Sensitivity: General

Board Meeting| 28 August 2023
Agenda item no. 17
Closed Session

Entered by Board Secretary

Te Tupu Ngātahi – South Frequent Transit Network and Key Connections Detailed Business Case for Route Protection

For decision: ☒ **For noting:** ☐

Reason for inclusion in closed board meeting session	
1. Please state why this report is being considered in the closed board meeting as opposed to the open board meeting. Please refer to the 'reasons for confidentiality' and provide a direct reference to one of these reasons.	To protect the integrity of political and administrative processes - sensitive information in the options report relating to individual properties considered as part of the options consideration which is yet to be redacted and shared to the public.
2. Please provide an estimated date for release of this report.	By 31 December 2023, subject to approval by Waka Kotahi's Official Information team

Ngā tūtohunga / Recommendations

That the Auckland Transport Board (board):

a) Endorses the South Frequent Transport Network (FTN) and Key Connections Detailed Business Case (DBC) which recommends a Strategic Transport Network to support future urban growth and mode shift between Drury and Manukau.

b) Endorses the recommended route protection strategy where additional road reserve is required for the Strategic Transport Network.

c) Notes the cost of delivering the route protection post lodgement activities is already provided for in existing contract approvals approved in 2019 and is incorporated into the board approved FY24 capital programme.

d) Notes that a provision for early property acquisition risk from lodgement of the Notices of Requirement (NoR's) for Auckland Transport (AT), estimated at $81 million (P50 escalated) over the Regional Land Transport Plan (RLTP) period to 2031/32, is included in the draft 2024/34 RLTP.

Auckland Transport
An Auckland Council Organisation

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Te whakarāpopototanga matua / Executive summary

1. Te Tupu Ngātahi is an alliance owned by AT and Waka Kotahi New Zealand Transport Agency (Waka Kotahi) for the purpose of planning and route protecting the strategic transport networks required to support the future urban (greenfield) growth areas identified in the Auckland Plan, Future Urban Land Supply Strategy (FULSS) and Unitary Plan over the next 30+ years.
2. Auckland Council's FULSS expects South Auckland (the South) to accommodate 45 percent of Auckland's greenfield growth. In addition, the urbanised areas could undergo further intensification under Plan Change 78 to implement the Government's Medium Density Residential Standards (MDRS) National Policy Statement. Combined this could see the South accommodating new growth between Manukau and Pukekohe equivalent to the scale of new Tauranga by 2046.
3. The South currently experiences from congestion and limited travel options, particularly through the existing urban areas of Takanini, Manurewa and Manukau. There are limited north-south connections and an over reliance on State Highway 1 and Mill Road corridor, and the rail network to achieve mode shift (30 to 45 percent north of Takanini in the morning peak) in 2046. On its own, these are not enough to support network resilience and the planned growth in the South.
4. Te Tupu Ngātahi South FTN and Key Connections DBC proposes a Strategic Transport Network to ensure safe and reliable connections for actives modes, public transport, freight and private vehicle travel between key land uses and rail stations. It supports mode shift by leveraging planned investment in rail and provides network resilience by connecting to other key parts of the wider network including Mill Road, Takanini Crossings, Drury Arterials and SH1. The cost of this network is $797 million (P50 un-escalated) including $177 million for property.
5. Auckland Council's draft Future Development Strategy (FDS) has added land use uncertainty with the proposed removal of flood impacted land in Takanini and Opaheke future urban areas. Sensitivity analysis has been undertaken and the strategic transport network would remain resilient to these changes such is the existing network issues and significant growth planned for the South overall.
6. The majority of the package is recommended for route protection by way of NoR. Route protection provides certainty of the future transport network, ensures better land use transport outcomes, and reduces future cost risk and social impacts. The cost of delivering the route protection post lodgement activities is already provided for in existing approvals. The project cost associated with the Southern FTN and connections were identified in the original contract as part of the Alliance risk costs so no release of additional funding is sought to progress post lodgement approvals.
7. Route protection does carry an early property acquisition risk, which is estimates at $81 million (P50 escalated at 10 percent per annum) over the remaining RLTP to 2031. Provision for early property acquisition has not been made in the current approved capital programme and will need to be made in the 2024-34 RLTP.
8. Over 400 properties are impacted by the NoRs. Engagement in this area has been extensive with several open days, drop-in sessions and workshops with stakeholders, as well as online platforms. Over 1300 pieces of feedback has been received, which is the highest for any of the Te Tupu Ngātahi DBCs. Local boards support the proposal.

Ngā tuhinga ō mua / Previous deliberations

Date	Report Title	Key Outcomes
February 2019 Board	Supporting Growth – Preferred networks and next steps.	The board approved the Indicative Strategic Transport Network to progress to the next stages including DBCs to lodgement of NoRs for route protection.
October 2019 Board	Supporting Growth – Amended Programme Alliance Agreement	The board approved Target Cost Estimate Two (TCE2) for the programme. This includes this DBC with route protection and post lodgement cost included as part of the risk provision.
August DDC committee	Te Tupu Ngātahi – South Frequent Transit Network and Key Connections Detailed Business Case for Route Protection	Directors canvassed the views of the community, noting that this area was much more built up than other SGA areas, and options for alternative routes were limited, and as such the impact on individual properties was likely to be higher. Directors noted in this context the benefit of route protection as early as possible. Directors requested a summary of the options considered be provided.

Te horopaki me te tīaroaro rautaki / Context and strategic alignment

9. The current FDS is under review. This review is indicating a reduction in some of the South future growth areas impacted by flood plains. The revised FDS is expected to be adopted by Auckland Council in late 2023.
10. To support the significant planned growth in the South, Te Tupu Ngātahi prepared an indicative strategic transport network for the South (see Attachment 1) which was endorsed by the board in 2019. The strategic transport network is highly reliant on State Highway 1 (SH1), Mill Road corridor, and the rail network to achieve mode shift (30 to 45 percent north of Takanini in the morning peak) in 2046. On their own, these are not sufficient to move people north and south or provide local active modes and public transport options.
11. Te Tupu Ngātahi's South FTN and Key Connections DBC recommends a strategic transport network for route protection. It was developed in collaboration with AT, Waka Kotahi, Auckland Council, KiwiRail and mana whenua and builds on the other business cases for Takanini Crossings, Drury Arterial Network and Mill Road corridor. The DBC includes (see Attachment 2):

a. Upgrades to Great South Road between Drury and Manukau for public transport and active modes, to connect to rail stations, and local, town, metropolitan centres, and the Mahia and Roscommon roads public transport corridors.

b. Upgrades to Hunua, Walters and Porchester, and Alfriston Road roads between Opaheke and Alfriston for public transport and active modes, to connect with the Opaheke North South Arterial, rail stations, and local, town and metropolitan centres.

c. Upgrades to Alfriston Road, Popes and Croskery Road to link Takanini (Manuia Road grade separation and SH1) and Papakura to the Mill Road corridor respectively, and provide access and network resilience for active modes, freight and general traffic.

12. The work of Te Tupu Ngātahi aligns with the Letter of Expectation for the Statement of Intent 2023 - 26, by adopting a one network approach to planning future infrastructure and incorporating a high level of community engagement and decision-making over the past five years. This engagement has and continues to involve elected members, local boards, community groups and landowners and builds on the previous engagement of the Transport for Future Urban Growth project (2016).

Ngā matapakinga me ngā tātaritanga / Discussion and analysis

13. The purpose of a DBC is to build a complete understanding of acceptable risks, uncertainties and the benefits associated with the investment, so that a final decision can be made on whether to implement it. A Multi-Criteria Analysis (MCA) is undertaken to allow for differentiation between the options and identify the benefits and disbenefits and/or effects of each. The options assessment (see Attachment 3) followed a robust process including MCAs, workshopping with partners (Auckland Council, mana whenua and KiwiRail) and public engagement.

14. The South currently experiences from congestion and limited travel options, particularly for public transport and active modes. The recommended strategic transport network addresses existing network issues being experienced now and supports planned growth both within the existing urban area and future urban growth areas by:

a. Connecting key parts of the strategic transport network together to provide network resilience, including SH1, Takanini Crossings and Mill Road corridor. This is particularly important for freight outcomes;

b. Supporting mode shift through safe and reliable north and south public transport and active modes connections. This both supports access to rail for longer trips and an alternative for local travel to key land use destinations. This also strongly supports both mode shift and climate change outcomes (see Attachment 4);

c. Improving travel options, safety, and access to employment, services and recreational opportunities.

15. Given the majority of the recommended strategic transport network is within the existing, and intensifying, urban areas of Takanini, Manurewa and Manukau, one of the key challenges has been striking a balance struck between reducing property impacts and ensuring network outcomes are realised. This is largely achieved through making better use of the existing road corridor where there is sufficient space and only widening where needed such as around key FTN routes and intersections.

Entered by Board Secretary

16. The FDS has added land use uncertainty with the proposed removal of flood impacted land in Takanini and Opaheke future urban areas. Sensitivity analysis has been undertaken and the strategic transport network would remain resilient to these changes such is the existing network issues and significant growth planned for the South overall.
17. The total cost of the project is $797 million (P50 un-escalated) including $177 million for property acquisition. The overall Benefit-Cost-Ratio (BCR) is 0.6. Upgrades of existing roads with active modes and bus lanes from private vehicle results in traffic disbenefits contributing to the low BCR. It is expected that value for money will increase at the implementation phase through design refinements, reducing land take, and investigating opportunities to partner with third parties (for example developers).
18. The DBC recommended a route protection strategy for parts of the network that have strategic merits and benefits. Significant effort has been spent right sizing the NoRs to reduce property impacts and therefore the southern section of the Takaanini FTN (refer to Attachment 5) and Croskery Road is not recommended for route protection. AT could also consider reducing the land requirements for Popes Road and Porchester Road if the Takanini future urban area is removed by the FDS.
19. The DBC assumes majority of the Strategic Transport Network would be implemented by 2038. Delaying or not proceeding with route protection is not recommended given the pressure and potential for growth along most of these corridors now and the related risk of buildout and long-term cost increases when these projects are needed in the future. Not implementing the network would reinforce reliance on private vehicle travel, negative outcomes for safety, mode shift and resilience.
20. Route protection does carry an early property acquisition risk, which is estimates at $81 million (P50 escalated at 10 percent per annum) over the remaining RLTP to 2031. Provision for early property acquisition has not been made in the current approved capital programme and will need to be made in the 2024-34 RLTP.
21. The full DBC is contained in Attachment 6.

Ngā tūraru matua / Key risks and mitigations

Key risk	Mitigation
Lodging NoR's creates a financial risk that AT may be obliged to purchase property earlier than required.	AT's hardship policy sets out circumstances for considering early acquisition of property from landowners on hardship grounds (i.e., financial hardship, illness etc). For early acquisition requests that do not meet the hardship thresholds or have insufficient justification, AT will continue to strike a balance between vulnerable landowners and managing financial risk. Funding for this early property acquisition is not provided for in the current approved capital programme and will need to be provided for in the upcoming 2024/34 RLTP.

	Overall, route protection will deliver significant benefits and cost savings into the $billions overtime time which outweigh the short-term risks and cost of early property acquisition.
Reputational – potential for landowner opposition to NoR lodgement due to the impact of designations on properties	Te Tupu Ngātahi has developed and will implement a proactive post lodgement approach to support landowners as part of the NoR process, including ongoing landowner meetings and communications and making support services available such as the Friend of the Submitter, which provides independent professional support to submitters to assist landowners make submissions.
Auckland Council's removal of the Takaanini Future Urban Areas under the Future Development Strategy	The route protection strategy has provided a separate NoR for corridors adjacent to the future urban areas in response to the potential removal of the Takaanini FUZ. In the event this happens, the need for this NoR can reviewed.

Ngā ritenga-ā-pūtea me ngā rauemi / Financial and resource impacts

22. The approved Te Tupu Ngātahi Supporting Growth Alliance (Te Tupu Ngātahi) agreement includes the cost of post-lodgement activities associated with route protection of the Southern FTN and connections as a risk item in the original 2019 contract approvals. As a result, no release of funding is sought. These costs are confirmed in the board approved FY24 Capital programme.
23. Early property acquisition risk once the NoRs are lodged with Auckland Council is estimated at $81 million (P50 escalated at 10 percent per annum) for the preferred route protection strategy to 2031. Funding has been sought through the draft Joint Transport Plan (JTP) and draft RLTP 2024-34 review for a regional 'Property and Encroachments" for all of Te Tupu Ngātahi's programme.

Ngā whaiwhakaaro ō te taiao me te panonitanga o te āhuarangi / Environment and climate change considerations

24. Modelling identifies the recommended strategic transport network will result in a reduction of 54,800 Vehicle Kilometres Travelled (VKTs) in 2048+ compared to the baseline network and an emissions reduction of 2,250 tonnes per year. Route protecting the recommended network further contributes to emission reductions by supporting a compact land use, reducing trip distances, and enabling mode shift.
25. The recommended transport package directly responds to the Transport Emissions Reduction Plan (TERP) outcomes through provision for bus priority and active mode facilities reducing travel by the private vehicle. Long-term resilience has also been a focus of the business case processes with stream crossings accommodating the 1 in 100-year flood event with sensitivity testing against climate change scenarios.

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Ngā whakaaweawe me ngā whakaaro / Impacts and perspectives

Mana whenua

26. Mana whenua are a partner of Te Tupu Ngātahi and were and continue to be engaged with through regular hui. Representatives provided input into the option development process. Mana whenua generally support the DBC with some concerns around the level of property impacts and efforts to reduce the level of impact was supported.

Ngā mema pōti / Elected members

27. Te Tupu Ngātahi has engaged with Otara-Papatoetoe, Manurewa, Papakura, and Franklin Local Board on the DBC, seeking input on the public engagement approach, providing on the feedback received and preferred options. Papakura Local Board was particularly engaged, with elected members understanding of the Great South Road corridor. In general, there was overall support from elected members.

Ngā rōpū kei raro i te Kaunihera / Council Controlled Organisations

28. Auckland Council is a partner of Te Tupu Ngātahi and are regularly updated on the programme, including this DBC. Te Tupu Ngātahi update Watercare regularly on its projects.

Ngā kiritaki / Customers

29. There has been a high level of feedback from the public engagement carried out between 8 March and 10 May 2023 with the project team speaking to over 200 community members at public events and receiving over 1,300 survey responses. There has also been regular engagement with community interest groups including business associations. In general, the response has been positive with strong support for the FTN routes and safe active mode facilities. Te Tupu Ngātahi will continue to engage with landowners as part of the NoR preparation.

Ngā whaiwhakaaro haumaru me ngā whaiwhakaaro hauora / Health, safety and wellbeing considerations

30. Te Tupu Ngātahi programme has applied Vision Zero principles to its business cases and applied the avoid, shift, improve approach at each step. The recommended transport package has been developed to avoid the need for private vehicle travel in the first instance, prioritise public transport and active modes, and ensure upgraded corridors have sufficient width to accommodate a safe and compliant design.

Entered by Board Secretary

Ā muri ake nei / Next steps

31. Should the AT and Waka Kotahi boards endorse the South FTN and Key Connections DBC, Te Tupu Ngātahi will continue preparing the NoRs with the intention that AT will lodge these in late October 2023. Public notification of the NoRs is expected in February 2024 with hearings and appeals expected to be resolved by the end of 2025.

Ngā whakapiringa / Attachments

Attachment number	Description
1	South Growth
2	Recommended Strategic Transport Network
3	Recommended Strategic Transport Network Outcomes
4	Targeted Route Protection Strategy
5	Options report

Te pou whenua tuhinga / Document ownership

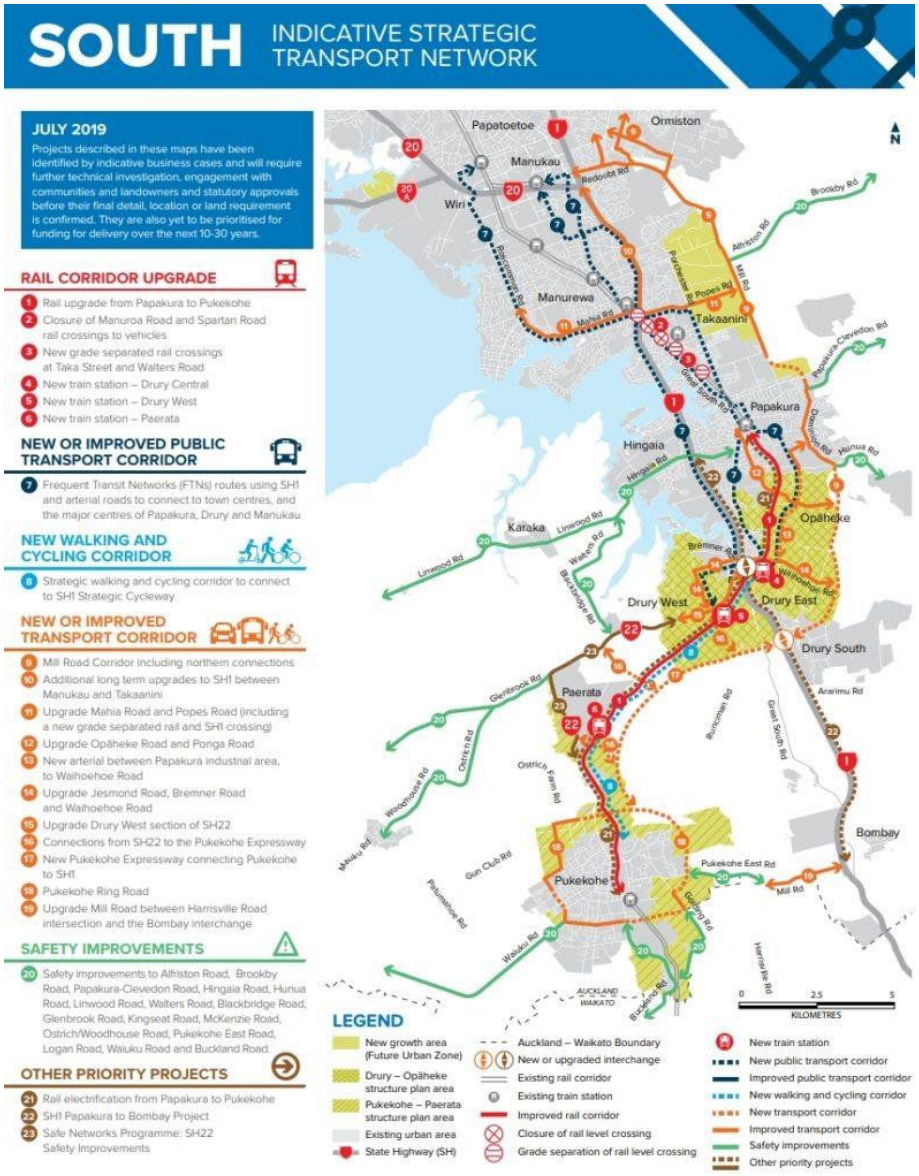
Submitted by	Alastair Lovell **Supporting Growth Alliance Owner Interface Manager** Chris Watson **General Manager Investment Development**
Recommended by	Jenny Chetwynd **Executive General Manager Planning and Investment**
Approved for submission	Dean Kimpton **Chief Executive**

Attachment 1 - South Growth

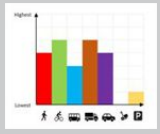
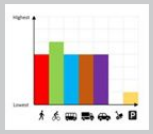
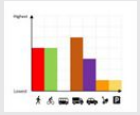
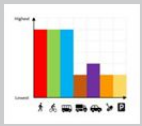
The South will grow equivalent to the scale of a new Tauranga between Manukau and Pukekohe over the next 30 years.

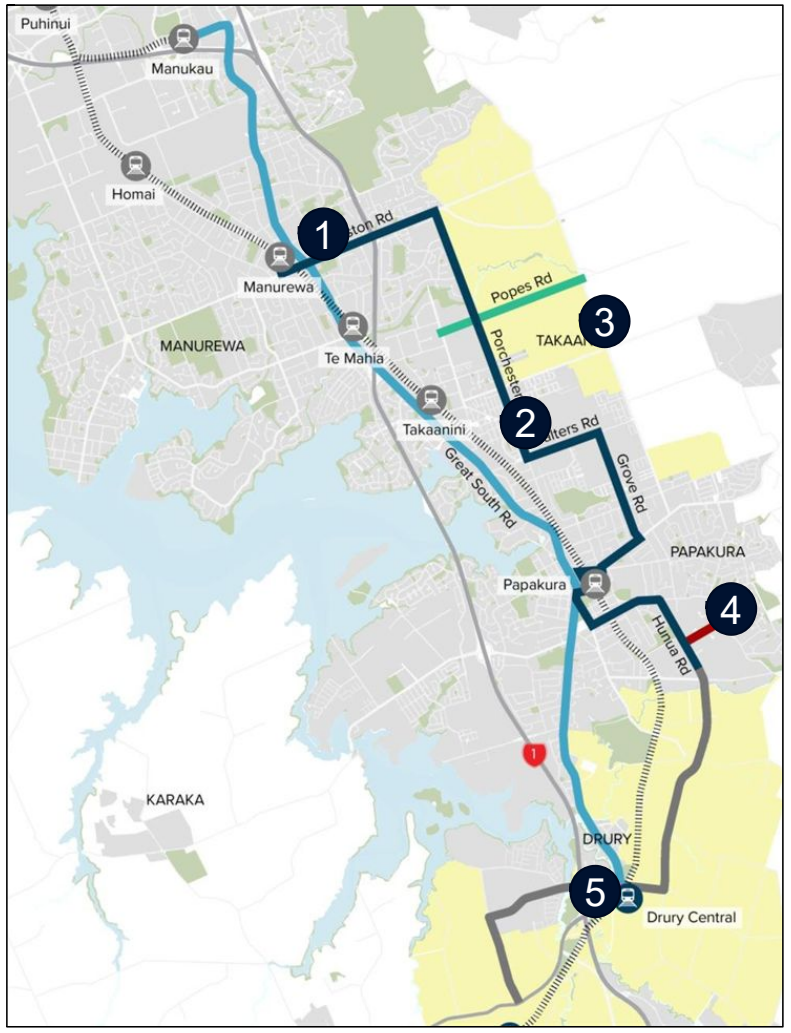
The key challenges are:

- Limited North-South alternatives to SH1
- Over reliance on rail to move people by PT
- Poor PT and active modes access to rail stations and centres



Attachment 2 - Recommended Strategic Transport Network

#	Project	Project purpose	Future Connect 2048+
1	GSR FTN	• Continuous northbound bus priority with targeted bus priority in the southbound direction • Connectivity for active mode users and improved bus performance • Alternative/support to the rail	 Varies - in general top priorities are active mode and PT
2	Takaanini FTN	• Targeted bus priority provided along the route • Connectivity for active mode users and improved bus performance • Alternative/support to the rail	 Varies - in general top priorities are active mode and PT
3	Popes Road	• Connectivity for active mode users • Improved safety • Support planned growth	 
4	Croskery Road	• Connectivity for active mode users • Improved safety • Key connection as part of the Drury-Opaheke Structure plan	
5	GSR upgrade	• Connectivity for active mode users • Improved safety • Fills a 'gap' with adjoining projects such as the Drury Central Station.	

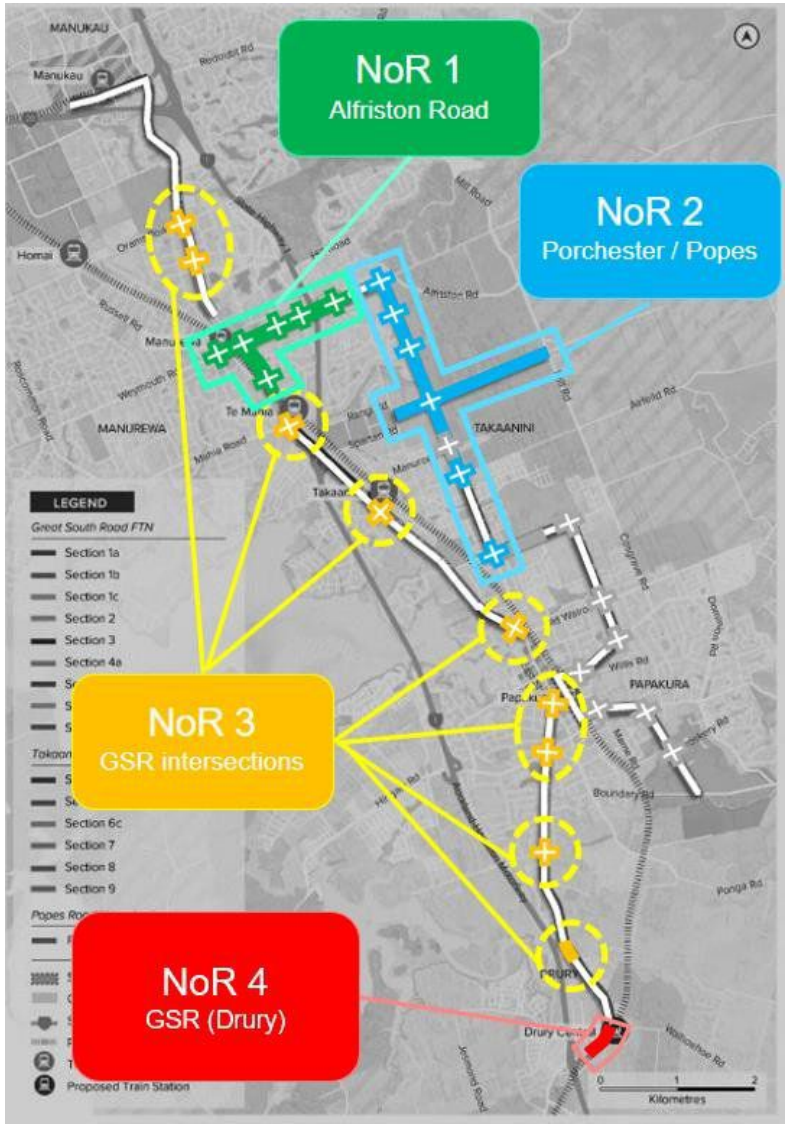


Attachment 3 - Recommended Strategic Transport Network Outcomes

Outcomes achieved	Alignment
Access	**Employment accessibility** 30 min by **PT** Manurewa ↑ **4%** Papakura ↑ **1%** Takaanini ↑ **12%** **177,000 jobs** accessible within 30 minutes by **active modes**
Reliability	Up to **11 mins** travel time saving on the GSR FTN (peak period) Up to **9 mins** travel time saving on the Takaanini FTN (peak period) Improvement in PT travel time reliability. Reduction in travel time spread to **18 minutes** on GSR FTN and to **12 minutes** on the Takaanini FTN.
Safety /Integration	**27km** New and improved cycle network **80** DSIs estimated to be saved over 40 years **29km** of new and improved network with enough space to improve street amenity appropriate for the place and built form
Travel Choice	**19km** New bus lanes to support the FTN network **2,800** average daily patronage increase across the FTN network **2,900** additional walk-km daily **1,400** additional cycle-km daily
Climate Change	**54,800** less vehicle kilometres travelled daily **2,250 tonnes** reduction of CO_2 per year. **89,800** tonnes reduction of CO_2 over 40 years. Stream crossings designed to accommodate 1 in 100 year flooding to respond to climate change.

Attachment 4 –
Targeted Route Protection Strategy

- Four NoRs proposed – 20-year lapse period across the board.
  - **NoR 1 Alfriston Road and GSR south of Manurewa -** most strategically significant section given the lack of east-west connections and has the most significant land requirement.
  - **NoR 2 Porchester / Popes Road –** to support future urban growth.
  - **NoR 3 GSR Intersections –** land take limited almost entirely to intersections.
  - **NoR 4 GSR Drury section –** packaged separately to ensure integration with adjoining NZUP projects.
- Southern sections of NoR3 not recommended for route protection – significant impacts on new build residential and long-term implementation / limited route protection benefit.



TE TUPU NGĀTAHI
SUPPORTING GROWTH

South FTN and Key Connections
Appendix C: Options Assessment Report

June 2023

Version 1.1

WAKA KOTAHI
NZ TRANSPORT AGENCY

New Zealand Government

Document Status

Responsibility	Name
Author	[redacted]
Reviewer	[redacted]
Approver	[redacted]

Revision Status

Version	Date	Reason for Issue
1.0	23/6/2023	Issue for IQA review
1.1	1/11//2023	FINAL

Disclaimer

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

Table of Contents

1 Introduction

1.1 The South FTN Project

The South Frequent Transit Network (**FTN**) Project (**the Project**) is one of two long-term transport interventions (along with the Takaanini Level Crossings (**TLC**) Project) proposed for the area of South Auckland between Manukau and Drury as part of the Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**[1]). These projects are part of a wider planned multi-modal transport network intended to support growth and enable mode shift in South Auckland. The wider strategic context for the identification of this network is covered in the main Detailed Business Case (**DBC**) document and in sections 2 and 3 of this report, and is not repeated here.

The Project proposes road upgrades intended to enable the operation of high-quality FTN[2] bus services along two routes – referred to as the Great South Road FTN, and the Takaanini FTN (see Figure 1-1). Improved active mode facilities are also proposed along both routes. In addition to the two FTN routes, the Project scope incorporates the urbanisation of three complementary (non-FTN) corridors – Popes Road, Croskery Road, and Great South Road to the south of Waihoehoe Road (see Figure 1-1). The total Project extent is over 32km in length.

1.2 Purpose and scope of this report

This report documents the optioneering process which has resulted in the recommended option for the Project identified in the DBC. This process has deductively assessed options in terms of:

- **Route optioneering** – that is, macro/network-level consideration of different route/alignment options for the Project;
- **Form and functional requirements** – which inform the physical extent of the corridors comprising the Project; and
- **Location refinement decisions** – that is, detailed consideration of how location choices (and resultant Project boundaries) may best reduce the adverse effects of the Project.

While the optioneering process documented in this report was undertaken specifically to inform the recommendations of the DBC, it has also been undertaken with a view to informing the consideration of alternative sites, routes, and methods for the Project under section 171(1)(b) of the Resource Management Act 1991 (**RMA**).

1.3 Report Structure

This report is divided into four parts (Parts A-D) to separate out optioneering considerations that are relevant to the whole of the Project (Part A) from the optioneering considerations relevant to each of the constituent routes (Part B for the Great South Road FTN, Part C for the Takaanini FTN, and Part D for the complementary corridors). Each part in turn comprises sections outlining the pertinent optioneering processes. This structure is summarised at Table 1-1 below.

[1] Te Tupu Ngātahi is a collaboration between Auckland Transport (**AT**) and Waka Kotahi NZ Transport Agency (**Waka Kotahi**) to investigate, plan, and undertake route protection for the strategic transport networks needed to support Auckland's growth over the next 30 years.

[2] FTN services are defined in AT's Regional Public Transport Plan (**RPTP**) as bus routes operating at least every 15 minutes between 7am-7pm every day, supported by priority measures.

Table 1-1 – Structure of this report

Part	Section	Matters covered
A – Whole-of-Project considerations	2	The business case process until now
	3	Gap Analysis
	4	General methodology
B – Great South Road FTN optioneering	5	Implications of the gap analysis
	6	Form and Function
	7	Route refinement
	8	Preferred option
C – Takaanini FTN optioneering	9	Implications of the gap analysis
	10	Corridor Assessment
	11	Form and Function
	12	Route refinement
	13	Preferred option
D – Complementary (non-FTN) corridors – Popes Road, Croskery Road, and Great South Road (Drury)	14	Implications of the gap analysis
	15	Form and Function
	16	Route refinement
	17	Preferred option

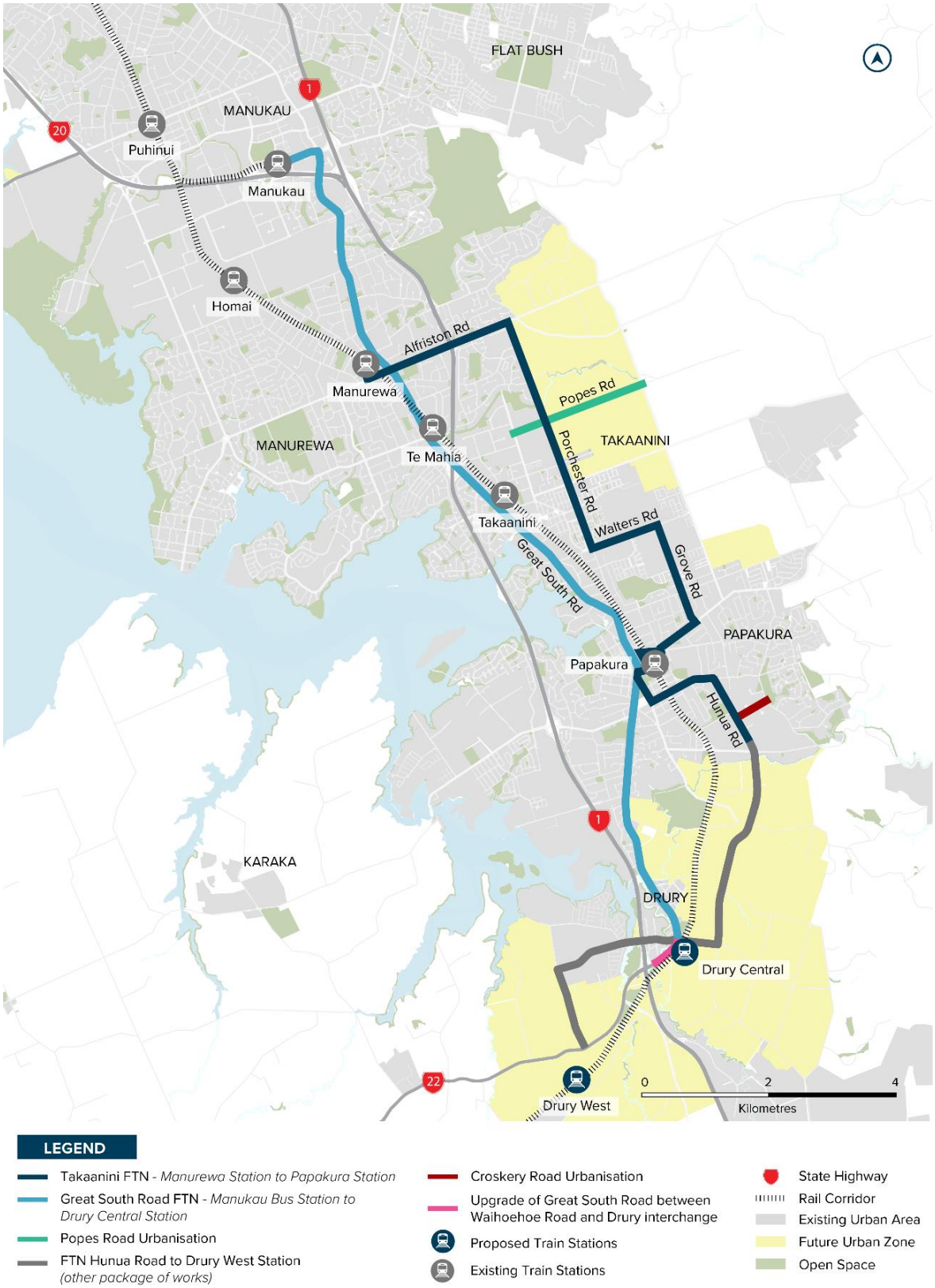


Figure 1-1 – South FTN Project Extent

PART A: WHOLE-OF-PROJECT CONSIDERATIONS

2 The business case process until now

2.1 Summary of the business case process

Optioneering has taken place through the following business case processes:

- A Programme Business Case (**PBC**) was completed in 2016 and identified a high-level draft preferred transport network across all of Auckland's growth areas;
- Four Indicative Business Cases (**IBC**) were completed in 2019 (for the Warkworth, Northern, North-Western, and the Southern growth areas), each identifying an Indicative Strategic Transport Network (**ISTN**) for each sub-region; and
- A total of nine Detailed Business Cases (**DBC**) are either complete or underway (including the South FTN DBC), each covering a package of projects derived from the wider ISTN.

The consideration of options becomes more detailed at each successive business case step – the initial focus is on identifying the networks at a high level, with focus subsequently narrowing to increasingly detailed project-specific considerations. The optioneering process documented in this report focuses on the DBC, which in turn used the South IBC as its starting point. The pertinent recommendations of the IBC are summarised in section 2.2.

2.2 Relevant recommendations of the South IBC

The initial IBC option longlist comprised some 484 network and corridor options for transport interventions for the entire Southern growth area. This was narrowed down to an amalgamated longlist of 151 options following a screening process, which were sorted according to relevant modes/intervention categories for shortlisting. The 'strategic connections' category included 'Mass Transit – Bus' options, intended to "provide access to and from areas not well serviced by the rail corridor… improve connecting public transport services to support rail… [and] provide high quality public transport directly into new urban areas"[3].

Following multiple Multi-Criteria Assessments (**MCA**), the following four FTN options were included in the ISTN (see Figure 2-1):

- **Option MT3C** – FTN on Great South Road from Drury to Manukau;
- **Option MT4I** – FTN between Drury and Takaanini via Jesmond Road, Bremner Road, Waihoehoe Road, the proposed Ōpāheke North-South Arterial, Porchester Road, Popes Road, Rangi Road (subsequently crossing State Highway 1 (**SH1**) and the North Island Main Trunk (**NIMT**) to join option MT3C on Great South Road);
- **Option MT4K** – FTN between Drury and Puhinui via SH1 bus shoulders, Mahia Road, and Roscommon Road; and
- **Option MT4L** – Express bus transit between Drury and Manukau via SH1 bus shoulders, Orams Road, and Druces Road.

[3] South IBC Appendix B – Options Assessment Report, p. 223.

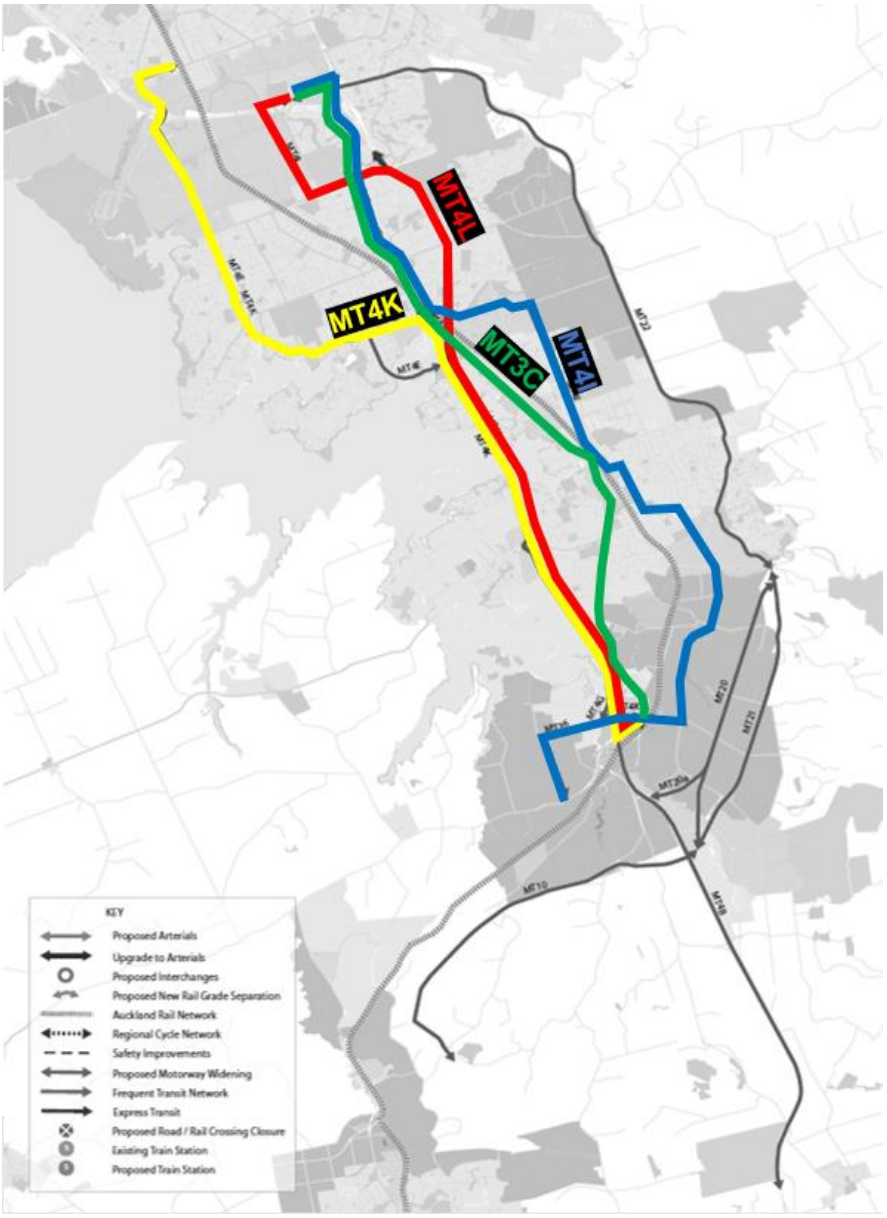


Figure 2-1 – FTN options included in the ISTN – MT3C, MT4I, MT4K, and MT4L. Other FTN routing options which were discarded at the IBC shortlisting stage are shown in grey.

In addition to these FTN options, the IBC shortlist also included option groupings for 'Drury-Ōpāheke eastern arterials', and 'Takaanini East-West Crossings'. A number of options from these shortlist groupings interact with the FTN options and were included in the ISTN, most relevantly including:

- **Option AR10** – comprising the proposed Ōpāheke North-South arterial (forming part of FTN option MT4I noted above), and the urbanisation of Hunua Road and Croskery Road (see Figure 2-2); and
- **Option EW9B** – comprising a series of east-west connections in the Takaanini area with grade-separated rail crossing. This option included an east-west corridor comprising a viaduct over SH1 and the NIMT connecting Rangi Road to Mahia Road, and urbanisation of Rangi Road and Popes Road (see Figure 2-3). This route forms part of option MT4I.

These options were all included in the ISTN (see Figure 2-4), and thus formed the starting point for the South FTN DBC.

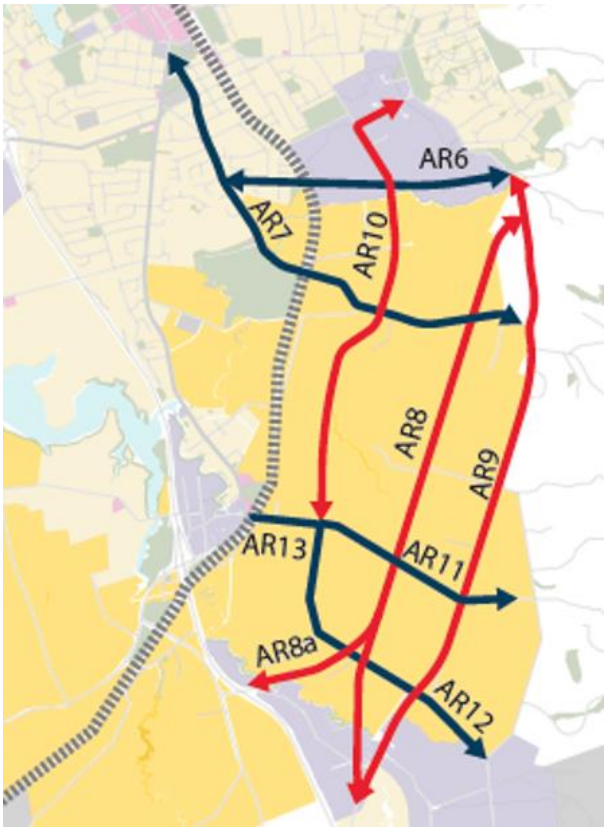


Figure 2-2 – Shortlisted IBC options for Drury-Ōpāheke eastern arterial options – note option AR10 (included in the ISTN) which includes the Ōpāheke North-South arterial, the urbanisation of Hunua Road, and Croskery Road which forms part of FTN option MT4I.

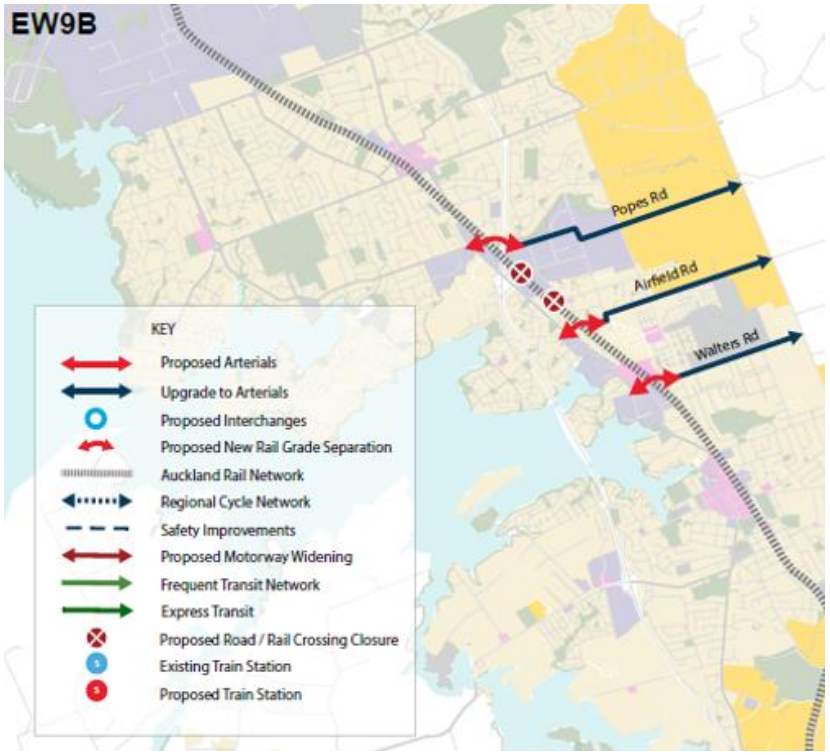


Figure 2-3 – Preferred IBC option for Takaanini east-west crossings as included in the ISTN, including the northernmost corridor encompassing a Rangi Road viaduct, and upgrades to Rangi Road and Popes Road (note the eastern extents of Airfield and Walters Road shown in this map were not included in the ISTN – see Figure 2-2 below).

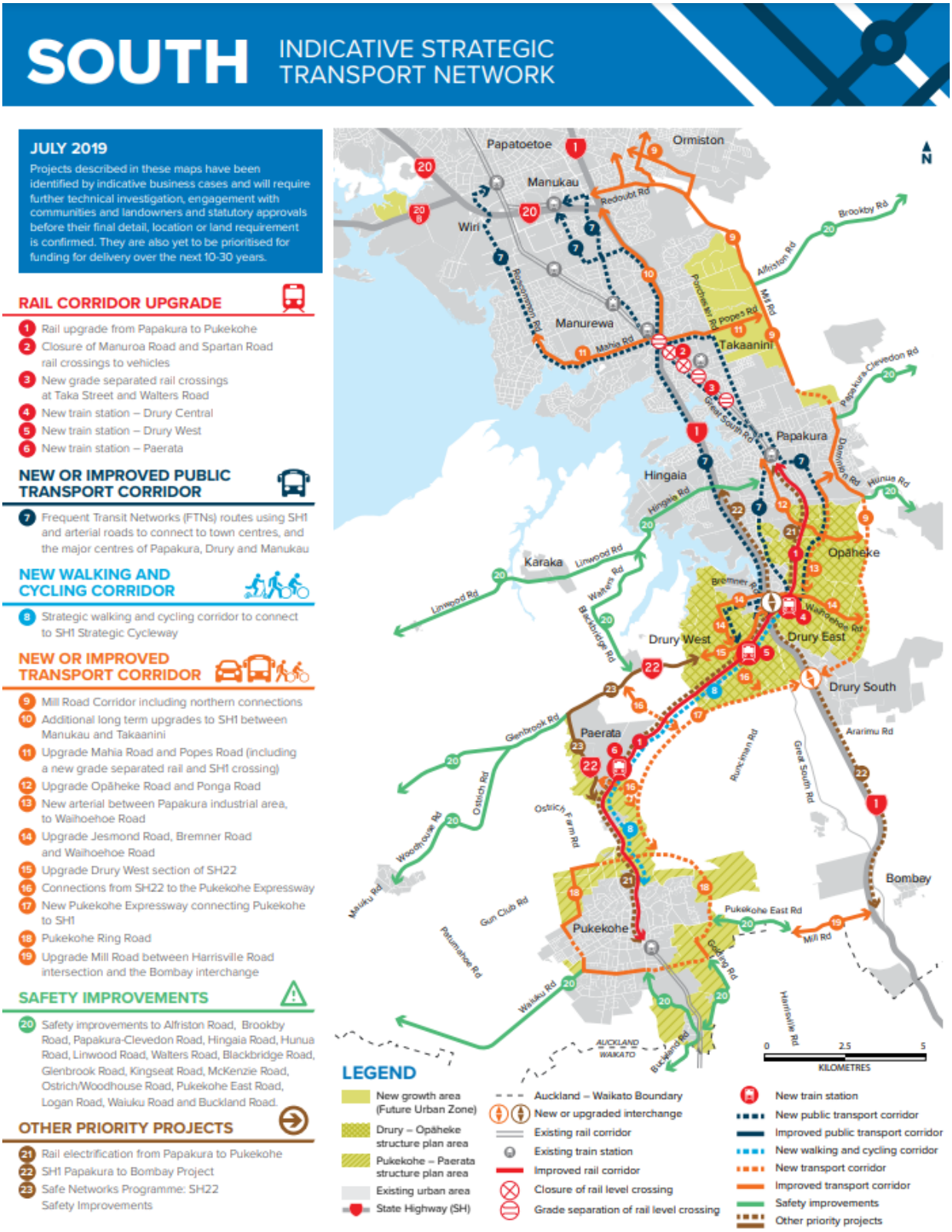


Figure 2-2 – South Indicative Strategic Transport Network – note the four FTN routes identified in the IBC shown in dark blue annotated as '7', the east-west crossing including the Rangi Road viaduct shown in orange annotated as '11'; and Croskery Road forming part of the corridor shown in orange annotated as '13'.

3 Gap Analysis – what's changed since the IBC?

At the outset of the South FTN DBC, a gap analysis was undertaken to capture changes in the strategic context that have occurred since the completion of the South IBC; and test the IBC assessment and conclusions in the context of new information. This process recognises that the IBC was completed in 2019, that changes in the context for the Project have occurred in the intervening period; and that such changes could change the scope of optioneering required for the DBC and/or the merits of conclusions in the IBC.

The gap analysis is set out at section 4 of the main DBC document and is not repeated in full here. However, the key contextual changes that are directly relevant to the scope and merits of options for the South FTN Project are summarised in Table 3-1.

Table 3-1 – Key contextual changes since the South IBC pertinent to the South FTN Project

Change	Explanation / relevance to South FTN optioneering
Changes to related transport projects	
Decision to progress the southern portion of IBC option MT4I as part of the Drury Arterials Package	The portion of IBC FTN route option MT4I between Drury and Papakura is proposed to utilise Jesmond Road, Bremner Road, Waihoehoe Road, a new Ōpāheke north-south arterial road, and Hunua Road. This part of the route follows IBC option AR10 shown above. With the exception of Croskery Road, these corridors have subsequently been progressed as part of the Drury Arterials DBC by Te Tupu Ngātahi, and are now designated. Accordingly, this section of the corridor is out of scope with no further optioneering required (apart from Croskery Road which is now in the scope of the South FTN DBC).
Decision to progress SH1 shoulder lanes as part of the Waka Kotahi Papakura-to-Drury (**P2D**) Project.	Two of the FTN route options identified in the IBC (options MT4K and MT4L) utilise sections of SH1 between Drury and Manukau. The shoulder lanes necessary to support such services now fall within the scope of Waka Kotahi's P2D Project, and accordingly are now outside the scope of the South FTN Project. Accordingly, no further optioneering has taken place progressing options utilising SH1. It is noted that these options also utilised a section of Great South Road east of the Drury Interchange. The decision to discard these options results in the need to examine this section of Great South Road separately (see Part D of this report).
Decision to progress Mahia and Roscommon Road corridors separately from South FTN DBC.	One of the FTN route options identified in the IBC (option MT4K) utilises the Mahia and Roscommon Road corridors. These two corridors are now being progressed as part of a separate project by AT, and funding was secured to run a new FTN route along these corridors as part of Auckland Council's 2022-23 Annual Budget. Moreover, an FTN connection from Mahia/Roscommon to Puhinui Station as envisaged in option MT4K was confirmed to no longer be supported by AT subject matter experts (**SME**). Accordingly, no further optioneering has taken place progressing options utilising Mahia and Roscommon Roads.
Progress on Single-Stage Business Cases (**SSBC**) for shorter-term interventions on Great South Road	Great South Road north of Papakura was a part of the Connected Communities programme of business cases to identify shorter-term bus, active mode, and safety improvements. Part of this extent overlaps with the option MT3C identified in the South IBC which proposed a longer-term FTN along Great South Road between Manukau and Drury. Accordingly, the South FTN DBC has given due consideration to these SSBCs to ensure alignment between the proposed short and long-term interventions along Great South Road.

Change	Explanation / relevance to South FTN optioneering
Decision to re-scope Mill Road under the NZ Upgrade Programme (**NZUP**)	The Mill Road Project was proposed as a four-lane strategic corridor between Manukau and Drury in the South IBC. It has subsequently been rescoped as a two-lane corridor focused on safety improvements at its northern end by 2028, with the remainder of the corridor to be route protected subsequently. The relevance of this is that two perpendicular east-west corridors – Popes Road and Croskery Road – still likely have strategic significance as connections to Mill Road. These are now included in the South FTN DBC as complementary (non-FTN) corridors (see Part D of this report).
Decision to implement NZUP Drury package	In addition to the P2D Project, two projects identified in the South IBC – the Drury Central Station and the urbanisation of Waihoehoe Road – have since been designated/consented (in the case of Drury Central) and designated (in the case of Waihoehoe Road), and funded under NZUP with a view towards implementation by 2025. This has left an adjoining short section of Great South Road in Drury in need of corresponding planning for urbanisation to ensure that the projects form a cohesive whole. This section of Great South Road is now in the scope of the South FTN DBC as a complementary (non-FTN) corridor.
Growth and Land Use	
Legislation and policy directing councils to enable increased housing supply	The National Policy Statement on Urban Development (**NPS-UD**) and the Medium Density Residential Standards (**MDRS**) (legislated through the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 set clear direction for councils to enable increased housing supply in high-growth areas. Auckland Council's response came in the form of Plan Change 78 (**PC78**) which was notified in August 2022. These changes signal that growth in South Auckland will continue to be provided for, which in turn will result in travel demands necessitating multi-modal transport improvements such as the South FTN Project.
Updates to Auckland Forecasting Centre (**AFC**) growth scenarios	The DBC considers changes in land use assumptions, and utilises the most current land use assumptions available from the AFC. Since the completion of the IBC, there have been updates to growth scenarios used in Auckland which are reflected in this DBC. Scenario I11.6 has been used in this DBC which is consistent with current regional models, and no significant changes have been identified in comparison with the previous version I11.4 which was used in the IBC.
Private Plan Changes	Since the IBC, Plan Changes 52 and 58 have been approved along Great South Road in the Ōpāheke area; and Plan Change 67 has also upzoned parts of the Hingaia Peninsula. Recently approved plan Changes 48, 49, 50, 51, and 61 in the Drury area will enable significant urbanisation at the southern end of the Project extent. Moreover, the Project team is aware that pre-lodgement discussions are underway for large Plan Changes in the Alfriston and Ardmore areas. These Plan Changes signal that growth in the Project area is continuing to be planned and provided for, which in turn will result in travel demands necessitating multi-modal transport improvements such as the South FTN Project.
Transport and Climate Change legislation and policy	
Government Policy Statement on Land Transport (**GPS**) 2021 (and indicative GPS 2024)	The current GPS signals greater focus on projects that provide for better travel options/mode shift to sustainable modes, and contribute to a low-carbon transport system that supports emissions reduction. This direction is further strengthened in the indicative 2024 GPS which elevates emissions reduction to being the overarching focus for transport investment. The South FTN Project is well-aligned with these directives.
Passage of the Zero Carbon Act and	The Climate Change Response (Zero Carbon) Amendment Act 2019 set in place a framework for emissions reduction comprising a long-term target of net-zero

Change	Explanation / relevance to South FTN optioneering
associated long-term target and Emissions Reduction Plans (and parallel amendments to the RMA)	greenhouse gas emissions by 2050, and a system of quintennial emissions budgets and Emissions Reduction Plans (**ERP**) as 'stepping stones' to the long-term target. The first ERP, published in 2022, sets a target of reducing vehicle kilometres travelled (VKT) by 20 percent by 2035 through providing better travel options. The South FTN Project is well-aligned with this objective. In parallel, sections 70A and 104E of the RMA have been amended to enable the consideration of greenhouse gas emissions on climate change in both plan-making and consenting decisions. Furthermore, sections 61, 66, and 74 of the RMA have been amended to require that local authorities must have regard to ERPs and national adaptation plans when making and amending regional policy statements, regional plans, and district plans. Finally, the NPS-UD set under the RMA sets an objective that New Zealand's urban environments support reductions in greenhouse gas emissions; and a related policy requiring planning decisions to contribute to well-functioning urban environments, which urban environments which support reductions in greenhouse gas emissions. All of the above considerations place an increased onus for transport projects to demonstrate how they contribute to greenhouse gas emissions reduction.

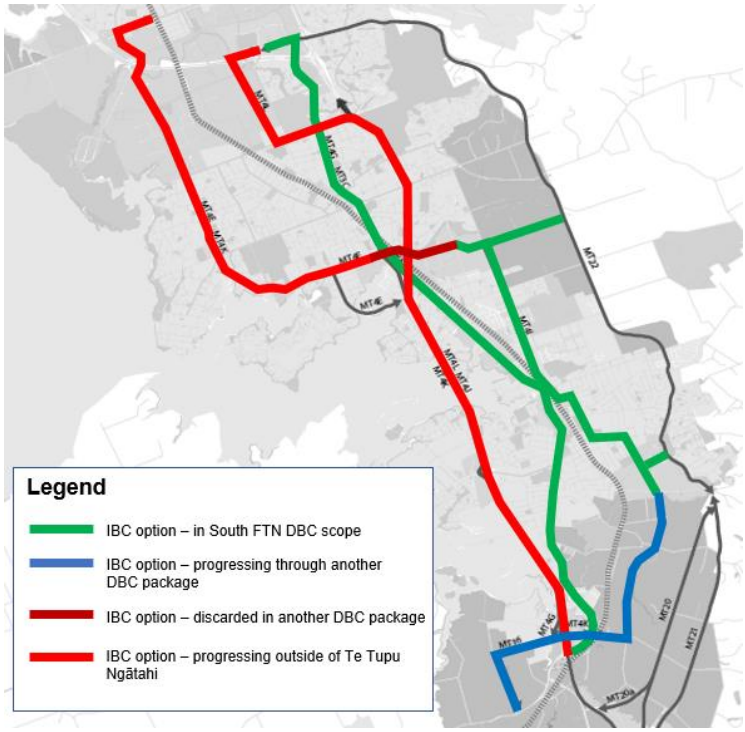


Figure 3-1 – Status of IBC FTN options at the commencement of the South FTN DBC process (N.B. Alignments through DBC process evolved as outlined later in this report).

The contextual changes summarised in Table 3-1 have directly informed the scope of Project and the optioneering documented in this report. In particular:

- Changes to related projects have resulted in a reduced scope of optioneering to be taken forward in the DBC compared with the FTN options identified in the IBC. The four FTN routes identified in the IBC are now reduced to two routes as a result of decisions to remove SH1, Mahia Road, and Roscommon Road from the scope (see Figure 3-1);
- Some sections of the remaining routes have already been designated as part of the Te Tupu Ngātahi's Drury Arterials package (i.e. the Ōpāheke North-South Arterial between Papakura and

Drury). However, this package omitted adjoining sections of Hunua Road and Croskery Road, which are now part of this DBC (see Figure 3-1);

- Changes to land use, transport, and climate change legislation and policy are strongly aligned with the South FTN Project, and provide strong justification to proceed with further investigation of options for the remaining FTN options; and
- Decisions on the scope of NZUP projects, in particular Mill Road and the Drury package, have informed the need to include complementary corridors (Popes Road, Croskery Road, and Great South Road at Drury) in the South FTN DBC scope.

4 General Methodology

4.1 Process Summary

The optioneering process applied to each of the Project corridors is shown in Figure 4-1. In essence, the process can be split into the following deductive steps:

- Steps to identify the preferred **routes** for the Project;
- Steps to identify the preferred **form and function** for each part of the Project to determine its physical extent; and
- Steps to refine the detailed **location** of any road widening/realignment required to accommodate the preferred form and function along the preferred route.

The process is described in greater detail below.

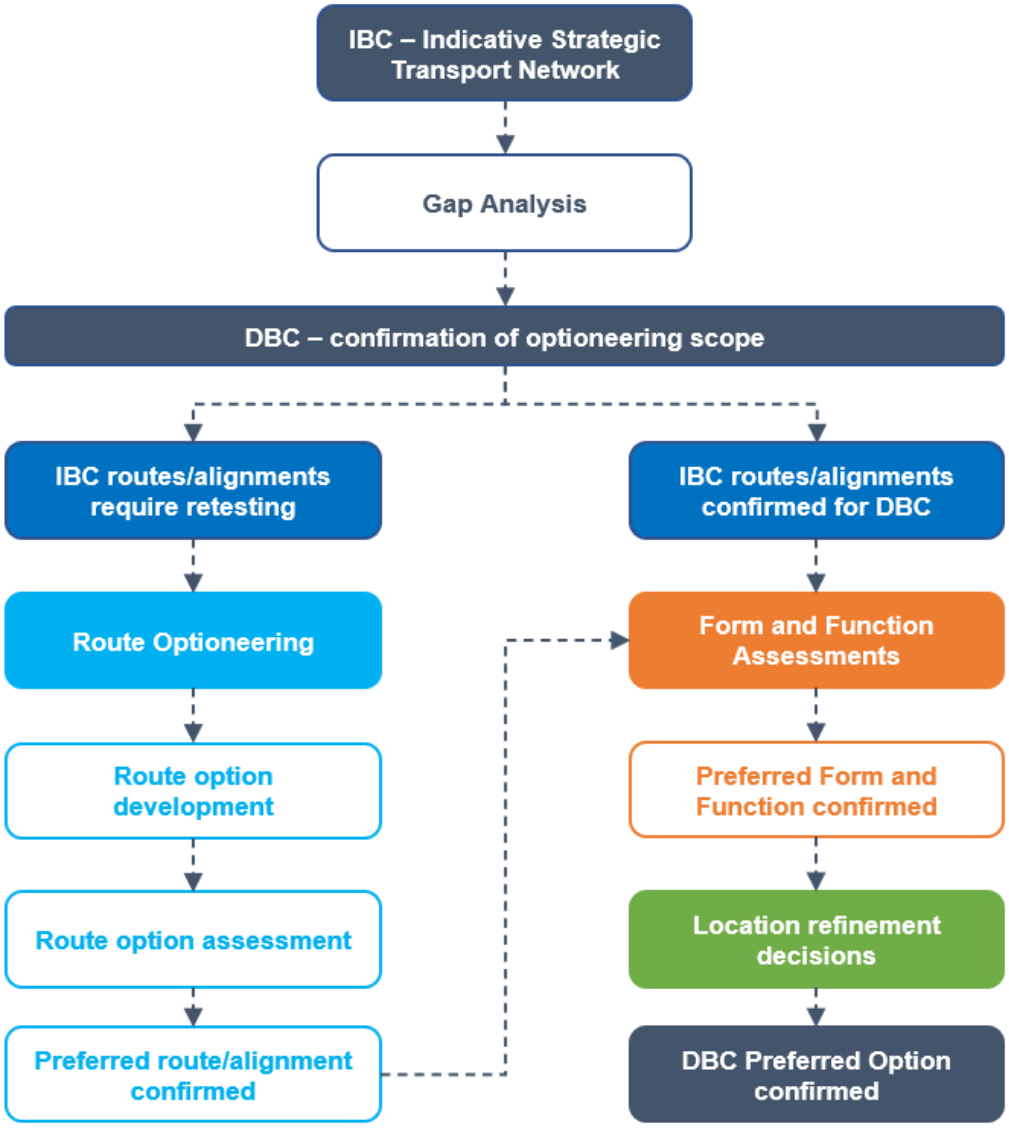


Figure 4-1 – DBC optioneering process

4.1.1 Gap analysis and confirmation of DBC optioneering scope

As summarised in section 2, the South IBC recommended several FTN corridors and related arterial roads for inclusion in the ISTN. The South FTN DBC advances this subset of projects from the ISTN, and thus uses the ISTN as a starting point for further optioneering.

The first optioneering stage is a gap analysis which captures the contextual changes that have occurred between the IBC and DBC processes. As noted in section 3, this process recognises that the IBC was completed in 2019, that changes in the project context have occurred in the intervening period; and that such changes could change the scope of optioneering required for the DBC and/or the merits of conclusions in the IBC.

The contextual changes identified in the gap analysis that are pertinent to optioneering for the whole Project are summarised in section 3 of this report. The localised optioneering for each part of the Project (in Parts B, C, and D of this report) identifies which changes from this wider summary are of particular relevance to the route or section in question.

The key aim of the gap analysis process is to confirm the necessary scope of optioneering for the DBC. In the case of the South FTN Project, the key scoping matter to be determined at the outset is whether or not the IBC route/alignment in question needs to be retested in light of contextual changes. This can include the identification of new options beyond the scope of previously assessed options; and retesting of previously discarded options.

Where retesting is needed, a process of further route optioneering is initiated. Where retesting is not needed, the step is omitted, and the IBC route is validated and taken forward as the basis for subsequent form and function assessment and location refinement.

4.1.2 Route optioneering

Where retesting of an IBC route option is needed, a process of further route optioneering is undertaken. This includes both the development of options to meet the DBC investment objectives, and the assessment of those options. As noted above, where the IBC route is validated through the gap analysis process, this step of further route optioneering is not undertaken.

Option Development

The purpose of option development is to ensure that an appropriate range of routes/alignments to meet the DBC investment objectives are identified for assessment. Inputs to option development included the use of Waka Kotahi's Early Assessment Sifting Tool (**EAST**), consideration of bus routing options provided by AT Metro in Remix software, as well as desktop assessment and constraints analysis.

Option Assessment

The Te Tupu Ngātahi MCA Framework was the primary method used to assess route options where this level of assessment was necessary. This process required all options in a given option grouping to be scored by relevant SMEs against the DBC investment objectives, and a set of MCA assessment criteria (see Table 4-1). This assessment used an eleven-point scoring scale (see Table 4-2), and also required the experts to provide commentary and rationale for their scores.

Table 4-1 – Te Tupu Ngātahi MCA Framework

MCA topic	No.	Criterion	Measure
Investment Objectives			See main DBC document for investment objectives and measures.
Heritage	1a	Heritage	See MCA Framework appendix for detailed explanation of measures for each criterion.
	1b	Manawhenua[4]	
Socio-economic impacts	2a	Land use futures	
	2b	Urban design	
	2c	Land requirement	
	2d	Social cohesion	
	2e	Human health and wellbeing	

[4] Note Manawhenua did not wish to score this criterion numerically, and accordingly it was excluded from scoring.

MCA topic	No.	Criterion	Measure
Natural Environment	3a	Landscape and Visual	
	3b	Stormwater	
	3c	Ecology	
	3d	Natural Hazards	
Transport	4a	Transport System Integration	
	4b	User Safety	
Construction Impacts	5a	Construction impacts on utilities / infrastructure	
	5b	Construction Disruption	
	6	Construction costs / risk / value capture	
Non-Scored Criteria		Stakeholder / Project Partner feedback	
		Policy Analysis	
		Indicative costs	
		Mana Whenua	

Table 4-2 – MCA Scoring Scale

	-5	-4	-3	-2	-1	0	1	2	3	4	5
Type	Adverse					Neutral					Positive
Magnitude	High				Low		Low				High
Significance	Regional				Local		Local				Regional
Extent	Substantial				Low		Low				Substantial
Duration	>20 years				<1 year		<1 year				>20 years

In identifying a preferred route/alignment option, aggregate scoring or weighting of MCA criteria were not produced. This ensured that preferred options were reached through balanced consideration of all criteria, and that the MCA would not prejudice further feedback received through the engagement process from project partners, stakeholders, and the public.

4.1.3 Form and Function Assessment

Following the identification of a preferred route for each part of the Project, the preferred form and function was then identified to determine its physical extent. The assessment informing the physical extent was divided into corridors (i.e. midblocks), and intersections using the following processes respectively.

Corridor Form and Function (CFAF) process

The CFAF process has been established by Te Tupu Ngātahi to provide a consistent methodology to define the form and functional requirements for transport corridors, and ensure that all modes are

considered. It is based on the AT Roads and Streets Framework (**RASF**) guidance which considers both 'movement' and 'place' significance.

In practice, the process systematically considers a range of transport inputs denoting the 'movement' significance for each transport mode (e.g. predicted future traffic volumes, bus network planning and predicted bus volumes, and status as freight or active mode routes); and factors denoting the 'place' significance such as adjoining land use. The typical output of the process is the identification of a suitable midblock cross-section from a suite of modular concept designs.

Intersection Assessment process

In parallel to the CFAF process, an intersection assessment process is undertaken to identify which intersections along each route require upgrades, which indicative intersection controls are to be applied where upgrades are required, and the resultant footprint implications.

In identifying which intersections require upgrades as part of the Project, a filtering process was applied which selected intersections based on the following considerations:

- Whether an intersection upgrade would provide for **more efficient and reliable bus services** – reducing the number of intersections that cause disruption to bus through movement. As part of this, spacing between proposed signalised intersections was considered;
- Whether an intersection upgrade would provide **safe crossing points for pedestrians and cyclists** to access the public transport network and connect to amenities based on walking catchments;
- Whether there were any **site-specific safety concerns** such as poor visibility, horizontal/vertical grade issues, and existing uncontrolled intersections at crossroads;
- **Side road factors** – i.e. the traffic volumes, complexity, status within the road hierarchy; and whether the side road provides access to key destinations such as schools, rapid transit stations, or the wider strategic road network; and
- T-intersections with local roads are generally priority controlled now, and it has been assumed that they will remain priority-controlled in the future.

In selecting the preferred intersection form at each site, a number of matters were considered including safety, operational efficiency, urban design/land use integration, public transport operations, engineering and environmental constraints, property constraints, and other site-specific factors. The selection process adopts a 'Safe System' approach which recommends roundabouts as the first choice for at-grade intersections due to the safety benefits for vehicular traffic resulting from the slowing of through traffic and reduction of conflict points. Where roundabouts are not considered appropriate, signalised intersections are then considered.

These assessment tools are designed to enable project teams to select appropriate form and function options from a set of modular concept designs developed at a Programme-wide level for both midblock cross-sections and intersection forms. This approach is taken on the basis that it provides for a suitable level of detail for route protection and design efficiency, whilst allowing for future design flexibility and changes at the time of implementation. However, in case of the South FTN Project, the process of defining a preferred form and function has required some refinement and further development of the modular designs to account for local contextual constraints, and the wide range of

present-day road configuration starting points. These are documented where relevant in Parts B, C, and D of this report.

As part of the above processes, the preferred form and function options were the subject of consultation and endorsement by owner organisation SMEs.

Further details of both the corridor and intersection form and function assessment process are included in **Appendix G: Transport Outcomes Report**.

4.1.4 Location refinement

Following the identification of a preferred form and function for each part of the Project, the final step of the optioneering process was to identify and refine the footprint for each part of the Project. This step required reconciliation of a number of expert and technical inputs in a workshop setting, considering factors such as:

- Opportunities to avoid or reduce impacts on known environmental and cultural features, values, and/or constraints[5];
- The need to set designation boundaries which ensure that reasonable access to and use of adjoining properties and buildings can be maintained;
- Any advantages or disadvantages associated with requiring land that relate to its ownership status (e.g. publicly or privately-owned) or zoning/planning controls (e.g. urban or future urban); and
- The need for designation boundaries to provide for the construction, operation, and maintenance of the Project.

Following the above location refinement considerations, the emerging preferred options proceeded to concept design. This included consideration of vertical and horizontal alignment, allowances for earthworks, the configuration of access for affected properties, and stormwater requirements including indicative attenuation and treatment devices. Full details of the design process are detailed in **Appendix H: Design Report**, and are only repeated in this report to the extent necessary to document optioneering.

4.2 Corridor Segmentation

To apply the above optioneering process on a localised basis, the Project corridors have been divided into sections as shown in Table 4-3 and Figure 4-2. Localised optioneering was necessary given the significant contextual differences that exist over a near-33km Project extent. The various sections are referred to throughout the remainder of this report as necessary.

It is noted that the segmentation outlined in Table 4-3 was not able to be undertaken until **after** routes were confirmed – accordingly, segmentation for each corridor took place between route optioneering and the form and function assessment. Segmentation sought to break the corridor into manageable areas for further localised assessment, and took account of a number of factors including areas of similar land use along the corridor, as well as the location of interfacing railway stations (which in turn form the centre-points for future upzoning under PC78).

Segmentation is summarised here for ease of report navigation.

[5] These were the subject of analysis reconciling of a number of expert and technical inputs, and in the first instance included matters identified in Part 2 of the RMA, matters for which RMA policy documents direct avoidance, and provisions cascading from those policies (e.g. AUP overlays).

Table 4-3 – Corridor Sections

Report reference	Route	Section	Extent	Length
Part B (sections 5-8)	Great South Road FTN	1a	Manukau Station Road (Davies Avenue to Great South Road)	4.8km
		1b	Great South Road (Manukau Station Road to Browns Road)	
		1c	Great South Road (Browns Road to Northcrest Way)	
		2	Great South Road (Weymouth Road to Mahia Road)	1.0km
		3	Great South Road (Mahia Road to Takaanini Station)	1.6km
		4	Great South Road (Takaanini Station to Subway Road)	3.6km
		5	Great South Road (Wellington Street to Waihoehoe Road)	4.5km
		Subtotal		*15.5km*
Part C (sections 9-13)	Takaanini FTN	6	Weymouth Road and Alfriston Road (Selwyn Road to Porchester Road)	2.3km
		7	Porchester Road (Alfriston Road to Airfield Road)	3.8km
		8	Porchester Road, Walters Road, Grove Road, Clevedon Road, Railway Street	5.4km
		9	Wood Street, Ōpāheke Road, Settlement Road, Hunua Road	2.5km
		Subtotal		*14km*
Part D (sections 14-17)	Complementary (non-FTN) Corridors	Popes Road (Takanini School Road to Mill Road)		2.2km
		Croskery Road (Hunua Road to Dominion Road)		0.6km
		Great South Road (Waihoehoe Road to Firth Street)		0.3km
		Subtotal		*3.1km*
Total Project Extent				**32.6km**

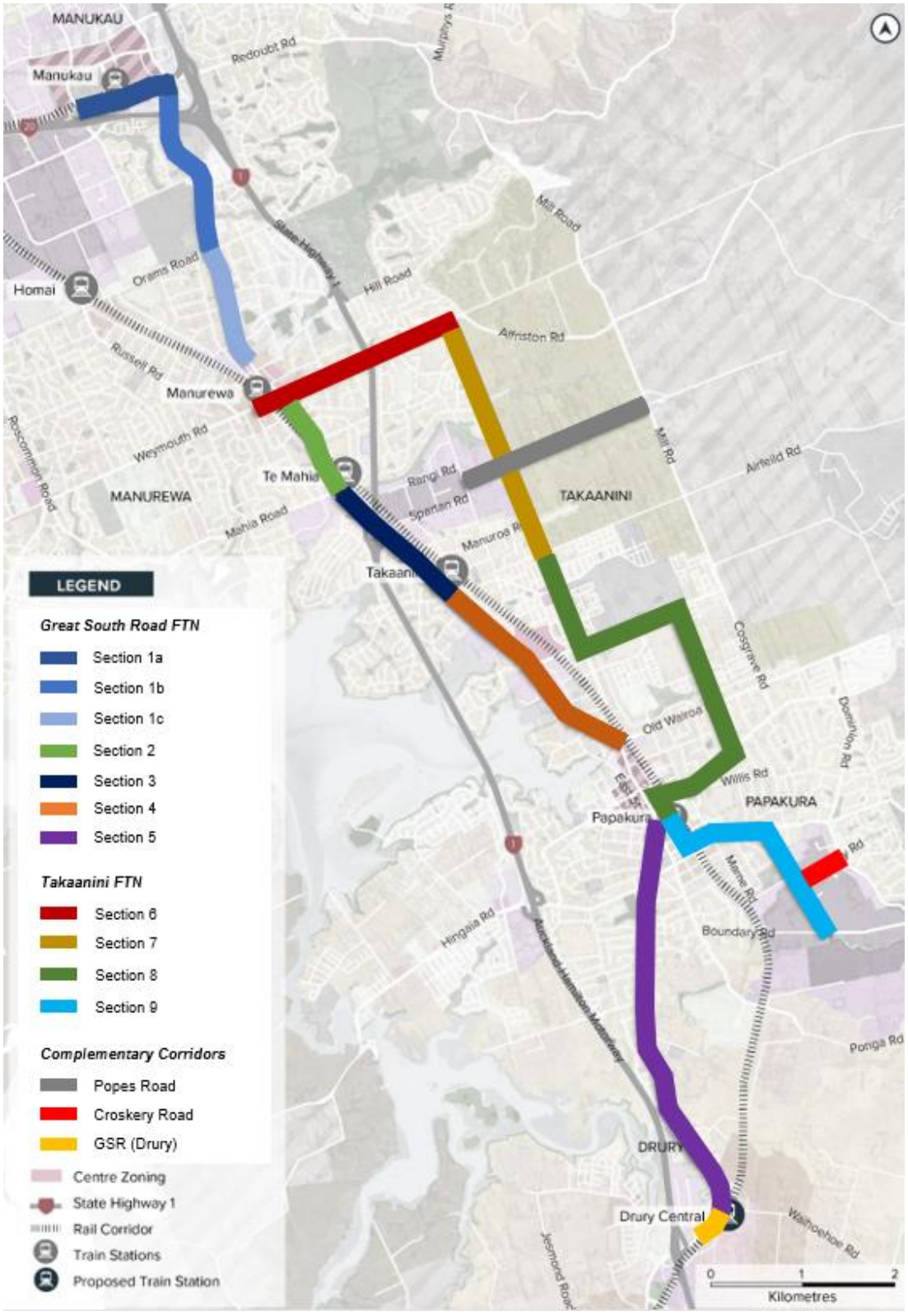


Figure 4-2 – South FTN Corridor Segmentation

PART B: GREAT SOUTH ROAD FTN

5 Gap Analysis and confirmation of optioneering scope

As noted in section 2.2, the ISTN included an FTN route on Great South Road between Drury and Manukau (referred to in the IBC as option MT3C as shown at Figure 2-1). This route was the starting point for DBC optioneering on the Great South Road FTN route. The methodology outlined in section 4 requires the implications of new information identified in the gap analysis to be considered with a view to establishing the necessary scope of further optioneering in the DBC.

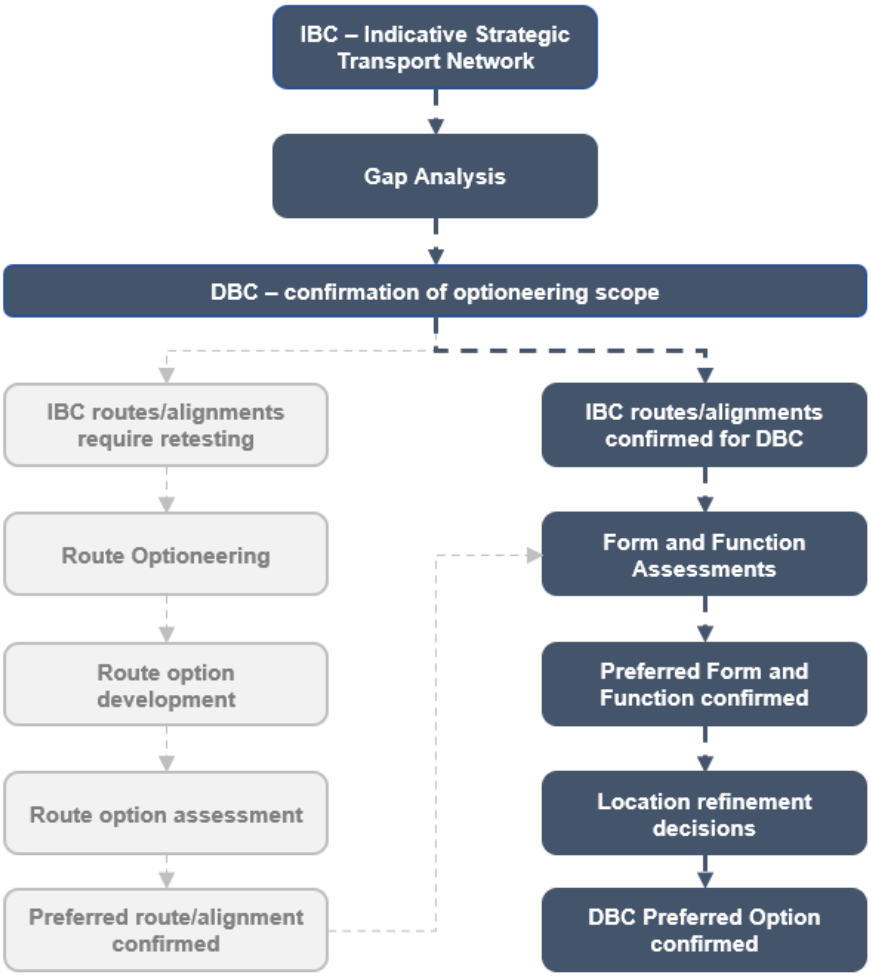


Figure 5-1 – Optioneering process adapted for the Great South Road FTN. Note omission of the route optioneering process steps.

In making this determination, the following conclusions on the Great South Road FTN were reached through the gap analysis process (summarised in section 3):

- None of the related transport projects outlined in Table 3-1 are a substitute for a Great South Road FTN. Therefore, the various changes to and decisions on these projects that have occurred since 2019 do not weaken the case for a Great South Road FTN. The closest related project identified are the Connected Communities SSBCs for Great South Road north of Papakura, which are not a

substitute for the longer-term interventions extending south to Drury envisaged in the South IBC and this DBC. Changes to and decisions on the remaining projects do not weaken the case for a Great South Road FTN, and in some cases (e.g. Mill Road rescoping) arguably strengthen it;
- Legislative and policy direction to enable increased housing supply, updates to AFC growth scenarios, and Private Plan Changes all signal that the areas on and around Great South Road between Manukau and Drury will continue to experience urban growth and increased demand on the transport network. PC78 proposes to enable significant growth in this area over and above the currently operative provisions of the AUP:OP; and recently approved plan changes 52 and 58 (in Ōpāheke), 67 (in Hingaia); and 48, 59, 50, 51, and 61 (in Drury) all signal continued growth in travel demand on Great South Road;
- The type of multi-modal interventions envisaged for Great South Road – namely enhanced FTN bus services and active mode improvements – are entirely consistent with the transport and climate change legislation and policy directives outlined in Table 3-1;
- In addition to the above, Great South Road remains a strategically significant north-south arterial route for all transport modes given the lack of alternative routes in the network. This is reflected in AT's Future Connect classifications, and AT Metro's future network planning. While additional north-south connections and network improvements are planned to increase network capacity and resilience, none are considered a direct substitute or replacement for Great South Road; and
- The road exists, and any parallel corridors will not be functionally equivalent.

For the above reasons, there was not considered to be any reason to further retest the route for the Great South Road FTN – accordingly IBC option MT3C was validated and confirmed as the route and extent in the DBC for the Great South Road FTN. Accordingly, the route optioneering process step was omitted, and the corridor proceeded directly to form and function assessment and location refinement (see Figure 5-1).

At this point, the Great South Road FTN route was divided into five sections as outlined in section 4.2 to allow for localised form and function assessment and location refinement optioneering.

6 Form and Function

6.1 Corridor Form and Function

As noted in section 4.1.3 of the general methodology, the CFAF process as developed and applied at the Programme-wide level is intended to use land use and transport planning inputs to define functional requirements for the corridor in question, and identify a suitable midblock cross-section from a set of modular concept designs. This approach is taken on the basis that it provides for a suitable level of detail for route protection and design efficiency, whilst allowing for future design changes and flexibility at the time of implementation.

In the case of the Great South Road FTN, the initial output of the CFAF process was the application of a four-lane FTN arterial cross-section to the entire length of the route (see Figure 6-1). This conceptual design incorporates one general traffic lane and one bus lane per direction, separated active mode facilities in each direction, and space for berms and a central median (see Figure 6-1). This cross-section was initially applied, with care taken to use the location refinement principles outlined in section 4.1.4 where third-party land was identified as being needed.

This initial approach was ultimately not followed for the Great South Road FTN for several reasons as follows:

- Significant third-party land requirements along the corridor, with over 1,300 properties directly affected along its 15.5km length. This significant property requirement in large part resulted in high costs and effects not justified by the Project's level of strategic benefit;
- The application of a generic cross-section did not account for local contextual constraints, and the wide range of present-day road configurations along Great South Road – in short, some sections have the necessary width already, while others require significant third-party land;
- The application of a generic cross-section also triggers land requirements even where third-party land is not required to meet the desired transport functions – for instance where reconfiguration of the corridor layout requires additional stormwater treatment not otherwise required. This is a significant contributor to the aforementioned third-party land requirements; and
- The nature of transport demands is relatively tidal in a number of sections of the corridor, meaning that there are opportunities to meet the investment objectives with a less impactful cross-section configuration (e.g. bus lanes in one direction only). This is discussed in greater detail in **Appendix G: Transport Outcomes Report**.

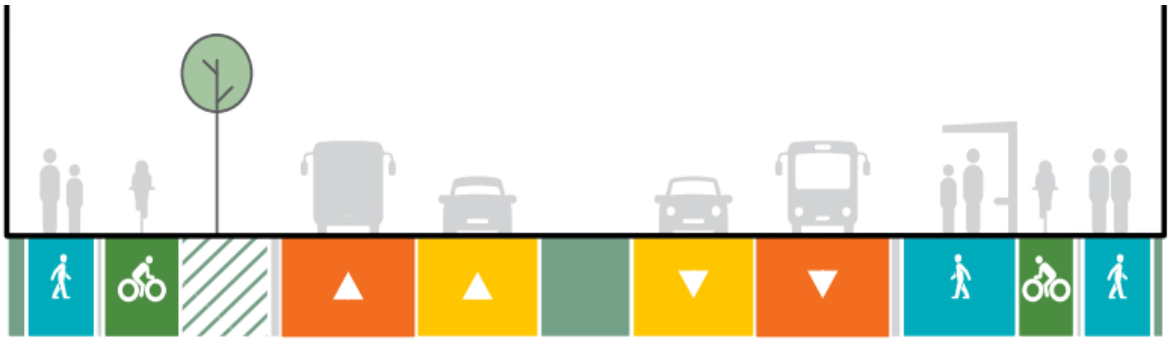


Figure 6-1 – Four-lane FTN arterial cross-section

Given the above issues, a bespoke reassessment of the required form and function for each section of the Great South Road corridor was undertaken on a section-by-section basis to confirm the preferred physical form of the section to be taken forward to the location refinement stage. Several approaches were considered in this process as summarised in Table 6-1.

Table 6-1 – Approaches considered in form and function reassessment

Premise	**Approach**	
Fit within (or largely within) existing road reserve and retain existing kerblines	**A**	Prioritise a transport mode (e.g. full bus lanes or active mode improvements but not both)
	B	Remove an element from cross-section (e.g. bus lanes in one direction only)
	C	Existing road reserve already sufficient to accommodate all desired cross-section elements (i.e. >26.5m)
Full road space reallocation and/or road widening	**D**	Apply full four-lane FTN arterial cross-section

The results of this reassessment are summarised in Table 6-2 below. It is noted that the applicability of the various approaches differs according to the different circumstances along the corridor, and accordingly that not every approach is compared in every section. The merits of the various approaches are discussed in the main DBC document and **Appendix G: Transport Outcomes Report**. Further detail on the design outcomes of the preferred approaches can be found in **Appendix H: Design Report**.

The specific cross-sections assessed in each section are shown in **Appendix B** of this report.

Table 6-2 – Summary of preferred form and function approaches

Section	Existing width	Approaches considered				Key reasons for preferred approach
		A	B	C	D	
1a	>30m	N/A	N/A	Preferred	Discarded	• Existing road width sufficient – no/minimal third-party land requirements. • Avoids property impacts associated with Approach D (e.g. stormwater treatment). • Achieves desired level of service for public transport, and maintains/improves level of service for active modes.
1b	>30m	N/A	N/A	Preferred	Discarded	
1c	20m	Discarded	Preferred	N/A	Discarded	• Achieves a northbound bus lane which is the direction of highest anticipated travel demand. • Ensures separated facilities for active modes. • Lesser third-party land requirement than other approaches.
2	20m	Discarded	Preferred	N/A	Discarded	
3	30m	N/A	N/A	Preferred	Discarded	• Note some variation within section 4 – hence both approach B and C preferred. • Existing road width sufficient – no/minimal third-party land requirements. • Achieves desired level of service for public transport, and maintains/improves level of service for active modes.
4	20-30m	N/A	Preferred	Preferred	Discarded	
5	<27m	Discarded	Preferred	N/A	Discarded	• Achieves a northbound bus lane which is the direction of highest anticipated travel demand. • Ensures separated facilities for active modes. • Lesser third-party land requirement than other approaches.

6.2 Intersection Assessment

As noted in section 4.1.3 of the general methodology, an intersection assessment process was undertaken in parallel to the CFAF to identify which intersections required upgrades, the indicative intersection controls in these locations, and the resultant footprint implications. Similarly to the CFAF process, the approach developed and applied across the programme for the intersection assessment was to use land use and transport planning inputs to define functional requirements for the corridor in question, and identify a suitable intersection layout from a set of modular intersection designs.

The intersection filtering process identified sixteen intersections requiring interventions along the Great South Road FTN route between Manukau and Drury. These were identified based on the considerations listed in section 4.1.3 of the general methodology, and are listed in Table 6-3.

As noted in section 4.1.3, the intersection form at each site was identified based on a range of factors including safety, operational efficiency, urban design/land use integration, public transport operations, engineering and environmental constraints, property constraints, and other site-specific factors. While roundabouts are the typical first choice for at-grade intersections recommended in 'Safe System' guidance, it is recommended that the majority of intersections along the Great South Road FTN route are signalised. The key reasons for the adoption of signals in these locations are:

- Complex existing intersections with multi-lane approaches;
- A highly urbanised context with limited space available without significant property impacts;
- Very high vehicular traffic volumes; and
- Strategic walking and cycling network functions and a need to allow for safe crossing facilities in the context of high traffic volumes.

Table 6-3 summarises the forms identified for key intersections following this assessment. The rationale and detail for the configurations for each intersection is included in **Appendix G: Transport Outcomes Report**.

Table 6-3 – Proposed intersection forms resulting from intersection assessment

Corridor section	Intersection	Proposed form
1b	Great South Road / Manukau Station Road / Redoubt Road	Signals
	Great South Road / SH1 offramp	Signals
	Great South Road / Kerrs Road / Pacific Events Centre Drive	Signals
	Great South Road / Browns Road / Orams Road	Signals
1c	Great South Road / Grand Vue Road	Signals
	Great South Road / Hill Road / Station Road	Signals
2	Great South Road / Weymouth Road / Alfriston Road	Signals
	Great South Road / McAnnalley Street	Signals
	Great South Road / Mahia Road	Signals
4	Great South Road / Taka Street	Signals

Corridor section	Intersection	Proposed form
	Great South Road / Walters Road	Dual-lane roundabout
	Great South Road / Subway Road	Signals
5	Great South Road / Wellington Street	Signals
	Great South Road / Beach Road	Signals
	Great South Road / Rosehill Drive	Signals
	Great South Road / Park Estate Road	Signals

7 Location Refinement

As noted in section 4.1.4 of the general methodology, a process of reconciling expert and technical inputs in a workshop setting applied to decisions on the location of any road widening and realignment (i.e. third-party land requirements) to accommodate the preferred form and function along the preferred routes.

Table 7-1 sets out the key matters identified for each section which have informed the extent and location of third-party land requirements. These generally emphasise where environmental features and identified constraints constitute clear 'differentiators'.

Table 7-1 – Key differentiating features/constraints informing application of location refinement principles

Section	Third-party land requirement?[6]	Key differentiating features/constraints informing application of location refinement principles
1a	None	N/A
1b	None	N/A
1c	Moderate	• Desire to avoid or reduce impacts on Sikh Temple (east side, chainage 3950), Presbyterian Church (east side, chainage 4300), historic heritage place at Cenotaph Park (east side, chainage 4450), scheduled military milepost (east side, chainage 3800), notable tree (east side, chainage 3800) and a Rest Home (west side, chainage 3280). • Several new-build medium-density multi-unit residential developments on both sides. Each presents a challenge in terms of avoidance (i.e. the ability to maintain a 1.5m front yard in the first instance), and/or boundary setting where the street frontage unit will need to be acquired.
2	High	• Lack of clear differentiating factors.
3	Low	• Lack of clear differentiating factors.

[6] Qualitative scale of land requirement is taken from **Appendix L: Route Protection Strategy**.

Section	Third-party land requirement?[6]	Key differentiating features/constraints informing application of location refinement principles
4	Low	• Desire to avoid or reduce impacts on notable trees (east side, chainage 9600 and 10000; and west side at chainage 10200), significant ecological area (**SEA**) to the west of the Longford Park esplanade reserve and Awhinatia Health centre (west side, chainage 9600), fire station (east side, chainage 10100), historic heritage buildings (churches) at chainage 10200-10500 (west side). • Several new-build medium-density multi-unit residential developments on both sides. Each presents a challenge in terms of avoidance (i.e. the ability to maintain a 1.5m front yard in the first instance), and/or boundary setting where street frontage units will need to be acquired. • Large industrial premises including a Fonterra distribution facility (west side, chainage 8200).
5	Moderate	• Desire to avoid or reduce impacts on historic heritage feature (War Memorial) at the corner of Ōpāheke Road and Great South Road (east side), Papakura Cemetery (east side, chainage 11400-11700), SEAs (bush areas on both sides of road at chainage 12000), notable trees at chainage 12300-12500 (east side), Drury Presbyterian Cemetery (west side, chainage 15100), Drury School (east side, chainage 15000). • Plan Changes 52 and 58 and associated frontage controls on the eastern side (between Park Estate Road and Parkhaven Drive). • Effects on Otūwairoa / Slippery Creek to be considered.

The Design Report also addresses the consequential/ancillary design features resulting from the optioneering process (e.g. stormwater treatment devices and earthworks), and these considerations are not repeated here. The General Arrangement drawings included in Appendix H show the resultant corridor location/alignment and proposed designation boundaries.

8 Preferred Option

Following the application of the above process, a preferred option for the Great South Road FTN was identified. Its route and form and function are shown conceptually in Figure 8-1 below. The detailed alignment and boundaries are shown in the General Arrangement drawings appended to **Appendix H: Design Report**.

Figure 8-1 – Great South Road FTN preferred option.

PART C: TAKAANINI FTN

9 Gap Analysis and confirmation of optioneering scope

As noted in section 2.2, the ISTN included an FTN route between Drury and Takaanini serving existing urban and FUZ areas generally east of SH1 and the NIMT, before connecting to Great South Road to the west of SH1 and the NIMT (referred to in the IBC as option MT3C; which also included sections of options EW9B and AR10 as shown at Figures 2-1, 2-2, and 2-3). This route was the starting point for DBC optioneering on the Takaanini FTN route. The methodology outlined in section 4 requires the implications of new information identified in the gap analysis to be considered with a view towards establishing the necessary scope of further optioneering in the DBC.

In making this determination, the following conclusions on the Takaanini FTN were reached through the gap analysis process (summarised in section 3):

- A number of factors identified in the gap analysis have prompted a retesting of the Rangi Road Viaduct assumed as part of IBC option MT4I (and the associated sections of options MT4K and EW9B). Given that the Rangi Road Viaduct also formed part of the ISTN for Takaanini level crossing removal, these matters were considered concurrently as part of optioneering for both the TLC and South FTN DBCs. The key factors prompting this retesting included:
  - The high likely cost, complexity, and levels of embodied carbon likely associated with the Rangi Road Viaduct relative to other options for providing an east-west connection (noting that the Viaduct would be over 500m long, and would traverse SH1, the NIMT, the Papakura Stream, and Transpower's electricity transmission corridor). The embodied carbon issue was of particular relevance given the recently increased emphasis in legislation and policy (see Table 3-1) on greenhouse gas emissions reduction, which includes embodied carbon from transport infrastructure assets; and
  - The confirmation by AT SMEs that the routing option along Mahia and Roscommon Road to Puhinui Station (part of option MT4K) was no longer supported as part of the FTN scope. This affects the logic underpinning the need for a Rangi Road Viaduct in terms of connections from the west (see Figure 2-1).
- The decision to progress IBC option AR10 (and by extension the southern portion of option MT4I) as part of the Drury Arterials package means that optioneering and route protection for this section is already complete. Accordingly, this section of the corridor is now out of scope with no further optioneering needed (apart from Croskery Road which is addressed in Part D of this report). The southern end of the Takaanini FTN can connect to the already designated Ōpāheke North-South Arterial at the intersection of Boundary and Hunua Roads to complete the route envisaged in the IBC;
- Legislative and policy direction to enable increased housing supply, updates to AFC growth scenarios, and Private Plan Changes all signal that the areas around the Takaanini FTN project area will continue to experience urban growth and increased demand on the transport network.; and

- The type of multi-modal interventions envisaged for the Takaanini FTN – namely FTN bus services and active mode improvements – are entirely consistent with the transport and climate change legislation and policy directives outlined in Table 3-1.

In light of the above, there remains a strong case for the Takaanini FTN; but a clear need to further retest the route and extent of the corridor. Accordingly, the route optioneering step was required to confirm a route and extent for the Takaanini FTN prior to proceeding to form and function assessment and option refinement (see Figure 9-1).

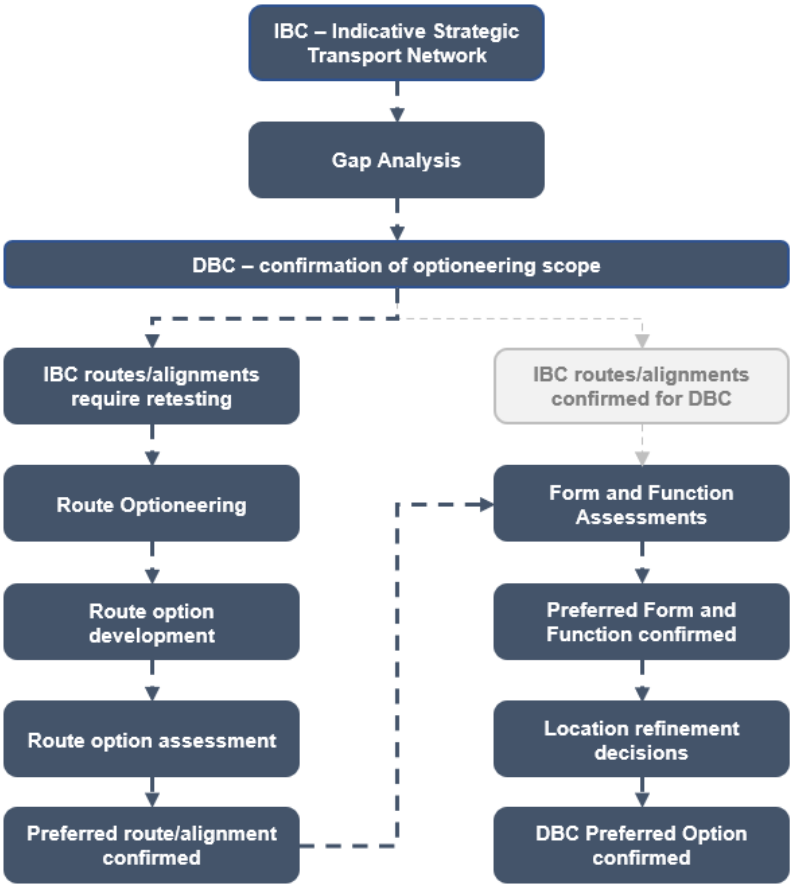


Figure 9-1 – Optioneering process adapted for the Takaanini FTN

9.1 Implications of the draft Future Development Strategy

In response to NPS-UD requirements, Auckland Council published a draft Future Development Strategy (**FDS**) in April 2023. The draft FDS proposes changes to the spatial composition of urban growth in Auckland, including removal of the Takaanini Future Urban Zone (**FUZ**). This area was identified as an area for long-term urbanisation under the Council's Future Urban Land Supply Strategy (**FULSS**), and remains zoned FUZ. Given the timing of the draft FDS, it was not considered during the gap analysis undertaken at the outset of the Project.

The draft FDS is yet to be finalised, and would need to be followed by plan changes to take practical effect, and accordingly has yet to make a material difference to the recommendations of this report. However, it does introduce some uncertainty to the land use context for the South FTN Project, in

particular the sections of the Takaanini FTN route which adjoin the FUZ. It is recommended that the options assessment is re-examined in future when the draft FDS has been finalised and its implications are clearer.

10 Route Optioneering

10.1 Route Option Development

10.1.1 Longlist screening

As outlined in section 4.1.2, Waka Kotahi's EAST tool was used to undertake an initial screening of route options. This process identified a longlist of eighteen options for different sections of the route with the intent of identifying a shortlist for assessment through an MCA process. The options in this instance comprise sections of a route with a view towards different sections being 'mixed and matched' to form a preferred route. The longlisted options can be divided into the following three categories:

- **North-south route sections** to provide connectivity generally between Manurewa and Papakura to the east of the NIMT and SH1 (noting that the need to proceed further south of Papakura as originally envisaged in IBC option MT3C has been negated by the Drury Arterials DBC). It is noted that option MT3C used Porchester Road, Ingram Street, Prictor Street, Marne Road, and Settlement Road as its north-south route in this area;
- **East-west route sections** to provide connectivity from the areas served by north-south route sections to the east of the NIMT and SH1, and areas to the west. It is noted that option MT3C used Popes Road and Rangi Road as its east-west connection connecting Porchester and Great South Roads. As noted above, the decision to discount the Rangi Road Viaduct from the TLC DBC means that this route is no longer possible, and an alternative east-west route is required; and
- **Route sections from AT Metro Remix files** – these were included to ensure all possible combinations of routes under consideration by AT Metro transport planners in this area were considered as options for FTN routing.

The eighteen longlisted options are shown in Figure 10-1, and the results of the EAST assessment are summarised in Table 10-1.

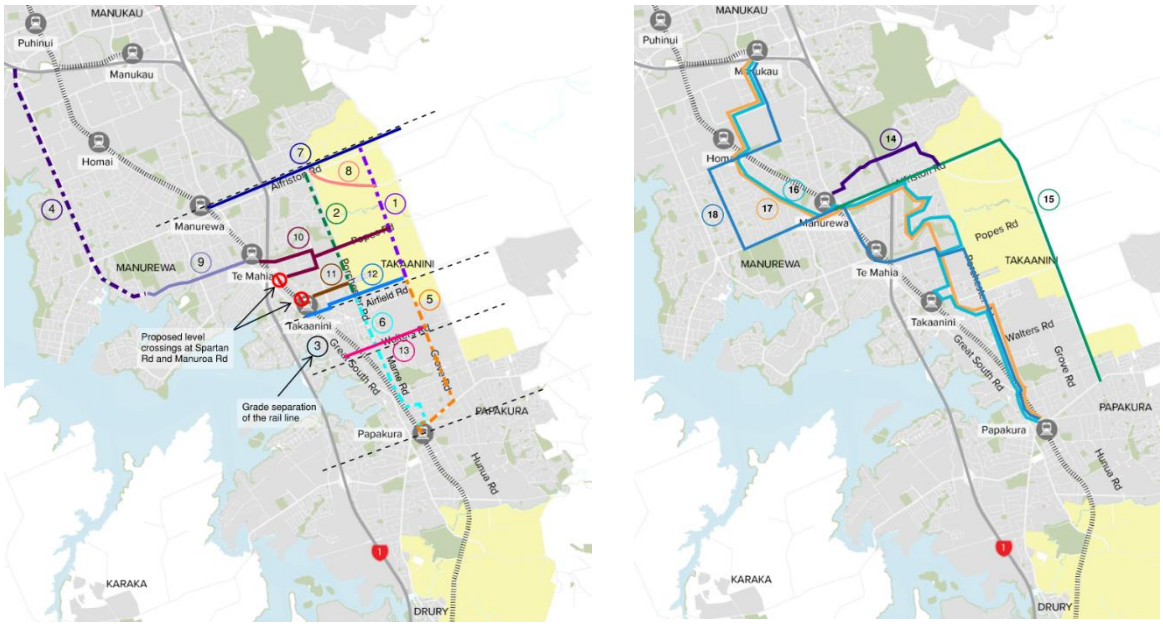


Figure 10-1 – North-south and east-west route sections (left) and route sections from AT Metro remix files (right)

Table 10-1 – Summary of longlist EAST assessment

No.	Option	Progress to shortlist?	Comment
North-South Route Sections (north of Airfield Road)			
1	Wastney Road / new road between Alfriston and Airfield Roads	Yes	North-south option through FUZ, new section of road needed.
2	Porchester Road between Alfriston and Airfield Roads	Yes	North-south option using existing roads, bisects existing urban area to west and FUZ to east.
3	Grade-separation of the NIMT between Alfriston and Walters Roads	No	Option does not address investment objectives as it competes with rail.
4	Roscommon Road	No	Option is being progressed separately by AT and provides no connectivity east of NIMT/SH1.
North-South Route Sections (south of Airfield Road)			
5	New road (continuing option 1) / Grove Road between Airfield Road and Papakura	Yes	North-south option through FUZ, new section of road needed.
6	Porchester Road and Marne Road between Airfield Road and Papakura (continuing option 2)	Yes	North-south option using existing roads.
East-West Route Sections (north of Airfield Road)			
7	Alfriston Road and Ranfurly Road east of Manurewa	Yes	

No.	Option	Progress to shortlist?	Comment
8	Alfriston Road between Manurewa and Wastney / new road (adjoins option 1)	Yes	East-west routes linking Takaanini FUZ and Manurewa Station / Great South Road.
9	Mahia Road west of Great South Road (adjoins option 10)	No	Option being progressed separately by AT (as noted in section 3).
10	Rangi Road and Popes Road between Great South Road and new road (adjoins option 1)	Yes	Option includes Rangi Road Viaduct (noting clear need to re-test this option was identified through gap analysis – see section 9).
11	Manuroa Road and Station Road east of Takaanini Station	Yes	Provides a link from Takaanini FUZ to Takaanini Station and Great South Road.
12	Airfield Road and Taka Street between Great South Road and new road (adjoins option 5)	Yes	
East-West Route Sections (south of Airfield Road)			
13	Walters Road between Great South Road and Grove Road	Yes	AT SMEs have identified this as a key east-west connection, providing access to Bruce Pulman Park.
AT Metro Remix Route Sections			
14	Alternative east-west connection via Hill Road	No	A less direct alternative to the Alfriston Road options.
15	Alternative north-south and east-west connections via Mill Road and Alfriston Road	No	Will only capture half of FUZ, hence a low catchment served. Mill Road addressed in separate project.
16	Manukau Station to Papakura Station via Russell Road, Magic Way, and Porchester Road	No	Each of these options includes collector roads and will result in a circuitous route.
17	Manukau Station to Papakura Station via Russell Road, Takanini School Road, and Porchester Road	No	
18	Manukau Station to Papakura Station via Druces Road, Browns Road, Rowandale Avenue, Weymouth Road, Great South Road, Rangi Road, Popes Road, and Porchester Road.	No	

From the above summarised EAST assessment, the longlist of eighteen route sections was rationalised to a shortlist of ten route sections for shortlist MCA assessment.

10.1.2 Shortlisted options

The ten options identified from the EAST assessment for shortlist assessment were split into two option groupings for assessment – north-south options and east-west options. These are summarised below.

North-South Options

The EAST assessment identified four north-south options. These are referred to as follows (see Figure 10-2):

- **Option 1.1** – Porchester and Marne Road between Airfield Road and Papakura (referred to in the EAST assessment as option 6);
- **Option 1.2** – Porchester Road between Alfriston Road and Airfield Road (referred to in the EAST assessment as option 2);
- **Option 2.1** – New Road / Grove Road between Airfield Road and Papakura (referred to in the EAST assessment as option 5);and
- **Option 2.2** – Wastney Road / New Road between Alfriston and Airfield Roads (referred to in the EAST assessment as option 1).

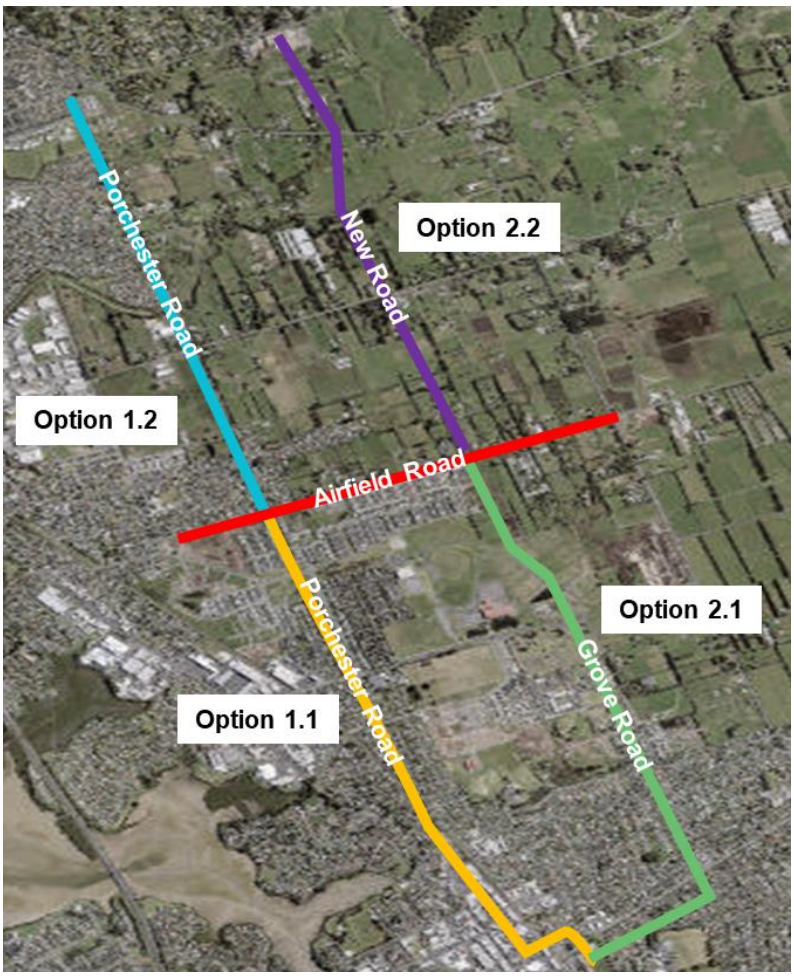


Figure 10-2 – North-South shortlisted options

East-West Options

The six east-west options from the EAST assessment were split out into a shortlist of six sub-options north of Airfield Road (see Figure 10-3) and five south of Airfield Road (see Figure 10-4) to allow for more localised assessment:

Shortlisted options north of Airfield Road were:

- **Options 1.1, 1.2, and 1.3** (derived from options 7 and 8 from the EAST assessment) – respectively comprising:
  - Alfriston Road between Manurewa and Porchester Road;
  - Alfriston/Ranfurly Roads from Porchester Road to Wastney Road; and
  - Alfriston Road from Ranfurly Road to Wastney Road; and
- **Options 2.1, 2.2, and 2.3** (derived from option 10 in the EAST assessment) – respectively comprising:
  - Rangi Road between Great South Road and Porchester Road via the Rangi Road Viaduct;
  - Spartan Road and Popes Road between Great South Road and Porchester Road; and
  - Popes Road between Porchester Road and New Road (see north-south option 2.2).

Shortlisted options south of Airfield Road were:

- **Option 3** (referred to in the EAST assessment as option 11) – Manuroa Road and Station Road east of Takaanini Station;
- **Options 4.1 and 4.2** (derived from option 12 in the EAST assessment) – respectively comprising:
  - Airfield Road between Porchester Road and New Road (see north-south options 2.1 and 2.2); and
  - Taka Street and Airfield Road between Great South Road and Porchester Road;
- **Options 5.1 and 5.2** (derived from option 13 in the EAST assessment) – respectively comprising:
  - Walters Road between Porchester Road and Grove Road; and
  - Walters Road west of Porchester Road.

Figure 10-3 – East-west shortlisted options – north of Airfield Road (left); and south of Airfield Road (right)

10.2 Route Option Assessment

10.2.1 North-South options

Initial MCA Assessment

The shortlisted north-south options were assessed using the Te Tupu Ngātahi MCA Framework described in section 4.1.2. The assessment scoring is summarised in Table 10-2 below.

Table 10-2 – Summary of initial north-south route option MCA assessment

Criteria	Scoring			
	South of Airfield Road		North of Airfield Road	
	Option 1.1	Option 2.1	Option 1.2	Option 2.2
IO 1: Access	2	1	3	4
IO 2: Integration	1	-1	3	4
IO 3: Travel choice and climate change	2	1	3	4
Historic Heritage	-2	-2	-2	-2
Land Use Futures	3	-1	3	2
Urban Design	1	-3	2	2
Land Requirement	-4	-4	-3	-1
Social Cohesion	4	-1	3	2
Human Health and Wellbeing	-2	-2	-2	-1
Landscape / Visual	0	0	-1	-1
Stormwater	-1	-2	-1	-4
Ecology	-1	-2	-4	-4
Natural Hazards	-4	-3	-2	-3
Transport System Integration	3	1	3	3
User Safety	1	-3	1	2
Construction Impact	-2	-1	-1	-1
Construction Disruption	-2	-2	-2	-1
Construction costs/risks	-2	-3	-2	-3

The key outcomes from this assessment for options to the north of Airfield Road are that:

- **Option 1.2** performs well against the investment objectives although not as favourably as Option 2.2 given that Option 2.2 will better support growth in the Takaanini FUZ. It scores as highly adverse for ecology based on an assumed widening and potential impact on high value wetlands. However, route refinement will likely improve the score and is preferred over Option 2.2 given that it is existing infrastructure; and
- **Option 2.2** performs the best against the investment objectives. However, it scores highly adverse for stormwater and ecology as it is a new road to be built on peat soils which will be challenging from a stormwater perspective and will impact low-to-high value wetlands in the area. In addition, the uncertainty of the Takaanini FUZ means there is uncertainty in the expected catchment for this route.

For options to the south of Airfield Road:

- **Option 1.1** scores favourably against the investment objectives given that it services an existing residential catchment. It scores highly favourably against social cohesion as it will provide and improve connectivity between areas anticipating intensified residential development to community facilities. However, the option was assessed as highly adverse for natural hazards due to likely settlement of existing properties as a result of earthworks and underlying soil conditions; and
- **Option 2.1** scores poorly against investment objective 2 as the proposed alignment runs through the existing Bruce Pulman Park. This will have a negative impact as it does not integrate of align with the intended land use. It also scores moderately adverse against urban design as it will cause severance to the Bruce Pulman Park and the Holy Trinity Catholic Primary School.
- The negative scoring for **Option 2.1** was largely attributed to the option cutting through Bruce Pulman Park. Feedback from specialists indicated the scoring would change if the assessment only considered the corridor up to Walters Road to avoid severing the park. Accordingly, the team considered a modified option should be assessed to fairly ascertain the preferred option.

Further North-South Assessment (south of Airfield Road)

Figure 10-4 shows the modified iteration of option 2.1 south of Airfield Road for further assessment. This option utilises Porchester Road north of Walters Road (i.e. part of option 1.1) to avoid impacts on Bruce Pulman Park, before turning east-west along Walters Road to connect with Grove Road and Clevedon Road (i.e. part of option 2.1) to connect to Papakura.

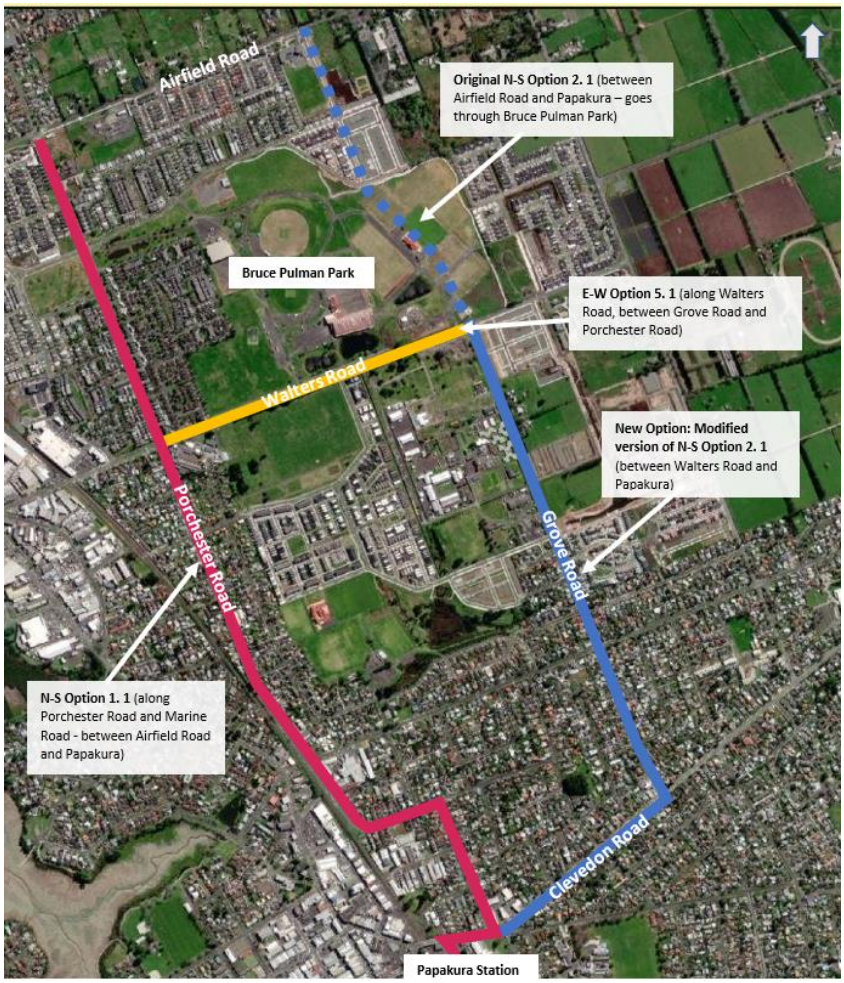


Figure 10-4 – Modified option 2.1, utilising Porchester Road north of Walters Road, Grove Road south of Walters Road, and Walters Road itself to connect them.

The modified option 2.1 was then tested against option 1.1 using the MCA Framework. This assessment is summarised in Table 10-3 below.

Table 10-3 – Summary of further north-south route option MCA assessment

Criteria	Scoring	
	Option 1.1	Modified Option 2.1
IO 1: Access	2	3
IO 2: Integration	1	2

IO 3: Travel choice and climate change	2	3
Historic Heritage	-2	-2
Land Use Futures	2	1
Urban Design	1	0
Social Cohesion	3	2
Human Health and Wellbeing	-2	-2
Landscape / Visual	0	1
Stormwater	-1	-2
Ecology	-1	-1
Natural Hazards	-4	-3
Transport System Integration	2	3
User Safety	1	2
Construction Impact	-2	-1
Construction Disruption	-2	-2
Construction costs/risks	-2	-3

The key outcomes from this assessment are that:

- **The modified option 2.1** scores more favourably against the investment objectives and transport criteria than Option 1.1 as the option will provide existing residential areas to the east of the NIMT with high quality public transport which it currently lacks; and
- As noted in the initial assessment, **option 1.1** was assessed as highly adverse against natural hazards due to likely settlement of existing properties as a result of earthworks and underlying soil conditions.

Accordingly, the modified option 2.1 is the preferred route option south of Airfield Road.

South of Papakura

The above assessment identifies a preferred north-south route as far south as its connection with the Papakura metropolitan centre via Clevedon Road. Given that the intent of the Takaanini FTN (as envisaged in IBC option MT4I) is to ultimately connect with the Ōpāheke North-South Arterial (already route protected as part of the Drury Arterials package) at the intersection of Hunua and Boundary Roads, all routing options were assumed to end on Hunua Road. This means that the only routing matter to consider is how to get from Clevedon Road to the intersection of Hunua and Boundary Roads.

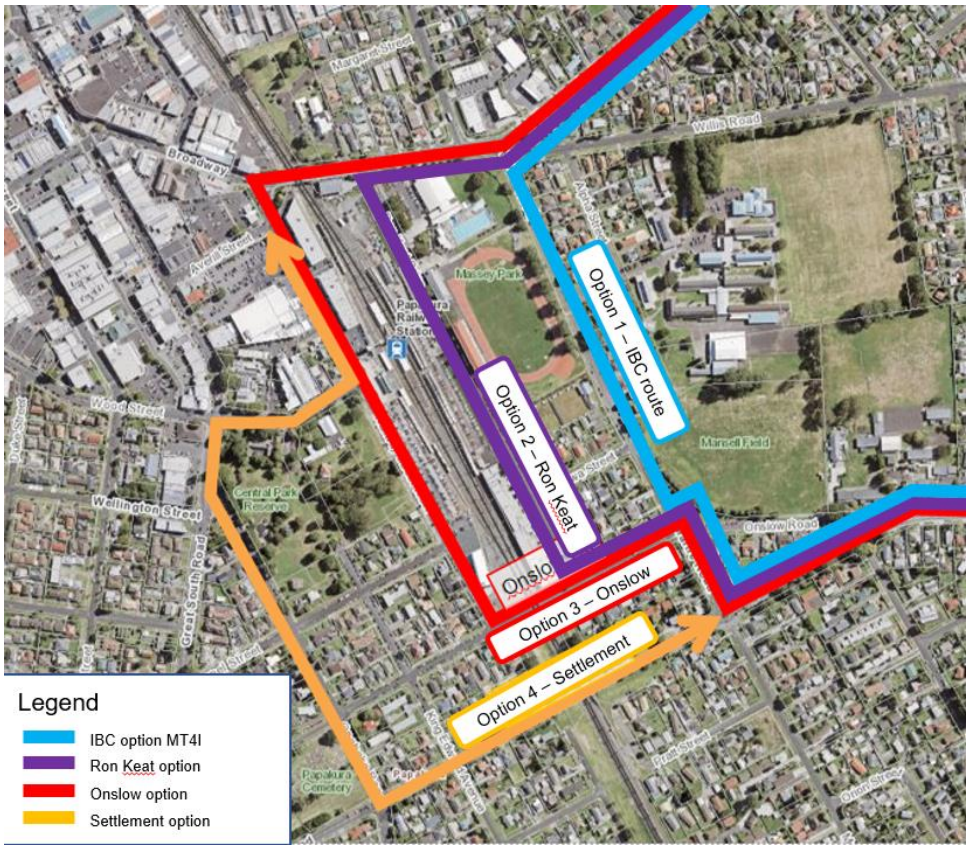


Figure 10-4 – Options for connecting Clevedon Road with Hunua Road.

The Project team identified four possible routes to connect these points (see Figure 10-6). A preferred route was identified with AT, and follows Railway Street West, Great South Road, Ōpāheke Road, Settlement Road, and Hunua Road (see Figure 10-6).

There were a number of reasons why this option was preferred as follows:

- AT considered it was an important functional requirement that the route provide a direct interchange with the Papakura train station, and that the route cross the NIMT to directly serve the Papakura metropolitan centre on the west side of the rail tracks. This ruled out options 1 (the IBC route) and option 2 (Ron Keat Drive) (see Figure 10-6);
- There is one road-over-rail crossing to the north of the station (Clevedon Road), which is the logical point to cross the tracks (given that the route already follows Clevedon Road);
- The Settlement Road routing option (Option 4 – see Figure 10-6) was preferred to cross the tracks to the south of the station as possible future rationalisation of the Onslow and Settlement Road crossings has been indicated as a possibility as part of the future four-tracking of the NIMT (both

existing crossings would need to be rebuilt to accommodate additional tracks). In this eventuality it was considered more likely that Settlement Road crossing remains, and that Onslow Road is closed given it is the more strategically significant east-west route for general traffic and freight (as indicated in AT's Future Connect portal);
- The option 4 routing also utilised intersection widening designations already secured as part of the Drury Arterials Network (e.g. at the corner of Ōpāheke Road and Settlement Road), ensuring future land take efficiencies; and
- Given the earlier noted assumption of a connection at the intersection of Boundary and Hunua Roads, all four options followed Settlement and Hunua Roads.

Preferred North-South Route Option

The above assessment has indicated that:

- **Option 1.2 (Porchester Road)** is the preferred north-south route option to the north of Airfield Road;
- **Modified option 2.1** (comprising a section of option 1.1 (Porchester Road), Walters Road, and Grove Road) is the preferred north-south route option to the south of Airfield Road to Papakura; and
- The preferred route option between Papakura and the intersection of Hunua and Boundary Roads follows Railway Street West, Great South Road, Ōpāheke Road, Settlement Road, and Hunua Road.

This preferred route option is shown in Figure 10-7.

Figure 10-5 – Preferred North-South Route Option

10.2.2 East-West options

Implications of the North-South Assessment

The north-south and east-west route option assessments were undertaken sequentially, meaning that the outcomes of the north-south assessment influenced the scope of optioneering and outcomes undertaken for east-west route options. In particular:

- The preference for Porchester Road as a north-south route north of Walters Road (over a new alignment further to the east) has meant that east-west options further to the east of Porchester Road outlined in section 10.1.2 can be discarded without further assessment as part of the FTN route (because the remaining east-west options were premised on connecting with a north-south alignment further to the east). This removed the need to assess options 1.2, 1.3, 2.3, and 4.1; all of which were premised on connecting with a new north-south alignment further to the east of Porchester Road; and
- The inclusion of Walters Road as part of the preferred north-south route means that one of the east-west options (option 5.1, see Figure 10.4) is already included as part of the preferred route.

Given the above, the eleven east-west options shortlisted in section 10.1.2 were reduced to six for the purposes of MCA assessment as follows:

- Option 1.1 – Alfriston Road between Manurewa and Porchester Road;
- Option 2.1 – Rangi Road and Popes Road (via Rangi Road Viaduct);
- Option 2.2 – Spartan Road and Popes Road between Great South Road and Porchester Road;
- Option 3 – Manuroa Road and Station Road east of Takaanini Station;
- Option 4.2 – Taka Street and Airfield Road between Great South Road and Porchester Road; and
- Option 5.2 – Walters Road west of Porchester Road.

MCA Assessment

The shortlisted east-west options were assessed using the Te Tupu Ngātahi MCA Framework described in section 4.1.2. The assessment scoring is summarised in Table 10-4 below.

Table 10-4 – Summary of east-west route option MCA assessment

Criteria	Scoring					
	Option 1.1	Option 2.1	Option 2.2	Option 3	Option 4.2	Option 5.2
IO 1: Access	3	1	1	2	2	1
IO 2: Integration	2	0	1	2	2	0
IO 3: Travel choice and climate change	2	1	1	2	2	1
Historic Heritage	-1	-2	-1	-1	-1	-1
Land Use Futures	2	1	2	2	2	2
Urban Design	1	-3	1	-1	-1	0
Land Requirement	-4	-2	-1	-4	-1	-1
Social Cohesion	3	2	2	3	3	3
Human Health and Wellbeing	-2	-1	-1	-2	-2	0
Landscape / Visual	0	-3	0	0	0	0
Stormwater	-1	-3	-2	-1	-1	-1
Ecology	-3	-3	-4	-1	-1	-1
Natural Hazards	-1	-3	-3	-4	-4	-4
Transport System Integration	4	4	-3	2	2	1

Criteria	Scoring					
	Option 1.1	Option 2.1	Option 2.2	Option 3	Option 4.2	Option 5.2
User Safety	1	1	-3	2	2	1
Construction Impact	-1	-2	-1	-1	-1	-1
Construction Disruption	-2	-3	-2	-2	-2	-2
Construction costs/risks	-1	-4	-3	-3	-3	-3

The key findings of the assessment were as follows:

- **Option 1.1** performs the best against the investment objectives, land use futures and transport system integration as it will provide for the existing residential community and integrate well with the existing environment. However, it was assessed as highly adverse for land requirement given the established residential community;
- **Option 2.2** (which included the Rangi Road Viaduct) was not preferred given the significant adverse effects associated with a large 500m viaduct traversing SH1, the NIMT, the Papakura Stream, and Transpower's electricity corridor – these are reflected in the urban design, landscape and visual, stormwater, ecology, natural hazards, and construction disruption criteria. Moreover, the high cost, complexity, and high levels of embodied carbon associated with the option are reflected in the scoring for construction costs/risks;
- **Option 2.2** is anticipated to only have low positive benefits against the investment objectives given the industrial land use, meaning that catchment is limited. The option was assessed as highly adverse against ecology due to the potential impact on mature exotic and native trees as well as floodplains assessed as having moderate value;
- **Option 3** scores similarly to Option 1.1 in terms of investment objectives with the exception of investment objective 1 as it is anticipated to have a smaller catchment, and accordingly benefitting fewer people. Similar to Option 1.1, significant land requirements were anticipated, hence the low score. Option also assessed as highly adverse for natural hazards due to the soft soil conditions resulting in the risk of settlement and groundwater management required;
- **Option 4.2** scores similarly to Option 3 with respect to investment objectives and for similar reasons. Likewise, it scores highly adverse for natural hazards due to ground conditions and the associated risks; and
- **Option 5.2** was assessed as having low positive benefits in respect of the investment objectives. However, it was assessed as highly adverse against natural hazards due to the soft soil conditions and its associated risks.

The assessment has identified **Option 1.1 (Alfriston Road)** as a preferred east-west route option as it best responds to the investment objectives by providing an east-west connection through to the Manurewa Station. Further, it is not anticipated to have the high adverse impacts on the natural environment as some of the other options, despite some of these options scoring similarly to Option 1.1 in terms of the investment objectives. **Option 5.1 (Walters Road)** is also an east-west connection forming part of the preferred option given it was already identified in the north-south route option assessment (see section 10.2.1).

Decision to discount the Rangi Road Viaduct

A corollary of the above assessment is a decision to discount the Rangi Road Viaduct (part of option 2.2) from further consideration. As noted above, the option was discounted due to high costs, high complexity, high environmental effects, and high levels of embodied carbon – all stemming from the inherent scale and complexity associated with a >500m viaduct traversing SH1, the NIMT, the Papakura Stream, and Transpower's electricity transmission corridor.

Given that the Rangi Road Viaduct formed part of the ISTN network for both Takaanini level crossing removal and the South FTN, this optioneering was undertaken concurrently between the TLC and South FTN DBCs. Accordingly, the Rangi Road Viaduct has been discounted as an option under both DBCs. This confirms that the ISTN options MT4I (and associated options MT4K and EW9B) will not be progressed in the form originally envisaged in the South IBC.

10.3 Preferred route

From the assessments summarised above, the preferred options for both north-south and east-west sections of the Takaanini FTN route were assembled into a single preferred option for the route as a whole. This is shown in Figure 10-8 below, and forms the basis of all subsequent form and function and location refinement assessment.

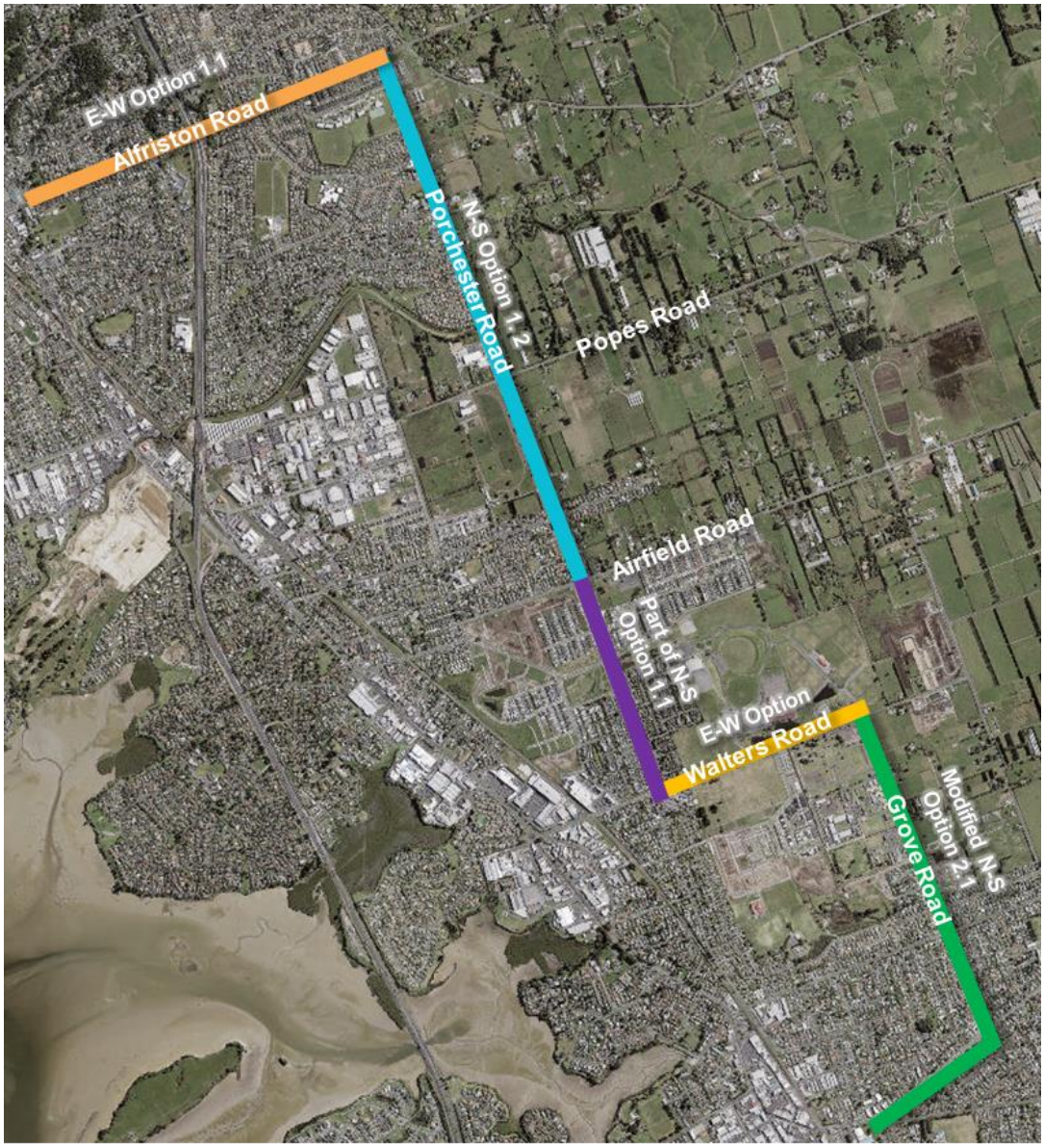


Figure 10-6 – Preferred route for the Takaanini FTN

11 Form and Function

11.1 Corridor Form and Function

As noted in section 4.1.3 of the general methodology, the CFAF process as developed and applied at the Programme-wide level is intended to use land use and transport planning inputs to define functional requirements for the corridor in question, and identify a suitable midblock cross-section from a set of modular concept designs. This approach is taken on the basis that it provides for a suitable level of detail for route protection and design efficiency, whilst allowing for future design changes and flexibility at the time of implementation.

In the case of the Takaanini FTN, the outputs of the CFAF process was the application of:

- **A four-lane FTN arterial** cross-section to section 6 (Alfriston Road), incorporating one general traffic lane and one bus lane per direction, separated active mode facilities in each direction, and space for berms and a median (see Figure 11-1); and
- **A two-lane FTN arterial** cross-section for the remainder of the route (sections 7-9) incorporating separated walking and cycling facilities (see Figure 11-2). No bus lanes are proposed for these sections of the route given the lower expected bus and general traffic volumes (as detailed in **Appendix G: Transport Outcomes Report)**.

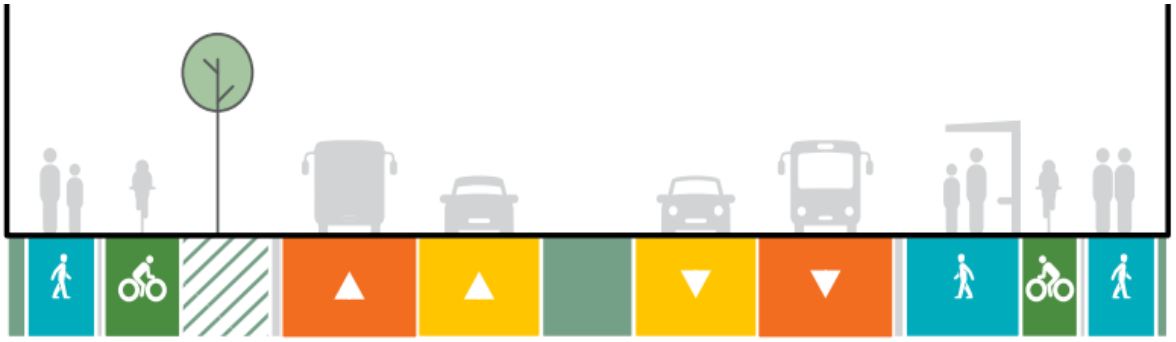


Figure 11-1 – Four-lane FTN arterial as proposed for Alfriston Road (section 6 of the Takaanini FTN).

Figure 11-2 – Two-lane FTN arterial as proposed for sections 7-9 of the Takaanini FTN.

Retesting of Alfriston Road

As was the case for sections of the Great South Road FTN, a reassessment of the Alfriston Road form and function was undertaken given the significant third-party land/property cost implications of applying the four-lane FTN arterial as shown in Figure 11-1. This included assessment of a similar range of form and function approaches considered for the Great South Road FTN, including:

- Prioritisation of a transport mode (e.g. full bus lanes or active mode improvements but not both);
- Removal of an element from the cross-section (e.g. bus lanes in one direction only); or
- Full road space reallocation and/or road widening through applying the full four-lane FTN arterial cross-section shown in Figure 11-1.

Following this assessment, it was concluded that the four-lane FTN arterial cross-section remained the preferred form and function option for the Alfriston Road corridor west of Magic Way; with the section to the east of Magic Way requiring eastbound bus lanes only. The reasons for generally retaining the four-lane FTN arterial cross-section, in spite of its significant third-party land requirements, are as follows:

- Lack of other east-west connections in the transport network which places significant demands on the Alfriston Road corridor for all modes;
- Significant predicted future bus volumes, with up to 26 buses per hour anticipated;
- The need to replace the SH1 and NIMT overbridges irrespective of corridor width;
- Poor outcomes for all transport modes and urban form without additional widening; and
- Inability to avoid significant property impacts with compromised solutions given the nature of land use along the corridor.

11.2 Intersection Assessment

As noted in section 4.1.3 of the general methodology, an intersection assessment process was undertaken in parallel to the CFAF to identify which intersections required upgrades, the indicative intersection controls in these locations, and the resultant footprint implications. Similarly to the CFAF process, the approach developed and applied across the programme for the intersection assessment is to use land use and transport planning inputs to define functional requirements for the corridor in question, and identify a suitable intersection layout from a set of modular intersection designs.

The intersection filtering process identified twenty intersections requiring interventions along the Takaanini Road FTN route between Manukau and Drury. These were identified based on the considerations listed in section 4.1.3 of the general methodology, and are listed in Table 11-1. The rationale and detail for the configurations for each intersection is included in **Appendix G: Transport Outcomes Report**.

As noted in section 4.1.3, the intersection form at each site was identified based on a range of factors including safety, operational efficiency, urban design/land use integration, public transport operations, engineering and environmental constraints, property constraints, and other site-specific factors. While roundabouts are the typical first choice for at-grade intersections recommended in ‘Safe System’ guidance, it is recommended that the majority of intersections along the Alfriston Road section of the route are signalised for the following reasons:

- Complex existing intersections with multi-lane approaches; and

- A highly urbanised context with limited space available without significant property impacts.

The majority of the remainder of the route has a two-lane midblock (see section 11.1 above). Accordingly, following the methodology outlined in section 4.1.3 has resulted in the identification of single-lane roundabouts as the preferred intersection form in the majority of cases. The exceptions are where signals have been recommended due to:

- Proximity of schools in some cases and the resultant need for safer crossing movements;
- The need to enable efficient turning movements for FTN buses; or
- Engineering constraints in the case of the Hunua/Croskery Road intersection.

Table 11-1 summarises the forms identified for key intersections following this assessment. The rationale and detail for the configurations for each intersection is included in **Appendix G: Transport Outcomes Report**.

Table 11-1 – Proposed intersection forms resulting from intersection assessment

Corridor section	Intersection	Proposed form
6	Weymouth Road / Manurewa Bus Interchange	Signals
	Alfriston Road / Claude Road	Signals
	Alfriston Road / Scotts Road	Signals
	Alfriston Road / Magic Way	Signals
	Alfriston Road / Porchester Road	Signals
7	Porchester Road / Popes Road	Dual-lane roundabout
	Porchester Road / Manuroa Road	Single-lane roundabout
	Porchester Road / Airfield Road	Single-lane roundabout
8	Porchester Road / Kauri Heart Avenue	Signals
	Porchester Road / Walters Road	Signals
	Walters Road / Grove Road	Signals
	Grove Road / Old Wairoa Road	Single-lane roundabout
	Grove Road / Clevedon Road	Single-lane roundabout
	Clevedon Road / Marne Road / Willis Road	Single-lane roundabout
	Clevedon Road / Broadway	As existing
9	Great South Road / Ōpāheke Road	As existing
	Ōpāheke Road / Settlement Road	Single-lane roundabout
	Settlement Road / Marne Road	Single-lane roundabout
	Settlement Road / Hunua Road	Single-lane roundabout
	Hunua Road / Croskery Road	Signals

12 Location Refinement

As noted in section 4.1.4 of the general methodology, a process of reconciling expert and technical inputs in a workshop setting applied to decisions on the location of any road widening and realignment (i.e. third-party land requirements) to accommodate the preferred form and function along the preferred routes.

Table 12-1 sets out the key matters identified for each section which have informed the extent and location of third-party land requirements. These generally emphasise where environmental features and identified constraints constitute clear 'differentiators'.

Table 12-1 – Key differentiating features/constraints informing application of location refinement principles

Section	Third-party land requirement?[7]	Key differentiating features/constraints informing application of location refinement principles
6	High	• Desire to avoid or reduce impacts on Church (north side, chainage 350), Cosmopolitan Club (north side, chainage 430), Housing for Elderly complex (south side, chainage 660), • Numerous residential new builds including large apartment complex (north side, chainage 560). Each presents a challenge in terms of avoidance (i.e. the ability to maintain a 1.5m front yard in the first instance), and/or boundary setting where street frontage units will need to be acquired. • The need to replace both SH1 and NIMT bridges drive significant property requirements.
7	Moderate	• Clear preference for any widening to be to the east given that land to the east of Porchester Road is zoned FUZ, while land to the west is already urbanised. • Desire to avoid or reduce impacts on churches/temples on east side, and Alfriston College on the west side, potential large wetland on the east side between Taipan Place and Papakura Stream. • Medium density residential new build at intersection of Porchester Road / Manuroa Road / Berwyn Road – presents a challenge in terms of avoidance (i.e. the ability to maintain a 1.5m front yard in the first instance), and/or boundary setting where street frontage units will need to be acquired.
8	Moderate	• Medium density residential new build at intersection of Walters Road / Grove Road – presents a challenge in terms of avoidance (i.e. the ability to maintain a 1.5m front yard in the first instance), and/or boundary setting where street frontage units will need to be acquired.
9	Moderate	• Desire to avoid or reduce impacts on historic heritage features (Papakura Old Central School and War Memorial), Papakura Cemetery, and notable tree in road reserve near Settlement Road rail bridge. • Medium density residential new build at intersection of Settlement Road and Marne Road – presents a challenge in terms of avoidance (i.e. the ability to

[7] Qualitative scale of land requirement is taken from **Appendix L: Route Protection Strategy**.

Section	Third-party land requirement?[7]	Key differentiating features/constraints informing application of location refinement principles
		maintain a 1.5m front yard in the first instance), and/or boundary setting where street frontage units will need to be acquired.

The Design Report also addresses the consequential/ancillary design features resulting from the optioneering process (e.g. stormwater treatment devices and earthworks), and these considerations are not repeated here. The General Arrangement drawings included in Appendix H show the resultant corridor location/alignment and proposed designation boundaries.

13 Preferred Option

Following the application of the above process, a preferred option for the Takaanini FTN was identified. Its route and form and function are shown conceptually in Figure 13-1 below. The detailed alignment and boundaries are shown in the General Arrangement drawings appended to **Appendix H: Design Report**.

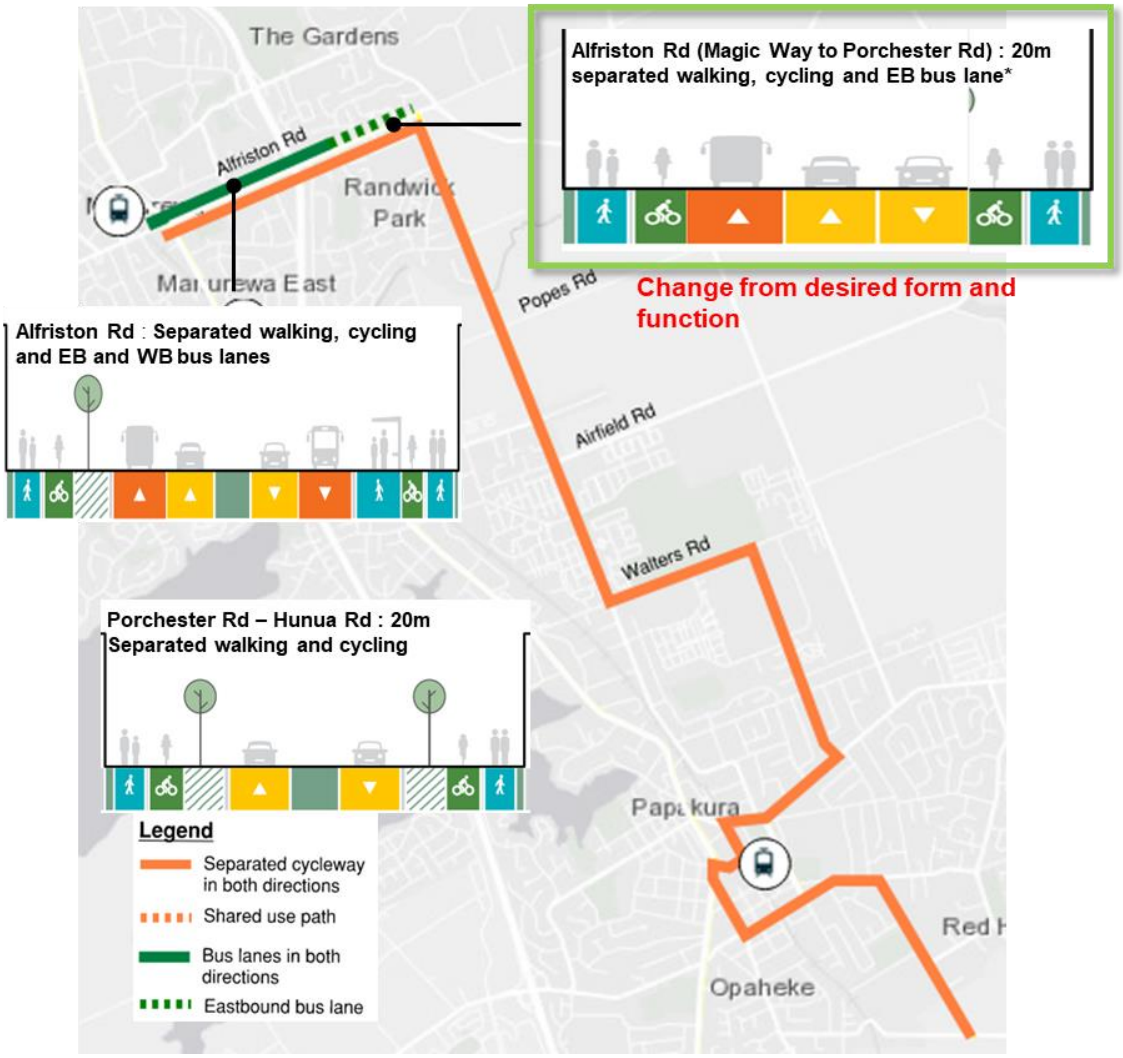


Figure 13-1 – Takaanini FTN preferred option

PART D: COMPLEMENTARY CORRIDORS

14 Gap analysis and confirmation of optioneering scope

As noted in section 2.2, each of the 'complementary' corridors originates from options identified as part of the ISTN through the IBC process; and have fallen into the scope of the South FTN DBC as a result of circumstances summarised in the gap analysis (see section 3).

These are outlined in Table 14-1 below.

Table 14-1 – Origins of the complementary corridors and why they are in South FTN DBC scope

Corridor	IBC option	Reasons for inclusion in South FTN DBC scope
Popes Road	Formed part of option EW9B which comprised east-west connections in the Takaanini area (see Figure 2-3).	• The decision to discount the Rangi Road Viaduct as part of the Takaanini FTN meant that option EW9B (and indeed option MT4L) was not possible in the form envisaged in the IBC. However, this decision only applied to the Rangi Road Viaduct, not to the wider east-west corridor including Popes Road. • Popes Road still likely has strategic significance as a future east-west connection between the north-south route formed by the Takaanini FTN and the future Mill Road corridor (and indeed further west via the TLC crossings).
Croskery Road	Formed the northernmost part of option AR10 (the Ōpāheke North-South Arterial), which in turn formed a part of FTN option MT4L (see Figures 2-1 and 2-2).	• The section of IBC option AR10 that formed part of FTN option MT4L has now been designated south of the intersection of Hunua and Boundary Roads (as part of the Drury Arterials package), and is part of the Takaanini FTN (see Part C of this report) to the north of the intersection. Croskery Road is therefore the only section not accounted for. • Croskery Road still likely has strategic significance as a future east-west connection between the north-south route formed by the Takaanini FTN and Ōpāheke North-South Arterial and the future Mill Road corridor.
Great South Road (Drury)	Formed the southernmost part of options MT4K and MT4L (SH1 FTN options), forming the connection between the SH1 Drury Interchange and Drury Central Station (see Figure 2-1).	• As noted in section 3, options MT4K and MT4L have not been taken forward into a DBC by Te Tupu Ngātahi, meaning that the upgrade of this section of Great South Road has not been provided for. • The designation/consenting and funding of the Drury Central Station and Waihoehoe Road urbanisation through NZUP have left this section of Great South Road requiring corresponding planning for urbanisation to ensure that the projects form a cohesive whole.

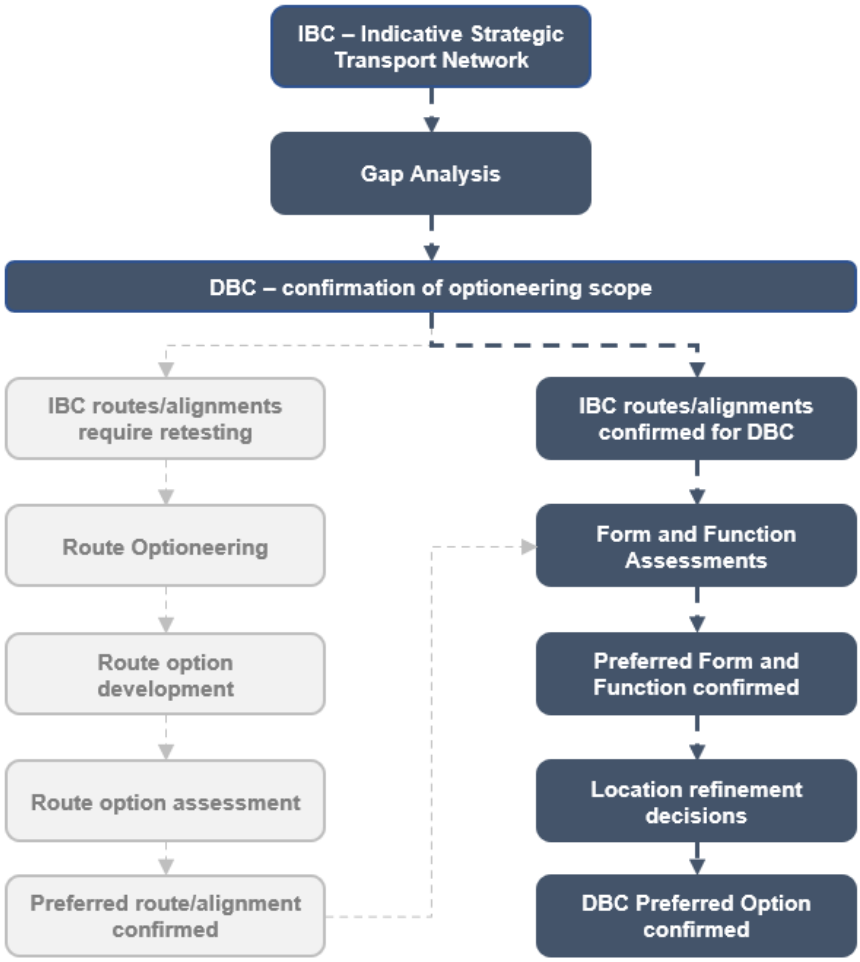


Figure 14-1 – Optioneering process adapted for Popes Road, Croskery Road, and Great South Road (Drury). Note omission of the route optioneering steps.

The methodology outlined in section 4 requires the implications of new information identified in the gap analysis to be considered with a view towards establishing the necessary scope of further optioneering in the DBC. In making this determination, the following conclusions were reached through the gap analysis on the three complementary corridors:

- The reasoning set out in Table 4-1 for each of the corridors identifies that each of the three corridors remains strategically important in the context of the wider network as it is now planned;
- Legislative and policy direction to enable increased housing supply, updates to AFC growth scenarios, and Private Plan Changes all signal that the areas around the Takaanini FTN project area will continue to experience urban growth and increased demand on the transport network;;
- The types of multi-modal interventions, namely urbanisation and active mode facilities, envisaged along the corridors are entirely consistent with the transport and climate change legislation policy directives outlined in Table 3-1; and
- All three corridors already exist. Given that FTN services are not proposed along these routes, there is no need to consider bus routing implications as was the case for the Takaanini FTN.

For the above reasons, there was not considered to be any reason to further retest the routes for Popes Road, Croskery Road, and Great South Road in Drury. Accordingly, the route optioneering process step was omitted, and the corridor proceeded directly to form and function assessment and location refinement (see Figure 14-1).

14.1 Implications of the draft Future Development Strategy

In response to NPS-UD requirements, Auckland Council published a draft FDS in April 2023. The draft FDS proposes changes to the spatial composition of urban growth in Auckland, including removal of the Takaanini FUZ. This area was identified as an area for long-term urbanisation under the Council's FULSS, and remains zoned FUZ. Given the timing of the draft FDS, it was not considered during the gap analysis undertaken at the outset of the Project.

The draft FDS is yet to be finalised, and would need to be followed by plan changes to take practical effect, and accordingly has yet to make a material difference to the recommendations of this report. However, it does introduce some uncertainty to the land use context for the Popes Road corridor given it traverses the Takaanini FUZ. It is recommended that the options assessment is re-examined in future when the draft FDS has been finalised and its implications are clearer.

14.2 Implications of potential freight network changes

There is some uncertainty at the time of writing as to the strategic role of Popes Road in the future freight network relating to a range of factors, including:

- Uncertainty as to the implications of a potential Alfriston Plan Change (currently in pre-lodgement discussions) for freight routing from freight generators to the east such as the Brookby Quarry;
- Uncertainty as to the form, function, and sequencing of the proposed Mill Road Corridor; and
- Implications of decisions relating to the Rangi Road Viaduct (see Part C of this report) for assumptions regarding freight routing.

Depending on the resolution of the above matters, the strategic significance of the Popes Road route as part of an east-west route connecting to Great South Road and SH1 via the proposed Manuia Road rail crossing (proposed as part of the TLC Project) may increase. This in turn may mean that further work needs to be undertaken in future to determine any route protection requirements to provide a freight connection between Popes Road and Manuia Road. Given the above uncertainties, this work has not been undertaken as a part of this business case. It is recommended that this is considered further in future work when the implications of the above uncertainties become clearer.

15 Form and Function

15.1 Corridor Form and Function

As noted in section 4.1.3 of the general methodology, the CFAF process as developed and applied at the Programme-wide level is intended to use land use and transport planning inputs to define functional requirements for the corridor in question, and identify a suitable midblock cross-section from a set of modular concept designs. This approach is taken on the basis that it provides for a suitable level of detail for route protection and design efficiency, whilst allowing for future design changes and flexibility at the time of implementation.

In the case of the three complementary corridors, the outputs of the CFAF process were the application of:

- **A two-lane arterial** cross-section for Popes Road and Croskery Road incorporating separated walking and cycling facilities (see Figure 15-1). No bus lanes are proposed for these corridors as they are not proposed as FTN bus routes; and
- **A four-lane arterial** cross-section for Great South Road (Drury) incorporating two general traffic lanes per direction, separated active mode facilities in each direction, and space for berms and a median (see Figure 15-2). No bus lanes are proposed for this part of the corridor as it is not proposed as an FTN bus routes. However, bus lanes are not precluded.

Figure 15-1 – Two-lane arterial as proposed for Popes Road and Croskery Road (indicative only).

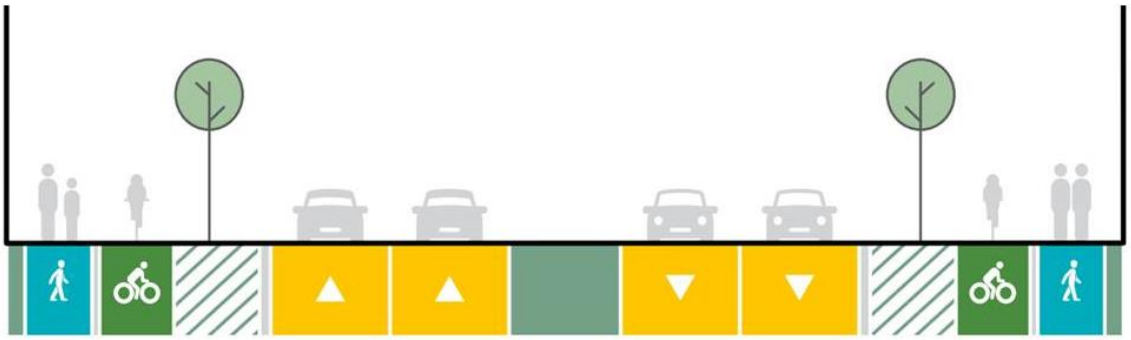


Figure 15-2 – Four-lane arterial as proposed for Great South Road (Drury).

In the case of Croskery Road, it is noted that the cross-section shown in Figure 15-1 can be readily accommodated within the existing road corridor without the need for third-party land.

15.2 Intersection Assessment

As noted in section 4.1.3 of the general methodology, an intersection assessment process is undertaken in parallel to the CFAF to identify the indicative controls required at key intersections, and the resultant footprint implications. Similarly to the CFAF process, the approach developed and applied across the programme for the intersection assessment is to use land use and transport

planning inputs to define functional requirements for the corridor in question, and identify a suitable intersection layout from a set of modular intersection designs.

In the case of the three complementary corridors, standalone intersection assessment was only undertaken for the intersection of Popes Road and Takanini School Road (see Table 15-1). The rationale and detail for the configurations for this intersection is included in **Appendix G: Transport Outcomes Report**. All other intersections along the three corridors were either:

- Already addressed as part of intersection assessment for the Great South Road or Takaanini FTN (given that the corridors intersect in some cases);
- Already assessed as part of another Te Tupu Ngātahi Project; or
- Anticipated to be assessed as part of a future project scope.

The circumstances pertaining to each intersection along the three complementary corridors is summarised in Table 15-1.

Table 15-1 – Complementary Corridors – intersections

Corridor	Intersection	Proposed form
Popes Road	Popes Road / Takanini School Road	Single-lane roundabout
	Porchester Road / Popes Road	Dual-lane roundabout (note addressed as part of Takaanini FTN, see Table 11-1).
	Porchester Road / Mill Road	TBC – Assumed to fall within future Mill Road project scope.
Croskery Road	Croskery Road / Hunua Road	Signals (note addressed as part of Takaanini FTN, see Table 11-1).
	Croskery Road / Mill Road	TBC – Assumed to fall within future Mill Road project scope.
Great South Road (Drury)	Great South Road / Waihoehoe Road	Signals – addressed as part of Drury Arterials package and to be implemented through NZUP (see Table 3-1)
	Great South Road / Firth Street	Addressed as part of Waka Kotahi Papakura-to-Drury (Stage 1B1) Project.
	Great South Road / SH1 Interchange	

16 Location Refinement

As noted in section 4.1.4 of the general methodology, a process of reconciling expert and technical inputs in a workshop setting applied to decisions on the location of any road widening and realignment (i.e. third-party land requirements) to accommodate the preferred form and function along the preferred routes.

Table 16-1 sets out the key matters identified for each section which have informed the extent and location of third-party land requirements. These generally emphasise where environmental features and identified constraints constitute clear ‘differentiators’.

Table 16-1 – Key differentiating features/constraints informing application of location refinement principles

Corridor	Third-party land requirement?[8]	Key differentiating features/constraints informing application of location refinement principles
Popes Road	Low	• Stormwater conveyance channel on the south side of the road east of Porchester Road to be retained (see **Appendix H: Design Report**). This constraint pushes widening northwards. • Desire to avoid/reduce any impacts on Spark Data Centre on the south side of the road west of Porchester Road. • Otherwise – a lack of clear differentiating factors.
Croskery Road	None	N/A
Great South Road (Drury)	Moderate	• The need to integrate with adjoining projects – Waihoehoe Road urbanisation to the north, Drury Central Station to the east, and SH1 Papakura-to-Drury (Drury Interchange) to the south. • Desire to avoid/reduce impacts on Hingaia Stream where bridge replacement is required. • Desire to avoid/reduce impacts on Watercare's Waikato No.1 Watermain on the east side of the road. • Approaches to Hingaia Stream bridge need to be raised for flood immunity.

17 Preferred Options

Following the application of the above process, preferred options for Popes Road and Great South Road (Drury) were identified, and are shown conceptually at Figures 17-1 and 17-2 below. The detailed alignment and boundaries are shown in the General Arrangement drawings appended to **Appendix H: Design Report**.

[8] Qualitative scale of land requirement is taken from **Appendix L: Route Protection Strategy**.

Further work on defining a preferred option for Croskery Road has not been progressed. As noted above, the preferred form and function can be accommodated within the existing road reserve with no third-party land needed. Accordingly, no designation is proposed (see **Appendix L: Route Protection Strategy**).

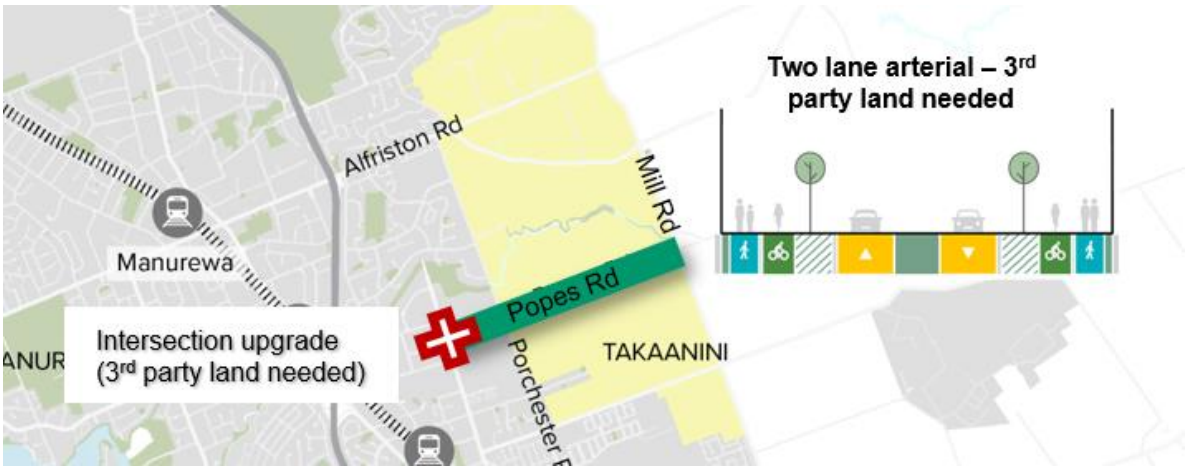


Figure 17-1 – Popes Road preferred option

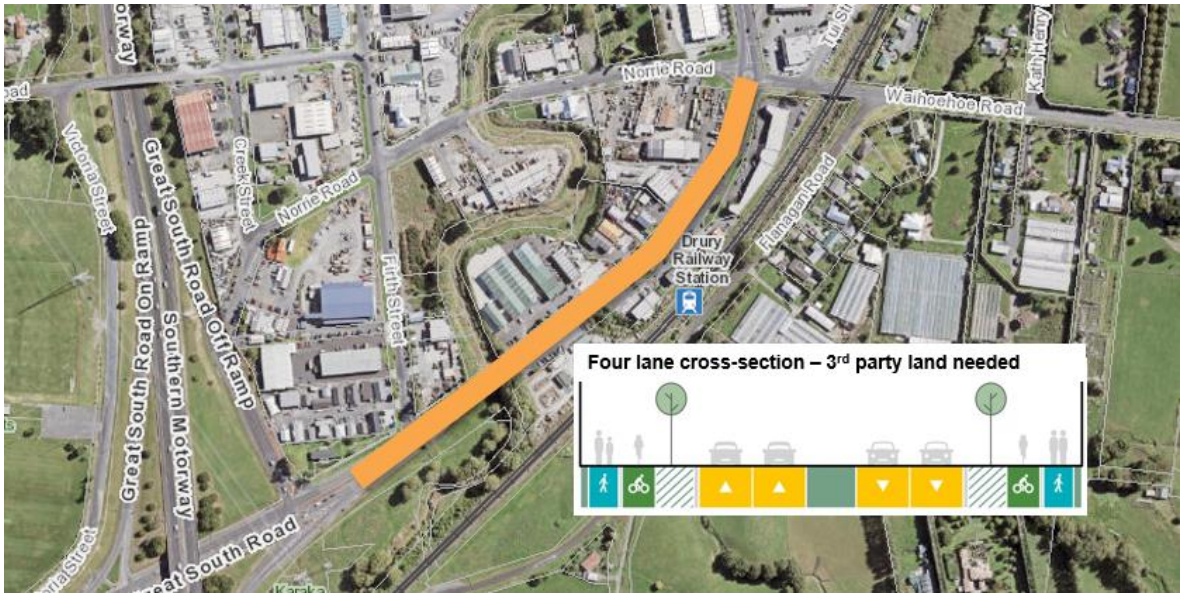


Figure 17-2 – Great South Road (Drury) preferred option

Appendix A: MCA Framework – Criteria

#	Criteria	Measure
1a	Heritage	Extent of effects on: sites and places of valued heritage buildings, scheduled trees (with heritage value) and places. sites and places of archaeological value. sites and places of European cultural heritage value
1b	Mana Whenua	Extent of *effects on sites and places of cultural heritage value to Manawhenua (including Sites and Places of Significance to Mana Whenua Schedule, Auckland Unitary Plan)*
2a	Land use futures / integration with planned land use	To what extent will the option impact on the future development of land (within the corridor, adjacent to it and impacted by it – ie consider all 3 scales), in relation to: • Integration with the future land use scenario (including any Structure Plans or Plan Changes) • Size and shape of potential development parcels to enable appropriate building typologies • Ability to consolidate residual land • Access that does not prevent neighbouring development
2b	Urban design	To what extent does the option support a quality urban environment (both current and future planned state)? particularly relating to: • Context and planned place making considerations • An inviting, pleasant and high amenity public realm • 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: • 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: • Air Quality • Contaminated land • Noise and vibration
3a	Landscape / visual	The extent of effects on: • 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: • Potential flooding effects of the option within the catchment • Extent and consequences of likely mitigation measures
3c	Ecology	Extent of effects on: • 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)
4a	Transport system integration	Extent the option achieves the following: • Connectivity / integration other transport modes (ie trains, buses, walking and cycling networks) • Wider transport system effects/benefits • Improve accessibility • Increase mode shift to public transport

4b	User safety	Extent of safety effects on all transport users, including: • People in public transport • people walking or cycling • People in private vehicles
5a	Embodied carbon emissions	Consider the following design requirements: • Length (in km) • Area of impervious surface/ volume of earthworks • Specific infrastructure requirements (e.g. bridges, viaducts, tunnels etc.)
5b	Construction impacts on utilities / infrastructure	Requirements for relocation / design of existing infrastructure, including: • Consideration of safety impacts • Risk of continuity of service over construction • Opportunities for integration with other bulk infrastructure
5c	Construction Disruption	Construction impacts on people and businesses regarding: • Traffic & noise • Earthworks related effects including dust • Quality of life and amenity • Economic impacts on businesses / community / town centres

6a	Construction costs / risk / value capture	Assessed cost for construction of options including: • 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.

Appendix B: Cross-sections assessed for Great South Road FTN

Section	Approaches Considered	Generic Cross-Section Considered
1a	C – Existing road reserve already sufficient to accommodate all desired cross-section elements	As existing.
	D – Apply full four-lane FTN arterial cross-section	
1b	C – Existing road reserve already sufficient to accommodate all desired cross-section elements	As existing.
	D – Apply full four-lane FTN arterial cross-section	
1c	A – Prioritise a transport mode	
	B – Remove an element from cross-section	

Section	Approaches Considered	Generic Cross-Section Considered
2	A – Prioritise a transport mode	
	B – Remove an element from cross-section	
3	C – Existing road reserve already sufficient to accommodate all desired cross-section elements	As existing.
	D – Apply full four-lane FTN arterial cross-section	
4	B – Remove an element from cross-section	
	C – Existing road reserve already sufficient to accommodate all desired cross-section elements	As existing.

Section	Approaches Considered	Generic Cross-Section Considered
	D – Apply full four-lane FTN arterial cross-section	
5	A – Prioritise a transport mode	
	B – Remove an element from cross-section	
	D – Apply full four-lane FTN arterial cross-section