



TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Local Arterials Assessment of Alternatives

Appendix A

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Version 1

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Glossary

Acronym / Term	Description
AUP:OP	Auckland Unitary Plan - Operative in Part
AT	Auckland Transport
Auckland Council, Council or the Council	Auckland Council
CFAF	Corridor Form and Function
DBC	Detailed Business Case
FTN	Frequent Transit Network
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
HIF	North West Housing Infrastructure Fund
IBC	Indicative Business Case
IFA	Infrastructure Funding Agreement
ISTN	Indicative Strategic Transport Network
Local Arterials Package	The eight NORs that make up the North West Local Arterials Package
LOS	Level of Service
MOD	Ministry of Defence
MCA	Multi-Criteria Assessment
NOR	Notice of Requirement
NZDF	New Zealand Defence Force
Partners	Collectively refers to Auckland Transport, Waka Kotahi NZ Transport Agency, Manawhenua and Auckland Council
PBC	Programme Business Case
RUB	Rural-urban boundary
RTC	Rapid Transit Corridor
RMA	Resource Management Act 1991
SEA	Significant Ecological Area
SH16	State Highway 16
SH18	State Highway 18
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Alliance

Acronym / Term	Description
TFUG	Transport for Urban Growth
Waka Kotahi	Waka Kotahi NZ Transport Agency

1 Introduction

1.1 Purpose of this Report

This report supports Auckland Transport's (AT) Notices of Requirements (NORs) to designate land for each of the extended and / or upgraded corridors within the North West Local Arterials Package (Local Arterials Package).

The Local Arterials Package includes eight NORs divided into two assessment areas, Whenuapai as detailed in Table 1-1 and Figure 1-1, Redhills as detailed in Table 1-2 and Figure 1-2 and Riverhead in Table 1-3 and Figure 1-3. The NORs seek to protect land to enable the construction, operation and maintenance of transport infrastructure.

Table 1-1: Local Arterials – Whenuapai

Ref	Project	Requiring Authority
W1	Trig Road North	Auckland Transport
W2	Māmari Road	Auckland Transport
W3	Brigham Creek Road	Auckland Transport
W4	Spedding Road	Auckland Transport
W5	Hobsonville Road	Auckland Transport

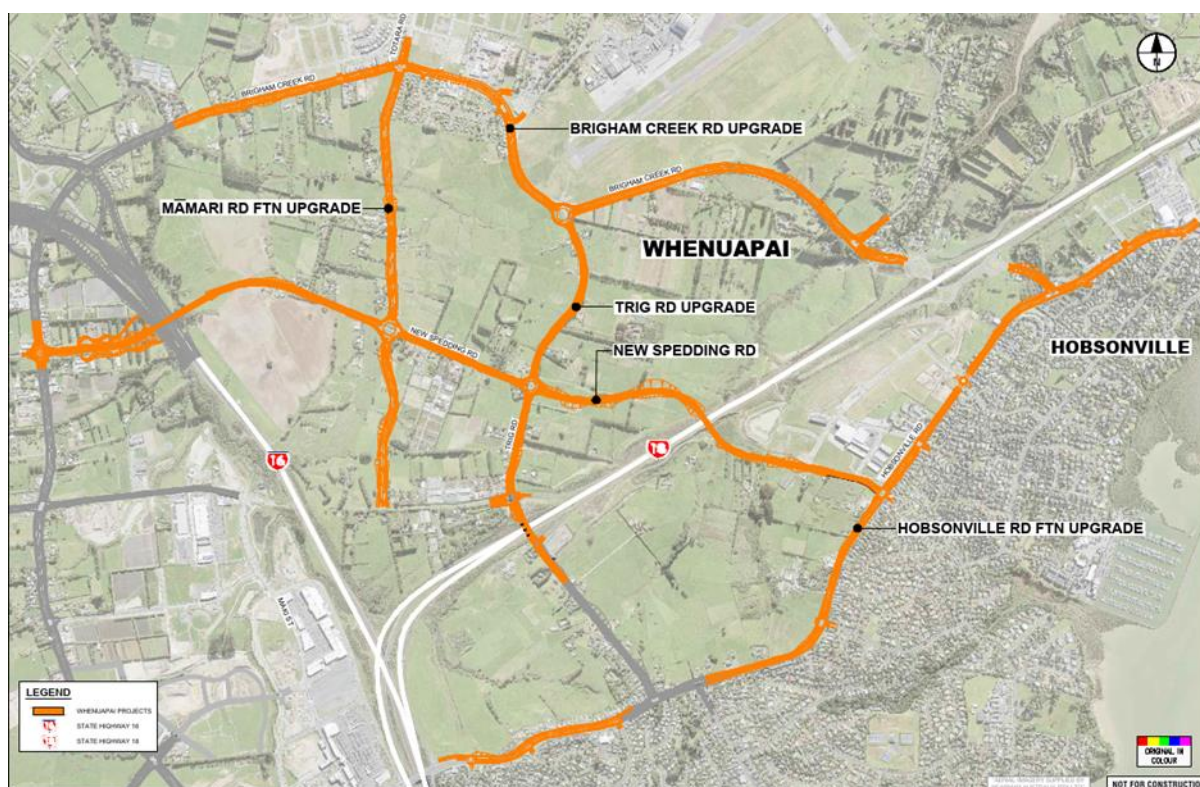


Figure 1-1: Whenuapai Package Overview

Table 1-2: Local Arterials – Redhills

Ref	Project	Requiring Authority
RE1	Don Buck Road Frequent Transit Network (FTN)	Auckland Transport
RE2	Fred Taylor Drive FTN	Auckland Transport



Figure 1-2: Redhills Package Overview

Table 1-3: Local Arterials – Riverhead

Ref	Project	Requiring Authority
R1	Coatesville-Riverhead Highway	Auckland Transport

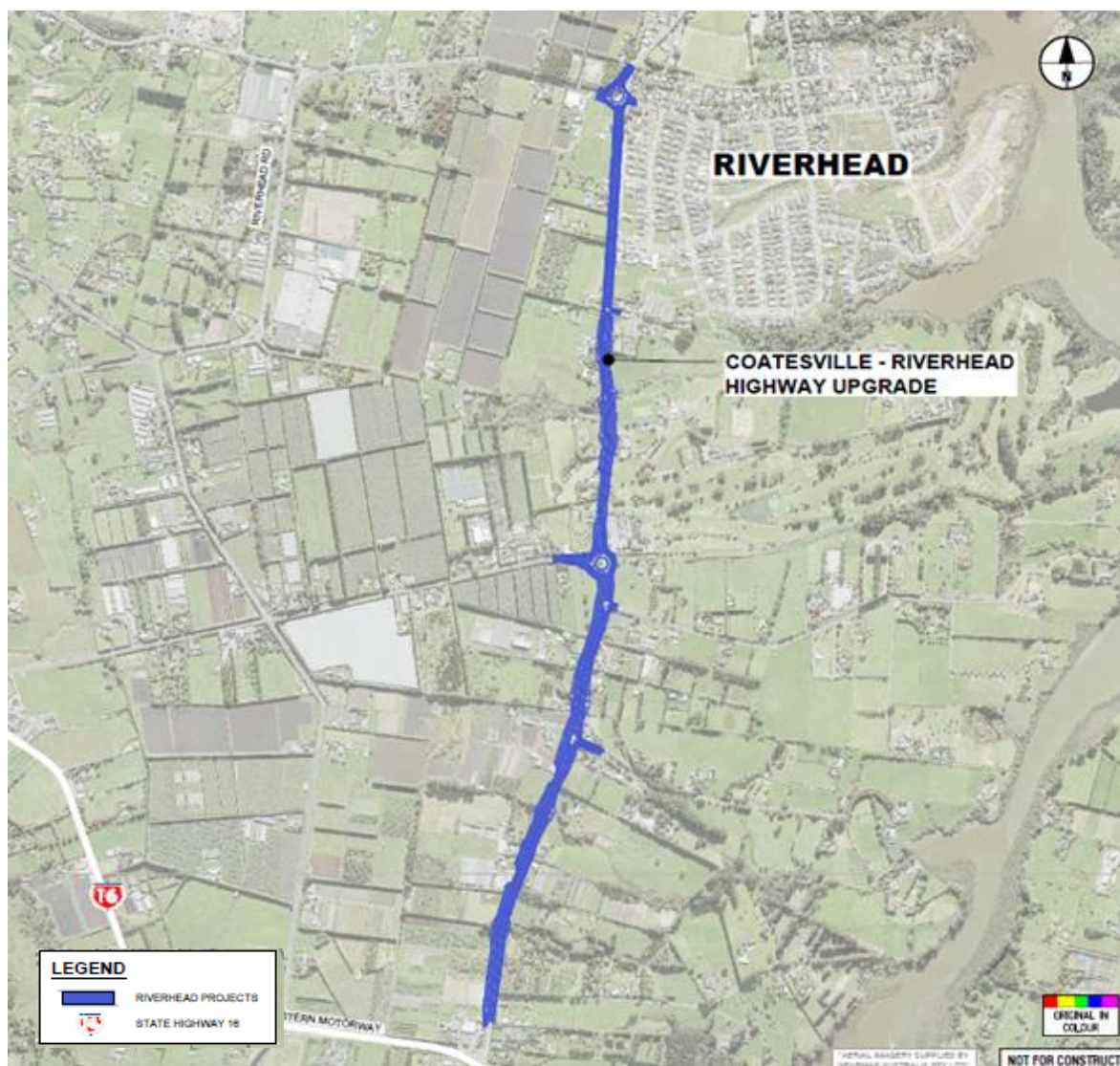


Figure 1-3: Riverhead Package Overview

Under section 171(1)(b) of the Resource Management Act 1991 (RMA), a territorial authority making a recommendation on a NOR must consider whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work if the requiring authority does not have an interest in the land sufficient for undertaking the work, or it is likely that the work will have a significant adverse effect on the environment.

AT does not currently have an interest in all of the land required for the construction and operation of the Local Arterials Package of projects and so consideration of alternative sites, routes and methods has been undertaken. The purpose of this report is to document the development of alternative options to undertake the works and the process used to assess and compare those options.

This report provides an overview of the corridor options considered during the North West long list and short list phases and describes the assessment of alternative alignment options undertaken including the route refinement process through to recommendation of a preferred transport network. This report also provides a summary of the alternative statutory methods considered for implementing the Local Arterials Package.

Figure 1-4 outlines the process undertaken through the corridor and route refinement assessment of alternatives.

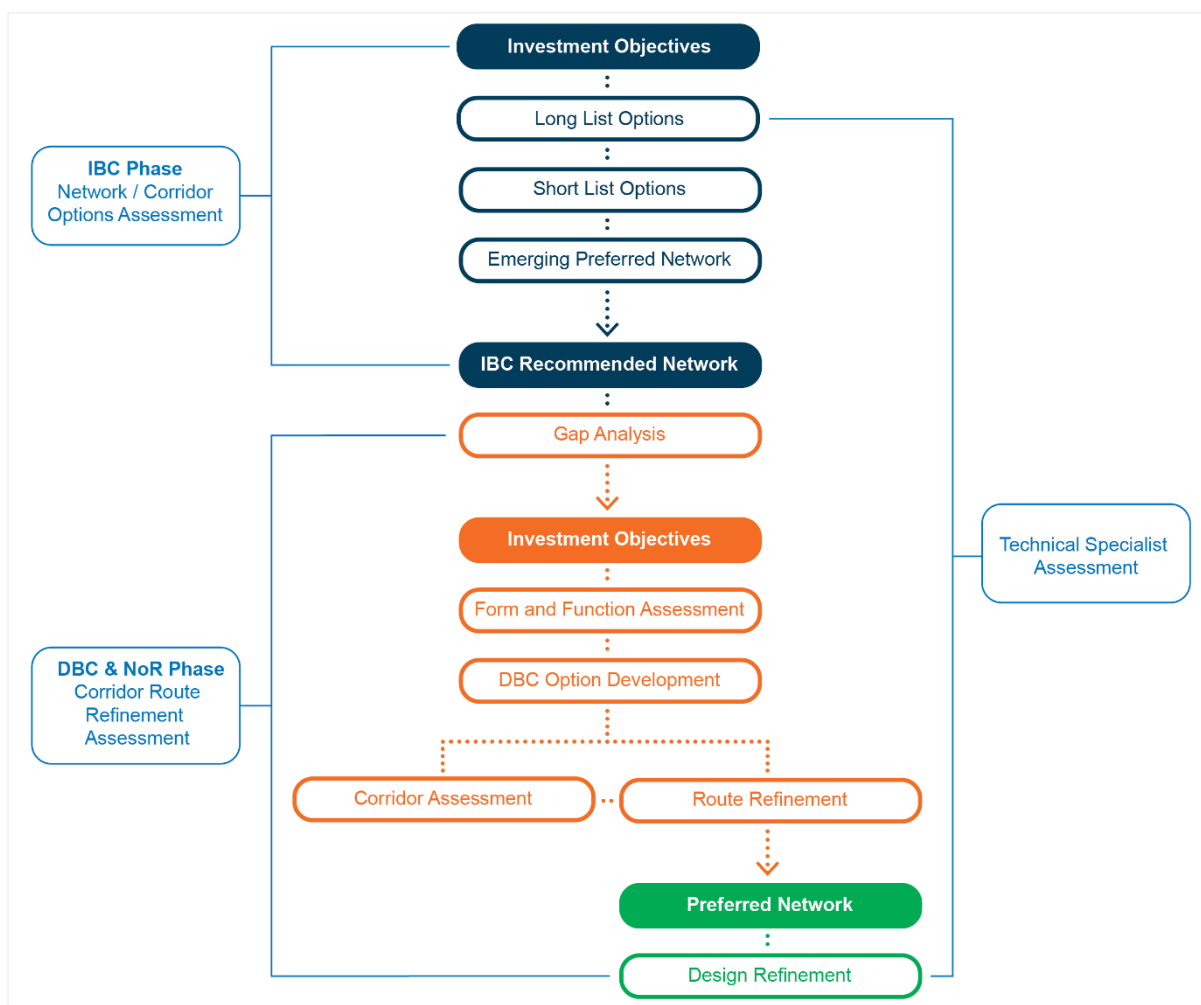


Figure 1-4: Summary of Assessment of Alternatives Process

1.2 Background

Auckland is New Zealand's largest city, home to approximately 1.69 million people and 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 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 transport 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 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
- North-west: Whenuapai-Redhills, Westgate, Kumeū, and Huapai (**subject of this report**)
- 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, AT, Waka Kotahi NZ Transport Agency (Waka Kotahi), and the Council 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:

1. 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.
2. 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 and will likely have impacts on and require improvements to the existing arterial, public transport, and state highway network, and to planning frameworks and / or policy.

The Te Tupu Ngātahi Programme is a collaboration between AT and Waka Kotahi to plan transport investment in Auckland's future urban zoned (FUZ) areas over the next 10 to 30 years. AT and Waka Kotahi have partnered with Auckland Council, Manawhenua and KiwiRail Holdings Limited and are working closely with stakeholders and engaging with the community to develop the strategic transport network to support Auckland's growth areas. North West Local is within the North West growth area. Auckland's growth areas including the North West growth area are shown in Figure 1-5.

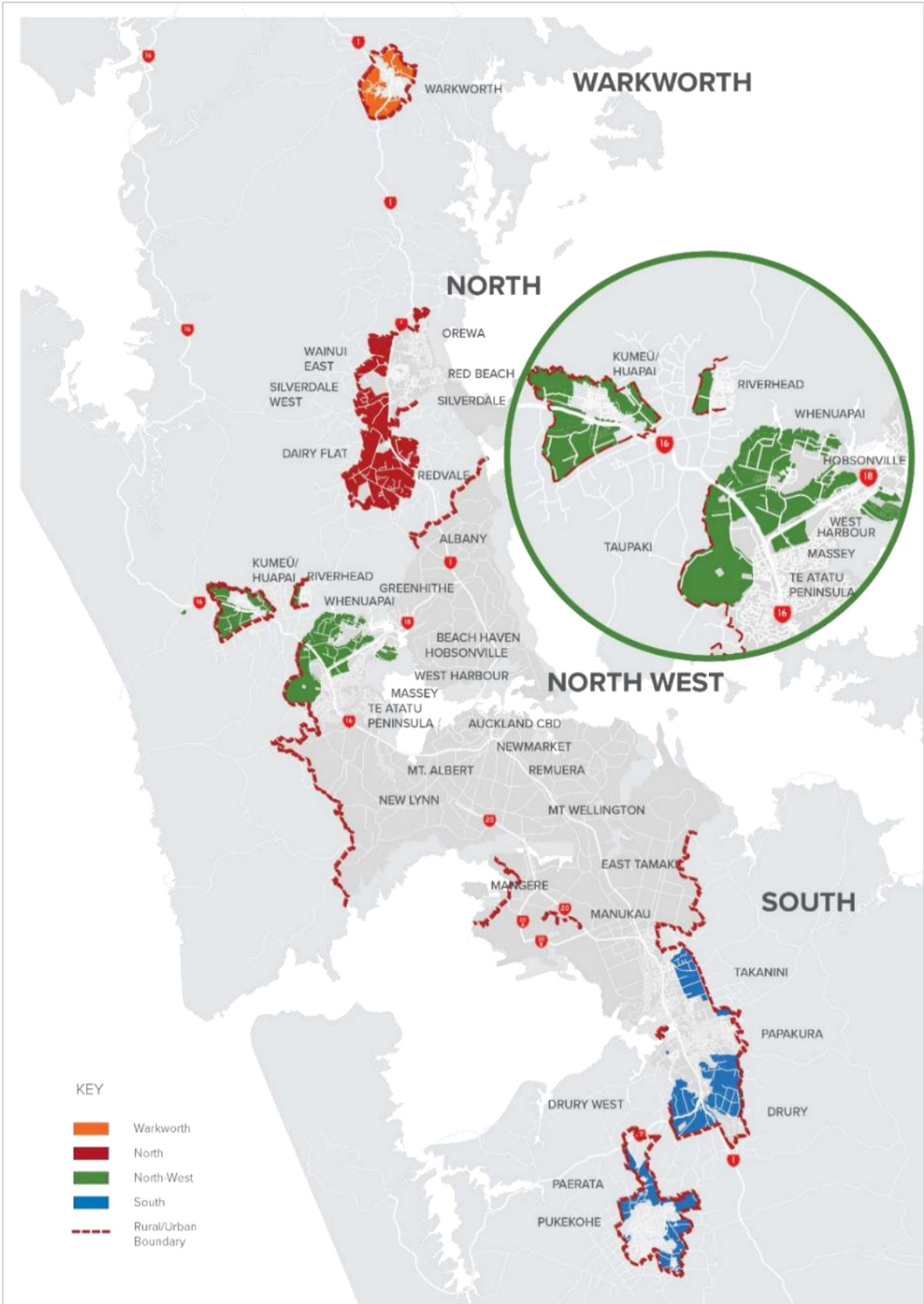


Figure 1-5: Future Urban Areas of Auckland, highlighting the North West Growth Area

1.3 North West – Overview and Issues

The North West growth area is approximately 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West.

A summary of planned growth, timing and the current AUP:OP zoning status for each growth area in the North West is set out in Table 1-4 below.

Table 1-4: Summary of North West Local planned growth

Area	Growth summary (approx.)	AUP:OP zoning	FULSS development timing
Whenuapai	Land 50 hectares, 1,150 dwellings	Live zoned	2012-2017
Whenuapai Stage 1	Land 401 hectares approx., 6,000 dwellings	FUZ	Decade One 1st half 2018 – 2022
Whenuapai Stage 2	Land 745 hectares approx., 11, 600 dwellings, Expanding local centres	FUZ	Decade Two 1st half 2028 – 2032
Redhills	Land 594 hectares, 10,650 dwellings, Expanding local centres	Live Zoned	2012 - 2017
Redhills North	Land 191 hectares, 1,400 dwellings, 1 local centre	FUZ	Decade Two 1st half 2028 – 2032
Kumeū-Huapai Riverhead	Land 992 hectares, 8,000 dwellings 1 local centre	FUZ	Decade Two 1st half 2028 – 2032

The urgency to route protect the preferred transport network in the North West Local area is driven by the rate and scale of committed development within the Hobsonville Corridor and the development anticipated to occur in Whenuapai, Redhills, and Riverhead. In addition, land under pressure from developers who are preparing private plan within Whenuapai and submitting resource consents on live zoned land adjacent to existing urban corridors.

Failure to protect the network ahead of these development plans risks a combination of fragmentation of the future transport network, prohibitively expensive property acquisition costs for transport connections, a lack of certainty around private development investment, and a loss of ability to influence good urban form. Over-reliance on the existing strategic transport corridors combined with rapid population growth in and around the North West growth area will reduce the ability of the transport system to move people and goods safely and efficiently.

Specifically, existing demand causes network constraints during peak periods indicating that as future growth occurs in the North West, the network will be unable to sustain an acceptable level of service. If not addressed, the existing transport system will constrain the levels of access for residents in both the existing and future urbanised areas, limit development potential, decrease regional productivity and undermine the quality of life for residents and employees in the area. Failure to integrate transport planning with pace, scale and form of urban development will limit the opportunity for the

transport system to positively contribute to quality, connected urban and natural environments in the North West growth area as a whole.

2 Methodology for Assessing Alternatives

The following sections provide an overview of the alternative sites and routes that have been considered for undertaking the works.

In developing options, the project team and specialist first considered options that integrated with land use planning and reduced the need to travel, options that increased network capacity were considered last. This approach aligns with the intervention hierarchy approach of prioritising lower impact and cost-effective options first, see Figure 2-1.

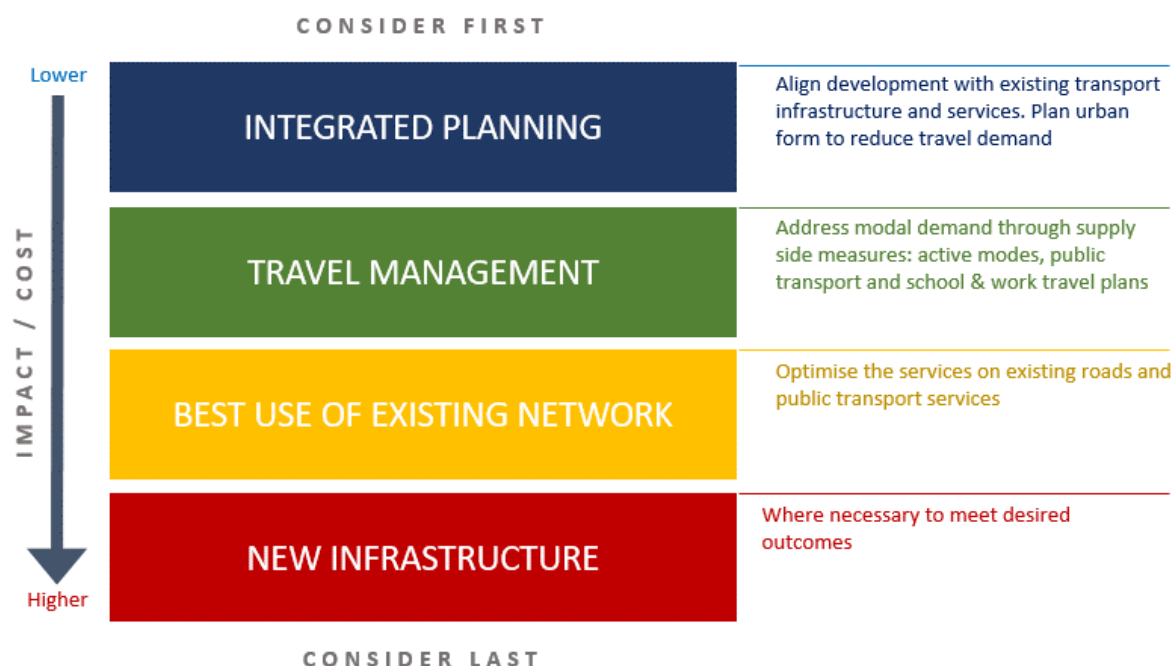


Figure 2-1: Options development – intervention hierarchy approach

A summary of long list and short list approach is set out in Section 3. The fundamental outcome of the long list and short list process for the local arterials network was the decision to make best use of the existing network, with new infrastructure upgrades as required, to achieve the identified transport outcomes. This resulted in refinement options to widen existing corridors, either left, right or both sides, and to extend some corridors to form an integrated network.

2.1 Approach Overview

The assessment of alternatives for the Local Arterials Package involved the following stages:

Corridor Assessment

- Through a long list and short list assessment process, the identification of Indicative Strategic Transport Networks (ISTN) (corridors) required to support Auckland's North West growth areas through the Indicative Business Case (IBC);
- Grouping the corridors within the North West ISTN into eight packages including subsequent grouping into a strategic and local set, including the Local Arterials Package (subject of this report);

Route Refinement Assessment

- Undertaking a gap analysis of the IBC, a constraint mapping exercise, an AUP:OP map review and a form and function assessment to develop options for the Detailed Business Case (DBC) local and strategic projects;
- Development and consideration of alternative route alignment for the options including stormwater and intersection treatment;

Preferred Alignment Refinement

- Further refinement of each route in the Whenuapai, Redhills and Riverhead Packages in order to determine the extent of the designations necessary for each transport corridor; and
- Confirmation of the corridors for route protection.

A summary of the long list and short list approach is set out in Section 3. Route refinement option development and evaluation is described in each project chapter, Sections 6 to 14 of this Report.

2.2 Assessment Framework

In order to evaluate and compare options, an assessment framework for the alternatives assessment which included a Multi-Criteria Assessment (MCA), was developed by the Project Team in consultation with AT, Waka Kotahi and Manawhenua, for use in the corridor and route refinement assessment processes.

The MCA was developed for use across the Te Tupu Ngātahi Programme and has been used in both the IBC and DBC option evaluation process. At the route refinement phase, this option evaluation process was tailored to make it specific to the requirements of the North West area.

The MCA framework is a common tool that is often used to assist in the alternatives assessment decision-making process and provides an opportunity to understand how different options compare against a set of standard and grouped criteria. The MCA framework developed and adopted by the Project Team involved the following:

- **Assessment criteria:** Transport outcomes 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:** Partners, stakeholders, the community and landowner feedback, policy analysis, value for money and resilience.

Options were assessed, and where appropriate, scored as summarised in Table 2-2 at each stage by a multi-disciplinary team, using the MCA framework set out in Table 2-1. Constraints mapping and existing evidence from desktop research were the main sources of information to assist with assessment. In assessing the criteria, guidance was provided by the policy direction of the AUP:OP (e.g. overlays), which could place constraints on the various options identified.

Assessment of the options against the criteria was not the sole means of assessing options but was a tool that informed and was complementary to the decision-making process for the preferred option. The process incorporated Manawhenua input, feedback from the consultation and engagement

process and technical experts. Manawhenua representatives have expressed views, provided specialist advice and raised key issues through workshops and hui held throughout the process.

Table 2-1: MCA Framework

#	Transport Outcomes		Measure	
	Transport Outcomes vary for each Project as identified in the sections below		Options assessed against the transport outcomes. For example, key themes include: <ul style="list-style-type: none"> • Access • Reliability • Mode choice • Integration 	
Wellbeing	MCA topic	#	Criteria	Measure
Cultural	1. Heritage	1a	Heritage	Extent of effects on: <ul style="list-style-type: none"> • 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	Manawhenua	Feedback on cultural values was sought from Manawhenua at the constraint mapping stage, the options considered in the MCA and on the preferred option.
Social	2. Socio-economic impacts	2a	Land use futures / integration with planned landuse	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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Context and planned place making considerations • An inviting, pleasant and high amenity public realm • Open space integration • Active interface between public and private realm • Scale of long-term impact on the amenity and character of the surrounding environment.
		2c	Land requirement	Scale of public / private land (m ² / number of properties / special status of impacted property) required to deliver the option.

		2d	Social cohesion	Impact on, use, connectivity / accessibility for and to the existing urban areas including use and access to: <ul style="list-style-type: none"> • Employment • Other communities or within the same community • Shops / services / other community and cultural facilities / 'attractors' • Severance of the existing community (including consented) • Scale of effect on existing community facilities community and open space • Public access to the coast, rivers and lakes
		2e	Human Health and Wellbeing	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: <ul style="list-style-type: none"> • Air Quality • Contaminated land • Noise and vibration
Environment	3. Natural Environment	3a	Landscape / visual	The extent of effects on: <ul style="list-style-type: none"> • 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 • Natural character and outstanding natural features / landscapes including geological features (mapped and protected features)
		3b	Stormwater	Impact of operational stormwater (both quantity and quality) on the receiving environment, including: <ul style="list-style-type: none"> • Potential flooding effects of the option within the catchment • Extent and consequences of likely mitigation measures
		3c	Ecology	Extent of effects on: <ul style="list-style-type: none"> • Significant indigenous flora; • Significant habitats of indigenous fauna; • Indigenous biodiversity; • Stream / waterway ecology • Marine ecology
		3d	Natural Hazards	Extent of effect on adverse geology; steep slopes; seismic impacts; other resilience risks (low level infrastructure near coastlines, inundation areas)
Economic	4. Transport	4a	Transport system integration	This criteria was considered as part of the assessment against the Transport Outcomes for each corridor.
		4b	User safety	Extent of safety effects on all transport users, including: <ul style="list-style-type: none"> • People in public transport • people walking or cycling • People in private vehicles
	5. Construction impacts	5a	Construction impacts on utilities / infrastructure	Requirements for relocation / design of existing infrastructure, including: <ul style="list-style-type: none"> • Consideration of safety impacts

6. Cost & Construction Risk			<ul style="list-style-type: none"> Risk of continuity of service over construction Opportunities for integration with other bulk infrastructure
	5b	Construction Disruption	<p>Construction impacts on people and businesses regarding:</p> <ul style="list-style-type: none"> Traffic & noise Earthworks related effects including dust Quality of life and amenity Economic impacts on businesses / community / town centres
	6a	Construction costs / risk / value capture	<p>Assessed cost for construction of options including:</p> <ul style="list-style-type: none"> Complexity and risk in construction (including consideration of constructability) 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 2-2: 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 the options against the criteria was completed by subject matter experts and discussed at several MCA workshops. In addition to the MCA framework, several additional (and important) inputs were included in the assessment framework (refer Table 2-3).

Table 2-3: Other inputs in MCA framework

Project Partners, including manawhenua, and landowner feedback	Project Partner feedback for each option identifying scale / validity of objections; identified preference / proposed changes to options etc. Feedback provided by other key stakeholders, the community and landowners.
Policy Analysis	Options alignment with the strategic policy framework including the AUP:OP, the Auckland Plan and the Whenuapai Structure Plan where it assisted in differentiating between options.
Indicative costs	High level indication of costs (including construction and property purchase) where it assisted in differentiating between options.

3 Corridor Assessment

The options assessment process commenced with an assessment of the various network and corridor options to achieve an ISTN to support Auckland's North West growth area. This section summarises the process relevant to the Local Arterials Package and the outcomes of that assessment, taken forward to the route refinement stage.

The corridor assessment process included both long list and short list assessment phases to identify an ISTN for the North West growth areas.

3.1 Longlist Corridor Assessment

The long list assessment phase included development and assessment of a wide range of options against transport outcomes and MCA framework, using the MCA framework described in Section 2. Key project Partners (Auckland Council, Manawhenua and KiwiRail) were involved in the development and evaluation of long list options. Section 2.2 provides further details on the long list development and assessment.

3.1.1 Longlist Option Development

For the North West growth area approximately 140 options were initially identified. These options were filtered down to exclude those that were: outside scope, already part of a designated / consented or funded project, considered business as usual, not feasible or duplicates of other options.

Out of 140 options, 75 were taken forward to the North West area long list MCA. These options were categorised and grouped according to their function. Those groups of options which led to the Local Arterials Package are as follows:

Whenuapai / Redhills / Riverhead

- **Rapid Transit (RTI / RTR-R)** – new or upgraded corridor to enable significant mode shift to public transport in the Whenuapai and Redhills area
- **Strategic Sub-Regional Connections (SR-W / SR-R)** – new or upgraded corridor providing interregional connections between the Whenuapai and Redhills area
- **Strategic Sub-Regional Connections (SR-K)** – new or upgraded corridor providing interregional connections between the Kumeū-Huapai and Riverhead area
- **Whenuapai Arterial Routes (AR-W)** – new or upgraded arterial roads providing both north-south connections and east-west connections through Whenuapai
- **Redhills Arterial Routes (AR-R)** - new or upgraded arterial roads providing both north-south connections and east-west connections through Redhills.

For the purposes of this report, only those options that would later form part of the Local Arterials Package are included here.

3.1.2 Longlist Option Assessment

At the commencement of the long list assessment phase, the MCA framework was adapted to the North West context and specific growth area. This involved distilling the MCA framework (see Table 2-1) to relevant criteria to enable distinctions to be made (described in Section 2).

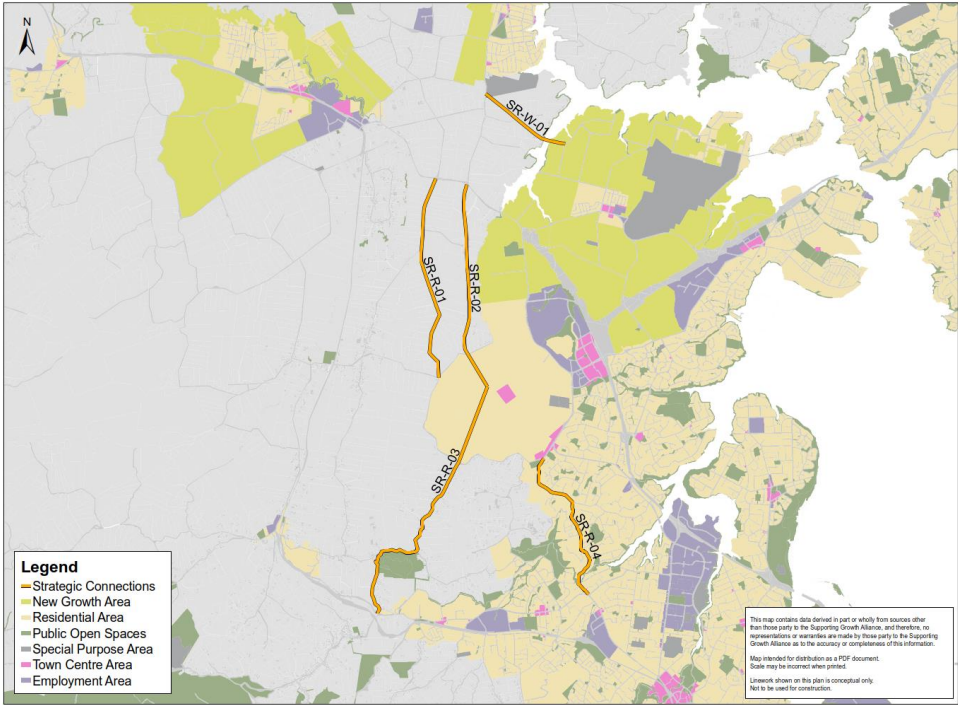
Each of the long list options were assessed using the MCA framework, in some cases the MCA criteria were specified to differentiating factors or omitted irrelevant assessment criteria. Key steps in the options assessment included:

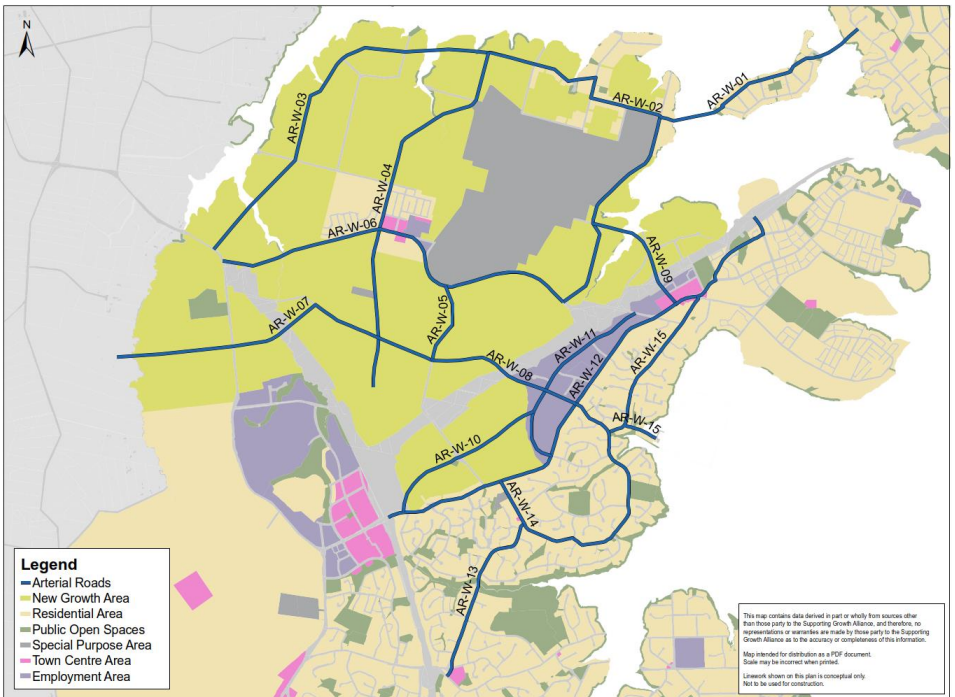
- Initial long list scoring and assessment of non-scored criteria by subject experts
- Manawhenua hui and discussion
- Workshops – collaborative evaluation of options and feedback from Partners
- Scores and preferences refined
- Long list refinement (amended and additional options) and assessment
- Identification of the short list.

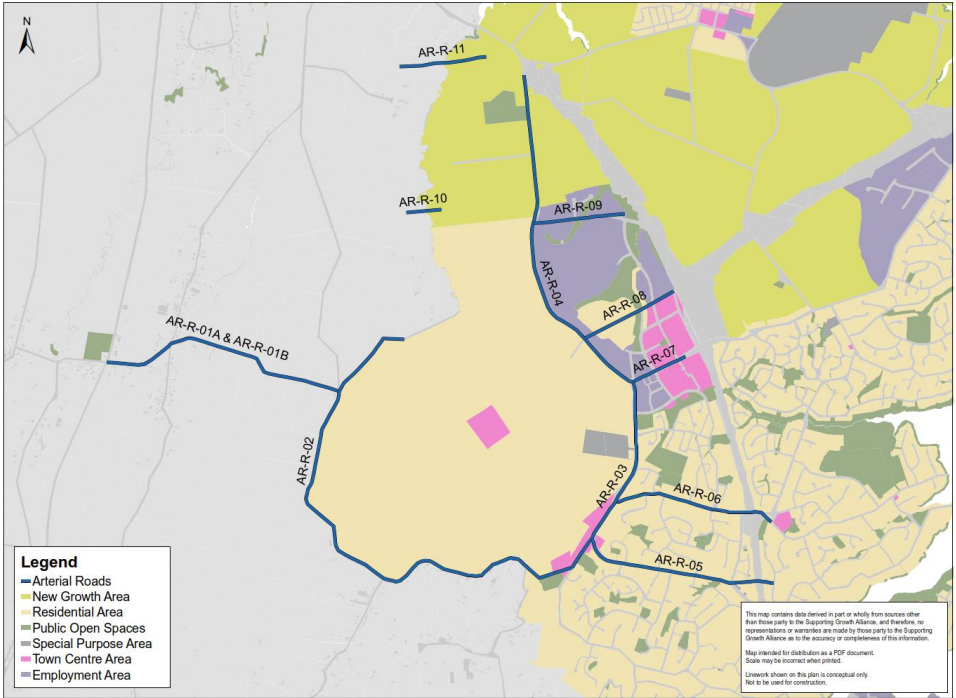
3.1.3 Recommendations

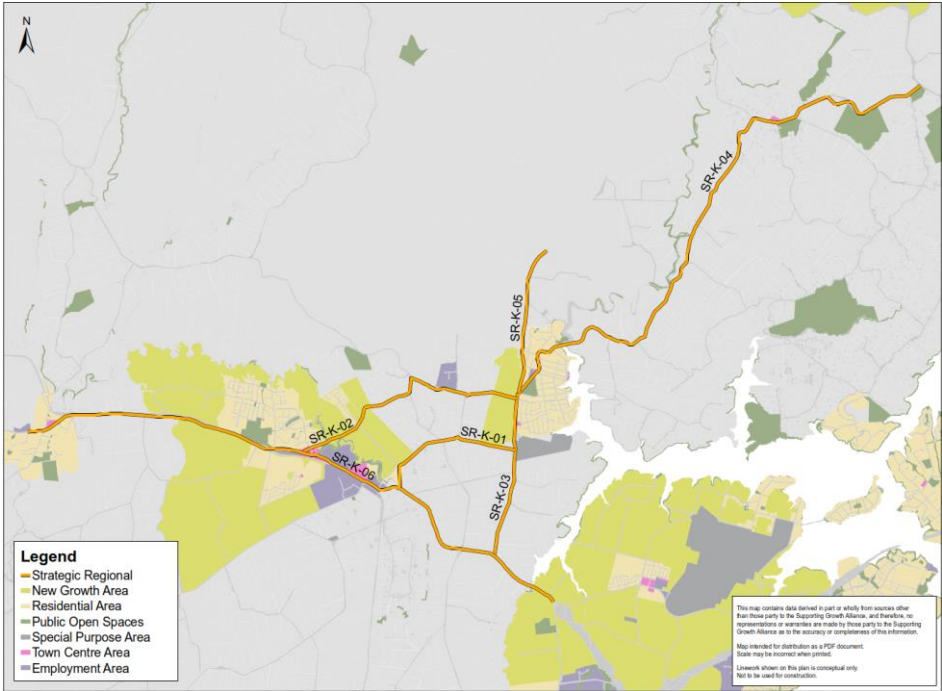
Table 3-1 provides an overview of the options assessed, recommendations and reasoning for progressing options to the short list.

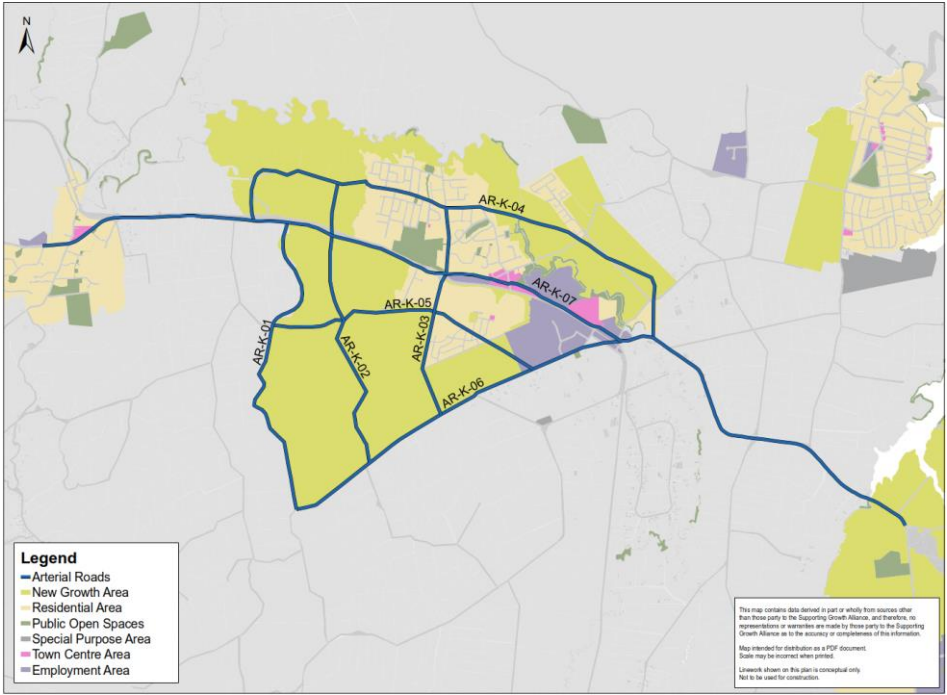
Table 3-1: Long List Corridor Assessment Recommendations

Options	Assessment Recommendation
Strategic Sub-Regional Connections (Whenuapai and Redhills)	
5 Options	<ul style="list-style-type: none"> • SR-W-01: Riverhead to Whenuapai connection • SR-R-01: North / south route via existing roads (Taupaki Road and Nixon Road) • SR-R-02: North / south via new road • SR-R-03: Sunnyvale Road upgrade • SR-R-04: Upgrade of Don Buck Road to Rānui Station
Options progressed	<p>4 Options: SR-W-01 was recommended for the short list as it provides a strategic inter-regional connection between Riverhead and Whenuapai area.</p> <p>SR-R-01, SR-R-02 and SR-R-04 were recommended for the short list as they provide better strategic inter-regional connection.</p>
Option Discarded	<p>1 Option: While SR-R-03 and SR-R-04 would improve public transport service, SR-R-04 catchment and adjacent urban land use is better suited for that function. SR-R-03: was discarded as it attracted a smaller catchment which would not benefit a priority bus service and was located near SEA.</p>

Options	Assessment Recommendation
<p>Whenuapai Arterial Routes</p>	
<p>16 Options</p>	<ul style="list-style-type: none"> • AR-W-01: Herald Island to Greenhithe Bridge • AR-W-02: Kauri Road and Pūiri Road • AR-W-03: Arterial between Tōtara Road and Brigham Creek Road • AR-W-04: Tōtara Road and Māmari Road • AR-W-05: Extension of Trig Road to Brigham Creek Road • AR-W-06: Brigham Creek Road • AR-W-07: Extend Spedding Road (Trig Road to Hailes Road) • AR-W-08: Rāwiri Road bridge • AR-W-09: Sinton Road • AR-W-10: Parallel route to Hobsonville Road • AR-W-11: West Point Drive • AR-W-12: Hobsonville Road • AR-W-13: Moire Road to State Highway 16 (SH16) • AR-W-14: Luckens Road • AR-W-15: Wiseley Road • AR-W-16: Riverhead to Whenuapai
<p>Options Progressed</p>	<p>10 Options: It was recommended AR-W-02, AR-W-03, AR-W-04, AR-W-05, AR-W-06, AR-W-07, AR-W-08, AR-W-12, AR-W-13 and AR-W-16 were taken into the short list for further investigation as the routes opened up opportunity for resilient and reliable public transport, freight and intra-regional trips.</p>
<p>Options Discarded</p>	<p>6 Options: AR-W-01 was disregarded due to a low strategic significance and high construction cost with the provision of a harbour crossing. AR-W-09, AR-W-10 and AR-W-11 were disregarded as they were considered to perform a collector function and therefore did not meet the strategic objectives. AR-W-14 and AR-W-15 were not taken forward to the short list due to their limited strategic benefits and high property impacts.</p>

Options	Assessment Recommendation
<p>Redhills Arterial Routes</p>	
<p>12 Options</p>	<p><u><i>Existing Taupaki Road and Nelson Road upgrade</i></u></p> <ul style="list-style-type: none"> • R-R-01A: without Taupaki Station • AR-R-01B: with Taupaki Station • AR-R-02: Red Hills Road (Don Buck to Henwood) • AR-R-03: Don Buck Road • AR-R-04: Fred Taylor Drive • AR-R-05: Triangle Road and proposed bridge over SH16 • AR-R-06: Royal Road and bridge over SH16 • AR-R-07: Fred Taylor Drive east • AR-R-08: Fred Taylor Drive / Dunlop Road intersection to northeast towards SH16 • AR-R-09: Northside Drive from Fred Taylor Drive to SH16 • AR-R-10: Northside Drive to Redhills route • AR-R-11: Brigham Creek roundabout to new north / south road
<p>Options Progressed</p>	<p>10 Options: AR-R-01B to AR-R-10 were recommended to progress to the short list as those arterial roads enhance transport connectivity to the Rapid Transit Corridor (RTC) project corridor, employment zones and social infrastructure.</p>
<p>Discarded Options</p>	<p>2 Options: AR-R-01A and AR-R-11 were disregarded for respectively providing low value to the strategic network.</p> <p>AR-R-11 was to be included in Kumeū bypass considerations and AR-R-01A would only be required if Taupaki heavy rail station was activated, otherwise could remain a collector.</p>

Options	Assessment Recommendation
<p>Strategic Sub-Regional Connections (Riverhead)</p>	
<p>6 Options</p>	<ul style="list-style-type: none"> • SR-K-01: Kumeū-Riverhead southern alignment • SR-K-02: Kumeū-Riverhead northern alignment • SR-K-03: SH16 to Riverhead • SR-K-04: Upgrade of Coatesville-Riverhead Highway to Dairy flats • SR-K-05: Riverhead to Dairy flats new alignment • SR-K-06: Existing SH16 alignment
<p>Options Progressed</p>	<p>4 Options: SR-K-01, SR-K-02, SR-K-03 and SR-K-04 were recommended to progress into the short list for further investigation.</p>
<p>Options Discarded</p>	<p>2 Options: SR-K-05 was disregarded due to its potential impact on sensitive vegetation located within a SEA (SEA_T_6540).</p> <p>SR-K-06 scored comparatively poorly against all transport outcomes. It was expected the proposed corridor would not cope with the increase in demand. The option was therefore disregarded.</p>

Options	Assessment Recommendation
<p>Kumeū Huapai / Riverhead Arterial Routes</p>	 <p>Legend</p> <ul style="list-style-type: none"> — Arterial Roads ■ New Growth Area ■ Residential Area ■ Public Open Spaces ■ Special Purpose Area ■ Town Centre Area ■ Employment Area <p><small>This map contains data licensed in part or wholly from sources other than those party to the Supporting Growth Alliance, and therefore, no representations or warranties are made by those party to the Supporting Growth Alliance as to the accuracy or completeness of this information. Map intended for distribution as a PDF document. Scale may be incorrect when printed. Contours shown on this plan is conceptual only. Not to be used for construction.</small></p>
<p>7 Options</p>	<ul style="list-style-type: none"> ● AR-K-01: Upgrade Puke Road ● AR-K-02: Upgrade Motu Road to the northern Huapai catchment ● AR-K-03: Upgrade of Station Road and Tapu Road ● AR-K-04: Upgrade of Matua Road ● AR-K-05: Central East-West arterial (south of existing SH16) ● AR-K-06: Upgrade Tawa / Access Road along FUZ boundary ● AR-K-07: Existing SH16 alignment
<p>Options Progressed</p>	<p>7 Options: All options were recommended to progress to the short list. The upgrade of arterials is critical in this growth area as they will provide improved traffic safety and transport connectivity to the future rapid transit network, employment zones and social infrastructure.</p>

3.2 Shortlist Corridor Assessment

At the short list stage options underwent a refinement and grouping process. Public consultation was undertaken, and feedback was considered in the short list evaluation. Key project Partners were involved in a short list evaluation to recommend an ISTN for the North West growth areas. Section 3.2 provides further details on the short list development and assessment.

3.2.1 Shortlist Option Development

Of the options considered at long list phase, 41 were recommended for the initial local short list, and the Project Team further developed the options to enable testing and evaluation. Based on workshop feedback and a gap analysis, additional refinement occurred, including, addition of variations, amalgamating options to rationalise the assessment, and removal of some options due to new information. The process is shown Figure 3-1 and results are summarised in Table 3-2.

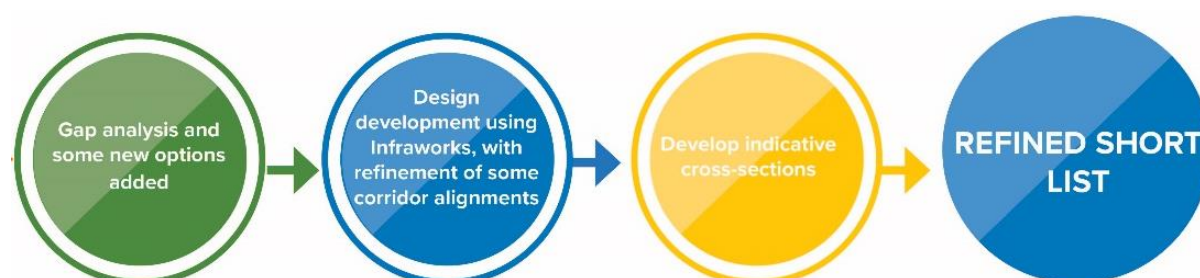


Figure 3-1: Short List Development Process

Table 3-2: Initial short list refinement outcomes

Option reference & Description	Initial refinement outcome
AR-W-06 Brigham Creek Road	Development of a variation which includes a partial realignment of Brigham Creek Road to straighten the road and deviate arterial traffic around Whenuapai village. This was a potential option in the Whenuapai Structure Plan. <u>New variations:</u> AR-W-06A: Arterial upgrade of Brigham Creek Road. AR-W-06B: Arterial upgrade of Brigham Creek Road (Whenuapai Village realignment).
AR-W-09 Sinton Road	The strategic State Highway 18 (SH18) bridge connection was included in another SH18 rapid transit project. The remaining section was considered a local connection, so was disregarded. <u>Option discarded.</u>
AR-W-09 / SR-W-01 Riverhead to Whenuapai	These options both form new connections to Whenuapai (AR-W-09 is an arterial, SR-W-01 is a sub-regional connection). The options were considered together in later analysis. <u>Options amalgamated into:</u> SR-W-01: Riverhead to Whenuapai connection.

Option reference & Description	Initial refinement outcome
SR-K-01 / SR-K-02 Kumeū to Riverhead	Two options were initially shortlisted a northern option and a southern option. Through review and public engagement, a hybrid was added to the shortlist which followed Riverhead Road. <u>New variation:</u> SR-K-01A: Third option for the Kumeū to Riverhead connection following Riverhead Road.
SR-K-06 Existing SH16 option – Brigham Creek to Kumeū	This longlist option included the full length of SH16 from Brigham Creek Road to Waimauku and was not carried forward. However, the shortlist still included a strategic regional route in part, between Brigham Creek Road and Access Road. <u>New variation</u> SR-K-06a: SH16 as a strategic route only between Access Road and Brigham Creek Road, not in Kumeū-Huapai.

3.2.2 Shortlist Option Assessment

The same general approach was used throughout the long list and short list corridor assessment. However, a greater level of design detail, technical assessment and specialist input was applied at the short list assessment phase (relative to the long list assessment) and additional consideration of stakeholder and public feedback. The short list process included:

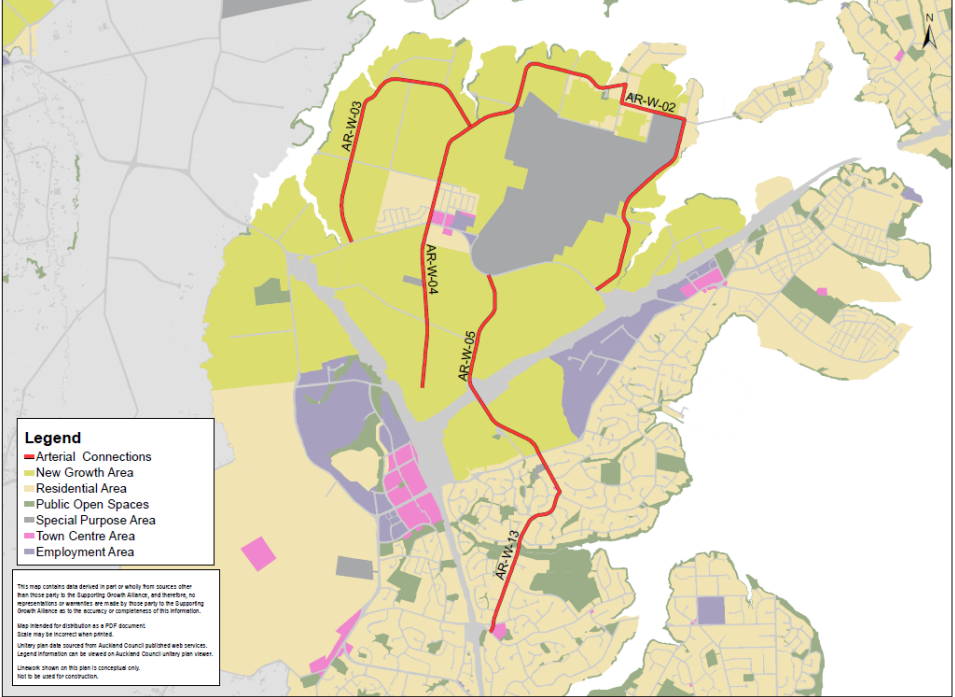
1. Initial draft assessment of criteria by subject experts
2. Pre-scoring workshop (challenge workshop) by subject experts
3. Manawhenua hui to discuss experts scores and an opportunity to score Manawhenua criteria
4. Project Partner input, stakeholders and public feedback
5. Recommendation on the ISTN.

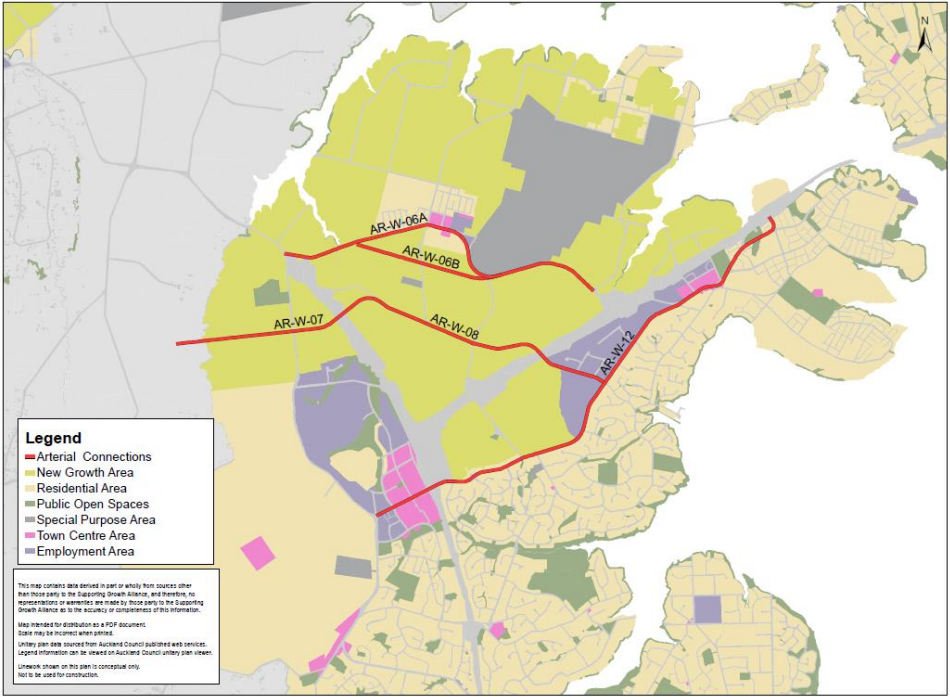
The same MCA process was applied at the short list option assessment, however at a more detailed level. Transport outcomes were assessed by the Project Team transport planners using quantitative and qualitative evaluation against key performance indicators and measures. Technical specialists scoring the MCA were fully briefed on the options and MCA process.

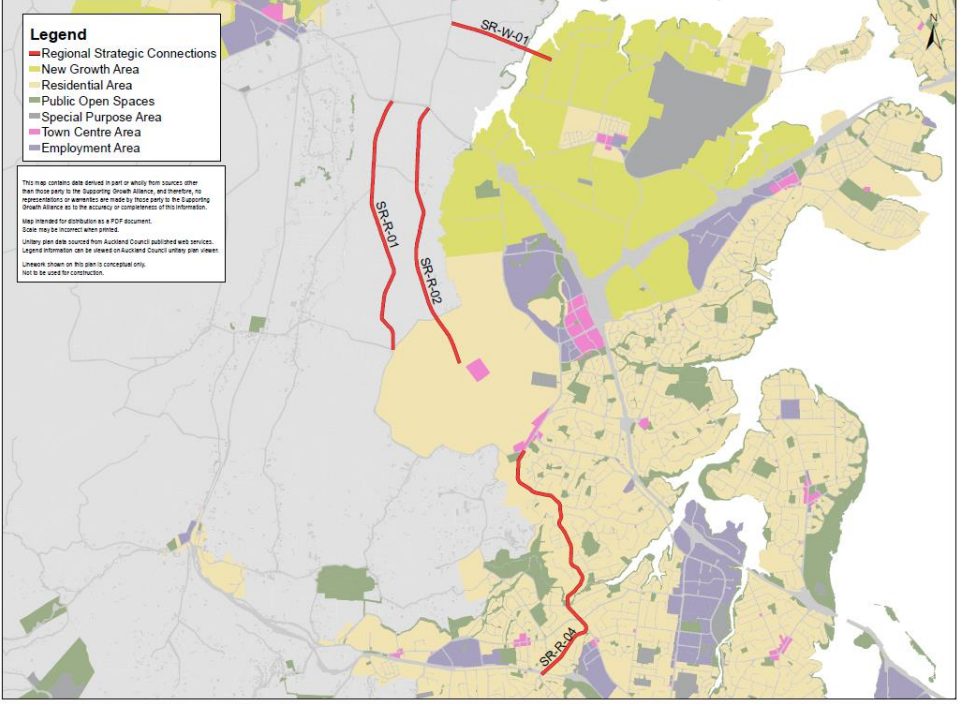
3.2.3 Recommendations

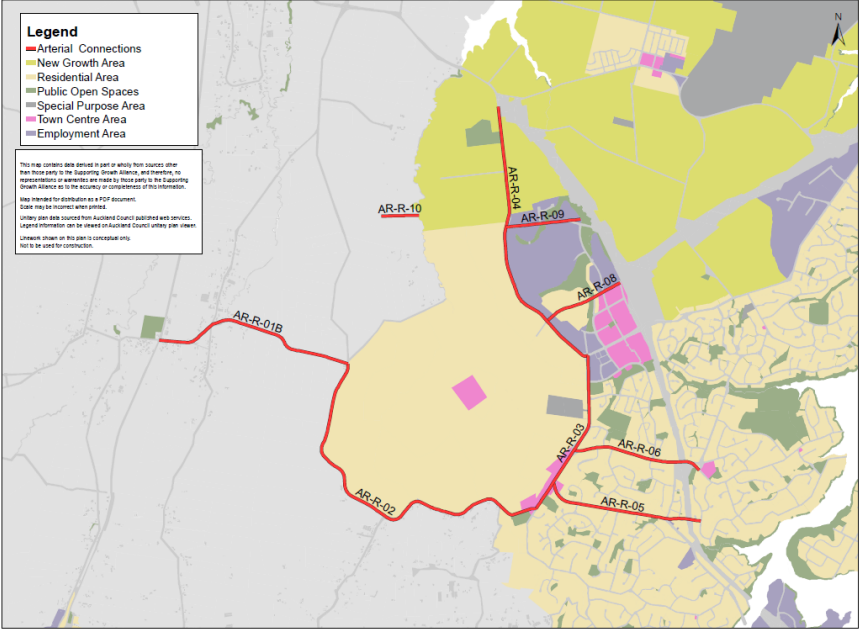
Table 3-3 provides an overview of the options assessed, recommendations and reasoning for identifying the preferred corridors and discarding options. The Short List assessment resulted in local arterial options being taken forward in the ISTN identified in Section 3.3.

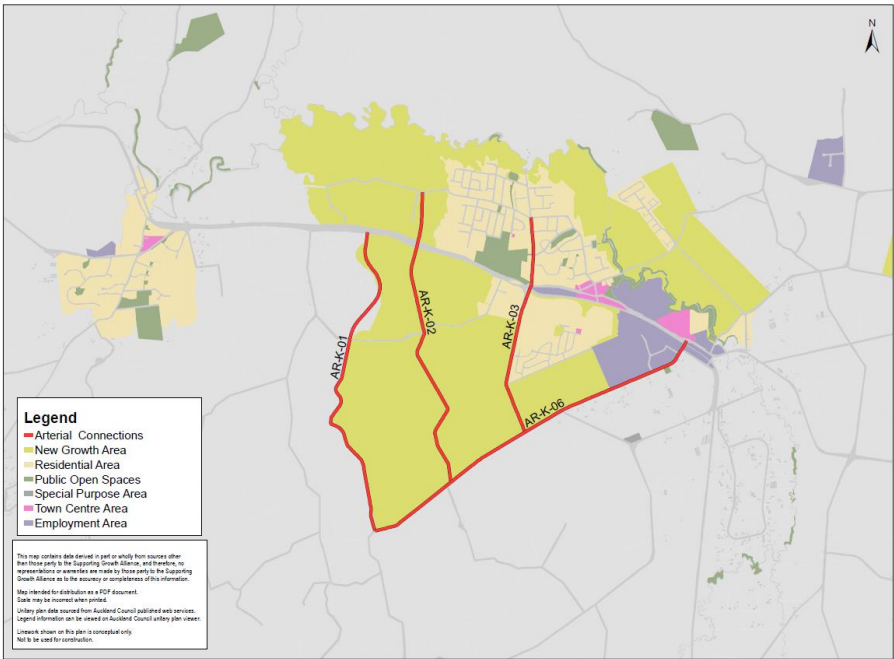
Table 3-3: Short List Corridor Assessment Recommendations

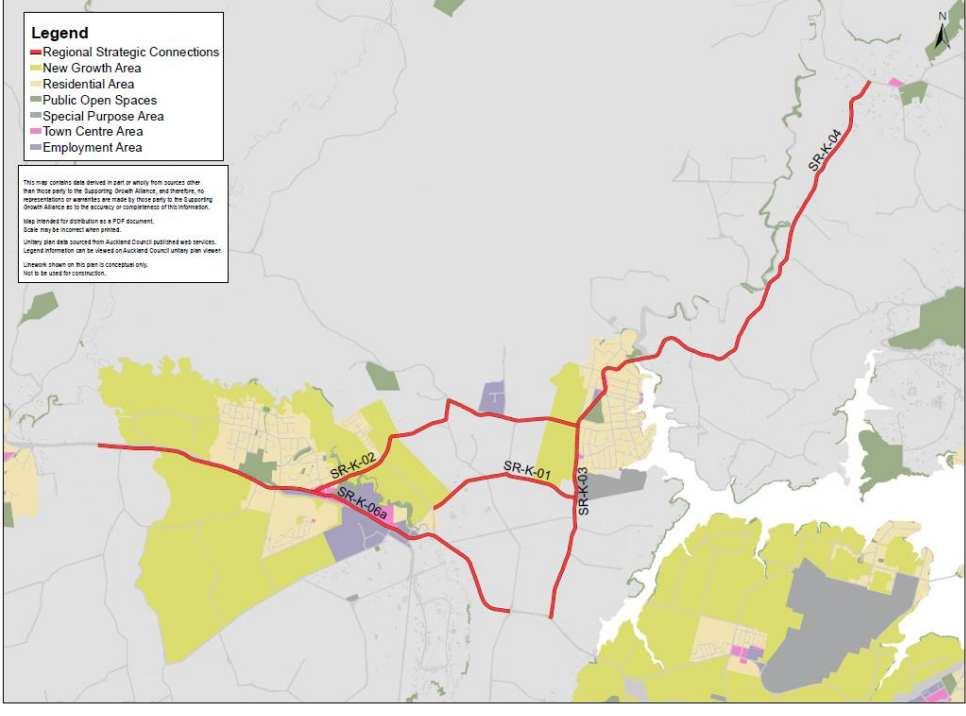
Options	Assessment Recommendation
<p>Whenuapai North-South Arterial Routes</p>	 <p>Legend</p> <ul style="list-style-type: none"> Arterial Connections New Growth Area Residential Area Public Open Spaces Special Purpose Area Town Centre Area Employment Area <p><small>This map contains data derived in part or wholly from sources other than those party to the Supporting Growth Alliance, and therefore, no representations or warranties are made by those party to the Supporting Growth Alliance as to the accuracy or completeness of this information.</small></p> <p><small>Map prepared for distribution as a PDF document.</small></p> <p><small>Scale may be incorrect when printed.</small></p> <p><small>Utility plan data sourced from Auckland Council's published web services.</small></p> <p><small>Copyright information can be viewed on Auckland Council's utility plan viewer.</small></p> <p><small>Linework shown on this plan is conceptual only.</small></p> <p><small>Not to be used for construction.</small></p>
<p>5 Options</p>	<ul style="list-style-type: none"> AR-W-02: Kauri Road and Pūriri Road upgrade AR-W-03: North western arterial between Tōtara and Brigham AR-W-04: Tōtara Road and Māmari Road upgrade AR-W-05: Extension of Trig Road to Brigham Creek Road AR-W-13: Moire Road to SH16.
<p>Options Progressed</p>	<p>2 Options: AR-W-04 was recommended as traffic flows on Māmari Road south of the Whenuapai village are estimated to be 25,000 vehicle per day (vpd) supporting the need for potential bus priority and enhanced active mode infrastructure along this corridor.</p> <p>AR-W-05 was recommended as it is estimated to carry 15,000 – 20,000 vpd north of SH18 by 2046. Trig Road plays an important role in connecting the future zoned business area with the Trig Road interchange and also the Brigham Creek Road interchange for additional resilience.</p>
<p>Options Discarded</p>	<p>3 Options: AR-W-02: Disregarded, as it didn't serve a strategic public transport purpose.</p> <p>AR-W-03: Reduced traffic on SH however increased traffic on local roads.</p> <p>AR-W-13: Discarded as it had lower potential for serving urban growth due to the largely urban areas. It also had potential adverse impacts on streams and a SEA.</p>

Options	Assessment Recommendation
<p>Whenuapai East-West Arterial Routes</p>	 <p>Legend</p> <ul style="list-style-type: none"> Arterial Connections New Growth Area Residential Area Public Open Spaces Special Purpose Area Town Centre Area Employment Area <p><small>This map contains data derived in part or wholly from sources other than those party to the Supporting Growth Alliance, and therefore, no representation or warranty is made by those party to the Supporting Growth Alliance as to the accuracy or completeness of this information.</small></p> <p><small>Map prepared for distribution as a PDF document. Data may be required when printed.</small></p> <p><small>Utility plan data sourced from Auckland Council's published web services. Support information can be viewed on Auckland Council's utility plan viewer.</small></p> <p><small>© Auckland Council. All rights reserved. This plan is for information only. Not to be used for construction.</small></p>
<p>5 Options</p>	<ul style="list-style-type: none"> ● AR-W-07: Proposed route (Spedding Road West, Crossing SH18 from Trig Road to Hailes Road) ● AR-W-08: Rāwiri Bridge upgrade (Spedding Road East) ● AR-W-12: Hobsonville Road upgrade <p><u>AR-W-06a: Brigham Creek Road upgrade variations</u></p> <ul style="list-style-type: none"> ● AR-W-06a: New variation - Brigham Creek Road upgrade ● AR-W-06b: New variation - Brigham Creek Upgrade with realignment.
<p>Options Progressed</p>	<p>4 Options: AR-W-06a, AR-W-07, AR-W-08 and AR-W-12 were recommended for further investigation as they provide an arterial network serving both business and residential land use, improve resilience and support mode shift through improved access to RTC and new active mode links.</p>
<p>Option Discarded</p>	<p>1 Option: AR-W-06b: New variation of Brigham Creek Upgrade with deviation from town centre was disregarded, as the Spedding Road alignment (AR-W-08) would reduce pressure through the town centre meaning the deviation was no longer required.</p>

Options	Assessment Recommendation
<p>Whenuapai / Redhills Strategic Sub-Regional Connections</p>	
<p>4 Options</p>	<ul style="list-style-type: none"> • SR-R-01: North-South Route via existing roads (Taupaki Rd and Nixon Road) • SR-R-02: North-South Route via new road • SR-R-04: Upgrade of Don Buck Road to Rānui Station • SR-W-01: Riverhead to Whenuapai connection.
<p>Option Progressed</p>	<p>1 Option: SR-R-01 was the only strategic sub-regional connection recommended for the area as it best integrates with future Brigham Creek Road interchange, with relatively minor social and environmental impact.</p>
<p>Options Discarded</p>	<p>3 Options: SR-R-02: was disregarded as although it provided a more direct bus route to the Riverhead area, the alignment could create a new road corridor surrounded by rural land encouraging urban sprawl between growth areas. It also had a more significant land take impact.</p> <p>SR-R-04: Was disregarded as it was in an existing urban area and was not identified to be necessary to support the growth areas, particularly as Redhills South has more convenient access to rapid transit at Westgate.</p> <p>SR-W-01: Was disregarded as it did not provide strategic connection to wider transport network. The option requires a new crossing with the potential for cultural and ecological impacts.</p>

Options	Assessment Recommendation
<p>Redhills Arterials Routes</p>	
<p>9 Options</p>	<ul style="list-style-type: none"> ● AR-R-01b: Existing Taupaki Road and Nelson Road upgrade, with Taupaki station activated ● AR-R-02: Red Hills Road upgrade (from Don Buck Road to Henwood Road) ● AR-R-03: Don Buck Road upgrade ● AR-R-04: Fred Taylor Drive - upgrade to existing roads. Urban form on both sides ● AR-R-05: Existing Triangle Rd upgrade and proposed bridge over SH16 ● AR-R-06: Royal Road and bridge over SH16 upgrade ● AR-R-08: Dunlop Extension - from intersection of Fred Taylor Drive and Dunlop Road to Northeast towards SH16 ● AR-R-09: Northside from Fred Taylor Drive to SH16 ● AR-R-10: Northside to N-S Redhills route.
<p>Options Progressed</p>	<p>5 Options: AR-R-03, AR-R-04, AR-R-06, AR-R-08 and AR-R-09 were all recommended.</p> <p>AR-R-03 provides a north-south alternative to SH16 with public transport access to Massey High School. AR-R-04 provides a north-south alternative to SH16 with no notable natural environment constraints or social constraints.</p> <p>AR-R-06 provides a strategic connection from Redhills to a future SH16 RTC station and future SH16 cycleway with 4 lanes provided including walking and cycling facilities.</p> <p>AR-R-08 provides improved Primary Public Transport / active mode connections between Redhills and Westgate and will help carry frequent bus services from Redhills Town Centre and off Fred Taylor Drive into Westgate.</p> <p>AR-R-09 improves resilience as it provides an alternative to Hobsonville Road and Bringham Creek Road to cross SH16.</p>
<p>Options Discarded</p>	<p>4 Options: AR-R-01b, AR-R-02, AR-R-05 and AR-R-10 were discarded, these options did not serve a strategic public transport function.</p> <p>AR-R-02 and AR-R-01b also had potential for high adverse visual amenity, including impacts on SEA_T_6336 and SEA_T_2648. AR-R-01b also had potential impacts on heritage building at Taupaki Road. AR-R-05 also had potential for high impacts on property.</p>

Options	Assessment Recommendation
<p>North South Arterial Routes (Kumeū / Huapai)</p>	 <p>Legend</p> <ul style="list-style-type: none"> — Arterial Connections ■ New Growth Area ■ Residential Area ■ Public Open Spaces ■ Special Purpose Area ■ Town Centre Area ■ Employment Area <p><small>This map contains data derived in part or wholly from sources other than those party to the Supporting Growth Alliance, and therefore, no representations or warranties are made by those party to the Supporting Growth Alliance as to the accuracy or completeness of this information. May intended for distribution as a PDF document. Data may be incorrect when printed. Utility plan data sourced from Auckland Council published web services. Legend information can be viewed on Auckland Council utility plan views. Lines are shown on this plan in conceptual only. Not to be used for construction.</small></p>
<p>4 Options</p>	<ul style="list-style-type: none"> ● AR-K-01: Upgrade Puke Road ● AR-K-02: Upgrade Motu Road to the northern Huapai catchment ● AR-K-03: Upgrade of Station Road and Tapu Road ● AR-K-06: Upgrade of Access Road.
<p>Options Progressed</p>	<p>2 Options: AR-K-03 and AR-K-06 are both recommended to be part of the emerging network as they provide this growth area with multi-modal access to both the RTC and ASH options.</p>
<p>Options Discarded</p>	<p>2 Options: AR-K-01 and AR-K-02 were discarded as they are located west of the existing growth area and due to lack of structure planning, there is high uncertainty of land use and centre location for these corridors. As there is no clear justification for a third spine road at this point, they were discounted.</p>

Options	Assessment Recommendation
<p>Kumeū-Huapai / Riverhead - Strategic Sub-Regional Connections</p>	
<p>6 Options</p>	<ul style="list-style-type: none"> • SR-K-01: Kumeū-Riverhead Southern Option • SR-K-02: Kumeū-Riverhead Northern Option • SR-K-03: SH16 to Riverhead • SR-K-04: Upgrade of Coatesville Riverhead Highway to Dairy Flat • SR-K-06a: Existing SH16 alignment <p><u>SR-K-01 & SR-K-02 Variation</u></p> <ul style="list-style-type: none"> • SR-K-01a: New variation for the Kumeū to Riverhead connection on Riverhead Road.
<p>Options Progressed</p>	<p>2 Options: SR-K-01a was recommended for the growth area to gain access to a potential future City Centre to Westgate RTC Station at Westgate (along Riverhead Road, not shown).</p> <p>SR-K-03 was also recommended to provide a critical social and economic connection between Riverhead and Kumeū.</p>
<p>Options Discarded</p>	<p>4 Options: SR-K-01: Provided potential benefits in terms of direct public transport routes, but this was offset by potential increase in private vehicles using the route.</p> <p>SR-K-02: had similar access advantages and topographical challenges as SR-K-01 but did not perform as well as the hybrid SR-K-01a.</p> <p>SR-K-04: Option disregarded as although it performed average on criteria, it had high impacts on threatened habitats and SEA_T_6303 and SEA-M2-57b.</p> <p>SR-K-06a: had potentially high impacts on established residential property through construction and required grade separation at some intersections, substantially increasing construction costs.</p>

3.3 Indicative Strategic Transport Network

Following the short list assessment, the North West IBC recommended the ISTN (including corridors that form part of the North West Strategic Package and those which did not progress to route protection). The indicative network was endorsed by the AT and Waka Kotahi boards in December 2018 to progress to route refinement (DBC), see Figure 3-2 below.

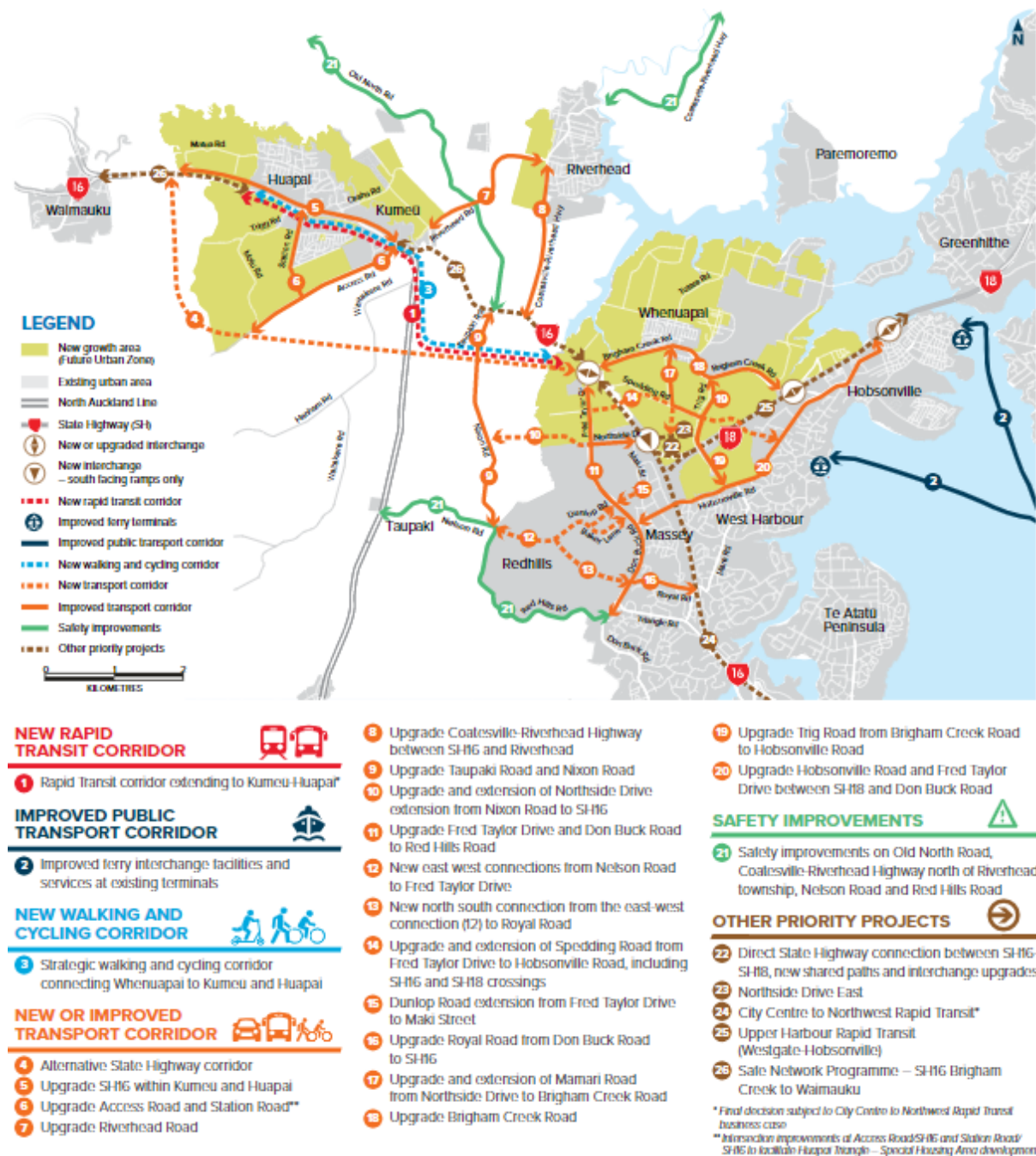


Figure 3-2: Indicative Strategic Transport Network

The corridors identified in the ISTN were assessed and grouped into two packages for the route refinement. These were the Local Arterials Package (subject of this report) and the North West Strategic Package (a separate package).

The North West Local Projects identify an integrated systems of arterials that connect sub regions into existing and proposed transport systems. The network enables greater travel choice, enhanced

access to the wider Auckland network and supports travel behaviour change for existing and new communities.

The ISTN corridors which progressed to route refinement and which form part of the Local Arterials Package are outlined in Table 3-4. For the sake of brevity and relevance, ISTN corridors which went to route refinement but did not progress to route protection are not further discussed.

Table 3-4: Corridor Assessment Outcomes – North West Local Arterials

Shortlist reference & name	Description
Whenuapai	
AR-W-12: Hobsonville Road FTN Upgrade	Hobsonville Road upgrade from the Dunlop Road extension (AR-R-08) to the SH18 north of Squadron Drive.
AR-W-04: Māmari Road FTN Upgrade	This corridor upgrade extends from Tōtara Road in the north to Māmari Road in the south. The proposed route intersects with Brigham Creek Road and links Māmari north and south to form a north south continuous corridor.
AR-W-05: Trig Road North Upgrade	Trig Road upgrade extending the North West Housing Infrastructure Fund (HIF) Trig Road project to Brigham Creek Road.
AR-W-06A: Brigham Creek Road Upgrade	This variation of the Brigham Creek Road upgrade follows the existing corridor from the Brigham Creek roundabout at its western end to the Brigham Creek Road / Sinton Road roundabout.
AR-W-07: New Spedding Road West	This proposed route extends Spedding Road to the west crossing the SH16 from Trig Road to Hailes Road.
AR-W-08: New Spedding Road East	This option extends Spedding Road on the eastern side to Hobsonville Road via the Rāwiri Bridge.
Redhills	
AR-R-04: Fred Taylor Drive FTN Upgrade	This option proposes an upgrade to the existing Fred Taylor Drive from the Don Buck Road intersection up to the SH16. The upgrade is looking to provide an urban form on both sides of the corridor.
AR-R-03: Don Buck Road North FTN Upgrade and Don Buck Road South FTN Upgrade	Don Buck Road upgrade from the intersection with Red Hills Road to the entrance of Fred Taylor Drive at the roundabout located in west Westgate.
Riverhead	
SR-K-03: Coatesville-Riverhead Highway Upgrade	North-south upgrade from SH16 to Riverhead via the existing Coatesville-Riverhead Highway.

4 Route Refinement Development and Assessment Methodology

4.1 Overview

The corridors identified in the ISTN were assessed and grouped into two packages for the DBC. These were the Local Arterials Package (subject of this report) and the North West Strategic Package (a separate package). The progression from corridor assessment to route refinement saw the identification of the preferred network at a ‘macro’ level during corridor assessment to ‘micro’ detail at the route refinement phase.

Refinement involved a gap analysis being undertaken to confirm the recommendations, this included a review of the IBC assessment, policy updates, developer aspirations and project interdependencies. Following gap analysis, a land use and constraints mapping exercise and corridor form and function assessment were undertaken to develop refined routes. Assessment of refined routes used the MCA framework (see Table 2-1), with adaptations to suit the option context. Key stages are explained in Sections 4.2 to Section 4.6.2 below and refinement process shown in Figure 4-1.

The outcome of route refinement was recommended alignments, these confirmed by Waka Kotahi and AT to establish the preferred projects for route protection.

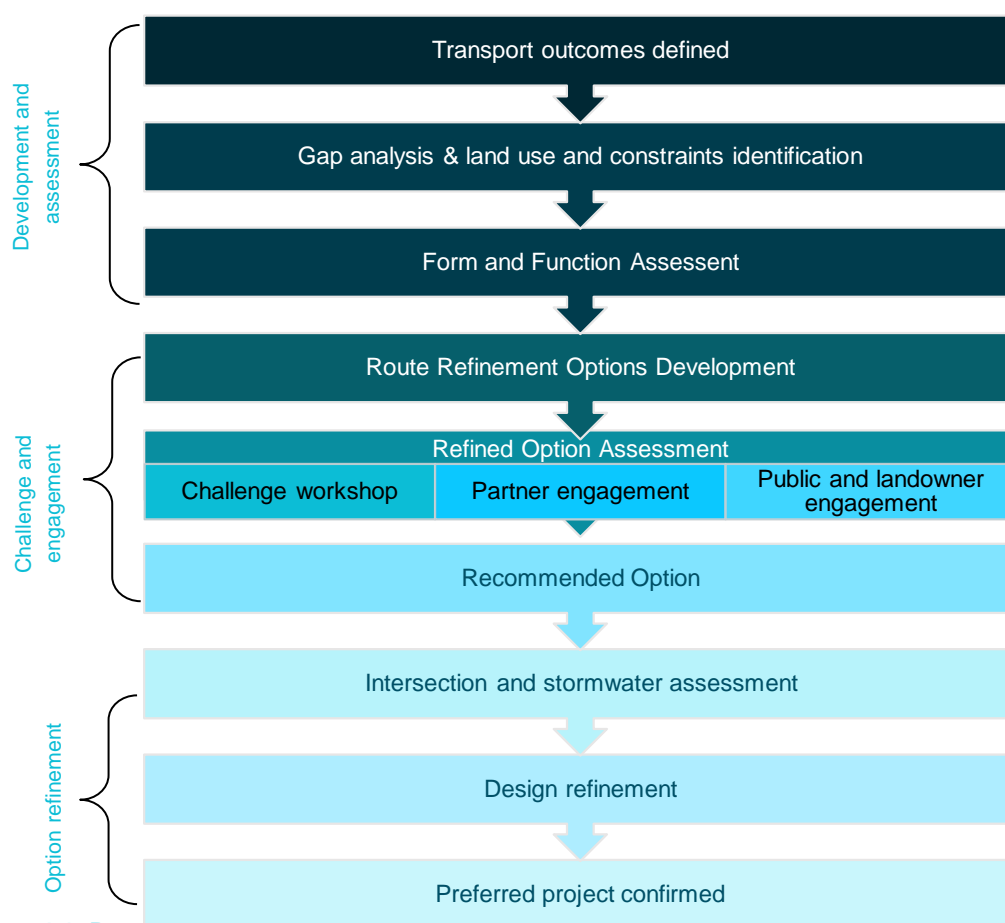


Figure 4-1: Route refinement process following corridor identification

4.2 Gap Analysis, Land Use Review and Constraint Mapping

4.2.1 Gap Analysis

A background review was undertaken of how the ISTN was identified, to check if any information or assumptions had changed since the corridor assessment. This included policy direction and statutory documents (for example, plan changes), and any issues that required further consideration. The gap analysis included the following:

- Review of Te Tupu Ngātahi Programme Business Case (PBC) (formerly Transport for Urban Growth (TFUG)) recommendations
- Review of the corridor assessment undertaken and the North West IBC (main document and Options Assessment Report), including the long list and the short list options, and the reasons why options were recommended or discounted
- The alignment of the recommended options with relevant policy documents (for example, Government Policy Statement on Transport, AUP:OP). In particular, to see if anything has changed since the North West IBC and corridor assessment recommendations
- Alignment with strategic plans other statutory documents and developer aspirations that may have progressed from the IBC. For example, structure plans, plan changes (or appeals), recent NORs and developer plans
- Consideration of other projects planned in the area.

A summary of the analysis undertaken for each Project is summarised the Project specific sections.

4.2.2 Land Use Review and Constraint Mapping

Following gap analysis, a review of the AUP:OP land use and constraints was undertaken. The review purpose was to identify potential constraints, inform design refinement and identify whether additional corridor options should be developed. A study area was identified for each local arterial project. This study area was informed by the gap analysis and an initial review of key constraints, including:

- Geological conditions
- Natural hazards such as flooding
- Cultural values – as identified by Manawhenua
- Contours and likely project earthworks requirements
- Strategic land use plans including live zoning, future urban areas and structure plans
- Identified sensitive areas through the AUP:OP overlays, conflicts with critical services and special purpose zones.

Study areas were 100m wide either side of the corridor, with extensions as prudent or identified by specialists. Constraints were mapped on Te Tupu Ngātahi GIS and discussed at a workshop with the Project Team and specialists.

4.3 Form and Function Assessment

To determine the desired function, and therefore the future form of alternative options, a form and function assessment process was undertaken in early 2020.

4.3.1 Corridor Assessment Principles

A Corridor Form and Function (CFAF) assessment tool was developed to support consistent decision making. The intent of the tool was to encourage well-rounded thinking about both the place and movement function of corridors and ensure all modes are considered, see Figure 4-2.

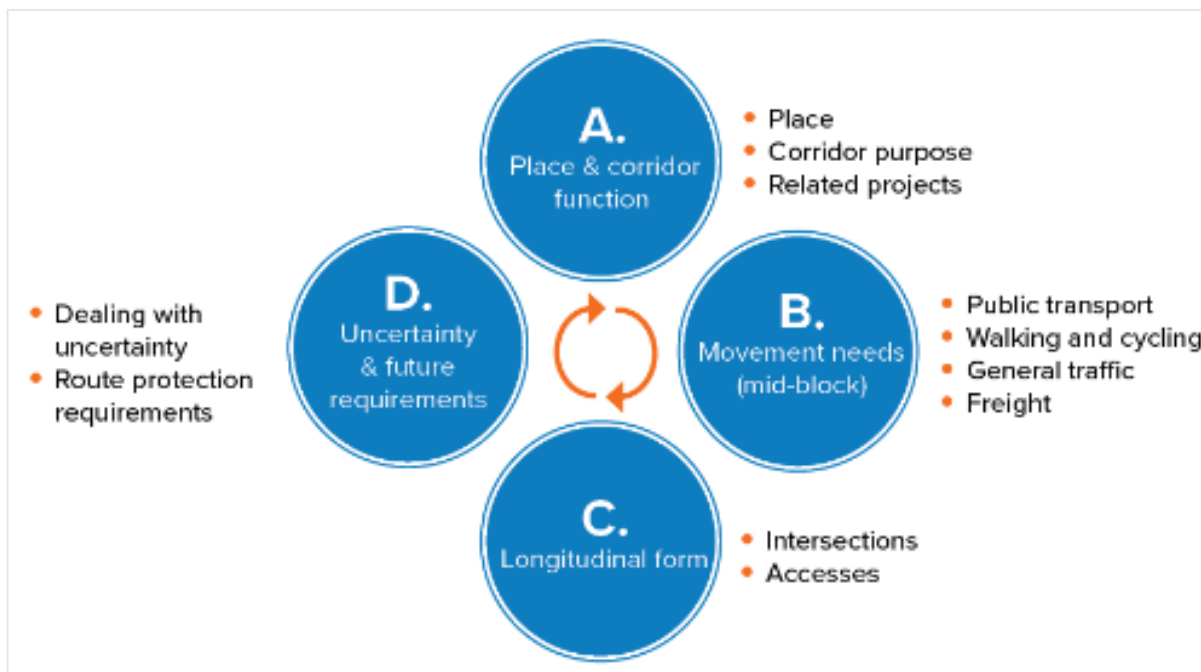


Figure 4-2: Corridor Assessment Principles, from A to D.

Both active and vehicular transport modes were considered in cross section development, however the form and function outcome may not necessarily provide facilities for all modes considered. The resulting cross section forms the basis for route protection of the corridor. The key principles of the assessment include:

- **Place factors:** Surrounding existing and future land use and expected future landuse density, including proximity of key trip generators and attractors such as metro stations and schools
- **Movement factors:** Considering the hierarchy of the corridor in the regional network, the corridor modal priorities for the existing and future traffic volumes. Movement is considered at both local and network levels to ensure duplication of route functions is avoided and corridors have targeted modal functions.

These are identified on a scale from Low P1 M1 to High P3 M3, see Figure 4-3.



Figure 4-3: Place and Movement – Low to High scale

- **Priority:** Under CFAF, general traffic should only be provided with two lanes up to an approximate daily flow of 15,000 vehicles per day, or less than 1,500 vehicles per hour each lane in the peak periods. Four general traffic lanes should only be considered when:
 - a) daily flow exceeds 15,000 vehicles per day;
 - b) where the Level of Service (LOS) for two general traffic lanes is less than LOS C in the interpeak;
 - c) where it can be demonstrated that bus / high occupancy vehicle lanes have been considered first; and
 - d) where it can be demonstrated that two general traffic lanes will not be appropriate.

The 'target' level of service for general traffic is LOS C in the interpeak. LOS D or E in the peak is considered acceptable and can encourage a shift to active modes or public transport for journeys at these times.

The CFAF assessment output informed the footprint of each corridor.

Options discarded

For existing corridors, an assessment of their current function was used to compare the available facilities with the assessment recommendation. This considered whether re-allocation of existing corridor space would achieve the outcomes sought by Te Tupu Ngātahi.

The assessment considered:

- Land use adjacent to the corridor and certainty of that land use being realised
- Current facilities versus those proposed (by non-Te Tupu Ngātahi project), compared to those recommended by Te Tupu Ngātahi
- Whether sufficient width already existed in the corridor to reallocate space to achieve outcomes sought by Te Tupu Ngātahi.

For each of the projects utilising the existing corridor was discounted. This is because there was not sufficient width in the carriageway to support the re-allocation of space or provide adequate provision for all modes to achieve the desired outcomes.

Figure 4-4 provides an overview of the form and function for the North West Local Arterials.

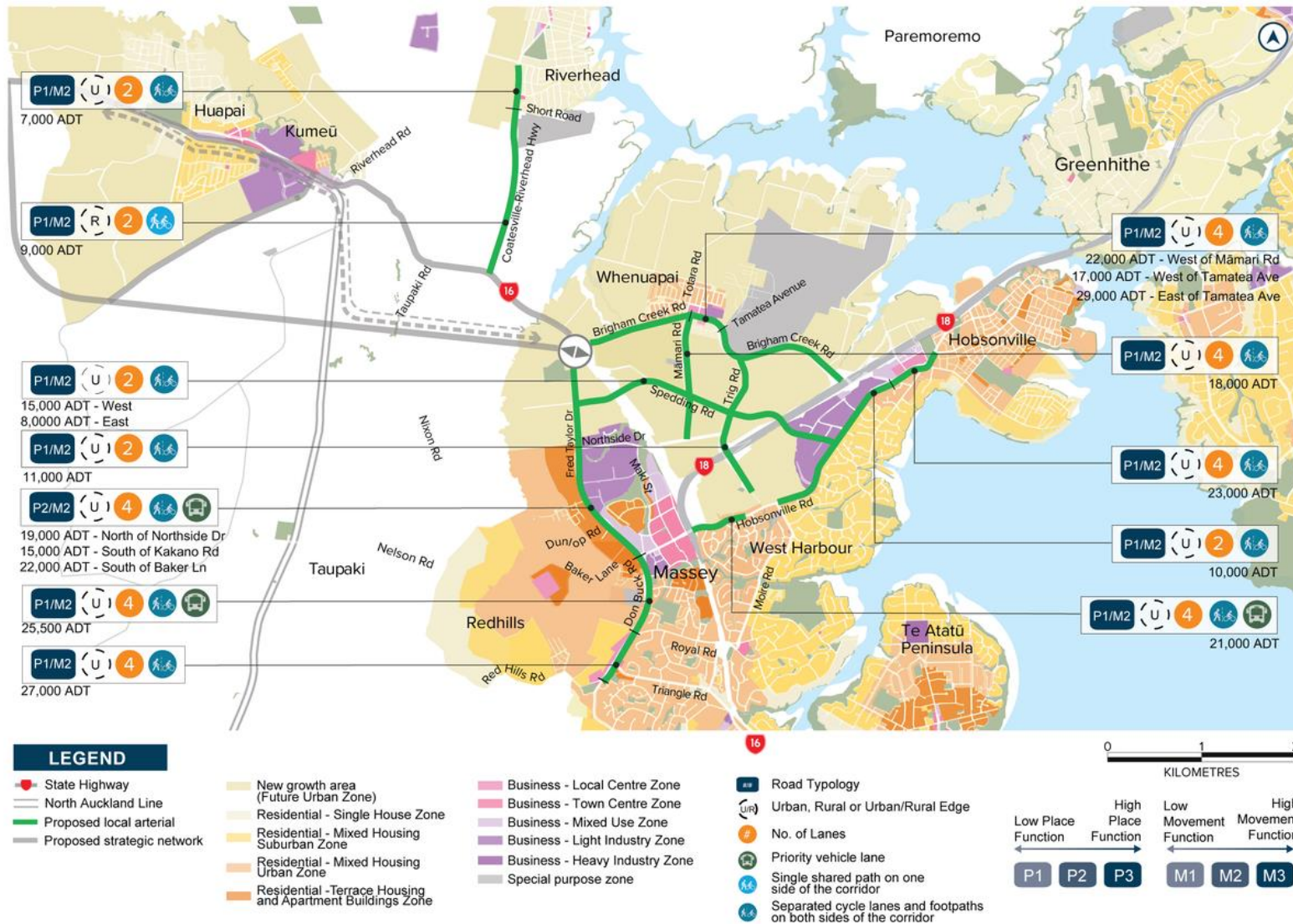


Figure 4-4: North West Local Arterials – CFAF Outcome

4.4 Route Refinement Options Development

The gap analysis (Section 4.2) identified whether the recommended option for each corridor required reconsideration due to relevant new information. For example, land use assumption changes, new growth projections (population, housing etc) and any constraints identified through engagement with stakeholders. The gap analysis also identified whether the corridor assessment had sufficiently considered alternatives proportional to the scale of potential effects of each Project. Where new information was identified, or the corridor assessment did not sufficiently consider alternatives proportional to potential effects, additional options assessment was undertaken.

To achieve the level of options assessment detail required to progress route protection, three approaches to developing route refinement alternatives were used:

- **Corridor Assessment** – options occupying different locations within a defined study area and potentially connecting to the ISTN at different points
- **Route Refinement** – options based on an IBC recommended option but with refinement based on the effects, constraints and opportunities from corridor widening on either side, both sides, or a combination
- **No Further Options Developed** – project corridor is fit for purpose, or has existing potential to meet needs (e.g., existing designation in place, mode space can be reallocated). Therefore, project not recommended for route protection.

Some project corridors were split into sections to allow specific consideration, this resulted in some of the three approaches being used along the alignment. Where greater outside specialist input was required Subject matter experts used in assessment, where the team had required skill, project team undertook the assessment, this is shown as SME input or Project Team input.

Table 4-1 provides an overview of the recommended alternatives assessment approach for each North West Local project. The assessment for each Project (or element) is discussed further in the Project specific section.

Table 4-1: Overview of refined alternative assessment approach and options

Project assessed	Development of Refined Alternatives - Approach
Whenuapai	
Trig Road	Route Refinement Project Team Option Assessment
Māmari Road	Route Refinement (Segment 1) Project Team Option Assessment in Segment 1 Corridor Assessment (Segment 2) Option Assessment with SME input in Segment 2
Brigham Creek Road	Route Refinement Option Assessment with SME input

Project assessed	Development of Refined Alternatives - Approach
Spedding Road East	Corridor Assessment Option Assessment with SME input
Spedding Road West	Corridor Assessment Option Assessment with SME input
Hobsonville Road (SH16 to Hobsonville Point Road)	Route Refinement Project Team Option Assessment
Redhills	
Don Buck Road (Fred Taylor Drive to Royal Road)	Route Refinement Project Team Option Assessment
Don Buck Road (Royal Road to Redhills Road)	No Options Developed due to potential land use impacts and as widening would have limited transport benefit
Fred Taylor Drive	Route Refinement Project Team Option Assessment
Riverhead	
Coatesville-Riverhead Highway Upgrade	Route Refinement Project Team Option Assessment

4.5 Refined Option Assessment

4.5.1 Expert Briefing and Technical Input

SMEs from the following disciplines were involved in the options assessment for the North West Local Arterials:

- Planning Impact
- Archaeology and Built Heritage
- Ecology
- Landscape and Visual
- Urban Design
- Transport
- Stormwater / Flooding
- Construction / Engineering
- Geotechnical / Natural Hazards.

Site visits to North West Auckland were undertaken by the Project Team on 11 February 2020 and SMEs on 21 July 2020 to understand the subject environment. Experts were then provided with a briefing pack, containing the MCA framework and assessment guidelines, an overview of the project and options and a template for a summary report to record their approach, assumptions, findings and recommendations. A specialist briefing with the Project Team was also held on the options and assessment process.

The refined options for each Project (from Table 4-1) were loaded into the Te Tupu Ngātahi GIS constraints viewer for experts' assessment.

SMEs were given access to the GIS viewer which showed the options against environmental, heritage, and social layers. The viewer mapped constraints and local site information to assist assessment. GIS information was sourced from the Auckland Council GIS datasets and those identified during the constraints mapping exercise in Section 4.2.2. The GIS viewer was also an interactive tool where information could be displayed in different combinations by the user alongside the options. Specialists were asked to add comments, identify features or areas of concern, so they could be shared with other SMEs and the Project Team. Where appropriate, scoring, and qualitative analysis was completed by the SMEs and discussed at MCA workshops.

4.5.2 MCA Framework in the Route Refinement Assessment

There were two approaches to using the MCA framework in the option assessment process: scoring the options or identifying a preference for one of the options. Both approaches used the same MCA framework but tailored to suit the North West projects.

Tailoring involved the removal of criteria where it would result in double counting due to the criteria repeating themes assessed under the transport outcomes. This applied to criteria for '*transport system integration*' and '*user safety*'¹. Some measures relating to parcels size and shape and access were removed from the '*land use futures*' criterion to instead focus on the existing and future use and developability of the land being in line with the AUP:OP Zoning. Manawhenua provided qualitative feedback as part of the Project Partner workshops.

Options scoring was undertaken when it assisted in differentiating between the options. Scoring was not undertaken for the *Route Refinement* options (see Table 4-1) due to the options only being a shift in the alignment, e.g., left side, right side or both sides, instead preferences were stated. The exception for *Route Refinement* options was where constraints were identified and scores assisted with differentiation.

Experts qualitatively assessed the options in Table 4-1 against the relevant MCA framework criteria and where relevant scored options on their potential effects, identified or suggested design amendments to reduce adverse effects. Following assessments, scoring and / or preferences were discussed options challenge workshops with the Project Team and other SMEs. Following challenge workshops, options requiring further assessment were considered at a Project Partner workshop.

4.5.3 Option Challenge Workshops

Throughout the options assessment process, workshops were held to discuss findings and undertake decision making. Two key types of workshops were held: Options Assessment Workshops and Te Tupu Ngātahi Project Team Workshops. The workshops process and purpose are detailed below.

Options Assessment Findings Workshops, with SMEs - The purpose of these workshops was to discuss and challenge initial options assessment findings with specialists and the Project Team. During these workshops the scores (where applicable) and /or findings of each specialist was shared with the Project Team and discussed and respectfully challenged. Based on discussions in the workshop, changes to scores or assessments were made where appropriate prior to assessments being confirmed.

¹ Exception was '*user safety*' for Hobsonville Road which was retained as criteria.

Options Assessments workshops, with Te Tupu Ngātahi Project Team - The purpose of these workshops was to discuss and assess each option on a qualitative basis and challenge Project Team commentary. Assessments were confirmed at the workshop unless additional information or input was required. The workshop outcomes are detailed in the project specific sections. Post option workshops the Project Team identified the recommended options.

4.5.4 Project Partner and Landowner Engagement

Throughout route refinement, a range of engagement was undertaken with Project Partners (Auckland Council and Manawhenua). This included evaluation of the options and feedback at workshops and hui. The workshops are identified in this section and the outcomes for each Project described in corridor specific sections. Engagement with the public and landowners was undertaken in 2020 and 2021, and targeted engagement for route protection in 2022.

Ngā Manawhenua

The Project Team provided regular updates on the option assessment and sought input from manawhenua. Specific North West Local engagement included:

- **March 2020** –Introduction to the North West projects located in Whenuapai, Riverhead, Redhills and Kumeū-Huapai and overview of the assessment process
- **May 2020** –Update and outcomes from the constraint mapping process
- **February 2021** – Presentation on Spedding Road East and approach to the Rāwiri Stream
- **June 2021** - A North West site visit with manawhenua and the Project Team.

Manawhenua were also invited to constraints mapping exercise for the corridors and attended post option assessment Project Partner workshops in 2020 and 2021 to seek feedback and option support.

Auckland Council

The Project Team has met with Council on a regular basis to discuss land use integration opportunities along each project corridor and to seek views on the proposed transport network.

Council's view has also been sought on the future use of FUZ land which has not been Structure Planned, in Riverhead and Redhills North, a structure plan is in place for Whenuapai. Council has prepared the Spatial Land Use Strategy - North West in response, this was adopted in May 2021. The Strategy identified potential future centres and business land that the Te Tupu Ngātahi transport network will support. Council also attends Project Partner workshops and the monthly Te Tupu Ngātahi and Council Integration meetings.

AT and Waka Kotahi

Five workshops specific to the North West options assessment were held between September 2020 and May 2021 with AT and Waka Kotahi to discuss options and identify issues to be addressed, Manawhenua and Council also attended these workshops.

- **September 2020** – The following projects were presented at two consecutive workshops: Fred Taylor Drive, Don Buck Road (North), Brigham Creek Road, Māmari Road and Trig Road
- **September 2020** – The following projects were presented at two consecutive workshops: Whenuapai arterial corridors (Spedding Road East, Spedding Road West and Hobsonville Road) and Riverhead arterial corridors (Coatesville-Riverhead Highway)
- **May 2021** – The projects were presented and discussed with sustainability specialists from Waka Kotahi, outlining agreement to approach adopted in optioneering the project corridors.

Community and Landowners

Community engagement on the proposed network took place between 30 November 2020 and 1 February 2021. Approximately 650 pieces of feedback were received across all channels between 30 November 2020 and 1 February 2021. Feedback items included comments on Social Pinpoint, online surveys, mailed feedback, landowner meetings, emails and phone calls and official information requests and subscriptions to the North West newsletter.

Following the engagement period, feedback was collated and reviewed by the Project Team and resulted in further options being developed for Māmari Road (see Section 7). Other options feedback did not result in additional assessment.

4.6 Intersection and Stormwater Approach

4.6.1 Intersection Form Assessment Methodology

Once the preferred route refinement option for the project was identified, an assessment of the alignment intersections form and function was undertaken to determine the route protection footprint. Intersection design adopts a Safe System approach in line with AT's Vision Zero Policy.

Intersection treatments for the North West network included:

- Maintaining existing vehicle access to private property where practicable, but not in a way that precluded efficient movement along the corridor, particularly for public transport and active modes
- Adequate consideration of modal needs at intersections, for example priority intersection requirements for FTN and safe and efficient crossing opportunities for active modes
- Intersection size (determined by SiDRA modelling), particularly in more constrained existing urban areas
- Ensuring each intersection had sufficient space for queuing length and the level of service is acceptable.

The assessment of intersection form adopts a Safe System approach by recommending well-designed roundabouts as the first choice for intersections due to the safety benefits for road users resulting from slowing down through traffic and reducing the number of conflict points. Site Specific constraints are also considered which may prompt design change to meet the needs of different users. In some cases, roundabouts are not preferred, and signalised intersection forms are proposed. Both typologies have been designed to meet the needs of users safely and respond to site factors as summarised in Figure 4-5.

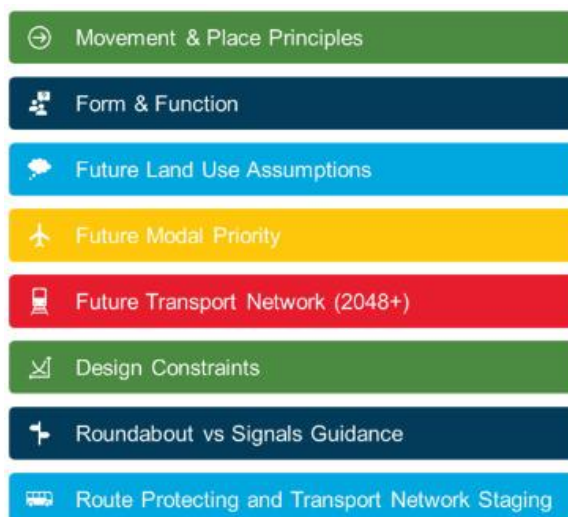


Figure 4-5: Intersection design considerations

The design for route protection allows sufficient flexibility to design and implement safety measures consistent with Vision Zero principles in the future. There is also flexibility in terms of staging and implementing with NORs overlapping at intersections.

4.6.2 Stormwater Infrastructure Design

As part of route protection, the projects are required to identify and appropriately protect the land necessary to enable the future construction, operation and maintenance of required transport corridors. The design has therefore considered the appropriate stormwater management methods to meet likely catchment needs and achieve the future regulatory requirements, the process for identifying stormwater treatment form and location is summarised in Figure 4-6.

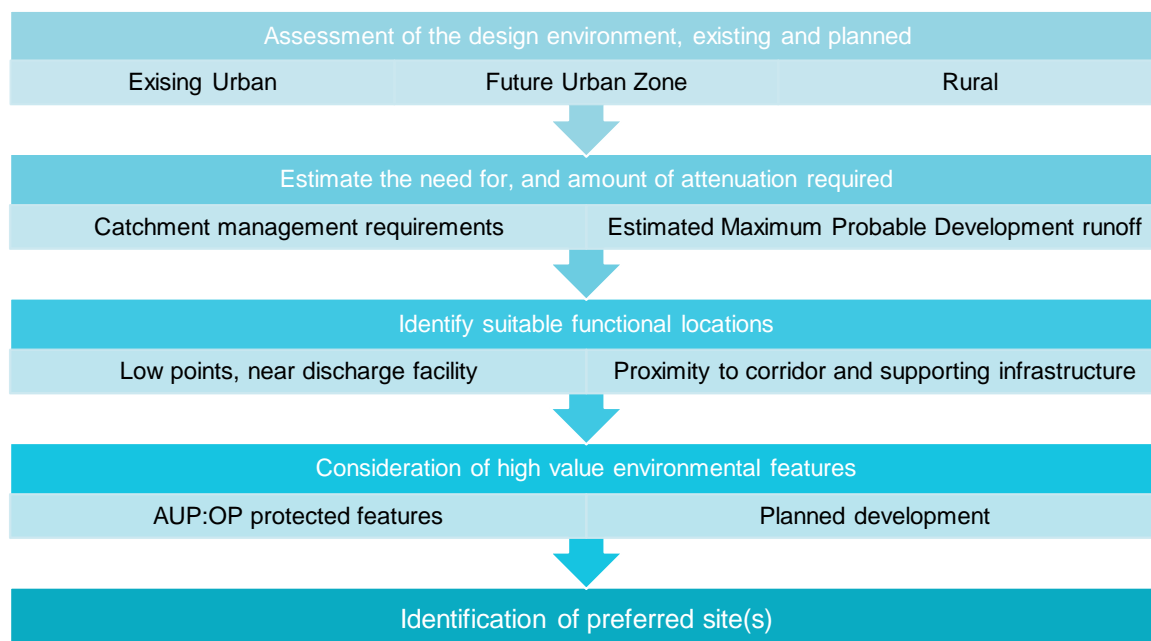


Figure 4-6: Stormwater infrastructure design and location approach

Alternative stormwater solutions were considered for the North West Local Arterials to inform the boundaries for each Project.

Design Environment Assessment

The type of stormwater management device was identified based on the Te Tupu Ngātahi design framework which considered:

- The surrounding existing and planned land-use;
- Form of the transport route;
- Road hierarchy; and
- How connectivity to adjacent properties would be provided.

This approach is summarised in Table 4-2.

Table 4-2: Stormwater System Design Approach

Design Environment	Conveyance	Treatment	Retention/s	Detention (Attenuation)	Diversion
Existing Urban – footpath and cycleway within existing road reserve	Pits and pipes	Discharge across berm	Raingarden	Wetland / pond	N/A
Existing Urban – increased road reserve and road upgrade	Pits and pipes	Raingardens or treatment wetland / pond, or as a lesser preference, proprietary treatment devices	Raingarden	Wetland / pond	N/A
Future Urban Zone	Pits and pipes preferred	Raingardens or treatment wetland / pond	Raingardens	Wetland / pond	Diversion drain or cut-off channels as required
Rural	Conveyance channels	Treatment swales or treatment wetland / pond	Retention swales	Attenuation swale or wetland / pond	Diversion drain or cut-off channels as required

Need and scale of attenuation required

Design of attenuation devices was undertaken at a high level to determine the need for, and amount of attenuation required, the design approach considered the following:

- Evaluate the overall catchment management plan requirements as approved by Auckland Council to determine if attenuation or a “pass it forward” approach was proposed for the catchment
- Determine the road runoff discharge conditions for any tie ins to existing systems or discharge to overland flow paths
- Estimate runoff from maximum probable development in the catchment (i.e., maximum expected impervious areas).

This information was used in the design of:

- Design of a primary (10-year) network to cater for the estimated runoff

- Location and sizing of primary (10-year) attenuation devices (if required) to address any capacity constraints in the downstream network, or to reduce the size of stormwater infrastructure (e.g., pipes) required.
- Identification of secondary (100-year) flow paths and floodplains
 - Location and sizing of secondary (100-year) attenuation devices to reduce floodplain and overland flow path extents.

Suitable Functional Location

If a pond was required, the location was selected by identifying a suitable functional location. The functional location considered off-line low points along the alignment, in sufficient proximity to the corridor for ongoing maintenance access, and suitably located for supporting infrastructure such as pipes and discharge outlets to nearby natural streams.

Where there were opportunities to upgrade or share existing public stormwater assets these were preferred and have been selected in various places along the corridor. Co-locating or upgrading existing assets has the benefit of reducing project land requirements and more effectively managing ongoing maintenance requirements with larger stormwater facilities, rather than providing multiple smaller devices. If practicable, across the Local Arterials, new ponds were designed to service multiple Projects, to achieve co-location efficiencies.

Consideration of high value environmental features

Once functional locations were identified the design then sought to avoid high value environmental features and where practicable minimise impacts on existing residential or business development.

Where new information or opportunities became available, the Project Team refined the stormwater solutions design and location. For example, where consents were approved for new development, the team made efforts to reconfigure ponds or discharge outlets to reduce impacts on developer aspirations and private property. However, this is not always practicable in constrained corridors.

Summary

The stormwater solution is generally the use of centralised wetlands. Wetlands have the benefit of being both more effective to operate and maintain, serve as both attenuation and treatment, and reduce the overall corridor cross section width. Swales and raingardens for example would impact many owners along the corridor, in existing urban areas where development is built up this would be particularly undesirable. Additionally, the North West Local Arterials are seeking to support growth and developable land adjacent to the corridors should therefore be maximised. Wider corridors for open channel systems and swales would not be as supportive of this objective in urban contexts, like Whenuapai and Redhills. This approach is appropriate in rural areas such as Coatesville-Riverhead Highway which are not identified for urbanisation and will largely remain rural.

5 Explanation of the Project Specific Sections

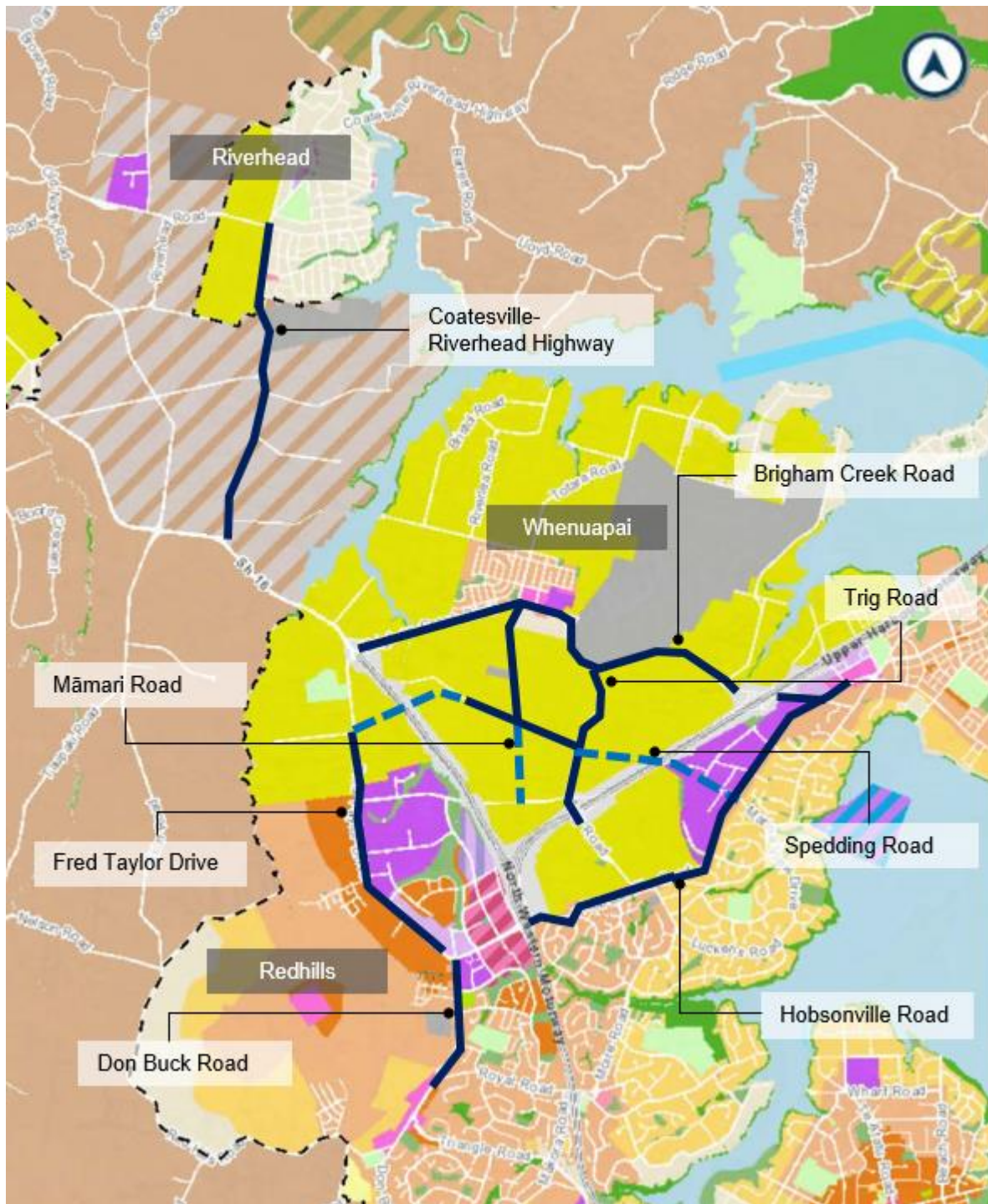
The routes in the refined North West network went to the AT and Waka Kotahi Boards in December 2021. Refined routes considered to be high strategic priority were endorsed to proceed to route protection (see Table 5-1). The following sections provide a summary of the route refinement assessment for each endorsed Project being route protected in the Local Arterials Package, including:

- Corridor assessment outcomes
- Gap analysis undertaken
- Land use review and constraints mapping
- Corridor form and function assessment
- Route refinement options developed
- Assessment summary including engagement outcomes
- Preferred and discounted options rationale.

Table 5-1: North West Local Arterials

Reference	Project	Requiring Authority
Whenuapai		
W1	Trig Road North	Auckland Transport
W2	Māmari Road	Auckland Transport
W3	Brigham Creek Road	Auckland Transport
W4	Spedding Road	Auckland Transport
W5	Hobsonville Road	Auckland Transport
Redhills and Riverhead		
RE1	Don Buck Road	Auckland Transport
RE2	Fred Taylor Drive	Auckland Transport
R1	Coatesville-Riverhead Highway	Auckland Transport

The Local Arterials Package corridors progressing to route protection are illustrated in Figure 5-1.



LEGEND	
---	Unitary Plan Rural Urban Boundary
---	New Road
—	Existing Road
■	Rural - Rural Production Zone
■	Rural - Mixed Rural Zone
■	Rural - Countryside Living Zone
■	Strategic Transport Corridor Zone
■	Special Purpose Zone
■	Coastal - General Coastal Marine Zone [rcp]
■	Open Space - Informal Recreation Zone
■	Open Space - Sport and Active Recreation Zone
■	Open Space - Civic Spaces Zone
■	Open Space - Community Zone
■	Business - City Centre Zone
■	Future Urban Zone
■	Business - Business Park Zone
■	Business - Heavy Industry Zone
■	Business - Light Industry Zone
■	Business - Town Centre Zone
■	Business - Local Centre Zone
■	Business - Neighbourhood Centre Zone
■	Business - Mixed Use Zone

Figure 5-1: Indicative Transport Network – North West Local Arterials

6 W1: Trig Road North

6.1 Corridor Overview

The Trig Road corridor upgrade formed part of the TFUG PBC preferred transport network plan prepared in 2016. The upgrade of Trig Road, extended from the SH18 intersection to Brigham Creek Road and was referred to as *AR-W-05* and assessed as one of the Whenuapai north-south connections at IBC stage. The existing corridor can be upgraded to meet requirements, so no alternative north south alignments were considered at IBC stage, see Figure 6-1.

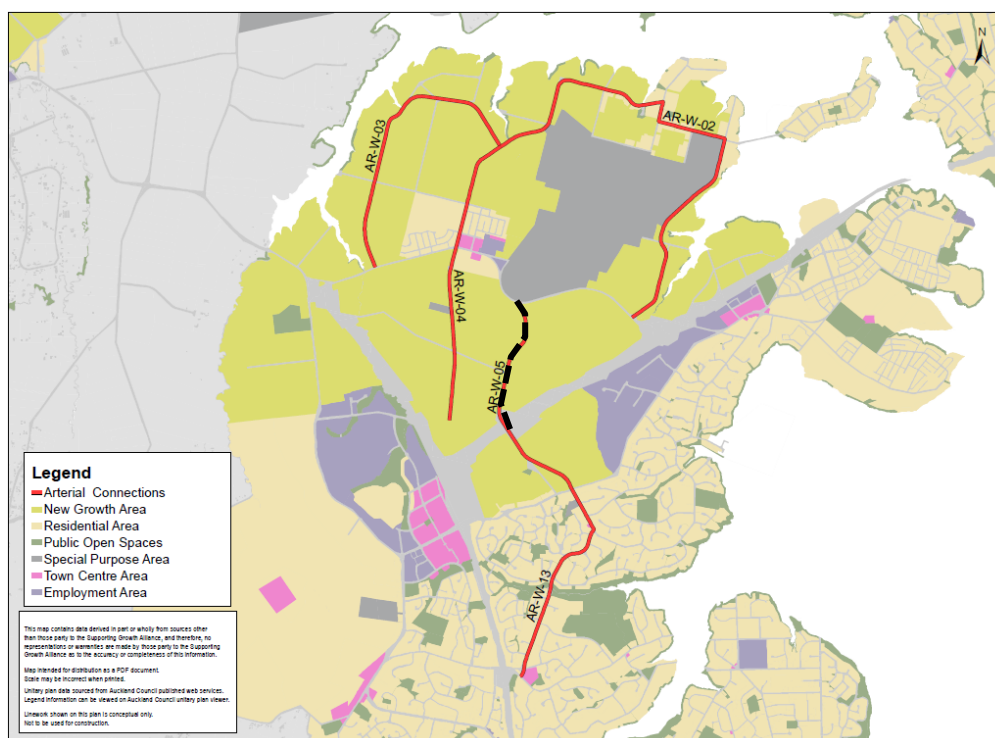


Figure 6-1: Trig Road North IBC Option AR-W-05

This arterial upgrade will connect the Whenuapai future business area at Brigham Creek Road with SH18 intersection providing strategic network resilience. The Trig Road upgrade includes widening the SH18 motorway bridge to include cycling and walking facilities which will enhance mode choice and active mode access. The upgrade also allows for priority vehicle access across SH18, which will enhance the public transport network's connectivity.

During the North West IBC progression, funding for the North West Housing Infrastructure Fund (HIF) projects was approved. Conditional to this funding was the preparation of a specific DBC (North West HIF DBC), which was completed by Te Tupu Ngātahi in 2018-19. The North West HIF DBC identified priority elements to be accelerated and built in the Whenuapai and Redhills area. This included upgrading part of Trig Road, located south of SH18, called Trig Road HIF. This section of the corridor forms part of the North West Local network but forms part of a separate project. The Trig Road north upgrade will need to tie into Trig Road HIF (southern section), between Hobsonville Road and SH18.

6.2 Gap Analysis

The gap analysis identified the key issues for this corridor as being uncertainty of future land use due to Plan Change 5, which proposed to re-zone the southern part of the Whenuapai FUZ to a mix of business and residential, this Plan Change has now been withdrawn.

Gap analysis confirmed that:

- Adequate corridor assessment of Trig Road North was undertaken at the IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints (see Section 6.3).

6.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Trig Road corridor environment, this identified that:

- **Extent and Zoning:** The Trig Road North corridor extends from Brigham Creek Road to the bridge over SH18, the land either side of the corridor is zoned FUZ
- **Future Land use:** The Whenuapai Structure Plan shows the land as being intended for Business zoning
- **Special uses and constraints:**
 - SH18 is designated by Waka Kotahi (Designation 6741) for transport purposes and has been given effect to
 - Watercare Northern Interceptor designation 9377 shares the corridor with SH16 / 18
 - AT existing Northside Drive designation 1473
- **Environment / social constraints:** Trig Road is a rural corridor with limited environmental constraints, however there are several overland flood paths and potential for wetlands.

The review identified that key project impacts were on property and existing or planned transport infrastructure.

6.4 Corridor Form and Function Assessment

An assessment was undertaken for Trig Road North, following the CFAF methodology in Section 4.3.1. The recommendation informed the route refinement options developed and assessed in Section 6.5. Figure 6-2 shows the CFAF cross section outcome.



Figure 6-2: CFAF Outcome – Trig Road North indicative 24m cross section

6.5 Route Refinement Option Development

The Trig Road North corridor is an important connection between Whenuapai and West Harbour and provides a connection to east facing ramps for SH18, and to Hobsonville Road a key east-west arterial. Three options using the 24m wide cross section were workshopped, these were:

- **Option 1 / Both:** Hold the existing centreline and widen the road on the eastern and western side
- **Option 2 / Widen West:** Hold the eastern boundary and widen the road to the west
- **Option 3 / Widen East:** Hold the western boundary and widen the road to the east.

6.6 Route Refinement Assessment

6.6.1 Assessment

The assessment undertaken for Trig Road North upgrade follows the process outlined in Section 4.4. Options 1, 2 and 3 were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Trig Road*
- *Safety: Provide improvements on Trig Road that contribute to a transport network that is free from deaths and serious injuries.*

All options performed well against the Transport Outcomes, with no differentiation.

Under the MCA, impacts on wellbeing criteria scored similarly, with the key differentiator being *Land Requirement*, where Option 1 was considered more equitable and thus preferred. The remaining criteria did not have any key differentiators.

Option considerations and constraints identified are shown in Figure 6-3, Table 6-1 provides a summary of the qualitative assessment undertaken.

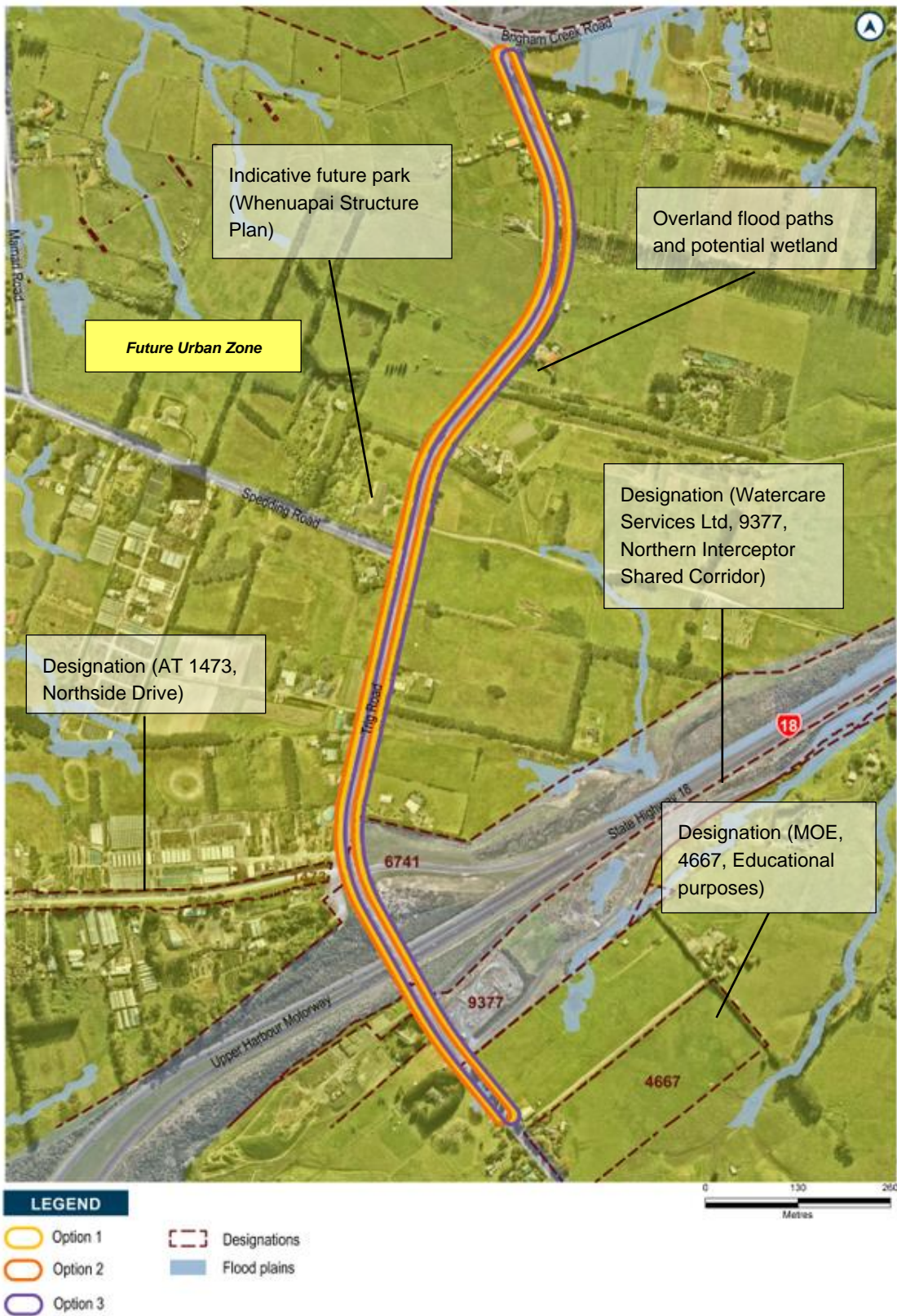


Figure 6-3: Trig Road options and identified constraints

Table 6-1: Trig Road North Upgrade Option Assessment Summary

Wellbeing Assessment	
Cultural	<u>Heritage:</u> No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.
Social	<p><u>Future land use integration:</u> The options will have a minor impact on land within the FUZ. There is no differentiation between the options on this criterion.</p> <p><u>Social:</u> There is no existing social infrastructure on Trig Road north. Council has identified parcels of Council land at 92 and 94a Trig Road for re-zoning to Open Space – Sport and Active Recreation Zone. The options widening to the west are not considered to have impacts in terms of social cohesion as the impacts are limited and it is not yet in park use. All options will improve accessibility to the future Open Space – Sport and Active Recreation Zone. There is no differentiation between the options on this criterion.</p> <p><u>Urban Design:</u> All options will integrate with the character of future development. There is no differentiation between the options on this criterion.</p> <p><u>Land Requirement:</u> All three options will have broadly similar and minor property impacts. Option 1 is preferred as it will result in a more equitable outcome in terms of requiring land on both sides of the road.</p> <p><u>Human Health and Wellbeing:</u> All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.</p>
Environment	<p><u>Landscape and Visual:</u> No significant landscape features were identified on Trig Road, and this criterion was not considered to differentiate between the options.</p> <p><u>Stormwater:</u> All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. This criterion was not considered to differentiate between the options.</p> <p><u>Ecology:</u> No significant ecological constraints were identified along or in close proximity to the options. This criterion was not considered to differentiate between the options.</p> <p><u>Natural Hazards:</u> No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.</p>
Economics	<p><u>Utilities:</u> All options will have a similar level of impact on existing utilities and infrastructure, and this criterion was not considered to differentiate between the options.</p> <p><u>Construction:</u> All options will have a similar level of construction disruption, and this criterion was not considered to differentiate between the options.</p>

6.6.2 Refinement through Engagement

The Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options. Feedback was received regarding Auckland Councils plans for a future sports park adjacent to Trig Road, the team confirmed the impacts on this site were limited. Feedback was also received on the potential for queuing on Trig Road bridge to access the south facing ramps onto SH18. The Project Team tested this and confirmed the upgraded corridor could adequately accommodate queuing.

SH18 is designated for Transport Purposes by Waka Kotahi, Designation 6741 provides sufficient space for bridge widening to include active modes or a new bridge. Therefore, no options for the bridge connection to Trig Road HIF were developed.

6.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for the Trig Road North upgrade was identified. The preferred option was:

‘Option 1 / Both holding centreline and widening to both sides’ was preferred because:

- There were no significant constraints identified along the corridor to favour or preclude widening east or west
- Although the centreline approach affects a greater number of properties, the effects on the adjacent land are less extensive for each site (i.e., as they are limited to partial / frontage impacts) whereas an east / west only alignment would have more extensive property impact.

Through the assessment, it was noted that there were no evident differentiators between the three options on most wellbeing criteria, see Table 6-1.

All route refinement options provided the same level of achievement against the transport outcomes as outlined in Section 6.6.1. Throughout route refinement specific consideration was made to minimise the Project footprint and associated impact on private properties.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

6.6.4 Discounted Options

Table 6-2 summarises the reasons for discounting the two options individually.

Table 6-2: Trig Road North Discounted Options

Option	Reasoning
Option 2 / Widen West	<ul style="list-style-type: none"> • Greater footprint extent into adjacent property with more significant impacts (i.e., greater than frontage impacts).
Option 3 / Widen East	<ul style="list-style-type: none"> • Greater footprint extent into adjacent property with more significant impacts (i.e., greater than frontage impacts).

6.7 Trig Road North Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Trig Road North Upgrade is Option 1, holding the centreline and widening to the east and west to enable an equitable land requirement with less extensive impacts on individual properties.

7 W2: Māmari Road Upgrade

7.1 Corridor Overview

The Māmari Road corridor formed part of the TFUG in the PBC preferred transport network plan prepared in 2016. The IBC original corridor *AR-W-04* extended from the southern intersection with the future Northside Drive (a separate non-Te Tupu Ngātahi project) to the end of Totara Road to provide Whenuapai with a North-South intra-regional connection, see Figure 7-1. The arterial's primary function was to support residential access to Whenuapai village and frequent bus network to access Westgate and the future rapid transit network.

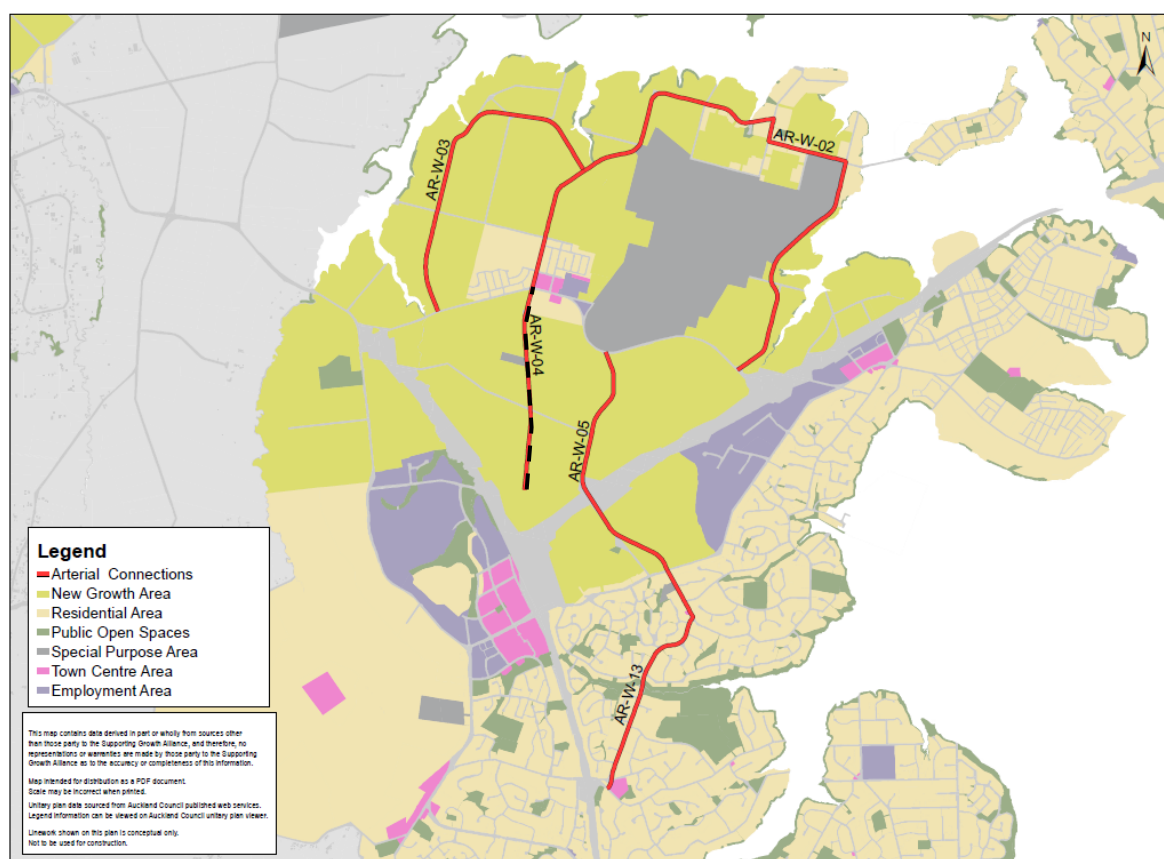


Figure 7-1: Māmari Road IBC Option AR-W-04

However, the traffic volume forecast anticipates the section south of the Whenuapai village would experience significantly higher traffic volumes compared to the northern section (Brigham Creek Road to the end of Totara Road). With Totara Road best suited as a collector road, the IBC recommended restricting the arterial upgrade to the southern section of Māmari Road from Brigham Creek Road to the future Northside Drive intersection. The Māmari Road upgrade was recommended to be a four-lane urban arterial.

7.2 Gap Analysis

Gap analysis identified key issues as the uncertainty of land use due to developer plan changes (Plan Change 69 (now approved)), which has indicated they will bring private plan changes for land adjacent to SH16. Ongoing discussion with Council is needed to inform the assessment.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC, and analysis did not trigger further corridor assessment.
- Route Refinement assessment should be undertaken to respond to constraints.

7.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Māmari Road corridor environment. This exercise identified that:

- **Extent and zoning:** Māmari Road corridor extends from the intersection of Māmari Road and Brigham Creek Road to future Northside Drive. The northern section of Māmari Road to Spedding Road is an existing corridor, and a section is 'paper road'
- **Future Land use:** The eastern side of the Māmari Road is *Residential – Single House Zone* and FUZ. The western section of Māmari Road, north of Spedding Road is FUZ except for a *Special Purpose – School Zone*. The southern extension to Māmari Road will extend through the FUZ to the south of Spedding Road
- **Special uses and constraints:**
 - The *Residential – Single House Zone* and a section of the FUZ is within Ministry of Defence (MOD) Designation 4310. A small area of land used for 'landing lights' is also designated by MOD
- **Environmental constraints:** Sinton Stream, flood plains and potential wetlands are along the corridor.

Key outcomes of the review was the decision to:

- Split the route into two segments for option assessment, to localise the assessment and consider constraints within each segment
 - Segment 1: Limited environmental constraints, Project team to carry out route refinement optioneering and assessment
 - Segment 2: Greater environmental constraints, develop options for a localised corridor refinement and assess options with SMEs input.

7.4 Corridor Form and Function Assessment

An assessment was undertaken for the Māmari Road upgrade following the CFAF methodology in Section 4.3.1. This recommendation informed the route refinement options developed and assessed in Section 7.5. Figure 7-2 shows the CFAF cross section outcome.



Figure 7-2: CFAF Outcome – Māmari Road Indicative 30m cross section

7.5 Route Refinement Option Development

Māmari Road forms an important connection between Whenuapai town centre and Northside Drive, it will also provide connectivity to proposed SH16 / SH18 Connections project and the Westgate metropolitan centre to the west. The route was split into two segments as shown in Figure 7-3, five options were workshopped based on the indicative 30m cross section.

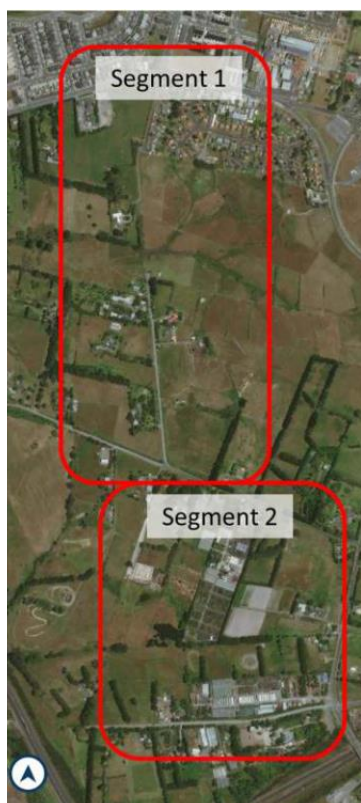


Figure 7-3: Māmari Road segments for option refinement

Segment 1 (Brigham Creek Road to Spedding Road intersection)

- **Option A1 / Both:** Hold the existing centreline and widen the road on the eastern and western side
- **Option A2 / Widen West:** Hold the eastern boundary and widen the road to the west
- **Option A3 / Widen East:** Hold the western boundary and widen the road to the east.

Segment 2 (Spedding Road to future intersection with Northside Drive)

- **Option B1 / West connection:** With a western connection on Northside Drive
- **Option B2 / East connection:** With an eastern connection on Northside Drive and connecting with the intersection proposed as part of the Northside Drive upgrade.

7.6 Route Refinement Assessment

7.6.1 Assessment

A route refinement assessment was undertaken in Segment 1 and a localised corridor assessment in Segment 2. Segment 1 options were considered by the Project Team and Segment 2 by SMEs. The assessment undertaken for the Māmari Road upgrade follows the process outlined in Section 4.4.

The options were assessed qualitatively against the MCA framework including the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor from Whenuapai to Redhills*
- *Reliability: Enable reliable people and freight movement between Whenuapai and Redhills*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Māmari Road*
- *Safety: Provide improvements on Māmari Road that contribute to a transport network that is free from deaths and serious injuries.*

Segment 1

All Segment 1 options achieved the transport outcomes sought with no differentiation. Considerations and constraints identified are shown in Figure 7-4. Table 7-1 provides a summary of the qualitative assessment undertaken by the Project Team using the MCA framework, scoring was not undertaken in Segment 1, instead preferences between options were identified.

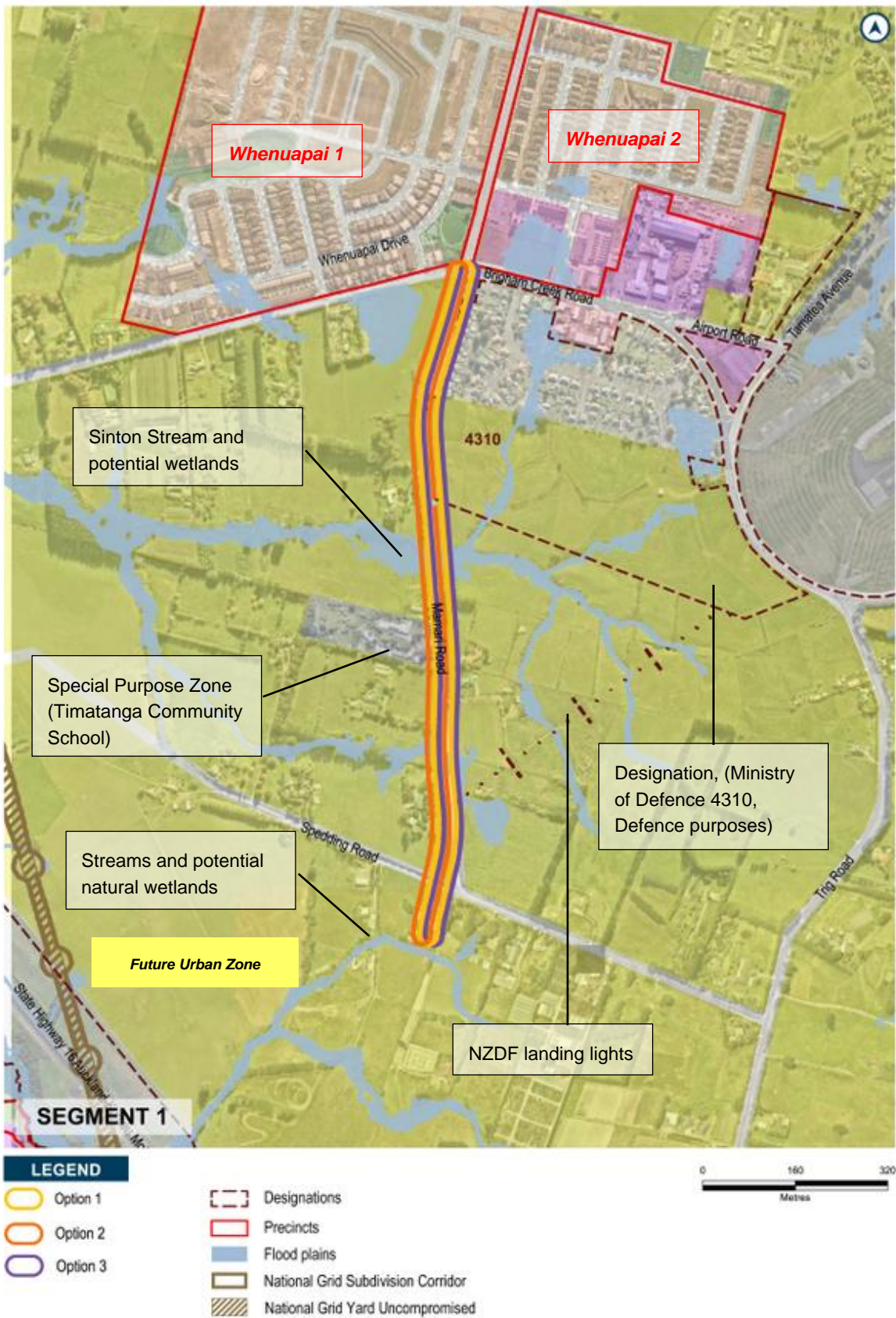


Figure 7-4: Māhari Road Segment 1 options and identified constraints

Table 7-1: Māmari Road Segment 1 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No significant constraints were identified along the route for heritage, therefore this criterion was not a differentiator.</p>
Social	<p><u>Future land use integration:</u> Option A1 is least preferred as it impacts upon both the MOD Designation (both New Zealand Defence Force (NZDF) housing and landing lights) and the Special Purpose School Zone.</p> <p>Option A2 impacts upon the Special Purpose School Zone (Timatanga Community School) in but avoids the MOD Designation. This option is preferred in the northern and southern sections of Segment 1.</p> <p>Option A3 impacts upon the MOD Designation but avoids the Special Purpose School Zone. This option is preferred in the middle section of Segment 1.</p> <p>A hybrid of Options A2 and A3 is the preferred option, as it would avoid these key constraints and would be the best option to allow the road to be integrated into a future development scenario on land currently zoned FUZ.</p> <p><u>Social:</u> Options A1 and A2 are least preferred as they impact upon the existing Timatanga Community School. Option A3 is preferred as it avoids the school.</p> <p><u>Urban Design:</u> Options A2 avoids impacting upon the established character of the NZDF housing / Residential – Single House Zone and is preferred.</p> <p><u>Land Requirement:</u> Option A1 is least preferred as it will impact on properties on both sides of Māmari Road increasing the land requirement. The MoD Designated land and Timatanga Community School pose challenges for the acquiring the required land for Options A2 and A3. A hybrid of Options A2 and A3 which avoids this land is preferred.</p> <p><u>Human Health and wellbeing:</u> Health and wellbeing were not a differentiator with all options resulting in similar levels of traffic.</p>
Environment	<p><u>Landscape and Visual:</u> No significant landscape features were identified on Māmari Road, and this criterion was not considered to differentiate between the options.</p> <p><u>Stormwater:</u> Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options.</p> <p><u>Ecology:</u> No significant ecological constraints were identified along or in close proximity to any of the options, and this criterion was not considered to differentiate between the options.</p> <p><u>Natural Hazards:</u> No significant geotechnical constraints or instability issues were identified along the alignment, and this criterion was not considered to differentiate between the options.</p>
Economics	<p><u>Utilities:</u> Options A1 and A3 impact on the NZDF landing lights, which are important to the safe and continued operation of the NZDF airbase, and these options are least preferred. Option A2 is preferred.</p> <p><u>Construction:</u> All options will have a similar level of construction disruption to the MOD designated land, residential properties, rural activities and Timatanga Community School. This criterion was not considered to differentiate between the options.</p>

Following the options assessment workshop, and as identified in the table above, the Project Team identified a revised option – a hybrid of options A2 and A3. The hybrid option was designed to avoid the key constraints being the MOD Designation and the Special Purpose Zone, along the route and was preferred by the Project Team over Options A1, A2 and A3. The hybrid option is called Option A2/3-H.

Segment 2

Both options in Segment 2 perform well against the Transport Outcomes, however Option B1 does not perform as well as Option B2 against 'Reliability'. This differentiation is due to Option B2 having more separation between Northside Drive and the proposed SH16 / 18 Connection's interchange to manage queuing and traffic.

Considerations and constraints identified are shown in Figure 7-5. Table 7-2 sets out the MCA scores for the two options developed in Segment 2. Table 7-3 sets out a summary of the qualitative assessment undertaken by SMEs against the MCA framework.

Table 7-2: Māmari Road Segment 2 MCA Assessment

Options	Option B1	Option B2
IO1. Access	4	4
IO2. Reliability	3	4
IO3. Mode Choice	4	4
IO5. Safety	3	3
Criteria		
Heritage	-1	-1
Land use futures	2	2
Urban Design	2	2
Land Requirement	-1	-1
Social Cohesion	2	2
Human Health and Wellbeing	-1	-1
Landscape / Visual	-1	-1
Stormwater	-1	-1
Ecology	-2	-3
Natural Hazard	-1	-1
Construction impacts on utilities / infrastructure	-1	-1
Construction Disruption	-1	-1
Construction costs / risk / value capture	-2	-2

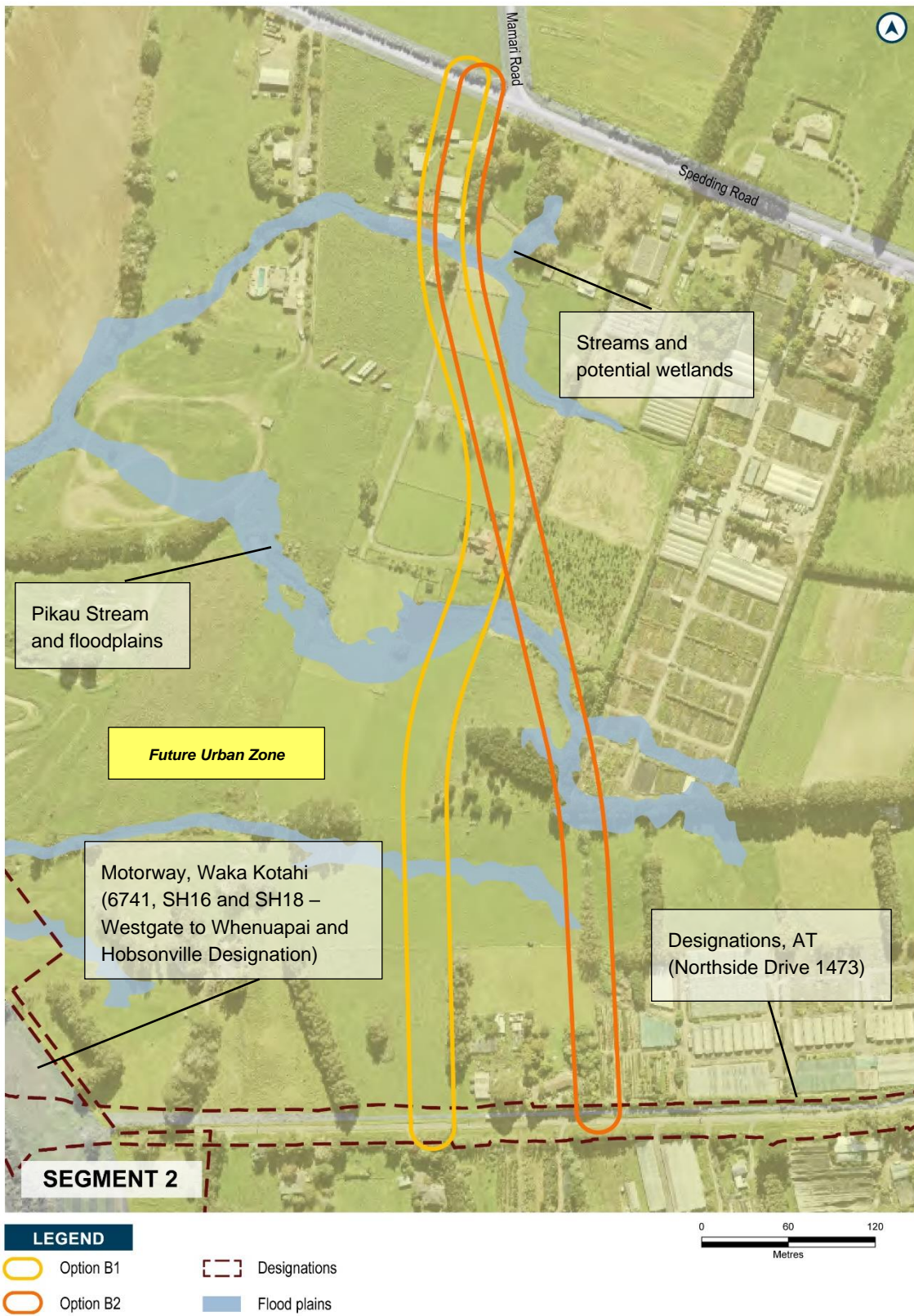


Figure 7-5: Māmari Road Segment 2 options and identified constraints

Table 7-3: Māmari Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> There are no known heritage constraints within the extent of either of the options. Both options pass through a similar number of streams and there is potential for discovering unrecorded subsurface archaeological sites at these points. There is however no differentiation between the options.</p>
Social	<p><u>Future land use integration:</u> Both options are located within the FUZ and will support growth within Whenuapai. There is no differentiation between the options on this criterion.</p> <p><u>Social:</u> Both will provide increased accessibility and connectivity to employment, community and shops. There is no differentiation on this criterion.</p> <p><u>Urban Design:</u> There is no significant differentiation between options in terms of urban design, both perform minor positive.</p> <p><u>Land Requirement:</u> Given the limited number of properties involved both have low adverse impacts; however, there is a preference for Option B1 due to the reduced number of properties impacted.</p> <p><u>Human health and wellbeing:</u> Both options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. There is no differentiation between the options on this criterion.</p>
Environment	<p><u>Landscape and Visual:</u> No significant landscape features were identified within Segment 2, and any landscape or visual impacts, which do occur, will be viewed in the context of future development. There is no differentiation between the options on this criterion.</p> <p><u>Stormwater:</u> Both have adverse impacts due to impacts on streams, flood plain and overland floodpath effects and embankment erosions. To optimise the route alignment the recommendation from the stormwater / flooding perspective would be to combine the two options in the following way:</p> <p>Option B1 alignment for the southern and central areas – avoids Pikau Stream realignment and flood attenuation. Additional culvert is required at the southern end however not significant impact.</p> <p>Option B2 alignment for the northern area – minimise stream compensation and erosion control measures.</p> <p><u>Ecology:</u> Option B1 is preferred as it will have less impact on the Pikau Stream and floodplains. Option B2 is not preferred due to the extent of impact on the Pikau Stream and is considered to have a less direct (and poorer) alignment running nearly parallel with the Pikau Stream.</p> <p><u>Natural Hazards:</u> No significant geotechnical constraints, instability issues or inundation were identified along the alignment. Geology is Puketoka Formation alluvium with key risks being settlement, liquefaction, stability. There are no differentiating factors between options.</p>
Economics	<p><u>Utilities:</u> As a greenfield site there is limited impacts on infrastructure. There is no differentiation between options.</p> <p><u>Construction:</u> Options can be constructed off road and will give rise to a similar level of construction disruption. There is no differentiation between options.</p>

Following the options assessment workshop, there was little notable differentiation identified between the options on many criteria. Option B1 performed better for property impacts and ecological criteria, however B2 performed better against the transport outcomes.

7.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council, to discuss the options. The key outcome of Project Partner engagement was agreement on the post MCA revised options for both Segments 1 and 2.

In 2020 and 2021 Te Tupu Ngātahi sought feedback from community and landowners on the corridor. The Project Team engaged with landowners at 80 Trig Road, where the owner proposed an amendment to the Māmari Road option, to allow the land to be split into more regular shaped parcels. Specialists from Stormwater, Flooding and Ecology considered the refinement, and confirmed it would:

- Avoid an area of potentially native vegetation
- Result in better alignment with Pikau Stream floodplain
- Not adversely impact the proposed SH16 / 18 Connections Interchange, due to the proposed intersection location being closer to Option B2 intersection. Previous option performance difference was due to Option B2 allowing more separation for queuing between Northside Drive and proposed SH16 / 18 interchange. The refined option therefore removed that difference.

This option incorporated the B2 intersection with Northside Drive (which scored higher on Transport Outcomes for 'Reliability') and a revised alignment which minimised environmental effects, particularly on the Pikau Stream. The revised option was called Option B2-H and was adopted by the Project Team.

Landowner Engagement 2022

During boundary confirmation, the northern end of Māmari Road (in Segment 2) was adjusted to reduce private property impacts in the north, this resulted in a western shift of the southern end near Northside Drive. Following engagement with the southern landowner (as above) feedback affirmed that evenly splitting the southern parcel was strongly preferred, the design was aligned to run more centrally through the lot, to enable more even sized parcels.

A further change was made based on feedback to the middle of Segment 2 to reduce direct building impacts at 7 Spedding Road, whilst holding the southern and northern intersections. This substantially reduced impacts at the site whilst still achieving the required transport outcomes.

7.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for Māmari Road was identified.

Segment 1: The preferred is a hybrid of Options A2 and A3, Option A2/3-H was preferred because:

- It avoids key planning constraints along the corridor, including the MOD designations and the *Special Purpose – School Zone* (Timatanga Community School), in the segment mid-section
- It minimises the land requirement and property impacts to the MOD housing and Timatanga Community School.

Segment 2: The preferred is a refined Option B2, informed by landowner feedback. Option B2-H is preferred because:

- The refined alignment will reduce environmental effects on existing streams and wetlands. Reducing need for future stream compensation and reducing extent of erosion and sediment controls required during construction
- It performs better against Transport Outcome 'Reliability'. This is due to the option proposed providing more separation to manage queuing and traffic onto SH16 / 18 Connections Interchange on Northside Drive.

The Māmari Road preferred corridor option was a combination of the options considered. The preferred option will reduce impacts on sensitive environmental features and responds to feedback from a landowner. The selected route refinement option achieves the transport outcomes identified. There will be further opportunities to minimise impacts during detailed design, as a result, no further design refinement is required at this stage.

7.6.4 Discounted Options

Table 7-4 summarises the reasons for discounting the remaining options.

Table 7-4: Māmari Road Discounted Options

Option	Reasoning
Segment 1	
Option A1	<ul style="list-style-type: none"> • Impacts on the Special Purpose – School Zone (Timatanga Community School) • Impacts on MOD designation – Whenuapai Airbase landing lights and NZDF housing • Increased property impacts on NZDF housing within the Ministry of Defence designation.
Option A2	Discounted at the northern and southern section of Segment 1 due to: <ul style="list-style-type: none"> • Impacts on MOD designation – Whenuapai Airbase landing lights and NZDF housing and associated property impacts.
Option A3	Discounted at mid-section of Segment 1 due to: <ul style="list-style-type: none"> • Impacts on the Special Purpose – School Zone (Timatanga Community School) and associated property impacts.
Segment 2	
<i>Note these options were rejected when applied in entirety for Segment 2, however both informed the hybrid preferred option.</i>	
Option B1	<ul style="list-style-type: none"> • Proximity to the proposed SH16 / 18 Connections Interchange providing less separation to manage queues and traffic operations.
Option B2	<ul style="list-style-type: none"> • Impacts upon streams and wetland habitats.

7.7 Māmari Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Māmari Road upgrade is a hybrid option for both Segment 1 and Segment 2 that involves widening along the west and east and in some places widening on both sides to ensure impacts on environmental constraints are minimised and transport network operations are optimised.

8 W3: Brigham Creek Road Upgrade

8.1 Corridor Overview

The Brigham Creek Road Upgrade was initially identified in the TFUG PBC preferred transport network plan prepared in 2016. This east-west corridor was identified to support residential access to the Whenuapai village and to provide frequent bus network access to Westgate and the proposed city centre to Westgate RTC.

Assessed as part of the Whenuapai arterial east-west connections, the IBC corridor considered two options, with one deviating from the town centre (AR-W-06B). While this option had improved urban design outcomes; it was later confirmed to have limited traffic redistribution benefits and was discounted as cost inefficient. The upgrade of the existing route, Option AR-W-06A as a four-lane urban arterial upgrade was recommended, see Figure 8-1.

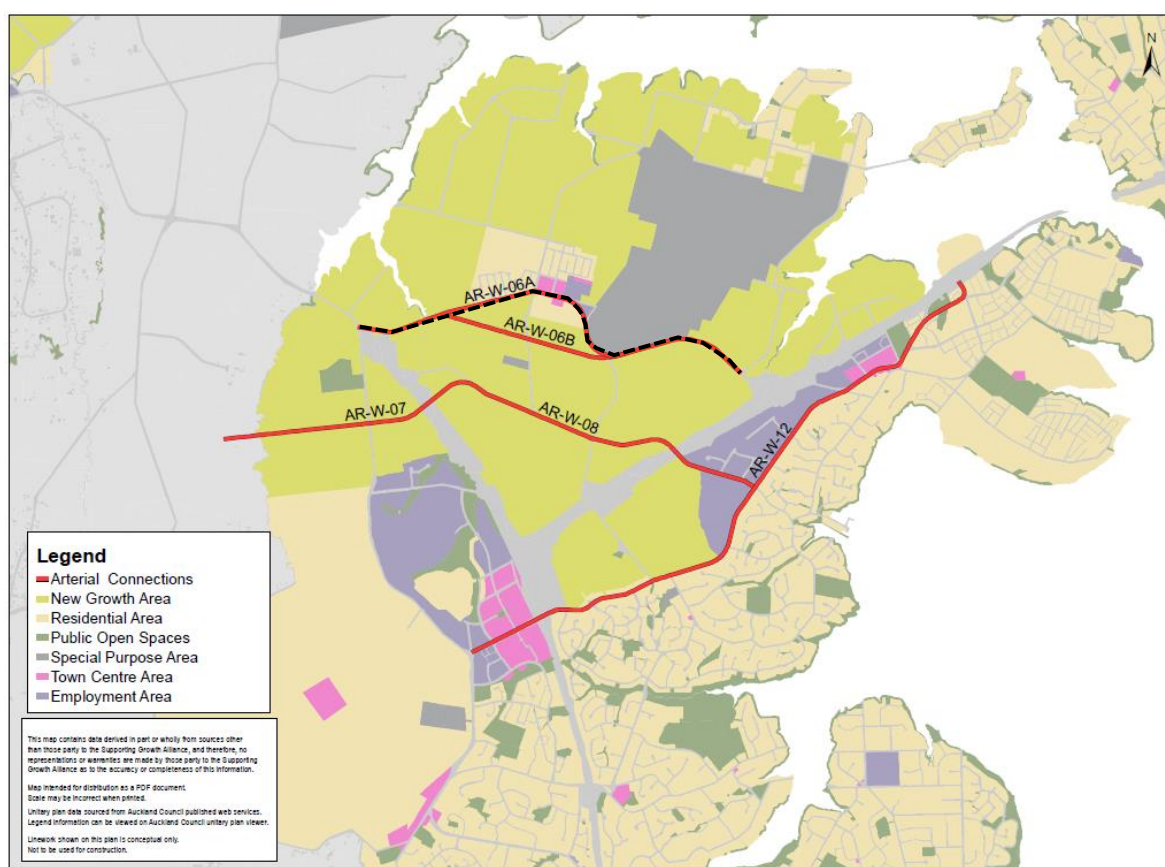


Figure 8-1: Brigham Creek Road IBC Option AR-W-06A

The preferred option refocused Brigham Creek Road on distributing the northern residential catchment to the SH16 and SH18 connections.

8.2 Gap Analysis

Gap analysis identified that land use uncertainty for the corridor was derived from the FUZ and plan changes along the corridor, such as Proposed Plan Change 5, (which has now been withdrawn). Oyster Capital Ltd has submitted a private Plan Change (PC 69 (now approved)) for land adjacent to SH16 within Whenuapai. Engagement with Council and developers was identified as necessary to

understand whether plan changes would alter land use expectations as set through the Whenuapai Structure Plan and to inform assessment.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC and analysis did not trigger further corridor assessment
- Route Refinement assessment should be undertaken to respond to constraints (see Section 8.5).

8.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Brigham Creek Road corridor environment. The exercise identified that:

- **Extent and zoning:** Brigham Creek Road is an existing corridor which extends from the interchange with SH16 in the west to the Interchange with SH18 in the east. The land adjacent to the road corridor is zoned FUZ, except within Whenuapai and the NZDF airbase which consists of.
 - On the corridor's southern side *Residential – Single House Zone* and *Business – Neighbourhood Centre Zone*. The north side of the corridor is *Residential - Mixed Housing Urban Zone*, *Business – Local Centre Zone* and *Business – Light Industry*
- **Future land use:** The Whenuapai Structure Plan (2016) identifies a mix of high and medium density residential and business land use on the south side of the corridor. Medium density residential is identified on the north side of the corridor
- **Special uses and constraints:** NZDF site is *Special Purpose – Airports and Airfields Zone* and designated for 'Defence Purposes' (Designation 4310). Designation 4310 extends beyond the Special Purpose Zone and includes NZDF housing (*Residential – Single House Zone*) on the southern side of Whenuapai. Key infrastructure such as Spark's telecommunication site at 153 Brigham Creek Road
- **Environmental constraints:** The corridor includes several SEAs and streams such as Waiarohia Stream, public open space reserve, and topography restrictions resulting in potentially large embankments.

Key outcomes of the review was decision to:

- Divide the route into three segments for option assessment, to localise the assessment and consider constraints within each segment
 - Segment 1: Brigham Creek Interchange to Totara Road intersection
 - Segment 2: Totara Road to Tamatea Avenue intersection
 - Segment 3: Tamatea Avenue to SH18 interchange
- Have SME input for all segment options assessment due to the varying land use and complexities along the corridor.

8.4 Corridor Form and Function Assessment

An assessment was undertaken for the Brigham Creek Road upgrade following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 8.5. Figure 8-2 to Figure 8-4 summarises the CFAF outcomes. The function

of Brigham Creek Road is to go through the centre of the Whenuapai area and link SH16 to Hobsonville Road.

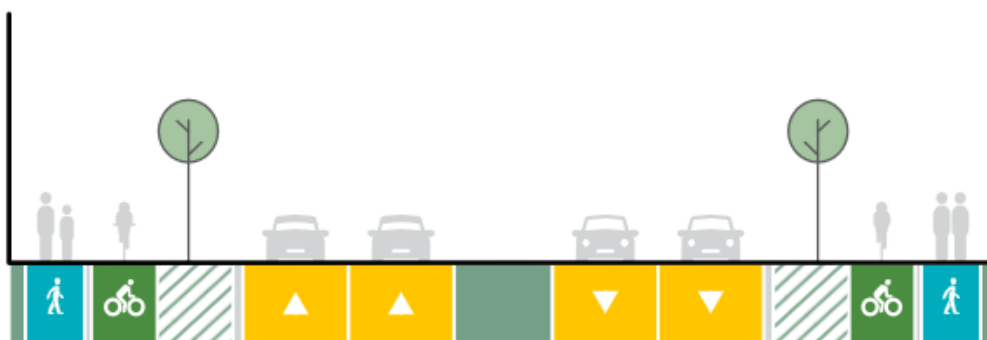


Figure 8-2: CFAF Outcome S1 (BCR interchange to Totara Road segment) Indicative 30m cross section



Figure 8-3: CFAF Outcome S2 (Totara Road to Tamatera Avenue) Indicative 30m cross section

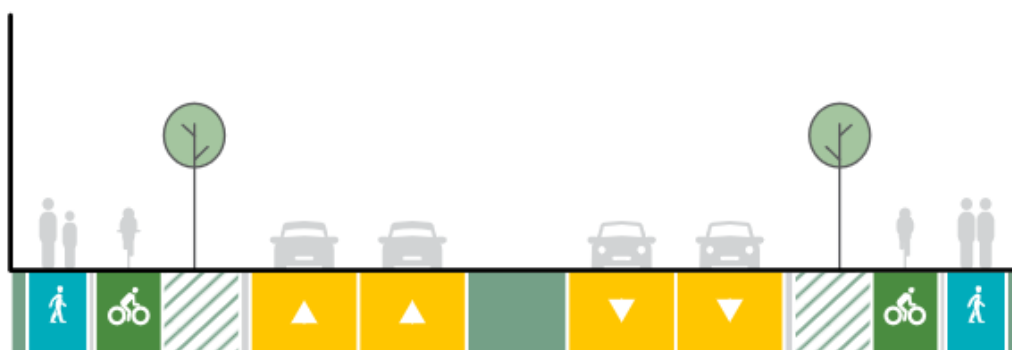


Figure 8-4: CFAF Outcome S3 (Tamatera Avenue to SH18 interchange) Indicative 30m cross section

8.5 Route Refinement Option Development

Brigham Creek Road forms a key link through the Whenuapai area connecting to SH16 and Hobsonville Road. The route was split into segments to allow consideration of each of the Whenuapai Precincts, i.e., Whenuapai Precinct 1 (Segment 1) and Whenuapai Precinct 2 (Segment 2) and the eastern section (Segment 3) adjacent to the FUZ. A further segment (Segment 1A) was later added and is discussed at Section 8.6.2, see Figure 8-5. These options were workshopped based on the indicative 30m wide cross sections.



Figure 8-5: Brigham Creek Road segments for route refinement

The same options were assessed for each segment.

- **Option 1 / Widen both:** Widen both the northern and southern side of the road and retain the centreline
- **Option 2 / Widen south:** Widen road on the south and retain the northern boundary
- **Option 3 / Widen North:** Widen road on the north and retain the southern boundary.

8.6 Route Refinement Assessment

8.6.1 Assessment

A Route Refinement assessment was undertaken for the Brigham Creek Road upgrade. The assessment follows the process outlined in Section 4.4. The three options were assessed against the MCA framework including the ability to achieve the corridor Transport Outcomes.

The Brigham Creek Road upgrade aims to achieve the following outcomes:

- *Access: Improve access to economic and social opportunities along Brigham Creek Road*
- *Reliability: Enable reliable people and freight movement on Brigham Creek Road*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Brigham Creek Road*
- *Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Whenuapai*
- *Safety: Provide improvements on Brigham Creek Road that contribute to a transport network that is free from deaths and serious injuries.*

All options achieved the transport outcomes sought with no differentiation.

Considerations and constraints identified are shown in Figures below for each Segment. Table 8-1 provides the MCA performance in each segment and Figure 8-6 to Figure 8-9 show the options against constraints. Table 8-2, Table 8-3 and Table 8-4 summarise the assessment undertaken by SMEs for each Segment using framework.

Table 8-1: Brigham Creek Road MCA Assessment

	Segment 1			Segment 2			Segment 3		
	1	2	3						
Option scoring									
Access	3	3	3	3	3	3	3	3	3
Reliability	3	3	3	3	3	3	3	3	3
Mode Choice	2	2	2	2	2	2	2	2	2
Integration	3	3	3	3	3	3	3	3	3
Safety	3	3	3	3	3	3	3	3	3
Criteria									
Heritage	0	0	0	0	0	0	0	0	0
Land use futures	-3	-2	-3	-2	-2	-2	-3	-3	-3
Urban Design	-3	3	-3	2	-3	-3	2	1	1
Land Requirement	-3	-2	-3	-2	-3	-3	-1	-1	-1
Social Cohesion	-3	0	3	-2	-2	-2	2	2	2
Human Health and Wellbeing	-1	-1	-1	-1	-1	-1	-1	-1	-1
Landscape / Visual	-2	-1	-2	-2	-2	-2	-1	-1	-1
Stormwater	-1	-1	-2	0	0	0	-2	-3	-1
Ecology	-2	-2	-2	0	0	0	-2	-2	-2
Natural Hazard	-2	-1	-2	-1	-1	-1	-2	-1	-2
Construction impacts on utilities / infrastructure	-3	-2	-3	-3	-3	-3	-3	-3	-2
Construction Disruption	-2	-2	-2	-2	-2	-2	-3	-3	-3
Construction costs / risk / value capture	-3	-2	-3	-2	-2	-2	-3	-3	-2

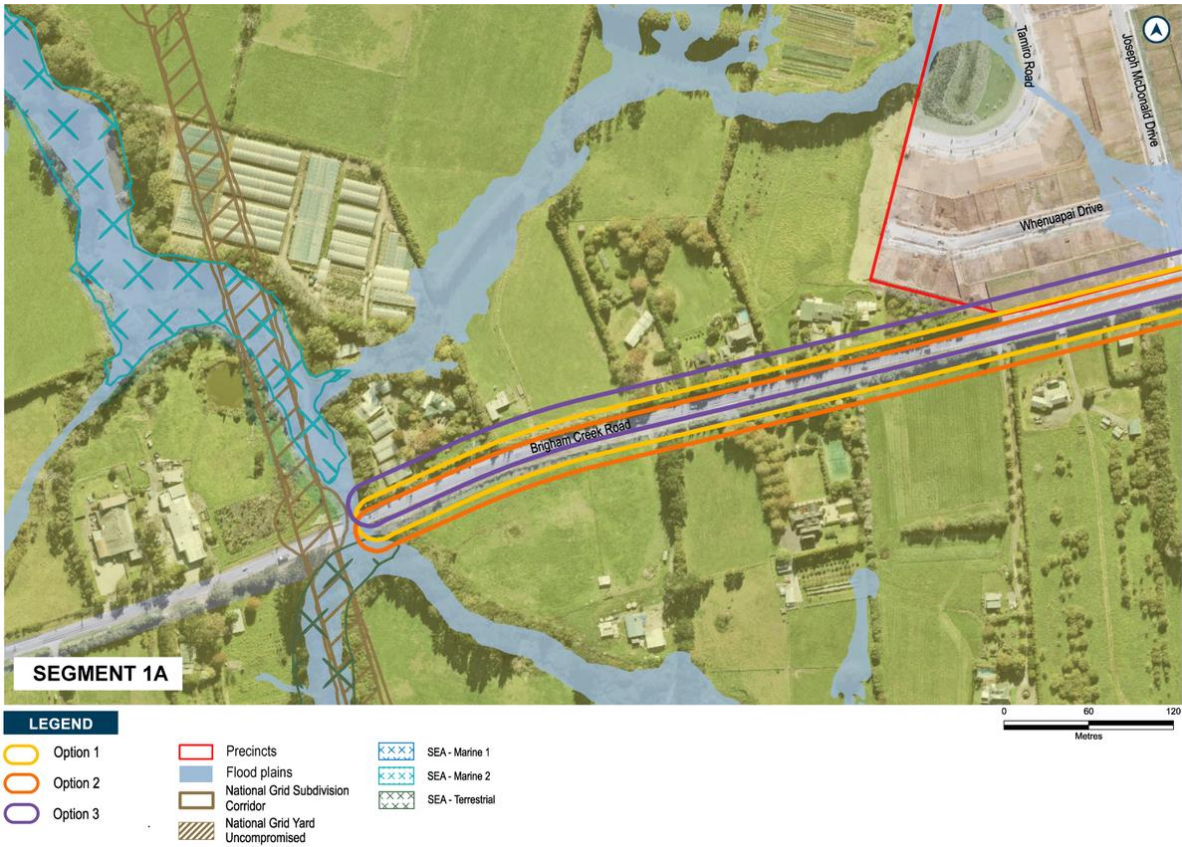


Figure 8-6: Brigham Creek Road Segment 1A Options and identified constraints

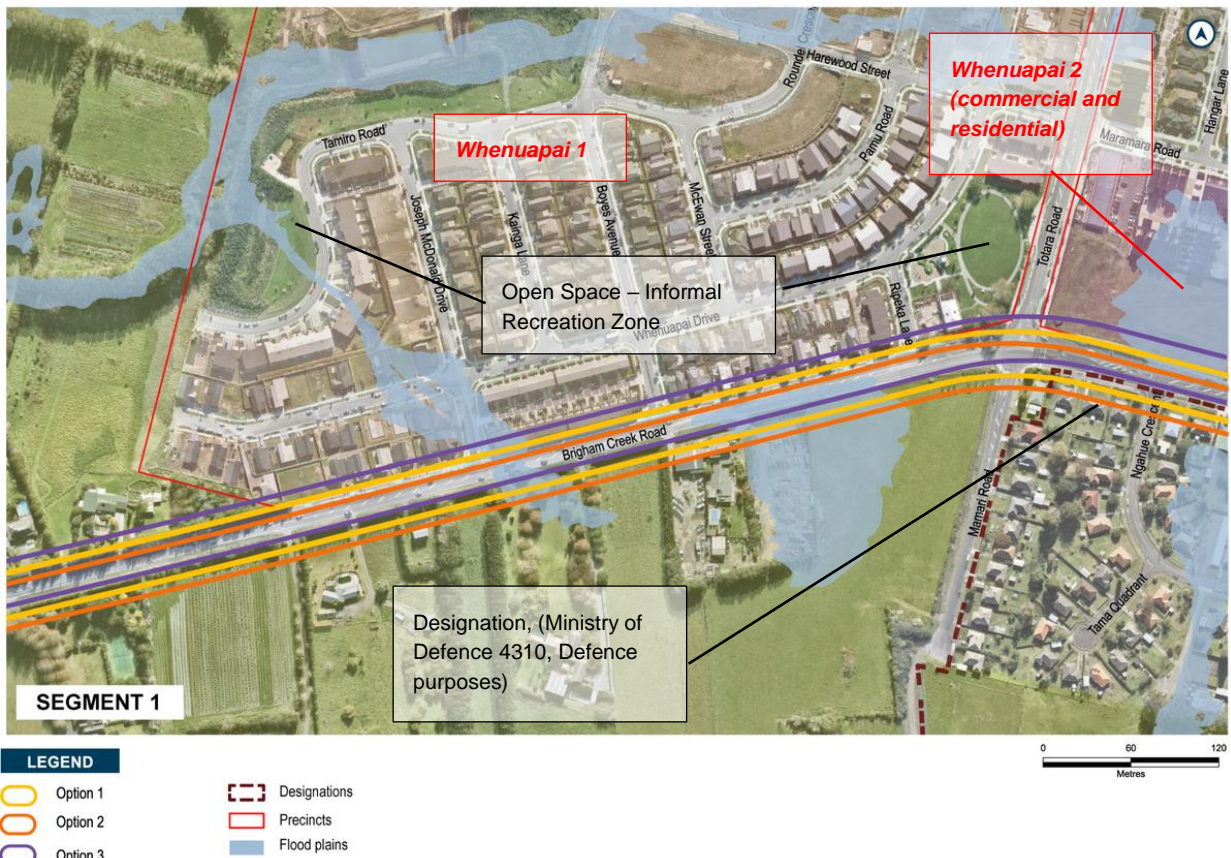


Figure 8-7: Brigham Creek Road Segment 1 Options and identified constraints

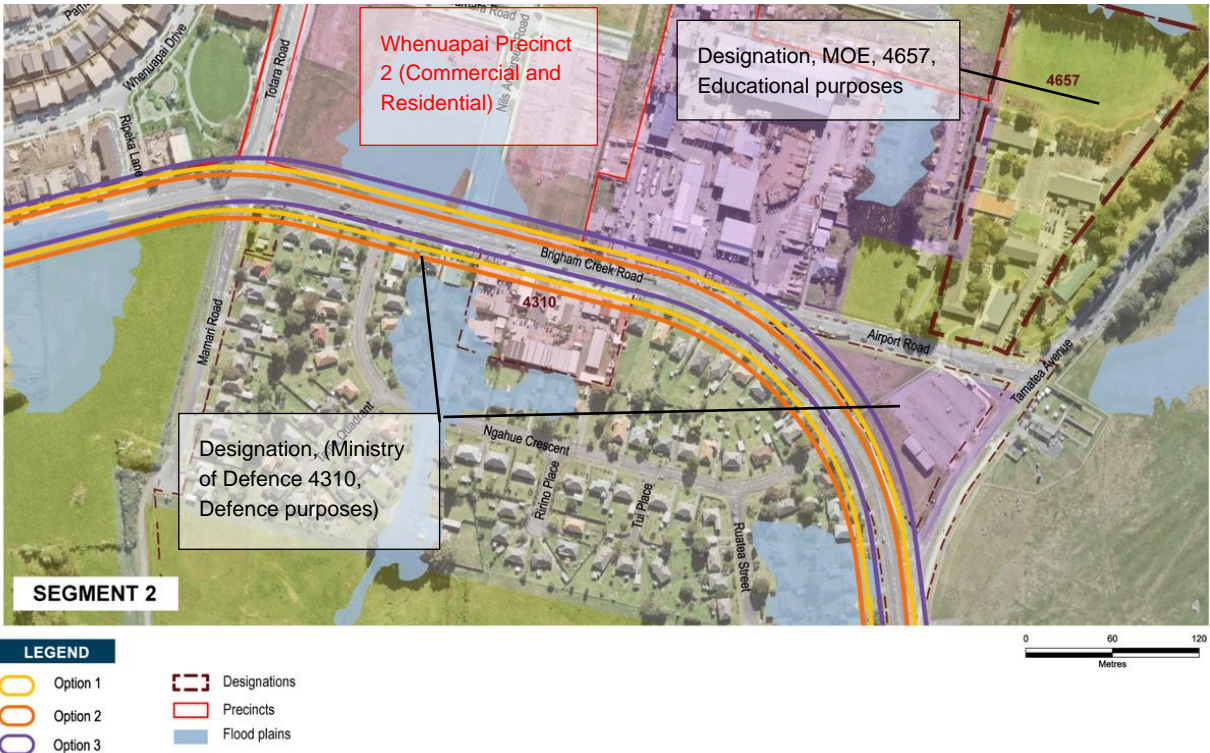


Figure 8-8: Brigham Creek Road Segment 2 Options and identified constraints

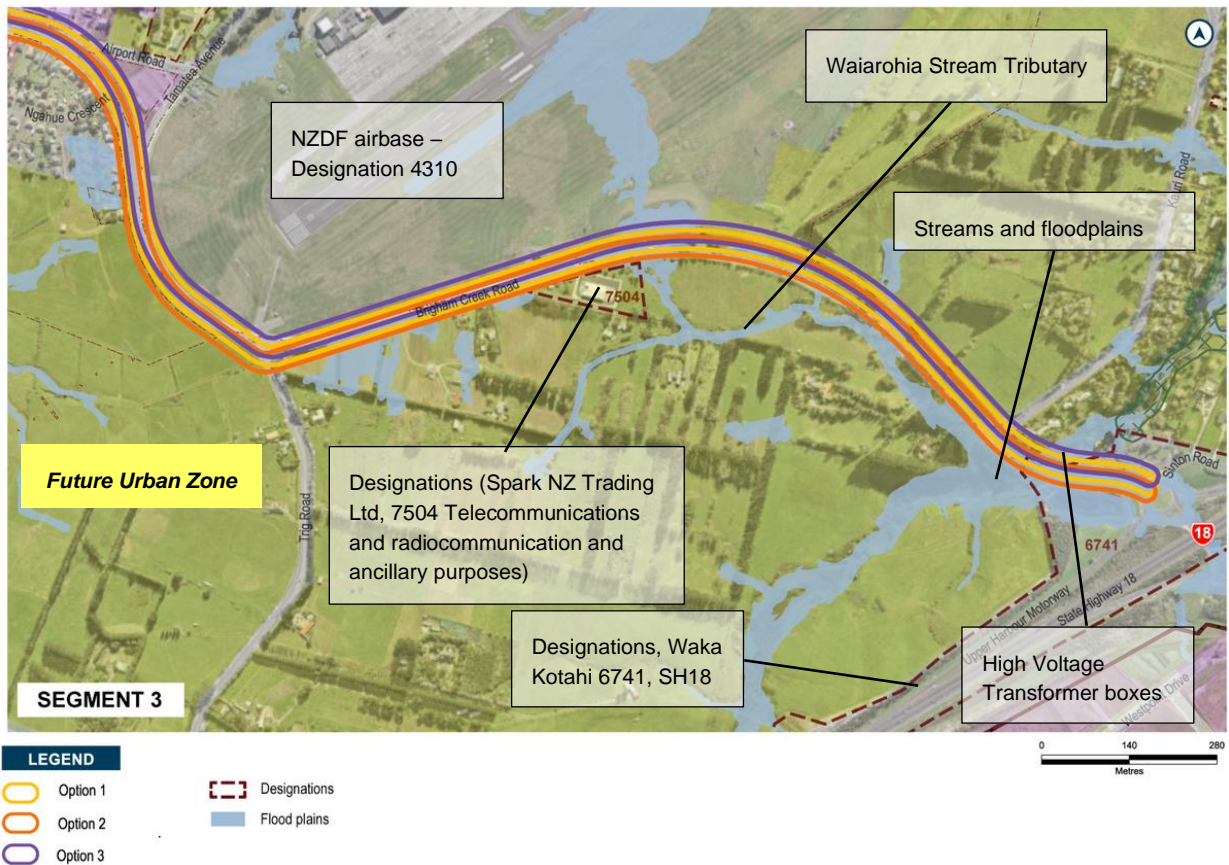


Figure 8-9: Brigham Creek Road Segment 3 Options and identified constraints

Table 8-2: Brigham Creek Road Segment 1 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No heritage constraints were identified along the corridor, therefore it was not a differentiator.</p>
Social	<p><u>Future land use integration:</u> Option 2 (South widening) performed better than Option 1 or 3 and is preferred. This is because Option 2 widens into the FUZ, which will allow for integration with future development and avoid existing high-density housing in Whenuapai Precinct 1 (Residential – Mixed Housing Urban Zone).</p> <p>Option 1 and 3 performed worse, with Option 1 slightly better than 3, requiring less land on the northern side. Both options created residual land that would be harder to integrate the corridor into.</p> <p><u>Social:</u> Option 2 performed best as it has the least impact on the resident community within Precinct 1 by avoiding existing high-density zone, the Hobsonville Road frontage of Whenuapai Settlement playground / Park (Open Space – Informal Recreation Zone) and a neighbouring café. Option 1 and 3 did impact the residential area, playground and café and so performed worse.</p> <p><u>Urban Design:</u> Option 2 is preferred as it will retain the character of the existing small lot medium density housing within Whenuapai Precinct 1. The road widening will occur within the FUZ where it can be more readily integrated with the future design outcomes for the area.</p> <p><u>Land Requirement:</u> Option 2 was preferred as it had less impact on the existing smaller residential lots.</p> <p><u>Human Health and wellbeing:</u> Human health and wellbeing impacts from additional traffic performed similarly across the three options, therefore this criterion was not a differentiator.</p>
Environment	<p><u>Landscape and Visual:</u> All options will create adverse visual effects for existing residents and visitors. Option 2 performs best and is preferred as the extent of visual effects on residents within Whenuapai Precinct 1 is limited. Options 1 and 3 will extend into the Precinct and will have greater visual effects on remaining residents.</p> <p><u>Stormwater:</u> Options 1 and 2 will have a low to moderate effect on the existing stormwater system and environment. Option 3 will have a greater impact on the existing stormwater system and may require increased flood attenuation or upsized culvert(s) due to the increased stormwater catchment needing to be conveyed to Slaughterhouse Stream.</p> <p><u>Ecology:</u> All options have the potential to create adverse ecological effects. Option 2 is however preferred as the widening occurs to the south and effects will largely be on the Sinton Stream which has a greater ability to buffer the receiving Totara Creek (and its SEA's) from catchment modification.</p> <p>The Slaughterhouse Stream which would be impacted by Options 1 and 3 has less ability to buffer Totara Creek and therefore these options are less preferred.</p> <p><u>Natural Hazards:</u> Option 2 is the preferred option. Widening to the south involves less cutting into the slope and this has a reduced instability risk. Options 1 and 3 involve the filling of embankments which have increased risk of instability and settlement on the soft alluvial material.</p>
Economics	<p><u>Utilities:</u> Option 2 is the preferred option as there are fewer services which would be impacted by widening to the south of the existing road corridor.</p> <p><u>Construction:</u> All options will result in construction disruption. Option 2 is however preferred as it will limit the extent of disruption within the Whenuapai 1 Precinct as construction will occur within and to the south of the road corridor.</p>

Table 8-3: Brigham Creek Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No significant constraints were identified along the route for heritage; therefore it wasn't a differentiator.</p>
Social	<p><u>Future land use integration:</u> All options impact on developable land adjacent to the road corridor. However, Option 1 is preferred as the extent of impacts on the mix of residential and business zoned land is more equitably split and as a result reduces the quantum of land lost for urbanisation within the respective zones.</p> <p>Option 2 is the second preference. It will have a greater impact on the Neighbourhood / Local Centre and industrial land but the area of land still available will not limit future development. Option 3 is least preferred as it will have the greatest impact on the Local Centre land, which is a comparatively small zone, and so this option will have a more notable reduction in the land available for Neighbourhood / Local Centre development. Impacts on the residential land are also greatest under Option 3.</p> <p><u>Social:</u> All options will impact on the existing shops, services and employment opportunities for the community located in the Neighbourhood / Local Centre (located in Segment 2). There is a preference for Option 2 as the centreline approach has greater potential for refinement to minimise impacts.</p> <p><u>Urban Design:</u> Option 1 is the preferred option. Option 2 balances the loss of frontages on both sides of the road corridor and will enable the road corridor to have a good interface between the road and the shops and services within surrounding land uses. Option 2 will also largely retain the character of the Residential – Single House Zone.</p> <p>Options 2 and 3 have a less positive interface between the road and surrounding land uses and perform worse.</p> <p><u>Land Requirement:</u> All options will result in significant property impacts. Options 2 and 3 will have greater impacts on the respective side of the road corridor that is being widened and have reduced opportunities for refinement. The property impacts from Option 1 are more evenly split along the corridor and have greater opportunities for refinement to minimise the land requirement.</p> <p><u>Human Health and wellbeing:</u> Human health and wellbeing impacts from additional traffic performed similarly across the three options, therefore the criterion was not a differentiator.</p>
Environment	<p><u>Landscape and Visual:</u> All options will create adverse visual effects for existing residents and visitors to the Neighbourhood / Local Centre. Option 3 is preferred as it avoids / reduces the proximity of the road to the residential properties within the Residential – Single House Zone.</p> <p><u>Stormwater:</u> All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. There is no differentiation between the options in terms of stormwater or flooding constraints.</p> <p><u>Ecology:</u> Segment 2 is an urban corridor with no notable ecological features. There is no differentiation between the options in terms of stormwater or flooding constraints.</p> <p><u>Natural Hazards:</u> All options have a similarly low level of geo-technical risk associated with settlement, liquefaction and slope instability issues. Therefore there is no differentiation between the options.</p>
Economics	<p><u>Utilities:</u> All options will impact on the existing utilities and infrastructure located within the road corridor. Therefore there is no differentiation between the options.</p> <p><u>Construction:</u> All options will result in construction disruption to residents, businesses and visitors. However Option 1 is preferred as the option will limit the extent of disruption to the residents within the Residential – Single House Zone.</p>

Table 8-4: Brigham Creek Road Segment 3 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No significant constraints were identified along the route for heritage, it was not a differentiator.</p>
Social	<p><u>Future land use integration:</u> Option 2 involves widening to the south. This is the preferred option adjacent to the NZDF runway as it would widen the road further away from the runway, although the widening would still extend into MoD designated land. Option 3 involves widening to the north impacting on land within the Special Purpose – Airports Zone. This is the preferred option adjacent to the Spark Designation as it will avoid impacts on telecommunication infrastructure associated with the Southern Cross Cable. Option 1 is not a preferred option as it still involves some widening towards the runway and within the Spark designation. All Options have drawbacks; however, a preference was identified for a hybrid of Options 2 and 3 that would minimise impacts on the designations along the corridor.</p> <p><u>Social:</u> There is a golf course located within the MoD designation. Option 3 will widen the road corridor to the north but will not have any significant impact on the golf course (nor the benefits this provides to the community). There is no other social infrastructure located along the route and the options will not give rise to any severance issues. All options perform well as they will increase accessibility and connectivity for the existing and future communities within Whenuapai.</p> <p><u>Urban Design:</u> Option 1 is the preferred option. This option will allow for greater integration with the urban character anticipated in the FUZ located on both sides of the road corridor. Options 2 and 3 have less integration with the character of future development by only widening on one side of the corridor.</p> <p><u>Land Requirement:</u> The property impacts from all three options are mostly minor, as existing buildings and activities are generally set back from the road corridor. The key differentiators are that Option 1 and 2 would significantly impact the Spark designated site, and for Option 3 the additional complexity of requiring MOD land close to the NZDF runway. A hybrid approach between Options 1 and 3 is therefore preferred.</p> <p><u>Human Health and wellbeing:</u> Health and wellbeing were not a differentiator with all options resulting in similar levels of traffic.</p>
Environment	<p><u>Landscape and Visual:</u> All options will result in very low adverse impacts on the existing vegetation found along the road corridor. There is a slight preference for Option 3 as this will have the least cumulative effects on the landscape due to the alignment being further from the wetland, stream and vegetative features (located to the south of the road). However, these features are located within the FUZ and visibility from the road is likely to change as development occurs.</p> <p><u>Stormwater:</u> Option 3 is the preferred option. Option 3 will widen the road corridor to the north reducing the flood risk on the Spark designated land (which is close to an overland flow path). Option 3 will impact upon the Waiarohia Stream; however, will likely require the least amount of potential stream compensation and re-alignment. Option 2 widens the road corridor to the south closer to the overland flow path and stream giving rise to greater flood risk. Option 1 sits between Options 1 and 3 in terms of flood risk and effects on the stream.</p> <p><u>Ecology:</u> In Segment 3 a tributary of the Waiarohia Stream can be found on the south side of the corridor and to the east of the Spark designation. There are also wetlands and riparian and floodplain features associated with the Stream. Options 1 and 3 involve widening to the road closer to these features and have the potential to give rise to greater ecological effects. Option 2 widens to the north and will have lower effects on the ecological features found in the area and is therefore the preferred option. However Option 2 performs similarly due to the potential</p>

Wellbeing Assessment	
	<p>for effects elsewhere along the segment. Note there is no differentiation between the options in the western section of Segment 3 (west of Spark designation).</p> <p><u>Natural Hazards:</u> Option 2 is the preferred option. Option 2 will involve cutting into the existing slope on the north; however, this has a lower level of instability risk compared filling embankments (as required by Option 3). Due to the complexity associated with filling embankments Option 3 performs worse. Option 1 also performs worse and is the least preferred option with a higher geo-technical risk due to needing both cut and fill widening on both sides of the road corridor.</p>
Economics	<p><u>Utilities:</u> Option 3 is the preferred option. By widening north, Option 3 will avoid existing telecommunication infrastructure, including the Southern Cross Cable Station, located within the Spark Designation site. There are also fewer utilities located on the northern side of the corridor. Options 1 and 2 perform worse as they both involve widening to the south and would impact the Spark designation. Additionally, there are more utilities located on the southern side of the corridor which will likely require relocation. Opportunities exist for all options to relocate the existing services into a common utility trench. The differentiation between the options is therefore limited to the area adjacent to the Spark designation.</p> <p><u>Construction:</u> Construction associated with Options 1 and 2 have the potential to have a greater impact on the Spark designation, which contains the service station for a nationally important piece of infrastructure. Option 3 has the potential to have greater impacts on the NZDF runway. All options therefore have drawbacks. A Hybrid Option of Options 2 and 3 which would minimise the construction disruption on the Spark designation and the NZDF runway is preferred.</p>

8.6.2 Refinement through Engagement

Throughout the option assessment the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were agreement on an Option 2 hybrid in Segment 1 and 2, and an Option 2 and 3 hybrid in Segment 3 being the early emerging preferred option.

Project Partners also challenged whether a reduced cross section of two lanes would be more suitable through the Whenuapai town centre and wider corridor. Two lanes were discounted because the predicted traffic volumes support four lanes within the existing Whenuapai town centre and on the extended section of Brigham Creek Road. Furthermore, the 2048 traffic volumes predicted are conservative based on other projects being implemented including:

- A parallel Spedding Road connection
- SH16 / 18 Connections, providing motorway alternatives
- RTC stations being operative at Westgate / Brigham Creek Road to enhance the public transport network.

The traffic volumes could also increase if land use changes are made to the Whenuapai Airbase, which although designated for defence is partly FUZ. The existing Whenuapai Local Centre is live zoned; however, there is potential for redevelopment as the population around the Local Centre grows. The Whenuapai Structure Plan also shows the centre as being the location of a 'Potential Multi-purpose Community Facility'. Redevelopment will create land use integration and urban design opportunities within Whenuapai Local Centre which can respond to a 30m cross section. Four lanes along the corridor length also provides consistency and resilience.

In 2020 and 2021 Te Tupu Ngātahi sought feedback from community and landowners. Oyster Capital Ltd which has land interests south of Segment 1 provided feedback on the early preferred option

(*Option 2 / Widen south*) and extent of property impact. This resulted in the Project Team refining the alignment to adopt more equitable land requirement by widening on both sides of the road, this resulted in new Segment 1A (see Figure 8-6).

The Project Team met with affected requiring authorities along the corridor, including NZDF. NZDFs key feedback was that it did not support widening north closer to the runway due to potential adverse operational effects on the runway. The Project Team also met with Spark. Key feedback was that the Southern Cross Cable is a significant piece of infrastructure which forms part of a trans-Pacific network of telecommunications cables connecting New Zealand with Australia and the west coast of America. Impacts on the cable should be avoided to protect it, and any relocation of the cable would be significantly complex.

8.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and community, a preferred option for Brigham Creek Road was identified. The preferred option is a combination of the options assessed, widening portions to either the north and south or both sides. This hybrid approach ensures impacts on sensitive features are reduced where possible.

Segment 1 and 1A: ‘Option 1 hold the centreline and widen on both sides’ was preferred because:

- Option 1 avoids the small lot residential properties within the Whenuapai Precinct 1 development, which is being developed to scale and density that supports growth within Whenuapai. The road widening can be better integrated into the FUZ located on the southern side of the road corridor
- The property impacts and land requirement for Option 1 will largely be limited to the south side of the road corridor
- Option 1 construction costs and risks will be low as there are less properties that will require to be demolished. There are also less utilities located on the southern side of the road corridor
- Option 1 allows for a greater buffer between the widened road and the Totara Creek reducing the potential for adverse ecological effects
- The option resulted in more equitable land requirement and responds to feedback received from Oyster Capital Ltd.

Segment 2: ‘Option 1 to widen both sides and retain the centreline’ was preferred because:

- Option 1 will allow the widened road corridor to have an enhanced interface between the road and surrounding land uses on both sides of the corridor
- Option 1 has the greatest opportunity for refinement to minimise property impacts and the land requirement.

Segment 3: The preferred option is a hybrid of Options 2 (widen on south) and 3 (widen on north) which avoids the NZDF and Spark designations. A hybrid was chosen because:

- It responds to key constraints along the corridor by widening to the south to avoid the NZDF runway and widening to the north to avoid the Spark Designation. This approach is supported by the respective Requiring Authorities
- Widening north in the eastern section of the segment minimises the potential for ecological and stormwater effects due to be further from the Waiarohia Stream and associated features.

There will be further opportunities to minimise impacts during detailed design, as a result, no further design refinement is required at this stage.

8.6.4 Discounted Options

Table 8-5 summarises reasons for discounting the three options along each segment.

Table 8-5: Brigham Creek Road Discounted Options

Option	Reasoning
Segment 1 and 1A	
Option 2	<ul style="list-style-type: none"> • Significant impacts on the properties located within the Whenuapai Precinct 1 and impacts on the southern side of the road corridor and an encroachment into the Open Space • Less ability to integrate the road corridor into the FUZ • Adverse effects on the existing urban design character of Whenuapai Precinct 1 • Potential for more significant ecological effects due to less buffer between the widened road corridor and Totara Creek.
Option 3	<ul style="list-style-type: none"> • Significant impacts on the properties located within the Whenuapai Precinct 1 and an encroachment into the Open Space • Less ability to integrate the road corridor into the FUZ and adverse effects on the existing urban design character of Whenuapai Precinct 1 • Potential for more significant ecological effects due to less buffer between the widened road corridor and Totara Creek • Greater impact upon the existing stormwater system and potential requirement for increased flood attenuation.
Segment 2	
Option 2	<ul style="list-style-type: none"> • Significant property impacts on the NZDF residential properties and the Neighbourhood / Local Centre properties • Reduced urban design outcomes in terms of the interface with the street and impacts on the character of the Residential – Single House Zone / NZDF residential properties • Less preferred in terms of Construction Cost / Risk criteria due to works be located close and requiring demolition of NZDF properties.
Option 3	<ul style="list-style-type: none"> • Significant impacts on the NZDF properties / land located within the Neighbourhood / Local Centre and industrial land • Reduced urban design outcomes in terms of the interface with the street and impacts on the character of future development within Business – Local Centre Zone.
Segment 3	
Option 1	<p>This option was discounted for the full length of Segment 3 for the following reasons:</p> <ul style="list-style-type: none"> • Significant impacts upon the Spark Designation and the potential for impacts on the NZDF airbase by widening towards the runway • Potential for greater ecological and stormwater effects due to proximity to the Waiarohia Stream and associated features.
Option 2	<p>This option was discounted in the eastern section of Segment 3 for the following reasons:</p> <ul style="list-style-type: none"> • Significant impacts upon the Spark Designation • Potential for greater ecological and stormwater effects due to proximity to the Waiarohia Stream and associated features.

Option	Reasoning
Option 3	<p>This option was discounted in the western section of Segment 3 for the following reasons:</p> <ul style="list-style-type: none"> • Potential for impacts on the NZDF airbase by widening towards the runway • Less opportunity to integrate the road widening with the FUZ located on the southern side of the road corridor.

8.7 Brigham Creek Road Upgrade Summary

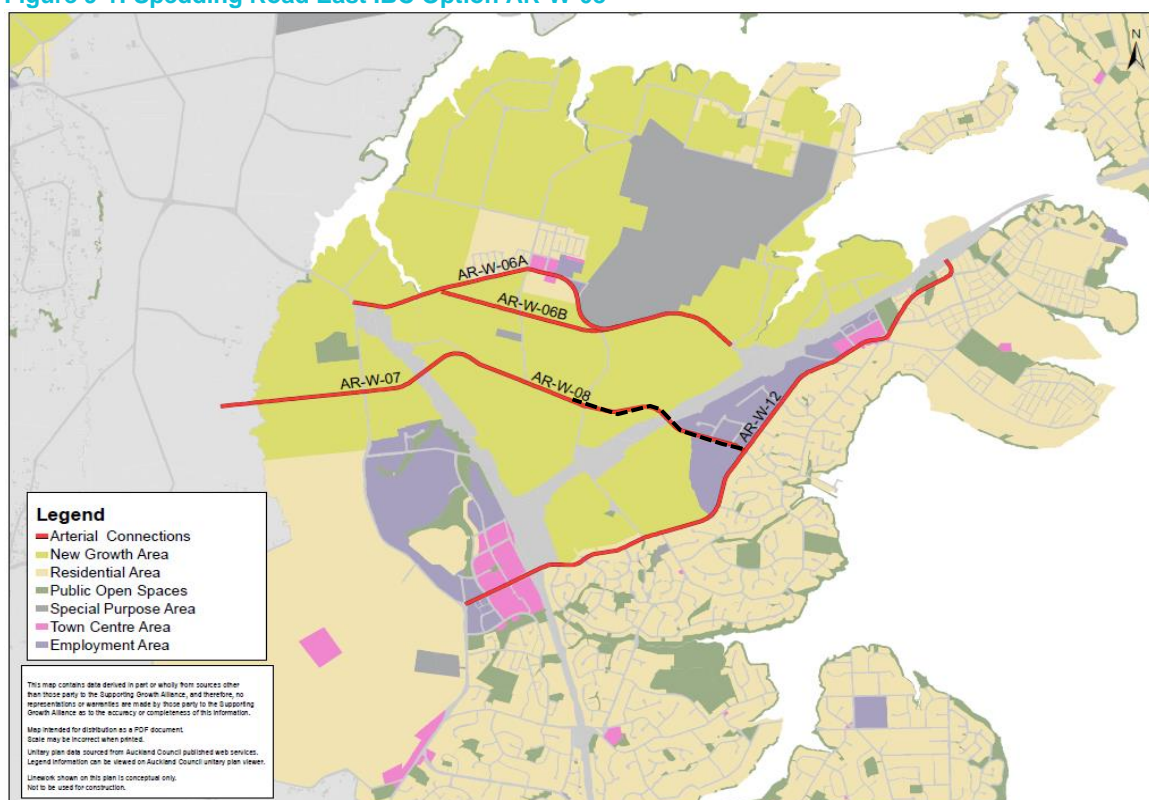
As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Brigham Creek Road upgrade is a centreline option in Segment 1A, widening both sides in Segment 1 and 2, and a hybrid of Option 2 and 3 (north and south) in Segment 3. This combination of widening on both sides, to the north or south ensures impacts on environmental constraints are minimised where possible.

9 W4: Spedding Road – East

9.1 Corridor Overview

The Spedding Road East corridor was included in the TFUG PBC preferred transport network plan prepared in 2016. Spedding Road West was added to the TFUG recommended transport network at the IBC stage and included an overbridge crossing of SH16 from Trig Road to Fred Taylor Drive. The two options form one route, but were divided into two sections for assessment, refer to Section 10 for the Spedding Road West assessment. Spedding Road East spans across eastern Whenuapai from Trig Road to Hobsonville Road and was referenced as *AR-W-08* at the IBC stage, see Figure 9-1.

Figure 9-1: Spedding Road East IBC Option AR-W-08



This new connection was assessed as one of the Whenuapai east-west arterials and will support access to the light industrial and business zoning adjacent to SH18. It will enable fast, reliable freight access to the motorway network. The eastern (and western) extensions of Spedding Road provide resilience for Whenuapai through additional state highway crossings that avoid interchanges and improve access for connector bus services to the future rapid transit network. The project will improve local walking and cycling journeys safety and connectivity and contribute to travel choice.

Project Partners and public consultation indicated strong support for both Spedding Road connections (east and west) and that upgrade of the existing section of Spedding Road would make the best use of existing infrastructure. Manawhenua raised concerns as the SH18 crossing could affect the Rāwiri Stream Ecological Restoration Project. However, manawhenua also indicated an option minimising adverse effect on this site would be acceptable.

9.2 Gap Analysis

The gap analysis for Spedding Road East confirmed that the key consideration was the uncertainty of future land use. Uncertainty was derived from proposed Plan Change 5 to the AUP:OP, which proposed to re-zone the southern part of the Whenuapai FUZ to a mix of business and residential zones². There is also potential for private plan changes within Whenuapai which propose different zoning from the Whenuapai Structure Plan (Auckland Council, 2016). Manawhenua raised concerns for the Rāwiri Stream restoration project at the IBC stage and indicated a need to reduce impacts on this site.

Gap analysis confirmed that:

- Adequate Corridor Assessment for existing alignment was undertaken at IBC and analysis did not trigger further corridor assessment; however
- Further assessment of corridor options within a focused study area was warranted as:
 - Spedding Road East is extending across greenfield land
 - There are potential impacts on Rāwiri Stream and associated ecology values
 - There is innate complexity of a new crossing over SH18.

9.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Spedding Road East corridor environment. The exercise identified that:

- **Extent and zoning:** The land to the south of SH18 is currently zoned FUZ in the AUP:OP
- **Future Land use:** The Whenuapai Structure Plan shows the land as being intended for Business zoning
- **Special uses and constraints:** The corridor crosses Waka Kotahi SH16 / 18 in Designation 6741 in the AUP:OP, and Watercare Service Ltd Designation 9377 for the Northern Interceptor. Existing infrastructure such as roading and stormwater ponds informed the options developed
- **Environmental Constraints:** There is a CHI World War II gun emplacement located near 4 Spedding Road. Spedding Road east of Trig Road has no significant constraints identified, and adjacent land is FUZ.

Key outcomes of the review were:

- The decision to upgrade the existing Spedding Road corridor (between Māmari Road and Trig Road) and not to consider new alignment options
- To widen this section of Spedding Road on both sides as there were no significant environmental constraints and this was the most equitable land requirement approach
- For the section through greenfield (east of Trig Road) proceeded to a localised corridor assessment.

² As noted Plan Change 5 has now been withdrawn.

9.4 Corridor Form and Function Assessment

An assessment was undertaken for the Spedding Road East upgrade following the CFAF methodology in Section 4.3. This recommendation informed the corridor options developed and assessed in Section 9.5. Figure 9-2 shows the CFAF cross section outcome.

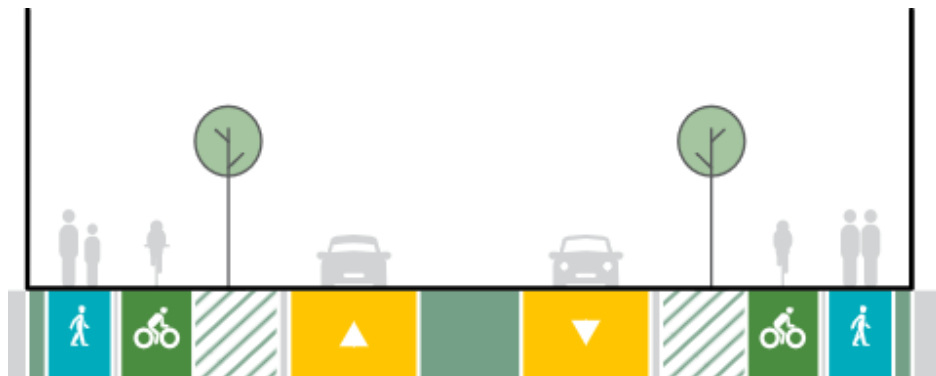


Figure 9-2: CFAF Outcome – Spedding Road East Indicative 24m cross section

9.5 Route Refinement Option Development

Spedding Road East forms an important strategic connection across SH16 / 18 for resilience, improves walking and cycling connections and connects Whenuapai and Hobsonville. Three options based on the indicative 24m wide cross section in Figure 9-2 were workshopped for the greenfield section of the corridor. All three options tie into existing Spedding Road, west of Trig Road and connect into Hobsonville Road opposite Marina View Drive.

- **Option 1 / Northern:** A northern alignment crossing over SH18
- **Option 2 / Central:** A 'central' alignment crossing over SH18
- **Option 3 / Southern:** A southern alignment crossing over SH18.

9.6 Route Refinement Assessment

9.6.1 Assessment

A Corridor Assessment was undertaken for Spedding Road East, the assessment follows the process outlined in Section 4. The three options above were assessed against the MCA framework including the ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people between Whenuapai and Hobsonville*
- *Safety: Contribute to a transport network between Whenuapai and Hobsonville that is free from deaths and serious injuries.*

Option 3 / Southern performed slightly less well on 'Access', however there was no significant differentiation, and therefore all options were considered to perform well against the Transport Outcomes. Option considerations and constraints are identified in Figure 9-3. Table 9-1 and Table 9-2 provides a summary of the assessment undertaken by SMEs using the MCA framework.

Table 9-1: Spedding Road East MCA Assessment

Options	Option 1	Option 2	Option 3
IO1. Access	4	4	4
IO2. Reliability	3	3	3
IO3. Mode Choice	3	3	3
IO4. Safety	3	3	3
Criteria			
Heritage	-2	-2	-2
Land use futures	1	2	1
Urban Design	2	2	1
Land Requirement	-2	-2	-2
Social Cohesion	3	3	3
Human Health and Wellbeing	1	1	1
Landscape / Visual	-1	-1	-1
Stormwater	-2	-2	-1
Ecology	-3	-3	-3
Natural Hazard	-2	-1	-1
Construction impacts on utilities / infrastructure	-1	-1	-1
Construction Disruption	-2	-2	-2
Construction costs / risk / value capture	-2	-2	-2

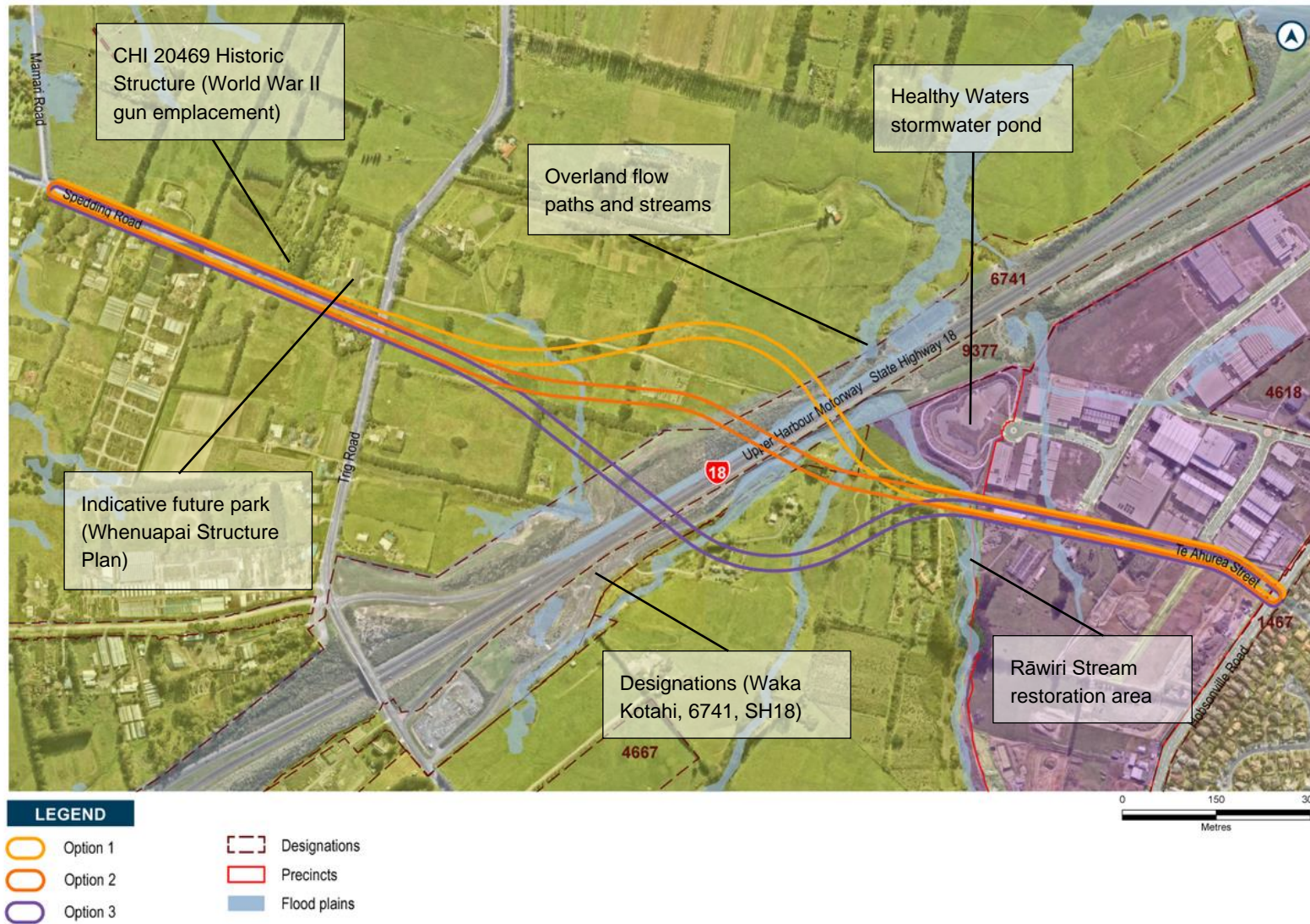


Figure 9-3: Spedding Road East Options and identified constraints

Table 9-2: Spedding Road East – Option Assessment Summary

Wellbeing assessment	
Cultural	<p><u>Heritage:</u> All three options cross three streams (Waiarohia, Trig and Rāwiri Streams), where there is potential for unexpected archaeological discoveries. The options have similar effects on CHI site 20469. There is therefore no differentiation between the options in terms of the heritage criteria.</p>
Social	<p><u>Future land use integration:</u> Option 2 is the most direct alignment across SH18 resulting in the creation of less residual land along the proposed corridor.</p> <p>Option 1 curves to the north and will result in the creation of small lots of residual land adjacent to the corridor. These lots have potential to be integrated / amalgamated with future land use / lots surrounding the corridor.</p> <p>Option 3 curves to the south and will create residual land. Some of the residual land will be severed from the FUZ land. This would make the residual land more difficult to integrate into future land use scenarios. Both Options 1 and 3 will better support the wider growth of Whenuapai. There is a preference for Option 1 given the greater ability to integrate the residual land.</p> <p><u>Social:</u> There is no existing social infrastructure located along New Spedding Road East. All options will increase accessibility between Whenuapai and Hobsonville Road. There is no differentiation on this criterion.</p> <p><u>Urban Design:</u> Options 1 and 2 act as a defining edge between different land uses on the southern side of SH18. Option 2 provides a more direct route for active mode users compared to Option 1 and is preferred. The difference between the options performance is not substantial.</p> <p>Option 3 does not provide as defining an edge on the south side of SH18 and also does less positively as it would result in a parcel of FUZ being located on the east side of the road corridor. This land would not integrate as well with the character of surrounding Business land uses.</p> <p><u>Land Requirement:</u> All options will impact a similar number of properties to a similar extent. There is no differentiation on this criterion.</p> <p><u>Human Health and Wellbeing:</u> All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.</p>
Environment	<p><u>Landscape and Visual:</u> The landscape features include the Rāwiri Stream, Waiarohia Stream, Trig Stream and surrounding wetlands. All options will impact on these features with some adverse effect.</p> <p>Option 3 is the preferred option due to its avoidance of the Rāwiri Stream wetland. However, the differences between the proposed options are not substantial enough to result in a preferred or discounted option.</p> <p><u>Stormwater:</u> Option 1 is preferred due to having the least impact on the Rāwiri Stream, the associated flood plain, and impacts on wetlands. Options 2 and 3 will have greater effects on these features.</p> <p>Option 3 is least preferred as it will also require deeper cuttings which will in turn require more pits and a greater pipe network to convey any flow through the cutting. Option 3 will also have a slightly greater impervious area.</p> <p><u>Ecology:</u> All options have impacts on streams, wetlands and riparian features. There is a preference for Option 2 due to the alignment with the Waiarohia Stream and the least impact</p>

Wellbeing assessment	
	<p>on the ecological features. However, the differences between the proposed options are not substantial enough to result in a differentiation or preference.</p> <p>Mitigation and refinement to the design can be adopted mitigates the effects of all options on the streams.</p> <p><u>Natural Hazards:</u> Option 1 has higher geo-technical issues. This is due to the large embankment on the sloping ground / existing cut to the north of SH18, and the impact on the stormwater pond to the south of SH18.</p> <p>The geo-technical risks for Options 2 and 3 are not as great as Option 1. However it is noted that appropriate engineering solutions can be put in place to address the geo-technical issues associated with all options.</p>
Economics	<p><u>Utilities:</u> There is potential for localised impacts upon utilities and infrastructure from all options. Therefore there is no differentiation between the options.</p> <p><u>Construction:</u> There is no differentiation between the options as they will give rise to a similar level of construction disruption.</p>

9.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners to discuss the options. The key engagement outcome was agreement on Option 1 / Northern being the emerging preferred.

Watercare has been engaged with on a regular basis in relation to their existing assets and plans for future urban growth in the North West growth area. Areas of interest to Watercare that relate to the Local Arterials Package include upgrades around Spedding Road and Watercare's Northern Interceptor and North Harbour Main 2. Engagement confirmed a workable solution could be achieved.

Manawhenua reiterated the importance of Rāwiri Stream and the associated restoration project at this site. Manawhenua sought that the impacts of any corridor in this area seek to avoid or minimise impacts on Rāwiri Stream. In response to this the Option 1 design was refined to include a bridge over the Rāwiri Stream.

AT and Waka Kotahi raised the need to integrate the option with the future SH18 RTC station (a non-Te Tupu Ngātahi project). The Option 1 design does not preclude a station being located at SH18 as part of any future RTC.

9.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and the community, a preferred option for Spedding Road East was identified. The preferred option is Option 1 / Northern, which extends the current road via a northern alignment across SH18. This alignment ensured impacts on sensitive features were reduced where possible.

Option 1 / Northern was preferred because:

- Although resulting in residual land, there is potential for resulting lots to be integrated with surrounding land use
- Although Option 1 did not perform best against some MCA criteria (Landscape and Visual, Stormwater, Natural Hazards), following engagement and refinement to include a hydrologically

sensitive design and bridging over Rāwiri Stream, effects of the option can be suitably avoided or mitigated at detailed design.

All options provided the same general level of achievement against the transport outcomes. Throughout design refinement specific consideration was made to reducing effects on stormwater and natural hazards, and consideration of how the new alignment would impact private properties and how to integrate residual land into the future corridor environment.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the project, and as a result, no further design refinement is required at this stage.

9.6.4 Discounted Options

Table 9-3 summarises the reasons for discounting the other two options.

Table 9-3: Spedding Road East Discounted Options

Option	Reasoning
Option 2	<ul style="list-style-type: none"> Resulted in increased construction costs and engineering complexity associated with the central alignment of the SH18 crossing Has greater impacts on stormwater and Rāwiri stream with associate cultural significance.
Option 3	<ul style="list-style-type: none"> There was less potential to integrate residual land with future land use scenarios and urban design outcomes as it splits an area of FUZ from the remainder of the zone Has greater impacts on stormwater and Rāwiri stream with associate cultural significance.

9.7 Spedding Road East Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for Spedding Road existing section is widening to either side of the corridor and for Spedding Road East is Option 1 which is a northern alignment.

10 W4: Spedding Road - West

10.1 Corridor Overview

Spedding Road West was added to the TFUG recommended transport network plan at the IBC stage and included an overbridge crossing of SH16 from Trig Road to Fred Taylor Drive. Assessed as AR-W-07 during the IBC (see Figure 10-1).

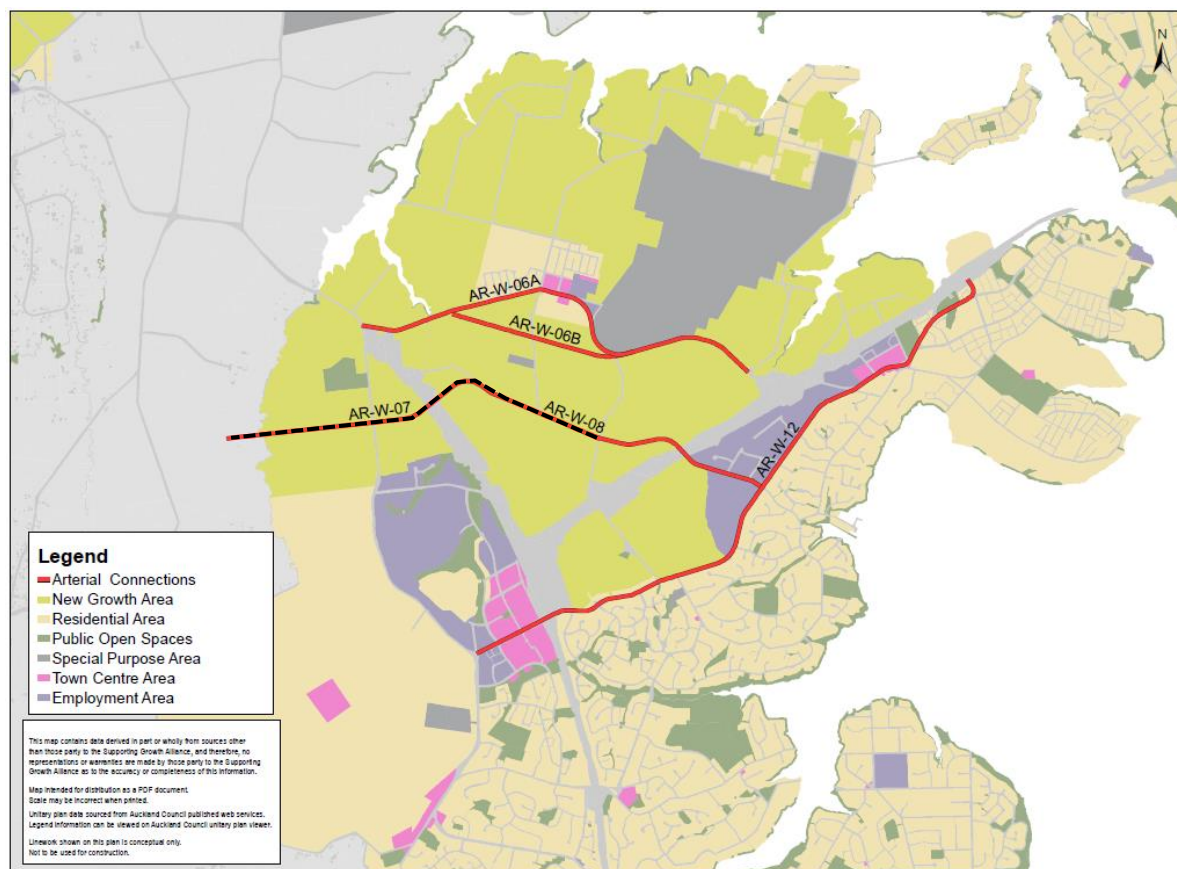


Figure 10-1: New Spedding Road West IBC Option AR-W-07

Spedding Road West is an urban arterial that provides resilience for Whenuapai through an additional state highway crossing that avoids interchanges and improves access for connector bus services to access the future RTC. The alternative crossings improve local walking and cycling safety and connectivity and contribute to travel choice.

Project Partners and public feedback indicated strong support for both Spedding Road connections (east and west). Spedding Road is partially existing, and feedback highlighted the upgrade and extension of this corridor was the best use of existing infrastructure. Although Spedding Road East and Spedding Road West form one transport corridor, they were assessed through the options development separately, refer to Section 9 for discussion on Spedding Road East.

10.2 Gap Analysis

The gap analysis for Spedding Road West identified that the key consideration was the uncertainty of future land use. Uncertainty of future land use was derived from Council not proposing to structure plan Redhills North prior to lodgement of this package. Local developer, Oyster Capital Ltd has and

subsequently lodged private plan change (PC 69 (now approved)) for land adjacent to SH16 within the Whenuapai Structure Plan³. There is potential for private Plan Changes within Whenuapai to propose alternative zoning to the Whenuapai Structure Plan. Ongoing discussion with Council and the developer were identified as necessary to inform the option assessment.

The National Policy Statement on Urban Development (draft at the time of the gap analysis) supports the intensification of development around rapid transit stops. Discussions with AT and Waka Kotahi indicated that an RTC station, associated with the city centre to Westgate RTC, will potentially be located near Spedding Road West. Ongoing discussions with AT and Waka Kotahi are recommended given the early stage of the project. Closer consideration of the Brigham Creek SEA_T_2034 was also recommended.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC phase, and analysis did not trigger further corridor assessment; however
- A localised corridor assessment should be undertaken, given the SEA location, crossing of SH16 and potential property impacts.

10.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Spedding Road West environment. The exercise identified that:

- **Extent and zoning:** New Spedding Road West will be a corridor which extends from Spedding Road over SH16 to Fred Taylor Drive. The land on either side of the corridor is zoned FUZ
- **Future land use:** Land on the west of SH16 is within the Redhills North Growth Area and has not been structure planned. Council's draft Spatial Land Use Strategy for the North West identifies a location to the west of the corridor as a potential neighbourhood centre. For the land to the east of SH16 the Whenuapai Structure Plan shows the land being developed for business use, which corresponds with Plan Change 69
- **Special uses and constraints:** Existing transport designations include Waka Kotahi Designation 6741 for SH16, and AT Designation 1468 for road widening of Fred Taylor Drive which is not yet operative, and Designation 1433 for Fred Taylor Drive which is given effect to
- **Environmental Constraints:** A SEA is present along Totara Creek, there are also existing wetlands and overland flow paths along the alignment.

Key outcomes of the review was:

- Decision to develop local corridor options due to the various environmental constraints in the area
- Identification that SH16 and stormwater pond requirement was a constraint to options developed.

³ Note that Oyster have now submitted a private plan change for the 'Spedding Block' Plan Change 69. This is still being processed, it aligns with the Whenuapai Structure Plan zones.

10.4 Corridor Form and Function Assessment

An assessment was undertaken for Spedding Road West following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 10.5. Figure 10-2 shows the CFAF cross section outcomes.

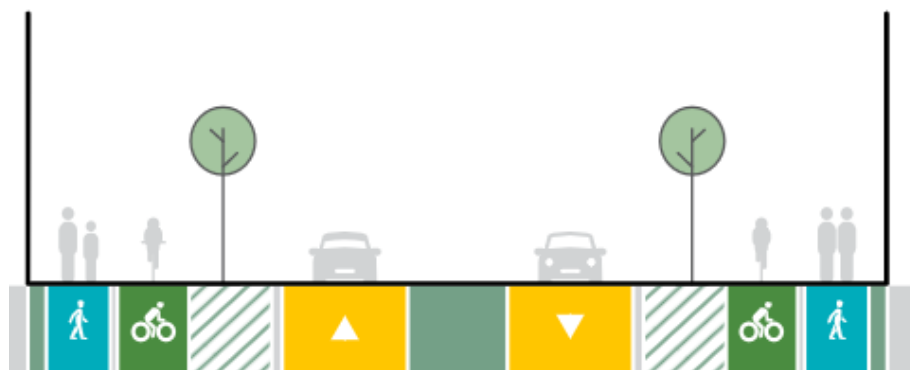


Figure 10-2: CFAF Outcome – Spedding Road West Indicative 24m cross section

10.5 Corridor Option Development

Spedding Road in its entirety forms a key link through Whenuapai connecting from Fred Taylor Drive through to SH18 and Hobsonville Road. Four route options were developed for Spedding Road West. These options were workshopped based on the indicative 24m wide cross section.

- **Option 1 / Central:** Central bridge alignment and connection to Fred Taylor Drive at Hailes Road
- **Option 2 / Northern T:** Northern bridge alignment and a T intersection connection to Fred Taylor Drive
- **Option 3 / Northern:** Northern bridge alignment and connect to Fred Taylor Drive at Hailes Road
- **Option 4 / Southern:** Southern bridge alignment and connect to Fred Taylor Drive at Hailes Road

10.6 Corridor Assessment

10.6.1 Assessment

A corridor assessment was undertaken for the Spedding Road West upgrade. The assessment follows the process outlined in Section 4.4. The four options were assessed with SME input against the MCA framework including their ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities by providing an integrated multi-modal corridor between Whenuapai and Hobsonville*
- *Reliability: Enable reliable people movement between Whenuapai and Hobsonville*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people between Whenuapai and Hobsonville*
- *Safety: Contribute to a transport network between Whenuapai and Hobsonville that is free from deaths and serious injuries.*

All options performed well against the Transport Outcomes identified, there was no differentiation in performance. Table 10-1 provides the MCA assessment against undertaken, considerations and constraints identified are shown in Figure 10-3 and Table 10-2 shows the options assessed by SMEs using the MCA framework.

Table 10-1: Spedding Road West MCA Assessment

Options	Option 1	Option 2	Option 3	Option 4
Access	4	4	4	4
Reliability	3	3	3	3
Mode Choice	3	3	3	3
Safety	2	2	2	2
Heritage	-1	-1	-1	-1
Land use futures	3	3	3	3
Urban Design	1	1	1	1
Land Requirement	-2	-2	-2	-2
Social Cohesion	3	3	3	3
Human Health and Wellbeing	-1	-1	-1	-1
Landscape / Visual	-1	-2	-2	-2
Stormwater	-1	-2	-1	-2
Ecology	-4	-4	-4	-4
Natural Hazard	-1	-1	-1	-1
Construction impacts on utilities / infrastructure	-1	-1	-1	-1
Construction Disruption	-2	-2	-2	-2
Construction costs / risk / value capture	-2	-2	-2	-2

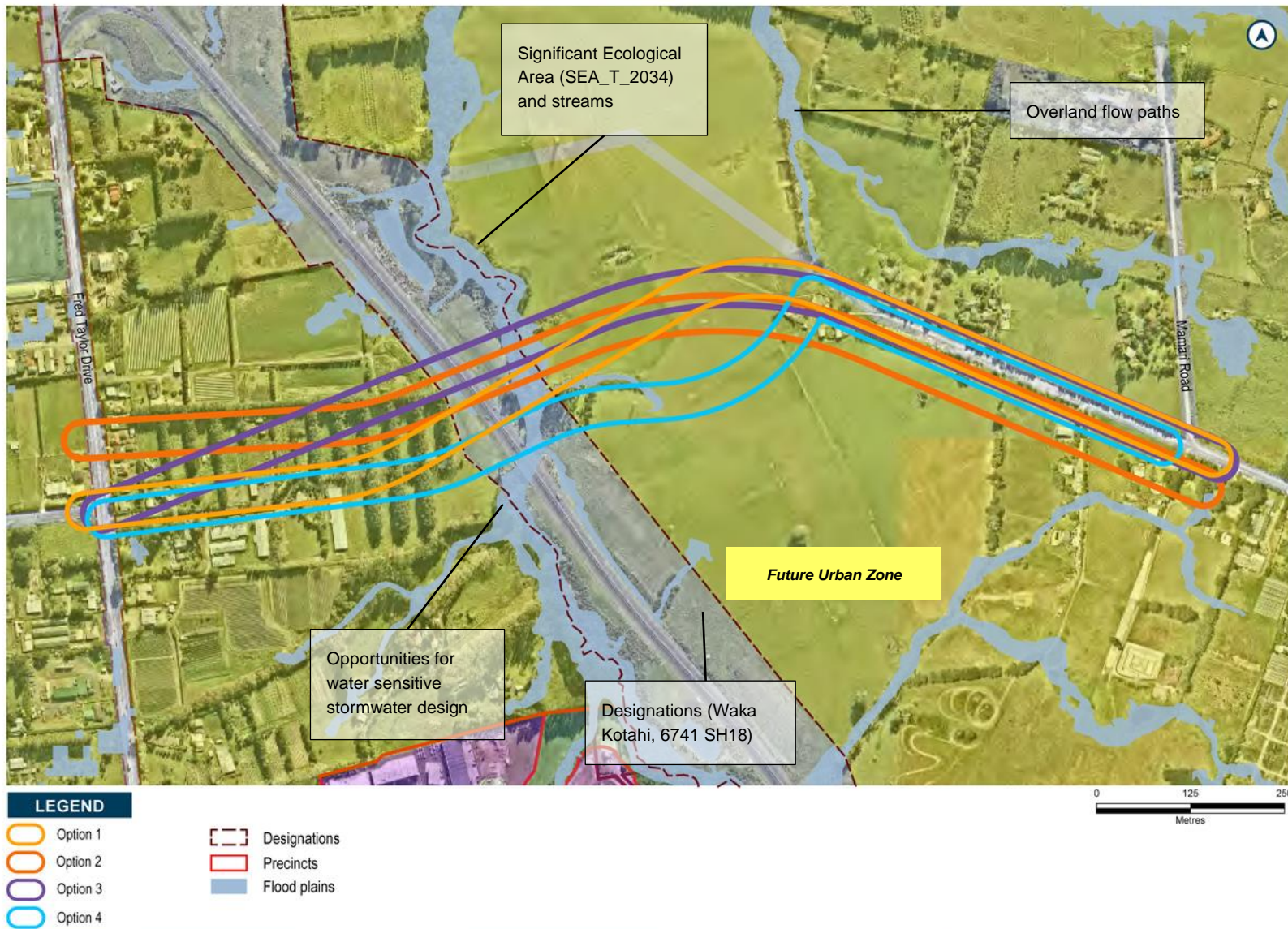


Figure 10-3: Spedding Road West Options and identified constraints

Table 10-2: Spedding Road West – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> All options have potential for adverse effects due to crossing the Totara Creek, where there is potential for unexpected archaeological discoveries. There is a slight preference for Option 4 as this will have the least impact / footprint within natural wetlands.</p>
Social	<p><u>Future land use integration:</u> All options perform the same due to the options all being located within the FUZ and supporting future development. However Option 3 is least preferred as it does not follow the existing property boundaries on the west side of SH16 and it will split one lot impacting on development potential.</p> <p><u>Social:</u> All options will increase accessibility and connectivity between existing and future communities located in Whenuapai and around Fred Taylor Drive. However Option 2 is least preferred as it does not connect directly to Hailes Road resulting in reduced connectivity for the future community.</p> <p><u>Urban Design:</u> All options perform the same and will provide a visible connection across SH16. This creates legibility and connects land on both sides of SH16 (currently severed by SH16). However there is a preference for Option 1 as this provides a greater opportunity to interface with the stream area.</p> <p><u>Land Requirement:</u> All options will impact a similar number of properties to a similar extent and have minor adverse impacts. However Option 3 is least preferred due to the amount of land requirement and the full requirement of land that is diagonally traversed on the west side of SH16.</p> <p><u>Human Health and Wellbeing:</u> All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. Therefore there is no differentiation between the options.</p>
Environment	<p><u>Landscape and Visual:</u> Option 1 is the preferred option. It has the least impact on the Totara Creek water body and the surrounding riparian habitat. Options 2, 3 and 4 perform worse due to the greater impact that the pier locations of each of these options would have on the Totara Creek and the associated riparian strip.</p> <p><u>Stormwater:</u> Options 1 and 3 have the least impact upon Totara Creek. Option 1 is preferred as it is located further away from the SEA and the soft soils will reduce the need for erosion control measures at the SH16 bridge. Option 2 and 4 are least preferred. Option 2 has the least impervious coverage and crosses Totara Creek at the narrowest location, however its proximity to the SEA is not desirable for stormwater treatment. Option 4 has the greatest impervious coverage and requires an additional culvert and stream compensation.</p> <p><u>Ecology:</u> Option 1 is preferred as it is not situated within the SEA associated with Totara Creek and avoids potential surrounding wetlands. Options 2 and 3 impact upon the SEA and Option 4 potentially impacts on the wetlands / existing drainage features and associated landscaping.</p> <p><u>Natural Hazards:</u> There is no differentiation between the options. This is due to all options crossing areas with the same geology and being typically flat.</p>
Economics	<p><u>Utilities:</u> There is no differentiation between the options due to construction occurring offline and within a greenfield area except for the motorway overbridge crossing. Overhead transmission lines and towers are found within the vicinity of the options and there is no significant differentiation between the options. Note that Transpower have stated that these will be demolished and the AUP:OP Overlay reviewed.</p> <p><u>Construction:</u> There is no differentiation between the options. Works above the SH16 can be managed with a robust Traffic Management Plan.</p>

10.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Project Partner agreement on Option 1 being the emerging preferred option. Project Partners confirmed that the emerging preferred option would not preclude a station associated with city centre to Westgate RTC nor an interim park and ride (neither are Te Tupu Ngātahi projects).

In 2020 and 2021 Te Tupu Ngātahi sought feedback from landowners. The Project Team met with Oyster Capital Ltd, and following discussions with Oyster, Option 4 was developed. Option 4 was assessed and later discounted, largely due to impacts on stormwater, ecology and construction.

In 2022, Oyster proposed a small change to the preferred (Option 1) Spedding Road alignment shifting the road and associated SH overbridge further north. This was considered but resulted in a greater intrusion into the SEA T_2034 and was therefore discounted.

10.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Partners and the community, a preferred option for Spedding Road West was identified. The preferred option is Option 1 / Central, widening both sides of the corridor, with variance to north or south in response to design and environment features. This allowed impacts to be reduced where possible and resulted in a fairer distribution of land requirement along the route, which was raised in feedback from Oyster Capital Ltd.

Option 1 / Central was preferred because it:

- Despite having the highest construction cost (due to the longer SH16 bridge crossing), it:
 - Has the least impact on the Totara Creek and associated riparian strip creating greater opportunity for enhancement
 - Does not directly impact on the SEA or potential surrounding wetlands.

All options provided the same level of achievement against the transport outcomes. Throughout design refinement consideration was made to minimise impacts on steams and minimise the Project footprint and associated impact on private properties. Interaction with future planned infrastructure projects was also a consideration (such as the RTC).

There will be further opportunities to minimise impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

10.6.4 Discounted Options

Table 10-3 summarises the reasons for discounting the three options.

Table 10-3: Spedding Road West Discounted Options

Option	Reasoning
Option 2 / Northern T	<ul style="list-style-type: none"> • Reduced accessibility and connectivity as the option does not connect to Hailes Road • Proximity to the SEA is not desirable for stormwater treatment • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip.

Option	Reasoning
Option 3 / Northern	<ul style="list-style-type: none"> • Impacts upon the SEA • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip • Does not follow the existing property boundaries on the west side of SH16 and it will split one lot impacting on development potential.
Option 4 / Southern	<ul style="list-style-type: none"> • Has the greatest impervious coverage and requires an additional culvert and stream compensation • Greater impact from bridge pier locations on the Totara Creek and the associated riparian strip.

10.7 Spedding Road West Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Spedding Road West upgrade is Option 1, a centreline alignment along the existing Spedding Road West that crosses over SH16 and connects at Hailes Road and Fred Taylor Drive.

The preferred option reduces impact on identified streams and ecological areas, it has also considered landowner and developer aspirations and results in a more equitable land requirement impact than a southern or northern weighted widening option would.

11 W5: Hobsonville Road

11.1 Corridor Overview

Hobsonville Road was included in the TFUG recommended network and extended from Hobsonville Point to Westgate. TFUG identified a transport route which extended to the West Harbour Ferry, but this section was discarded at the IBC stage. The Hobsonville Road upgrade was assessed as AR-W-12 during the IBC phase (see Figure 11-1).

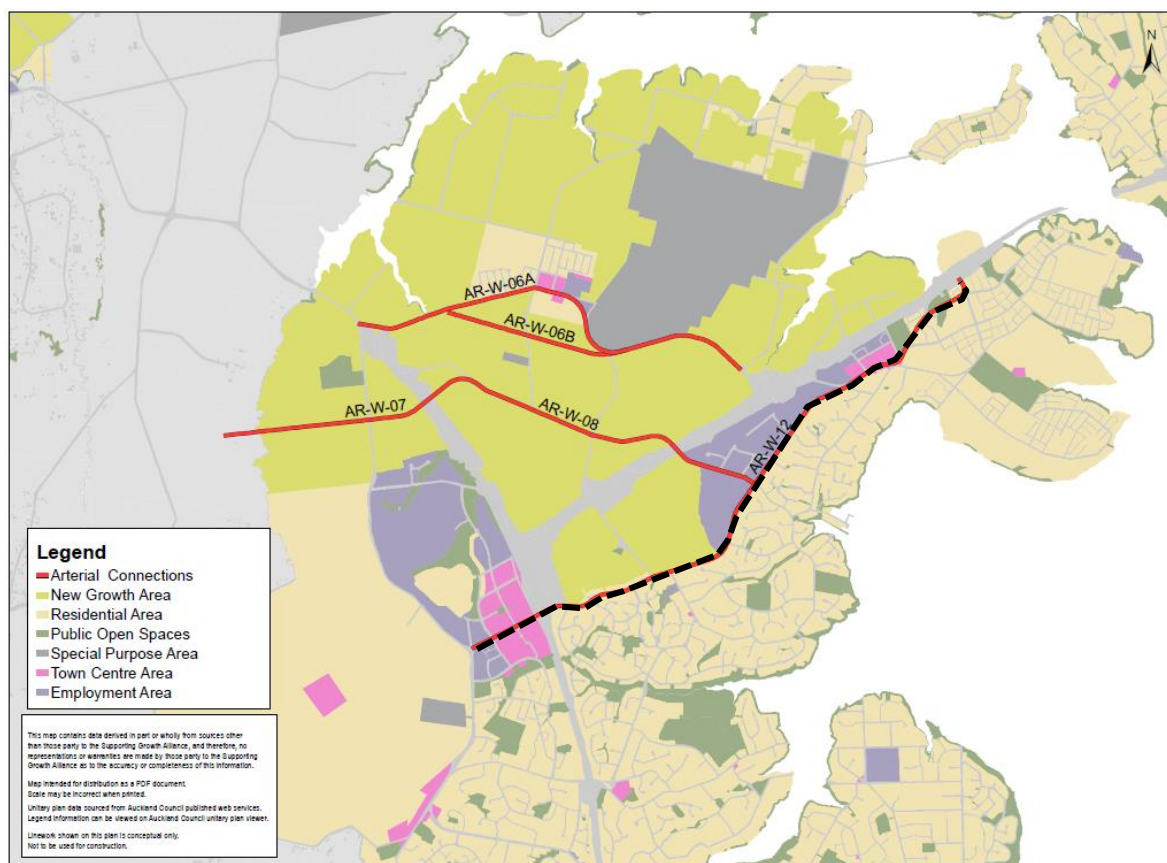


Figure 11-1: Hobsonville Road IBC Option AR-W-12

The option is one of the Whenuapai east-west arterial routes and a key link between Westgate and Hobsonville Point. The corridor provides resilience as an alternative to SH18. It is also an important multi-modal link that supports bus priority for local services, walking and cycling, and freight access to the future business zones.

Two alternatives to the Hobsonville Road upgrade were considered but were discarded at the long list stage as their primary functions were collector roads. Project Partners and engagement indicated strong support for improving walking and cycling facilities on Hobsonville Road.

Hobsonville Road was recommended as a four-lane, arterial corridor as it provides a key strategic connection to Westgate, the future rapid transit network, and the wider area.

11.2 Gap Analysis

The gap analysis for Hobsonville Road confirmed reasons for discounting an alternative route north of Hobsonville Road, between SH16 and Luckens Road (at IBC phase) were still valid. The alternative option required reduced land to upgrade the corridor, however, was discounted as:

- The route duplicated function of Hobsonville Road;
- It would provide a collector road function for the catchment north of Hobsonville Road and would not serve as an arterial; and
- The option had potential for greater adverse effects as a new route, compared to upgrading an existing corridor.

The gap analysis also noted there remained some future land use uncertainty due to developer interest and proposed consents on undeveloped land and the withdrawal of Proposed Plan Change 5. Gap analysis confirmed that:

- Adequate corridor assessment was undertaken at the IBC phase, and analysis did not trigger further corridor assessment
- Route refinement was recommended to respond to the constraints identified.

11.3 Corridor Form and Function Assessment

A CFAF assessment was undertaken following the methodology in Section 4.3. This resulted in Hobsonville Road being divided into five assessment segments, being: (1) Don Buck Road to SH16; (2) SH16 to Luckens Road; (3) Luckens Road to Brigham Creek Road; (4) Brigham Creek Road to Hobsonville Point Road and (5) Hobsonville Point Road to Squadron Drive. See Figure 11-2.



Figure 11-2: Hobsonville Road CFAF segments overview (Segments 1 and 5 determined fit for purpose)

The CFAF recommendation for Segment 1 and 5 identified that the existing road reserve was fit for purpose and should be retained. Segments 2-4 therefore informed the options developed and assessed in Section 11.5. Figure 11-3, Figure 11-4 and Figure 11-5 show the CFAF cross section outcomes for Sections 2, 3 and 4.



Figure 11-3: CFAF Outcome S2: SH16 Interchange to Luckens Road Indicative 30m cross section



Figure 11-4: CFAF Outcome S3: Luckens Road to Brigham Creek Road Indicative 24m cross section

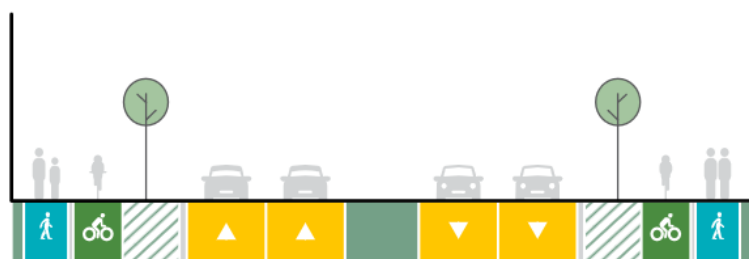


Figure 11-5: CFAF Outcome S4: Brigham Creek Road to Hobsonville Point Road Indicative 30m cross section

11.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Hobsonville Road corridor environment. The land use and constraints exercise identified that:

- **Extent and zoning:** Hobsonville Road is an urban corridor on the south side, land use is identified as *Residential – Mixed Housing Zone*. There is also *Business – Local Centre Zone* in Segment 4 near the intersection of Hobsonville Road and Wisely Road. The northern side has a mix of zoning including *Residential – Mixed Housing Zone* to Trig Road with FUZ at the rear of a *Terraced Housing and Apartment Building Zone*. FUZ then fronts Hobsonville Road to the east of Trig Road

- **Future land use:** The Whenuapai Structure Plan indicates that the FUZ and an area currently zoned *Residential – Mixed Housing Zone* fronting Hobsonville Road will be re-zoned to high density residential
- **Special uses and constraints** The Hobsonville Corridor Precinct extends on the northern side of Hobsonville Road and identifies sub-precincts: Precinct C extends from Westpark Drive to Williams Road and is *Business – Light Industry Zone* with Precincts A and B located east of Brigham Creek Road and identified as *Business – Mixed Use Zone* and *Business – Local Centre Zone*
 - Hobsonville Road is under existing AT Designation 1437 for ‘Transport purposes’, there is also an existing AT NOR lodged in 2012 for road widening. The NOR proposed two widened lanes and four approach lanes at intersections. The NOR has not progressed to a hearing but has interim land protection effect under s178(2) of the RMA
 - Existing infrastructure constraints include Vector Designation 9956 and Watercare Services Ltd Northern Interceptor Designation 9375. There is also social infrastructure including an Ministry of Education school under Designation 4618, as well as churches and public parks / reserves
 - Hobsonville Road is a partly urbanised corridor and has the potential for impacts on existing building along the alignment.

Key outcomes of the review were the decisions to:

- Not discount widening the corridor either to the north or south at this stage
- Undertake a property impact assessment, as land requirements of widening were a constraint
- Adopt a narrower cross section at Hobsonville School which was seen as a key constraint
- Project Team lead route refinement as no major constraints were identified other than property
- Split the assessment to align with the CFAF segments and focus on specific constraints
- No further consideration required for Hobsonville Road Segments 1 and 5 (see Figure 11-2), as there was either:
 - Sufficient space in the existing carriageway to reallocate space; or
 - Provision for transport modes already existed, sufficient to achieve Transport Outcomes.
- 2012 NOR design was discounted as a Te Tupu Ngātahi option, because it would not provide the form and function requirements or achieve the identified Transport Outcomes.

11.5 Route Refinement Option Development

Hobsonville Road forms an important connection between Hobsonville Point and Westgate. Eight options based on the indicative cross sections were initially developed for Hobsonville Road, including four options with a reduced cross section for Segment 2 (indicated by an ‘R’) these are:

Segment 2 only options:

- **Option 2 / R:** 24.6m cross-section holding the existing centreline
- **Option 3 / R:** 27.1m cross-section holding the existing centreline
- **Option 4 / R:** 20.6m cross-section holding the existing centreline
- **Option 5 / R:** 21.4m cross-section holding the existing centreline.

Corridor Options:

- **Option 1 / both:** 30m cross-section in Segment 2 and 4, reducing to 24m in Segment 3. This Option holds the existing centreline and widens on both sides
- **Option 6 / south:** 30m cross-section in Segments 2 and 4 reducing to a 24m cross-section in Segment 3, holds the northern side and widens southern side

- **Option 7 / north:** 30m cross-section in Segments 2 and 4 reducing to 24m cross-section in Segment 3, holds the southern side and widens northern side
- **Option 8 / variant:** Variation of Option 6 which avoids Hobsonville School with no widening in front or immediately adjacent. Holds the northern side and widens southern side.

Segment 2 Options 2, 4 and 5 were determined to not achieve the Transport Outcomes sought and so were discounted and not taken to assessment. Segment 2s Option 3 was not taken forward to option assessment either but was retained as an option to be considered during option refinement to avoid or minimise effects on properties along the corridor. Options 1, 6, 7 and 8 proceeded to route refinement assessment.

11.6 Route Refinement Assessment

11.6.1 Assessment

Route refinement assessment was undertaken for Hobsonville Road corridor. Options were considered by the Project Team with specialist property input. The assessment follows the process outlined in Section 4.4. Options 1, 6, 7 and 8 were qualitatively assessed in each segment against the MCA framework, including their ability to achieve the following Transport Outcomes.

- *Access: Improve access to economic and social opportunities along Hobsonville Road Reliability: Enable reliable people movement on Hobsonville Road*
- *Mode Choice: Support transformational mode share in Whenuapai by providing a high quality, safe and attractive movement of people along Hobsonville Road*
- *Safety: Provide improvements on Hobsonville Road that contribute to a transport network that is free from deaths and serious injuries*
- *Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Whenuapai.*

Figure 11-6 shows the options assessed and constraints.

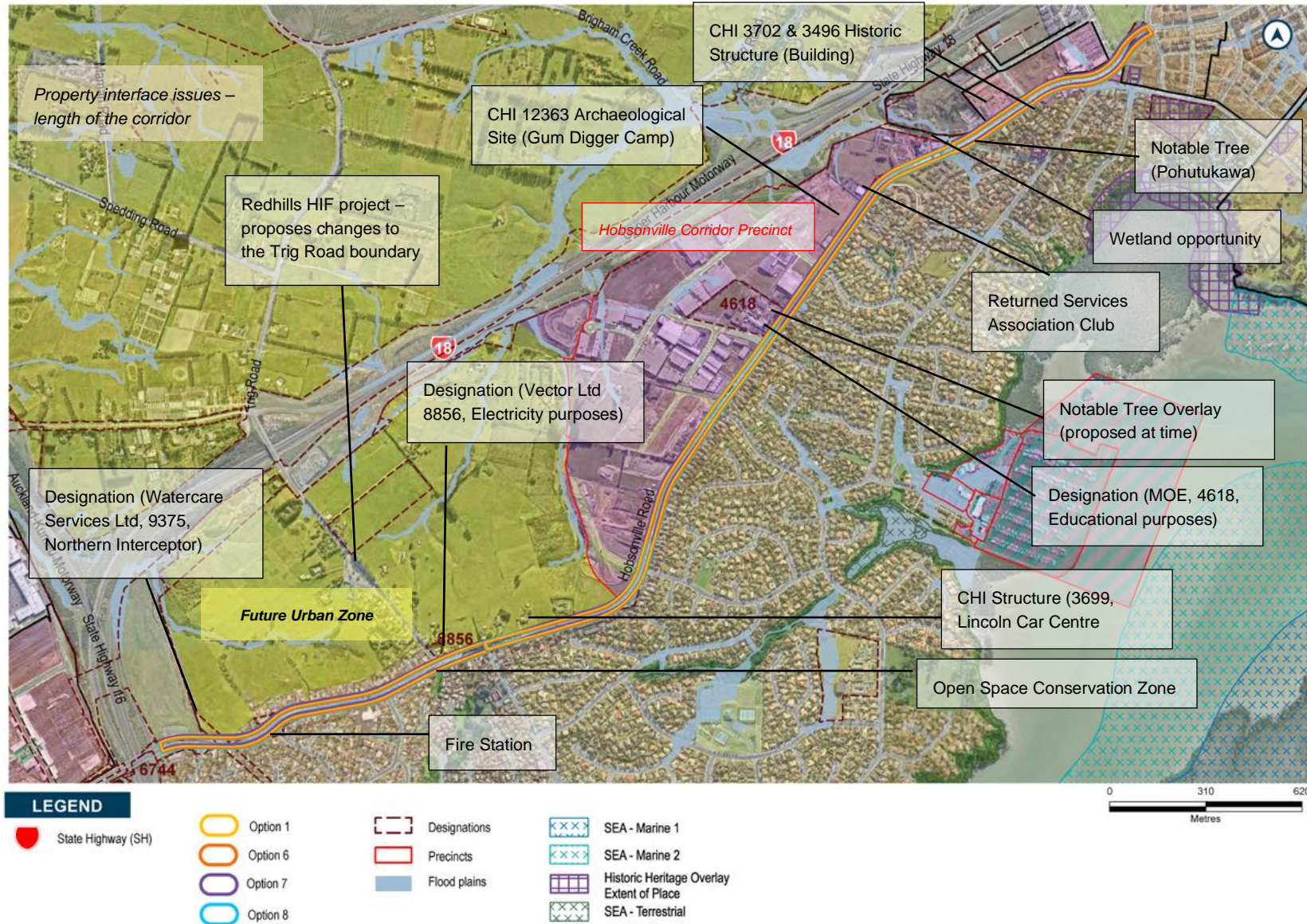


Figure 11-6: Hobsonville Road options and identified constraints

Segment 2 Assessment

All options perform well against the Transport Outcomes identified, there is no differentiation in performance for Segment 2. Considerations and constraints identified are shown in Figure 11-6. Table 11-1 provides a summary of the assessment undertaken using the MCA framework for Segment 2, options were not scored.

Table 11-1: Hobsonville Road Segment 2 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.</p>
Social	<p><u>Future land use integration:</u> Options 6 and 8 will impact on the southern side of the Hobsonville Road. The southern side is zoned in the AUP:OP as Residential – Mixed Housing Zone consisting of multiple residential lots. As no change in zoning is anticipated and given the small lot size there is less ability to respond to and integrate the widened road into a future development scenario / redevelop the southern side. These options are therefore less preferred. Option 1, which will widen on both the northern and southern side, is also less preferred due to the impacts on the southern side.</p> <p>Option 7 avoids impacts on the Residential – Mixed Housing Zone to the south, impacting only on the FUZ and Residential – Mixed Housing Zone to the north. The Whenuapai Structure Plan indicated that the FUZ and the Residential – Mixed Housing Zone will be re-zoned to high density residential. Given the proposed re-zoning widening Hobsonville Road to the north (Option 7) is preferred as there is greater potential for the option to be integrated into the future land use scenarios facilitated by the re-zoning.</p> <p><u>Social:</u> Social infrastructure includes a church located on the south side of the corridor and the area of open space. The open space will be avoided by all options. There is a preference for Option 7 as it will avoid the church.</p> <p><u>Urban Design:</u> Options 1, 6 and 8 will impact upon the established character of residential development on the southern side of Hobsonville Road. Options 6 and 8 and to a lesser degree Option 1 will result in overshadowing of existing and redeveloped properties on the south side due to the topography / level difference. Character changes are anticipated on the northern side of Hobsonville Road due to the future urbanisation of FUZ land. Option 7 is preferred as it has the potential to integrate with the future urban design character.</p> <p><u>Land Requirement:</u> Option 1 is least preferred as it will have a significant impact on properties on both sides of Hobsonville Road, increasing the land requirement. Options 6 and 8 limit property impacts primarily to the south. The property impacts and land requirement will be significant and will extend beyond properties immediately fronting Hobsonville Road due to the topography on the southern side.</p> <p>Option 7 will predominantly impact properties the northern side of Hobsonville Road. Whilst the northern side has potential for denser development (potentially increasing the number of properties impact than in the current environment) it is preferred as the extent of properties affected is less compared to Options 1, 6 and 8.</p> <p><u>Human health and wellbeing:</u> All options will support additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options.</p> <p><u>Safety:</u> Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways.</p>

Wellbeing Assessment	
Environment	<p>Landscape and Visual: No significant landscape features were identified within Segment 2 of Hobsonville Road. Note that no options impact upon the Open Space – Conservation Zone (and any associated landscape features) located opposite Trig Road (on the south side of Hobsonville Road). This criterion was not considered to differentiate between the options.</p> <p>Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the proposed cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options.</p> <p>Ecology: No significant ecological constraints were identified along or in close proximity to the alignment is Segment 2. This criterion was not considered to differentiate between the options.</p> <p>Natural Hazards: Option 7 is preferred as it will avoid the more challenging topography located on the south of the corridor. All other options involving widening to the south.</p>
Economics	<p>Construction: All options will require works within the road corridor. Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is also anticipated.</p>

Segment 3 Assessment

All options perform well against the Transport Outcomes with no differentiation for Segment 3. Segment 3. Considerations and constraints identified are shown in Figure 11-6. Table 11-2 provides a summary of the assessment undertaken using the MCA framework for Segment 3, options were not scored.

Table 11-2: Hobsonville Road Segment 3 – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p>Heritage: An Auckland Council's Cultural Heritage Indexed (CHI) Historic Structure (Lincoln Car Centre CHI 3699) and Archaeological Site (Gum Diggers Camp CHI 12363) were identified within Segment 3. Both are set back from the road corridor and will not be directly impacted by the options. This criterion was not considered to differentiate between the options.</p>
Social	<p>Future land use integration: Option 1 impacts on both the Residential – Mixed Housing Zone and the Light Industrial Zone land within the Hobsonville Road Corridor Precinct on both sides of the corridor. Options 6 and 8 primarily impact on the Residential – Mixed Housing Urban Zone to the south. The Residential – Mixed Housing Urban Zone is a long narrow strip consisting of small lots (widening at the eastern end of Segment 2). There is less ability to integrate south widening options (i.e., Option 6) with the remaining Residential – Mixed Housing Urban Zone and potential for residual land to be created with limited development potential.</p> <p>Option 7 avoids impacts on the Residential – Mixed Housing Urban Zone to the south and impacts on the Hobsonville Road Corridor Precinct to the north. The Precinct is large and widening the road north will only impact on the frontage, it will not prevent the future development of this part of the zone, nor create undevelopable residual land if existing buildings are impacted.</p> <p>Social: Option 8 was specifically designed to avoid impacts upon Hobsonville School. This is a preferred outcome; however, there is the potential for a reduced cross-section at the school to be applied to other options, and as such, avoiding impacts on the school is not a differentiator.</p>

Wellbeing Assessment	
	<p>Urban Design: Options 1, 6 and 8 are less preferred as they will impact upon the established character of residential development on the southern side of Hobsonville Road. Whilst the Hobsonville Road Corridor Precinct is currently being developed there is still greater potential to integrate into the design of development. Option 7 is therefore preferred.</p> <p>Land Requirement: Option 1 is least preferred as it will have increased property impacts on both sides of Hobsonville Road, increasing the land requirement. Options 6 and 8 limit property impacts primarily to the south, which is fully developed with residential properties with multiple ownership.</p> <p>Option 7 will predominantly impact on properties on the northern side of Hobsonville Road; however, given the size of the lots full property requirement is unlikely. Additionally, AT lodged an NOR for a separate road widening project with Auckland Council in 2012. The NOR has interim effect (under section 178 of the RMA). This results in a reduced land requirement for Option 7 as the NOR has generally protected the land from development into the NOR boundary. Option 7 is preferred.</p> <p>Human health and wellbeing: All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options.</p> <p>Safety: Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways.</p>
Environment	<p>Landscape and Visual: No significant landscape features were identified within the segment. Note that the Rāwiri Stream which is the subject of a restoration project will not be impacted by any of the options. This criterion was not considered to differentiate between the options.</p> <p>Stormwater: Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options.</p> <p>Ecology: No significant landscape features were identified along the road corridor. This criterion was not considered to differentiate between the options.</p> <p>Natural Hazards: Option 7 is preferred as it will avoid the more challenging topography located on the south of the corridor. All other options involving widening to the south are less preferred.</p>
Economics	<p>Construction: All options will require works within the road corridor. Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is anticipated and existing buildings are generally less sensitive receptors to construction disruption.</p>

Segment 4 Assessment

All options perform well against the Transport Outcomes and there is no differentiation for Segment 4 between the options. Segment 4 considerations and constraints identified are shown in Figure 11-6. Table 11-3 provides a summary of the assessment undertaken using the MCA framework, options were not scored.

Table 11-3: Hobsonville Road Segment 4 – Option Assessment Summary

Assessment Findings	
Cultural	<p>Heritage: A Cultural Heritage Indexed Historic Structure (Hobsonville Hall CHI 3496) was identified on the south side of Hobsonville Road. Option 7 will avoid the Hall and is preferred.</p>

Assessment Findings	
	<p>However, the adoption of a reduced cross-section for all other options would avoid direct impacts on the Hall.</p>
Social	<p><u>Future land use integration:</u> In the east of the segment Options 1 and 7 are least preferred as they impact on the consented and recent development within the Hobsonville Road Corridor Precinct. Options 6 and 8 impact on the Residential – Mixed Housing Zone to the south and a narrow strip of Business - Local Centre Zone; however, there is greater potential to refine these options to minimise effects to ensure the land remains developable.</p> <p>In the west of the segment Options 1, 6 and 8 are least preferred as they impact upon the Residential – Mixed Housing Zone. Option 7 has the greatest potential to be integrated into future development within the Hobsonville Corridor Precinct as site are currently vacant. There is also greater potential to influence development to respond to the proposed road widening.</p> <p><u>Social:</u> There are a number of community facilities, shops and services located within Segment 4. In the western end of the Segment, Options 1 and 7 will impact on an existing supermarket and a retail parade which includes health related occupiers. Options 6 and 8 will impact upon the Hobsonville Hall, a dental practice and a veterinary practice. The buildings on the south have a staggered building line and so there is greater potential to avoid these facilities through a reduced cross section.</p> <p>A medical practice is located on the south side of Hobsonville Road within the western section of Segment 4. Options 1 and 7 are preferred as they will avoid social impacts from the loss of the medical practice.</p> <p><u>Urban Design:</u> In the east of the segment all options will impact upon the existing character of the areas. Options 6 and 8 have greater potential to be refined to avoid character impacts and are preferred. In the west of the Segment Option 7 is preferred as it will avoid impacts on the residential character on the south side of the corridor.</p> <p><u>Land Requirement:</u> Option 1 is not preferred as it will have increased property impacts on both sides of Hobsonville Road increasing the land requirement. In the east of the segment Options 6 and 8 are also not preferred as they will limit property impacts primarily to the south, which is fully developed with residential properties with multiple ownership.</p> <p>Option 7 will predominantly impact on properties on the northern side of Hobsonville Road; however, given the size of the lots the full properties are unlikely to be required. Additionally, AT has lodged a NOR for a separate road widening project with Auckland Council in 2012. The NOR has interim effect (under S. 178 of the RMA). This results in a reduced land requirement for Option 7 as the NOR has protected the land from development intruding into the NOR boundary. Option 7 is therefore preferred in the east of the segment.</p> <p>Options 6 and 8 are preferred in the west of the segment as this has the greatest potential to be refined to reduce property impact and impacting the properties located on the north.</p> <p><u>Human health and wellbeing:</u> All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing. This criterion was not considered to differentiate between the options.</p> <p><u>Safety:</u> In the west of the segment Option 7 is preferred as it will avoid / minimise impacts on driveways / access arrangements to residential properties located on the south side of the corridor. All other options will have a greater impact on the residential driveways. This criterion was not considered to differentiate between the options in the east of the segment.</p>

Assessment Findings	
Environment	<p><u>Landscape and Visual:</u> No significant landscape features were identified within the Segment, and this criterion was not considered to differentiate between the options.</p> <p><u>Stormwater:</u> Appropriate stormwater infrastructure can be provided within or adjacent to the Te Tupu Ngātahi cross-section for all options. No significant constraints were identified. This criterion was not considered to differentiate between the options.</p> <p><u>Ecology:</u> No significant ecological constraints were identified along or in close proximity to the alignment. This criterion was not considered to differentiate between the options.</p> <p><u>Natural Hazards:</u> No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.</p>
Economics	<p><u>Construction:</u> All options will require works within the road corridor. In the west of the Segment, Option 7 is preferred as it will minimise impacts on the residential properties located on the south of the corridor. Construction will have a greater impact on the north where construction associated with future development is anticipated and buildings are / will generally be less sensitive receptors to construction disruption due to the Business zoning. In the east of the segment Options 6 and 8 are preferred. The options have greater potential to be refined to avoid demolition of existing building and to avoid the associated disruption.</p>

11.6.2 Post MCA Option Refinement

Following the MCA, the Project Team reviewed the highly constrained sections of the corridor where the preferred option had the potential to give rise to significant adverse effects and high property impacts including on heritage buildings. As a result, a reduced cross section was proposed at two specific points:

- Segment 3, adjacent to Hobsonville School, to avoid impacts on the school and the residential properties located on the south of the corridor
- Segment 4 (eastern end), to avoid impacts on businesses and community facilities located within the Business Local Centre Zone.

The reduced cross section retained capacity between closely spaced intersections and maintained suitable walking and cycling facilities on both sides of the road. The reduced cross section was considered at alternative locations along the corridor but discounted as it would affect the corridors' ability to achieve the Transport Outcomes sought.

11.6.3 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Project Partner support on the early emerging preferred options, being:

- Option 7 in Segment 2 and 3;
- A refined version of Option 6 in Segment 4; and
- In Segments 1 and 5 to use the existing sufficient road corridor.

AT noted benefits of aligning the project land requirements with the existing 2012 NOR where practicable, which has interim effect of protecting land. Aligning the two will reduce further property requirement impacts along the corridor. AT also queried the operational efficiency of a two-lane corridor particularly for public transport; however, the Project Team transport forecasts prepared indicate two lanes is sufficient.

11.6.4 Preferred Option

Following the MCA assessment and consideration of feedback, a preferred option for the Hobsonville Road corridor was identified for each segment:

Segment 2: Option 7, to widen Hobsonville Road to the north and hold the southern edge is preferred in Segment 2 because it:

- Has greater potential to be integrated into the future land use scenarios and urban design outcomes.
- Impacts properties on the north, but the extent of impact is less than alternative options. There is also the potential to integrate the corridor with residual land fronting Hobsonville Road (indicated for high density residential in the Whenuapai Structure Plan).
- Maintains the residential character on the southern side of Hobsonville Road.
- Avoids the more challenging topography in the south, resulting in a less complex engineering construction solution, and requires less land to facilitate the widening.

Segment 3: Option 7, to widen Hobsonville Road to the north and hold the southern edge is preferred in Segment 3 because it:

- Has greater potential to be integrated into the future land use scenarios on adjacent sites which have not been developed or consented
- Will have a reduced land requirement due to the large size of the adjoining lots and as the 2012 NOR boundary means development has generally not occurred within the boundary
- Maintains the residential character on the southern side and has greater potential to be integrated into the emerging development character within the Hobsonville Road Corridor Precinct
- Can be refined through the use of a reduced cross-section to avoid impacting Hobsonville School without compromising safety.

Segment 4: A hybrid of 6 and 7 is the preferred option in Segment 4:

In Segment 4 eastern section, Option 7 to widen Hobsonville Road to the north and holds the southern edge is preferred because it:

- Has greater potential to integrate into the future land use scenarios on sites which have not been developed or consented
- Will have a reduced requirement for full acquisition of sites due to the large size of the lots and as the 2012 NOR boundary means development has generally been set back
- Maintains the residential character on the southern side and has greater potential to integrate into the development character of the Hobsonville Road Corridor Precinct
- Does not impact a local medical practice on the south of Hobsonville Road, which avoids social impacts.

In Segment 4 western section, a refined Option 6 with a reduced cross section is preferred. The option widens Hobsonville Road to the south and holds the northern side. This option was preferred because:

- The businesses and community facilities on the northern side of Hobsonville Road are avoided; and the reduced cross section will minimise property, land use, social cohesion and heritage impacts on the southern side of Hobsonville Road however it retained capacity between closely spaced intersections and maintained suitable walking & cycling facilities on both sides of the road.

Throughout design refinement specific consideration was made to minimising the Project footprint and associated impact on community features and private properties. There will be further opportunities to minimise impacts along the Project alignment during detailed design, as a result, no further option refinement is required at this stage.

11.6.5 Discounted Options

Table 11-4 summarises the reasons for discounting the remaining options for each segment.

Table 11-4: Hobsonville Road Discounted Options

Option	Reasoning
Segment 2:	
Option 1	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 6	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 8	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Segment 3	
Option 1	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Options 6	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Impacts on the established residential character of the southern side, where no character changes are anticipated • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Option 8	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side

Option	Reasoning
	<ul style="list-style-type: none"> • Impacts on the established residential character of the southern side, where no character changes are anticipated • Extended property impacts on the southern side of the road due to topography • Increased engineering complexity and construction footprint due to topography on the south of the corridor.
Segment 4	
Option 1	<ul style="list-style-type: none"> • Less land use integration opportunities, potentially difficult to develop residual land and impacts on the established residential character of the southern side • Increased property impacts and land requirement by widening the road on both the northern and southern side • Poor social cohesion outcomes due to impacts on community facilities, shops and services, and heritage impacts.
Option 7 (eastern)	<ul style="list-style-type: none"> • Impacts on development which meets the Hobsonville Road Corridor Precinct Objectives with associated property impacts and land requirement • Poor social cohesion outcomes due to impacts on community facilities, shops and services.
Option 6 (western)	<ul style="list-style-type: none"> • Less ability to integrate the options with the remaining Residential - Mixed Housing Zone, there is the potential for residual land to be created with limited development potential • Impacts on the established residential character of the southern side, where no character changes are anticipated • Increase property impacts compared to Option 7 in the western segment • Poor social cohesion outcomes due to impacts on community facilities.

11.7 Hobsonville Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Hobsonville Road upgrade is:

- **Segment 1:** Retain existing corridor as fit for purpose
- **Segment 2 and 3:** Option 7 is preferred
- **Segment 4:** Option 7 in the eastern section and Option 6 in the western section
- **Segment 5:** Retain existing corridor as fit for purpose.

This involves a combination of widening to the north, to the south and in some places widening on both sides to ensure impacts on environmental constraints are minimised where possible.

12 RE1: Don Buck Road

12.1 Corridor Overview

TFUG did not recommend the Don Buck Road South FTN Upgrade in the PBC plan in 2016. The IBC recommended an arterial upgrade to the urban corridor referenced as *AR-R-03* extending from Fred Taylor Drive to Triangle Road. For the purposes of the assessment Don Buck Road was split and assessed as Don Buck Road (North) from Fred Taylor Drive to Royal Road and Don Buck Road (South) from Royal Road to Red Hills Road.

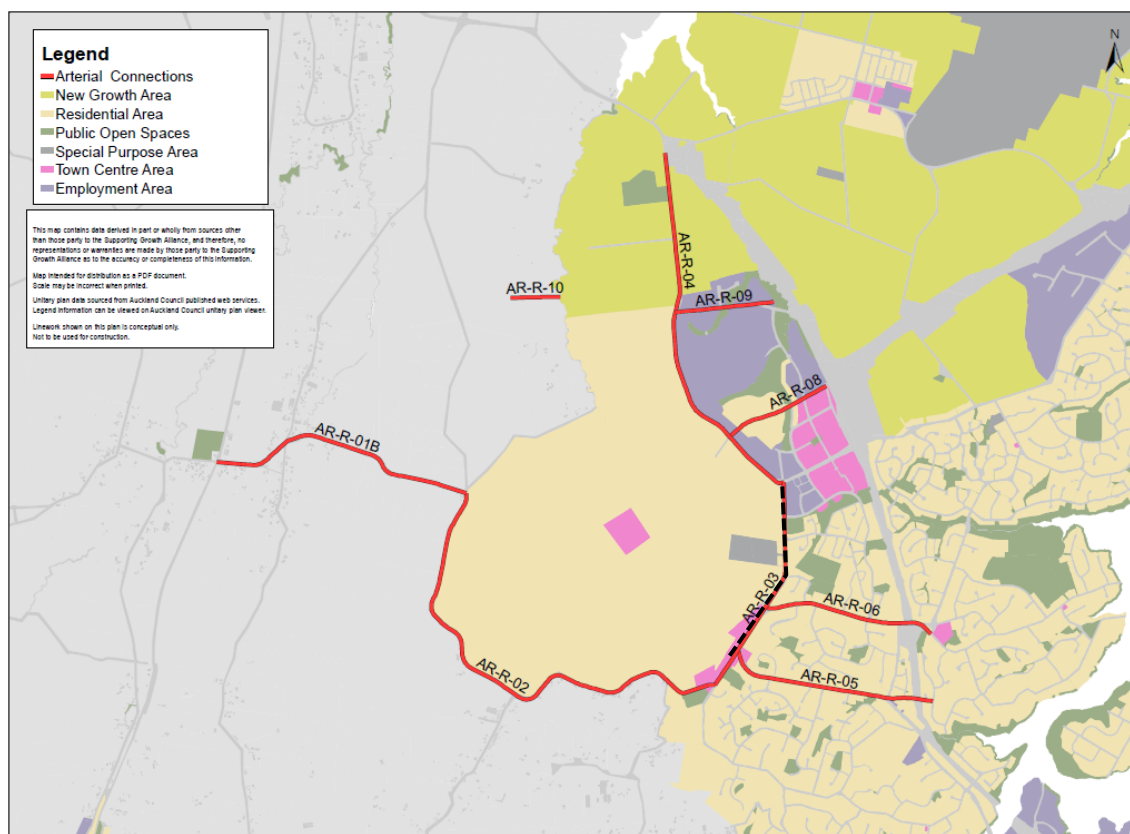


Figure 12-1: Don Buck Road IBC Option AR-R-03

Don Buck Road FTN South was assessed at route refinement by the Project Team and recommended not to proceed to route protection, as impacts on the town centre resulted in a reduced cross section with very little change to predicted traffic volumes. Whilst not widening Don Buck Road FTN South would delay the proposed FTN, in context of overall route it was not significant (only 0.4km). Section 12 therefore only reports on Don Buck Road FTN North (hereafter called Don Buck Road).

Don Buck Road forms a parallel spine to SH16 to connect people to future rapid transit nodes the strategic cycle network and SH16 motorway interchange. The existing corridor can be upgraded to meet requirements see Figure 12-1. It was recommended Don Buck Road be upgraded as a four-lane arterial providing strategic access, bus priority, and cycling and walking facilities. Upgrade of this corridor forms an effective use of existing assets.

12.2 Gap Analysis

Gap analysis identified existing urban development along Don Buck Road corridor as a constraint. This would require consideration of property impacts, including impacts on driveways. The corridor interacted with the North West HIF project (a separate Te Tupu Ngātahi project) which proposes new roading connections through Redhills basin with connections at Royal Road and Fred Taylor Drive.

Gap analysis confirmed that:

- Adequate corridor assessment of Don Buck Road was undertaken at the IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints.

12.3 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Don Buck Road corridor environment, this identified that:

- **Extent and Zoning:** Don Buck Road urban corridor extends from Fred Taylor Drive to the Triangle Road intersection. East of the corridor and north of Westgate Drive is Business-Light Industry Zone. South of Westgate Drive is Open Space – Community Zone occupied by Massey Leisure Centre. The remainder of the east side is Residential – Mixed Housing Urban Zone
 - The Western side of Don Buck Road is zoned residential, primarily Residential - Mixed Housing Urban Zone, with a northern segment at Fred Taylor Drive also zoned Residential - Terraced Housing and Apartment Building Zone
- **Future Land use:** Land west of Don Buck Road is identified within the Redhills Precinct, this precinct undulates along the land use at Don Buck Road, forming an inconsistent frontage to the corridor
- **Special uses and constraints:** Access to St Pauls Primary School (Special Purpose – School Zone) and Westbridge residential school (Ministry of Education Designation 4646) is from the east side of Don Buck Road. Existing AT designation 1468 for Road Widening – SH16 (Westgate to Whenuapai) is present at the intersection with Fred Taylor Drive. Designation 9376 by Watercare Services Ltd is runs along Don Buck Road for the North Harbour No.2 Watermain
- **Environment / social constraints:** The existing urban corridor has public open space, educational facilities and services along the corridor including religious buildings and existing community centres. There are limited natural environment factors present given the urbanised form of the corridor.

Key project impacts were identified as being on topography, property and social infrastructure. The decision was made for the Project Team to undertake the assessment, rather than SMEs, due to the limited constraints along the corridor.

12.4 Corridor Form and Function Assessment

An assessment was undertaken for Don Buck Road, following the CFAF methodology in Section 4.3. The recommendation informed the route refinement options developed and assessed in Section 12.5. Figure 12-2 shows the CFAF cross section outcome.



Figure 12-2: CFAF Outcome – Don Buck Road Indicative 30m cross section

12.5 Route Refinement Option Development

The Don Buck Road corridor is an important parallel route to SH16 and provides north south resilience to the transport network, forming a key FTN arterial. Seven options were initially considered for the corridor, two options were based on reduced cross-sections which reduced project property impacts:

- **Option 4 / 20.6m:** A 20.6m cross section holding the existing centreline
- **Option 5 / 21.4m:** A 21.4m cross section holding the existing centreline.

Whilst reducing property impacts due to the reduced cross section these options did not meet the CFAF outcome and would not achieve the Transport Outcomes identified for the project. The options were therefore not taken forward.

Five options using variations on the cross section from Figure 12-2 were workshopped, these were:

- **Option 1 / 30m:** A 30m cross section holding the existing centreline and widen on both sides
- **Option 2 / 24.6m:** A constrained cross section of 24.6m with no flush median hold the existing centreline and widen both sides
- **Option 3 / 27.1m:** A constrained cross section of 27.1m with a flush median holding the existing centreline and widen both sides
- **Option 6 / 30m:** A 30m cross section holding the eastern boundary and widening west
- **Option 7 / 30m:** A 30m cross section holding the western boundary and widening east.

12.6 Route Refinement Assessment

12.6.1 Assessment

The assessment undertaken for Don Buck Road upgrade follows the process outlined in Section 4.4. The five options were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to economic and social opportunities along Don Buck Road
- Reliability: Enable reliable people and freight movement on Don Buck Road
- Mode Choice: Support transformational mode share in Redhills by providing a high quality, safe and attractive movement of people along Don Buck Road
- Safety: Provide improvements on Don Buck Road that contribute to a transport network that is free from deaths and serious injuries
- Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form, and supports growth in Redhills.

All options performed well against the Transport Outcomes, however Options 1, 6 and 7 were preferred over Options 2 and 3. This was because Option 1, 6 and 7 had unconstrained cross sections which enabled better performance against the Transport Outcomes.

Option considerations and constraints identified are shown in Figure 12-3 and Table 12-1 provides a summary of the qualitative assessment undertaken.

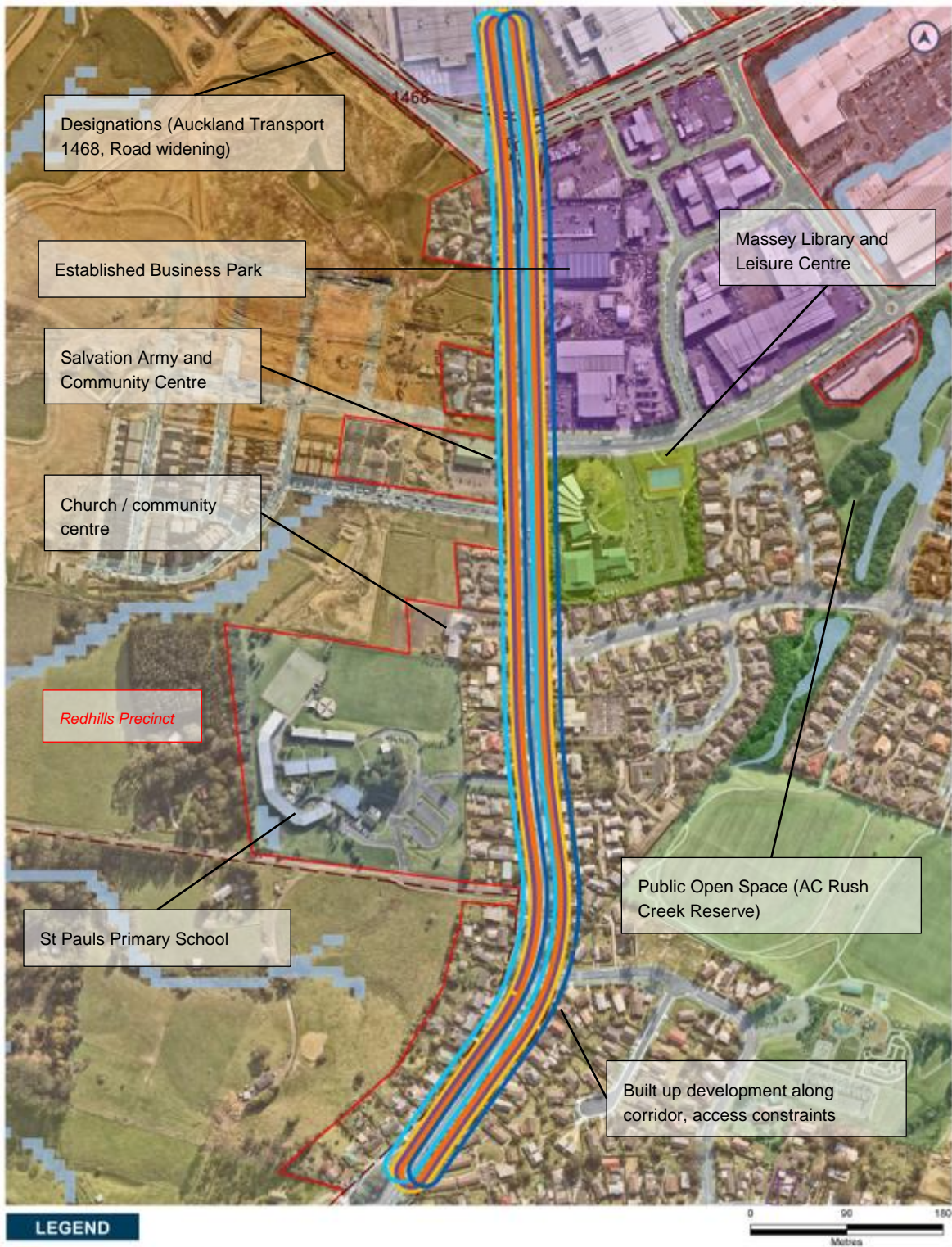


Figure 12-3: Don Buck Road Options and identified constraints

Table 12-1: Don Buck Road – Options Assessment Summary

Wellbeing Assessment	
Cultural	<p><u>Heritage:</u> No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.</p>
Social	<p><u>Future land use integration:</u> Options 1, 2, 3 and 7 involve widening to the east and would impact upon the Business – Light Industry Zone and the Open Space – Community Zone (occupied by Massey Leisure Centre). Given the role these zones have in providing employment opportunity and community facilities and the impact that encroachments would have on existing developments, these options are least preferred in northern section of the corridor. Option 6, which widens west and avoids the business park, is preferred.</p> <p>In the mid-section of the corridor, the preferred options are Options 1, 2 and 3, as these would have equitable and more limited impact on the land within the Residential – Mixed Housing Zone by widening on both sides of the road corridor. Options 6 and 7 would result in less equitable outcomes and are less preferred. Option 7 will tie in with the North West HIF project and will minimise the area of land impacted across both projects. In the southern section Option 7, widening to the east, is preferred.</p> <p><u>Social:</u> Options 1, 2, 3 and 7 impact upon the Massey Leisure Centre site and are least preferred in the northern section. Option 6, widens west, and will impact on the existing Salvation Army building, however this allows for impacts upon the leisure centre to be minimised (although the side access will be impacted).</p> <p>In the mid-section of Don Buck Road there is a Jehovah’s Witness Hall and the access to the Amberwood Rest Home. Option 6 will minimise impacts on the Jehovah’s Witness Hall and Options 2 and 3 can be refined to minimise impacts on the site. Options 2, 3 and 6 are therefore preferred. Access to the Amberwood Rest Home can be maintained with all options.</p> <p>The Haumarū Housing (a community for older people) is located in the southern section of Don Buck Road and is impacted by all options. There is a preference for Option 6 as this option minimises the extent of impacts, however there is the potential to build a retaining wall or apply a reduced cross-section to minimise impacts with all options.</p> <p><u>Urban Design:</u> All options will impact upon the existing residential character of Don Buck Road. Option 2 is less preferred as it will limit the potential for pedestrians to cross the road mid-block, reducing connectivity between both sides of the road. There is no differentiation between the preferred options (Options 1, 3, 6 and 7).</p> <p><u>Land Requirement:</u> All options will impact on property along the corridor. In the northern section of the corridor there is the preference for Option 7 as this will avoid impacts on the properties within the Business and Open Space Zones. Avoiding the Open Space Zone, which contains, the Massey Leisure Centre will reduce the complexity associated with find alternatives sites. In the mid-section the preference is for the centreline options (1, 2 and 3) as these result in a more equitable impact on property on both sides of the corridor. In the southern section the preference is for Option 7 which will tie in with the North West HIF project and will minimise the number of properties impacted across both projects.</p> <p><u>Human Health and Wellbeing:</u> All options will result in additional traffic with a similar level of effects in terms of Human Health and Wellbeing, and this criterion was not considered to differentiate between the options.</p>
Environment	<p><u>Landscape and Visual:</u> No significant landscape features were identified on Don Buck Road as it is an urbanized road corridor, and this criterion was not considered to differentiate between the options.</p> <p><u>Stormwater:</u> All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. Options 2 and 3 have reduced potential to provide the</p>

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	<p>required infrastructure within the corridor and as a consequence are least preferred. Options 1, 6 and 7 do not preclude the provision of stormwater within the corridor (if achievable) and are preferred.</p> <p><u>Ecology:</u> No significant ecological constraints were identified along or in close proximity to any of the options, and this criterion was not considered to differentiate between the options.</p> <p><u>Natural Hazards:</u> No significant geotechnical constraints or instability issues were identified along the alignment, and this criterion was not considered to differentiate between the options.</p>
Economics	<p><u>Utilities:</u> Don Buck Road is designated for the North Harbour No.2 Watermain in the AUP:OP. There is however no differentiation in terms of construction impacts on the watermain. This criterion was not considered to differentiate between the options.</p> <p><u>Construction:</u> All options will have a similar level of construction disruption, and this criterion was not considered to differentiate between the options.</p>

12.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options. AT provided feedback that it was appropriate for active mode facilities to be progressed on urban arterials with existing development constraints.

The key outcome of engagement was support for the emerging preferred being a hybrid of Options 1, 6 and 7.

12.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for Don Buck Road was identified. The preferred option was a hybrid of the options considered, including Option 1, 6 and 7 with consideration of a reduced cross section (Option 3) at identified points to minimise impacts on property and social infrastructure.

The Hybrid Option was preferred because:

- By widening to west (Option 6) in the northern section of Don Buck Road, the Business – Light Industry Zone is avoided and impacts on the Open Space – Community Zone (occupied by Massey Leisure Centre) are minimised
- Widening on both sides of the road (Option 1) in the mid-section of Don Buck Road is more equitable has less significant property impacts
- Widening to the east (Option 7) in the southern section of Don Buck Road will tie in with the HIF proposal intersection at Don Buck Road and Royal Road. This minimises the number of properties impacted by both projects.

Options 1, 6 and 7 performed best against the transport outcomes. Throughout route refinement specific consideration was made to minimising the Project footprint and associated impact on private properties, resulting in a hybrid option that alternates along the corridor whilst still meeting the transport outcomes.

There will be further opportunities to minimise any impacts within the Project alignment during the detailed design of the Projects. As a result, no further design refinement is required at this stage.

12.6.4 Discounted Options

Table 12-2 summarises the reasons for discounting the options individually.

Table 12-2: Don Buck Road Discounted Options

Option	Reasoning
Option 1 / 30m	<p>The option was discounted from the northern and southern sections of Don Buck Road North for the following reasons:</p> <ul style="list-style-type: none"> • Impacts on the Business – Light Industry Zone and impacts on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Property impacts will occur on both sides of the road • Does not tie into the intersection works proposed as part of the HIF project in the southern section, and would increase the extent of property impacts across both projects.
Option 2 / 24.6m	<p>This option was discounted from all of Don Buck Road for the following reasons:</p> <ul style="list-style-type: none"> • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Reduced transport and urban design outcomes as the absence of a flush median reduces access for vehicles and connectivity for pedestrians to cross the road • Does not tie into the intersection works proposed as part of the HIF project in the southern section, and would increase the extent of property impacts across both projects.
Option 3 / 27.1m	<p>This option was discounted from all of Don Buck Road for the following reasons:</p> <ul style="list-style-type: none"> • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Does not tie into the intersection works proposed as part of the HIF project, and would increase the extent of property impacts across both projects.
Option 6 / 30m	<p>This option was discounted from the mid and southern sections of Don Buck Road for the following reasons:</p> <ul style="list-style-type: none"> • Increased property impacts on the western side of the corridor, and more significant impacts compared to widening on both sides • Does not tie into the intersection works proposed as part of the HIF project. And would increase the extent of property impacts across both projects.
Option 7 / 30m	<p>This option was discounted from the northern and mid sections of Don Buck Road for the following reasons:</p> <ul style="list-style-type: none"> • Impacts on the Business – Light Industry Zone and on the Open Space - Community Zone (occupied by Massey Leisure Centre) in the northern section • Increased property impacts on the eastern side, and more significant impacts compared to widening on both sides.

12.7 Don Buck Road Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Don Buck Road is a hybrid of Options 1, 6 and 7. Which enables tailored responses to constraints on the corridor.

13 RE2: Fred Taylor Drive

13.1 Corridor Overview

The Fred Taylor Drive corridor was recommended as part of the TFUG preferred network as an arterial upgrade. This upgrade was identified to improve the safety of active modes by providing separated walking and cycling facilities and increase the attractiveness of public transport through upgrades such as bus priority.

Fred Taylor Drive corridor was assessed at the IBC stage as one of Redhills' north-south arterial connections (referenced as *AR-R-04*). It forms a spine road running parallel to SH16 and serves a critical function to distribute future Redhills growth and connect people to rapid transit stations, the strategic cycle network and SH16 motorway interchange. The upgrade of the existing route, Option *AR-R-04* as a four-lane urban arterial upgrade was recommended, see Figure 13-1.

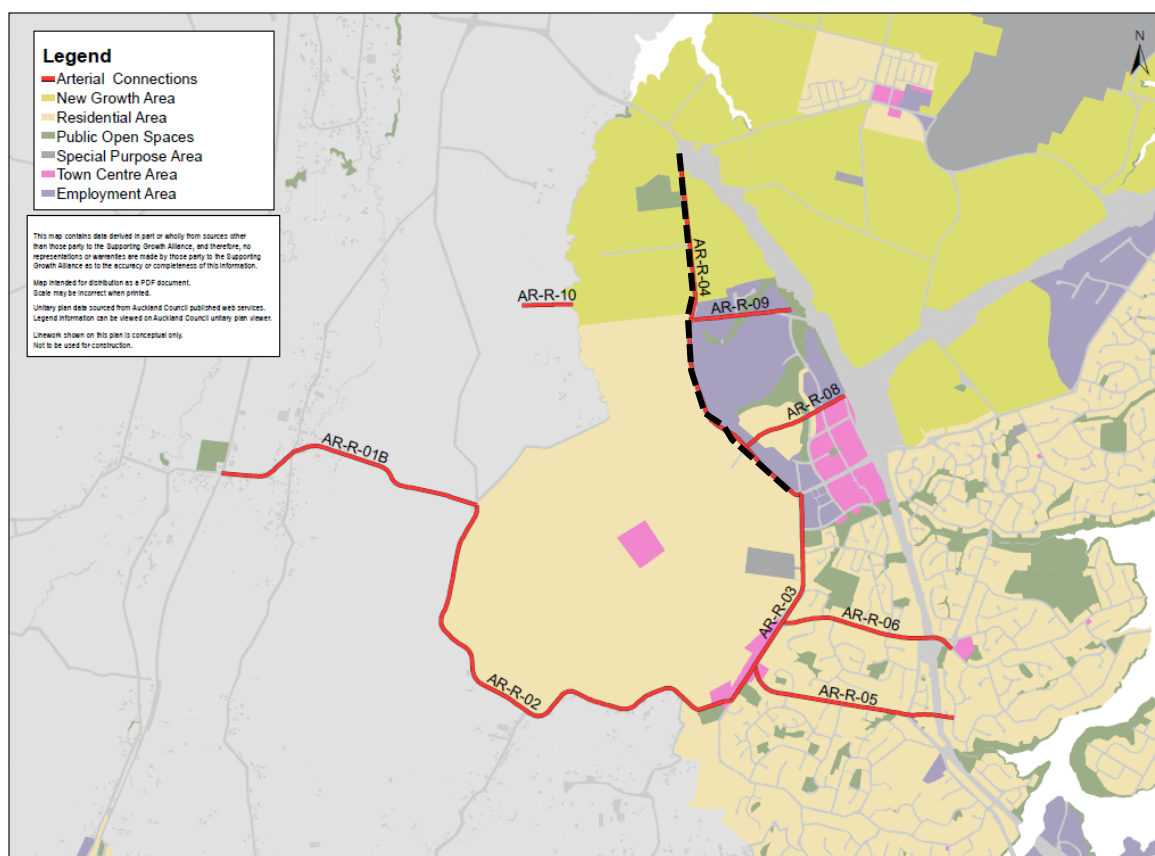


Figure 13-1: Fred Taylor Drive IBC Option AR-R-04

It will establish strategic access and bus priority and will support the Redhills collectors' network as well as improve cycling and walking facilities. The corridor was recommended as it will fulfil a north-south strategic function which provides resilience to public transport access between Westgate and Kumeū-Huapai.

13.2 Gap Analysis

Gap analysis confirmed the key consideration as the interface of the corridor with existing and planned projects and landuse. Future land use needed to be considered as Redhills North is currently zoned FUZ and AC is not proposing a structure plan in the short term. The proximity of the corridor to future RTN also needed to be considered in that adjacent development along the corridor may intensify in line with the National Policy Statement on Urban Development for rapid transit stops.

Social infrastructure including Fred Taylor Park is located adjacent to the corridor and would require work with AC to resolve impacts. Existing designations are also present along the corridor, with ATs Designation 1468 for road widening presenting an opportunity to utilise the currently designated area. The corridor also interacts with the North West HIF proposal onto Fred Taylor Drive.

Gap analysis confirmed that:

- Adequate Corridor Assessment was undertaken at IBC, and analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to constraints (see Section 13.5)
- The existing AT Designation 1468 should be investigated to confirm if the footprint is sufficient to upgrade Fred Taylor Drive and achieve the identified Transport Outcomes.

13.3 Corridor Form and Function Assessment

An assessment was undertaken for the Fred Taylor Drive upgrade following the CFAF methodology in Section 4.3. This recommendation informed the route refinement options developed and assessed in Section 13.5. Figure 13-2 shows the CFAF outcome.



Figure 13-2: CFAF Cross Section Outcomes – Fred Taylor Drive Indicative 30m cross section

13.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out to understand the Fred Taylor Drive corridor environment. The exercise identified that:

- **Extent and zoning:** Fred Taylor Drive is an existing road corridor that extends from the existing Brigham Creek Interchange in the north to the intersection with Don Buck Road in the south. The northern adjacent land use is FUZ, Fred Taylor Park is also adjacent and zoned Open Space-Sport and Active Recreation Zone. The Southern section of Fred Taylor Drive is live zoned residential, being Terraced Housing and Apartment Building Zone on the west within the Redhills

Precinct. The eastern side is zoned Business-Light Industry Zone and Business – Mixed Use Zone forming part of the Westgate Precinct

- **Future land use:** Although live zoned in the southern portion, the area is currently significantly greenfield
- **Special uses and constraints:** Two designations by AT (#1433 and #1468) are present along the full length of Fred Taylor Drive from SH16 (Brigham Creek Road) to SH16 (Hobsonville Road). Designation 1433 has been given effect to, and designation 1468 has been extended to March 2027 by AT. This would otherwise have lapsed in November 2021. The Whenuapai Ambulance station is adjacent to the corridor
- **Environmental Constraints:** Two botanical CHI sites (CHI 2164 and CHI 2165) at 121 Fred Taylor Drive for two trees. There is also riparian vegetation near the Totara Creek. CHI site 20445 is recorded at 81 Fred Taylor Drive (however this site has since been earthworked).

Key outcomes of the review were decision to:

- Utilise the existing AT designations (1433 and 1468) areas on Fred Taylor Drive as combined these were considered to have sufficient width (approximately 30m) to accommodate the desired corridor form and function cross section (see Section 13.1). Note this was subsequently reviewed (see Section 13.5)
- Assess their capability to provide for required construction and supporting infrastructure areas that enable the corridors delivery and tie in with landuse.

13.5 Route Refinement Option Development

It was initially confirmed at land use and constraint mapping stage that the road corridor and AT designation(s) provided sufficient width to accommodate the desired cross section for Fred Taylor Drive. However, it was subsequently identified, as the option developed, that to construct the upgraded corridor localised widening and construction works outside of the existing corridor and designations were needed to respond to:

- Construction areas, including laydowns, sediment retention ponds, and staging
- Existing road geometry at horizontal curves
- Supporting services, such as stormwater facilities
- Intersections with existing side roads
- Topography adjacent to the existing corridor.

As local widening was predominantly required for temporary works, a central running option was identified as an early preferred and alternative options not initially developed. However, given the need to designate outside of the existing corridor options were developed for assessment. These were:

- **Option 1:** Central running / both sides
- **Option 2:** Widening West
- **Option 3:** Widening East.

13.6 Route Refinement Assessment

13.6.1 Assessment

The assessment undertaken for Don Buck Road upgrade follows the process outlined in Section 4.4. The options were assessed qualitatively against the MCA framework by the Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to economic and social opportunities along an integrated Fred Taylor Drive
- Reliability: Enable reliable people and freight movement in Redhills
- Mode Choice: Support transformational mode share in Redhills by providing a high quality, safe and attractive movement of people along Fred Taylor Drive
- Safety: Provide improvements on Fred Taylor Drive that contribute to a transport network that is free from deaths and serious injuries
- Integration: Provide a transport system that is integrated with land use enabling a more sustainable, high quality, connected urban form and supports growth in Redhills.

All options performed well against the Transport Outcomes, however Option 1 was preferred in terms of integration. This was because it provided the greatest opportunity to utilise the existing road corridor and transport designations.

Option considerations and constraints identified are shown in Figure 13-3 and Table 13-1 provides a summary of the qualitative assessment undertaken.

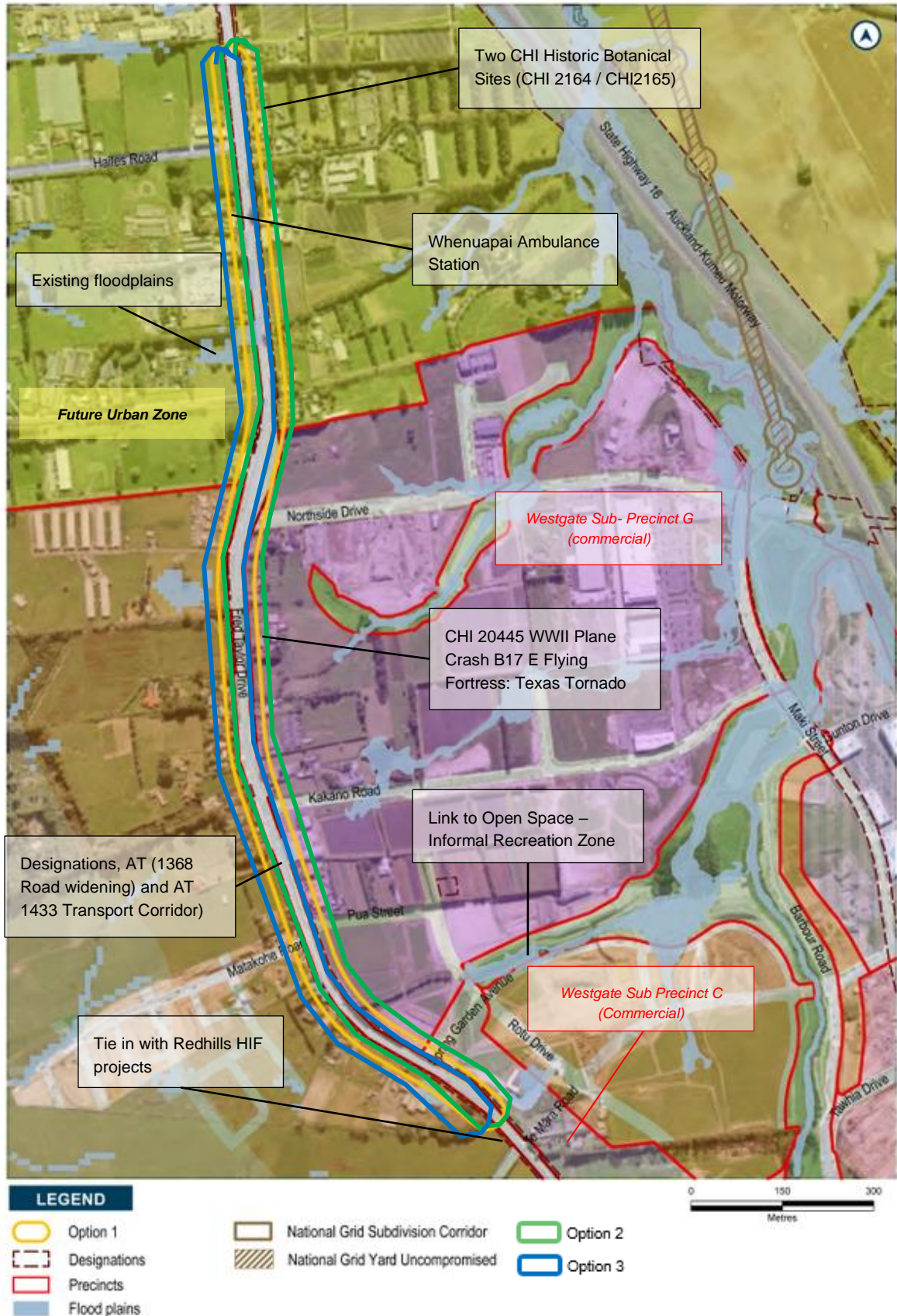


Figure 13-3: Fred Taylor Drive central option and identified constraints

Table 13-1: Fred Taylor Drive localised widening assessment

Assessment	
Cultural	<p><u>Heritage:</u> CHI site 'Flying Fortress Crash site' (CHI 20445) is located at 81 Fred Taylor Drive on the eastern side of the corridor, Whenuapai. There are also two CHI trees (CHI 2164 and 2165) at 121 Fred Taylor Drive.</p> <p>All options have works in the existing corridor and could have potential for discovery. Option 1 requires construction works along the frontage of both sites. Option 2 would encroach further into the site Option 3 would reduce impacts on this site and therefore be preferred.</p> <p>Note that 81 Fred Taylor Drive site has now been earth worked and cleared and therefore impacts at this site are not a differentiator.</p>
Social	<p><u>Future land use integration:</u> All options integrate with proposed intersection at Redhills HIF for Dunlop Road and Spedding Road intersection opposite Hailes Road. Both sides of Fred Taylor Drive (south of Northside Drive) have development present along the corridor. Widening only to the east or west has greater potential to impact on the industrial or residential landuse, including smaller residential lots along the western frontage (Option 3), or commercial on the east (Option 2).</p> <p>North of Northside Drive is primarily zoned FUZ. There are some warehouses and dwellings located close to the corridor in larger lots. It is likely that an east or west alignment would have greater impacts on those buildings located close to the corridor, however Option 1 could be integrated into future landuse, given FUZ and expected landuse change.</p> <p><u>Social:</u> Whenuapai Ambulance Station is located on the western side. Options should look to minimise impacts on this site, including the maintenance of access, so as to avoid adverse social effects. Option 3 would have greater potential for impacts at this site. There are limited open space areas along the corridor (the upgrade does not extend as far north as Fred Taylor Park).</p> <p><u>Urban Design:</u> Urban design was not a differentiator.</p> <p><u>Land Requirement:</u> An east or west only widening alignment would affect less properties and would be focused on one side of the corridor, however this would require more land and have more significant impacts on those sides.</p> <p>Option 1 would require a greater number of properties to be included in the footprint but will have a reduced extent and likely avoid full acquisitions by reducing demolition of buildings. In addition, the construction areas would be temporary and therefore upon finalisation. For this reason, Option 1 is preferred.</p> <p><u>Human Health and Wellbeing:</u> An east (Option 2) or west (Option 3) aligned option would move the corridor closer to existing properties and / or to future development, this has the potential to increase adverse amenity impacts. Option 1 is therefore preferred.</p>
Environment	<p><u>Landscape and Visual:</u> No differentiation.</p> <p><u>Stormwater:</u> Being on a ridgeline, the route runs along the boundary of catchments. As such, there are no visible stream crossings or major flood plains along the route.</p> <p><u>Ecology:</u> No SEA mapped along the alignment, a number of streams and wetlands were identified in the vicinity of the road however these were not noted as being of significant ecological value.</p> <p><u>Natural Hazards:</u> There is limited exposure to flood hazard along the corridor, the western side of the corridor has an area of flooding at 160 Fred Taylor Drive. Option 3 would be greater affected by this and was less preferred to a central (Option 1) or eastern (Option 2) option.</p>
Economics	<p><u>Utilities:</u> All options will impact on utilities to a similar extent.</p>

Assessment

Construction: An eastern or western option would likely have greater building impacts and associated construction complexity and duration. An option which minimises impacts on buildings, such as Option 1, would have reduced construction disruption and cost.

13.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners, to discuss the options. Key engagement outcomes were Partners agreed with Option 1. AT extended the lapse date of Designation 1468 from November 2021 to March 2027 to allow future widening of the corridor.

Additional feedback was received on the impact of the National Policy Statement on Urban Development, specifically that once the proposed RTN is confirmed (non-Te-Tupu Ngātahi project) it will create intensification opportunities around Fred Taylor Drive. The Project Team confirmed that the preferred Option 1 will support this growth, as it will most effectively utilise the existing road corridor and transport designation.

13.6.3 Preferred Option

Following gap analysis and consideration of the land use and constraints, in addition to feedback received from Partners and community, the preferred option for Fred Taylor Drive was identified as:

- Option 1 / central, utilising the existing road reserve and designation areas with some widening to enable construction and tie ins.

The preferred option reduces new impacts on properties and receivers, makes best use of the existing road corridor and transport designations, and achieves the transport outcomes identified.

13.7 Fred Taylor Drive Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Fred Taylor Drive upgrade is Option 1, central widening. Option 1 allows localised widening to provide for tie ins at intersections and enable space for construction and stormwater facilities.

14 R1: Coatesville-Riverhead Highway

14.1 Corridor Overview

The Coatesville-Riverhead Highway upgrade was included in the TFUG recommended network and extended from SH16 northeast to the Riverhead live zoned area, see Figure 14-1. This corridor was split into two sections to assess separately at the IBC stage:

- **SR-K-03:** Coatesville-Riverhead Highway – South of Riverhead to SH16
- **SR-K-04:** Coatesville-Riverhead Highway – North of Riverhead to Dairy Flat.

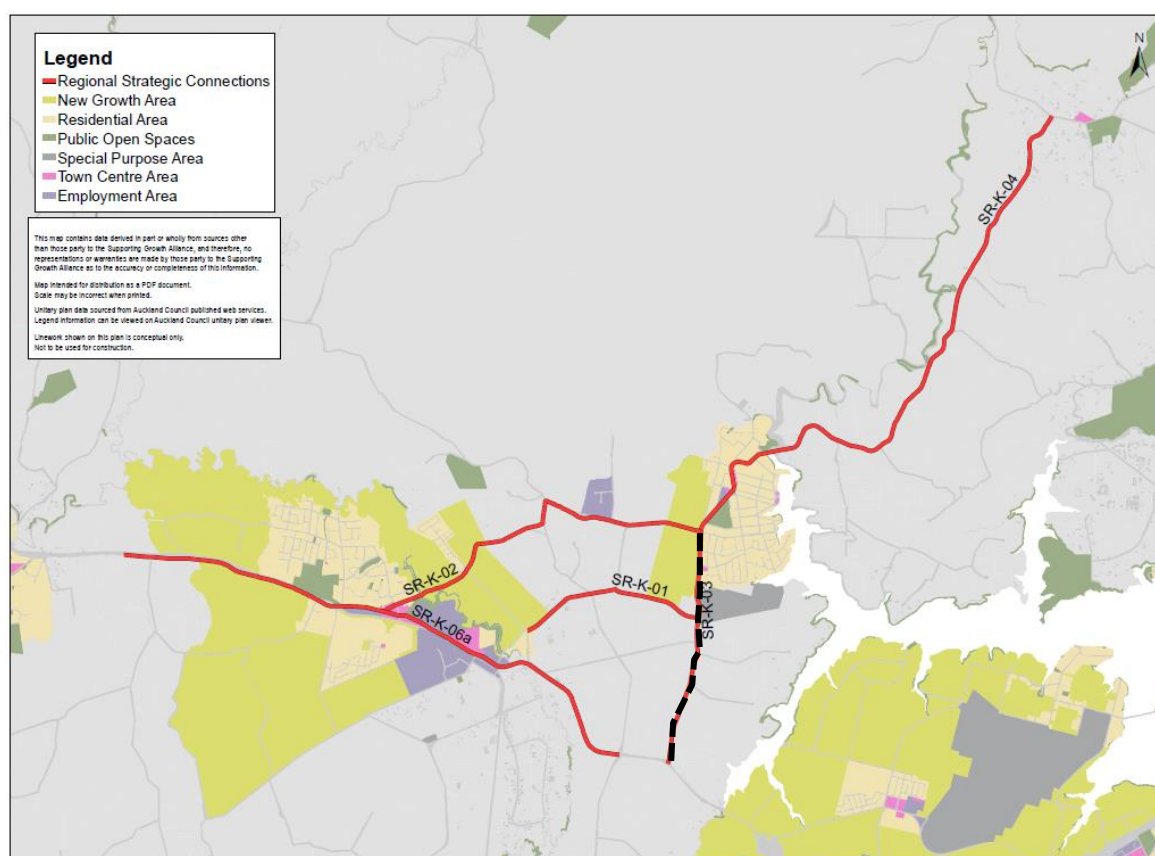


Figure 14-1: Coatesville-Riverhead Highway IBC Option SR-K-03

Both sections of Coatesville-Riverhead Highway were assessed as strategic sub-regional connections to service the Riverhead community. Coatesville-Riverhead Highway north of Riverhead to Dairy Flat (SR-K-04) would potentially result in significant environmental impacts, it was therefore discarded at the IBC stage. Project Partners and public feedback supported the section south of Riverhead and indicated support for safety improvements along the corridor.

Because Coatesville-Riverhead Highway is an existing corridor that can be upgraded to meet transport outcomes, no alternative routes were considered during the IBC. The Coatesville-Riverhead Highway (SR-K-03) southern section was therefore shortlisted for further development at DBC stage. The function of Coatesville-Riverhead Highway upgrade is to provide an important connection between Riverhead and the areas to the south such as Whenuapai and Westgate

14.2 Gap Analysis

Gap analysis identified that the SH16 Safety Improvements Project (a Non-Te Tupu Ngātahi project) will need to be considered in the design on the intersection.

Gap analysis confirmed that:

- Adequate corridor analysis of the Coatesville-Riverhead Highway was undertaken at the IBC phase, analysis did not trigger further corridor assessment
- Route refinement assessment should be undertaken to respond to identified constraints and for the project team to undertake the assessment, rather than SMEs.

14.3 Corridor Form and Function Assessment

An assessment was undertaken for Coatesville-Riverhead Highway following the CFAF methodology in Section 4.3, the recommendation informed the route refinement options developed and assessed in Section 14.5. Coatesville-Riverhead Highway was divided into two segments for the purposes of the assessment and Figure 14-2 and Figure 14-3 show the CFAF cross section outcomes.

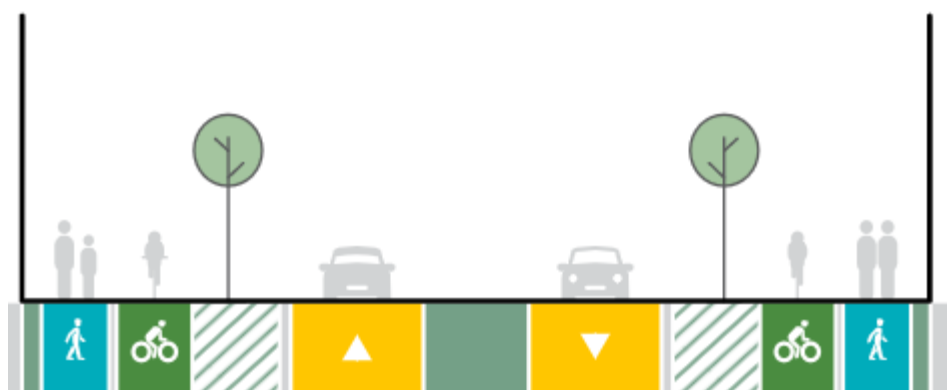


Figure 14-2: Coatesville-Riverhead Highway CFAF cross section outcome S1: SH16 to Short Road Indicative 24m cross section



Figure 14-3: Coatesville-Riverhead Highway CFAF cross section outcome S2: Short Road to Riverhead Road Indicative 24m cross section

14.4 Land Use Review and Constraint Mapping

To inform the option development and assessment, a land use review and constraint mapping exercise was carried out on the Coatesville-Riverhead Highway corridor environment, this identified that:

- **Extent and Zoning:** The northern end of the corridor is located within the urban side of the rural-urban boundary (RUB). Within the RUB section, the east boundary has a mix of zones being Residential – Single House Zone and Business – Neighbourhood Centre Zone. The western side is FUZ and currently rural land use
- **Future Land use:** The corridors western side is within the RUB has not yet been structured plan and the future land use is not confirmed. Outside the RUB segment, the corridor traverses land primarily held in rural use zoned Rural-Mixed Rural Zone, and a portion on the east zoned Special Purpose – School Zone
- **Special uses and constraints:** The corridor has a number of uses along the alignment including a Hare Krishna Centre (Special Purpose School), social and community uses including a Monastery on the western side, and Huapai Golf Club on the east. A number of buildings have also located close to the corridor, which may result in property impacts
- **Environment / social constraints:** The corridor crosses a number of existing streams, including four in the rural zone. The area is a natural watershed between the Waitematā Harbour and the Kaipara.

It was decided to develop a centreline-based option that would address safety issues by improving road geometry deficiencies. It was also decided to develop two additional active mode options which could be applied should the geometric issues not warrant the wider upgrading of the corridor geometry.

14.5 Route Refinement Option Development

Coatesville-Riverhead Highway forms a key link between the Riverhead FUZ and SH16 and onwards to the RTC. Four options were initially developed, Option 1 a high-speed rural arterial of 90kph design speed was considered initially however following Partner engagement, was discounted as 90kph was considered inappropriate for the environment.

Three options using variations on the 24m cross sections were therefore workshopped, these were:

- **Option 2:** Upgrade to high-speed rural road, based on a 70kph design speed including walking and cycling facilities on western side
- **Option 3W:** Maintains the existing road alignment and adds walking and cycling facilities on the western side
- **Option 3E:** Maintains the existing road alignment and adds walking and cycling facilities on the eastern side.

14.6 Route Refinement Assessment

14.6.1 Assessment

The assessment undertaken for Coatesville-Riverhead Highway upgrade follows the process outlined in Section 4.5. The three options were qualitatively assessed against the MCA framework by the

Project Team. Options were also assessed against the ability to achieve the following Transport Outcomes.

- Access: Improve access to social and economic opportunities for active modes on Coatesville-Riverhead Highway
- Mode Choice: Support transformational mode share in Riverhead by providing a high quality and attractive active mode facility on Coatesville-Riverhead Highway
- Safety: Provide improvements on Coatesville-Riverhead Highway that contribute to a transport network that is free from deaths and serious injuries.

All options performed well in meeting the 'Access' outcome, however option performance varied against mode choice and safety. Options 2 and 3W had the least number of intersections and consequently performed better in providing a high-quality active mode facility along Coatesville-Riverhead Highway, Option 3E performed comparatively less well on mode choice.

Coatesville-Riverhead Highway is classified as a high-risk road due to its high crash rate and density of crashes being five serious injury crashes in the last five-year period. The increased traffic volumes predicted for this route are expected to exacerbate the safety concerns, with increases from 8,230 vehicles per day to 11,000 vehicles per day in 2048. Option 2 upgrading the existing vertical and horizontal alignment would address the current safety issues and is preferred on this outcome.

Option considerations and constraints identified are shown in Figure 14-4, Table 14-1 provides a summary of the qualitative assessment undertaken.

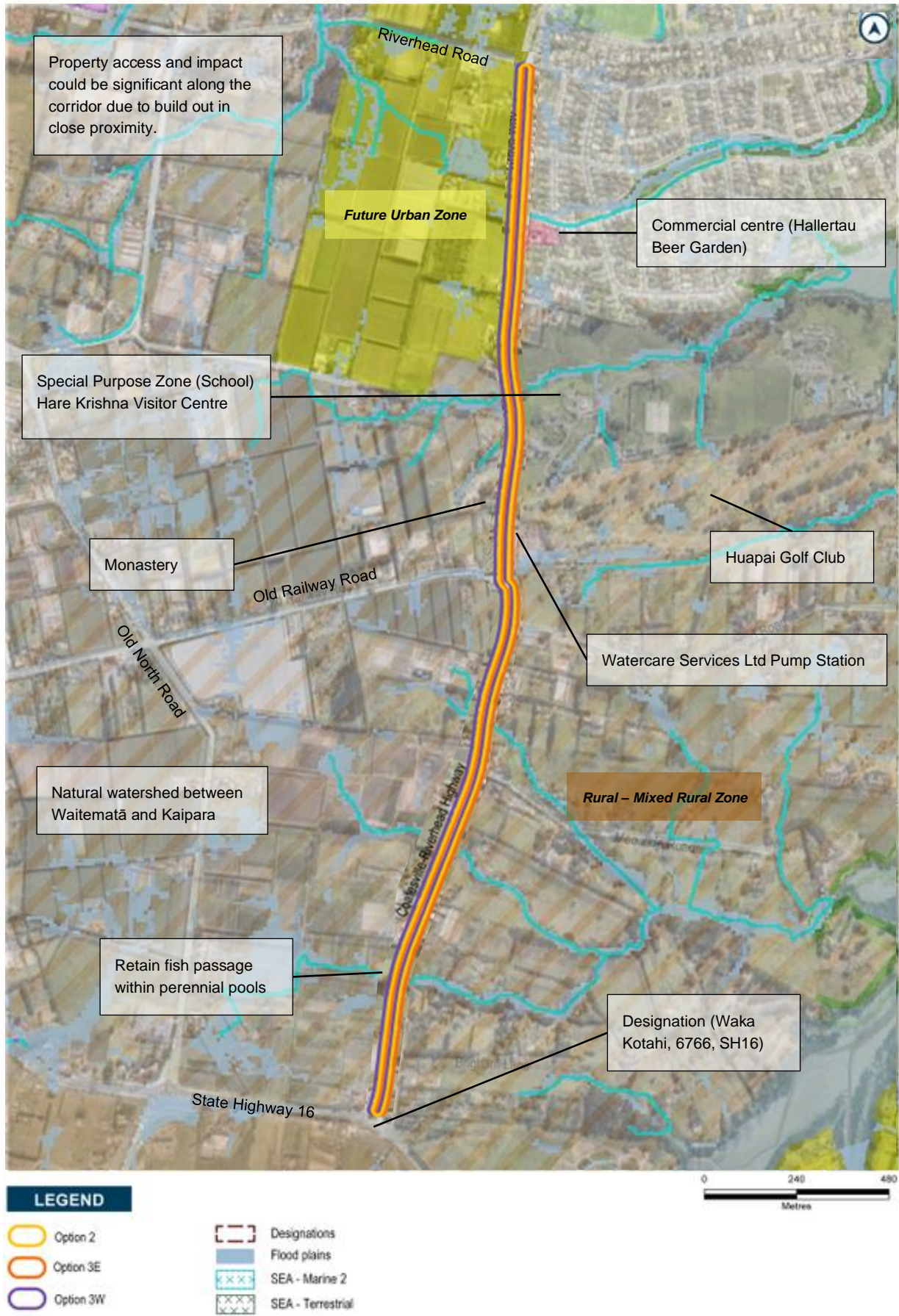


Figure 14-4: Coatesville-Riverhead Highway Options and identified constraints

Table 14-1: Coatesville-Riverhead Highway – Option Assessment Summary

Wellbeing Assessment	
Cultural	<p>Heritage: No significant heritage or archaeological constraints were identified along the route, and this criterion was not considered to differentiate between the options.</p>
Social	<p>Future land use integration: Option 2 and 3W are preferred as they will integrate with FUZ on the west side of the corridor within Riverhead. There is no significant difference between the options within the rural southern section of the corridor.</p> <p>Option 2 and 3W have the potential to utilise existing active mode infrastructure on the east side within the urban section of the corridor; whilst providing facilities on the east side that integrate with future development in the FUZ. These options were preferred in the urban section over 3E.</p> <p>Social: Option 2 and 3W will encroach upon the existing Buddhist Monastery site, and Option 3E will encroach upon the Special Purpose School Zone. The impact is not so significant that the options will prevent the ongoing use of the school and monastery sites or the existing buildings within the sites. Consequently, there is no differentiation between the options with regard to this criterion.</p> <p>Urban Design: All options provide better legibility outcomes for cyclists. The northern sections of Option 2 and 3W can be integrated with the future urban design outcomes for the Riverhead FUZ.</p> <p>Land Requirement: Option 2 involves active modes and upgrading the road corridor. This option was developed as it would result in a more equitable outcome in terms of requiring land on both sides of the road. Options 3W and 3E; however, have a reduced land requirement as both options only propose the addition of active modes. Options 3W and 3E have similar impacts and are equally preferred and Option 2 is least preferred due to increased land requirement.</p> <p>Human Health and Wellbeing: No major impacts or effects on health and wellbeing were identified for any of the options, and this criterion was not considered to differentiate between the options.</p>
Environment	<p>Landscape and Visual: No significant landscape features were identified, and this criterion was not considered to differentiate between the options.</p> <p>Stormwater: The options will not significantly impact the streams / watercourses located along / in proximity Coatesville-Riverhead Highway. No other significant constraints from flooding or overland flow paths were identified along the route. All options will require stormwater infrastructure to be provided either within the road corridor or on adjacent property. This criterion was not considered to differentiate between the options.</p> <p>Ecology: No significant ecological constraints were identified in close proximity to the options. This criterion was not considered to differentiate between the options.</p> <p>Natural Hazards: No significant geotechnical constraints or instability issues were identified along the alignment. This criterion was not considered to differentiate between the options.</p>
Economics	<p>Utilities: Option 3E will impact upon an existing water pump station and pylons located on the eastern of the corridor. Option 2 can be refined to avoid or minimise impacts on the water pump and minimise impacts on the pylons. Option 3W will avoid impacts on these utilities as the eastern edge is held in this current position Option 3W is therefore preferred under this criterion.</p> <p>Construction: Option 2 is least preferred as it will require the greatest extent of work within the road corridor. Options 3E and 3W are equally preferred as most of the works can take place off road and will require less traffic management on the road corridor.</p>

14.6.2 Refinement through Engagement

Throughout the option assessment workshops the Project Team engaged with Project Partners including Manawhenua and Auckland Council to discuss the options.

Engagement with Watercare Services Ltd has been regular and ongoing, Coatesville-Riverhead Highway upgrades have potential to affect the existing Watercare pump station which collects wastewater from surrounding area. The site is undesignated and located in front of the Huapai Golf Course at 1262 Coatesville-Riverhead Highway. Watercare highlighted construction and design challenges of impacting the pump station. Shifting the pump site would also add significant project costs. The key outcome of engagement was Partner support for the emerging preferred of Option 2.

14.6.3 Preferred Option

Following the MCA assessment and consideration of feedback received from Project Partners and the community, a preferred option for the Coatesville-Riverhead corridor was identified. The preferred option was Option 2 which widens to both sides of the existing corridor.

Option 2 was preferred because it:

- Provides active modes on the western side of Coatesville-Riverhead Highway, which can then be integrated with the Riverhead FUZ land, which is preferable to locating in the existing urban zone
- The option cross section can be refined to only provide active modes on the west side and utilise existing active mode facilities on the east side of the urban section of the corridor
- Has a reduced number of intersections which will need to be crossed on the western side resulting in less potential conflicts for the active mode corridor
- Avoids shifting the pump station (Watercare Services Ltd asset) on the eastern side of Coatesville-Riverhead Highway
- Enables alteration to the road geometry enabling key corridor safety issues to be resolved on the primary access from Riverhead to Westgate and future employment areas in Whenuapai
- Whilst likely to be costlier to construct and has higher land requirements, this is required to achieve the safety outcomes identified.

The key differentiator through the assessment was that Option 2 outperformed the other options in terms of safety. Other impacts of the option on the environment and social infrastructure are able to be managed. There will be further opportunities to minimise impacts within the Project alignment during the detailed design of the Projects. As a result, no further refinement is required at this stage.

14.6.4 Discounted Options

Table 14-2 summarises the reasons for discounting the remaining two options.

Table 14-2: Coatesville-Riverhead Discounted Options

Option	Reasoning
Option 3E	<ul style="list-style-type: none"> • Impacts on the Watercare Services Ltd Pump Station and electricity pylons • Does not address the safety issues associated with the existing geometrical alignments on Coatesville-Riverhead Highway • Less integrated with future development within the FUZ and future urban design outcomes of the FUZ development.

Option	Reasoning
Option 3W	<ul style="list-style-type: none"> Does not address the safety issues associated with the existing geometrical alignments on Coatesville – Riverhead Highway.

14.7 Coatesville-Riverhead Highway Upgrade Summary

As outlined, through the assessment process and feedback from Project Partners and landowners, the preferred option for the Coatesville-Riverhead Highway upgrade is Option 2, to widen to both sides of the existing corridor and locate the shared path on the western side of the corridor. Corridor Option 2 was the only option that satisfactorily addressed the geometrical safety issues along the alignment and locating the shared path to the west also reduces the number of intersections active mode users are exposed to, increasing their safety.

15 North West Local Arterials Conclusion

This report has set out the consideration of alternatives undertaken to identify the preferred alignments and set out the considerations for project elements along the alignment, including stormwater and flooding management.

Te Tupu Ngātahi on behalf of AT adopted a systematic approach to considering alternative sites, routes and statutory methods for undertaking the Projects. The MCA framework adopted to consider alternative options incorporated Part 2 RMA elements as well as matters appropriate to AT statutory functions. The Local Arterials Package for route protection comprises eight new extended and / or upgraded corridors as follows:

Whenuapai

- **W1:** Trig Road Upgrade
- **W2:** Māmari Road FTN Upgrade
- **W3:** Brigham Creek Road Upgrade
- **W4:** Spedding Road
- **W5:** Hobsonville Road.

Redhills and Riverhead

- **RE1:** Don Buck Road
- **RE2:** Fred Taylor Drive
- **R1:** Coatesville-Riverhead Highway.

The assessment of alternative methods to deliver the Projects is set out in Section 16.

16 Alternative Statutory Methods

This section provides an overview of the statutory methods considered to deliver the Local Arterials Package of works.

16.1 Assessment of Route Protection Methods

The principal objective is to identify, and route protect the strategic transport network for the Local Arterials Package. The corridors will support Auckland's projected growth over the next three decades. To achieve this a number of statutory methods have been considered (see Figure 16-1), to enable route protection and implementation in light of each project's strategic importance, delivery urgency / timing, complexity and risk profile.

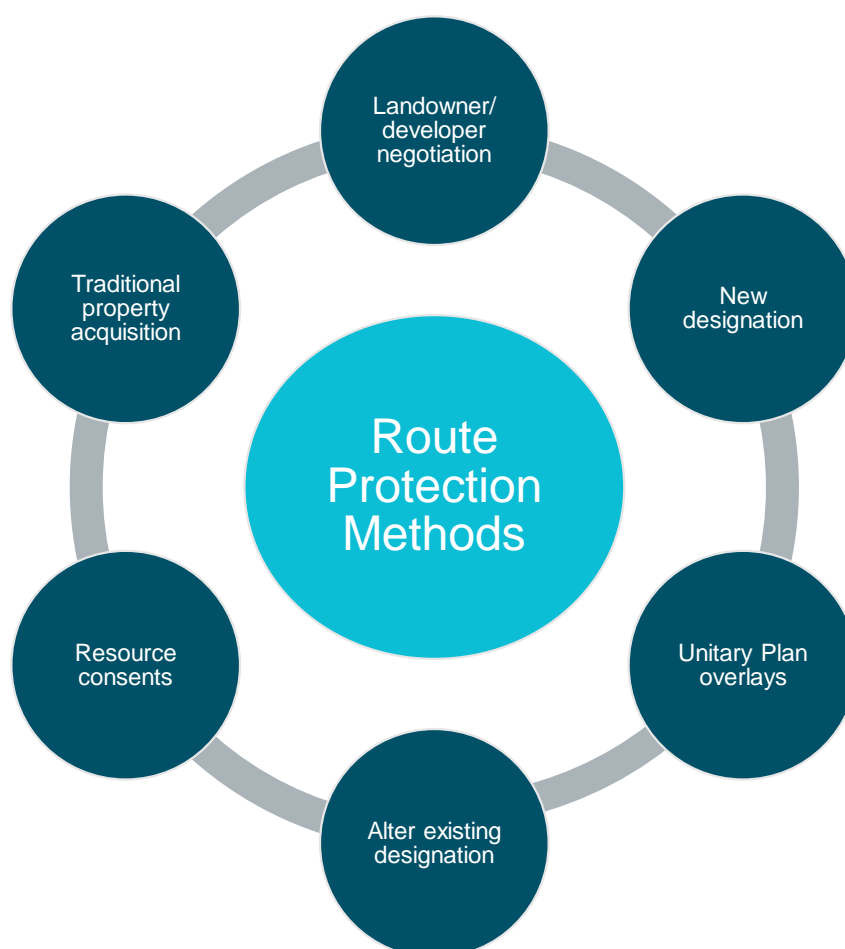


Figure 16-1: Route Protection Methods Considered

Table 16-1 below summarises the strengths, weaknesses and suitability of each method for route protecting the Local Arterials Package. The planning context, key risks and considerations which may influence the preferred route protection method were reviewed and evaluated taking into account the planning environment and identified risks and considerations.

A package assessment is provided of the method, and where applicable, further commentary is provided on a route's unique characteristics.

Table 16-1: Summary of route protection methods considered

Methods	Summary of strengths and weaknesses within local context
Auckland Unitary Plan 'Corridor Overlay'	<p>AUP:OP overlays can provide certainty to the community by publicly identifying the network, however they do not protect the land necessary for the works. Any overlays would require a plan change, this approach may not be accepted by Council as the AUP:OP overlays are generally focussed on RMA Section 6 and 5 matters (e.g., heritage, SEAs) rather than transport.</p> <p>There are existing infrastructure overlays in the AUP:OP for noise (e.g., Airport Noise Overlay, City Centre Port Noise Overlay) as well as the National Grid Corridor Overlay, which is most reflective of how an overlay may appear for transport. However, it is noted that the National Grid is also served by the National Policy Statement on Electricity Transmission which sets out key protections from adverse impacts of third-party development. There is currently no National Policy Statement which would provide the required protection for key transport corridors.</p> <p>Progressing a 'Transport Corridor Overlay' within the AUP:OP is therefore not considered a viable route protection method for the Local Arterials Package.</p>
Resource Consents	<p>A resource consent grants approval to use resources such as the land, water, air and coastal environment. A resource consent, if granted, is not shown publicly in a district plan and does not protect land or provide rights of exclusion that would hinder incompatible land use. Therefore resource consents are not an appropriate route protection method.</p> <p>It can be advantageous to seek resource consents (particularly for construction activities) under the RMA alongside route protection methods in instances where projects will proceed to construction once the route is secured. None of the Projects within the Local Arterials Package have funding for short term construction and delivery, therefore resource consents are not being sought.</p>
Landowner / developer negotiation	<p>Landowner or developer negotiations can include private parties purchasing land and vesting roads that support development, or development agreements whereby a developer agrees to "set aside land for future transport corridor" and / or construction at a future point.</p> <p>Infrastructure Funding Agreements (IFA) are the preferred form of landowner / developer agreement to enable delivery of transport infrastructure. IFAs provide route protection where a developer agrees to design and implement a project.</p> <p>For landowner agreements to be efficient, the aspirations and timing of each party must be aligned. There are several developers which are active in the wider Whenuapai area, however in most cases they do not own all the required land for a corridor. This then relies on individual property owners, who may not be developers (with sufficient capital or expertise) to enter into agreements. Private property owners with no development aspirations that are not part of a broader scheme may not have capacity or desire to negotiate such agreements.</p> <p>Where several independent properties and developers are involved, the final solution is likely to be delivered piecemeal due to the impracticalities and timeframes required to negotiate complex agreements with numerous landowners for each corridor, noting that there are a high number of property owners along the Local Arterials Package.</p> <p>IFAs with a large number of parties are generally impractical to implement and unlikely to protect the corridors within a reasonable time period. Additionally, it is not compulsory for landowners to enter into agreements. For linear corridors requiring a consistent network, agreement must be secured along the length of the route. A piecemeal approach significantly reduces the utility of this method for route protection purposes.</p> <p>Strategic routes (such as North West Local Arterials) are longer term and typically arterial corridors. These routes are usually delivered by the transport authority, due to their network</p>

Methods	Summary of strengths and weaknesses within local context
	<p>role. Provision of partial routes would not achieve the strategic network benefits the programme is seeking to protect.</p> <p>Trig Road</p> <p>The existing land ownership pattern adjacent to this section of Trig Road is fragmented, with the existing corridor predominantly surrounded by large rural lots or lifestyle block sections. There is therefore not sufficient certainty on the future ownership pattern at this stage.</p> <p>Māmari Road</p> <p>The existing land ownership pattern the Māmari Road corridor traverses is currently comprised of large rural and lifestyle block properties, with the exception of the NZDF housing and the Timatanga Community School. There is potential for an amalgamation of lots to enable the development of the FUZ. There is not however sufficient certainty on the future ownership pattern at this stage; and it is unlikely that there would be one owner / developer for the length of Māmari Road.</p> <p>Brigham Creek Road</p> <p>The existing land ownership pattern adjacent to Brigham Creek Road is fragmented, with the existing corridor predominantly surrounded by large rural lots or lifestyle block sections. The exception to this is in the Whenuapai town centre area. The surrounding land is constrained by smaller residential and commercial properties.</p> <p>Spedding Road</p> <p>Plan Change 69 has been submitted to Auckland Council for the Spedding Block and is now approved. It covers a portion of Spedding Road West. The team have commented on the proposal and worked with the developer to align the roading plans for Spedding Road West. There is opportunity to enter IFAs with developers for some portions of the Local Arterials Package where developers are active. Although opportunity for an agreement exists, the timing of the developer plans and the network are not confirmed and may not align.</p> <p>Hobsonville Road</p> <p>The existing land ownership pattern adjacent to Hobsonville Road is fragmented, with the existing corridor constrained by residential dwellings on the southern side, and commercial and industrial properties on the northern side. The fragmented nature of these land holdings suggests that there is a low likelihood that the upgrade of this road could be incorporated into a wider land development project.</p> <p>Don Buck Road</p> <p>The existing landowner pattern along Don Buck Road is fragmented with several smaller landowners, with mixed land use between business and residential uses with some full property acquisitions required. Reaching a successful IFA or agreement to deliver the upgrade is unlikely.</p> <p>Fred Taylor Drive</p> <p>Fred Taylor Drive has fragmented landownership along its length, with mixed land use including residential and business and open space. Land requirement is lower due to the existing Designation 1468 however this corridor is a strategic priority, and delivery under an IFA would rely on multiple individual owners and be susceptible to the weaknesses referred to above.</p> <p>Coatesville-Riverhead Highway</p> <p>The corridor runs primarily through a rural area, where urban development is not planned under the AUP:OP. Therefore, it is unlikely that a developer or landowner would progress this stretch outside of their development frontage.</p>

Methods	Summary of strengths and weaknesses within local context
	<p>The section of Coatesville-Riverhead Highway north within the RUB has active developers in the FUZ area. Although this area has not been subject to a plan change there is potential for the section to be delivered in part by landowners and Te Tupu Ngātahi. AT have been engaging with developers on this design, however these conversations are ongoing and no plan change has been confirmed or formal agreement to deliver this section reached yet.</p>
Traditional Property acquisition	<p>Traditional property acquisition to acquire the necessary land for each route was also considered. Land is typically purchased a few years before projects go to construction and delivery, based on detailed design plans.</p> <p>Purchasing property at this stage ahead of detailed design may result in more or less land being acquired than is required to deliver the project. It also may not enable construction areas to be protected which are required temporarily to construct the corridors. Like developer negotiations, traditional property purchase would not provide route protection until acquisition, where multiple owners are present this is unlikely to be achieved in a timely or consistent manner.</p>
Designation	<p>A NOR to designate land for a public work under the RMA provides a strong level of route protection from incompatible development particularly where development pressure is anticipated along the corridor. Once confirmed it also provides authorisation to undertake and maintain the works. A NOR has interim route protection effect as soon as the notice is lodged with Council which ensures the corridors will be protected from incompatible development from that date, enabling a cohesive interim protection for linear networks like roads.</p> <p>This effectively manages risk of development within the corridor that may otherwise hinder the proposed work. This is particularly important as there is keen developer interest in Whenuapai, particularly along Hobsonville Road and Brigham Creek Road.</p> <p>Developers have submitted private plan changes to Auckland Council indicating the intention to expedite growth in the area. A designation, if confirmed, is included in the relevant district plan as a publicly visible layer. This provides visibility to the public about the intended land use and project extent, it also provides certainty to other infrastructure providers and developers about the future network location, enabling integrated development planning.</p> <p>A designation enables faster construction and delivery of a corridor following detailed design, by consenting the project requirements under the district plan and allowing regional consents and Outline Plan of Works to be sought at a later date.</p>
Alteration to existing designations	<p>There are limited opportunities to rely on this method throughout the Local Arterials Package. Lodging a NOR for the alteration of an existing designation has the same strengths and potential risks as identified for a new designation.</p> <p>An alteration to an existing designation for the recommended network is only available for Hobsonville Road (Designation 1437) and Fred Taylor Drive (Designation 1468 or Designation 1433). The existing road corridor designation on Hobsonville Road (Designation 1437) and on Fred Taylor Drive (Designation 1433) are proposed to be altered. This approach represents an integrated approach with the existing designations.</p> <p>On Fred Taylor Drive altering Designation 1468 was discounted as this relates to relatively small areas along the corridor only and would have been a less integrated approach. However, Designation 1433 could be altered to provide for the proposed cross section.</p>

16.2 Preferred Method(s)

Designations (new or alterations to existing) are the preferred method. Designations provide certainty to the public by identifying the long-term transport network, enable it to be implemented in stages as

aligned with government funding and pace of growth, enabling effective investment. The method protects the required area by restricting activities or use that may prevent or hinder the project and allows detailed design to be undertaken prior to project delivery. Designations provide an efficient and effective route protection method for linear corridors in changing environments. Table 16-2 sets out the preferred method for each Project.

Table 16-2: Local Arterials Package Preferred Method

Ref	Project	Preferred Method
Whenuapai		
W1	Trig Road	Notice of Requirement
W2	Māmari Road	Notice of Requirement
W3	Brigham Creek Road	Notice of Requirement
W4	Spedding Road	Notice of Requirement
W5	Hobsonville Road	Alteration to existing AT Designation 1437
Redhills and Riverhead		
RE1	Don Buck Road	Notice of Requirement
RE2	Fred Taylor Drive	Alteration to existing AT Designation 1433
R1	Coatesville-Riverhead Highway	Notice of Requirement

16.3 Summary

The assessment of alternatives undertaken meets the statutory requirements set out in section 171(1)(b) of the RMA.