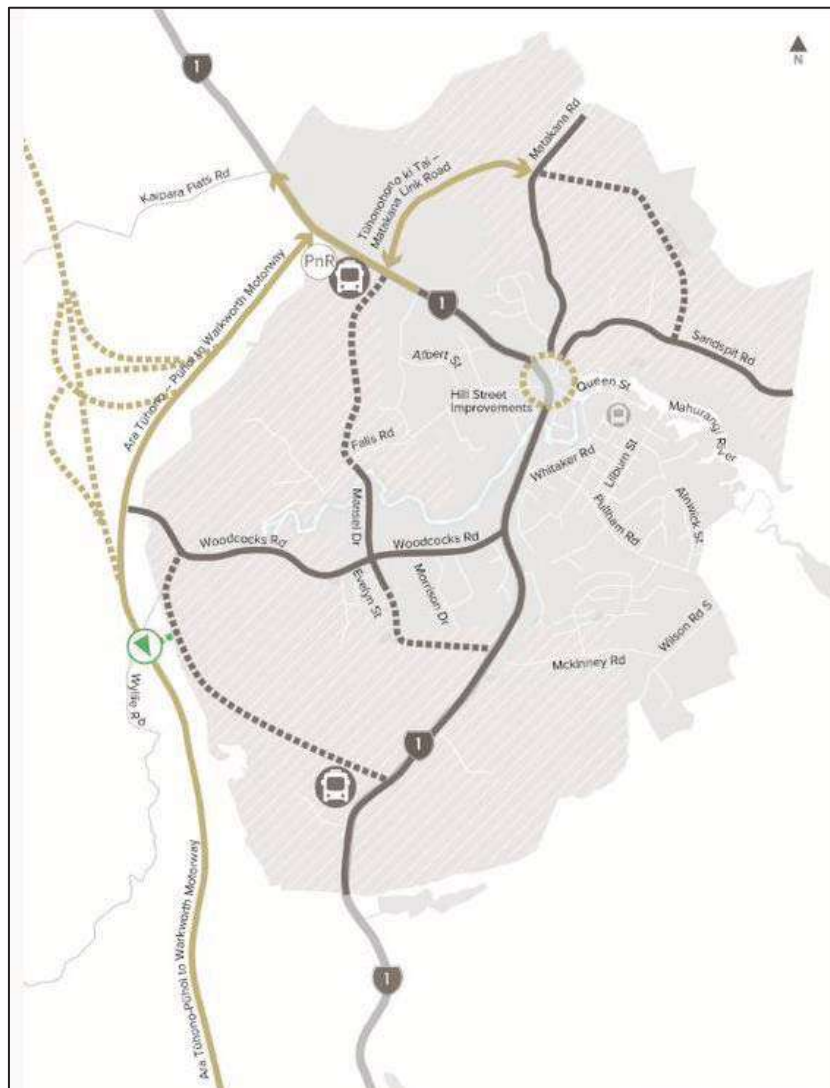


### 3.3 New Southern Interchange on Ara Tūhono Puhoi to Warkworth Motorway

#### 3.3.1 Overview

The new Southern Interchange in the DBC Warkworth transport network is shown in Figure 3-21 below.

Figure 3-21: New Southern Interchange



The Southern Interchange is a proposed new interchange connecting to Ara Tūhono (Puhoi to Warkworth Motorway). The interchange will have southbound ramps connecting to the proposed Wider Western Link Road and will provide a direct connection to the Warkworth southern growth area from Ara Tūhono (Puhoi to Warkworth Motorway).

#### 3.3.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Southern Interchange.

### 3.3.2.1 Gap analysis

The gap analysis recommended that the new Southern Interchange should be subject to the route refinement process in the DBC phase because the project has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and consider the following:

- Design and operation of the project.
- An appropriate connection point with Ara Tūhono (Puhoi to Wellsford motorway) in consideration of constraints and land uses within the study area.

### 3.3.2.2 Land use assessment

The AUP:OP land use zoning for the study area is shown in Figure 3-22 below which illustrates the entire area is currently future urban zoned with open space – conservation zoning to the north and south of the indicative Southern Interchange location as shown below.

**Figure 3-22. AUP:OP land uses**



Anticipated future zoning in the study area as identified in the Warkworth Structure Plan is shown in Figure 3-23 below. The structure plan indicates future changes in the study area as industrial zoning to the north and residential land uses to the east and south.

Figure 3-23: Warkworth Structure Plan zoning



#### LEGEND

- |   |  |
|---|--|
| <span style="display: inline-block; width: 15px; height: 10px; background-color: purple; border: 1px solid black;"></span> Business – Heavy Industry Zone         | <span style="display: inline-block; width: 15px; height: 10px; background-color: yellow; border: 1px solid black;"></span> Residential Mixed Housing Suburban Zone |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: orange; border: 1px solid black;"></span> Residential – Mixed Housing Zone       | <span style="display: inline-block; width: 15px; height: 10px; background-color: green; border: 1px solid black;"></span> Protection areas (not for development)   |
| <span style="display: inline-block; width: 15px; height: 10px; background-color: lightorange; border: 1px solid black;"></span> Residential – Terrace Housing and |  |

### 3.3.2.3 Climate change assessment

The climate change assessment concluded the Southern Interchange cannot be eliminated from the Warkworth transport network because it would:

- Reduce land use integration and the ability for the network to support growth. 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 town principle and increase the need to travel further for employment opportunities.
- Result in 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. 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.
- Reduce 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.

- Additional wider investment in additional local road upgrades would be expected. Without the interchange, SH1 west of Te Honohono 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.

The assessment recommends the option development and assessment process consider the following opportunities:

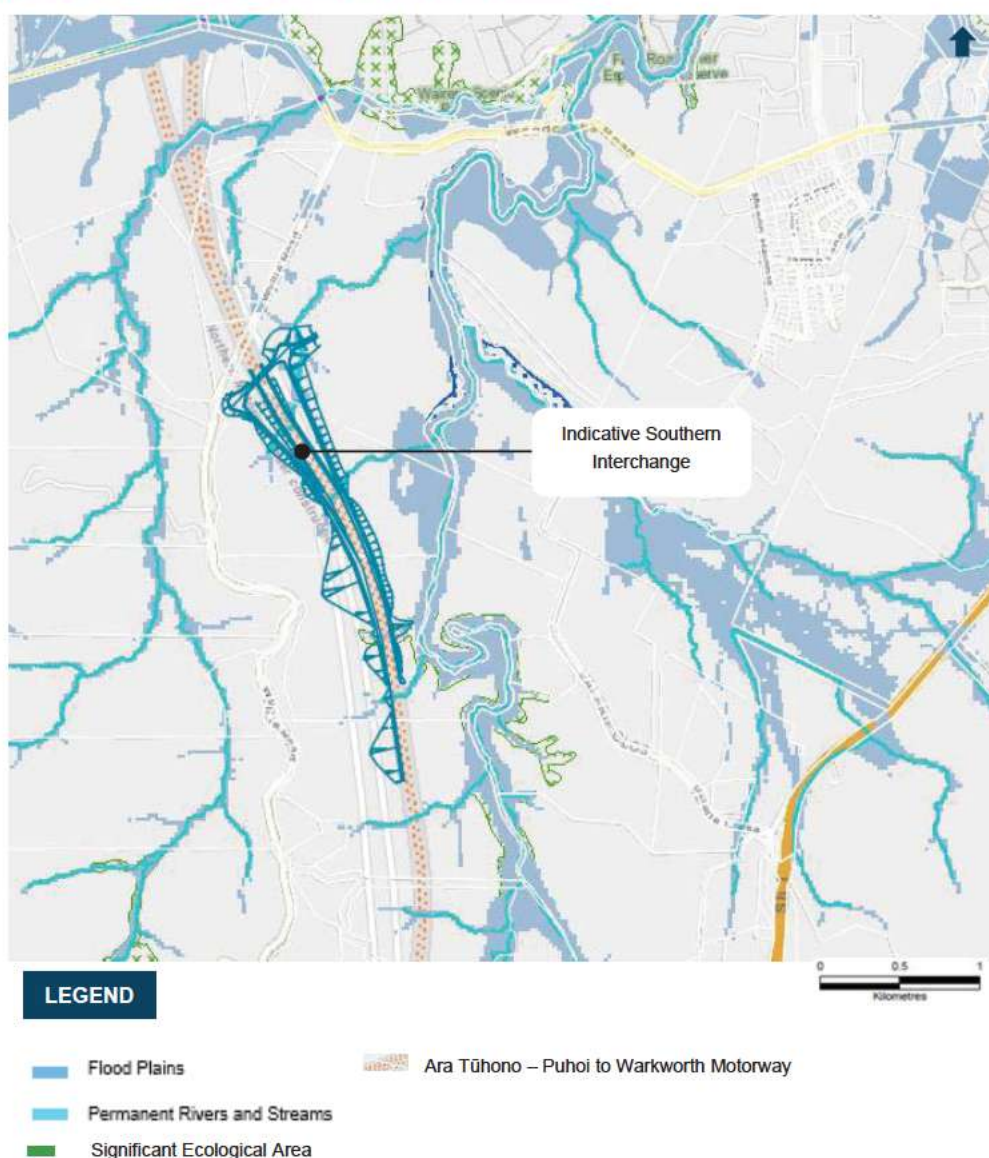
- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

### 3.3.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the study area are outlined in Figure 3-24 below and include:

- Integration with Ara Tūhono (Puhoro to Warkworth) Project design and safety requirements
- Mahurangi River and tributaries, permanent streams and large flood plains.
- IBC interchange location - bridge over adjoining stream required with 2,445Ha upstream catchment and flooding.
- Natural wetlands, including wetland floodplain system constrained by riparian features of Mahurangi River
- Uneven topography and large planar landslides.
- Riparian woodland and vegetation associated with river, tributaries, and streams
- SEA's in the south.
- Indicative Warkworth South 'local centre' shown on Structure Plan.
- Proposed draft Warkworth South PC applicant – large area of land south of Mahurangi River under ownership of one party.



**Figure 3-24. Southern Interchange Constraints Overview**

### 3.3.2.5 Form and function assessment

The form and function assessment indicates that the Southern Interchange will provide access to the Warkworth southern growth area and will have multiple connections to the motorway. The form of the interchange road is dependent on the interchange form and staging which is currently unconfirmed. The project team are currently recommending a two-lane 24m corridor.

### 3.3.3 Option Development

Upon completion of the preliminary analysis the project team considered 5 options for assessment of the alignment (location) of the southern interchange along the Ara Tūhono – Puhoi to Warkworth motorway, including the IBC alignment. The options are outlined in Table 3-11 below and tested connections closer to SH1, closer to Woodcocks Road, and a connection with the Wider Western Link Road. The project team considered that a do-nothing option was not applicable to the new Southern Interchange for the reasons outlined below:

- Provides an opportunity for a direct link between industrial land identified in the Warkworth Structure Plan and the strategic transport network – by supporting land use of this nature, the overall viability of Warkworth as a satellite town is maintained and provides an opportunity for freight movement associated with the heavy industrial land to access the strategic network with limited interface with sensitive land uses.
- Flexibility for transport and land use integration opportunities.
- Provides future network choice should land use uncertainties result in greater housing yields than expected, placing additional pressure on critical network points.
- Minimises demands on SH1 as a result of growth in the southern sector of Warkworth.
- Will provide network flexibility and an alternative access for vehicles and freight to access land in the south. This will in turn relieve pressure at the northern interchange and decouple longer distance trips to destinations such as Matakana and Sandspit from local trips to southern Warkworth.

As part of the optioneering process an opportunity was identified that the additional connection to the southern growth area could potentially be provided as part of the Ara Tūhono Warkworth to Wellsford system interchange with Ara Tūhono Puhoi to Warkworth motorway. As this Ara Tūhono Warkworth to Wellsford interchange is part of another parallel project and is currently processing through a NoR process this design opportunity is not able to be explored further at this time. As such the DBC has continued to progress the identification of an independent southern interchange location which meets separation requirements to the current Ara Tūhono Warkworth to Wellsford design. It is noted this remains an opportunity to be considered during future detailed design.

**Table 3-11. Southern Interchange options**

Option	Description
1	IBC alignment
2	North of IBC – Woodcocks Road
3	Connecting to Wider Western Link Road between IBC location and SH1
4	Between south of FUZ/Western Collector (SH1 Intersection)
5	South of FUZ (SH1 intersection)

### 3.3.4 Option Assessment

Following the identification of options, the project team participated in a workshop and assessed the options against a targeted MCA criteria and utilized the constraints mapped in the Te Tupu Ngātahi GIS viewer to identify the preferred option.

The heat map in Table 3-12 below provides an assessment summary. The table indicates that all options had low impacts on heritage, social cohesion and transport constraints and a moderate level of land requirement, and ecological, stormwater and construction impacts. Overall, the IBC recommended alignment (Option 1) had less construction impacts and land requirement compared to

the other options in addition to having better integration outcomes. As a result, Option 1 was identified as the preferred option.

**Table 3-12: Southern Interchange option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
I.O.1 – Access					
I.O.2 – Resilience					
I.O.3 – Integration					
Heritage					
Land Requirement					
Ecology					
Stormwater					
Social Cohesion					
Transport					
Construction					

Table 3-13 and Table 3-14 below provides a summary of the assessment outcomes for the emerging preferred and discounted options.

**Table 3-13: Assessment outcomes for the emerging preferred option**

Option	Assessment Outcomes
1 IBC alignment	<ul style="list-style-type: none"> <li>Option provides good access to the future heavy industrial area and direct access to southern PT hub.</li> <li>Minimal travel for industrial traffic is required through residential or local centre zoned areas resulting in reduced time on the local road network.</li> <li>Connects well to the land uses identified in the Warkworth Structure Plan.</li> <li>Avoids the SEA.</li> <li>Has the shortest link to connect to the Wider Western Link Road resulting in lower connection costs and lower land requirement.</li> <li>Acts as an appropriate transition to the heavy industrial zone.</li> </ul>

**Table 3-14: Assessment outcomes for the discounted options**

Option	Assessment Outcomes
2 North of IBC – Woodcocks Road	<ul style="list-style-type: none"> <li>Interchange directly loads onto the school road near the schools on Woodcocks Road.</li> <li>Is in close proximity to the Te Ara Tūhono northern interchange.</li> <li>Design difficulties with locating in proximity to future Te Ara Tūhono northern interchange and ramp distance.</li> <li>Option provides low dispersion of traffic, and all interchange users will be utilising one route.</li> <li>Depending on the size of the footprint the option could potentially impact on the SEA.</li> </ul>
3	<ul style="list-style-type: none"> <li>Option severs proposed residential land use to the south and east including high density zoned areas.</li> </ul>

Option	Assessment Outcomes
Connecting to Wider Western Link Road between IBC location and SH1	<ul style="list-style-type: none"> <li>• Flooding risks and additional land required.</li> <li>• Wider crossing of the Mahurangi River, and impacts on tributaries and contiguous SEA.</li> <li>• Requires heavy vehicles to pass through the local centre and Southern PT Hub.</li> </ul>
4 Between south of FUZ/Western Collector (SH1 Intersection)	<p>Severance of residential zoned land but has lower impact compared to Option 3.</p> <p>Is a further distance resulting in higher construction costs to link into the Wider Western Link Road</p> <p>Impacts on tributaries of the Mahurangi River and contiguous SEA, the alignment could possibly avoid SEA if it is shifted south however this will still have wider ecological and landscape impacts.</p> <p>Traffic will be dispersed to Wider Western Link Road and SH1 only but will result in heavy vehicles travelling past the planned local centre.</p> <p>Crosses large flood plains.</p>
5 South of FUZ (SH1 intersection)	<ul style="list-style-type: none"> <li>• Option is the farthest distance resulting in a higher construction cost.</li> <li>• Crosses large floodplains</li> <li>• Additional landscape and land use considerations (rural zoned land, natural heritage landscape overlay),</li> <li>• There are other feasible options that could better avoid impacts outlined.</li> </ul>

### 3.3.5 Engagement

The following section provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members.

For further details refer to Appendix E of the DBC.

Project	Feedback
Southern Interchange	<ul style="list-style-type: none"> <li>• Strong community and stakeholder support for the Southern interchange and integration with heavy industrial land use to provide effective land use outcomes and transport integration.</li> <li>• The interchange supports the viability of the heavy industrial land, an important future employment area for Warkworth.</li> <li>• Preference for a location further north to reduce number of crossings of the Mahurangi River by connection to the Wider Western Link Road and address potential constructability concerns from topography.</li> <li>• Concern over exclusion of northbound ramps.</li> </ul>



### 3.3.6 Option Refinement

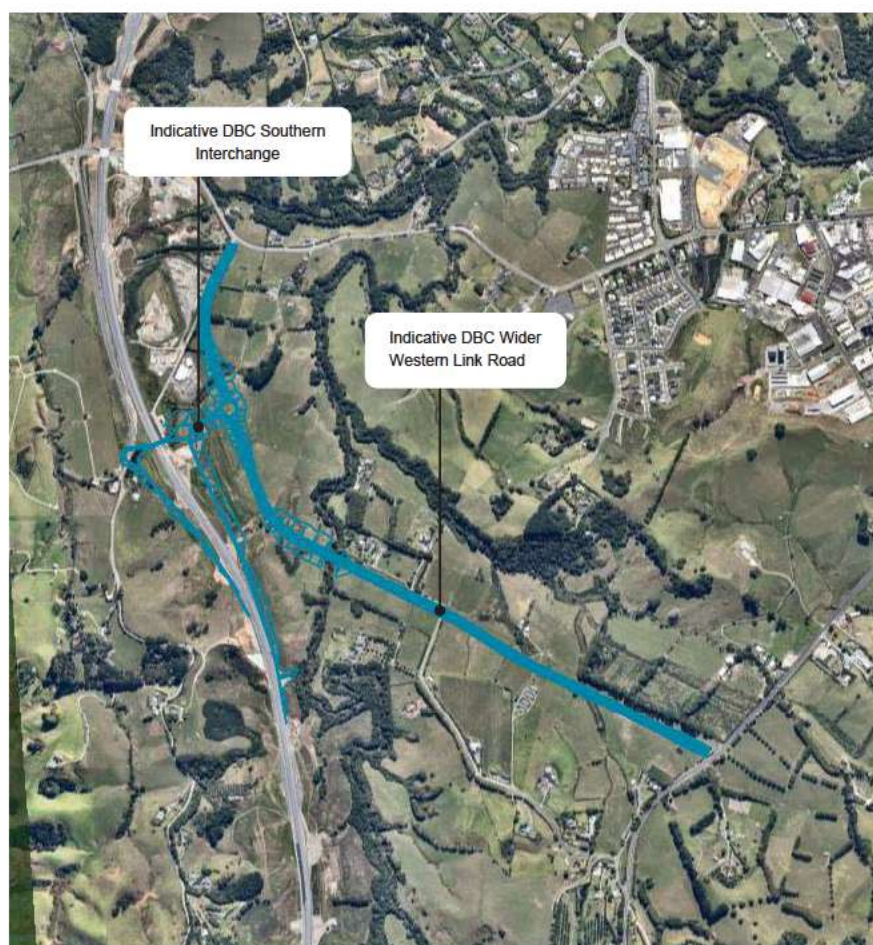
Following feedback and further refinement by the project team, the emerging preferred alignment was shifted further north for the following reasons:

- A shift further north reduces the number of crossings of the Mahurangi River required.
- Ties in with the emerging preferred option for the Wider Western Link Road (Northern Section)
- Southern Interchange can be located on land under Waka Kotahi ownership which allows flexibility in location and design responses to future conditions.

### 3.3.7 Refined Emerging Preferred Option

The recommended DBC Southern Interchange alignment is shown below in Figure 3-25.

Figure 3-25: DBC Recommended Southern Interchange

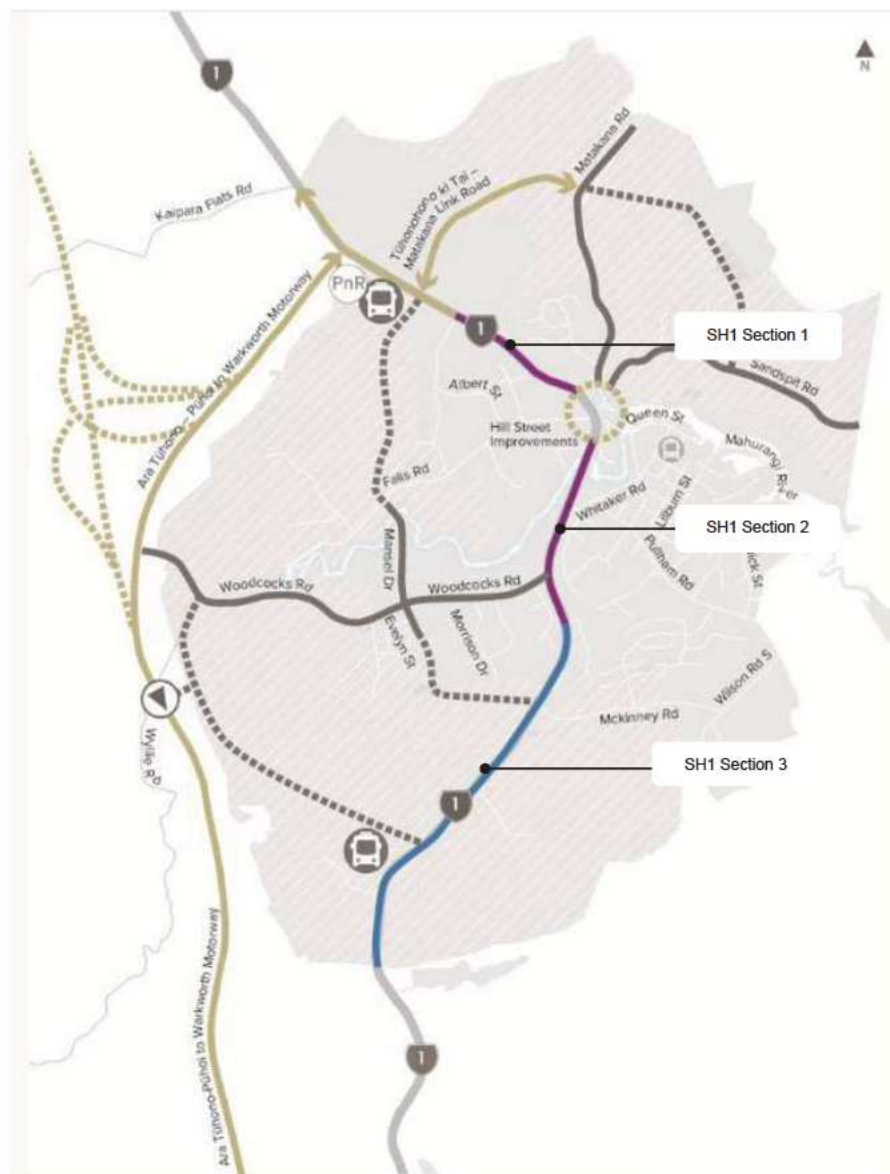


## 3.4 Existing State Highway 1 Upgrade

### 3.4.1 Overview

The urbanisation of the existing SH1 in the DBC Warkworth transport network is shown in Figure 3-26 below.

Figure 3-26. SH1 Upgrade



For the DBC option development and assessment process, the project team split the corridor into three sections to ensure the process responded accurately to differing existing land uses and constraints along the length of the corridor. The three corridor sections and extents are outlined below and illustrated in Figure 3-26 above.

- **SH1 Section 1** – Hudson Road to Hill Street
- **SH1 Section 2** – Hill Street to Fairwater Road
- **SH1 Section 3** – Fairwater Road to edge of FUZ

The state highway status of the existing SH1 is to be revoked upon completion of the Ara Tūhono - Puhoi to Wellsford motorway and will operate as an urban arterial. Within the Warkworth transport network, the future role of the corridor will be as a central route for public transport to connect local communities and town centres as well as act as the key spine for active mode transport choices within Warkworth. The existing SH1 will also become the main arterial route heading south prior to joining the SH1 motorway.

### 3.4.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the SH1 upgrade.

#### 3.4.2.1 Gap analysis

The gap analysis recommended that the upgrade of the existing SH1 corridor should be subject to the route refinement process in the DBC phase because the corridor has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and complete further refinements to the option as the corridor supports and connects well with planned future roads and fits the Te Tupu Ngātahi options hierarchy of utilising and improving existing infrastructure first.

The gap analysis concluded the DBC scope of works should also include the following:

- An assessment of the corridor's level of compliance with current geometric design and flood immunity standards.

#### 3.4.2.2 Land use assessment

Current zoning within the study area is shown in Figure 3-27 below. SH1 traverses through an existing urban area in the north and rural land uses in the south. Section 1 of the corridor has single house residential zoning along its southern length and is adjacent open space zoning areas to the north. Single house zoning is on either side of section 2 of the corridor with mixed housing residential zoning to the far west. The northern portion of section 2 runs through a significant ecological area and has open space zoning to its northwest. To the northeast and southeast the section is adjacent to business zoning. Further south, section 3 is abutted primarily by future urban zoning, with an area of single house residential zoning to the northeast of the section.



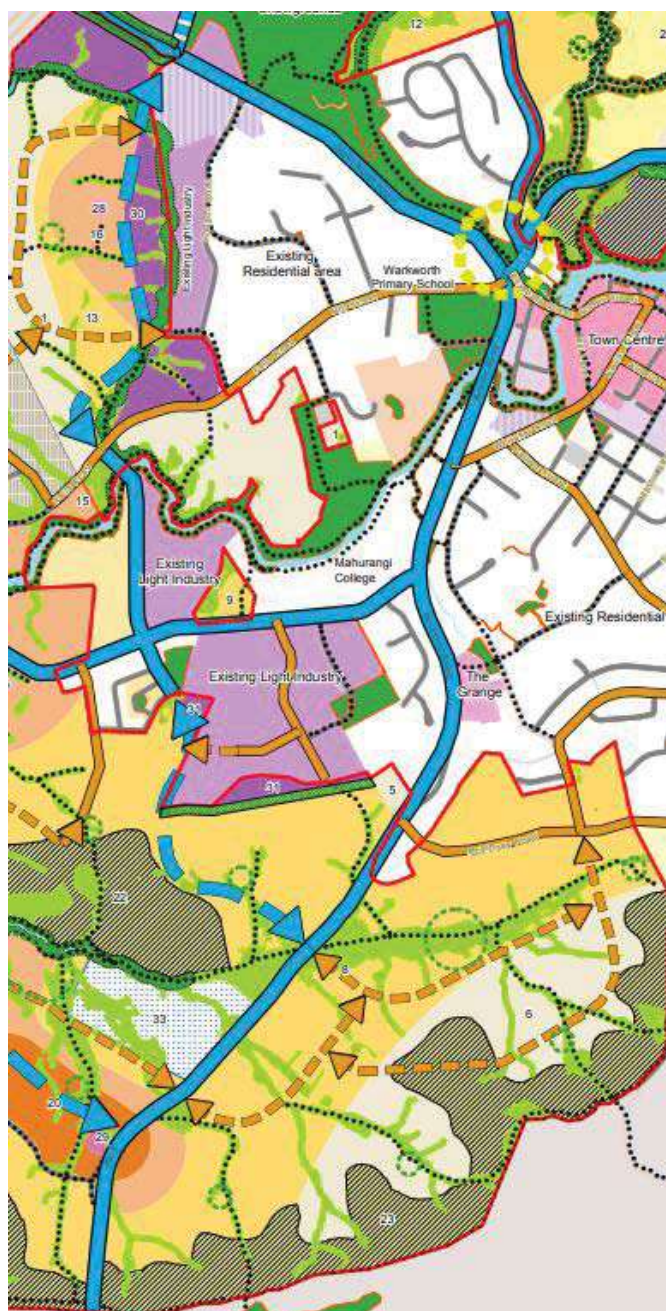
Figure 3-27: SH1 Upgrade AUP: Zoning



Proposed future zoning within the extent of SH1 as identified in the Warkworth Structure Plan is shown in Figure 3-28 below. The structure plan indicates limited future change within the existing residential and urban areas in section 1 and 2 but changes to the FUZ area in segment 3 to residential zoning.



Figure 3-28. Warkworth Structure Plan



### 3.4.2.3 Climate change assessment

The climate change assessment concluded the existing SH1 Upgrade project cannot be eliminated from the Warkworth transport network as if the network is eliminated, the network will not have a dedicated central active mode spine connecting the town centre with residential land uses which will impact the mode shift to active modes. In addition, the retention of four lanes and surplus of vehicle capacity at intersections will continue to make driving a private vehicle attractive.

The assessment recommends the option development and assessment process consider the following opportunities:

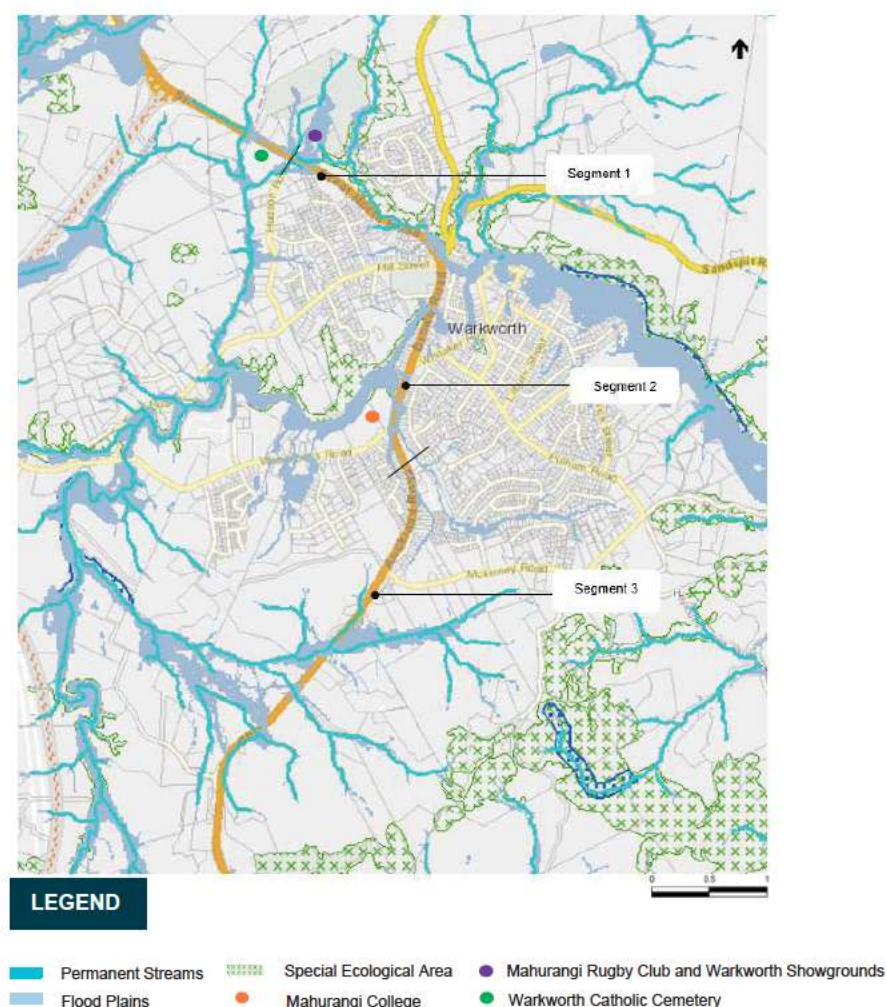
- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift

### 3.4.2.4 Constraints mapping

Constraints mapping was undertaken for the existing SH1 by the Project team with input from Mana whenua and SMEs. Key constraints and considerations for the project extent are outlined in Figure 3-29 below and include:

- Areas of SEA to the northeast and northwest of the corridor
- Established residential and business areas in the northern half of the corridor
- Location of Warkworth Showgrounds, the Mahurangi Rugby Club, and the Local Board Interim Community Transport Hub to the north of the corridor.
- Permanent streams and flood plains over the north and southern sections of the corridor.
- Location of catholic cemetery in the west and Mahurangi College located in the corner of the intersection between SH1 and Woodcocks Road.
- [REDACTED]
- Existing designation along the length of the corridor
- The river to the east of the bridge is a Coastal Statutory Acknowledgement (Treaty Settlement) area.

Figure 3-29. SH1 Upgrade Constraints Map



### 3.4.2.5 Form and function assessment

The form and function assessment recommended that SH1 be upgraded to a 24m wide two-lane arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details about the corridor form and function assessment refer to Appendix G of the DBC.

## 3.4.3 Option Development and Assessment Process – SH1 Upgrade Section 1

The following section sets out the option development and assessment process for Section 1 of the SH1 upgrade.

### 3.4.3.1 Option Development

Upon completion of the preliminary analysis the project team identified the route refinement options for the upgrade of Section 1. A total of 6 options were identified and are outlined in Table 3-15 below.

**Table 3-15: Section 1 Options**

Option	Description
1	Fit for purpose - use existing and planned facilities (under construction)
2	Existing and planned facilities with localised reallocations of existing road reserve in section 3.
3	SGA 20m Constrained - Cycle Lane in each direction, keeping within existing road reserve
4	SGA 24m cross section - Holding centreline
5	SGA 24m cross section - Widening to the east
6	SGA 24m cross section - Widening to the west

### 3.4.3.2 Option Assessment

Following the identification of options for Section 1 of SH1, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were assessed through the targeted MCA under the relevant criteria.

Table 3-16 below illustrates a heat map summarising the assessment outcomes for SH1 (section 1). Overall, all the options assessed achieved the investment objectives and social cohesion outcomes,



with options 3 to 6 meeting investment objective 2 slightly less favourably, and option 1 meeting investment objective 3 and 4 slightly less favourably when compared to the other options.

Option 1 and 2 generally avoided most constraints with transport and construction outcomes identified as the key barriers. Similarly, for options 3 to 6 construction was the primary source of high impact on the existing environment. Land requirement, stormwater and ecological impacts were also determining factors for the preferred and discounted options. While options 4 and 6 had moderate impacts on land, stormwater and ecology, Option 5 had limited/manageable land requirement but a higher ecological impact.

After completion of assessment, the project team identified Option 2 as the preferred option as it was assessed as generally having low or no impacts on the identified constraints within the project extent.

**Table 3-16: SH1 Upgrade - Segment 1 option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
I.O.1 – Access						
I.O.2 – Integration						
I.O.3 – Travel Choice						
I.O.4 – Safety						
Heritage						
Land Requirement						
Ecology						
Stormwater						
Social Cohesion						
Transport						
Construction						

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-17 and Table 3-18 below.

**Table 3-17. Assessment outcome for the preferred option**

Option	Assessment Outcome
2  Existing and planned facilities with localised reallocations of existing road reserve in section 3.	<ul style="list-style-type: none"> <li>Achieves transport outcomes.</li> <li>Option does not require property acquisition.</li> <li>Option makes best use of committed infrastructure including the existing and planned cycle network which provides a legible route to connect destinations such as the Warkworth Showground and the Warkworth Town centre. In addition, the existing lower volume cycling routes connect the north-western Warkworth growth area to the Warkworth town centre.</li> <li>The option improves on Option 1 by addressing issues of user conflict and safety by modifying existing shared path facilities on one side of the carriageway.</li> </ul>



**Table 3-18. Assessment outcome for the discounted options**

Option	Assessment Outcome
<b>1</b>  Fit for purpose - use existing and planned facilities (under construction)	<ul style="list-style-type: none"> <li>Partially achieves transport outcomes however there are actual and perceived safety concerns in certain areas.</li> <li>Option does not require property acquisition.</li> <li>Makes best use of parallel transport investment in the corridor.</li> </ul>
<b>3</b>  SGA 20m Constrained - Cycle Lane in each direction, keeping within existing road reserve	<ul style="list-style-type: none"> <li>Achieves transport outcomes.</li> <li>Option would require localised property acquisition where the existing SH1 designation narrows.</li> <li>Major rework will be required for newly constructed connections.</li> <li>Option will require significant earthworks.</li> </ul>
<b>4</b>  SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>Achieves transport outcomes.</li> <li>Option will impact on the SEA to the east of the corridor and driveway access to residential properties along the southeast length of the corridor.</li> <li>Potential for the implementation of the option to create redundant facilities.</li> </ul>
<b>5</b>  SGA 24m cross section - Widening to the east	<ul style="list-style-type: none"> <li>Achieves transport outcomes.</li> <li>Implementation will significantly impact on the SEA located adjacent to the eastern section of the corridor.</li> <li>Potential for the implementation of the option to create redundant facilities.</li> </ul>
<b>6</b>  SGA 24m cross section - Widening to the west	<ul style="list-style-type: none"> <li>Achieves transport outcomes.</li> <li>Implementation will significantly impact on driveway access to residential properties on the southern side of the corridor.</li> <li>Option will likely require large retaining structures.</li> <li>Potential for the implementation of the option to create redundant facilities.</li> </ul>

### 3.4.3.3 Emerging Preferred Option

The outcome of the assessment identified Option 2 as the emerging preferred option. The option does not require land acquisition, does not impact on the existing residential area along the southern length of the corridor, and avoids the SEA. Additionally, by modifying existing shared path facilities on one side of the carriageway, the option addresses safety and user conflict concerns that were identified as a concern for Option 1.

### 3.4.4 Option Development and Assessment Process – SH1 Upgrade Section 2

The following section sets out the option development and assessment process for section 2 of the SH1 upgrade.

#### 3.4.4.1 Option Development

Upon completion of the preliminary analysis the project team identified the route refinement options for the upgrade of Section 2. A total of 4 options were identified and are outlined in Table 3-19 below.

**Table 3-19: SH1 Upgrade – Section 2 options**

Option	Description
1	Single direction cycle lane on both sides of SH1. Existing Road reserve.
2	Bidirectional cycle lanes on west side of SH1. Existing Road reserve.
3	Bidirectional cycle lane on east side of SH1. Existing Road reserve.
4	Parallel shared path along Mahurangi River

#### 3.4.4.2 Option Assessment

Following the identification of options for section 2 of SH1, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.

Table 3-20 below illustrates a heat map summarising the assessment outcomes for SH1 (section 2). The assessment identified that all upgrade options had either low or moderate impacts on the identified constraints. While all options achieved the investment objectives, there were safety, access, and integration concerns associated with Option 3 and 4. Notably, Option 4 was also assessed as having more impact over all the constraints criteria compared to Option 1,2, and 3, including the requirement for property acquisition and impacting on stormwater constraints.

The assessment outcome additionally identified that each of the options generally faced their own unique barriers. For instance, Option 1 had moderate ecological, transport and construction impacts, whilst Option 3 had low ecological and construction impacts but moderate social cohesion and transport impacts.

The project team identified Option 2 as the preferred option as it was assessed as generally having low or no impacts on the identified constraints within the project extent.

**Table 3-20: SH1 Upgrade Segment 2 option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3	Option 4
I.O.1 – Access				
I.O.2 – Integration				
I.O.3 – Travel Choice				
I.O.4 – Safety				
Heritage				
Land Requirement				
Ecology				
Stormwater				
Social Cohesion				
Transport				
Construction				

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-21 and Table 3-22 below.

**Table 3-21: Assessment outcome for the preferred option**

Option	Assessment Outcome
2  Bidirectional cycle lanes on west side of SH1. Existing Road reserve.	<ul style="list-style-type: none"> <li>The corridor has connectivity and legibility with key local land uses and planned upgrades on Woodcocks Road and the Hill Street intersection.</li> <li>The provision of intersections enable safe crossing facilities for land uses on the eastern side of the corridor.</li> <li>Option connects Mahurangi College and Warkworth School.</li> </ul>

**Table 3-22: Assessment outcomes for the discounted options**

Option	Assessment Outcome
1  Single direction cycle lane on both sides of SH1. Existing Road reserve.	<ul style="list-style-type: none"> <li>The option would require two structures to cross the Mahurangi River (one each side).</li> <li>Results in increased crossing requirements to enable the option's integration with bidirectional lanes planned on Hill Street and Woodcocks Road.</li> </ul>
3	<ul style="list-style-type: none"> <li>Does not provide direct connectivity to key land uses such as schools or planned facilities on Woodcocks Road and Hill Street.</li> </ul>

Option	Assessment Outcome
Bidirectional cycle lane on east side of SH1. Existing Road reserve.	
4  Parallel shared path along Mahurangi River	<ul style="list-style-type: none"> <li>• Future function of the option is primarily recreational.</li> <li>• Has decreased access to land uses and as a result reduces the potential catchment.</li> <li>• Contributes to poor personal safety and allows for limited passive surveillance.</li> <li>• The off-road nature of the path and proximity to the Mahurangi River does not support commuters or a variety of users including elderly and school aged populations.</li> <li>• The option is located within a riparian environment.</li> </ul>

### 3.4.4.3 Emerging Preferred Option

The outcome of the assessment identified Option 2 as the emerging preferred option. The option achieves connectivity and legibility with key local land uses and planned upgrades on Woodcocks Road and at Hill Street, connects school facilities, and the availability intersections enables safe crossing facilities for land use on the eastern side of the corridor.

## 3.4.5 Option Development and Assessment Process - SH1 Upgrade Section 3

The following section sets out the option development and assessment process for Section 3 of the SH1 upgrade.

### 3.4.5.1 Option Development

Upon completion of the preliminary analysis the project team identified the route refinement options for the upgrade of Section 3. A total of 3 options were identified and are outlined in Table 3-23 below.

**Table 3-23: SH1 Upgrade – Section 3 options**

Option	Description
1	Holding centreline
2	Widen to the west (hold eastern boundary)
3	Widen to the east (hold western boundary)



### 3.4.5.2 Option Assessment

Following the identification of options for section 3 of SH1, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.

Table 3-24 below illustrates a heat map summarising the assessment outcomes for SH1 (section 3). The heat map illustrates that all the options achieved the investment objectives but generally had moderate impacts on the constraints identified with Option 2 being assessed as having moderate impacts over a larger number of constraint categories. The key differentiator between the preferred and the discounted options was land requirement, transport, and construction constraints.

The project team identified Option 1 as the preferred option because it has a lower land requirement, and less transport and construction impacts. To address heritage impacts on the Morrison's Heritage localised widening to the east (Option 2) was utilised in this location.

**Table 3-24: SH1 Upgrade Section 3 option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
I.O.4 – Safety			
Heritage			
Land Requirement			
Ecology			
Stormwater			
Social Cohesion			
Transport			
Construction			

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-25 and Table 3-26 below.

**Table 3-25: Assessment outcome for the preferred option**

Option	Assessment Outcome
1 Holding centreline	<ul style="list-style-type: none"> <li>• Achieves transport, heritage, and construction outcomes.</li> <li>• Has equitable property requirement.</li> <li>• Option has a potential impact on the frontage of the Morrison's Heritage Orchard, identified a potential need to widen to the east in this location in the option/design refinement phase to minimise impacts on the orchard.</li> <li>• Has a potential impact on the open space area.</li> <li>• There is potential flooding risk along the corridor</li> </ul>

Option	Assessment Outcome
	<ul style="list-style-type: none"> <li>Option results in the least disruption to the existing carriageway.</li> </ul>

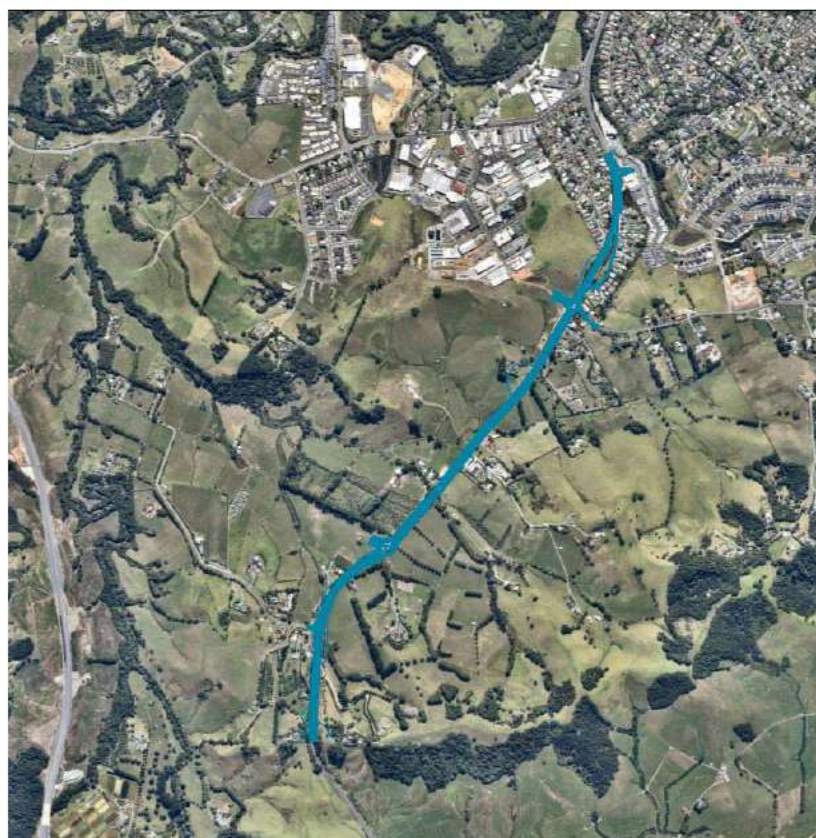
Table 3-26: Assessment outcomes for the discounted options

Option	Assessment Outcomes
2 Widen to the west (hold eastern boundary)	<ul style="list-style-type: none"> <li>Achieves transport and heritage outcomes.</li> <li>Has less equitable property requirement compared to Option 1.</li> <li>Option impacts on the Morrison's Orchard.</li> <li>There is a potential flooding risk along the corridor.</li> <li>Option would cause some disruption to the existing carriageway due to widening on one side.</li> </ul>
3 Widen to the east (hold western boundary)	<ul style="list-style-type: none"> <li>Achieves transport, social cohesion, and heritage outcomes.</li> <li>Has less equitable property access compared to Option 1.</li> <li>There is a potential flooding risk along the corridor.</li> <li>Option would cause some disruption to the existing carriageway due to widening on one side.</li> </ul>

### 3.4.5.3 Emerging Preferred Option

The outcome of the assessment identified Option 1 as the emerging preferred option. The option achieves transport, heritage, land requirement, and construction outcomes. The option causes the least disruption to the existing carriageway and impacts on the existing Morrison's Heritage Orchard will be reduced through utilising localised widening to the east within the impacted section of the corridor.

The DBC existing SH1 Upgrade – Section 3 alignment is shown in Figure 3-30 below.

**Figure 3-30: DBC SH1 Upgrade – Section 3**

### 3.4.6 Engagement

Table 3-27 below provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to DBC appendix.

**Table 3-27: SH1 engagement summary**

Project	Feedback
SH1 Upgrade	<ul style="list-style-type: none"> <li>• Support for dedicated walking and cycling facilities along the corridor and support for access to local facilities and town centres.</li> <li>• General agreement for the principle to provide:</li> <li>• Reallocation of road reserve north of Hill Street (Section 1)</li> <li>• Reallocation of road reserve between Hill Street and Woodcocks Road (Section 2)</li> <li>• Provision of a 24m urban arterial road for Section 3 following the centreline principles.</li> <li>• General support for the use of bi-directional lanes in Section 2.</li> </ul>

### 3.4.7 Option Refinement

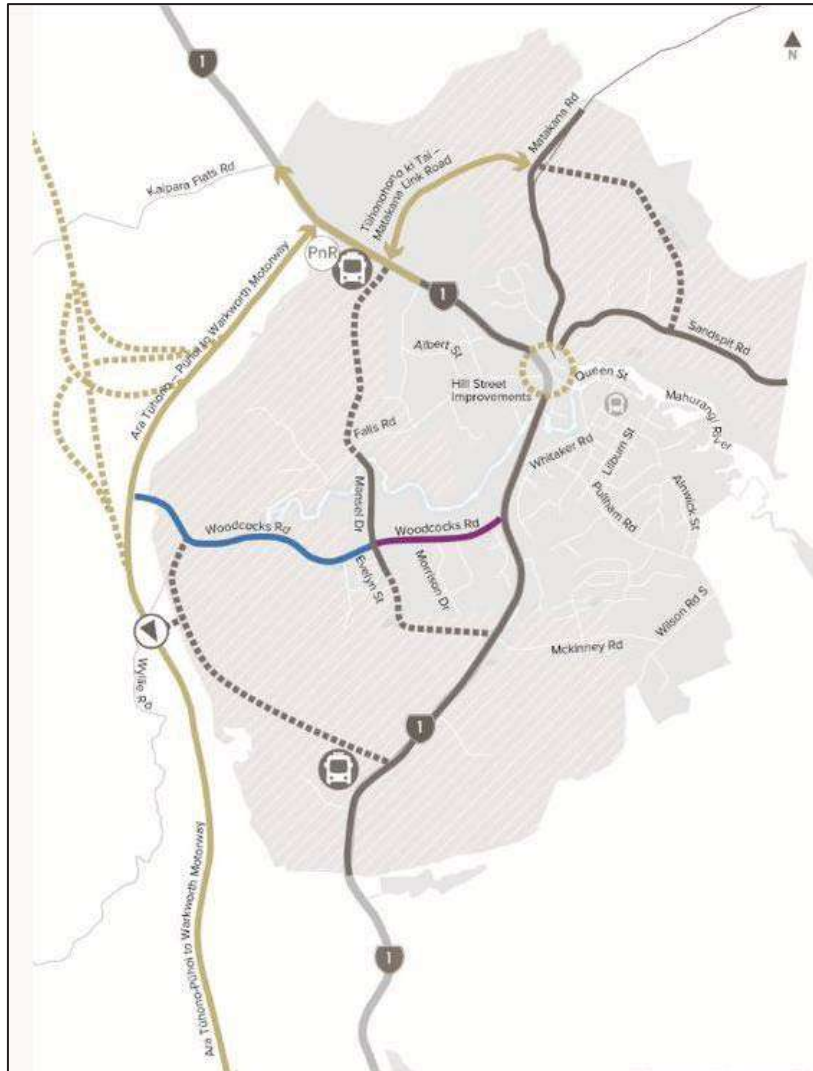
No further option refinement opportunities were identified by the Project team within the length of the corridor.

### 3.5 Woodcocks Road Upgrade

### 3.5.1 Overview

The urbanisation of Woodcocks Road in the DBC Warkworth transport network is shown in Figure 3-31 below.

### Figure 3-31. Woodcocks Road Upgrade



Woodcocks Road forms a key east-west connection in the existing network. Upgrading the corridor will provide multimodal access to the western Warkworth growth area and improve active mode access to key social and economic destinations including Mahurangi College and future planned schools.

### 3.5.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for Woodcocks Road.



### 3.5.2.1 Gap analysis

The gap analysis recommended that the upgrade of the Woodcocks Road corridor should be subject to the route refinement process in the DBC phase because the corridor has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and complete further refinements to the option as the corridor supports and connects well with planned future roads and fits the Te Tupu Ngātahi options hierarchy of utilising and improving existing infrastructure first.

The gap analysis concluded the DBC scope of works should also include the following:

- An assessment of the corridor's level of compliance with current geometric design and flood immunity standards.

### 3.5.2.2 Land use assessment

An overview of current zoning within the study area is illustrated in Figure 3-32 below. Land uses in the western section of the corridor are currently rural and the area is future urban zoned to the north and south. Open space conservation zoning runs north-south through the western section at its midpoint and residential zoning is present to the far northeast and southeast of the corridor. The eastern section of the corridor has existing industrial land used to the northwest and south and Mahurangi College is situated to the north east of corridor.

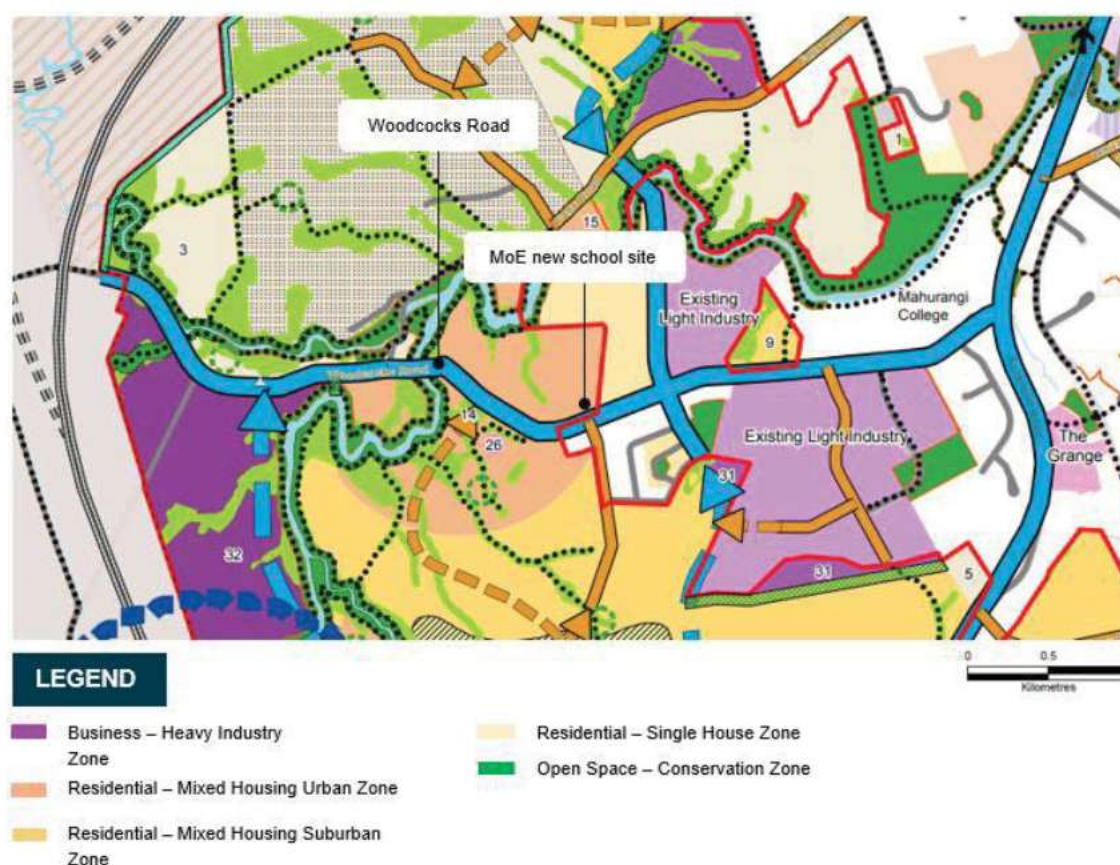
**Figure 3-32. Woodcocks Road AUP-OP Zoning**



Proposed future zoning within the study area as identified in the Warkworth Structure Plan structure are shown in Figure 3-33 below. Whilst industrial zoning in the eastern section of the corridor remains the same, future urban zoning in the western section of the corridor changes to a combination of heaving industrial zoning in the southwest and residential zoning in the north, far northwest, and southeast of the corridor. The Ministry of Education (MoE) has also identified a new school site located to north of the corridor which is outlined in the zoning map below.



Figure 3-33. Woodcocks Road - Warkworth Structure Plan Zoning



### 3.5.2.3 Climate change assessment

The climate change assessment concluded the Woodcocks Road upgrade cannot be eliminated from the Warkworth transport network as the network will not have a dedicated east west active mode spine connecting the planned north and south growth areas (which include industrial and intensified residential land uses) with key destinations such as the Warkworth Town Centre. This will leave a critical gap in the overall Warkworth active mode network and impact the ability to achieve mode shift from private vehicles to active modes.

The assessment recommends the option development and assessment process consider the following opportunities:

- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

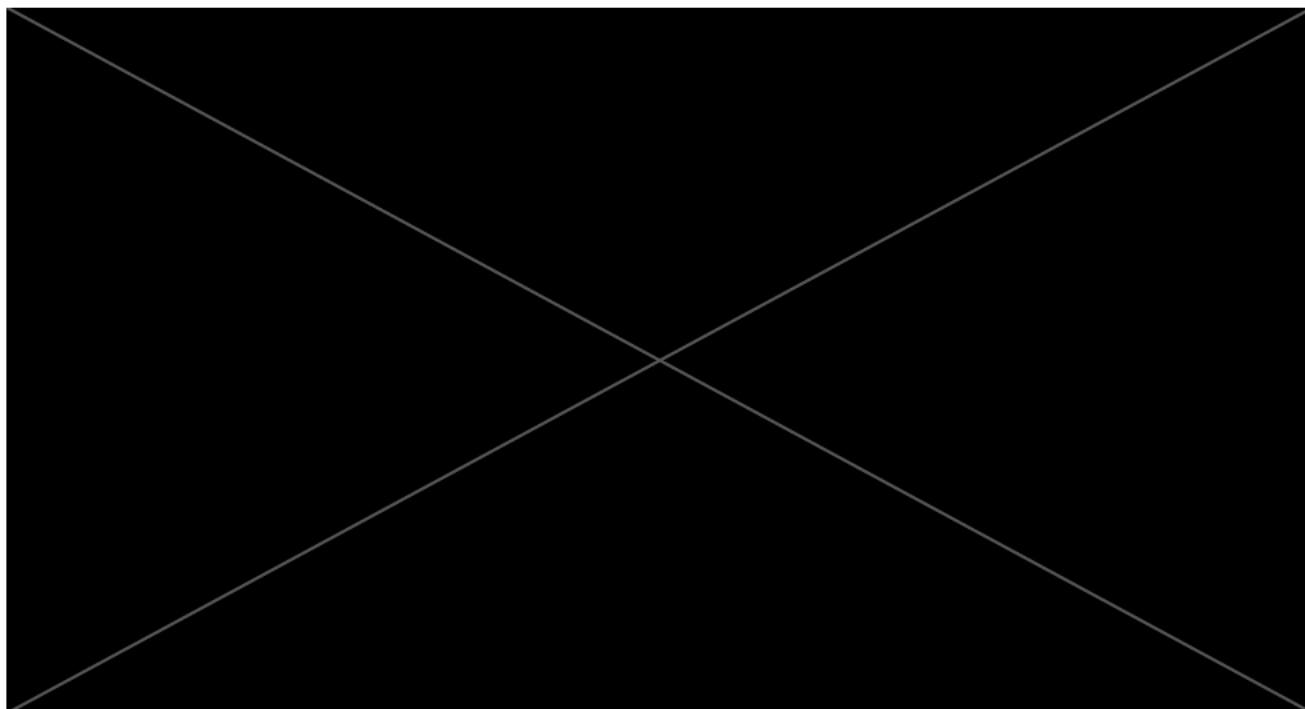
### 3.5.2.4 Constraints mapping

Constraints mapping was undertaken Woodcocks Road by the Project team with input from Mana whenua and SMEs. Key constraints and considerations for the project extent are outlined in Figure 3-34 below and include:

- Mahurangi College and a future planned school.
- Existing industrial and residential areas in the eastern section of the corridor.
- [REDACTED]
- Significant ecological areas to the north of the western section of the corridor.

- Flood plains and areas of high flooding potential through the midsection of the corridor.
- Open space conservation zoning adjacent to river/streams within the Woodcocks Road extent.

**Figure 3-34: Woodcocks Road Constraints Map**



### 3.5.2.5 Form and function assessment

The form and function assessment identified a 24m wide two-lane urban arterial with footpaths and cycling facilities on both sides of the corridor.

For further details about the corridor form and function refer to Appendix G of the DBC.

### 3.5.3 Option Development and Assessment Process

During the commencement of the option development phase, the project team sectioned the Woodcocks Road corridor for the purpose of option development into a rural section extending from the Ara Tūhono intersection in the west to the Mansell Drive intersection in the east; and an urban section extending from Mansell Drive in the west to the corridor's intersection with SH1 in the east.

This approach was informed by constraints mapping at the preliminary analysis stage and was taken due to the differences in the existing environment through the length of the corridor. During this stage the project team identified that corridor design could not be the same for both sections as the urban section consists of existing residential, commercial, industrial land uses and social infrastructure such as Mahurangi College where a wider cross section would result in greater property impact, whilst the western section is currently rural and any future urbanisation in the area would be completed alongside or after the upgrade of the corridor. The eastern end of the rural section is currently an existing residential area but is included in the rural section extent due to the Mansell Drive intersection being the separation point between the two sections.

For the purpose of clarity, the option development and assessment process for each section is outlined separately in the following sections. Figure 3-35 below outlines the rural and urban sections of Woodcocks Road.



**Figure 3-35. Woodcocks Road section overview**

### 3.5.3.1 Option Development - Woodcocks Road Upgrade (Urban Section)

In consideration of the findings of the preliminary analysis the project team identified the options outlined in Table 3-28 below for the upgrade of the urban section of Woodcocks Road.

**Table 3-28. Woodcocks Road urban section options**

Option	Description
1	SGA 24m cross section - Holding centreline
2	SGA 24m cross section - Widening to the north
3	SGA 24m cross section - Widening to the south
4	SGA 20m cross section - Within existing road reserve. One cycling lane in each direction
5	SGA 20m cross section - Within existing road reserve. Bi-directional cycling lane in each direction

### 3.5.3.2 Option Assessment – Woodcocks Road (Urban Section)

Following the identification of options for the urban section of Woodcocks Road, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.



Table 3-29 below illustrates a heat map summarising the assessment outcomes for the urban section of Woodcocks Road. Overall, all the options achieved the investment objectives with corridor width being the primary differentiator between the preferred and discounted options. Options which included a 24m wide cross section were discounted by technical specialists and the project team as they were assessed as having a higher land requirement, greater disruption of social cohesion, and moderate construction impacts. This was in comparison to those options with a 20m wide cross section which were preferred by technical specialists and the project team as they were assessed as having a low or positive impacts across the criteria.

**Table 3-29: Woodcocks Road (urban section) Assessment Outcome**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
I.O.1 – Access					
I.O.2 – Integration					
I.O.3 – Travel Choice					
I.O.4 – Safety					
Heritage					
Land Requirement					
Ecology					
Stormwater					
Social Cohesion					
Transport					
Construction					

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-30 and Table 3-31 below.

**Table 3-30: Woodcocks Road Upgrade (urban section) preferred option**

Option	Rationale
5  SGA 20m cross section - Within existing road reserve with bi-directional cycling lane in each direction.	<ul style="list-style-type: none"> <li>Minimised cross-section responds to existing land use constraints and avoids property impact on Mahurangi College and existing industrial area.</li> <li>Cross – section balances the existing land use with transport outcomes. Walking and cycling connectivity is still achieved without impacting the existing urban infrastructure.</li> <li>The implementation of a bi-directional cycle lane supports safe access to the school and minimises conflict with industrial land use to the southwest of the corridor.</li> </ul>

**Table 3-31: Rationale for discounted Woodcocks Road Upgrade (urban section) options**

Option	Rationale
1 SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>• Achieves transport outcomes however land requirement would have considerable impacts on Mahurangi College and the existing industrial area.</li> <li>• Would result in significant construction disruption for Mahurangi College and the existing industrial area.</li> </ul>
2 SGA 24m cross section - Widening to north	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Property impacts would be confined to Mahurangi College however this would have a high degree of social impact.</li> </ul>
3 SGA 24m cross section - Widening to south	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Property impacts would be confined to businesses within the existing industrial area however this would potentially have a high economic and social impact on those businesses.</li> </ul>
4 SGA 20m cross section - Within existing road reserve with one cycling lane in each direction.	<ul style="list-style-type: none"> <li>• Achieves transport outcome.</li> <li>• Preference for bi-directional cycling lane on both sides compared to one cycling lane. As this would improve safety outcomes by alleviating conflict between cyclists and industrial forecourts and driveways.</li> </ul>

### 3.5.3.3 Woodcocks Road (Urban Section) Emerging Preferred Option

The outcome of the assessment identified Option 5 as the emerging preferred as it best balances the existing land use and transport outcomes by avoiding property impact and achieves walking and cycling connectivity whilst ensuring safe access to the school, and minimising conflict with the existing industrial area for active mode users.

### 3.5.3.4 Option Development – Woodcocks Road (Rural Section)

In consideration of the findings of the preliminary analysis the project team identified the options outlined in Table 3-32 below for the upgrade of the Woodcocks Road rural section. As noted in section 3.5.3, reduced cross section options were not explored for this section of the corridor as it does not have the same constraints as the urban section which necessitated assessment of reduced cross sections.

**Table 3-32: Woodcocks Road (rural section) options**

Option	Description
1	SGA 24m cross section – Holding centreline
2	SGA 24m cross section – Widening to the south (hold northern boundary)
3	SGA 24m cross section – Widening to the north (hold southern boundary)

### 3.5.3.5 Option Assessment - Woodcocks Road (Rural Section)

Table 3-33 below illustrates a heat map summarising the assessment outcomes for the rural section of Woodcocks Road. Overall, the assessment identified that all the proposed options achieved investment objectives and had either moderate or low impacts on the identified constraints. Land requirement, ecology, stormwater and construction effects were the key differentiators between the options. While generally all the options had a similar level of impact, technical specialists and the project team identified Option 1 and 2 as the preferred options due to their reduced property requirement for and ecological impacts.

**Table 3-33: Woodcocks Road Upgrade Assessment (rural section)**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
I.O.4 – Safety			
Heritage			
Land Requirement			
Ecology			
Stormwater			
Social Cohesion			
Transport			
Construction			



A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-34 and Table 3-35 below.

**Table 3-34: Woodcocks Road Upgrade (rural section) preferred options**

Option	Assessment Outcomes
1 SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>• Cross-section achieves transport outcomes, has equitable property requirement and results in the least disruption to the existing carriageway.</li> <li>• However, there is potential for the corridor to have localised impacts on the Open Space – Conservation Zone that runs north-south through the midsection of the corridor and the SEA to the north of the corridor.</li> <li>• There is a potential risk of flooding along the corridor.</li> </ul>
2 SGA 24m cross section - Widen to the south (Hold northern boundary)	<ul style="list-style-type: none"> <li>• Cross section achieves transport outcomes but will require acquisition of property and cause disruption to the existing carriageway due to only widening on one side.</li> <li>• Does not impact on the Open Space Conservation – Zone or the SEA.</li> <li>• There is a potential risk of flooding along the corridor.</li> </ul>

**Table 3-35: Assessment outcomes for discounted option Woodcocks Road Upgrade (rural section)**

Option Name	Assessment Outcomes
3 SGA 24m cross section – Widen to the north (hold south boundary)	<ul style="list-style-type: none"> <li>• Will require property acquisition and overall has the highest impact on the Open Space – Conservation Zone and the SEA.</li> <li>• Will cause disruption to the existing carriageway due to only widening on one side.</li> <li>• There is a potential risk of flooding along the corridor.</li> </ul>

### 3.5.4 Woodcocks Road Emerging Preferred Option

The outcome of the assessment identified a hybrid of Option 1 and 2 as the emerging preferred option. The corridor will generally be upgraded using centreline widening and localised widening to the south to minimise impacts on the SEA and Open Space – Conservation Zone.

### 3.5.5 Engagement

The following section provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to Appendix E of the DBC.

Project	Feedback
Woodcocks Road Upgrade	<ul style="list-style-type: none"> <li>General agreement from all partners and stakeholders on the provision of a 24m wide corridor in the rural section and a 20m wide corridor in the urban section.</li> <li>Community members are supportive of walking and cycling facilities along the entire length of the corridor.</li> <li>During initial engagement, the Ministry of Education requested that Mahurangi College and the future planned school at 100 Woodcocks Road be considered in any upgrade to the corridor by the Project team.</li> </ul>

### 3.5.6 Option Refinement

No further option refinement opportunities were identified by the project team for the length of the corridor. Feedback received from the Ministry of Education was applied to the option development and assessment process and is reflected in the emerging preferred DBC option for the rural section of the corridor. The emerging preferred option utilises centreline widening to avoid property impact on the future planned school site (100 Woodcocks Road) and the implementation of cycling facilities and footpaths on both sides of the corridor will support active mode user access to the planned school.

### 3.5.7 Emerging Preferred Option

Following the option development and assessment process the preferred DBC Woodcocks Road upgrade alignment is shown below in Figure 3-36.

**Figure 3-36: Indicative DBC Woodcocks Road (rural segment) Upgrade**

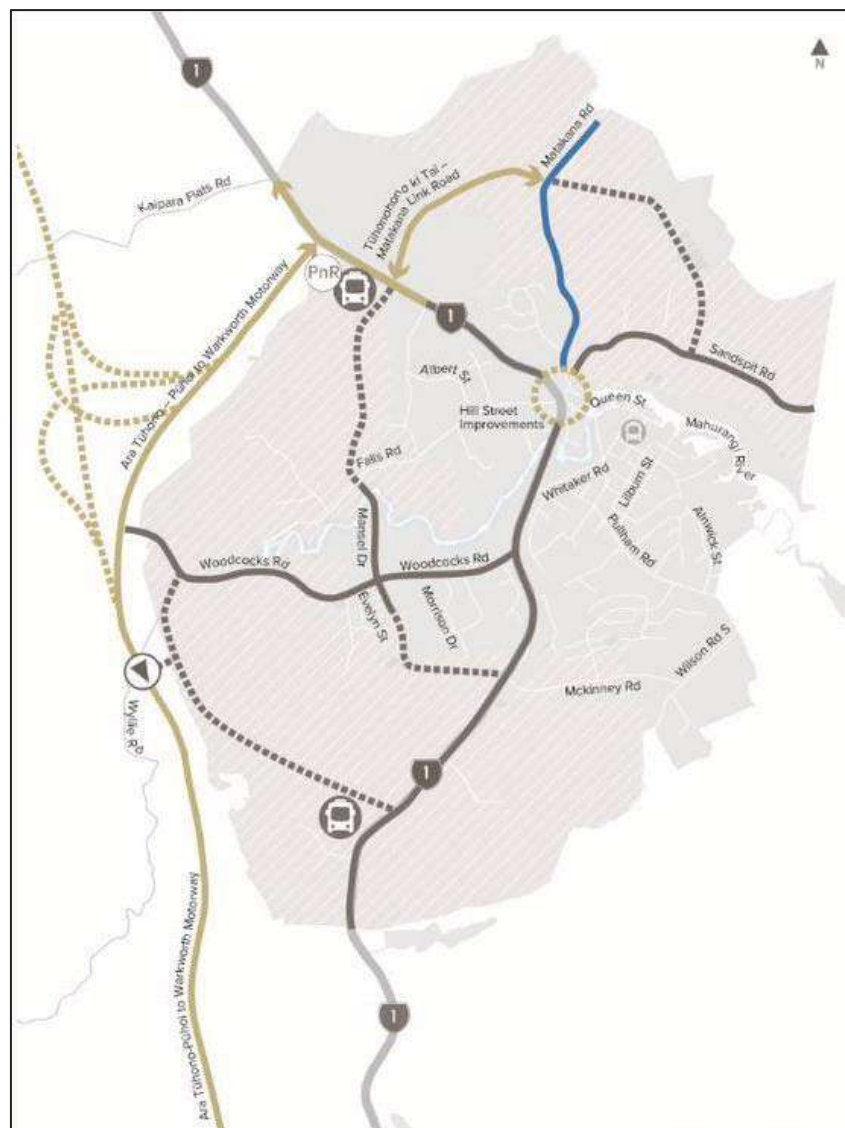


## 3.6 Matakana Road Upgrade

### 3.6.1 Overview

The urbanisation of Matakana Road in the DBC Warkworth transport network is shown in Figure 3-37 below.

**Figure 3-37: Matakana Road upgrade**



Matakana Road forms a key north-south connection in the existing network and upgrades to the corridor will improve connectivity between Warkworth growth areas and the Kowhai Coast. The corridor will additionally integrate with, and support planned urban growth and the future transport network in Warkworth.

### 3.6.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Matakana Road upgrade.



### 3.6.2.1 Gap Analysis

The gap analysis recommended that the upgrade of Matakana Road should be subject to the route refinement process in the DBC phase because the corridor has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and complete further refinements to the option as the corridor supports and connects well with planned future roads and fits the Te Tupu Ngātahi options hierarchy of utilising and improving existing infrastructure first.

The gap analysis concluded that in the DBC scope of works the following should be completed and considered:

- An assessment of the corridor's level of compliance with current geometric design and flood immunity standards.
- Integration with the Auckland Transport (AT) Hill Street Intersection Upgrade including tie in point and extent of works required for the corridor.

### 3.6.2.2 Land use Assessment

Current zoning within the study area is shown in Figure 3-38 below. The western length of the corridor is currently comprised of various residential zones and is an established urban area, the eastern length of the corridor is adjacent to future urban zoning and the southern section of the corridor is adjacent to open space conservation zoning on the east and west. Te Honohono ki Tai (Matakana Link Road) is currently under construction and will intersect with Matakana Road on completion.

Figure 3-38. Matakana Road AUP-OP Zoning





Proposed future zoning within the study area as identified in the Warkworth Structure Plan is shown in Figure 3-39 below. The structure plan outlines limited change within the existing residential urban area along the western length of the corridor, however, identifies that the current FUZ area adjacent to the corridor will change to residential zoning.

**Figure 3-39: Matakana Road Warkworth Structure Plan Zoning**



### 3.6.2.3 Climate Change Assessment


The climate change assessment concluded the Matakana Road upgrade cannot be eliminated from the Warkworth transport network as the network will not have an active mode connection to northern growth areas and the opportunity for mode shift for short trips to the Warkworth Town Centre will be lost. This will leave a critical gap in the overall Warkworth active mode network and impact the ability to achieve mode shift from private vehicles to active modes.

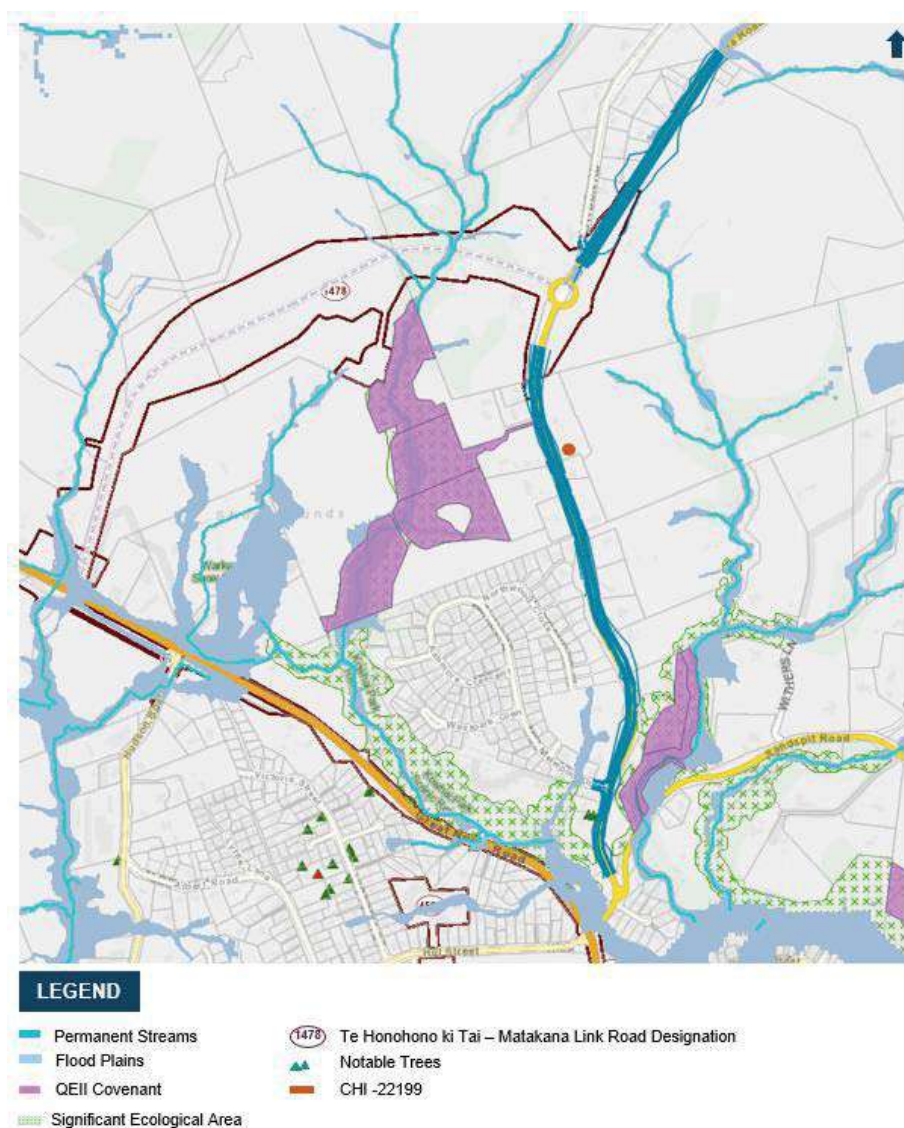
The assessment recommends the option development and assessment process consider the following opportunities:

- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

### 3.6.2.4 Constraints Mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of Matakana Road are outlined in Figure 3-40 below and include:

- 
- A mixture of native and exotic woodland to the west of the corridor and cedar trees located to the southwest of the corridor.
- Overland flow path, flood plains, and SEA in the southern section of the corridor.
- Tie into Hill Street Intersection Upgrade and Matakana Link Road intersection.
- Matakana Link Road designation.
- Existing urban area along the western length of the corridor.

**Figure 3-40. Matakana Road - Constraints Map**

### 3.6.2.5 Corridor Form and Function Assessment

The form and function assessment identified that Matakana Road will be upgraded to a 24m wide two-lane arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details about the corridor form and function assessment refer to Appendix G of the DBC.

### 3.6.3 Option Development

Upon completion of the preliminary analysis the project team identified options for further assessment for the upgrade of Matakana Road. A total of 3 options were identified which tested centreline widening or widening to the east/west and holding the eastern/western boundary.

Details of the options identified are outlined in Table 3-36 below.



**Table 3-36: Matakana Road Upgrade Options**

Option	Description
1	SGA 24m cross section - Holding centreline
2	SGA 24m cross section - Widen to the west (Hold eastern boundary)
3	SGA 24m cross section - Widen to the east (Hold western boundary)

### 3.6.4 Option Assessment

Following the identification of options for Matakana Road, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.

Table 3-37 below illustrates a heat map summarising the assessment outcomes for Matakana Road. Overall, all the options assessed generally achieved the investment objectives and avoided identified constraints. The key differentiator between the 3 options was the requirement for land and construction impacts. Option 1 was the only option to have low land requirement and minimised construction impacts as a result it was identified as the preferred option by the project team. The project team noted the potential impact of Option 1 on key constraints such as mature woodland to the southwest of the corridor and the SEA adjacent to the southeast section of the corridor and identified the opportunity to refine the corridor design during the detailed design phase to avoid/reduce impacts on identified constraints.

**Table 3-37: Matakana Road Upgrade option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
I.O.4 – Safety			
Heritage			
Land Requirement			
Ecology			
Stormwater			
Social Cohesion			
Transport			
Construction			

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-38 and Table 3-39 below.

**Table 3-38: Assessment outcome of the preferred option**

Option	Assessment outcomes
1 SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Has equitable property requirement compared to Option 2 and 3.</li> <li>• Consider impact on key constraints such as mature woodland to the southwest of the corridor and the SEA adjacent to the southeast section of the corridor during detailed design.</li> <li>• Centreline widening causes the least disruption to the existing carriageway.</li> </ul>

**Table 3-39: Assessment outcomes for the discounted options**

Option Name	Assessment outcomes
2 SGA 24m cross section - Widen to the west (Hold eastern boundary)	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Has less equitable property requirement as existing residential properties to the west of the corridor will be impacted.</li> <li>• Impacts on mature woodland to the southwest of the corridor.</li> <li>• Will cause some disruption to the existing carriageway due to widening on one side.</li> </ul>
3 SGA 24m cross section - Widen to the east (Hold western boundary)	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Has less equitable property requirement as existing residential properties adjacent to the southeast of the corridor will be impacted.</li> <li>• Impacts on SEA to the southeast of the corridor.</li> <li>• Will cause some disruption to the existing carriageway due to widening on one side.</li> </ul>

### 3.6.5 Emerging preferred option

The outcome of the assessment identified Option 1 as the emerging preferred option. The corridor will be upgraded using centreline widening as the option minimizes disruption to the existing carriageway, achieves transport outcomes, and has the most equitable property requirement compared to the other two options. Whilst all the options have ecological impacts on the southern section of the corridor this will be considered in the detailed design for Option 1.

### 3.6.6 Engagement

Table 3-40 provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to DBC appendix.

**Table 3-40: Matakana Road upgrade engagement summary**

Project	Feedback
Matakana Road upgrade	<ul style="list-style-type: none"> <li>• Need to be aware of environmental areas identified as including native bush and existing sensitive areas.</li> <li>• Consider support for dedicated walking and cycling facilities along the corridor and support for access to local facilities and town centres.</li> <li>• General agreement of the principle to provide 24m road reserve on Matakana Road based on centreline widening.</li> </ul>

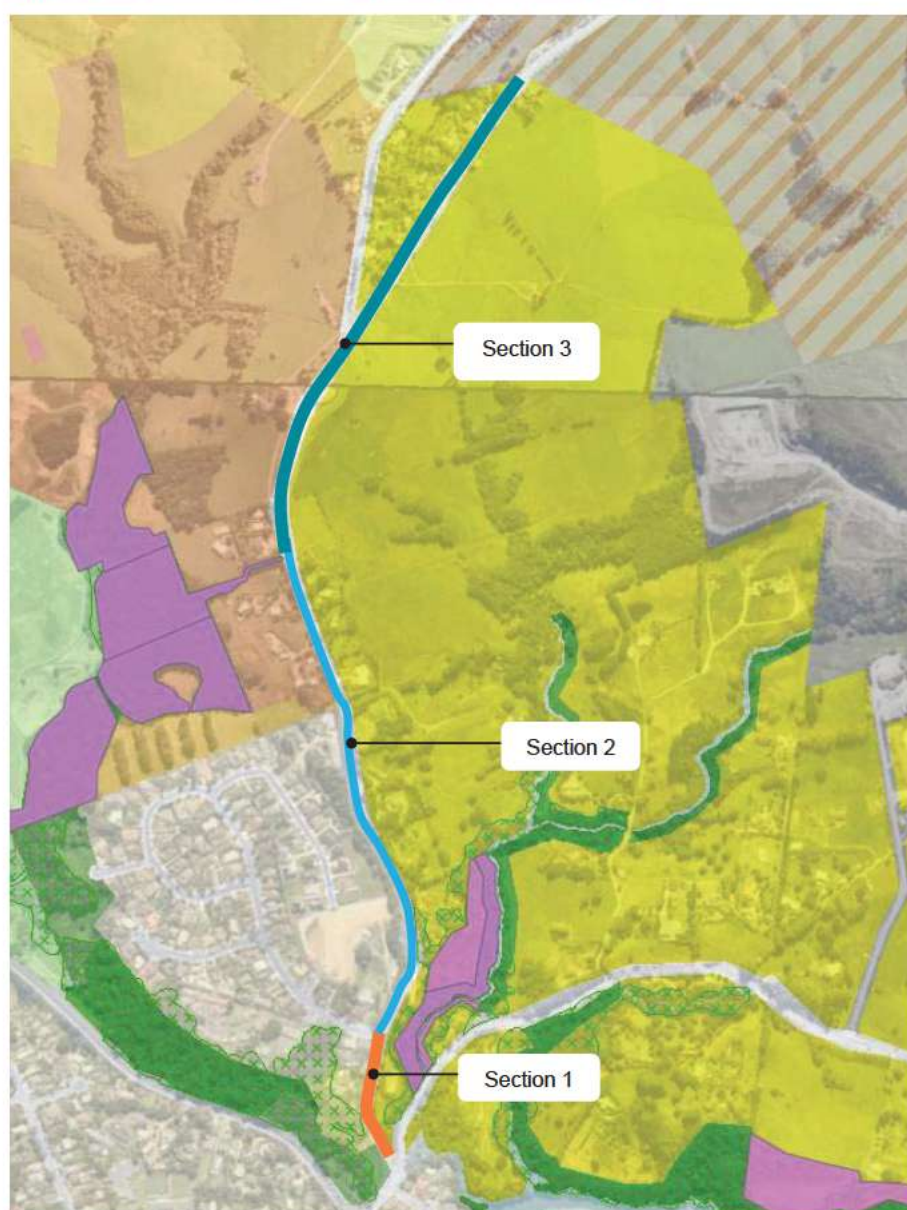
### 3.6.7 Option Refinement

After completion of further design works including the development of geometric designs which enabled the project team to review the detailed design of the corridor, it was identified that as a result of the topography adjacent to the existing corridor the emerging preferred option (24m wide cross section utilising centreline widening) would result in significant construction impacts on property and environmental features (i.e. SEA) in particular areas of the corridor. The design was subsequently refined to achieve improved land use outcomes and reduce impacts on the existing environment.

Through this refinement process it was identified that due to the identified constraints and considerations there was a need to split the corridor into three sections to better enable the project team to avoid and/or minimise impacts on the identified constraints specific to each section. The sections are outlined below:

- Section 1: Hill street intersection tie-in to Melwood Drive intersection
- Section 2: Melwood Drive intersection to south of the Te Honohono ki Tai (Matakana Link Road) intersection
- Section 3: South of the Te Honohono ki Tai (Matakana Link Road) intersection to north FUZ boundary below provides an overview of the Matakana Road option refinement sections.



**Figure 3-41. Matakana Road – Option refinement sections**

The following changes were made to the initial recommendation of a 24m wide cross section using centreline widening with separated cycle lanes and footpaths on both sides of the corridor:

**Section 1:** Alignment reduced to a 16m wide cross section using centreline widening with bidirectional cycling on the western side, and footpaths on both sides between the Hill Street and Melwood Road intersection due to identified constraints and considerations including; integration (tie-in) with the (non-SGA) Hill Street intersection Project, the presence of SEA to the east of the corridor (with a QEII covenant area located further to the east), sloping topography immediately adjacent to the corridor, and existing single house zoned residential properties to the west of the corridor that appear unlikely to be redeveloped. A reduction in the cross section from 24m to 20m wide was tested however this still resulted in property and SEA impacts.

**Section 2:** Recommendation to widen to the west with a 20m wide cross section from Melwood Road to south of the Te Honohono ki Tai (Matakana Link Road) intersection, resulting in the need to straighten the corridor in some areas, due to the initial recommendation resulting in impacts to the

FUZ and substantial property impacts on the recently established residential development to the west of the corridor, as a result of steep topography directly adjacent to the formed road. The project team tested a number of alternative options for this section to mitigate and reduce impacts including:

- A reduced 20m wide cross section utilising centreline widening. However, this option was discounted as there is insufficient space for the corridor to be implemented, without resulting in the same or similar impacts on the FUZ and residential property, due the steep topography located to the west of the corridor.
- A 24m wide cross section utilising widening to the east only. However, this option was discounted as it still resulted in impacts to the west, as well as resulting in considerable impacts on the FUZ, while also impacting on the SEA and QEII covenant area located to the east of the corridor.

The recommended refined option was identified as the best outcome for this section as the reduced 20m wide corridor will provide a suitable transition to and from the reduced 19m wide corridor to the south and into the 24m wide corridor to the north. while achieving transport outcomes by providing for separated cycle lanes and footpaths on both sides of the corridor and reduce the previously significant property impacts on west of the corridor.

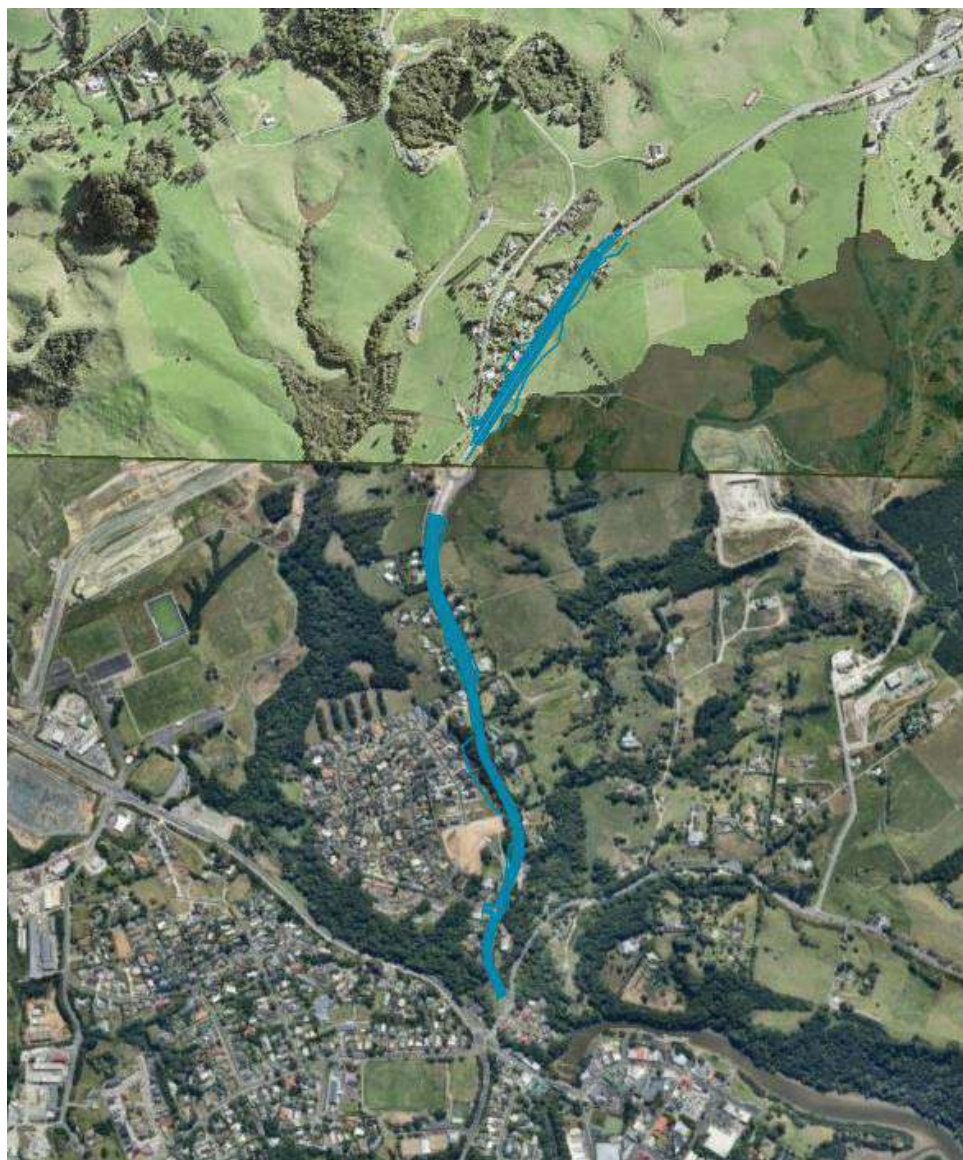
**Section 3:** From south of Te Honohono ki Tai (Matakana Link Road) intersection to the northern extent of the project at the FUZ boundary the corridor will continue as a 24m wide cross section utilising centreline widening and will have separated cycle lanes and footpaths on both sides of the corridor. The initial corridor recommendation remains applicable to this section of the corridor as it does not have ecological, topographical, or residential constraints which require mitigation.

### 3.6.8 Refined Emerging Preferred Option

Following the engagement and option refinement process the indicative DBC Matakana Road upgrade was confirmed and is illustrated below in [Figure 3-42](#).



**Figure 3-42: DBC Recommended Matakana Road upgrade**

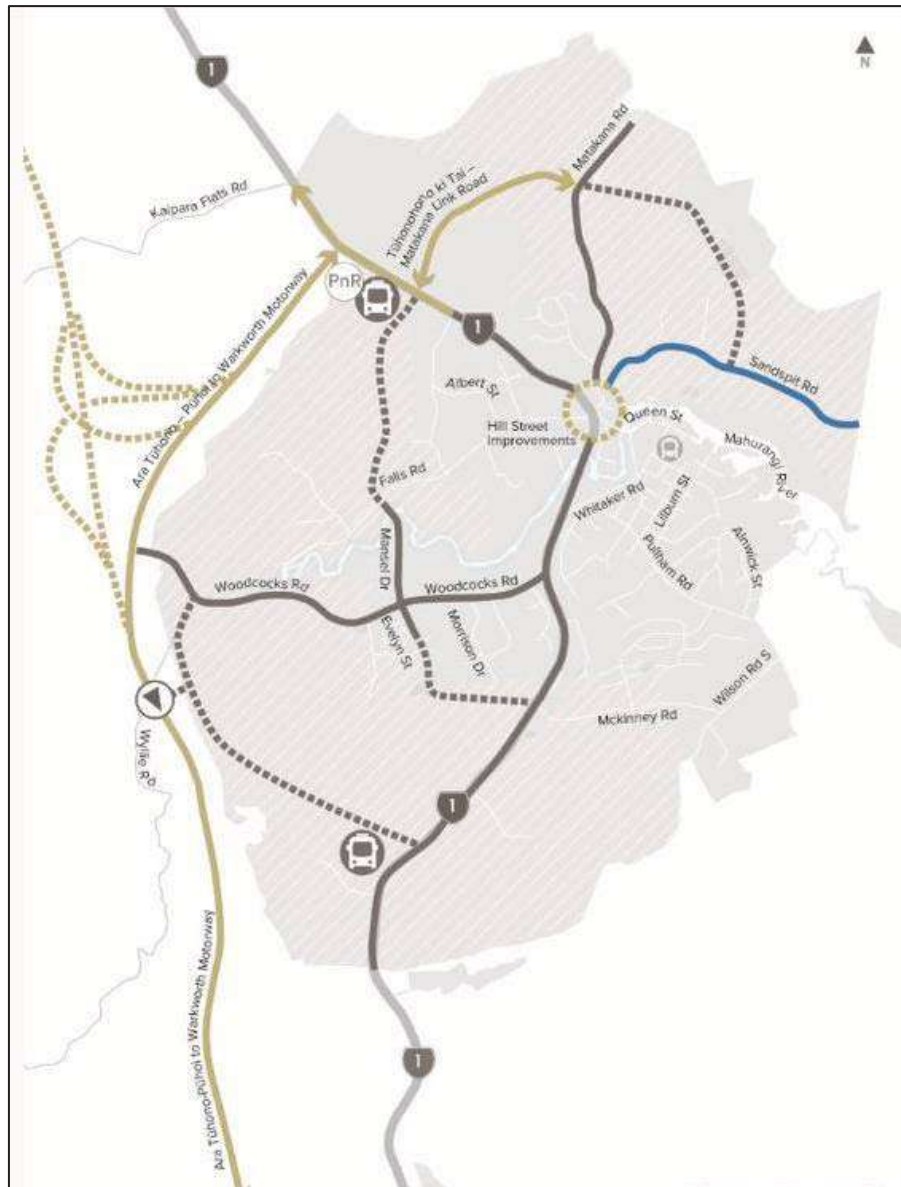


## 3.7 Sandspit Road Upgrade

### 3.7.1 Overview

The urbanisation of Sandspit Road in the DBC Warkworth transport network is shown in Figure 3-43 below.

**Figure 3-43: Sandspit Road Upgrade**



Sandspit Road forms a key north-south connection in the existing network and upgrades to the corridor will improve connectivity between the north-east Warkworth growth area and the Mahurangi Peninsula. The corridor will integrate with the future transport network in Warkworth, and support planned urban growth.

### 3.7.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Sandspit Road upgrade.



### 3.7.2.1 Gap Analysis

The gap analysis recommended that the upgrade of Sandspit Road should be subject to the route refinement process in the DBC phase because the corridor has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and complete further refinements to the option as the corridor supports and connects well with planned future roads and fits the Te Tupu Ngātahi options hierarchy of utilising and improving existing infrastructure first.

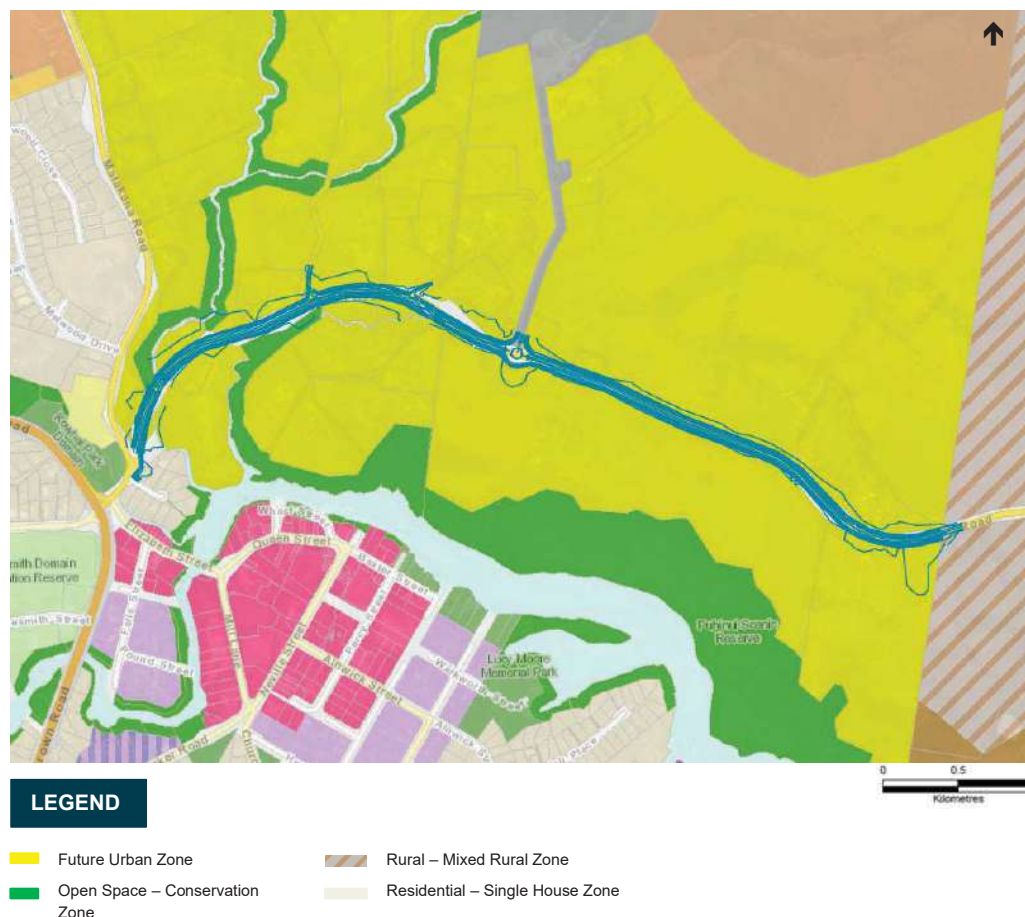
The gap analysis concluded that in the DBC scope of works the following should be completed and considered:

- An assessment of the corridor's level of compliance with current geometric design and flood immunity standards.
- Integration with the Auckland Transport (AT) Hill Street Intersection Upgrade including tie in point and extent of works required for the corridor.

### 3.7.2.2 Land use Assessment

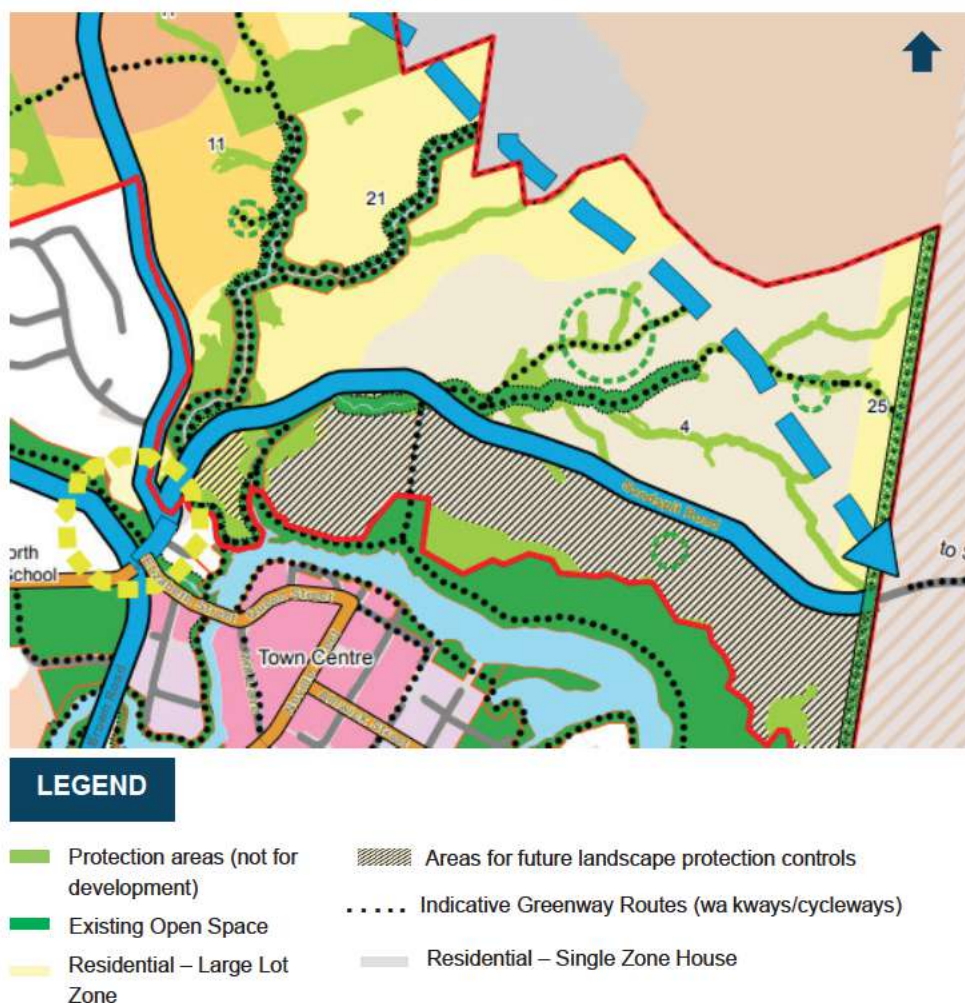
Current zoning within the Sandspit Road extent is shown in Figure 3-44 below. The existing environment within the corridor extent is largely rural with low density housing. The length of the corridor the upgrade relates to is future urban zoned with open space conservation zoning adjacent to the corridor in the west and far south. The Project team notes that a Private Plan Change has been submitted for the southern side of Sandspit Road and new land use policies suggest this is expected to include higher density residential housing.

**Figure 3-44: Sandspit Road AUP-OP zoning**



Proposed future zoning within the Sandspit Road extent as identified in the Warkworth Structure Plan is shown in Figure 3-45 below. The structure plan indicates a change from the existing environment and future urban zoning to residential zoning along the northern length of the corridor and the area adjacent to the southern length of the corridor has been identified as an area subject to further landscape protection controls. Sandspit Link Road will additionally be intersecting with the corridor at its mid-point.

**Figure 3-45. Sandspit Road - Warkworth Structure Plan Zoning**



### 3.7.2.3 Climate change assessment

The climate change assessment concluded the Sandspit Road upgrade cannot be eliminated from the Warkworth transport network as the network will not have an active mode connection to northern eastern growth areas and the opportunity for mode shift for short trips to the Warkworth Town Centre will be lost. This will leave a critical gap in the overall Warkworth active mode network and impact the ability to achieve mode shift from private vehicles to active modes.

The assessment recommends the option development and assessment process consider the following opportunities:



- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

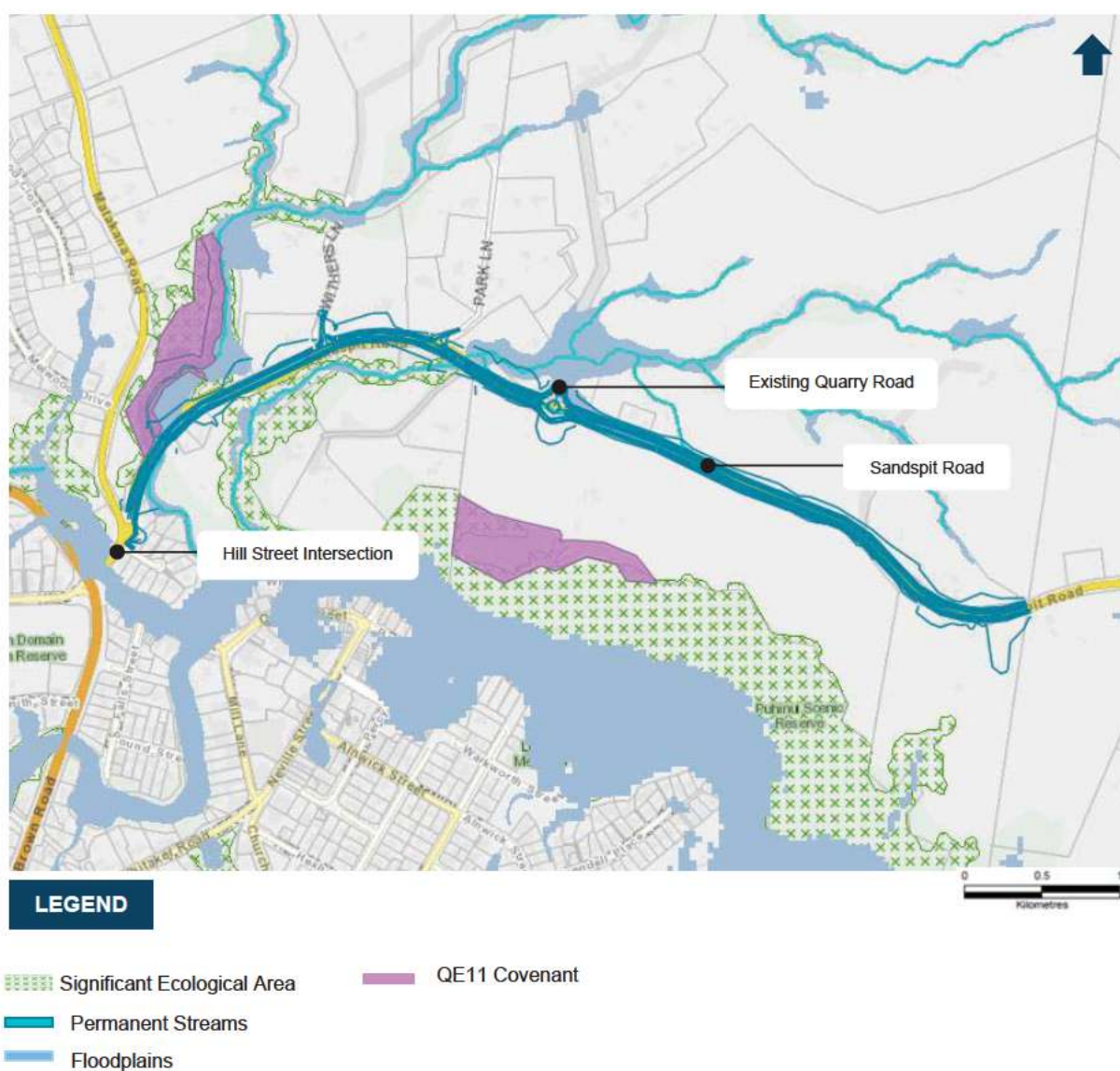
### 3.7.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of Sandspit Road are outlined in

Figure 3-46 below and include:

- SEA to the north and south of the western extent of the corridor.
- Permanent streams and flood plains in the western extent of the corridor.
- Tie in with the Hill Street Intersection Upgrade and existing quarry road.
- Queens Elizabeth II (QE11) covenant to the north of the western section of the corridor.
- Steep topography and large existing retaining wall.

Figure 3-46: Sandspit Road Constraints Map





### 3.7.2.5 Corridor form and function assessment

The form and function assessment identified that Sandspit Road will be upgraded to a 24m wide two-lane urban arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details on the corridor form and function refer to Appendix G of the DBC.

### 3.7.3 Option Development

Upon completion of the preliminary analysis the project team identified options for assessment for the upgrade of Sandspit Road. A total of 3 options were identified which tested centreline widening or widening to the east/west and holding the eastern/western boundary and are outlined in Table 3-41 below.

**Table 3-41: Sandspit Road Upgrade Options**

Option	Description
1	SGA 24m cross section - Holding centreline
2	SGA 24m cross section - Widen to the north (Hold southern boundary)
3	SGA 24m cross section - Widen to the south (Hold northern boundary)

### 3.7.4 Option Assessment

Following the identification of options for Sandspit Road, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.

Table 3-42 below illustrates a heat map summarising the assessment outcomes for Sandspit Road. Overall, all the options assessed achieved the investment objectives, transport outcomes and social cohesion. Similarly, ecological and stormwater constraints were present amongst all the options with the primary differentiator between the options being the requirement for land and construction works. As a result, Option 1 was identified as the preferred by the project team because it had reduced property requirements and construction impacts compared to Option 2 and 3.

**Table 3-42: Sandspit Road Upgrade option assessment summary**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
I.O.4 – Safety			
Heritage			

MCA Criteria	Option 1	Option 2	Option 3
Land Requirement			
Ecology			
Stormwater			
Social Cohesion			
Transport			
Construction			

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-43 and Table 3-44 below.

**Table 3-43: Assessment outcome for the preferred option**

Option	Assessment Outcome
1  SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• The centreline approach generally avoids constraints however there are potential flooding concerns and the SEA to be considered at the western edge of the corridor – need localised widening to be used on the western section to minimise localised impacts to the SEA/QEII.</li> <li>• There is equitable property requirement compared to Option 2 and 3.</li> <li>• Option causes the least disruption to the existing carriageway.</li> <li>• Potential for flooding to occur in the western section of the corridor.</li> <li>• Steep topography adjacent to corridor.</li> </ul>

**Table 3-44: Assessment outcomes for discounted options**

Option	Assessment Outcome
2  SGA 24m cross section - Widen to the north (Hold southern boundary)	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Less equitable property requirement compared to Option 1.</li> <li>• Some disruption to existing carriageway due to widening on one side.</li> <li>• Could potentially impact on the SEA located to the northwest of the corridor.</li> <li>• Steep topography adjacent to corridor</li> <li>• Potential for flooding to occur in the western section of the corridor.</li> </ul>
3  SGA 24m cross section	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Less equitable property requirement compared to Option 1.</li> <li>• Potential for flooding to occur in the western section of the corridor.</li> </ul>

Option	Assessment Outcome
- Widen to the south (Hold northern boundary)	<ul style="list-style-type: none"> <li>• Could potentially impact on the streams and/or SEA located to the southwest of the corridor.</li> <li>• Some disruption to existing carriageway due to widening on one side.</li> <li>• Steep topography adjacent to corridor</li> </ul>

### 3.7.4.1 Emerging preferred option

The outcome of the assessment identified Option 1 as the emerging preferred option. The corridor will be upgraded using centreline widening to the north and south. Option 1 has the most equitable property requirement and will have the least disruption on the existing carriageway. While this option generally avoids most constraint's, localised widening will be used in the western section to avoid the SEA. This was addressed at the option refinement stage of the project and is discussed in Section 3.7.6 below.

### 3.7.5 Engagement

Table 49 provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to DBC appendix.

**Table 49: Sandspit Road upgrade engagement summary**

Project	Feedback
Sandspit Road upgrade	<ul style="list-style-type: none"> <li>• Strong support for the urbanisation of Sandspit Road and walking and cycling facilities.</li> <li>• General agreement of the principle to provide 24m road reserve on Sandspit Road based on centreline widening.</li> </ul>

### 3.7.6 Option Refinement

After completion of further design works including the development of geometric designs which enabled the project team to review the detailed design of the corridor, it was identified that as a result of the need to provide for the upgrade to the existing culvert/bridge in the western section (Hill Street intersection tie in until Withers Lane) in order to provide for future resilience of the corridor the emerging preferred option would result in significant construction impacts on SEA/QEII covenant areas to the west of the corridor. The Project team subsequently tested refinements to the design of the western section of the alignment to minimise, or avoid, impacts on these areas.

Through this refinement process it was identified that due to the identified constraints and considerations there was a need to split the corridor into three sections to better enable the project team to avoid and/or minimise impacts on the identified constraints specific to each section. The sections are outlined below:



- **Section 1:** Hill Street intersection tie-in to after the first bridge (stream) crossing adjacent to SEA/QEII
- **Section 2:** First bridge to second bridge
- **Section 3:** Second bridge to eastern FUZ boundary.

An overview of the Sandspit Road sections is shown in Figure 3-47 below.

**Figure 3-47. Sandspit Road Section Overview**



The following refinements were applied to the initial corridor recommendation:

**Section 1:** Recommendation for a reduced 18m cross section (to provide for tie into Hill Street intersection and bridge) from the Hill Street intersection to the first bridge, with an interim active mode boardwalk (in place until stormwater infrastructure upgrade) to the east of the corridor parallel to the road connecting to the Hill Street Intersection. Design works revealed that the initial recommendation of a 24m cross section would have a considerable impact on the SEA and stream network adjacent to the corridor, as well as the QEII covenant to the west, and result in high volumes of earthworks due to the steep topography. Additionally, it was identified that construction of the initial 24 cross section would require works to the existing stormwater infrastructure within the section resulting in significant flooding effects downstream.

- An alternative option to widen to the east with a 150+ bridge was considered however was discounted due to the high cost and complex constructability associated with this option.

The recommended refined option was identified as the best outcome for this section of the corridor as an interim solution to respond to planned land use and achieve the urbanisation, resilience, and transport outcomes of the corridor. It is considered that the integration of active mode facilities can be delivered when stormwater infrastructure upgrades occur (30+ years).

**Section 2:** A reduced 20m cross section with centreline widening from the first bridge to the second bridge to avoid impacts on the SEA on either side of the corridor and high volumes of earthworks associated with the topography.

**Section 3:** From the second bridge to the eastern extent of the project at the FUZ boundary the corridor will continue as a 24m wide cross section utilising centreline widening and will have separated cycle lanes and footpaths on both sides of the corridor due to becoming less constrained through this section. The initial corridor recommendation remains applicable to this section of the corridor as it does not have ecological, topographical, or residential constraints which require mitigation.

### 3.7.7 Refined Emerging Preferred Option

Following the engagement and option refinement process the indicative DBC Sandspit Road upgrade was confirmed and is illustrated below in Figure 3-48.

**Figure 3-48: DBC Recommended Sandspit Road upgrade**



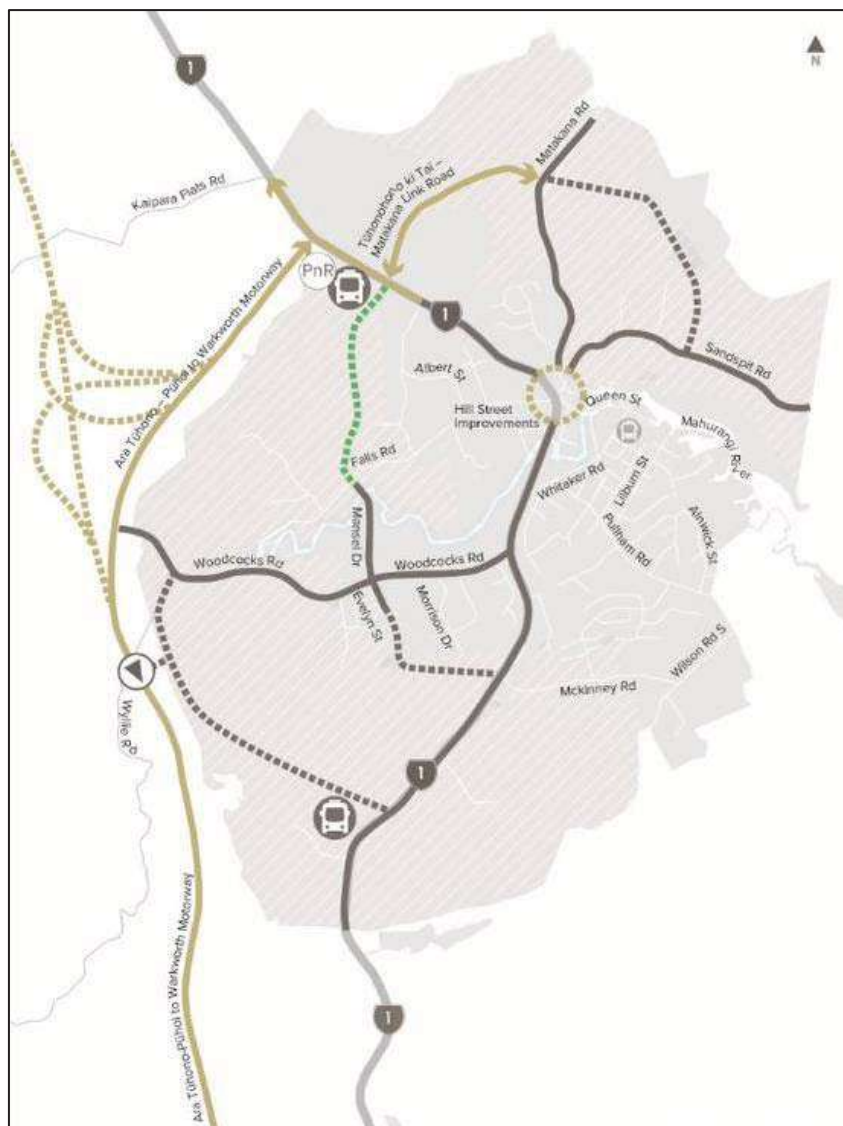


### 3.8 New Western Link Road – North

### 3.8.1 Overview

The new Western Link Road – North in the DBC Warkworth transport network is shown in Figure 3-49 below.

**Figure 3-49: Western Link Road – North**



The Western Link Road – North is a proposed new corridor with the purpose of enabling development in west Warkworth. The IBC Western Link Road – North alignment has been incorporated into and is provisioned for in the operative Warkworth North Precinct. The Precinct provisions, through the Precinct Plans and activity table, promote the Western Link - North alignment as it was confirmed through the plan change process that established the precinct. It is considered that the plan change process was robust with the outcome of this being confirmation of the Western Link Road - North alignment in the operative Warkworth North Precinct Plan(s). As such it is considered that there is a reasonable expectation by landowners and/or developers that the alignment of the corridor will reflect the alignment confirmed through this process and included in the precinct provisions.



The alignment will integrate with the Northern PT Hub and Park and Ride facility as confirmed in the Warkworth North Precinct Plan, the Te Honohono Ki Tai (Matakana Link Road) intersection currently under construction, and the proposed new Western Link Road – Central.

### **3.8.2 Preliminary Analysis**

The following section provides the project specific findings of the preliminary analysis completed for the Western Link Road – North.

#### **3.8.2.1 Gap analysis**

As noted above, the new Western Link Road – North is incorporated into and provisioned for in the operative Warkworth North Precinct Plan. As such, no further optioneering is required for the corridor in the DBC.

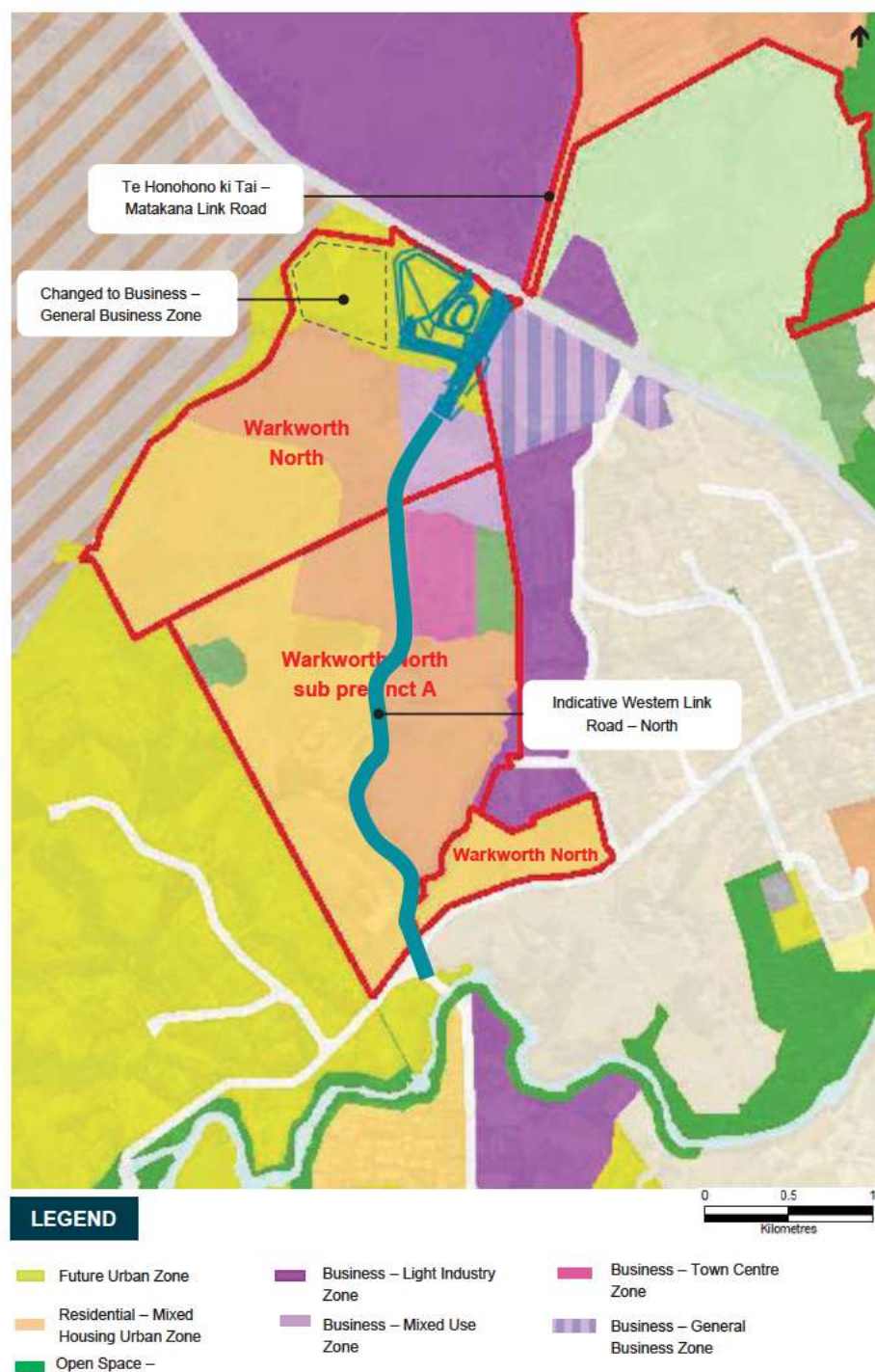
The Warkworth DBC will provide the northern section of the corridor as part of the Northern PT Hub and Park and Ride facility, to tie into the SH1 / Te Honohono ki Tai (Matakana Link Road) intersection.

#### **3.8.2.2 Land use assessment**

Current zoning within the Western Link Road – North as identified in the AUP:OP is shown in

Figure 3-50. The central section of the indicative alignment forms a boundary between business industrial zoned land in the east and general business zoned land in the west, the northern and southern section is adjacent to future urban zoned land in the northwest and residential zoned land in the southeast and west.

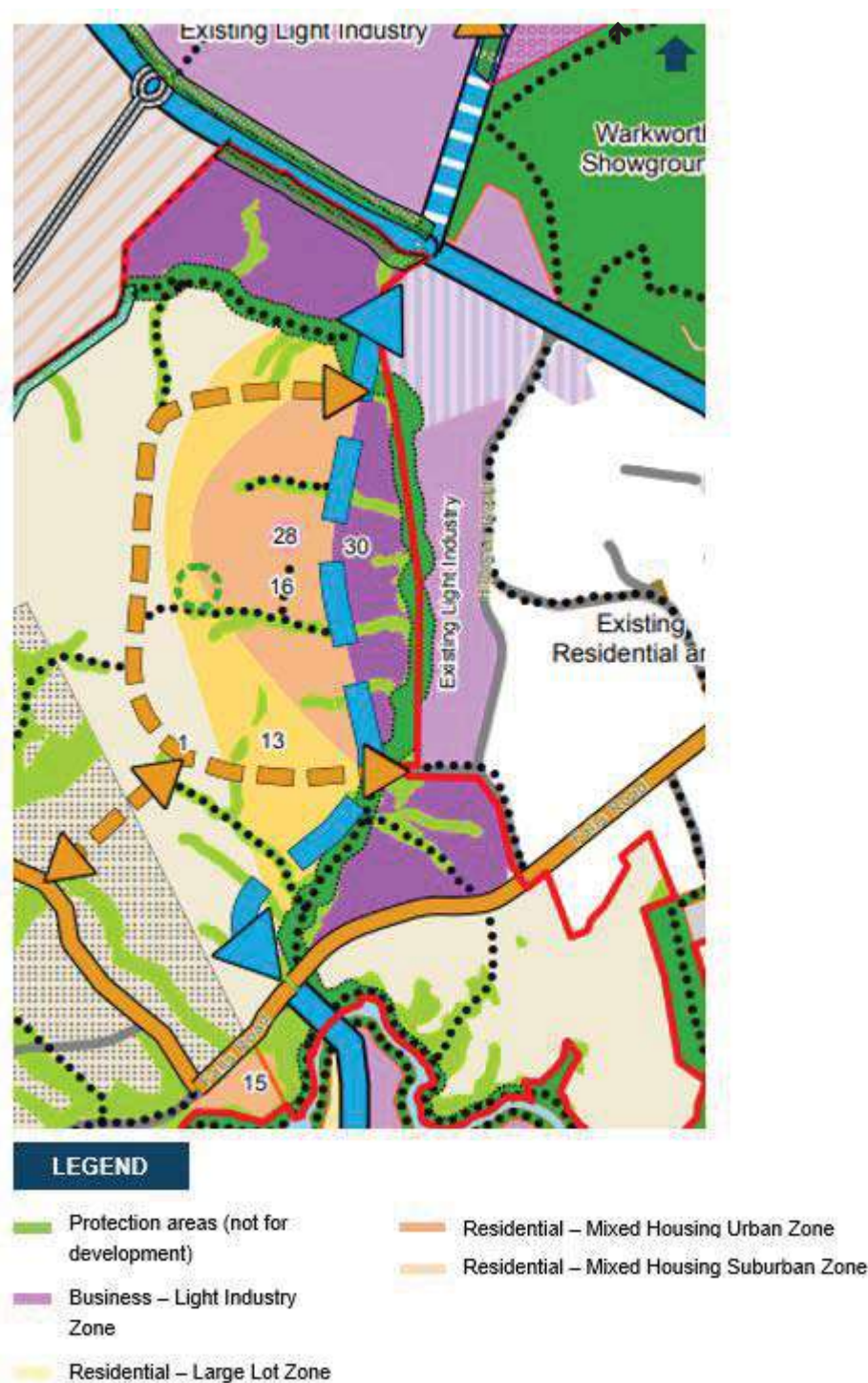
Figure 3-50: Western Link Road - North AUP-OP Zoning



The Warkworth Structure Plan identifies changes in future zoning within the Western Link Road – North extent in Figure 3-51 below. The structure plan indicates that the business zoning to the west of the alignment will be replaced with residential zoning and the current future urban zoned land to the northwest of the alignment will change to industrial zoning.



Figure 3-51. Western Link Road - North Warkworth Structure Plan Zoning



### 3.8.2.3 Climate change assessment

The climate change assessment concluded the new Western Link Road – North cannot be eliminated from the Warkworth transport network as all access to the northern and southern growth areas would then (including freight) have to go through the Hill Street Intersection and via existing SH1. This will add significant additional distance to all vehicles exiting Ara Tūhono. Without the link, the bus network would also have to travel further and would either miss the northern catchment or incur additional travel times making this mode less attractive and reduce the likelihood of achieving the desired public

transport mode shift. The proposed local centre would also not be well served by direct public transport.

The assessment recommends the option development and assessment process consider the following opportunities:

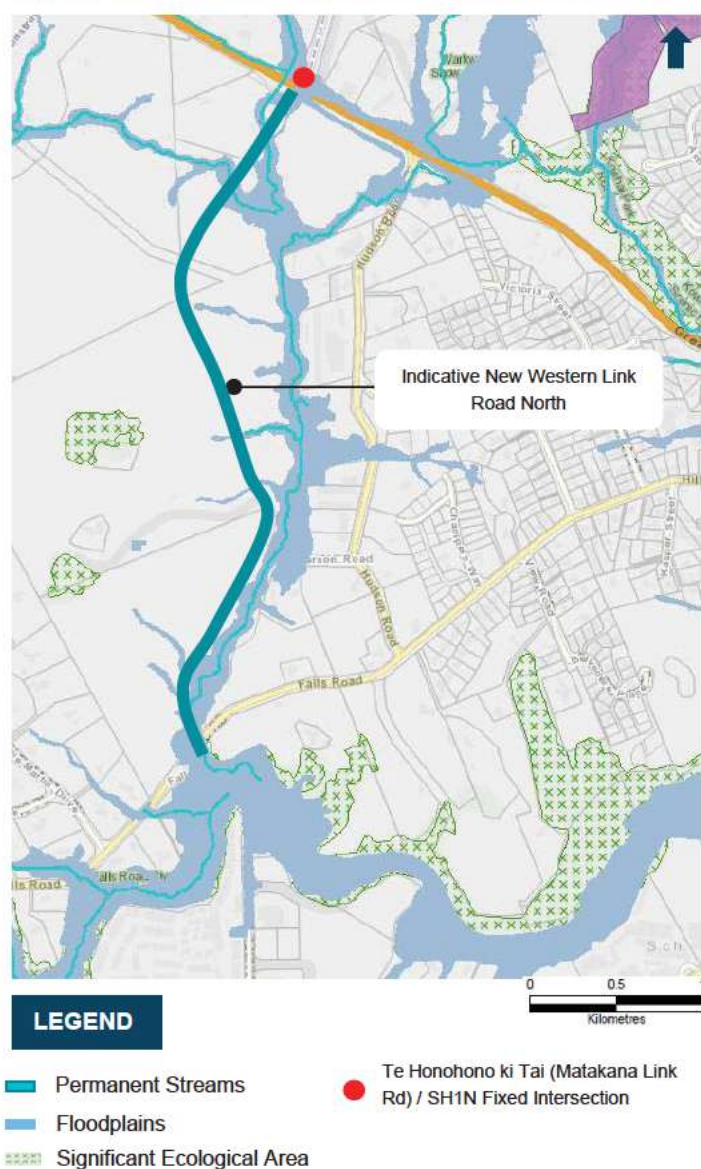
- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

#### 3.8.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the new Western Link Road – North are outlined Figure 3-52 below and include:

- Permanent streams located to the north of the alignment, potential flooding risk at the connection point with Falls Road.
- Corridor will be adjacent to a permanent stream and at risk of potential flooding if alignment is located to the east.
- Corridor extent area is mapped in the Warkworth Structure Plan as having "large scale active or inactive landslides" present and at "high risk" of slope instability.
- Te Honohono ki Tai (Matakana Link Rd)/ SH1N intersection under construction. This is a fixed tie-in point i.e., northern end of the future Western Link Rd is dictated by this project.
- Plan Change 25 approved and includes Western Link Road - North alignment.
- Stubbs Farm Development. The development design will inform the design of the southern half of Western Link Road – North including the intersection at Falls Road and Mansell Drive.

Figure 3-52. New Western Link Road North Constraints Overview



### 3.8.2.5 Form and function assessment

The form and function assessment identified that the Western Link Road – North will initially be developed as a 24m wide two-lane corridor with separated cycle lanes and footpaths on both sides, with future proofing to be upgraded in the long term to enable bus priority as required. The future form of any upgrade section of the corridor will be a 30m wide four-lane corridor with separated cycle lanes and footpaths on both sides.

For further details on the corridor form and function refer to Appendix G of the DBC.

### 3.8.3 Option Recommendation

Gap analysis and constraint mapping in the preliminary analysis stage for the DBC did not identify any issues which would require further investigation of the alignment of the WLR North. Therefore, it was determined that there was not a need to revisit this alignment through the DBC process and consequently no further optioneering was undertaken for the corridor in the DBC phase.



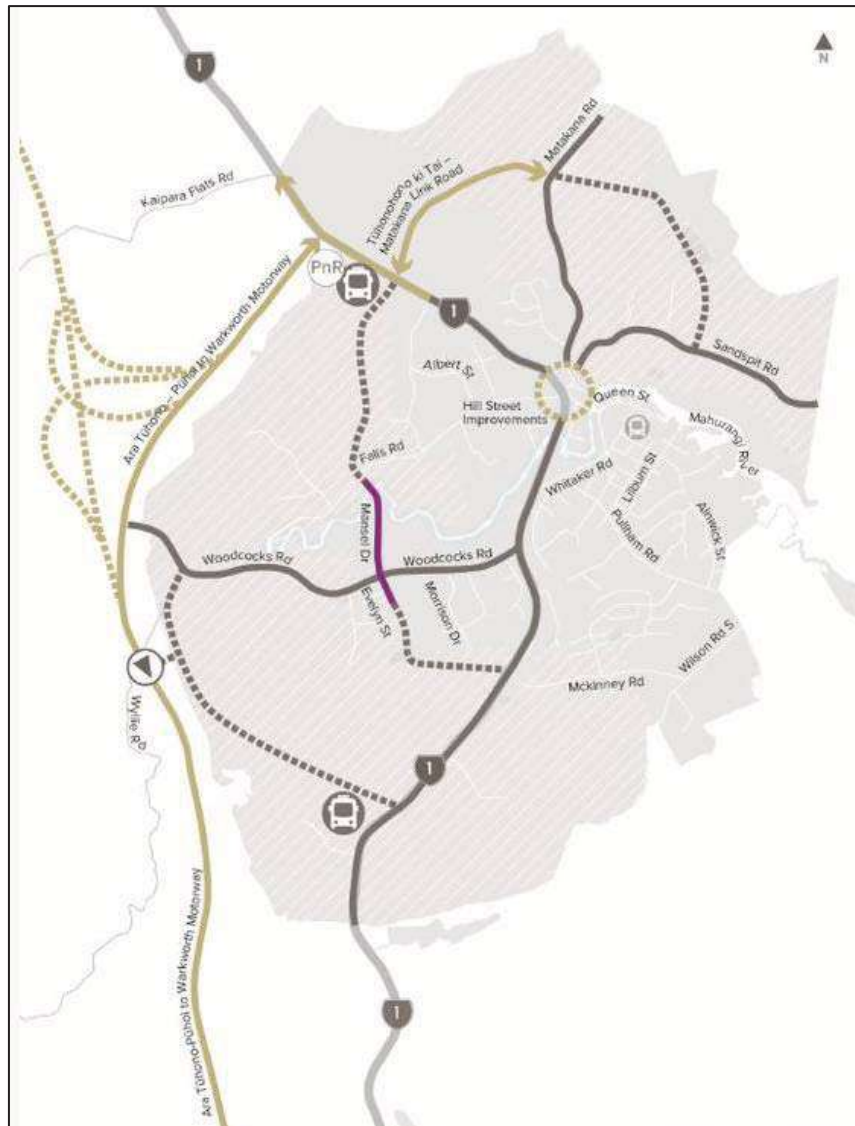
Refer to the Appendix L of the DBC for further details regarding the protection and implementation of the Western Link Road - North.

## 3.9 New Western Link Road – Central

### 3.9.1 Overview

The IBC identified the new Western Link Road – Central in the Warkworth transport network shown in Figure 3-53 below.

**Figure 3-53: Western Link Road – Central**



The Western Link Road – Central is a proposed new corridor with the purpose of providing a north-south multimodal connection enabling access between the North Warkworth Precinct and Warkworth southern growth area. The corridor is an alternative route to the existing SH1 and the Hill Street intersection and will connect communities to key social and economic destinations including the industrial area to the west of Woodcocks Road and schools to the east.

### 3.9.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Western Link Road – Central.

### 3.9.2.1 Gap Analysis

The gap analysis identified that the new Western Link Road – Central should be included in the DBC as an upgrade to an existing urban arterial as road represents the existing Falls Road intersection to Evelyn Street road infrastructure.

As such, it is recommended that the new Western Link Road – Central should be subject to the route refinement process in the DBC phase as the corridor has already been assessed against the Te Tupu Ngātahi MCA framework in the IBC. The gap analysis identified that the DBC should expand on the work completed in the IBC and complete further refinements to the option as the corridor supports and connects well with planned future roads and fits the Te Tupu Ngātahi options hierarchy of utilising and improving existing infrastructure first.

The gap analysis concluded that in the DBC scope of works the following should be completed:

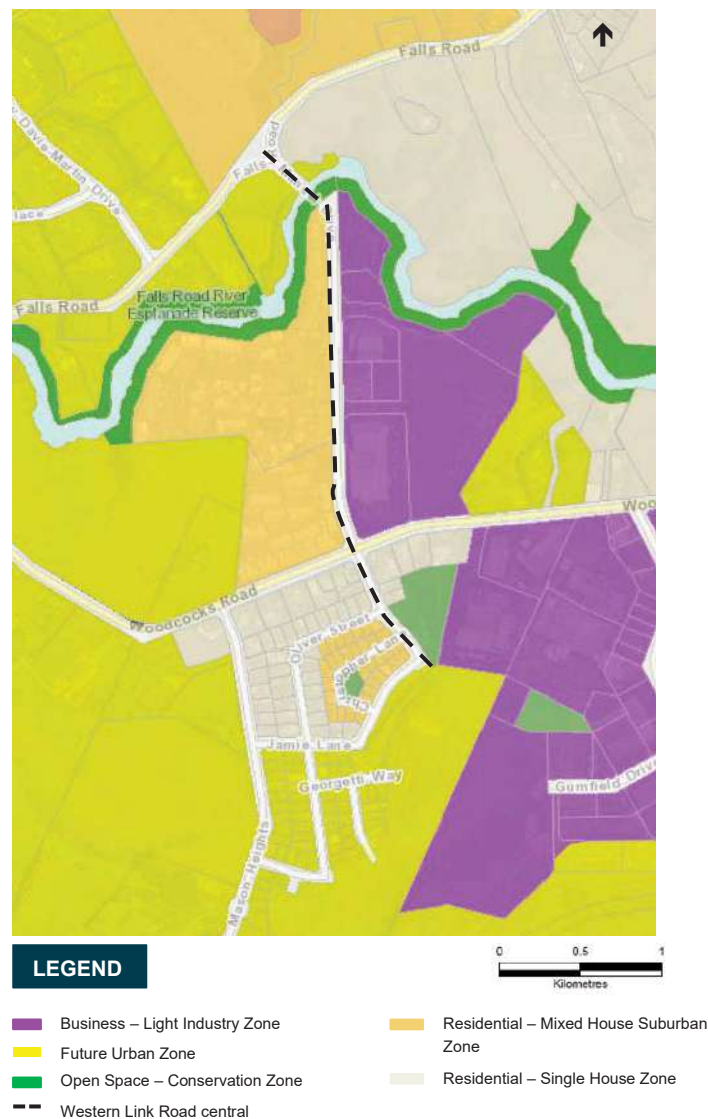
- An assessment of the corridor's level of compliance with current geometric design and flood immunity standards.

### 3.9.2.2 Land use assessment

Majority of the land uses within the extent of Western Link Road – Central are currently urban. AUP:OP zoning for the area is shown in Figure 3-54 below which identifies current zoning for the area as primarily residential and industrial to the east and west, with future urban zoned land to the northwest. The corridor additionally bridges over the Mahurangi River and open space conservation zoning in the north.

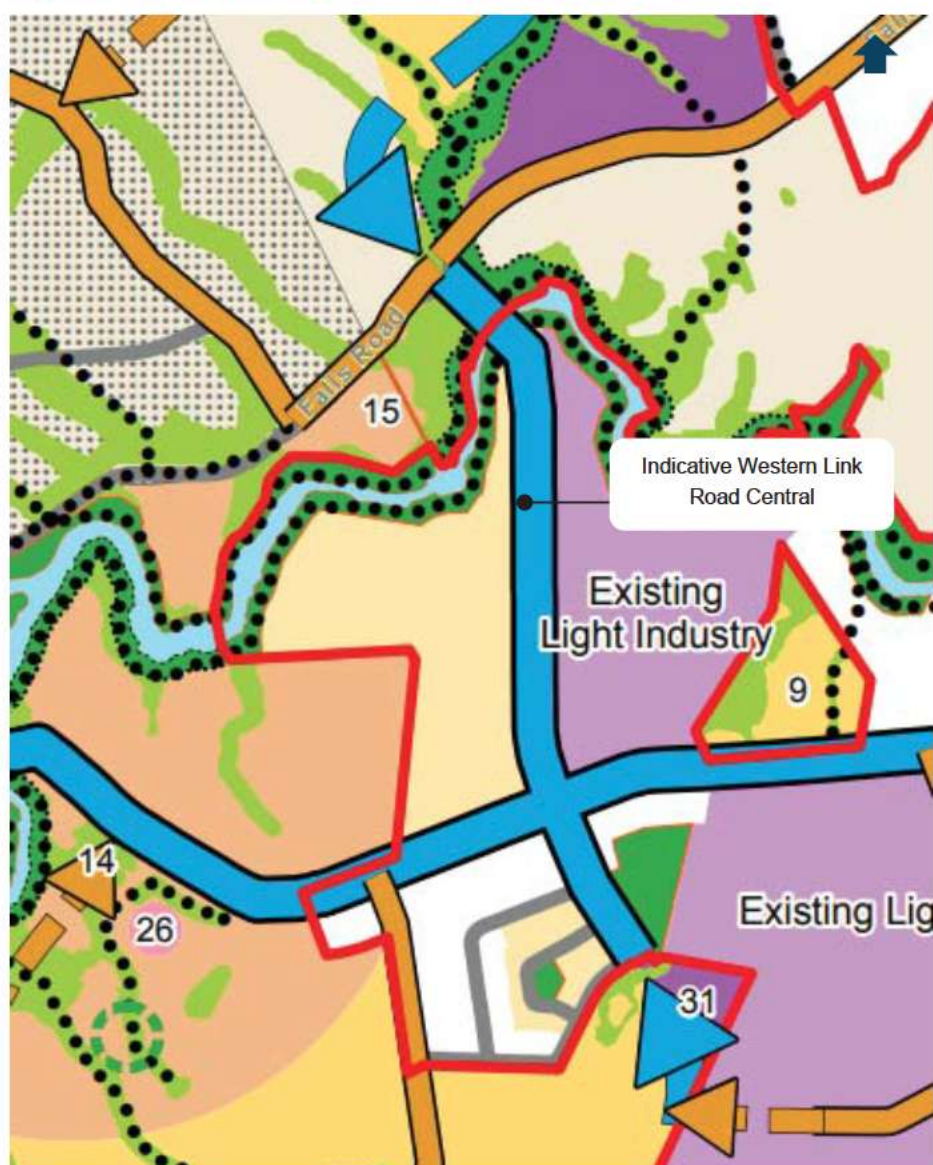


**Figure 3-54: Western Link Road central AUP-OP zoning**



The Warkworth Structure Plan indicates that future zoning within the corridor extent is unlikely to deviate from the current zoning. Future zoning as indicated by the structure plan is shown in Figure 3-55 below.

Figure 3-55. New Western Link Road – Central Structure Plan



#### LEGEND

- Protection areas (not for development)
- Existing Light Industry Zone
- Residential – Large Lot Zone
- Residential – Mixed Housing Suburban Zone
- Existing Open Space
- - - Indicative Greenway Routes (walkways/cycleways)

### 3.9.2.3 Climate change assessment

The climate change assessment concluded the new Western Link Road – Central cannot be eliminated from the Warkworth transport network as it will result in a critical gap in the active mode network along the Western Link Road which would not support transport choice for either the new growth areas or existing land uses to access key destinations such as the local centre or schools.

The assessment recommends the option development and assessment process consider the following opportunities:

- Consider incorporating a climate lens into the route refinement options assessment with respect to reduced cross sections, retention of existing carriageway to minimise new embodied carbon, consideration of active mode facility form.

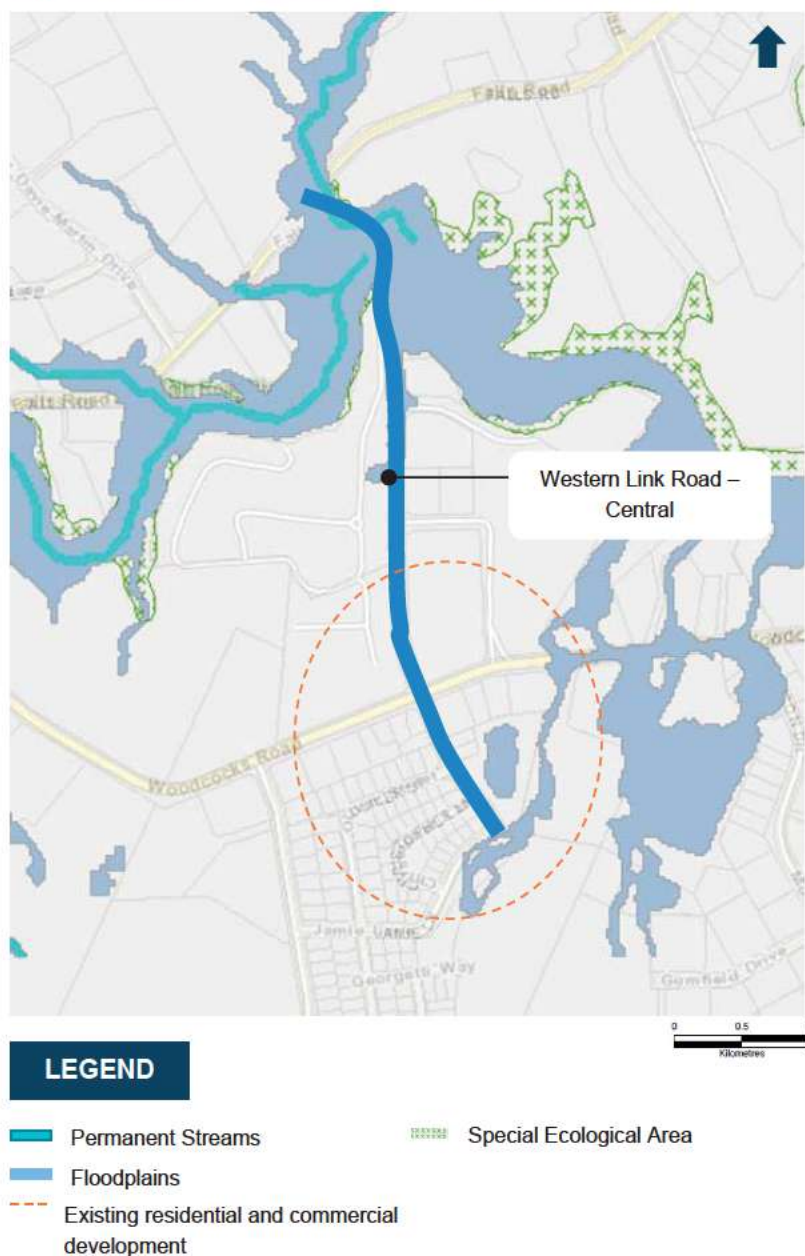
#### 3.9.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the new Western Link Road – Central are outlined in Figure 3-56 below and include:

- Existing recently developed commercial (including large format retail – Mitre 10) and residential (retirement village) land uses on both sides of the corridor.
- The Mansell Drive bridge
- Alignment crosses a large flood plain to the north of the corridor near Falls Rd.
- Northern section of the alignment crosses over the Mahurangi River with SEA and riparian margins along the river and adjacent to the Falls Road intersection.
- The SEA and heritage item on Falls Road (over the river crossing) is identified as a significant area of ecological value.
- Constrained existing corridor and bridge (designation (1471) – existing shared paths (bridge 2-3years old)



**Figure 3-56. Western Link Road - Central Constraints Map**



### 3.9.2.5 Form and function assessment

The form and function assessment identified that the Western Link Road - Central will be upgraded to a 24m wide two-lane urban arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details on the corridor form and function refer to Appendix G of the DBC

### 3.9.3 Option Development

Upon completion of the preliminary analysis the project team undertook an assessment to identify route refinement options for the Western Link Road – Central. The following section outlines the option development process for the corridor.

Constraint mapping during the preliminary stage identified that the corridor was highly constrained as a result, 3 options were developed with the desired 24m corridor width and two options were considered with a reduced 20m cross section.

The options considered for the Western Link Road – central upgrade are outlined in Table 3-45 below. The options tested centreline, east and west widening for the 24m corridor cross section options. In consideration of the identified constraints, the 20m cross section options comprised of upgrading the existing road reserve with the implementation of either one cycling lane on both sides of the corridor or bidirectional cycling paths on both sides of the corridor.

**Table 3-45: New Western Link Road - Central options**

Option	Description
1	SGA 24m cross section - Holding centreline
2	SGA 24m cross section – Widening to west
3	SGA 24m cross section – Widening to east
4	SGA 20m cross section – Within existing road reserve, with one cycling lane on both sides of the corridor
5	SGA 20m cross section – Within existing road reserve and bi-directional cycling paths on both sides of the corridor

### 3.9.4 Option Assessment

Following the identification of options for Western Link Road - Central, the project team participated in a workshop and assessed the options against the constraints mapped in the Te Tupu Ngātahi GIS viewer. The constraints and the assessed impacts were categorised and recorded under the programme wide MCA framework criteria.

Table 3-46 below illustrates a heat map summarising the assessment outcomes for Western Link Road - Central. The assessment considered the scale of impact the options would have on the key constraints and identified that whilst all options achieved heritage, ecology, stormwater, and transport objectives, the options with the preferred 24m wide cross section would have high adverse impacts on social cohesion within the area and higher land requirement. This is in comparison to the options with the reduced 20m wide cross section which do not require additional land and do not disrupt social cohesion within the area. Of the two 20m wide cross section options, Option 4 was assessed as having a high construction impact while Option 5 achieved all the identified outcome. As a result, the project team identified Option 5 was identified as the preferred option.

**Table 3-46: New Western Link Road - Central Assessment Summary**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
I.O.1 – Access					

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
I.O.2 – Integration					
I.O.3 – Travel Choice					
I.O.4 – Safety					
Heritage					
Land Requirement					
Ecology					
Stormwater					
Social Cohesion					
Transport					
Construction					

A qualitative summary of the assessment outcomes for the preferred and discounted options are provided in Table 3-47 and Table 3-48 below.

**Table 3-47: New Western Link Road – Central preferred option**

Option	Assessment Outcome
5  SGA 20m cross section – Within existing road reserve and bi-directional cycling paths on both sides of the corridor	<ul style="list-style-type: none"> <li>• Achieves transport outcomes.</li> <li>• Option does not require land acquisition and does not impact on social or economic land uses.</li> <li>• The bidirectional cycling facilities on the west side of the corridor avoids cyclist and pedestrian conflict with driveways and commercial land use to the east.</li> <li>• Bidirectional cycle path supports access to the retirement village and north-south connectivity.</li> <li>• Contiguous facility with reallocation of space on the Mahurangi Bridge.</li> </ul>

**Table 3-48: Assessment outcomes for discounted New Western Link Road - Central options**

Option	Assessment Outcome
1  SGA 24m cross section - Holding centreline	<ul style="list-style-type: none"> <li>• Achieves transport, heritage, ecology, and stormwater outcomes.</li> <li>• Land acquisition would impact on the existing retirement village to the west and commercial businesses to the east.</li> </ul>



Option	Assessment Outcome
2 SGA 24m cross section – Widening to west	<ul style="list-style-type: none"> <li>Achieves transport, heritage, ecology, and stormwater outcomes.</li> <li>Property impacts would be confined to the retirement village however this would have a high social impact.</li> </ul>
3 SGA 24m cross section – Widening to east	<ul style="list-style-type: none"> <li>Achieves transport, heritage, ecology, and stormwater outcomes</li> <li>Property impacts would be confined to commercial businesses in the west, but this would have a high social impact.</li> </ul>
4 SGA 20m cross section – Within existing road reserve, with one cycling lane on both sides of the corridor	<ul style="list-style-type: none"> <li>Achieves transport outcomes, heritage, ecology, and stormwater outcomes.</li> <li>There is no requirement for land acquisition and the option does not impact on the social or economic land uses within the area.</li> <li>The option would require widening of the Mahurangi Bridge into the SEA to accommodate through lanes in each direction.</li> <li></li> </ul>

### 3.9.5 Engagement

Table 60 provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members.

For further details refer to Appendix E of the DBC.

**Table 60: Western Link Road – Central engagement summary**

Project	Feedback
Western Link Road – Central	<ul style="list-style-type: none"> <li>Feedback indicated strong support for the upgrade of Mansell Drive.</li> <li>General agreement of the principle to retain the existing road reserve of 20m.</li> <li></li> <li></li> <li>Project team to consider crossing points, particularly for bus stops during design.</li> <li>Detailed discussion regarding the type of cycling treatment that should be considered for the project within the business case.</li> <li>Bi-directional lanes supported on the western side.</li> <li>Stakeholders requested further work be undertaken on the cross section for Evelyn Street.</li> </ul>

### 3.9.6 Option Refinement

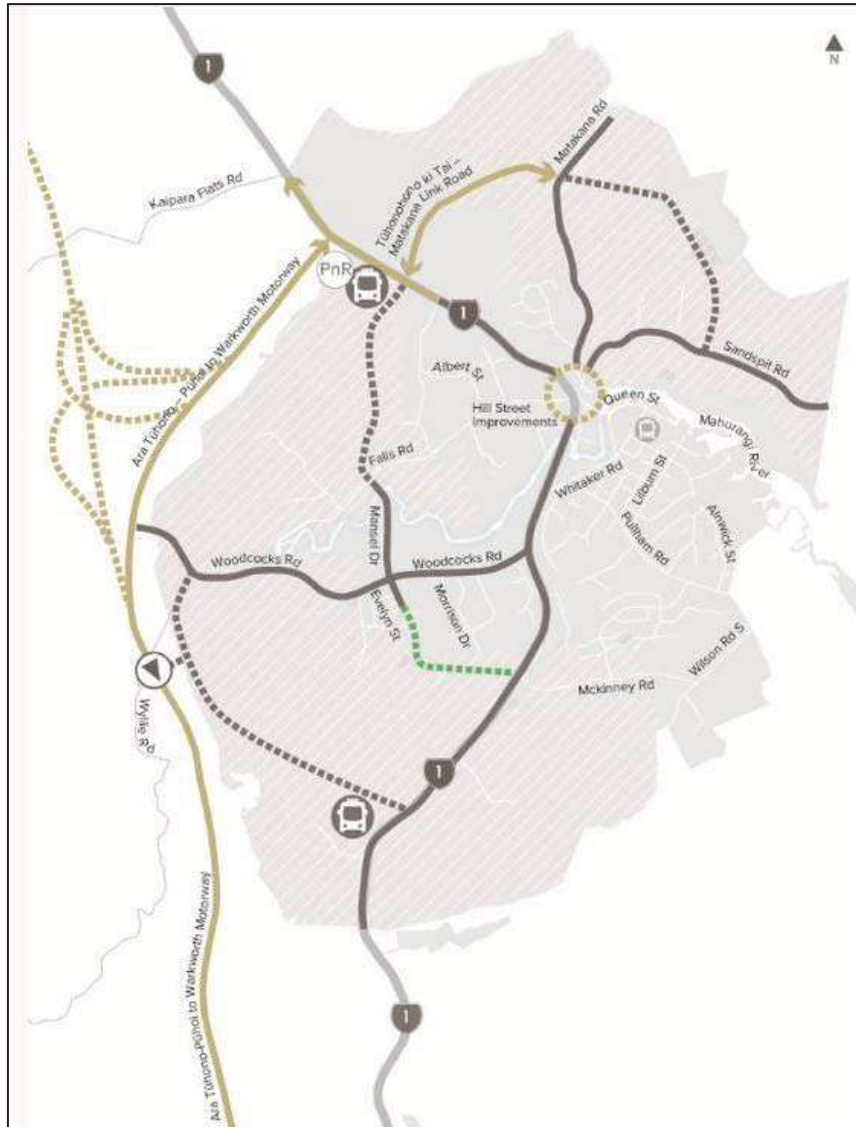
No further option refinement opportunities were identified by the project team following engagement.

## 3.10 New Western Link Road – South

### 3.10.1 Overview

The new Western Link Road – South in the DBC Warkworth transport network is shown in Figure 3-57 below.

Figure 3-57: Western Link Road - South



The Western Link Road – South is a proposed new corridor with the purpose of providing connectivity between the southern and northern Warkworth growth areas. The corridor is anticipated to improve network efficiency and integrate with and support the planned urban growth and future transport network in Warkworth.

### 3.10.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Western Link Road – South.



### 3.10.2.1 Gap Analysis

The gap analysis recommended that the new Western Link Road – South undergo further optioneering through the corridor assessment process in the DBC as a result of identified constraints as part of the early constraints mapping completed within the study area including those outlined below and the need for further landowner engagement as a result of landowner suggested corridor alignments.

Constraints identified as part of the early constraints mapping within the study area include:

- Pohutukawa grove significant to the landowner in the north-eastern section of the study area.
- Large flood plain in the south-eastern section of study area near SH1 and ecological features within the study area i.e. wetlands.
- A new landowner dwelling within the study area.
- Finalised Warkworth Structure Plan as the IBC was informed by the draft Warkworth Structure Plan.

### 3.10.2.2 Land use Assessment

Current zoning within the Western Link Road – South extent is shown in Figure 3-58 below with the IBC corridor alignment in red. The corridor will wholly be located within future urban zoned land and is adjacent to live zoned industrial land to the east. Residential zoning and an open space area are to the north of the alignment.

Figure 3-58: Western Link Road – South AUP:OP Zoning



#### LEGEND

- Future Urban Zone
- Existing Industrial Area

Proposed future zoning within the Western Link Road – South extent as identified in the Warkworth Structure Plan is shown in Figure 3-59 below. Whilst zoning to the north and east of the corridor remain the same, the structure plan indicates that the existing environment to the north-west and west of the alignment will change to residential zoning (currently Residential - Mixed Housing Suburban Zone and Large Lot Zone).

Figure 3-59. Western Link Road - South Warkworth Structure Plan Zoning



### 3.10.2.3 Climate Change Assessment

The climate change assessment concluded the new Western Link Road – South cannot be eliminated from the Warkworth transport network as the primary access to the southern growth area would then be via existing SH1. The less direct access to key destinations such as local centres and schools would likely result in longer routes for those living in the southern growth area which could reduce the attractiveness of bus services, impacting public transport modal shift. Without a complete Western Link Road, SH1 and Woodcocks Road would be under increased pressure including congestion at key intersections such as Woodcocks Road and SH1/Hill Street intersection. SH1 itself might then require additional widening to allow bus priority or to cater for the additional 10,000 vehicles that are expected on Western Link Road-South. Importantly, Warkworth would not have an alternative local north-south route which would reduce resilience for the local network. Access by active modes from




the southern growth areas to key destinations such as local centres and schools would also be less direct and likely negatively impact the uptake of walking and cycling.

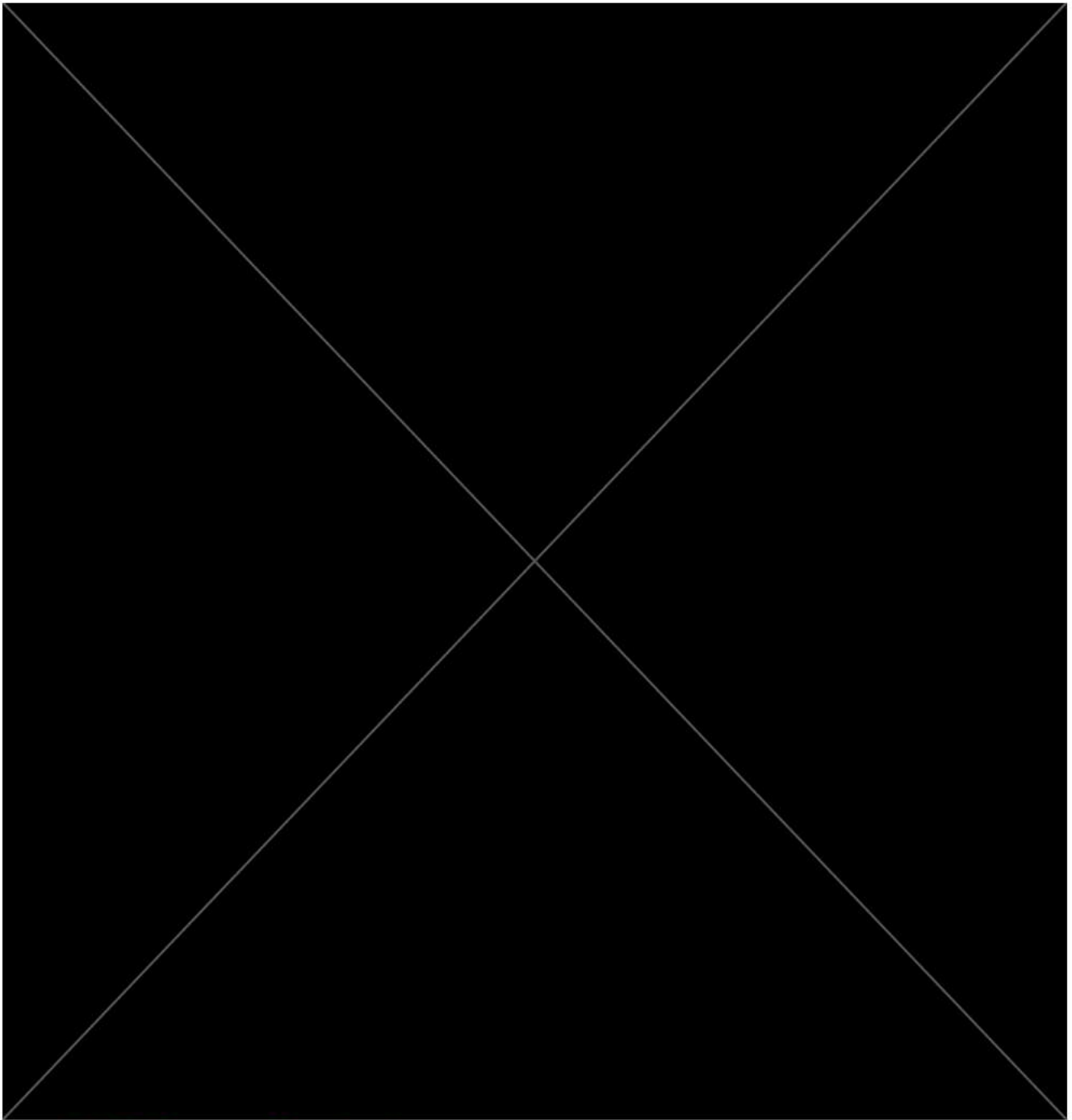
The assessment recommends the option development and assessment process consider the following opportunities:

- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

#### 3.10.2.4 Constraints Mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the new Western Link Road – South are outlined in Figure 3-60 below and include:

- Presence of large flood plains and permanent streams to the south.
- 
- Challenging topography.
- First Gas Limited (Pipeline designation) – not currently in use however designation to be retained for future use.
- Landowner dwellings
- Proximity to Wider Western Link Road and Morrison's Heritage Orchard.



#### 3.10.2.5 Form and Function Assessment

The form and function assessment has identified that the Western Link Road – South will be a 24m wide two-lane urban arterial road with separated cycle lanes and footpaths on both sides of the corridor. For further details on the corridor form and function refer to Appendix B of the DBC.

### 3.10.3 Option Development

Due to the presence of live zoned industrial land and with the Project team made aware of existing developer / landowner activity in the north, including existing lodged consents The Western Link Road - South was divided into two sections (northern and southern) for option assessment.

- **Northern Section:** Corridor located between the tie in with Evelyn Street to the southern extent of the industrial zone.
- **Southern Section:** Corridor located between the boundary with the industrial zone and SH1.

The purpose of this approach was to allow the specific characteristics of each section to be given due consideration, and the flexibility to respond to these, through the option development process

Figure 3-61 below provides the indicative extent of the two sections with the IBC alignment.

**Figure 3-61: Western Link Road - South section overview**



#### 3.10.3.1 Options Long List

The preliminary analysis phase, in particular constraint mapping for this project was completed in conjunction with the initial option development process. As a result, some proposed options were discounted during the constraint mapping phase due to the impact on/from identified constraints. Table 3-49 below provides the rationale for the options discounted at the constraint mapping phase.

For completeness, the project team determined the IBC alignment – Southern Section (Option 4) which was discounted at the constraints mapping phase should be assessed alongside the alternative options developed for the Western Link Road - South. As a result, whilst it is discounted in Table 3-49, it has been readded as an option for assessment in Table 3-50.

**Table 3-49: Rationale for discounted proposed Western Link Road (south) option**

Option	Rationale
Alignment south of IBC	<ul style="list-style-type: none"> <li>Proximity of the option, notably the SH1 connection to the Wider Western Link Road.</li> <li>Proximity to flood plain - SH1 intersection likely located in major flood plain.</li> <li>Is a longer route to connect back to more northern SH1 connections.</li> </ul>
4 – IBC Alignment (Southern Section)	<ul style="list-style-type: none"> <li>Proximity to flood plain - SH1 intersection would be located in major flood plain</li> <li>Located within challenging topography which would make it difficult to construct and exacerbate ecological impacts.</li> </ul>

Upon completion of the preliminary analysis the project team developed a long list of options for further assessment. The long list encompassed 5 options including the IBC option and two previously proposed landowner options for further assessment. The options tested the variables outlined below:

- Three connection points on SH1
- A connection with the McKinney Road intersection
- The opportunity to have the alignment sleeve or 'hug' the existing industrial area to the east.
- An option going through the existing industrial area in the east

Table 3-50 below sets out the Western Link Road – South options long list.

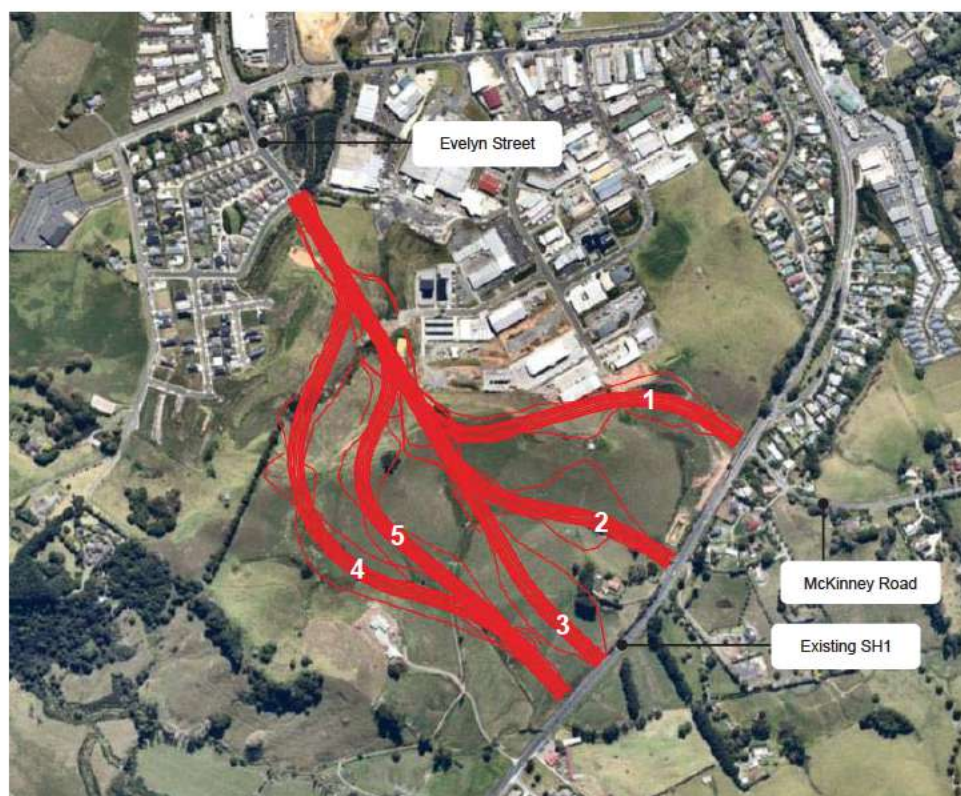
**Table 3-50: Western Link Road (south) options long list**

Option	Description
1	McKinney Road connection / Landowners revised preferred option
2	Landowner indicatively proposed alignment
3	Southern SH1 connection (north of IBC SH1 connection and flood plains)
4	IBC Alignment
5	IBC SH1 connection with refined alignment



Figure 3-62 below provides an overview of the Western Link Road – South long list options

**Figure 3-62: Western Link Road - South long list options overview**



### 3.10.4 Option Assessment

For the purpose of option assessment, technical specialists were provided with a briefing pack and the opportunity to pre-score each of the options. Specialists then participated in an interdisciplinary MCA workshop to present their scores which provided an opportunity for MCA scores to be explained by specialists and respectfully challenged if needed.

Table 3-51 below demonstrates a heat map and the outcomes of the technical specialists MCA scoring for each option considered. The heat map illustrates that all options generally scored positively in relation to the investment objectives, and land use and urban design outcomes.

Key differentiators between the options were the extent of impact the options would have on ecological, landscape, stormwater, and construction outcomes. Whilst all the options had some degree of adverse impact on these outcomes, Option 4 and 5 had a higher adverse ecological impact compared to the other options. Similarly, Options 1 to 3 had a higher construction cost/risk in comparison to the other options but was also assessed as having lower adverse social cohesion impacts.

Whilst the MCA scoring did not show a clear preferred option for the whole alignment. The technical specialists and project team identified an opportunity to create a hybrid option of the southern section Option 1 and the northern section of 4 to address the differing constraints within the extent of the corridor. Whilst the southern section of Option 1 reduced impacts on ecological constraints by avoiding the large floodplain located to the south of SH1, the northern section of Option 4 follows the boundary of the future urban zone and existing industrial zone and provides a buffer between the

future residential development and the industrial zone which was assessed as a positive land use and integration outcome.

**Table 3-51: Western Link Road (South) MCA assessment summary**

MCA Criteria	Option 1	Option 2	Option 3	Option 4	Option 5
I.O.1 – Access					
I.O.2 – Integration					
I.O.3 – Travel Choice					
I.O.4 – Resilience					
Heritage					
Land use					
Urban Design					
Land Requirement					
Social Cohesion					
Human health and wellbeing					
Landscape/Visual					
Stormwater					
Ecology					
Natural Hazards					
Construction impacts					
Construction disruption					
Construction cost/risk					

As noted above, upon completion of the MCA there was no clear one preferred option for the whole alignment and the technical specialists and project team identified a need to create a hybrid option of the southern section of Option 1 and the northern section of Option 4. Table 3-52 below provides a qualitative summary of the assessment outcomes for these two options as the preferred options. Further refinement considerations for each of these options to create a hybrid option are as follows:

- Shifting the northern section of the Option 1 alignment west to minimise impacts on existing industrial land.
- Shifting the southern section of the Option 4 alignment to the east to avoid floodplains, wetlands, and the landowner dwelling.
- Consider alternative intersection location to account for safety sight line issues for the SH1 intersection.

**Table 3-52: Assessment outcome for Western Link Road – South preferred options**

Option	Assessment Outcome
1 McKinney Road connection /	<ul style="list-style-type: none"> <li>• Northern section of the alignment severs existing industrial area.</li> <li>• Alignment may potentially impact a large stretch of a historic road.</li> <li>• Has positive amenity contributions by forming an appropriate transition between existing and planned industrial land and future residential land.</li> </ul>

Option	Assessment Outcome
Landowners revised preferred option	<ul style="list-style-type: none"> <li>Option avoids the large floodplain located to the south of SH1.</li> <li>Impacts on a cultural site of significance.</li> <li>Safety sightline issues with option's intersection with SH1.</li> </ul>
4 IBC Alignment	<ul style="list-style-type: none"> <li>Provides a longer north-south route compared to the other options, resulting in a longer travel distance for pedestrians and cyclists.</li> <li>Northern section of the alignment follows boundary of the future urban zone and existing industrial zone, providing a buffer between future residential development and the industrial zone.</li> <li>Southern section of the alignment impacts on permanent streams and its connection with SH1 is within a flood plain.</li> <li>The option is in close proximity to landowner's dwelling.</li> <li>Poorest cumulative interaction with streams and wetlands compared to other options and will require the most mitigation.</li> </ul>

Table 3-53 provides a summary of the assessment outcomes for the discounted options.

**Table 3-53: Assessment outcomes for discounted Western Link Road (south) options**

Option	Assessment outcomes
2 Landowner indicatively proposed alignment	<ul style="list-style-type: none"> <li>Has the most direct route.</li> <li>Northern section of the option severs existing industrial land and southern section runs through the centre of future urban zoned land.</li> <li>Provides low positive contributions to amenity and quality values.</li> <li>Impacts on streams and wetlands.</li> </ul>
3 Southern SH1 connection (north of IBC SH1 connection and flood plains)	<ul style="list-style-type: none"> <li>Located within close proximity to the flood plain.</li> <li>Provides low positive contributions to amenity and quality values.</li> <li>Requires the least invasive earthworks.</li> <li>Impacts on streams and wetlands but to a lower extent than Option 2.</li> <li>Option severs existing industrial land in the northeast of the alignment.</li> </ul>
5 IBC SH1 connection with refined alignment	<ul style="list-style-type: none"> <li>Southern section of the alignment provides a less direct connection to central and eastern future urban zoned land.</li> <li>Northern section of the alignment cuts through existing industrial land and results in residual existing industrial land being located on the western side of the corridor.</li> <li>Provides low positive amenity and quality values.</li> <li>Crosses three permanent streams and the southern section of the alignment is located within the floodplain near SH1 but is preferred over Option 4.</li> </ul>



As noted above, following the identification of the preferred options for the northern and southern sections of the Western Link Road – South in Table 3-52 above, a hybrid option of Option 1 and 4, Option 6, was developed by the project team for further assessment. The option details and refinement outcomes are outlined in Table 3-54 below. An overview of the Option 6 alignment is provided in Figure 3-63.

**Table 3-54: MCA Refined – Option 6 (refined Option 1 and Option 4)**

Option	Refinement outcomes
6 (hybrid of Option 1 and 4)	<ul style="list-style-type: none"> <li>Option sleeves around the existing industrial area and forms a boundary (buffer) between the industrial area and FUZ land</li> <li>Avoids the large flood plain and wetlands.</li> <li>The southern connection point with SH1 is in a safe location and addresses safety sightline concerns, without the need for SH1 corridor works.</li> </ul>

**Figure 3-63. Overview of Western Link Road - South Option 6**



Once the refined option was developed and loaded onto the Te Tupu Ngātahi GIS viewer, the project team and technical specialists participated in an MCA workshop to assess and score the option against the MCA criteria.

Table 3-55 below demonstrates a heat map and results of the technical specialists MCA scoring for Option 6. The assessment identified that Option 6 achieved investment objectives, and land use and urban design outcomes. The option still impacts on the heritage feature and remains in close proximity to the Pohutukawa grove identified as significant to the landowner. The option was however assessed as having a decreased ecological impact, in that it has the lowest level of wetland



interaction and avoids majority of the flood plain effects associated with the other options. Additionally, the northern section of the alignment formed a boundary (buffer) between the FUZ and existing industrial area which improved urban design outcomes.

**Table 3-55: Western Link Road South Option 6 MCA summary**

MCA Criteria	Option 6
I.O.1 – Access	
I.O.2 – Integration	
I.O.3 – Travel Choice	
I.O.4 – Resilience	
Heritage	
Land use	
Urban Design	
Land Requirement	
Social Cohesion	
Human health and wellbeing	
Landscape/Visual	
Stormwater	
Ecology	
Natural Hazards	
Construction impacts	
Construction disruption	
Construction cost/risk	

The technical specialists and project team subsequently confirmed Option 6 as the emerging preferred option. Table 3-56 below sets out the assessment outcome for the preferred Western Link Road – South alignment.

**Table 3-56: Assessment outcomes for Option 6 (emerging preferred option)**

Option	Assessment Outcomes
6 (Hybrid of Option1 and 4)	<ul style="list-style-type: none"> <li>Sleeves FUZ and industrial zoning and prevents severance of the existing industrial land.</li> <li>The buffer between future residential and industrial land uses provides an appropriate transition between existing and planned industrial land and future residential land.</li> <li>Option has a heritage impact as it will potentially destroy a large portion of an identified historic road.</li> <li>Alignment results in longer travel time to employment opportunities within industrial and employment zoned areas and does not have a direct connection to with the transport network east of SH1.</li> <li>Avoids key ecological features and floodplains.</li> <li>Southern connection point with SH1 is an acceptable transport outcome</li> </ul>

### 3.10.5 Engagement

Table 3-57 below provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members.

For further details on engagement please refer to Appendix E of the DBC.

**Table 3-57: Western Link Road - South engagement summary**

Project	Feedback
Western Link Road – South	<ul style="list-style-type: none"> <li>General agreement with the proposed emerging preferred option – the alignment forming a buffer between industrial land and future residential was strongly supported.</li> <li>[REDACTED]</li> <li>Project team to consider difficult terrain and topography in the design phase.</li> <li>Concerns around the proximity of the emerging preferred SH1 intersection to the existing McKinney, and potential operational and safety concerns resulting from this.</li> </ul>

### 3.10.6 Option Refinement

In consideration of feedback received through engagement (as outlined above), the project team completed further investigations in relation to the location of the emerging preferred SH1 intersection and identified opportunities for design refinements with the purpose of further minimising potential impacts of the emerging preferred option.

Table 3-58 below outlines the refinements completed and their outcomes.

**Table 3-58: Post Engagement Refinement**

Option	Refinement outcomes
6A	<ul style="list-style-type: none"> <li>Alignment has been shifted to minimise impact on wetlands and floodplains and avoids impacting on the Pohutukawa grove.</li> <li>Alignment has been shifted west further into the future urban zoned land to further minimise impact of the alignment and earthworks on existing and future industrial land use.</li> <li>Alignment has been adjusted to utilise the existing SH1 intersection connection at McKinney Road to avoid conflict between a new intersection (as proposed by the emerging preferred option) in close proximity to the existing, while providing improved east-west connectivity across SH1.</li> <li>Note: Further investigation confirmed that sight distance on SH1 issue is able to be improved through corridor improvement works.</li> </ul>

### 3.10.7 Refined Emerging Preferred Option

Following the engagement and option refinement process the indicative DBC Western Link Road South was confirmed and is illustrated below in Figure 3-64.

**Figure 3-64: Western Link Road - South DBC Preferred Option**

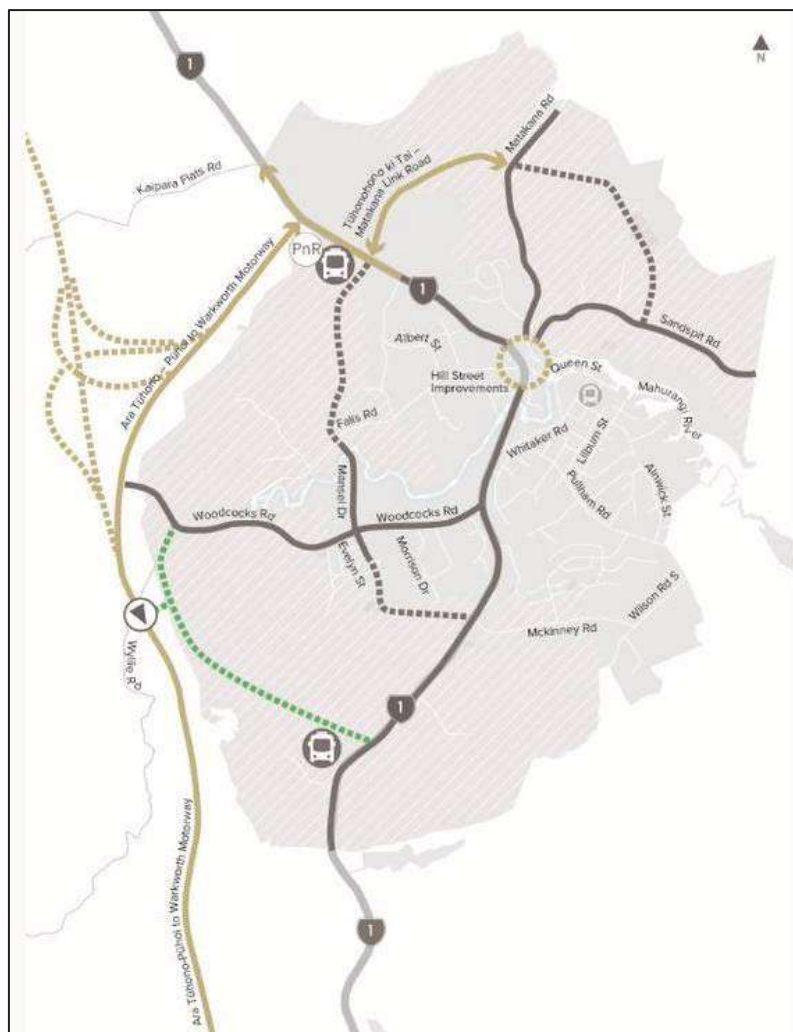


## 3.11 New Wider Western Link Road

### 3.11.1 Overview

The new Wider Western Link Road in the DBC Warkworth transport network is shown in Figure 3-57 below.

**Figure 3-65: New Wider Western Link Road**



The Wider Western Link Road is a new proposed corridor located within the southern Warkworth growth area, the corridor will provide connectivity through Warkworth from the southern growth area, improve network efficiency and resilience, in addition to integration with and supporting planned urban growth and the future transport network in Warkworth.



### 3.11.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Wider Western Link Road.

#### 3.11.2.1 Gap analysis

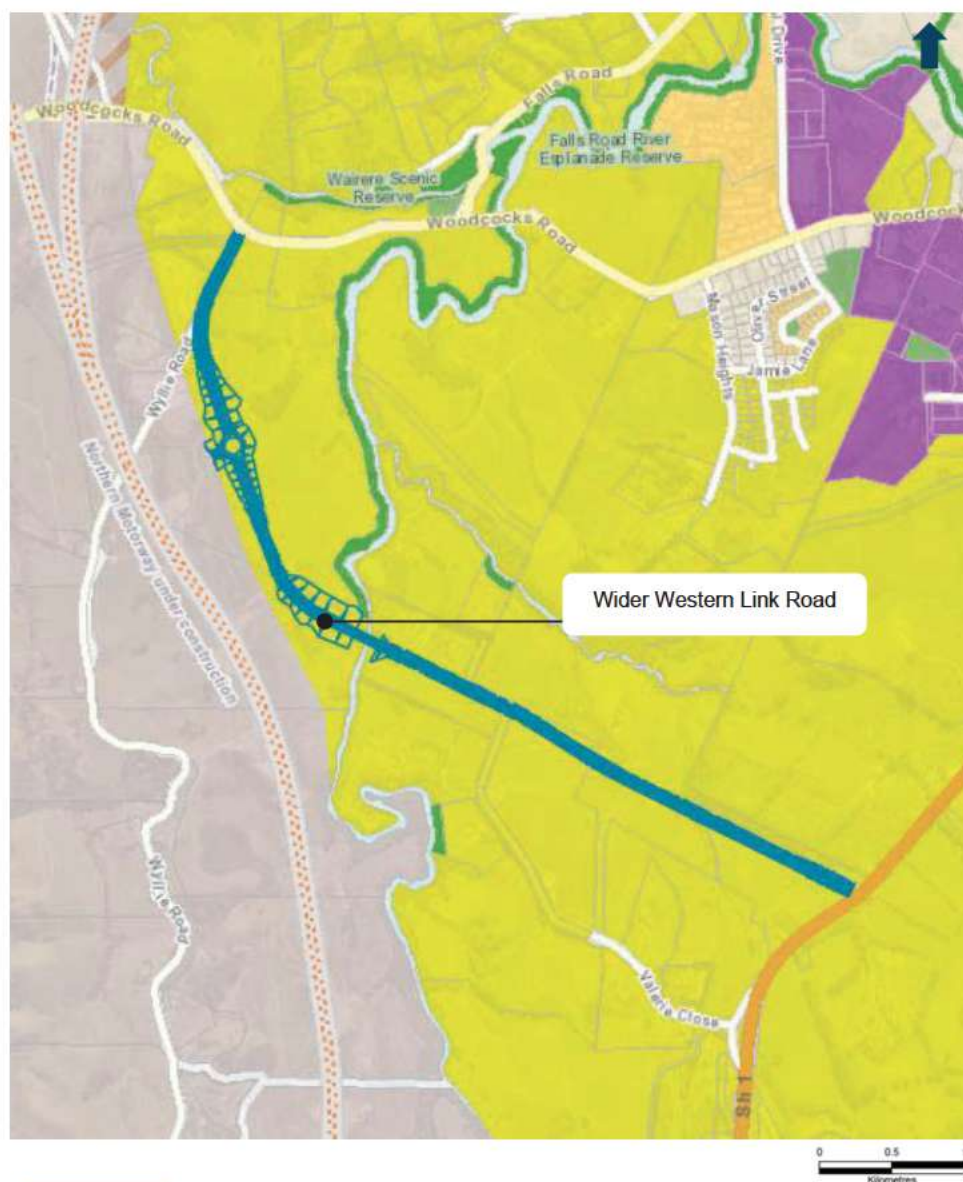
The gap analysis recommended the new Wider Western Link Road undergo further optioneering through the corridor assessment process in the DBC and consider the following:

- Key connections to Woodcocks Road (north), the Southern Interchange (central), and the existing SH1 (south).
- Warkworth South – Draft plan change

#### 3.11.2.2 Land use assessment

Current zoning for the southern Warkworth growth area in the AUP:OP is shown in Figure 3-66 below. The area is currently rural and future urban zoned, open space – conservation zoning and the Mahurangi River run through the northern section of the area.

Figure 3-66: Wider Western Link Road AUP-OP zoning

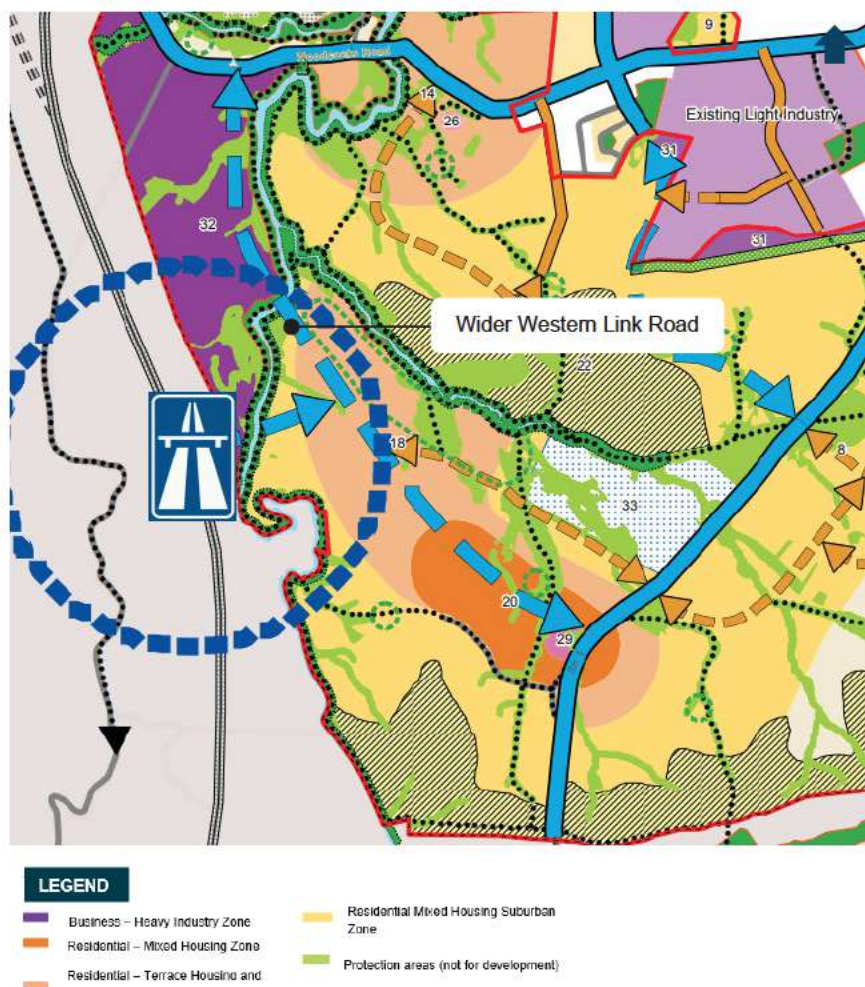
**LEGEND**

- Future Urban Zone
- Open Space – Conservation Zone

Future zoning in the southern Warkworth growth area as identified in the Warkworth Structure Plan are shown in Figure 3-67 below. The structure plan indicates future zoning change in the area from FUZ to heavy industrial zoning to the north-west of the corridor, and high-density residential zoning to the south-west and south-east of the corridor, as well as a local centre and PT hub in the south.

The southern extent of the corridor is also located within an area subject to the proposed draft Warkworth South Plan Change which extends from the Mahurangi River in the north to the southern side of SH1 in the south.

Figure 3-67: Warkworth Structure Plan indicative land uses



### 3.11.2.3 Climate change assessment

The climate change assessment concluded the new Wider Western Link Road cannot be eliminated from the Warkworth transport network as there would be no planned connection to access the proposed Southern Interchange. This would therefore require all the heavy industrial traffic to use local roads such as Western Link Road and Woodcocks Road for access and would bring an increase of heavy traffic through high intensity residential, school and local centre land uses. Without the certainty of a through route between Woodcocks Road and SH1 people would have to travel a lot further via Western Link Road South or SH1 to reach key destinations. Similarly, it would not support good active mode catchment to the proposed southern local centre.

The assessment recommends the option development and assessment process consider the following opportunities:

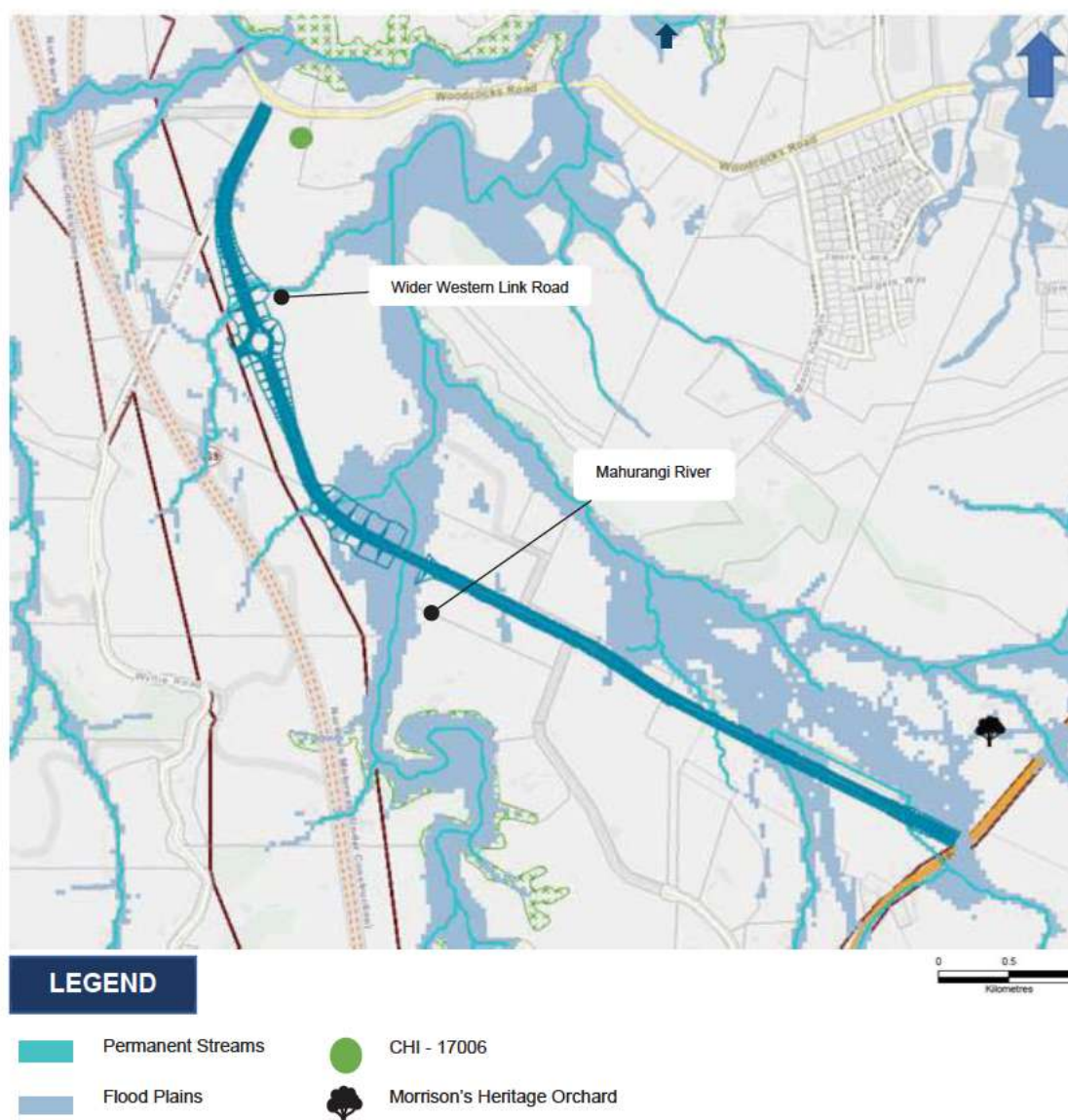
- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

### 3.11.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the new Wider Western Link Road are outlined in Figure 3-68 below and include:

- Cultural heritage sites in the northern section.
- Proposed draft Warkworth South Plan Change for a large area of land under individual ownership located to the south of the Mahurangi River.
- The Mahurangi River and its tributaries run through the area, the study area additionally has riparian woodland and vegetation associated with the river and its tributaries. The project team additionally noted that the riparian vegetation linked to the Mahurangi river within the study area likely played an important role in providing ecological connectivity between SEA\_T\_6676 to the north and SEA\_T\_2367 to the south.
- Morrison's Heritage Orchard located to the southeast of the area.
- The indicative location of the local centre and Southern PT Hub as shown in the Warkworth Structure Plan.
- Permanent streams and flood plains, including large flood plains associated with the Mahurangi River. Flood plains are most prominent through the centre of the area but present in proximity to streams across majority of the study area.
- The eastern portion of the study area is hilly, with majority of the land area having up/down topography.



**Figure 3-68. Wider Western Link Road Constraints Overview**

### 3.11.2.5 Form and function assessment

The form and function assessment identified that the Wider Western Link Road will be a 24m wide two-lane urban arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details on the corridor form and function refer to Appendix B of the DBC.

### 3.11.3 Option Development

Upon completion of the preliminary analysis the project team developed and identified options to be progressed to corridor assessment for the Wider Western Link Road, these are outlined in Table 3-59 below and include the IBC alignment, an alignment proposed in the Warkworth South draft plan change which was being developed during the initial DBC option development stage, and a project team developed option.

For all the options developed, the form of the northern section of the alignment followed the IBC alignment. This is because the northern section of the IBC alignment was considered at this particular

time to be best placed to avoid the identified constraints in the north whilst achieving overall outcomes.

The options identified for further assessment tested a new connection point with SH1 via Valerie Close, a connection point with SH1 which ran adjacent to the boundary with Morrison's Heritage Orchard, and the IBC alignment which tested a connection in proximity to the planned Southern PT Hub.

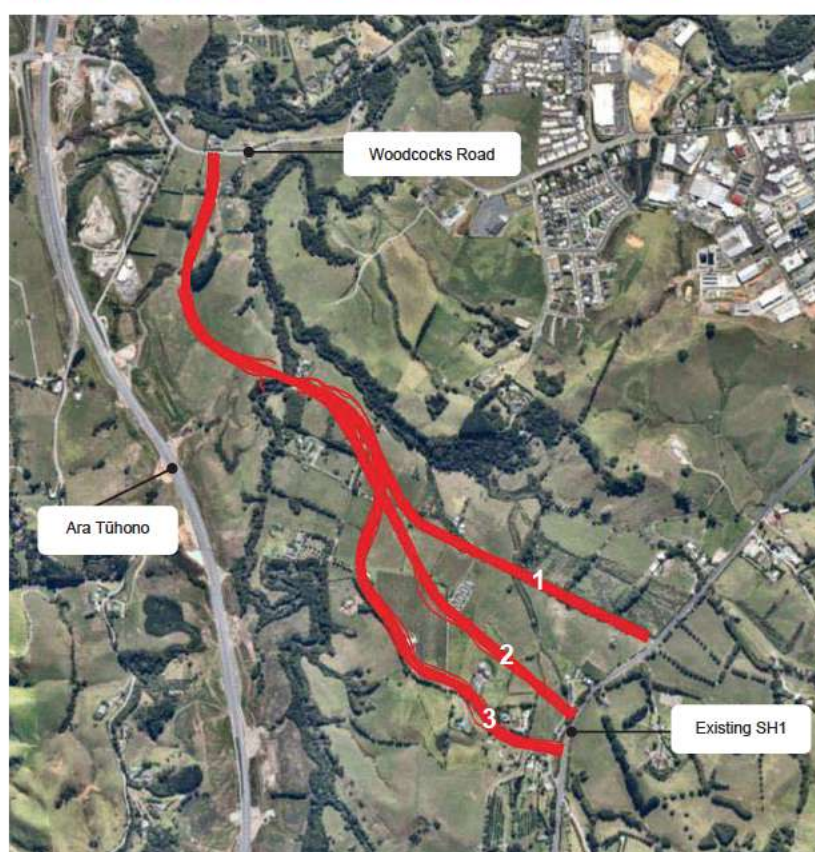
Alignment options further south of Option 3 were not considered by the Project team due to the challenging topography, proximity to the Mahurangi River, environmental considerations such as the SEA, and the area's distance from key Warkworth Structure Plan elements such as the local centre and Southern PT Hub.

**Table 3-59: New Wider Western Link Road Options**

Option	Description
1	Waimanawa (Warkworth South) Concept Plan Change Alignment
2	IBC alignment
3	Connection via Valerie Close

Figure 3-69 below provides an overview of the options developed for the Wider Western Link Road.



**Figure 3-69: Overview of Wider Western Link Road options**

### 3.11.4 Option Assessment

For the purpose of assessing the initial options specified in Table 3-59, technical specialists were provided with briefing pack which included the following information:

- Indicative option alignments
- AUP-OP Management Layers
- AUP-OP Zoning
- Instructions to assess and utilise the Te Tupu Ngātahi GIS viewer
- Wider Western Link Road MCA Spreadsheet

Table 3-60 below demonstrates a heat map and the outcomes of the technical specialists MCA scoring for each option considered. The assessment outcomes indicated that all the options assessed achieved the investment objectives with Option 2 scoring less favourably compared to Option 1 and 3. In relation to adverse impacts, Option 1 had the overall highest adverse impact due to its impacts on stormwater, landscape and ecological constraints, this was followed by Option 3 which was assessed as needing a high land requirement and having more adverse construction impacts compared to the other options, along with high adverse ecological impact. Compared to Option 1 and 3, Option 2 had the least overall adverse impact. The option had a high adverse ecological impact but had lower land requirement, construction, stormwater, and landscape impacts whilst also achieving land use, urban design, and social cohesion outcomes. Consequently, Option 2 was identified as the preferred option with refinements suggested to reduce the adverse ecological impacts of the option.

**Table 3-60: Wider Western Link Road MCA Summary**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
Heritage			
Land use			
Urban Design			
Land Requirement			
Social Cohesion			
Human health and wellbeing			
Landscape/Visual			
Stormwater			
Ecology			
Natural Hazards			
Construction impacts			
Construction disruption			
Construction cost/risk			

Table 3-61 below provides a summary of the assessment outcomes for the preferred option and suggested refinements.


**Table 3-61: Assessment outcomes and suggested refinements for the preferred option**

Option	Assessment Outcomes
2  IBC alignment	<ul style="list-style-type: none"> <li>• Achieves investment objectives.</li> <li>• The alignment could potentially impact on heritage site located in the northern section of the alignment and crosses the Mahurangi River which will increase the likelihood of encountering unrecorded pre-European Māori archaeology.</li> <li>• Option aligns with the Warkworth Structure Plan alignment, and it is anticipated that the alignment will integrate well with future development in the area.</li> <li>• Provides moderate positive contributions to amenity and quality values.</li> <li>• Land requirement impacts private land under single ownership and associated to the Warkworth South Plan Change.</li> <li>• Increases connectivity in the western growth area, and to the southern growth area and industrial land to the north of the alignment.</li> <li>• Alignment crosses three permanent streams, and the southern connection point is adjacent to a minor flood plain. However, location of stormwater treatment is not an issue.</li> <li>• Has the farthest distance from potential impact on ecologically sensitive areas such as riparian margins, SEAs, and wetlands.</li> <li>• Provides a good east – west connection across SH1.</li> <li>• Suggested refinements to reduce or avoid the ecological impacts (flooding, streams) of the option include the opportunity to seek a hybrid approach between Option 1 and 2.</li> </ul>

Table 3-62 sets out the assessment outcomes for the discounted options for Wider Western Link Road.



**Table 3-62: Assessment outcomes for the discounted Wider Western Link Road options**

Option name	Assessment Outcomes
1 Waimanawa (Warkworth South) Concept Plan Change Alignment	<ul style="list-style-type: none"> <li>A significant portion of the alignment is located within a floodplain, including the SH1 connection, the alignment additionally impacts the highest number of streams and location of stormwater treatment is difficult.</li> <li>Fragmentation of the Mahurangi River corridor and riparian corridor of tributaries between SEA's.</li> <li>Alignment has the greatest proximity to ecologically sensitive areas (riparian, corridors, SEA's, wetlands).</li> <li></li> </ul>
3 Connection via Valerie Close	<ul style="list-style-type: none"> <li>The ridgeline topography in the south of the study area limit's development potential of the local centre and Southern PT Hub.</li> <li>Alignment generally avoids floodplains and the location of stormwater treatment is not an issue however the option has the greatest road surface area to treat.</li> <li>Alignment fragments the Mahurangi River corridor and riparian corridor of tributaries between SEA's.</li> <li>Alignment runs within the zone of influence of the Mahurangi River and associated SEA.</li> <li>Adverse construction impacts on the existing road and access connections to properties on Valerie Close.</li> </ul>

### 3.11.5 Emerging preferred option

The outcome of the assessment identified option 2 as the emerging preferred option. The alignment avoids flood plains and impacts on wetlands whilst providing a good east - west connection.

### 3.11.6 Engagement

Table 76 provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to DBC appendix.

**Table 3-63: Wider Western Link Road engagement summary**

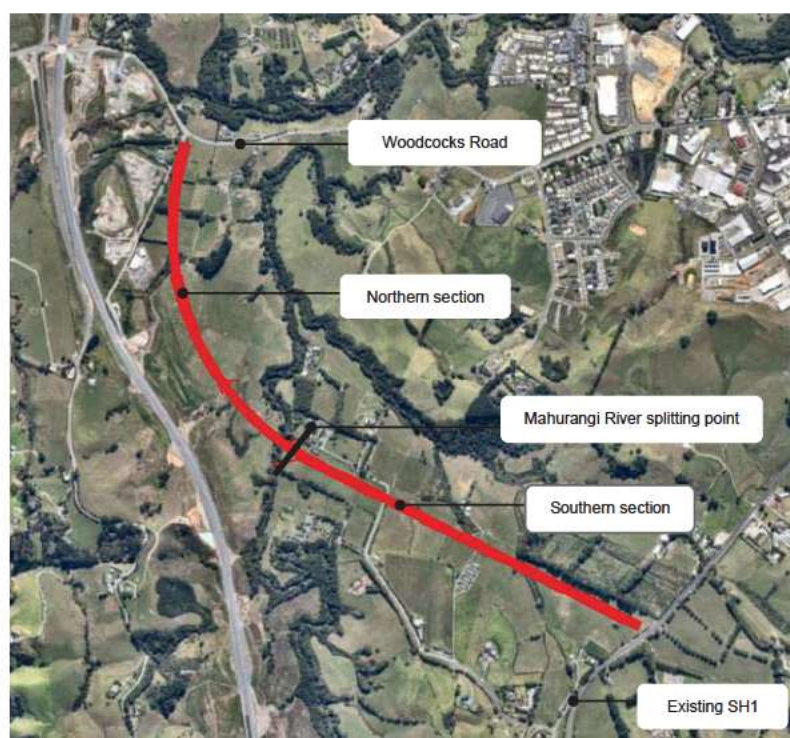
Project	Feedback
Wider Western Link Road	<ul style="list-style-type: none"> <li>Preference for alignments within floodplains to be avoided.</li> <li>An east-west connection over SH1 is desired, particularly for local bus connections.</li> <li>Consider whether the emerging preferred option's intersection location in the south achieves the best outcome, and adequately provides for the implementation of a four-way intersection.</li> <li>Suggestion to consider whether the northern end of the route can connect into Wyllie Road to have a single intersection with Woodcocks Road.</li> <li>Preference for a route which travels adjacent to the Morrison Heritage Orchard boundary.</li> <li>Crossings of the Mahurangi River should be minimised.</li> </ul>

Project	Feedback
	<ul style="list-style-type: none"> <li>Project team to be aware of environmental impacts including bats.</li> </ul>

### 3.11.7 Option Refinement

Following engagement and feedback received, and to reflect the outcomes of the completed route protection strategy for the Warkworth (refer DBC Appendix L) the alignment for the Wider Western Link Road was split into a northern section and a southern section for the purpose of further option development and refinement. The splitting point between the two sections was the Mahurangi River, with the northern section connecting to Woodcocks Road in the north and the southern section connecting to SH1 in the south. Figure 3-69 below provides an overview of the sectioning of the Wider Western Link Road.

**Figure 3-70: Overview of Wider Western Link Road northern and southern sections**



#### 3.11.7.1 Northern section

Feedback was received relating to the use of the existing Wyllie Road corridor and the existing intersection with Woodcocks Road as the northern connection point, as well as on a potential alternative crossing point of the Mahurangi River. The project team subsequently developed an additional option for the northern alignment of the Wider Western Link Road and assessed this through the MCA framework alongside the northern section of the emerging preferred option (Option 2 – IBC alignment).

The Project team also gave consideration to a further option which connected centrally (between Options 1 and 2) to Woodcocks Road. However, this was discounted by the Project team and not taken through to MCA assessment due to an identified conflict with the existing intersection of



Woodcocks Road with Wyllie Road, with operational and safety concerns resulting in the option not being viable.

Details of the additional option for the northern section are provided in Table 3-64 below and Figure 3-71 provide an overview of the two options being assessed for the Wider Western Link Road northern section.

**Table 3-64: Post engagement additional northern section options**

Option	Description
4	Wyllie Road Connection
2	IBC alignment

**Figure 3-71. Wider Western Link Road northern section overview**

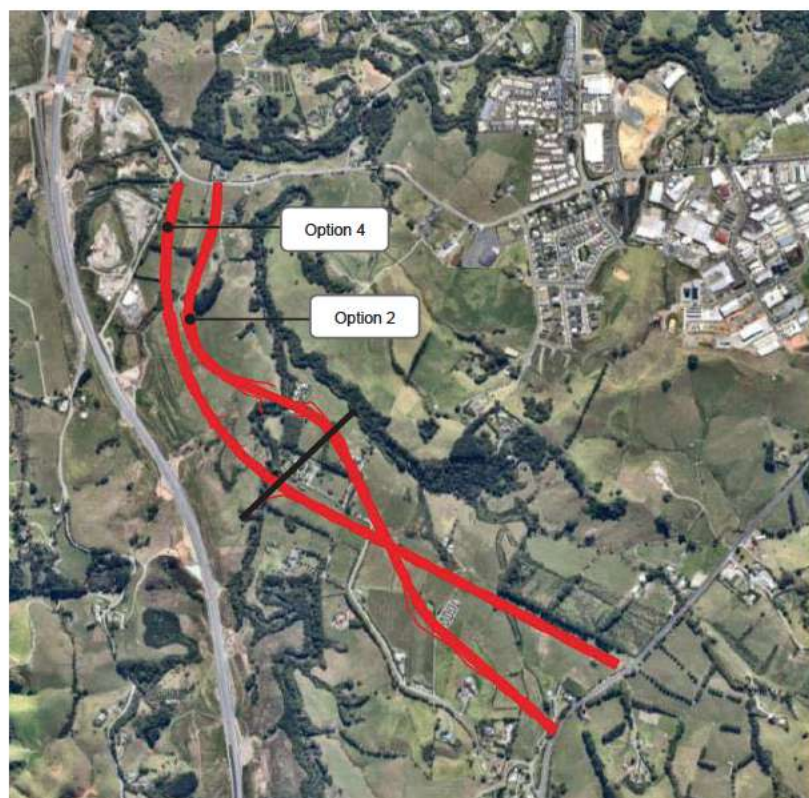


Table 3-65 below demonstrates a heat map and the outcomes of the technical specialists MCA scoring for each northern section option considered. The heat map indicates that the Option 4 was the generally preferred option because of its reduced land requirement and ecological impact. Compared to Option 2, Option 4 was additionally assessed as having greater land use and integration outcomes. While both the options had the same heritage, construction, and landscape outcomes, Option 4 was identified as the preferred option due to the abovementioned differences.



**Table 3-65: Wider Western Link Road northern section MCA summary**

MCA Criteria	Option 4	Option 2
I.O.1 – Access		
I.O.2 – Integration		
I.O.3 – Travel Choice		
Heritage		
Land use		
Urban Design		
Land Requirement		
Social Cohesion		
Human health and wellbeing		
Landscape/Visual		
Stormwater		
Ecology		
Natural Hazards		
Construction impacts		
Construction disruption		
Construction cost/risk		

Table 3-66 and Table 3-67 below provide a summary of the assessment outcomes for the preferred and discounted options.

**Table 3-66: Assessment outcomes for the preferred option**

Option	Assessment Outcomes
4  Wyllie Road Connection	<ul style="list-style-type: none"> <li>Alignment requires low modification to the current topography in the area.</li> <li>The use of the existing (Wyllie) road reduces landowner impacts and additional property acquisition – retains large developable area for future heavy industrial land use, and is an efficient use of existing infrastructure</li> <li>Mahurangi River crossing point aligns with proposed plan change alignment for the southern section.</li> <li>Results in the fragmentation of the Mahurangi River and the riparian corridor between SEAs - the Mahurangi River is only required to be crossed once to provide connection to southern interchange.</li> </ul>

**Table 3-67: Assessment outcomes for the discounted option**

Option	Assessment Outcomes
2  IBC alignment	<ul style="list-style-type: none"> <li>Alignment crosses the Open Space – Conservation Zone and the natural stream management area overlay adjacent to the Mahurangi River.</li> <li>Greater landowner / property acquisition - impacts on two separate private properties.</li> <li>Splits future developable industrial land and result in multiple road frontages – reduced land use outcomes for future heavy industrial land use</li> <li>Greater land use impact due to greater land requirement and property acquisition for additional intersection and new alignment</li> </ul>

Option	Assessment Outcomes
	<ul style="list-style-type: none"> <li>Results in the fragmentation of the Mahurangi River and the riparian corridor between SEAs- requirement to cross the Mahurangi River twice to achieve connection to southern interchange.</li> </ul>

### 3.11.7.2 Option refinement - Southern section

Based on feedback received, including on an updated proposed PPC alignment (with Option 1 previously based on the plan change concept alignment), relating to a preference for the alignment to travel down adjacent to Morrison's Heritage Orchard, the preference for alignments to avoid floodplains and the suggestion for the project team to consider whether the pre-engagement emerging preferred option's intersection location in the south achieved the best outcome, the project team completed further investigations and made the decision to reassess the initial Option 1 alignment.

Option 1 was selected for reassessment as its southern section travels down adjacent to the Morrison's Heritage Orchard boundary and further refinements were completed to shift it away from the flood plain near the stream and SH1 connection and enable the provision for a better outcome for the implementation of a four-way intersection with SH1.

Upon completion of the refinements a new option for the southern section (Option 4) which also reflects the updated crossing point of the Mahurangi River was created for further MCA. Details of the new option for the southern section and an overview of the alignment are provided below in Table 3-68 and Figure 3-72.

**Table 3-68: Post engagement new southern section option**

Option	Description
4	Refined option 1 with refined PPC alignment

**Figure 3-72: Overview of southern section option 4**

Table 3-69 below demonstrates a heat map and technical specialists MCA scores for the option considered for the southern section. The assessment outcome identified Option 4 as the preferred option because it achieved investment, land use, and social cohesion objectives. In addition, the option reduces ecological impacts on the floodplain to the south of the corridor and is subsequently assessed as having better stormwater outcomes.

A summary of the qualitative assessment undertaken by the technical specialists against the MCA framework is provided in Appendix A.

**Table 3-69: Wider Western Link Road southern section post engagement MCA summary**

MCA Criteria	Option 4
I.O.1 – Access	
I.O.2 – Integration	
I.O.3 – Travel Choice	
Heritage	
Land use	
Urban Design	
Land Requirement	
Social Cohesion	
Human health and wellbeing	
Landscape/Visual	
Stormwater	
Ecology	
Natural Hazards	
Construction impacts	



MCA Criteria	Option 4
Construction disruption	
Construction cost/risk	

Table 3-70 sets out the assessment outcomes for the preferred option for the Wider Western Link Road southern section.

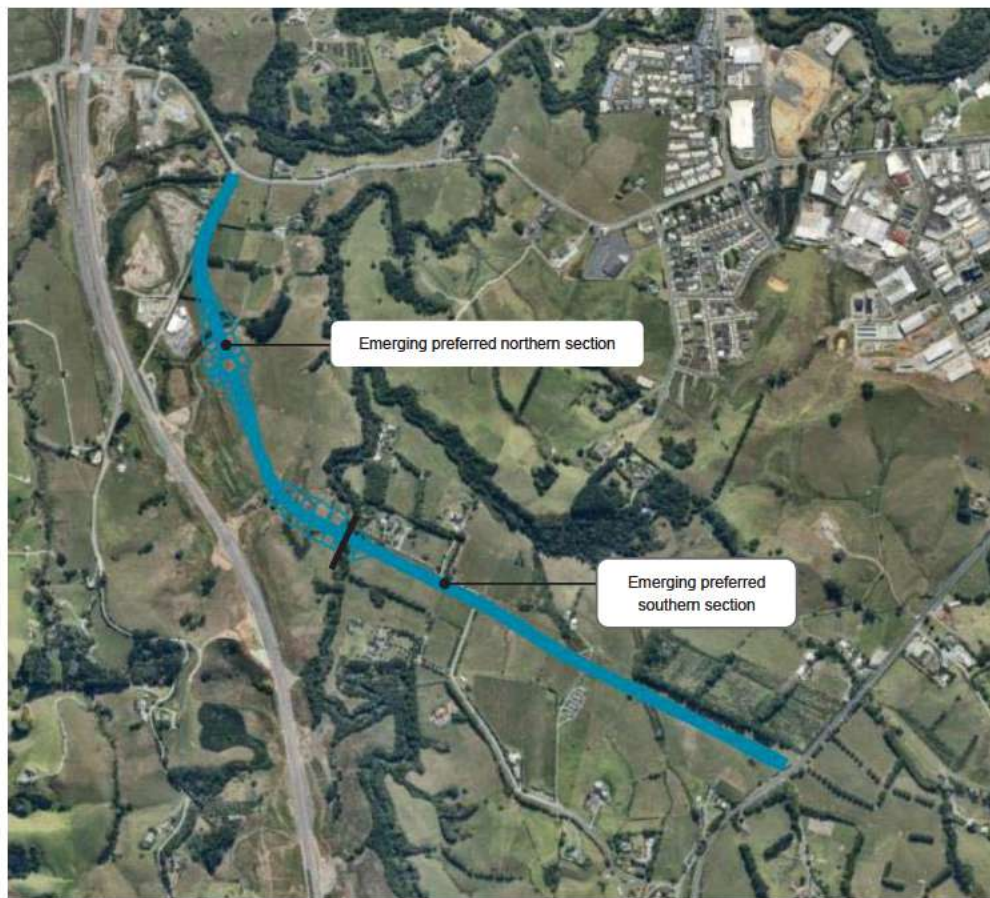
**Table 3-70: Assessment outcomes for the emerging preferred option**

Option	Assessment Outcomes
<b>4</b>  Refined option 1 with refined PPC alignment	<ul style="list-style-type: none"> <li>• Alignment increases access and connectivity in the western Warkworth growth area</li> <li>• Provides for greater east - west connectivity across SH1, which also aligns with the PPC</li> <li>• Has minimal construction impacts on the existing transport infrastructure.</li> <li>• Reduces impacts on flood plains, improved stormwater treatment options</li> <li>• Southern section is located on land under single ownership associated with PPC</li> <li>• Option aligns with indicative new collector alignment in Warkworth Structure Plan and proposed PPC alignment.</li> </ul>

### 3.11.8 Refined Emerging Preferred Option

Following the option refinement process the DBC Wider Western Link Road was confirmed and is illustrated below in Figure 3-73.

**Figure 3-73: DBC Wider Western Link Road**

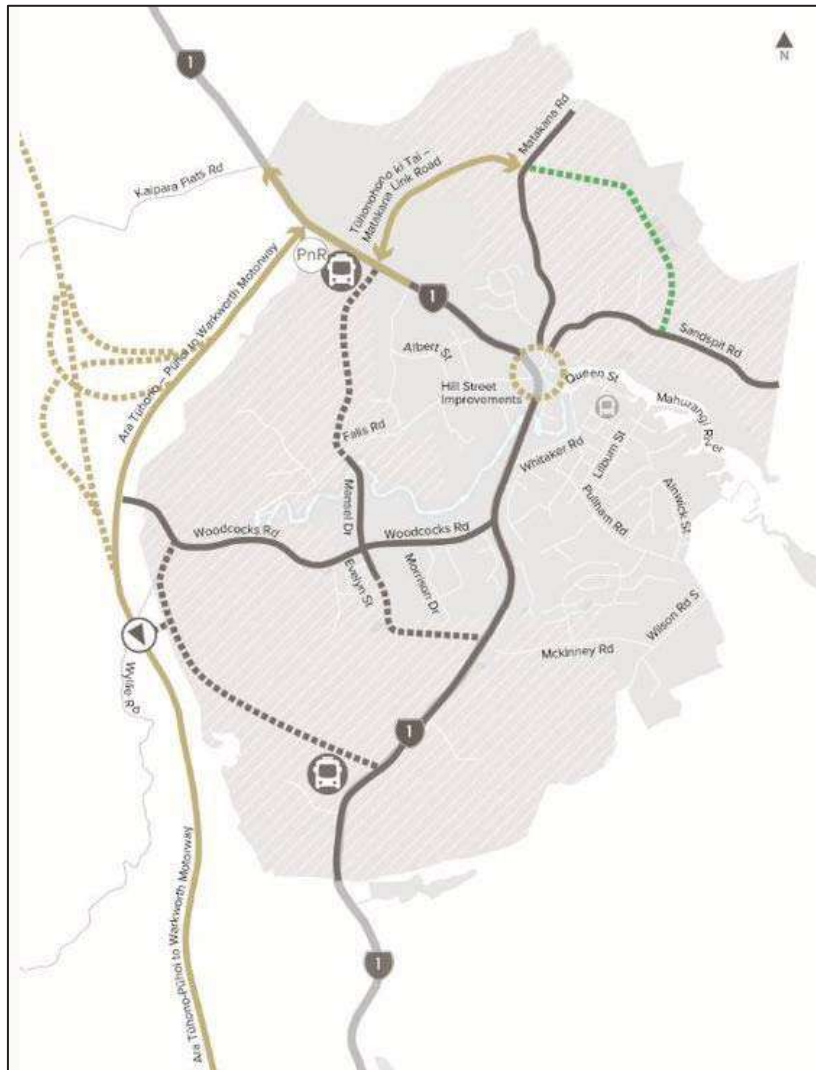


## 3.12 New Sandspit Link Road

### 3.12.1 Overview

The new Sandspit Link Road in the DBC Warkworth transport network is shown in Figure 3-74 below.

Figure 3-74: Sandspit Link Road



Sandspit Link Road is a proposed new corridor located in the northern Warkworth growth area. The purpose of the corridor is to provide local connectivity within the north-east Warkworth growth area and improve connectivity to the Kowhai Coast and Mahurangi Peninsula.

### 3.12.2 Preliminary Analysis

The following section provides the project specific findings of the preliminary analysis completed for the Sandspit Link Road.

#### 3.12.2.1 Gap analysis

The gap analysis recommended the new Sandspit Link Road undergo further optioneering through the corridor assessment process in the DBC and assess the following:

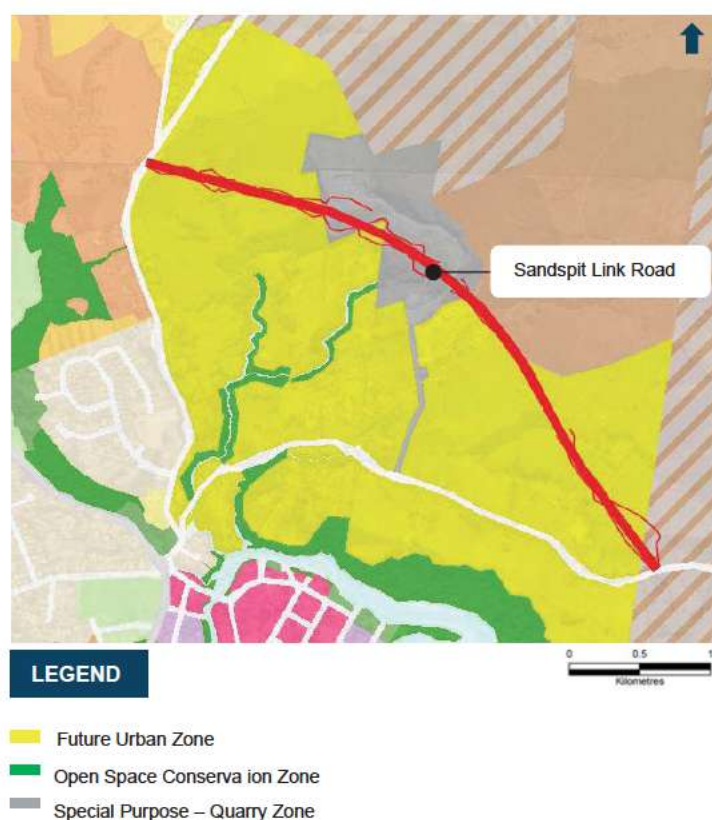


- Option's within and outside of the FUZ boundary in consideration of identified key constraints in the study area.
- Location of the eastern connection with Sandspit Road and whether final location aligns with the corridor purpose.

### 3.12.2.2 Land use assessment

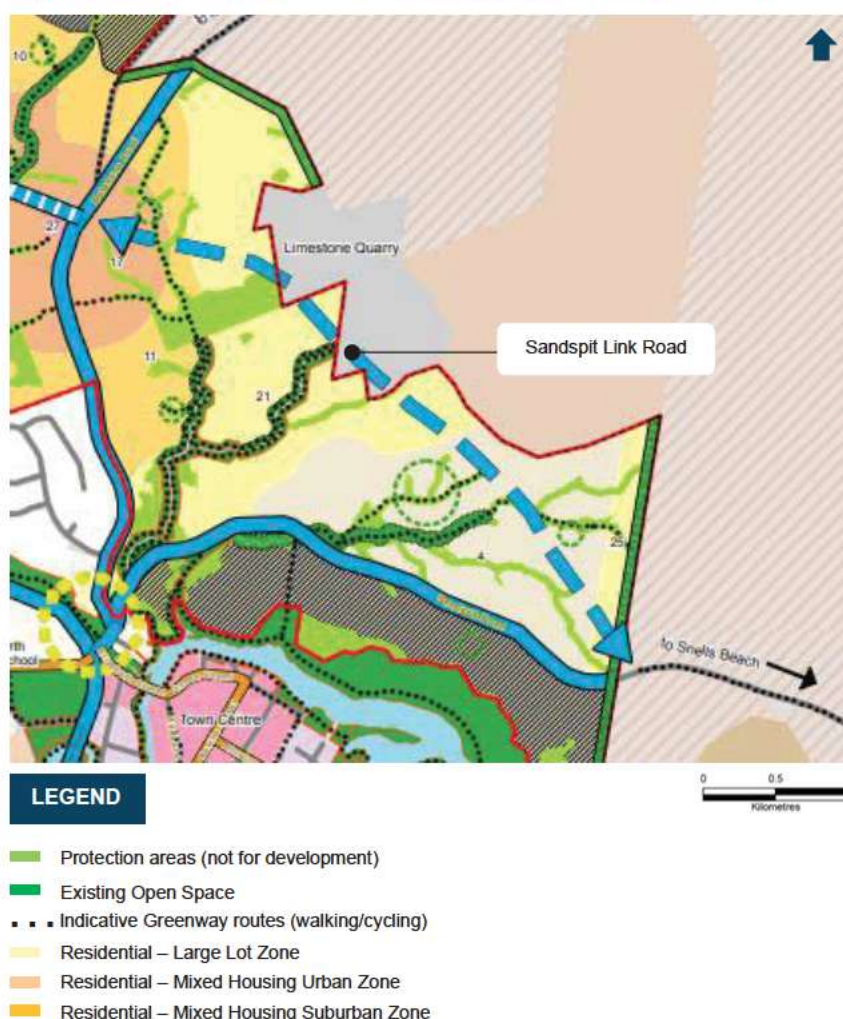
Current zoning for the northern Warkworth growth area in the AUP:OP is shown in Figure 3-75 below. The area is currently primarily future urban zone and the eastern FUZ boundary is adjacent to an operational quarry (Special Purpose Zone). The southern half of the section is additionally dissected by open space conservation zoning.

**Figure 3-75. Sandspit Link Road - AUP:OP Zoning**



Future zoning in the northern Warkworth growth area as identified in the Warkworth Structure Plan is shown in Figure 3-76 below. The structure plan indicates future zoning change in the area from FUZ to primarily residential zoning. This includes large lot and single house zoning in the southwest and Mixed Housing Suburban and Mixed House Urban zoning in the northwest and northeast.

Figure 3-76. Sandspit Link Road - Warkworth Structure Plan Zoning



### 3.12.2.3 Climate change assessment

The climate change assessment concluded that whilst it is considered possible for the network to function without the new Sandspit Link Road there is merit in continuing to route protect it. This is because without the link, the future transport network would have:

- Less resilience with increased pressure on the Hill Street intersection and a likely increase in congestion. The ability to bypass this intersection in the case of an incident would be reduced without long detours through other local roads like Sharp Road.
- Reduced attractiveness for the primary cycle links connecting Matakana Road and Sandspit roads to the town centre due to increased traffic and development accesses from the growth area which could reduce mode shift for short trips to the Warkworth Town Centre.
- Reduced ability to influence a connected urban form through the northeast growth area. Organic growth in the northeast area with fragmented land ownership would likely result in cul-de-sac type developments with limited active mode connectivity throughout the growth area. This could disincentivise local active mode shift and continue the reliance on private vehicles and reduce the opportunity for the growth area to achieve more sustainable transport outcomes.

The assessment recommends the option development and assessment process consider the following opportunities:



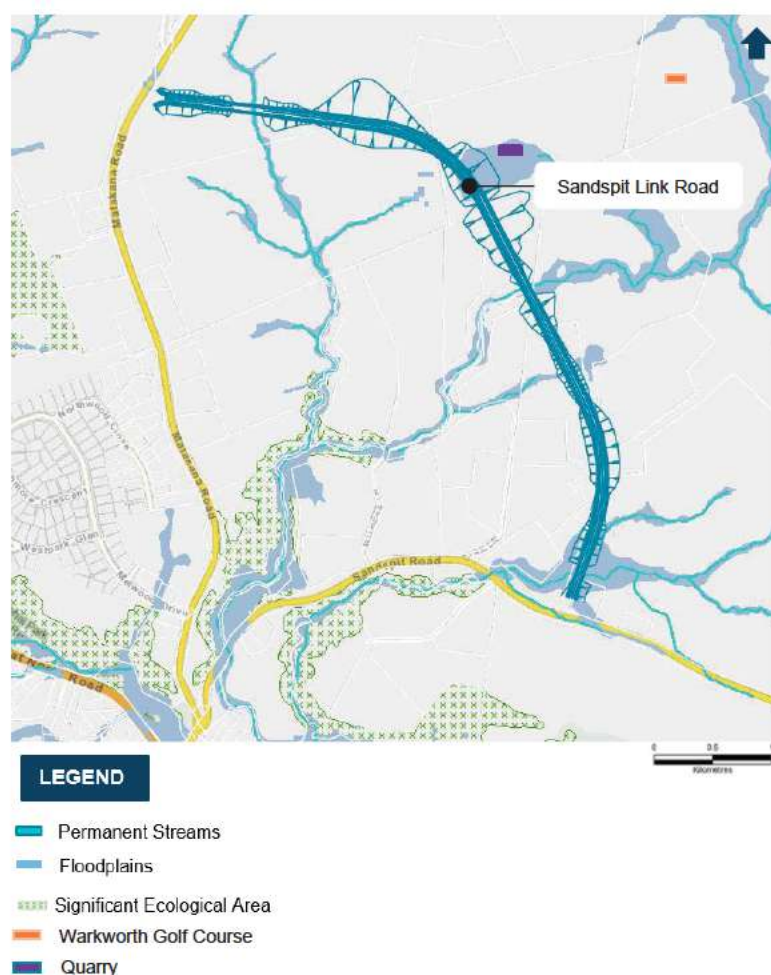
- Consider refinement of cross section and type of active mode facilities to respond to constraints whilst maximising opportunity for mode shift.

### 3.12.2.4 Constraints mapping

Constraints mapping was undertaken by the Project team with input from Mana whenua and SMEs, key constraints and considerations identified within the extent of the new Sandspit Link Road are outlined in Figure 3-77 below and include:

- Permanent streams and flood plains
- Native woody and riparian vegetation including SEA
- Hill slope seep, valley head seeps and natural wetlands present.
- Surface ponding - avoid fragmenting potential bird corridors between nearby ponds.
- Warkworth golf course in the north of the study area.
- Matakana Link Road designation
- Limestone Quarry

Figure 3-77. Sandspit Link Road Constraints Overview





### 3.12.2.5 Form and function assessment

The form and function assessment identified that Sandspit Link Road will be a 24m wide two-lane urban arterial road with separated cycle lanes and footpaths on both sides of the corridor.

For further details on the corridor form and function refer to Appendix B of the DBC.

### 3.12.3 Option Development

Upon completion of the preliminary analysis the project team developed and identified options to be progressed to corridor assessment for Sandspit Link Road, these are outlined in Table 3-81 below.

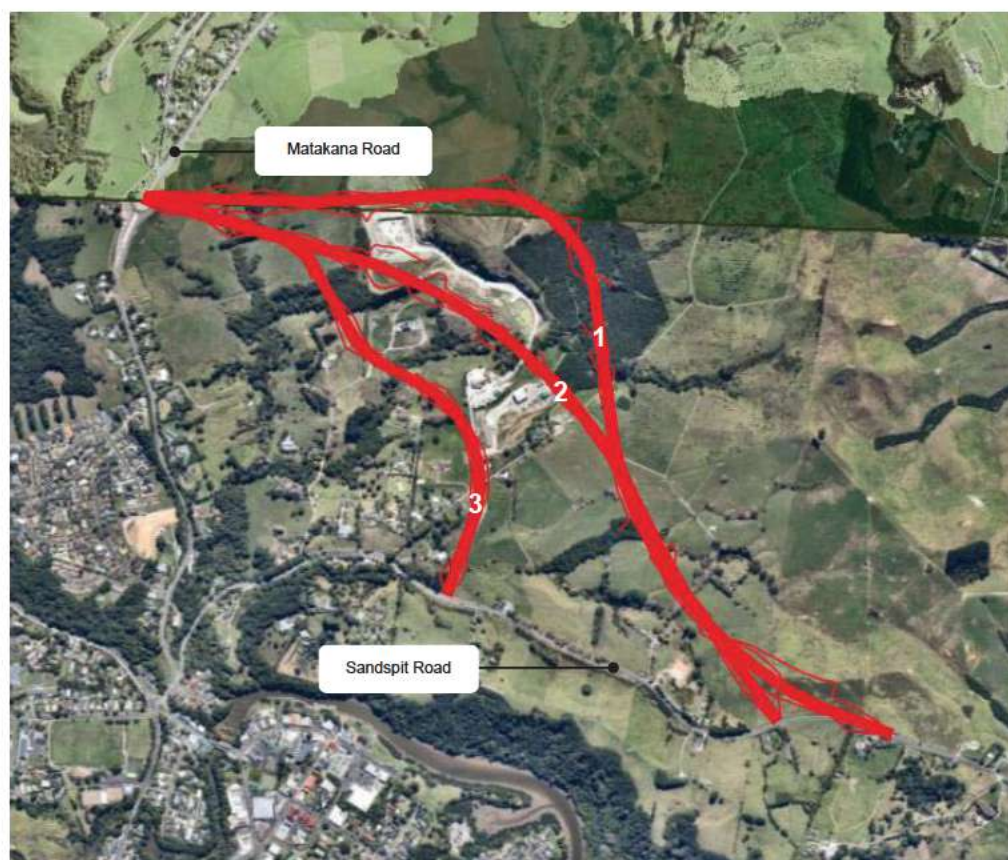
The options identified for assessment test a connection traversing to the north around the limestone quarry and into the Rural – Mixed Rural Zone (similar to that considered at the IBC stage, developed to reflect a previous landowner(s) option), a central connection adjacent to the inner boundary of the FUZ and going through the quarry connecting to Sandspit Road in east (IBC alignment), and a southern connection cutting through the middle of the FUZ with a connection onto Sandspit Road adjacent to the quarry road.

**Table 3-71: New Sandspit Link Road Options**

Option	Description
1	Rural alignment North of Quarry
2	IBC alignment
3	Southern alignment through FUZ

Figure 3-78 below provides an overview of the Sandspit Link Road options for assessment.

**Figure 3-78: Overview of options for Sandspit Link Road**



### 3.12.4 Option Assessment

For the purpose of the assessment technical specialists were provided with briefing pack which included the following information:

- Indicative option alignments
- AUP-OP Management Layers
- AUP-OP Zoning
- Instructions to assess and utilise the Te Tupu Ngātahi GIS viewer
- Sandspit Link Road MCA Spreadsheet

Table 3-72 below demonstrates a heat map and the outcomes of the technical specialists MCA scoring for each option considered. The assessment indicated a clear preference for Option 3 compared to Option 1 and 2. Option 3 best met the investment objectives, land use and urban design outcomes, and had the lowest adverse impacts with the exception of ecological and social cohesion outcomes whereby all options were assessed as having similar impacts. Overall, Option 1 scored the least favourably primarily due to land use outcomes, but whilst Option 2 was a balance of both, the technical specialists and Project team identified Option 1 along with Option 3 as options to be taken forward for further refinement and consideration. Option 2 was discounted due to the risks associated to an alignment going directly through the centre of the quarry and the associated uncertainty around its future operations.

**Table 3-72: Sandspit Link Road MCA Summary**

MCA Criteria	Option 1	Option 2	Option 3
I.O.1 – Access			
I.O.2 – Integration			
I.O.3 – Travel Choice			
I.O.4 – Resilience			
Heritage			
Land use			
Urban Design			
Land Requirement			
Social Cohesion			
Human health and wellbeing			
Landscape/Visual			
Stormwater			
Ecology			
Natural Hazards			
Construction impacts			
Construction disruption			
Construction cost/risk			

Table 3-73 below provides a summary of the assessment outcomes for the options selected for further refinement.

**Table 3-73: Assessment outcomes and suggested refinements for Option's 1 and 3**

Option	Assessment Outcomes
1  Rural alignment North of Quarry	<ul style="list-style-type: none"> <li>Results in minimal flood risk</li> <li>This option provides low negative contributions to amenity and quality values.</li> <li>Does not protect rural urban boundary (RUB) and creates development pressure on residual rural land between FUZ and the corridor resulting in negative land use outcomes.</li> <li>Impacts existing golf course.</li> <li>Results in the highest ecological fragmentation of catchment and more pronounced stream and wetland effects.</li> <li>Construction risk due to quarry infill and slope instability.</li> <li>Longest route and highest earthwork cost.</li> </ul>



Option	Assessment Outcomes
3  Southern alignment through FUZ	<ul style="list-style-type: none"> <li>The shorter link of the option is more attractive for active mode users and provides better opportunities to integrate with the local network and future land use.</li> <li>The eastern connection of the option - requires bridging over southern floodplains and ecological impacts.</li> <li>Closest proximity to SEA, impacts on riparian features.</li> <li>Main construction impact is on the existing Quarry road – this will be minimised if the intersection is relocated.</li> </ul>

Table 3-74 below sets out the assessment for the discounted options.

**Table 3-74: Assessment outcomes for discounted Sandspit Link Road options**

Option	Assessment Outcomes
2  IBC alignment	<ul style="list-style-type: none"> <li>Alignment overall has minimal flood risk.</li> <li>There is a moderate amount of catchment fragmentation and the option impacts on riparian features. Level of catchment fragmentation is more than for Option 1 but less than for Option 3.</li> <li>The option will largely be constructed on Greenfields however there are some landslide features observed around slopes and streams.</li> <li>The alignment is longer compared to Option 3, resulting in the requirement for more earthworks.</li> <li>There is a higher risk associated to an alignment going through a quarry.</li> <li>Preferred stormwater option as option has lower surface area to treat compared to Option 1.</li> </ul>

Table 3-75 below sets out the opportunities identified to refine Option's 1 and 3.

**Table 3-75. Option 1 and 3 suggested refinements**

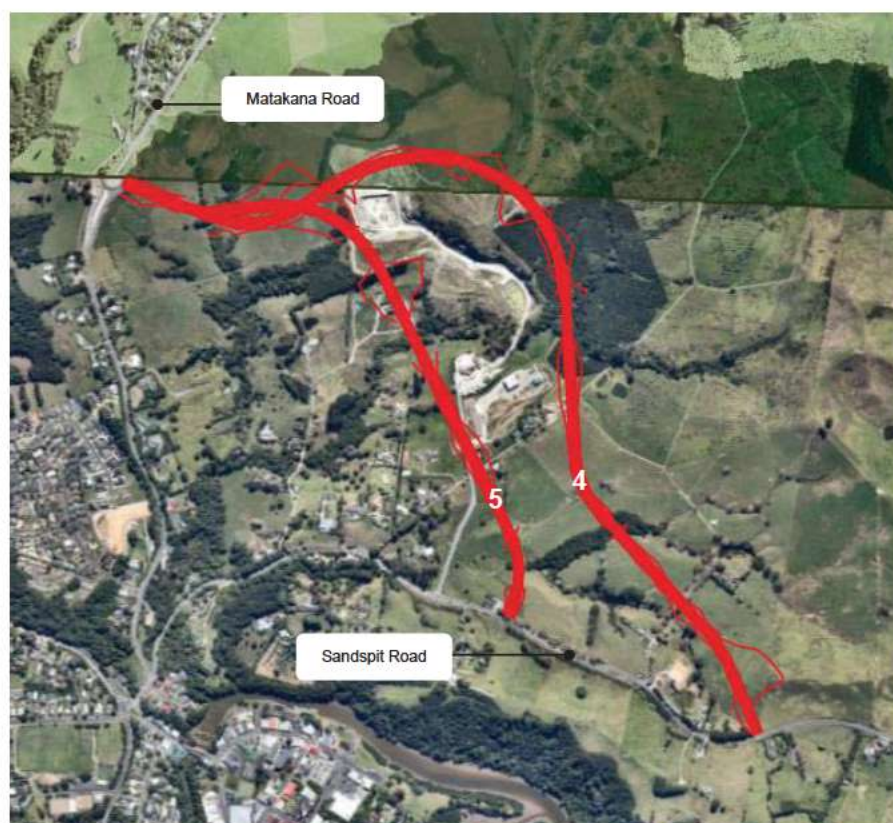
Option	Suggested Refinements
1	<ul style="list-style-type: none"> <li>Alignment to be shifted further to the south and north to avoid the Warkworth Golf Course and reduce impacts on the quarry, respectively, and to reduce stream crossings/impacts through the central section.</li> <li>Shift the option's eastern connection with Sandspit Road to align with the FUZ boundary.</li> </ul>
3	<ul style="list-style-type: none"> <li>Shift alignment to the north-east to minimise impact on permanent streams, vegetation and conservation zone.</li> <li>Shift eastern intersection connection with Sandspit Road to the west to avoid streams.</li> </ul>

Following the identification of opportunities to further refine Option's 1 and 3, the Project team developed the following options for further assessment:

- **Option 4** (Refined Option 1)
- **Option 5** (Refined Option 3)

Figure 3-79 below provides a design overview of the refined options for further assessment.

**Figure 3-79: Overview of Sandspit Link Road refined options**



### 3.12.4.1 MCA Workshop 2

Following the development of the refined options, a second MCA workshop was conducted with the project team and technical specialists in attendance. A heat map illustrating the outcomes of the technical specialists MCA scoring for the options considered is provided in Table 3-76 below. The heat map illustrates that overall Option 5 was assessed as having less adverse impacts in comparison to Option 4. The key differentiators between the two options were the land use, urban design, and social cohesion impacts each option derived. Option 5 was assessed as having positive impacts on these outcomes compared to Option 4. Whilst both options had similar adverse ecological impacts, Option 5 was preferred because it resulted in a smaller amount of catchment fragmentation and lower wetland and stream impacts.

**Table 3-76: MCA Workshop 2 Summary**

MCA Criteria	Option 4	Option 5
I.O.1 – Access		
I.O.2 – Integration		
I.O.3 – Travel Choice		
I.O.4 – Resilience		

MCA Criteria	Option 4	Option 5
Heritage		
Land use		
Urban Design		
Land Requirement		
Social Cohesion		
Human health and wellbeing		
Landscape/Visual		
Stormwater		
Ecology		
Natural Hazards		
Construction impacts		
Construction disruption		
Construction cost/risk		

The technical specialists and project team identified Option 5 as the emerging preferred option for Sandspit Link Road and a summary of the assessment outcome is provided in Table 3-77 below.

**Table 3-77: Sandspit Link Road emerging preferred option**

Option	Assessment Outcomes
5 Refined Option 3	<ul style="list-style-type: none"> <li>Option minimises impacts on the identified vegetation area and open space - conservation zone.</li> <li>Provides for ability to integrate with local network and future land use connections. Noting that alignment runs centrally through the FUZ but with a central western connection resulting in limited integration with eastern part of FUZ land while still achieving transport outcomes.</li> <li>Least preferred stormwater option although option as the lowest surface area to treat.</li> <li>Option is in closest proximity to the existing SEA and FGZ, it will result in the smallest amount of catchment fragmentation and the smallest extent of wetland and stream impacts.</li> <li>Option increases connectivity of north-east Warkworth and Mahurangi peninsula.</li> </ul>

Table 3-78 sets out a summary of the assessment outcome for the discounted option.

**Table 3-78: Assessment outcomes for discounted Sandspit Link Road option**

Option name	Assessment Outcomes
4 Refined Option 1	<ul style="list-style-type: none"> <li>Separation from the FUZ prevents good land use outcomes for future development through limited opportunities for integration and localised connections.</li> <li>Impacts on streams / riparian features / potential wetland minimised through refined alignment, crossing and intersection locations.</li> <li>Second longest route and highest earthwork cost.</li> <li>Option will increase potential for urban spread to occur outside of the RUB into rural land use.</li> </ul>



Option name	Assessment Outcomes
	<ul style="list-style-type: none"> <li>Quarry creates a severance and reduces connectivity for active mode users.</li> </ul>

### 3.12.5 Emerging preferred option

The outcome of the assessment identified option 5 as the emerging preferred option. The alignment avoids impacts on the identified vegetation and open – space conservation zone, provides better social cohesion and land use outcomes due to its location within the FUZ, in comparison to option 4 which has large sections being located outside the RUB on rural land.

### 3.12.6 Engagement

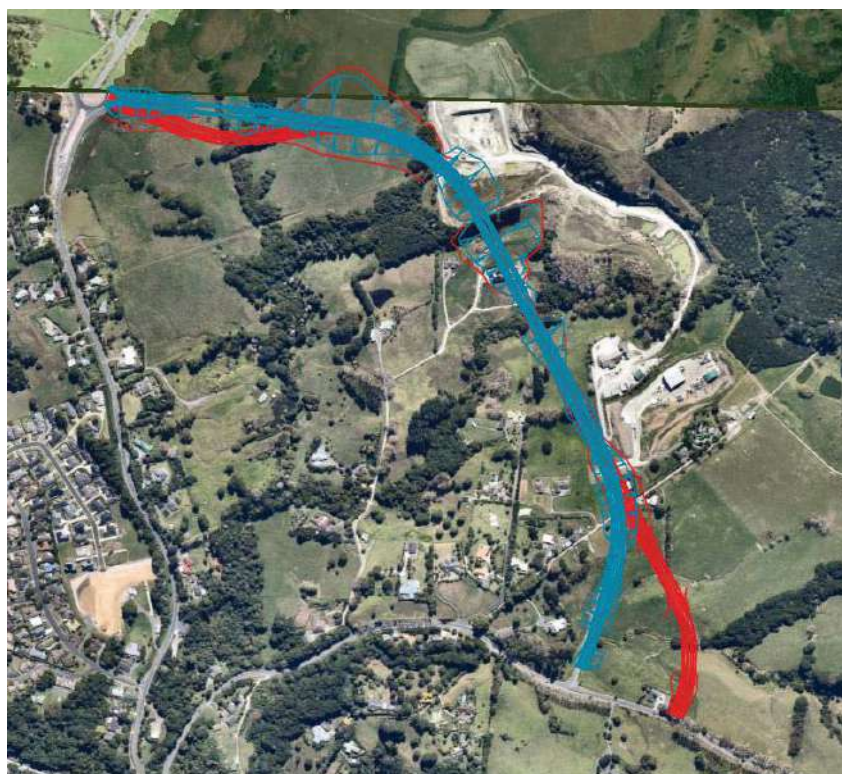
Table 76 provides a summary of the project specific feedback received from engagement with Te Tupu Ngātahi partners, stakeholders, and community members. For further details refer to DBC appendix.

Project	Feedback
Sandspit Link Road	<ul style="list-style-type: none"> <li>Preference for corridor to be within the FUZ area and not extend out to the Rural Urban Boundary (RUB). Concerns that an alignment in the RUB will encourage further urban sprawl.</li> <li>Consider a crossing of the Mahurangi river east of the town centre.</li> <li>Consideration that northern alignment provides for the better transport / network outcome due to 'by pass' function</li> </ul>

### 3.12.7 Option Refinement

Following engagement feedback and further ecological and design investigations, the project team confirmed that the inner / southern alignment (Option 5) as the emerging preferred option (as opposed to an outer / northern route) for the reasons previously identified at MCA the phase. However, an opportunity to refine the emerging preferred option was identified to further minimise environmental impacts and utilise existing infrastructure at the southern connection point with Sandspit Road. As a result, the northern section of the option was shifted slightly north to reduce ecological vegetation impacts and the southern connection point of the emerging preferred option with Sandspit Road was shifted west to utilise the existing quarry road and intersection. This subsequently reduced the extent of permanent stream(s) impacted. Figure 3-80 below illustrates the refinement made to the emerging preferred option.

**Figure 3-80. Sandspit Link Road Option Refinement**



### 3.12.8 Refined Emerging Preferred Option

The emerging preferred option for the indicative DBC Sandspit Link Road alignment is shown below in Figure 3-81.

**Figure 3-81: Indicative DBC Sandspit Link Road**



