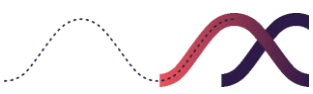
SL1 Industrial and Residential

Integrated Transport Assessment

04 September 2026



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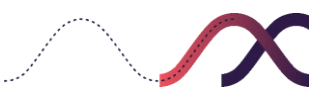


Table of contents

1. Statement of Qualifications and Experience 1
1.1 Sivakumaran Balachandran 1
1.2 Cameron Beswick Inder 2
2. Executive Summary 4
3. Introduction 6
4. Site Location 7
5. Existing Transportation Environment 8
5.1 Existing Road Network 8
5.1.1 Industrial Development 8
5.1.2 Residential Development 9
5.2 Existing Public Transport Network 10
5.2.1 Public Transport 10
5.2.2 Industrial Development 11
5.2.3 Residential Development 11
5.3 Existing Walking and Cycling Network 12
5.4 Intersection Counts 13
5.5 Crash History 13
5.5.1 Industrial Development 14
5.5.2 Residential Development 16
6. Changes in Transport Infrastructure 20
6.1 Hamilton Southern Links 20
6.2 Waikato Metro Spatial Plan 23
6.3 Hamilton Waikato Metro Spatial Plan - Public Transport Pathways 24
6.4 Waikato Regional Public Transport Plan 2022 - 2032 25
7. Project Overview 27
7.1 Industrial Development 27
7.2 Residential Development 28
8. Access Strategy 29
8.1 Industrial Development 29
8.1.1 Option A: Ultimate Network Arrangement (once HSL Stage 1 is Delivered) 29
8.1.2 Option B: Preferred Interim Option 30
8.1.3 Option C: Interim Option 33
8.1.4 SL1 Roundabout 34
8.2 Residential Development 36
8.2.1 MacMurdo Avenue Access 37
8.2.2 Forth Crescent Access 37
8.2.3 Saxbys Road Access 38
9. Public Transport Provision 38
9.1 Industrial Development 40
9.2 Residential Development 40

10. Walking and Cycling Connections 41
10.1 Industrial Development Walking and Cycling Connections 42
10.1.1 Shared Walking and Cycling Paths (Red Line) 42
10.1.2 New Footpath Connection (Blue Line) 43
10.1.3 Mixed Traffic Lanes (Yellow Line) 43
10.2 Residential Development Walking and Cycling Connections 43
10.2.1 Saxbys Road 45
10.2.2 MacMurdo Avenue 46
10.2.3 Deanwell Avenue 48
11. Internal Road Network 49
11.1 Road Carriageway Widths 50
11.1.1 Industrial Development 50
11.1.2 Residential Development 52
11.2 SL1 Development Intersections 55
12. Trip Generation 56
12.1 Travel Mode Splits 56
12.1.1 Industrial Development Travel Mode Estimates 56
12.1.2 Residential Development Travel Mode Estimates 57
12.2 Predicted Trip Generation 60
12.2.1 Industrial Development 60
12.2.2 Residential Development 61
13. Transport Modelling 65
13.1 WRTM Validity 65
13.2 Modelled Scenarios 66
13.3 Key Findings from WRTM Modelling 68
14. Average Daily Traffic Volume Changes 69
14.1 Industrial Development 69
14.2 Residential Development 70
15. Intersection Capacity Performance 71
15.1 Industrial Development 72
15.1.1 Greenwood Street / Kahikatea Drive Intersection 72
Option A: Ultimate Network Arrangement (once HSL Stage 1 is Delivered) 73
Option B: Preferred Interim Option 76
Option C: Interim Option 77
15.1.2 HSL / SL1 Roundabout Connection 78
15.1.3 Kahikatea Drive / Higgins Road Intersection 81
15.2 Residential Development 82
15.2.1 Ohaupo Road / Collins Road Intersection 82
15.2.2 Ohaupo Road (SH3) / Saxbys Road / Tomin Road Roundabout 85
15.2.3 Ohaupo Road / Lambert Court Intersection 91
15.2.4 Ohaupo Road / Resthill Crescent Intersection 96
15.2.5 Ohaupo Road (SH3) / Houchens Road Intersection 99
15.2.6 Future Houchens Road Full-Diamond Interchange 102

15.3 Bus Route Modelling 104
15.4 Summary of Traffic Modelling 107
15.5 Staging of Transportation Infrastructure Improvements 108
15.5.1 Industrial Development Transport Infrastructure Improvements 108
15.5.2 Residential Development Transport Infrastructure Improvements 109
16. District Plan Compliance 113
16.1 Rule 25.14.4.1 (c) Minimum Distance between any Vehicle Crossing and a Transport Corridor Intersection 116
16.2 Rule 25.14.4.1 (e) Minimum Sight Distance from any Vehicle Crossing 117
16.3 Reversing onto Local Roads 117
17. Construction Traffic 118
18. Transport Strategies and Policy 119
18.1 Government Policy Statement on Land Transport 2024 – 34 119
18.2 NZ Transport Agency Waka Kotahi Statement of Intent 2024 – 2028 120
18.3 Waikato Regional Land Transport Plan 2024 – 2054 120
19. Stakeholder Engagement 121
20. Conclusions 121
21. Recommendations 122
Appendix A – Intersection Upgrade and Walking and Cycling Wider Connectivity Concept Plans
Appendix B – SIDRA Movement Summaries
Appendix C – Responses to NZTA and MPDC Comments
Appendix D – Intersection Traffic Counts
Appendix E – Draft Construction Traffic Management Plan

1. Statement of Qualifications and Experience

1.1 Sivakumaran Balachandran

My name is Sivakumaran Balachandran. I am a Senior Transportation Engineer at Bloxam Burnett & Olliver ("BBO"), a firm of consulting engineers, planners and surveyors based in Hamilton. I have been employed by BBO since 2017.

I hold a Bachelor of Engineering (Honours) degree in Civil Engineering from the Nanyang Technological University, Singapore (2014). I am a Chartered Professional Engineer (CPEng), a Chartered Member of Engineering New Zealand (CMEngNZ), and a member of the Engineering NZ Transportation Group.

I have over eleven years' experience in transportation and traffic engineering, including eight years in New Zealand and three years in Singapore. My experience includes transportation planning, integrated transport assessments, traffic modelling, road safety engineering, subdivision design, active mode infrastructure, intersection design, and the assessment of transport effects for resource consent applications, plan changes and structure plans.

My experience relevant to this Project is as follows:

- I was the design lead for the Cambridge Pathways project for Waipā District Council, involving active mode infrastructure connecting the Te Awa River Ride path, Hamilton Road Cycleway, Victoria high-level bridge, schools, the Cambridge town centre and Leamington. My role includes design of protected cycling and walking facilities, raised safety platforms / intersections, contract documentation, stakeholder consultation, and catchment analysis to inform facility provision.
- I am the transportation assessment lead for the proposed Calcutta Farms Ltd industrial rezoning at Matamata, including assessment of effects on the local and state highway networks, consultation with Matamata-Piako District Council and NZ Transport Agency Waka Kotahi, intersection modelling, and concept design of SH24 roundabout upgrades.
- I was the traffic design engineer for the Ruakura Road urban upgrade for Hamilton City Council, including intersection review, complex intersection modelling, preliminary and detailed design inputs for two signalised intersections, full walking and cycling crossing provision, and preparation of signal design drawings.
- I was the traffic design engineer for the Peacocke Strategic Transport and Whatukooruru Drive projects, including detailed signal design and intended operations for multiple signalised intersections. The designs supported mode-neutral outcomes through fully separated walking and cycling crossings and bus priority.
- I authored and led the Integrated Transport Assessment for the Te Rapa Racecourse Medium Density Plan Change, including intersection modelling, preliminary intersection upgrade and signalised mid-block crossing designs, and presentation of expert transportation evidence at the Commissioner-led hearing in August 2023.
- I have led and been a member of Safe System Audit and Road Safety Audit teams for a range of projects, including Kihikihi Township, Te Kowhai Road and the Lockerbie residential subdivision.

I confirm that I have read and abided by the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals Act 2024: Panel Convenors' Practice and Procedure Guidance. This Integrated Transport Assessment has been prepared in compliance with that Code.

1.2 Cameron Beswick Inder

My name is Cameron Inder. I am a Principal Traffic and Transportation Engineer at BBO, a company of consulting engineers, project managers, planners and surveyors in Hamilton and Tauranga.

I hold a Bachelor of Engineering (Hons) from the University of Auckland and have 27 years' experience in traffic and transportation engineering. I am a Chartered Professional Engineer (CPEng) with Engineering New Zealand. I have extensive experience in transportation planning, modelling, and the design of urban and rural transport networks, with particular experience in large-scale infrastructure projects, intersection design, and the assessment of transport effects.

My experience relevant to this Project is as follows:

- I led all traffic and transportation assessments for Takitimu North Link Stage 2, authoring the Integrated Transport Assessment and numerous supporting assessments, and contributing to concept design development for the future four-lane expressway, interchanges, and tie-ins to the existing SH2 at both termini, including the link to Takitimu North Link Stage 1.
- I led transportation assessments for the rezoning of 176 ha at Ohinewai (Comfort Group), supporting a manufacturing / industrial business park and 1,100 residential units. Provided expert witness evidence, participated in joint witness conferencing and stakeholder consultation, and presented evidence at the Commissioner hearing (2020). Continuing to lead transport planning and design as the development progresses.
- I led traffic and transport assessments for the proposed rezoning of 130 ha north of Hamilton Airport. Responsibilities included ITA authorship, supplementary assessments, and concept design of new roundabout access at SH3 / Raynes Road and SH21. Prepared and presented expert evidence for the public hearing. Integrated multi-modal planning, including a strategic bi-directional cycle connection to the Peacocke growth area.
- I project managed the design and delivery of two new rural intersections on SH34 and 400 m of new access road for an industrial business park funded through the regional Infrastructure Fund in 2022. I led and co-ordinated all design inputs from concept through to detailed design, wrote the contract documentation, led the construction procurement phase, and provided design support during construction. I also managed all stakeholder engagement with NZ Transport Agency Waka Kotahi, NOC, Kawerau District Council, and safety auditors.
- Updated and extended the Te Rapa North VISSIM micro-simulation model for Hamilton City Council to assess network effects of a proposed Pak'nSave development. This included commissioning and analysing OD surveys, model calibration (2018 base), and future modelling (2031) with and without development scenarios.
- I led the traffic, walking, and cycling design for the Papamoa Eastern Interchange, including three signalised intersections. Delivered modelling and concept/preliminary design supporting a mode-neutral network, with strong emphasis on safe, fully separated walking and cycling infrastructure.
- I was the lead traffic design engineer for complex intersection modelling and design inputs for the Wairere Drive / Cambridge Road network and diamond interchange in Hamilton. The design integrated raised safety platforms (in collaboration with NZ Transport Agency Waka Kotahi trials), full pedestrian / cycle crossings, and future bus priority, with connections to key cycle networks.
- I reviewed transportation assessments and provided expert advice for a Board of Inquiry hearing relating to a proposed prison expansion, including consultation with Waipā District Council and NZ Transport Agency Waka Kotahi.

- I authored the Integrated Transport Assessment report for a private plan change for Hobbiton Movie Set Tours, assessing the transport effects of increasing permitted visitor numbers from 300,000 to 650,000 annually. I identified the required network and travel demand management responses to accommodate the significant visitor numbers, and I presented expert evidence for the applicant at the Commissioner-led hearing.
- I have extensive experience preparing Integrated Transport Assessments for resource consent applications and private plan changes, including regular attendance at hearings and provision of expert transportation evidence.

I confirm that I have read and abided by the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals Act 2024: Panel Convenors' Practice and Procedure Guidance. This Integrated Transport Assessment has been prepared in compliance with that Code.

2. Executive Summary

This Integrated Transport Assessment ("ITA") supports the Fast-track substantive consent application for the SL1 Project, which comprises the proposed Industrial Development and Residential Development on the southern edge of Hamilton. The assessment has been prepared with regard to Hamilton City Council and NZ Transport Agency Waka Kotahi requirements and assesses the transport effects of the Project in the context of the existing and planned transport network.

The Project comprises two related development areas:

- SL1 Industrial, comprising approximately 60 hectares ("ha"), of which approximately 40 ha are expected to be developable for industrial activities, with the balance associated with the Hamilton Southern Links ("HSL") designation, proposed wetland areas and an existing developed lot.
- SL1 Residential, comprising approximately 46 ha, with an anticipated yield of approximately 938 dwellings, together with a small neighbourhood centre and local open space.

The assessment recognises that development at this scale cannot rely on unconstrained growth in private vehicle travel. Accordingly, the transport strategy incorporates a combination of road network improvements, public transport integration, walking and cycling infrastructure, and staged development controls intended to support a more balanced transport network over time.

HSL forms an important part of the future strategic transport context, but whilst a Road of National Significance its timing remains subject to future funding and delivery decisions. The ITA therefore considers both interim and future network scenarios and identifies staging controls and mitigation measures that respond to different levels of network delivery.

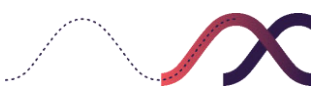
The ITA assesses the existing transport environment, including the road network, public transport services, walking and cycling facilities, traffic volumes and crash history. It also assesses site access arrangements, trip generation, strategic transport modelling using the Waikato Regional Transport Model ("WRTM"), and intersection performance using SIDRA Intersection software.

The key findings are:

- The proposed transport network incorporates walking, cycling and public transport infrastructure that supports the mode share assumptions adopted in the assessment and provides connectivity between the Developments and the wider transport network.
- HSL remains an important long-term component of the future transport network and would improve wider network performance and resilience once delivered. However, the transport strategy adopted for the Project does not rely on HSL being delivered within a specific timeframe, with interim access arrangements, transport infrastructure upgrades and staging measures identified to manage transport effects under interim network conditions.
- For the Industrial Development, Interim Option B has been identified as the preferred interim access strategy. The assessment demonstrates that the full assessed Industrial Development can proceed independently of HSL delivery, while maintaining flexibility to integrate with the ultimate HSL-based transport network should it be delivered in the future.
- For the Residential Development, the Ohaupo Road / Saxbys Road / Tomin Road roundabout represents the principal transport constraint within the assessed network. Subject to implementation of the transport infrastructure upgrades identified in this ITA, the assessment indicates that Residential Development can be accommodated with acceptable transport effects up to approximately 543 dwellings under a network scenario that does not rely on HSL delivery.

- Development beyond approximately 543 dwellings should be supported by a future transport reassessment to confirm whether the assumptions underpinning this ITA remain representative of the receiving transport environment at that time and to identify whether any additional mitigation measures or staging controls are required.

Overall, the ITA concludes that the SL1 Industrial and Residential Developments can proceed without unacceptable transport effects, subject to implementation of the transport infrastructure upgrades, staging framework and reassessment provisions identified in this report.



3. Introduction

The Project relates to land at the south-western edge of Hamilton and seeks to enable industrial and residential development, together with the associated transport infrastructure required to support that growth.

The Project has two distinct components, an Industrial Development area and a Residential Development area, both bordered in red in Figure 1. The Project will enable:

- Approximately 46 hectares ("ha") of land with residential activities, resulting in an anticipated yield of 938 residential units, a small local neighbourhood centre and supporting infrastructure; and
- Approximately 60 ha of land with industrial activities and supporting infrastructure.

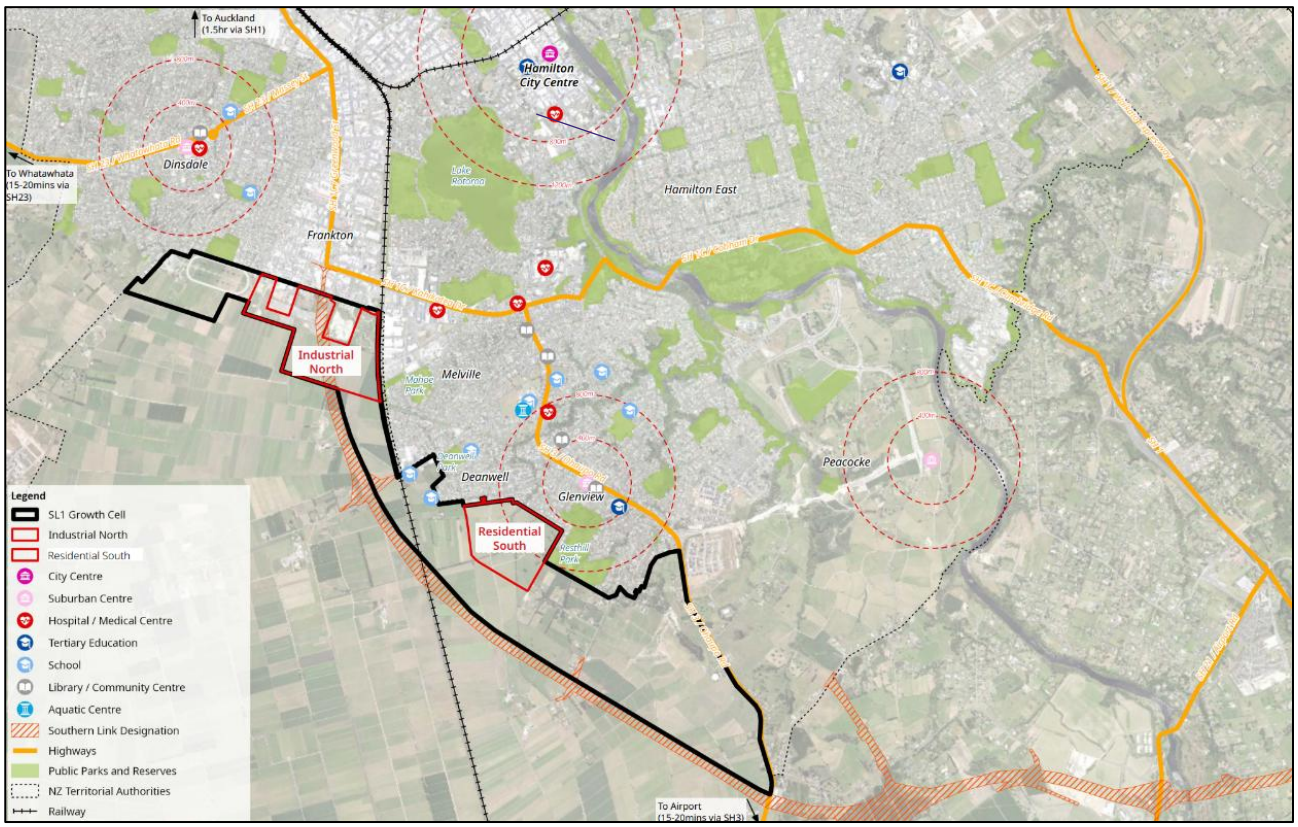


Figure 1: SL1 Industrial and Residential Sites

The Project will provide additional housing and industrial land within the southern Hamilton environs over the short, medium and long term due to the proposed Project size. It gives effect to a large-scale urban development growth cell recognised in Future Proof ("FP") / Future Development Strategy ("FDS") spatial planning documents.

The Project will integrate with the existing Hamilton urban fringe, facilitate improved connectivity and support the implementation of Hamilton Southern Links ("HSL"), which is designated and identified in the Government Policy Statement on land transport ("GPS 2024") as a Road of National Significance ("RoNS"), to "unlock housing".

The Project area is in the Waipā District, but forms part of the future southern Hamilton City growth area and will become part of Hamilton City in time. Neither of the development areas require access from existing Waipā District Council roads.

Accordingly, the Integrated Transport Assessment ("ITA") primarily refers to the transport provisions of the Hamilton City Operative District Plan ("ODP"), planned transport infrastructure and the surrounding Hamilton transport network. This approach is appropriate given the direct urban integration of the Project, its intended future transport connections and the strategic planning framework applying to the area.

This ITA provides an overview of the traffic and transportation investigations undertaken to support the Project. It addresses:

- The existing transport environment in the vicinity of the sites, including the surrounding road network, public transport provision, walking and cycling facilities, traffic volumes and crash history.
- The nature and scale of the Project.
- The level of travel demand expected to be generated by the Project and its distribution on the surrounding network.
- The effects of development traffic on the adjacent road network, including localised intersection analysis at the sites' interfaces with Ohaupo Road (SH3) and Greenwood Street (SH1C), to assess future roading infrastructure performance with development traffic added.
- The transport mitigation and infrastructure required to support the Project, including provision for active modes and public transport.

This ITA does not assume unconstrained growth in private vehicle travel. It recognises that public transport, walking and cycling will need to accommodate an increasing share of future travel demand as development proceeds. This will be supported through subdivision design, the provision of connected walking and cycling infrastructure, integration with the future public transport network, staged transport infrastructure delivery, and wider strategic transport investment.

4. Site Location

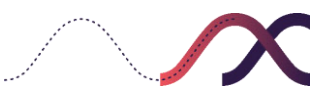
The Project area adjoins Hamilton City Council's ("HCC") south-western boundary. Located approximately 3.5 km southwest of Hamilton City Centre, the wider SL1 urban development growth cell site stretches from south Frankton to the southwestern edge of the Peacocke Structure Plan area. The Industrial and Residential sites are partially bounded by State Highway 3 ("SH3") to the southeast, the North Island Main Trunk Rail ("NIMTR") to the northeast and the HSL designation to the west.

The sites are currently zoned Rural under the Waipā District Plan and comprises a mix of rural, rural-residential and peri-urban land uses.

The Industrial Development area is located adjacent to the Frankton industrial area and is well positioned to connect to Greenwood Street (SH1C), Kahikatea Drive and the wider strategic freight network.

The Residential Development area adjoins the existing urban neighbourhoods of Glenview, Resthill and Deanwell and is connected to the surrounding network primarily via Ohaupo Road, Collins Road, Saxbys Road, MacMurdo Avenue and surrounding local streets. Hamilton Airport and Titanium Park industrial business precinct are approximately 4.5 km to the south-east and Waikato Hospital is approximately 3 km to the north.

The location of the SL1 Development areas is relevant to the transport assessment because it places the Project at the interface between the existing urban area and future growth areas, with access to established strategic transport corridors, public transport services and planned network upgrades to support future growth. The transport implications of that setting are outlined in the following section.



5. Existing Transportation Environment

5.1 Existing Road Network

The existing network of roads surrounding the Project are presented in Figure 2 and discussed in the following sub-sections.

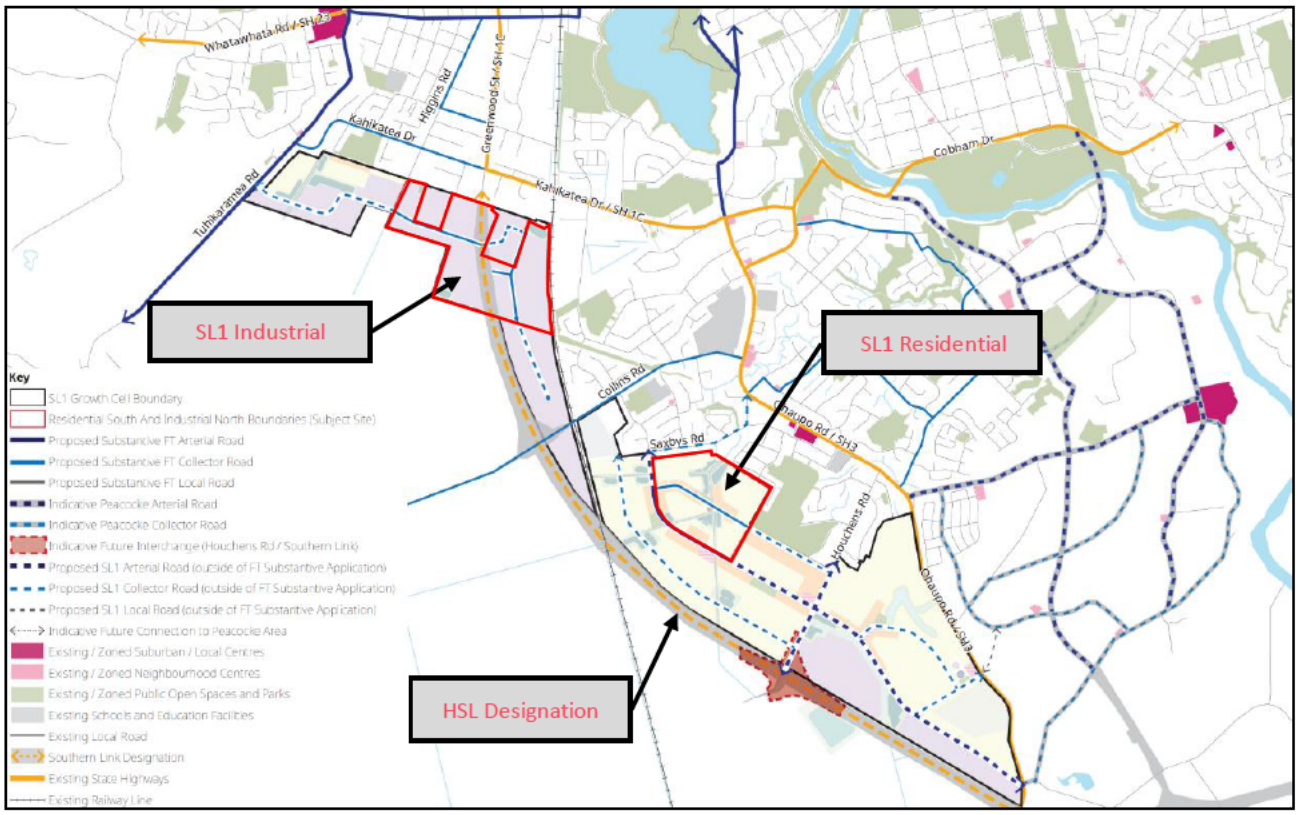


Figure 2: Adjoining Road Network (Existing and Planned / Proposed)

5.1.1 Industrial Development

The transport network adjacent to the Industrial Development area comprises local roads such as Higgins Road and Wickham Street. These roads connect to the primary network of Kahikatea Drive Extension (collector road), Kahikatea Drive and Greenwood Street (SH1C).

Table No: 1

Adjoining Road Network – Industrial Development				
Road	**ONF[1]**	**Posted Speed Limit[2]**	**Average Daily Traffic[3] ("ADT")**	**Heavy Commercial Vehicle[4] ("HCV") Proportion**
Greenwood St (SH1C)	Transit Corridor	80 km/h	23,860 vpd	5.4%
Kahikatea Dr	Urban Connector	60 km/h	27,200 vpd	5.4%

[1] Based on NZTA MegaMaps
[2] Based on NZTA MegaMaps
[3] Based on MobileRoad website
[4] Based on MobileRoad website

Kahikatea Dr Extn	Urban Connector	50 km/h	5,260 vpd	15%
Higgins Rd (north of Kahikatea Dr Extn)	Urban Connector	50 km/h	4,511 vpd	14%
Wickham St	Local Street	50 km/h	1,800 vpd	5%

A known network capacity constraint in this locality is the Greenwood Street (SH1C) / Kahikatea Drive intersection. The intersection is a give-way controlled T-intersection that is proposed by NZ Transport Agency Waka Kotahi ("NZTA") to be replaced with a large urban three-arm roundabout as part of the HSL project. This is discussed further in Section 6.1.

5.1.2 Residential Development

The Residential Development area has connections to the existing transport network comprising primarily of local roads servicing the existing residential neighbourhoods of Deanwell and Glenview. These local roads connect to Collins Road (a collector road in the ODP) and Ohaupo Road (major arterial road).

Table No: 2

Adjoining Road Network – Residential Development				
Road	**ONF[5]**	**Posted Speed Limit[6]**	**ADT[7]**	**HCV[8] Proportion**
Ohaupo Rd (north of Collins Rd)	Urban Connector / Activity St	60 km/h	30,996 vpd	6.6%
Ohaupo Rd (between Saxbys Rd and Lambert Ct)	Urban Connector	60 km/h	15,300 vpd	10.8%
Ohaupo Rd (between Resthill Cr and Houchens Rd)	Urban Connector	60 km/h	15,300 vpd	10.8%
Collins Rd (near SH3)	Urban Connector	50 km/h Variable speed limit = 30 km/h	6,786 vpd	3%
Saxbys Rd	Local Street	50 km/h	2,717 vpd	5%
Deanwell Ave	Local Street	50 km/h Variable speed limit = 30 km/h	2,050 vpd	5%
MacDonald Rd	Local Street	50 km/h	2,460 vpd	5%
MacMurdo Ave	Local Street	50 km/h	261 vpd	5%
Lambert Ct	Local Street	50 km/h	1,681 vpd	5%
Resthill Cres	Local Street	50 km/h	3,107 vpd	5%
Houchens Rd	Local Street	50 km/h	2,091 vpd	5%

Ohaupo Road is a major arterial corridor and designated SH3. It performs an important movement function for both local and inter-regional travel. It provides a primary connection between Hamilton and the wider south Waikato region, including Hamilton Airport, Te Awamutu, Otorohanga and, ultimately, New Plymouth. The proximity of these activity nodes to Hamilton means Ohaupo Road carries substantial commuter, business and inter-regional freight traffic in both peak periods. In the local context, Ohaupo Road also serves as a primary public transport corridor serving Glenview, Deanwell and Melville residential suburbs.

[5] Based on NZTA MegaMaps
[6] Based on NZTA MegaMaps
[7] Based on MobileRoad website
[8] Based on MobileRoad website

Ohaupo Road is a four-lane carriageway north of Saxbys Road and two-lanes south of Saxbys Road.

Existing intersections on Ohaupo Road with limited spare capacity during peak periods include Ohaupo Road / Saxbys Road / Tomin Road roundabout, Ohaupo Road / Lambert Court intersection, Ohaupo Road / Resthill Crescent intersection, and Ohaupo Road / Houchens Road intersection.

5.2 Existing Public Transport Network

5.2.1 Public Transport

The existing Hamilton public transport ("PT") bus network is shown in Figure 3 (blue lines), while existing bus stop locations near the SL1 Development areas are identified in Figure 4.

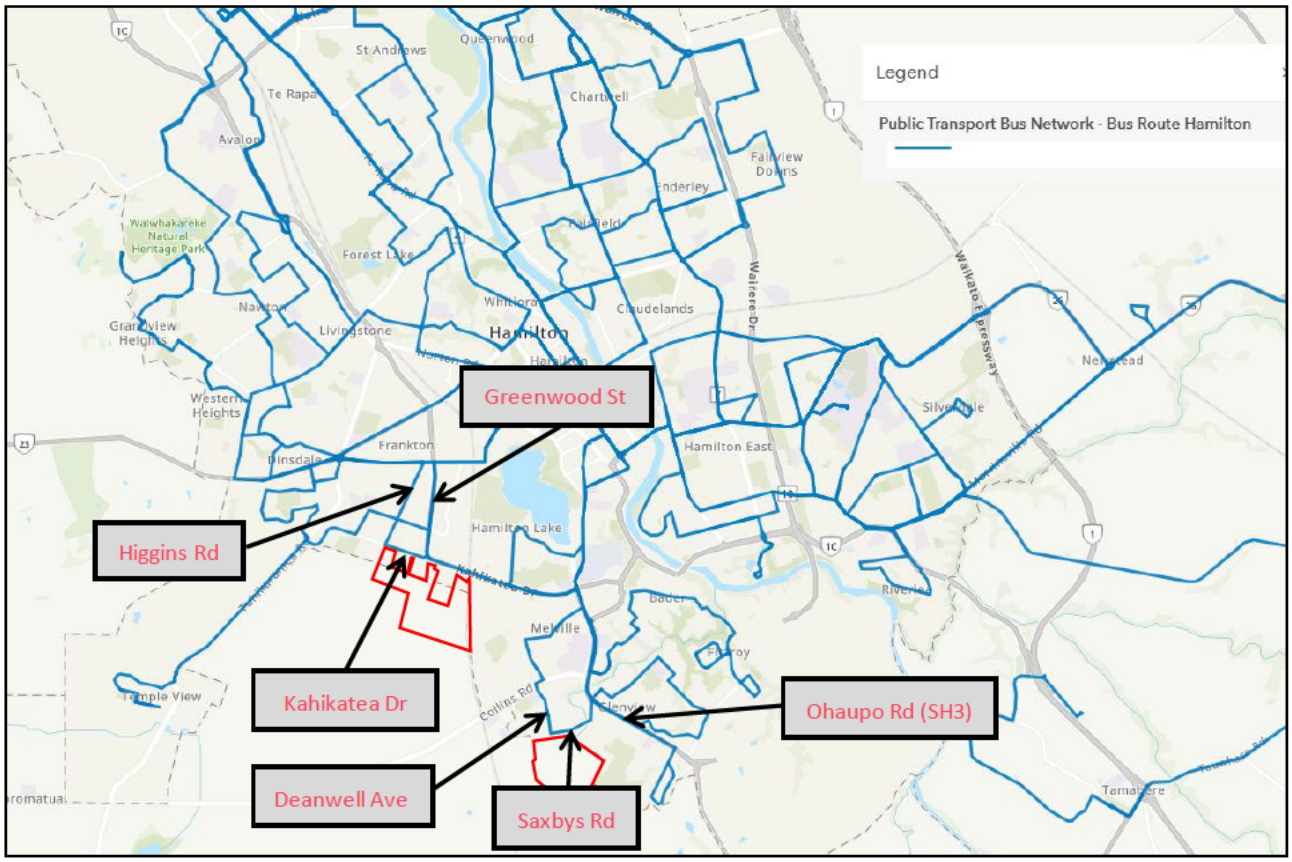


Figure 3: Existing PT Bus Network

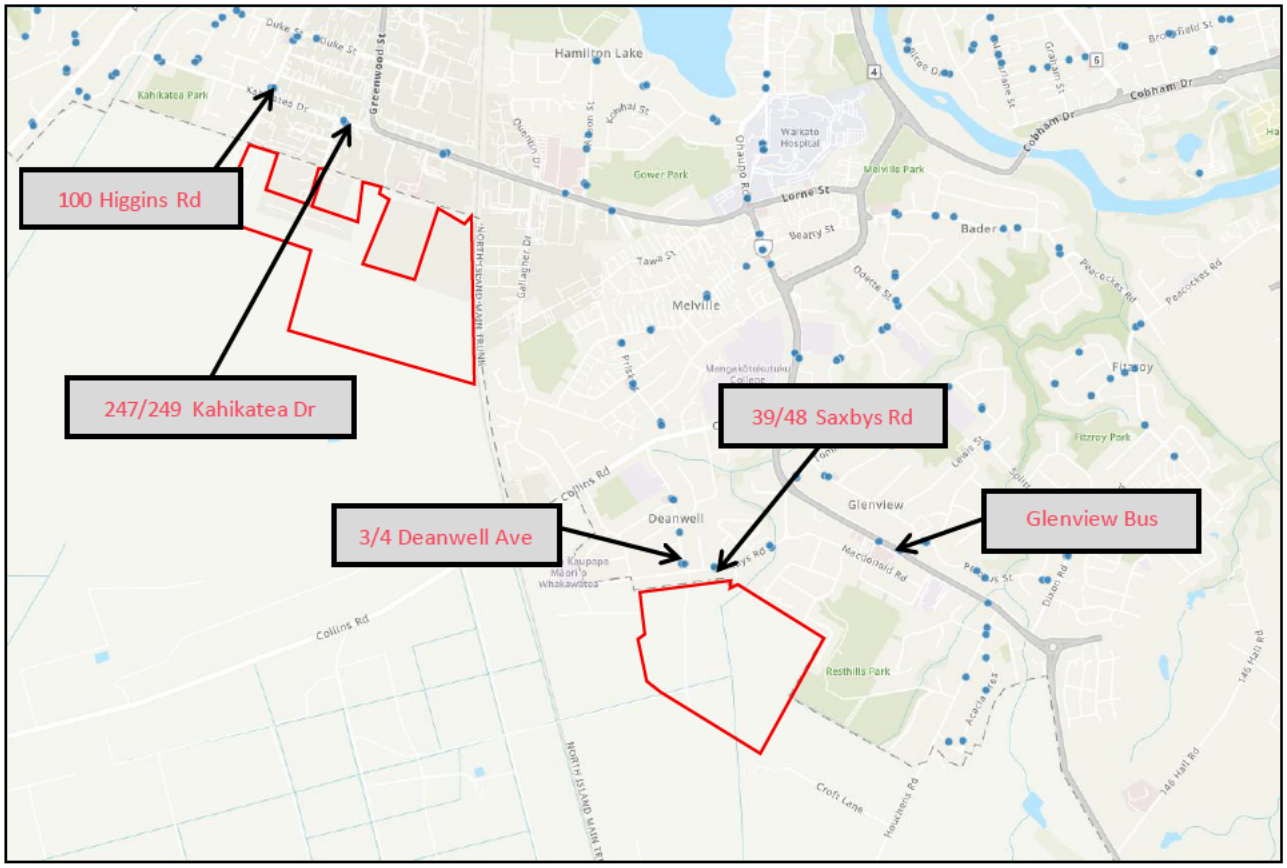


Figure 4: Existing PT Bus Stops

This demonstrates that both the Industrial Development and Residential Development areas are currently served by existing public transport services within reasonable walking distance of the sites.

5.2.2 Industrial Development

The nearest bus stops to the Industrial Development site are located at 274 / 279 Kahikatea Drive and 100 Higgins Road. These bus stops are currently served by the bus service '19 Bremworth / Temple View'. This service travels via alternative routes from the Hamilton Transport Centre, via Queens Avenue, Killarney Road and Kahikatea Drive – in both directions, seven days per week.

5.2.3 Residential Development

The nearest bus stops to the Residential Development site are located at 3 / 4 Deanwell Avenue, 39 / 48 Saxbys Road and the Glenview Bus Hub.

The bus stops at Deanwell Avenue and Saxbys Road are currently served by the Comet bus service. This is a high-frequency service[9], which travels north-to-south through Hamilton city, approximately every 15 minutes, in both directions. South of the hospital, the Comet alternates trips in the Melville / Glenview area – stopping every 30 minutes in these areas.

The Glenview Bus Hub is currently served by the Comet, '24 Te Awamutu' and '26 Te Kūiti Connector' bus services. The '24 Te Awamutu' and '26 Te Kūiti Connector' bus services are regional buses. Route 24 operates between Hamilton Transport Centre and Kihikihi, serving key locations including Waikato Hospital, Glenview Bus Hub, Ōhaupō township, and Te Awamutu town centre, with additional weekday, term-time trips serving Hamilton Boys' High School and Southwell School. Route 26 operates on weekdays between Wintec

[9] https://www.busit.co.nz/hamilton-routes/comet/

Rotokauri Campus and Te Kūiti, travelling via Hamilton Transport Centre, Glenview, Ōhaupō, Te Awamutu, Kihikihi and Ōtorohanga, and providing access to major employment, education, health and town-centre destinations along the corridor.

5.3 Existing Walking and Cycling Network

A mix of on-road, off-road and shared paths are provided in the immediate vicinity of the sites providing alternative routes and forms of transport between the proposed development areas, Dinsdale, Frankton and Hamilton Central to the north. These also provide links to key employment nodes and important destinations including Waikato Hospital, and Melville High School. Figure 5 presents the existing walking and cycling network surrounding the sites.

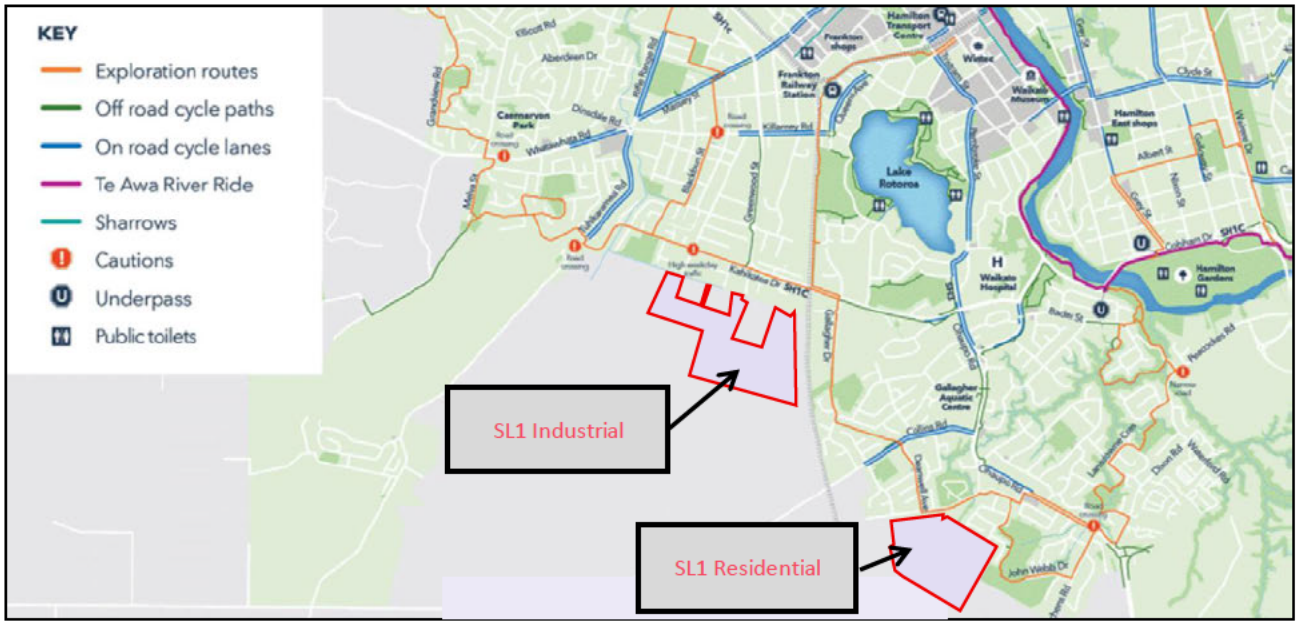


Figure 5: Existing Walking and Cycling Network

Table No: 3

Existing Walking and Cycling Provision on Adjoining Road Network	
Road	**Existing Walking and Cycling Infrastructure**
Greenwood St (SH1C)	• 3 m wide off-road walking and cycling shared path on the western side of the road • Sealed road shoulders for confident cyclists
Kahikatea Dr	• 3 m wide off-road walking and cycling shared path on the southern side of the road • Sealed road shoulders for confident cyclists
Kahikatea Dr Extn	• 1.2 m wide footpaths on both sides of the road
Higgins Rd (north of Kahikatea Dr Extn to Duke St)	• 2 m wide footpaths on both sides of the road
Wickham St	• 1.5 m wide footpath on eastern side of the road
Ohaupo Rd	• 3 m wide off-road walking and cycling shared path on southern/western side of Ohaupo Rd between Collins Rd and Houchens Rd. • 3 m wide off-road walking and cycling shared path on eastern side of the Ohaupo Rd between Collins Rd and Saxbys Rd. • Neighbourhood greenway with sharrow markings on access road on the northern side of Ohaupo Rd between Saxbys Rd and Garden Heights Ave.

	• 3 m wide off-road walking and cycling shared path on northern side of the Ohaupo Rd between Garden Heights Ave and Houchens Rd. • 1.3 m – 1.5 m wide sealed road shoulders for confident cyclists
Collins Rd (near SH3)	• 1.5 m - 1.8 m wide on-road cycle lanes • 1.2 m wide footpath on the southern side of the road • 2.0 m wide footpath on the northern side of the road
Saxbys Rd	• 1.5 m – 1.8 m wide footpath on the northern side of the road between Deanwell Ave and MacDonald Rd
Deanwell Ave	• 1.2 m – 1.5 m wide footpaths on both sides of the road
MacDonald Rd	• 1.8 m wide footpaths on both sides of road between Saxbys Rd and Lambert Ct
MacMurdo Ave	• 1.2 m – 2 m wide footpaths on both sides of the road
Lambert Ct	• 1.8 m wide footpaths on both sides of road

5.4 Intersection Counts

Bloxam Burnett & Olliver Ltd ("BBO") has undertaken intersection traffic counts as part of this ITA. The peak period traffic volumes are attached as Appendix D for the various intersections surveyed.

Table No: 4 summarises the surveyed data.

Table No: 4

2025 Surveyed Intersection Traffic Counts			
Road	**ADT[10]**	**Surveyed Average AM Peak Hour Two-way Volume (vph)**	**Surveyed Average PM Peak Hour Two-way Volume (vph)**
Greenwood St (SH1C)	23,860 vpd	2,021	2,220
Kahikatea Dr	27,200 vpd	2,159	2,358
Kahikatea Dr Extn	5,260 vpd	469	571
Higgins Rd (north of Kahikatea Dr Extn)	4,511 vpd	283	342
Ohaupo Rd (north of Collins Rd)	30,996 vpd	2,210	2,663
Ohaupo Rd (between Saxbys Rd and Lambert Ct)	15,300 vpd	1,590	2,054
Ohaupo Rd (between Resthill Cr and Houchens Rd)	15,300 vpd	1,591	1,843
Collins Rd (near SH3)	6,786 vpd	782	719
Saxbys Rd	2,717 vpd	299	310
Lambert Ct	1,681 vpd	183	383
Resthill Cres	3,107 vpd	70	135
Houchens Rd	2,091 vpd	224	303

5.5 Crash History

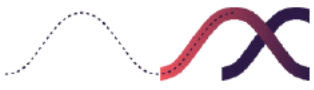
Crash data was sourced from NZTA's Crash Analysis System (CAS) over a ten-year period from 2016 – 2025. The study area includes all crashes within a 50 m radius of key intersections and sections of key roads in the vicinity of the Site.

[10] Based on MobileRoad website

5.5.1 Industrial Development

Table No: 5

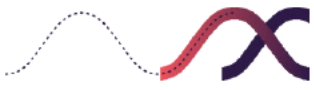
SL1 Industrial Development Crash History 2016 – 2025						
Location	Total # Crashes	Crash Severity				Comments
		Death	Serious Injury	Minor Injury	Non-injury	
Intersections						
Greenwood St / Kahikatea Dr	48	0	4	8	36	<u>Crossing crashes</u> One serious injury crash and three of the minor injury crashes involved a vehicle turning right onto Kahikatea Dr not giving way to a northbound vehicle on Kahikatea Dr. A minor injury crash involved a vehicle turning left onto Greenwood St not giving way to a northbound vehicle on Kahikatea Dr. One of the minor injury crashes involved a vehicle turning right onto Kahikatea Dr not giving way to a southbound vehicle on Greenwood St. <u>Cornering crashes</u> One serious injury crash involved a driver losing consciousness and accelerating off-road. Another serious injury crash involved a vehicle travelling northbound around the corner on Kahikatea Dr, losing control and colliding with a small retaining wall. <u>Head on crash</u> A serious injury crash involved a vehicle travelling southbound at speed, failing to manoeuvre the bend and colliding with another vehicle travelling in the opposite direction head-on.
Kahikatea Dr Extn / Wickham St	2	0	0	1	1	<u>Right turn against crashes</u> A minor injury crash involved a vehicle turning right into Wickham St failing to give way to a vehicle travelling westbound on Kahikatea Dr Extn.
Kahikatea Dr Extn / Higgins Rd	14	0	1	1	12	<u>Crossing (no turns) crashes</u> The serious injury crash involved a vehicle travelling eastbound on Kahikatea Dr failing to give way to a northbound vehicle on Higgins Rd. <u>Crossing (vehicle turning) crashes</u> The minor injury crash involved a vehicle travelling eastbound on Kahikatea Dr failing to give way to a vehicle turning right from Higgins Rd.
Tuhikaramea Rd / Kahikatea Dr Extn	5	0	0	0	5	-



Higgins Rd / Duke St	16	0	1	3	12	Crossing (no turns) crashes Both minor injury crashes involved a westbound vehicle on Duke St failing to stop and give way to a northbound vehicle on Higgins Rd. Another minor injury crash involved an eastbound cyclist on Duke St failing to stop and give way to a southbound vehicle on Higgins Rd. Crossing (vehicle turning) crash The serious injury crash involved a westbound vehicle waiting to turn right onto Higgins Rd failing to stop and give way to a southbound motorcyclist.
Road Sections						
Kahikatea Dr Etxn (between Wickham St and Greenwood St)	4	0	1	0	3	Overtaking / lane change crashes The serious injury crash involved a police pursuit of two motorcyclists.
Kahikatea Dr Extn (between Higgins Rd and Wickham St)	1	0	0	0	1	-
Kahikatea Dr Extn (between Tuhikaramea Rd and Higgins Rd)	13	0	1	3	9	Head on crash The serious injury crash involved a bus going around a right-hand bend crashing into a stolen motorcycle. Cornering crashes A minor injury crash involved a motorcyclist losing control when going around a right turn bend and crashing into a fence. Another minor injury crash involved a westbound vehicle going around the bend at excessive speed, losing control and colliding with a parked vehicle and fence. Pedestrian crash A minor injury crash involved a vehicle reversing out of a driveway colliding with a cyclist on the footpath.
Higgins Rd (between Duke St and Kahikatae Dr Extn)	8		1	1	6	Rear end crash The serious injury crash involved a motorcyclist colliding with a vehicle that was waiting to turn right into a driveway. Manoeuvring crashes A minor injury crash involved a vehicle travelling northbound on Higgins Rd colliding with another vehicle attempting to perform a u-turn.

A review of the crash history indicates the following dominant crash patterns:

- Greenwood Street / Kahikatea Drive exhibits a combination of crossing, turning and lane-change related crashes consistent with the operational characteristics of a priority-controlled T-intersection



on a high-volume arterial corridor. HSL includes a three-arm roundabout at this location. When implemented, this treatment would remove priority-controlled crossing movements, reduce approach speeds and simplify driver decision-making. These changes would be expected to address the dominant crash patterns identified at this intersection.

- Kahikatea Drive Extension / Higgins Road and Higgins Road / Duke Street exhibit recurring crossing crash patterns typical of priority-controlled crossroads intersections, where crashes are generally associated with drivers failing to correctly assess or respond to conflicting traffic movements. The Project does not rely on these intersections as primary access points and therefore is not expected to materially increase exposure to the identified crash patterns. It is also noted that the current HSL concept design includes closure of the western arm of the Greenwood Street / Kahikatea Drive intersection and conversion of the Greenwood Street / Duke Street intersection to a left-in left-out arrangement, which would alter traffic movement patterns within the local road network.
- Kahikatea Drive Extension, particularly between Tuhikaramea Road and Higgins Road, exhibits a recurring loss-of-control and cornering crash pattern along the existing horizontal alignment, indicating a concentration of crashes associated with vehicles departing from their intended path. While the Project does not propose specific geometric modifications to this section of road, the future transport network, including HSL and the wider SL1 transport framework, is expected to alter travel patterns within the area and may reduce exposure to the identified crash pattern over time.
- Higgins Road between Duke Street and Kahikatea Drive extension exhibits manoeuvring-related crashes associated with driveway activity, turning movements and other access-related interactions. As the Project does not rely on Higgins Road as the primary means of access to the Industrial Development area, it is not expected to materially increase exposure to these crash patterns.

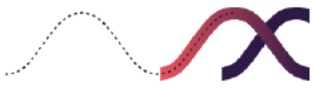
Overall, the crash history does not identify any dominant crash pattern that would preclude development of the Industrial Development area. The proposed access strategy directs traffic to the strategic road network and is not expected to materially exacerbate the identified crash patterns within the surrounding transport environment.

5.5.2 Residential Development

Table No: 6

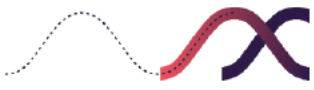
SL1 Residential Development Crash History 2016 – 2025						
Location	Total # Crashes	Crash Severity				Comments
		Death	Serious Injury	Minor Injury	Non-injury	
Intersections						
Ohaupo Rd / Urlich Ave	14	0	0	5	9	Crossing crashes Four minor injury crashes involved vehicles turning right from Urlich Ave colliding with a southbound vehicle on Ohaupo Rd. One crash involved a motorcycle. Right turn against crashes One minor injury crash involved a vehicle turning right into Urlich Ave failing to give way to a southbound vehicle on Ohaupo Rd.
Ohaupo Rd / Collins Rd	27	0	0	6	21	Rear end crashes A minor injury crash involved a vehicle stopping at the limit line to allow a pedestrian to cross. The trailing vehicle

						could not stop in time and collided with the vehicle in front. <u>Pedestrian crashes</u> One of the minor injury crashes involved a vehicle travelling northbound on Ohaupo Rd colliding with a pedestrian who had ran in front of the vehicle. It is to be noted that there is no signalised pedestrian crossing on the southern arm of the intersection. Another minor injury crash involved a child crossing Ohaupo Rd when through movement on Ohaupo Rd had the right of way. The child was hit by a southbound vehicle. <u>Right turn against crashes</u> The minor injury crash involved a northbound vehicle on Ohaupo Rd failing to give way to a vehicle turning right into Collins Rd. <u>Cornering crashes</u> A minor injury crash involved when a vehicle turned right into Collins Rd too fast and mounted the kerb. Driver's alcohol test was above limit. Another minor injury crash involved a motorcyclist turning right into Collins Rd and crashing into the traffic signals.
Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout	42	0	1	10	31	<u>Pedestrian crossing road crash</u> A serious injury crash involved when a southbound vehicle collided with a pedestrian crossing Ohaupo Rd via the roundabout splitter island on the south leg. <u>Cornering crashes</u> A minor injury crash which involved a driver blacking out and crashing into the median barrier. A minor injury crash which involved a vehicle crashing into the tree within the roundabout central island. A minor injury crash involved a vehicle travelling from Tomin Rd losing control and colliding with a parked vehicle on Saxbys Rd. <u>Crossing crashes</u> Four minor injury crashes involved vehicles on Tomin Rd failing to give way to vehicles travelling southbound on Ohaupo Rd. <u>Merging crashes</u> One minor injury crash involved a northbound vehicle on Ohaupo Rd entering the roundabout and colliding



						with another vehicle while attempting to change lanes. <u>Overtaking / lane change crashes</u> A minor injury crash involved a police chase. <u>Head on crash</u> A minor injury crash which involved a driver falling asleep, crossing the centre line crashing into oncoming vehicles.
Ohaupo Rd / Lambert Ct	6	0	0	1	5	<u>Right turn against crash</u> A minor injury crash involved a right turning vehicle colliding with a northbound vehicle on Ohaupo Rd.
Ohaupo Rd / Garden Heights Ave	7	0	0	1	6	<u>Crossing crashes</u> A minor injury crash involved a vehicle exiting Garden Heights Ave failing to give way to a southbound vehicle on Ohaupo Rd. Another non-injury crash involved a vehicle exiting Garden Heights Ave failing to give way to a southbound cyclist on Ohaupo Rd)
Ohaupo Rd / Resthill Cres	3	0	0	1	2	<u>Crossing crash</u> A minor injury crash involved a vehicle turning right out of Resthill Cres failing to give way to a northbound motorcycle.
Ohaupo Rd / Houchens Rd	4	0	0	0	4	-
Ohaupo Rd / Dixon Rd	7	0	0	1	6	<u>Merging crash</u> A minor injury crash involved a vehicle exiting Dixon Rd failing to give way to a southbound vehicle, accelerating and colliding with another vehicle.
Saxbys Rd / Macdonald Rd Roundabout	4	0	0	1	3	<u>Cornering crashes</u> One minor injury crash involved a vehicle travelling south on Saxbys Rd losing control at the roundabout and hitting a tree. Speed believed to be excessive.
Collins Rd / Deanwell Ave	3	0	0	1	2	<u>Head on crashes</u> A minor injury crash involved a police patrol car which was in pursuit of a motorcycle, colliding with a vehicle turning right out of Deanwell Ave.
Road Sections						
Ohaupo Rd – between Collins Rd and Saxbys Rd	11	0	2	3	6	<u>Crossing crashes</u> Serious and minor injury crashes involved vehicles exiting Urlich Shopping Centre colliding with a southbound vehicle on Ohaupo Rd. <u>Cornering crashes</u> A minor injury crash occurred when a driver travelling southbound on Ohaupo Rd lost control of the vehicle and hit the medial island and tree. Another minor injury crash involved a driver losing control and hitting the

						median island and tree while trying to avoid a cat. <u>Cyclist crash</u> A northbound vehicle on Ohaupo Rd collided with a cyclist travelling southbound on the adjacent footpath when the cyclist entered the carriageway.
Ohaupo Rd – between Saxbys Rd and Lambert Ct	15	0	0	6	9	<u>Rear end crashes</u> A minor injury crash involved a vehicle travelling northbound on Ohaupo Rd colliding with another vehicle that had stopped due to congestion ahead. A minor injury rear end crash due to congestion at Lambert Ct intersection. <u>Pedestrian crashes</u> A minor injury crash involved a pedestrian crossing the road colliding with a vehicle where the carriageway widens to two lanes closer to the roundabout. A minor injury crash involved a wheeled pedestrian on the footpath and a vehicle exiting 200 Ohaupo Rd (ABI Hamilton Inpatient and Residential Service). A minor injury crash involved northbound vehicle colliding with a pedestrian crossing the road at an undesignated location. <u>Head on crash</u> A minor injury crash involved a driver who was intoxicated crossing the centre line and crashing with oncoming vehicle.
Ohaupo Rd – between Lambert Ct and Garden Heights Ave	4	0	0	2	2	<u>Lost control / off road crashes</u> Two minor injury crashes happened when a driver fell asleep behind the wheel, going off road and colliding with the traffic signal pole / pedestrian fence.
Ohaupo Rd – between Resthill Cres and Houchens Rd	2	0	0	1	1	<u>Overtaking / lane change crashes</u> A minor injury crash involved a vehicle travelling southbound on Ohaupo Rd colliding with a vehicle merging into the carriageway from the adjacent grass berm.
Saxbys Rd – between Rhonda Ave and Macdonald Rd	11	0	1	4	6	<u>Overtaking / lane change crashes</u> A serious injury crash occurred at the Saxbys Rd / Stan Heather Dr intersection. Two cyclists travelling eastbound on Saxbys Rd performed evasive action when they noticed a vehicle approaching them from Stan Heather Dr. They hit each other. <u>Lost control / off road crashes</u> A minor injury crash involved a vehicle losing control and hitting a tree and house garage. <u>Right turn against crashes</u>



						A minor injury crash occurred at the Saxbys Rd / Deanwell Ave intersection. A cyclist riding eastbound on the footpath was hit by a vehicle turning right into Deanwell Ave. A minor injury crash occurred at the Saxbys Rd / Stan Heather Dr intersection. A westbound vehicle turning right into Stan Heather Dr failed to give way to an eastbound vehicle on Saxbys Rd. <u>Cornering crash</u> A minor injury crash involved a vehicle travelling west on Saxbys Rd going off-road and colliding with a fence and power pole having misjudged a bend.
Saxbys Rd – between Macdonald Rd and Ohaupo Rd	1	0	0	0	1	-

The crash history indicates the following key patterns relevant to the Residential Development area:

- Ohaupo Road / Collins Road exhibits strong patterns of rear-end, cornering and crossing crashes, which are characteristic of a high-volume signalised arterial intersection. However, the intersection already operates as a four-lane divided arterial with a dedicated right-turn lane, and the constrained corridor environment limits the scope for further major geometric widening or intersection expansion that would deliver proportional safety benefits.
- Ohaupo Road / Saxbys Road / Tomin Road roundabout exhibits a combination of crossing, merging, cornering and pedestrian-related crashes. While these crash types are not uncommon at urban roundabouts, the roundabout represents the principal transport constraint within the assessed network. The Project includes upgrades comprising four-laning of Ohaupo Road between Saxbys Road and Lambert Court, additional approach capacity on Saxbys Road and Tomin Road, and metering of the southbound Ohaupo Road approach. These measures are intended to improve the operational performance of the roundabout while maintaining an urban-speed environment.
- A lost control / off-road (straight) crash pattern on Saxbys Road, between Rhonda Avenue and Macdonald Road, suggests repeated departures from the roadway that may be associated with approach speed and the existing road environment. The proposed localised improvements on Saxbys Road (refer to Section 10.2.1) reinforce the role of Saxbys Road as an urban collector-type corridor rather than a high-speed local link.

Overall, the crash history does not identify any dominant crash pattern that would preclude development of the Residential Development area. The proposed intersection upgrades, active mode improvements and transport staging framework respond directly to the principal crash patterns identified within the study area and are expected to improve the safety and operation of the surrounding transport network

6. Changes in Transport Infrastructure

6.1 Hamilton Southern Links

HSL is a transport network improvement project for state highway and urban arterial routes linking SH1C from Kahikatea Drive in Hamilton to the Waikato Expressway at Tamahere and SH3 from Hamilton Airport to central and east Hamilton. The project aims to develop an effective transport network of state highway and

urban arterial routes to support Hamilton's planned growth to the south. In 2024, HSL was identified in the GPS 2024 as a RoNS.

As outlined in the GPS 2024, HSL is intended to "*reduce congestion, improve safety, support housing development, boost economic growth, and provide a more resilient roading network*", and specifically recognised as key infrastructure required to unlock land for significant new housing supply. In this context, HSL is particularly relevant to the Residential Development area because it has the potential to redistribute a proportion of future traffic demand away from the Ohaupo Road corridor and improve wider network connectivity within southern Hamilton.

NZTA completed an Investment Case for HSL. While the completed Investment Case identifies a preferred corridor and staging framework, the most recent NZTA Major Transport Projects Pipeline ("MTPP")[11] identifies that HSL has not yet progressed to the pre-implementation phase and future progression remains subject to funding availability and National Land Transport Programme priorities. Accordingly, the delivery timing of HSL remains uncertain.

Notwithstanding, HSL remains an important component of the long-term transport plan for southern Hamilton and provides relevant strategic context for understanding the future operation of the transport network serving the SL1 Industrial and Residential Development areas.

Based on the completed Investment Case, the recommended staging framework for HSL comprises the following four stages as shown in Figure 6):

- Stage 1 – Greenwood Street to SL1 roundabout

  This involves widening Greenwood Street from two lanes to four lanes from Kahikatea Drive to Killarney Road. A new three-arm roundabout is proposed at the Greenwood Street / Kahikatea Drive intersection with no access to Kahikatea Drive Extension. A roundabout is also proposed allowing access to the Industrial Development area.

- Stage 2 – SH1 to SH21

  This includes a new interchange on SH1 Waikato Expressway between the Pickering Road overbridge and Tamahere Interchange, with the road heading west on a new bridge over the Waikato River to connect with a new interchange to be built where HSL meets SH21.

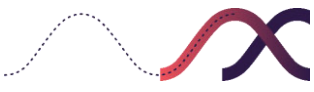
- Stage 3 – SL1 roundabout to SH3

  The largest stage in road length, this connects the Industrial Development roundabout at Greenwood Street corner with SH3 and includes an overbridge of the NIMTR and SH3.

- Stage 4 – SH3 to SH21 including central interchange and north-south connection

  The final stage completes the east-west connection, including building a new central interchange to connect to the Peacocke Structure Plan Area. It will also see a new stretch of road from the SH3 / SH21 roundabout to connect at the central interchange.

[11] https://www.nzta.govt.nz/assets/projects-and-consultations/major-projects/major-transport-projects-pipeline-infographic.pdf



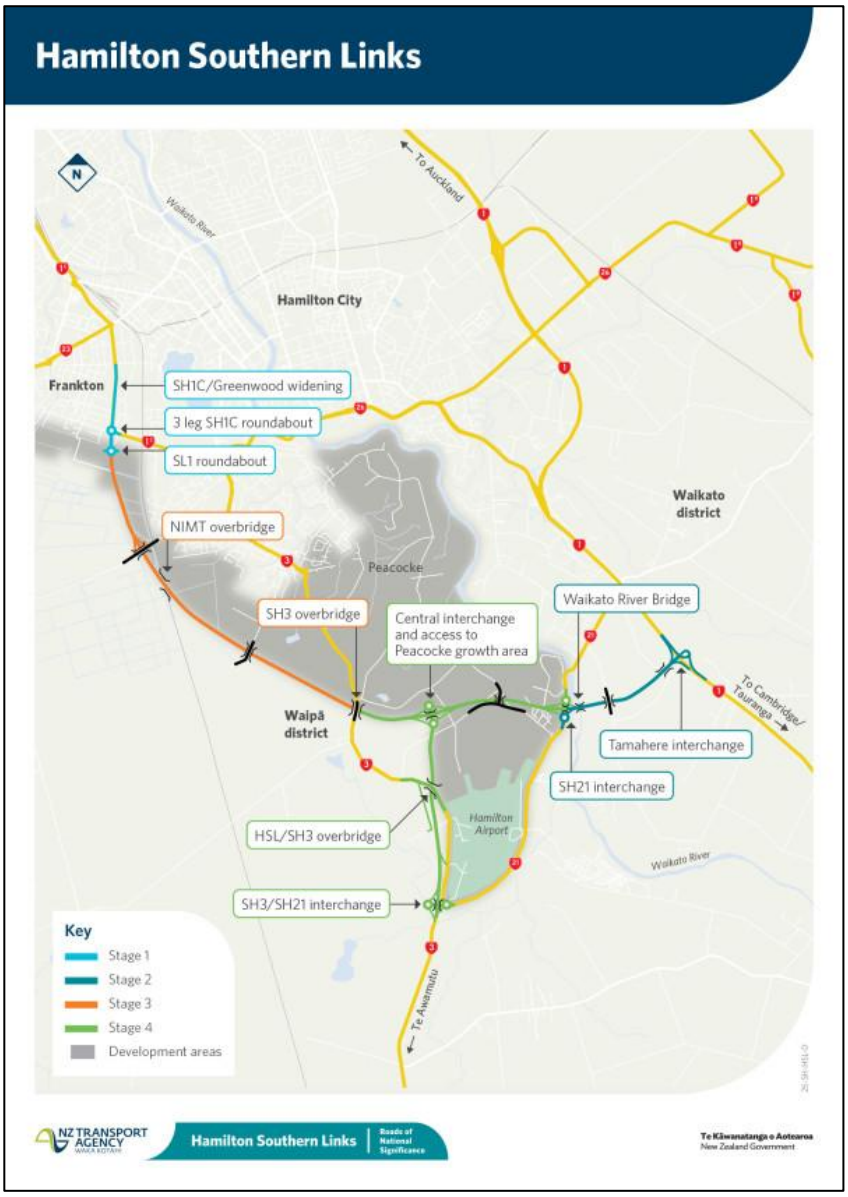


Figure 6: HSL Recommended Staging

The HSL designation borders the southwest edge of the Residential Development area. The HSL designation presently has no direct access to Glenview other than a half-diamond grade separated intersection with Collins Road. However, this location has limited accessibility to Glenview and the wider Hamilton network other than through the intersection of Ohaupo Road / Collins Road. Complicating accessibility matters is the existence of the Collins Road / NIMTR level crossing adjacent to the planned HSL half-diamond interchange.

An alternative interchange arrangement at Houchens Road has been considered as part of strategic transport investigations to improve accessibility between the Residential Development area, Glenview, Deanwell and the wider transport network. The concept has been explored with NZTA and assessed using the Waikato Regional Transport Model ("WRTM") to understand its potential transport benefits. However, the ultimate form, location, timing and delivery of any future HSL interchange remains subject to future NZTA investigation, approvals, funding decisions and statutory processes.

For the purposes of this ITA, HSL has been considered as part of the future strategic transport environment. However, the transport conclusions contained within this assessment do not rely on HSL being delivered within any specific timeframe. Rather, the assessment identifies both interim and future network scenarios and recommends appropriate mitigation and staging measures under each scenario.

6.2 Waikato Metro Spatial Plan

The Waikato Metro Spatial Plan ("MSP") identifies "Short list Option C"[12] as the recommended programme to "support a radical transport shift and support the transformative move to a Rapid Transit Network future" in Hamilton.

The MSP illustrates the Rapid Transit ("RT") Network[13] components of this programme as follows:



Figure 7: Proposed Rapid Transit Corridors (Source: MSP Business Case Executive Summary)

RT4 is one of four key rapid transit routes across Hamilton. It will service Waikato Hospital and Glenview West, with potential to be extended in the long-term to Te Awamutu. The Residential Development area is located adjacent to the RT4 corridor identified in the MSP and is therefore well positioned to access future rapid transit services envisaged within the wider Hamilton transport network.

The MSP describes RT4 (and RT3) as a service supporting Light Rail Transit ("LRT") or Bus Rapid Transit ("BRT") on RT1 and RT2 routes, by way of bus priority. This suggests RT4 is not envisaged as a BRT or LRT service itself

[12] Waikato Metro Spatial Plan Programme Business Case report. Revision D, Section 6.2.2
[13] Waikato Metro Spatial Plan Executive Summary report. Revision C, Figure 1-8

but a frequent bus service on a route with bus priority measures including bus lanes and signal priority at intersections. The diagram suggests the route may use the Ohaupo Road corridor although that is not determined in the MSP business case report.

The use of the Ohaupo Road corridor by RT4 will require significant modifications to existing road infrastructure and space allocation, including bus priority upgrades at the key intersections identified earlier as network constraints.

One of the key requirements for BRT or LRT to be viable is sufficient medium to high-density residential population surrounding the transit route. The MSP *states "The routes designated as RT3 and RT4 will deal to increased density of existing neighbourhoods and aligns with the existing and proposed community facilities. Although these routes may not ultimately be able to achieve the demand for a full BRT – they are key routes that will require early investigation and investment to deliver bus lanes and bus priority for service functions and reliability."*.

The above refers to existing neighbourhoods potentially not being dense enough to achieve the demand for full BRT. It should be noted that while the SL1 growth cell near the RT4 corridor is identified as a future growth cell in the MSP land-use framework, it is unlikely to reflect the proposed detailed land use understanding, density and residential typologies. These elements could potentially propel RT4 to be viable as a full BRT corridor.

The MSP also identifies a recommended timeframe to implement the programme as shown below. This indicates RT4 coming online from Year 20 onwards (year 1 is 2025).

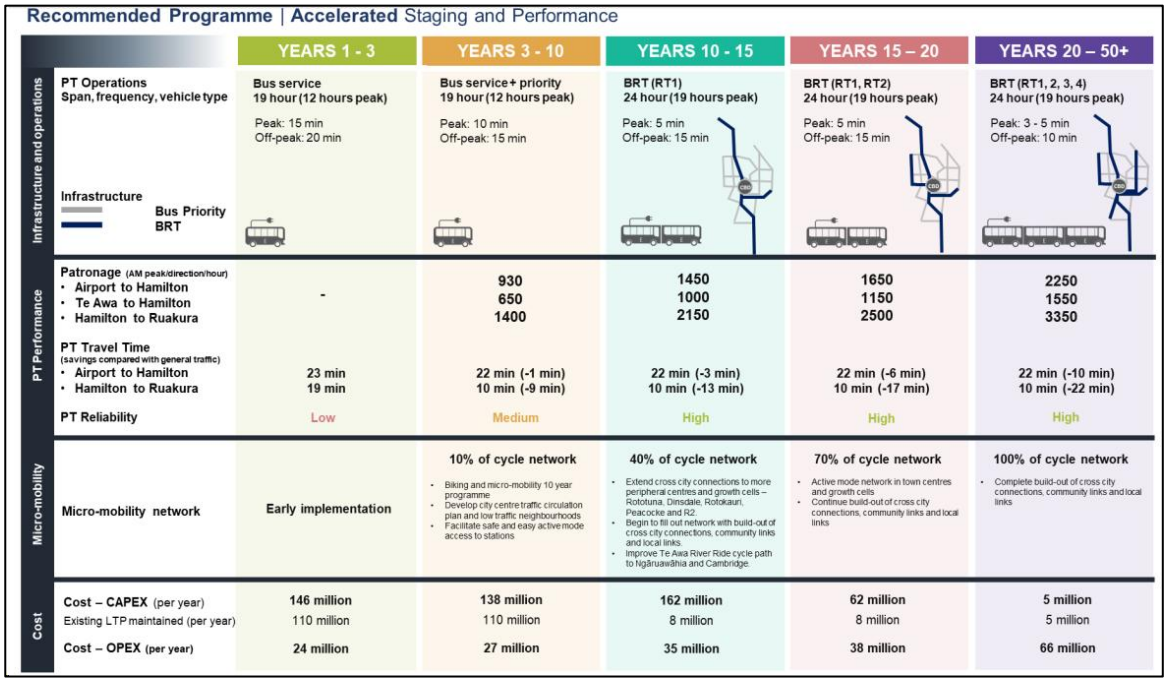


Figure 8: Recommended RT Network Staging Approach (Source: MSP Business Case Executive Summary)

6.3 Hamilton Waikato Metro Spatial Plan - Public Transport Pathways

The *Hamilton Waikato Metro Spatial Plan - Public Transport Pathways Technical Report 2* ("PT Pathways Report") identifies the Comet bus service as a strategic cross-city service linking Glenview, the central city, The Base and major growth areas including Peacocke and Te Awa Lakes. The report also identifies Ohaupo Road as an important future public transport corridor and supports the continued development of public transport services and infrastructure along the corridor. Future public transport improvements relevant to the Project are discussed further in Section 6.

The Comet is classified as a Tier 2 frequent service by 2030, transitioning to a Tier 1 frequent service by 2038, and is aligned in full with "Line 2" of the Bus Rapid Transit Proof of Concept. As a Tier 1 frequent route, the Comet service is expected to operate at a 10-minute peak frequency under the adopted service standards. The report further identifies Ohaupo Road (SH3) as a priority corridor for bus priority infrastructure, noting that such infrastructure is required to support higher-frequency services and improve speed and reliability, and that Tier 1 frequent routes are expected to transition to Bus Rapid Transit in the longer term, although BRT-level infrastructure is not assumed to be delivered within the twelve-year study period.

6.4 Waikato Regional Public Transport Plan 2022 - 2032

According to the Waikato Regional Public Transport Plan, it is projected that a future frequent network to be implemented over 10 years (refer to Figure 9) and a future 'BRT lite' network to be implemented over 30 years (refer to Figure 10) along Ohaupo Road.

For clarity, frequent services are described as "*15-minute frequency or better, bus priority measures sufficient to enable competitive and reliable journey times regardless of traffic conditions. On board fare collection, zero emission vehicles, quality stops. Enables and requires moderate or greater land use.*", and BRT lite is described as "*high service frequencies, extensive bus priority measures, traffic signal priority, may have off board fare collection, zero emission vehicles, high quality passenger stops. Enables and requires moderate to high intensity land use.*".

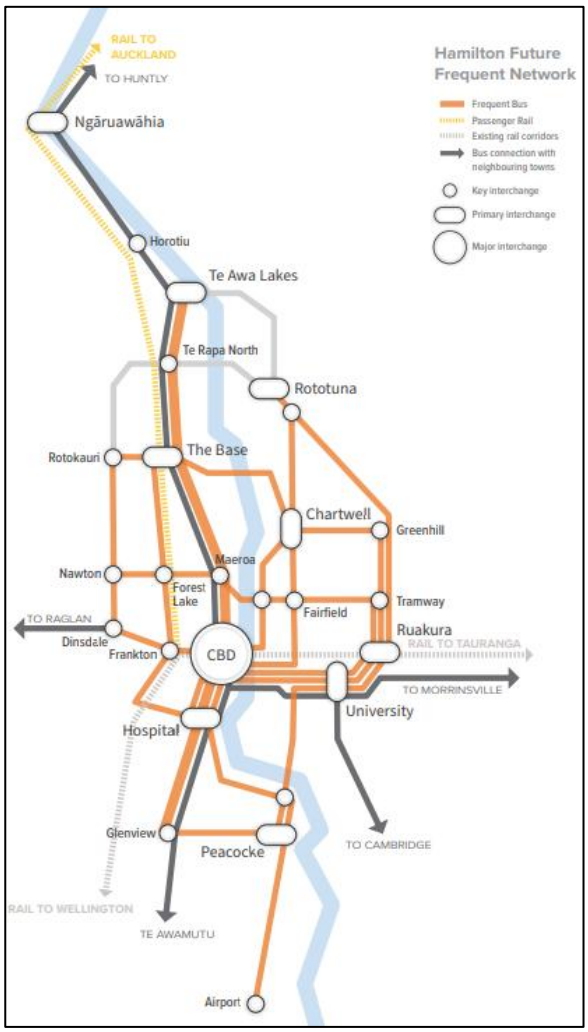


Figure 9: Future frequent network to be implemented over 10 years, 2022-2032 (Source: Waikato Regional Public Transport Plan Network Diagram 1)



Figure 10: Future frequent network to be implemented over 30 years, 2022-2052 (Source: Waikato Regional Public Transport Plan Network Diagram 2)

7. Project Overview

7.1 Industrial Development

The Industrial Development comprises circa 60 ha of presently rural land. The net developable area is estimated to be 40 ha with the balance accommodating the HSL designation, proposed wetland areas and existing Industre Property Tahi Limited lot (Lot 1 DP 396081) that is developed and occupied in accordance with an existing resource consent.

The industrial subdivision will comprise a mix of lot sizes and industrial activities that will be supported by the proximity to HSL and the existing Frankton Industrial area. Access to the development area is proposed via an east – west collector road connection to HSL which is future-proofed for connectivity to Wickham Street, Higgins Road, and ultimately to Tuhikaramea Road as shown in Figure 11. While the Master Plan provides for integration with HSL when it is delivered in the future, the timing of Industrial Development is not dependent on HSL delivery.

The transport assessment has been undertaken based on the functionality of the access and road network arrangements shown on the Master Plan. The ITA does not seek to determine the ultimate ownership, funding arrangements or individual delivery responsibilities for infrastructure located within the HSL designation, as those matters will be addressed through separate infrastructure delivery and approval processes. For consenting purposes, the relevant transport considerations for this ITA are to show that the proposed interim and ultimate access arrangements can operate safely and efficiently and that they do not hinder delivery of the future HSL road infrastructure. Any infrastructure intended to form part of the future state highway network would be subject to the relevant NZTA design, review and approval processes prior to implementation.

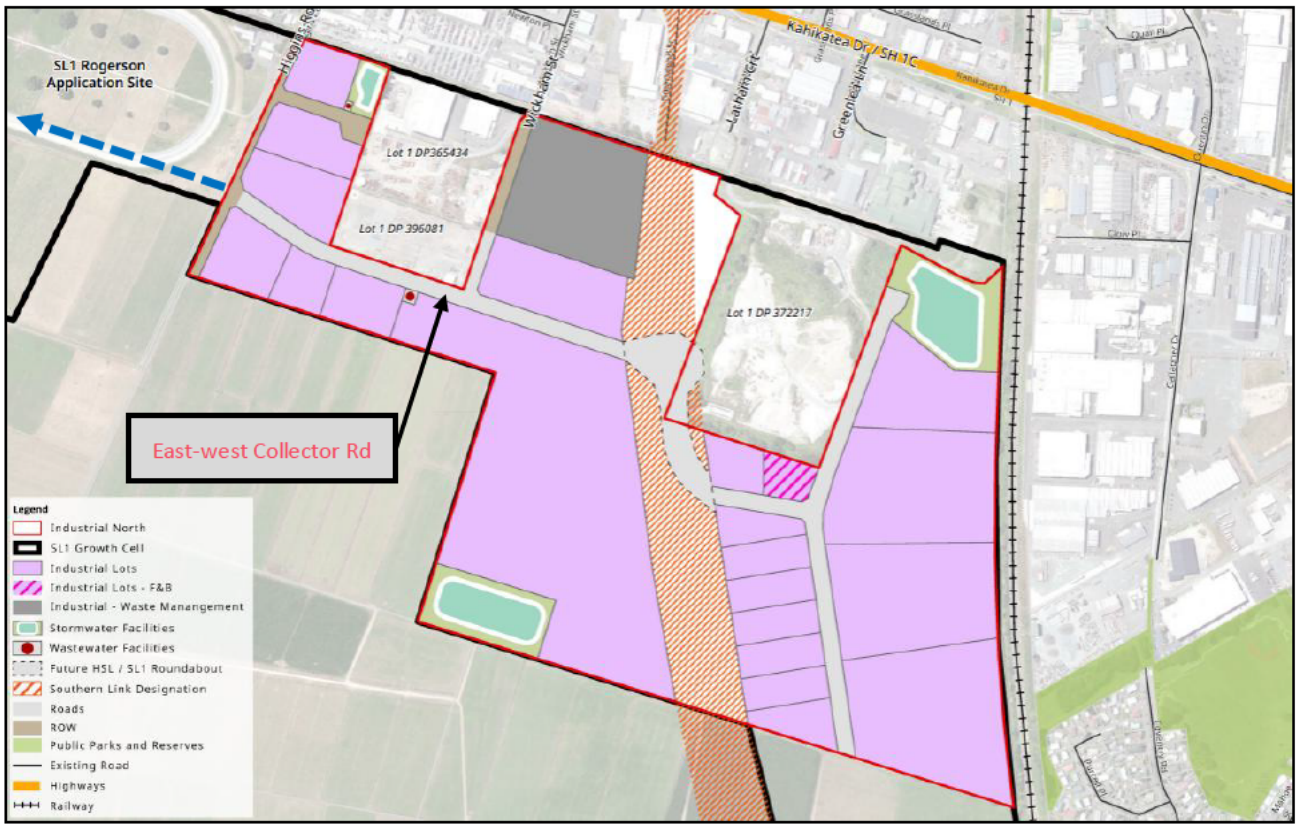


Figure 11: SL1 Industrial Development Master Plan

The Industrial Development is expected to occur progressively between 2030 and 2045. Access for the Industrial Development has been assessed "without" and "with" HSL, referred herein as the interim and ultimate network arrangements. Both are detailed further in Section 8.1.

7.2 Residential Development

The Residential Development forms part of the residential component of the wider SL1 Growth Cell. The Residential Development area is approximately 46 ha and comprises 938 residential units consisting of:

- 347 Low density dwellings (minimum 10 m lot width for detached or duplex dwellings)
- 298 Medium density dwellings (front-access terraced or duplex dwellings)
- 293 High density dwellings (rear-access lane terraced dwellings)

The Residential Development area also includes 1,000 m^2 of commercial land area for a neighbourhood centre and 3,200 m^2 for a neighbourhood park.

Access for the Residential Development has been assessed and detailed further in Section 8.2.

The Residential Development is underpinned by a comprehensive Master Plan which is illustrated in Figure 12.

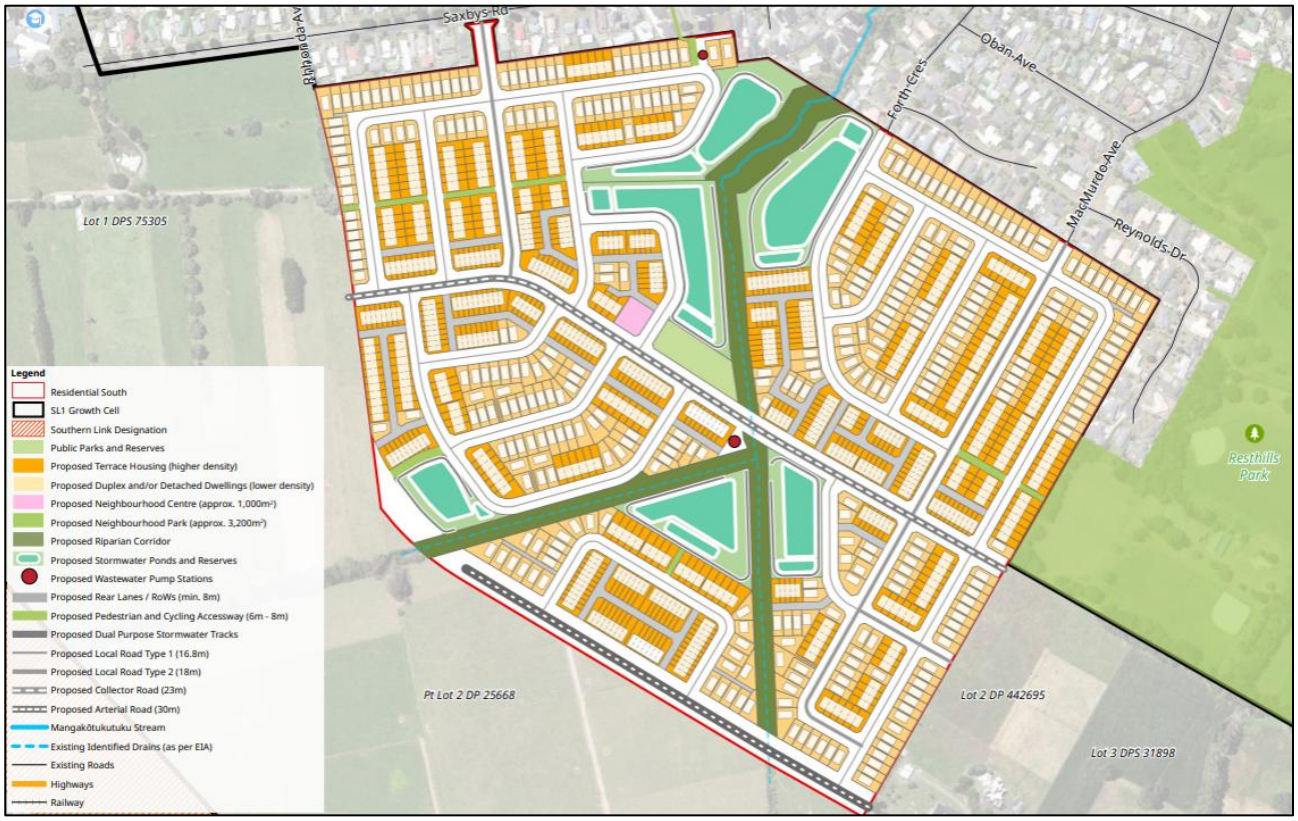


Figure 12: Residential Development Master Plan

Indicative development staging is presented in Figure 13 below.



Figure 13: Residential Development - Indicative Staging

Stage 1 is anticipated to be completed by 2030, Stages 2 and 3 are anticipated by 2035, and Stages 4 and 5 by 2045. These staging timeframes are indicative only and have been adopted for the purposes of the transport assessment.

8. Access Strategy

SL1 access arrangements have been designed to provide for the safe and efficient movement of people (and freight for the Industrial Development) with mode-choice including vehicles, walking, cycling, and public transport. A high degree of flexible transport choice is expected to assist in managing the transport effects of the development.

8.1 Industrial Development

Three access options were evaluated to assess how Industrial Development could proceed:

8.1.1 Option A: Ultimate Network Arrangement (once HSL Stage 1 is Delivered)

Once HSL is delivered in the future, the Industrial Development has been designed so that it can integrate with the ultimate HSL transport network without precluding future infrastructure. Under the ultimate arrangement, the following infrastructure may be provided:

- A four-arm roundabout connection on HSL approximately 520 m south of the future Greenwood Street / Kahikatea Drive three-arm roundabout (refer to Section 8.1.4).
- Connection of the east-west collector road to the proposed HSL / SL1 roundabout.
- Extension of Wickham Street into the site.
- Access to the eastern part of the Industrial Development is dependent on the future HSL network staging scenario. If the SL1 roundabout and associated HSL connection is delivered in HSL Stage 1, access to the eastern area is proposed via a short section of HSL arterial and a local road connection to the north-south road in the eastern development area, as shown in Figure 14. In that scenario, following completion of HSL Stage 3 by NZTA, this local road connection would become a cul-de-sac.
- Integration with the wider walking, cycling and strategic transport network associated with HSL.

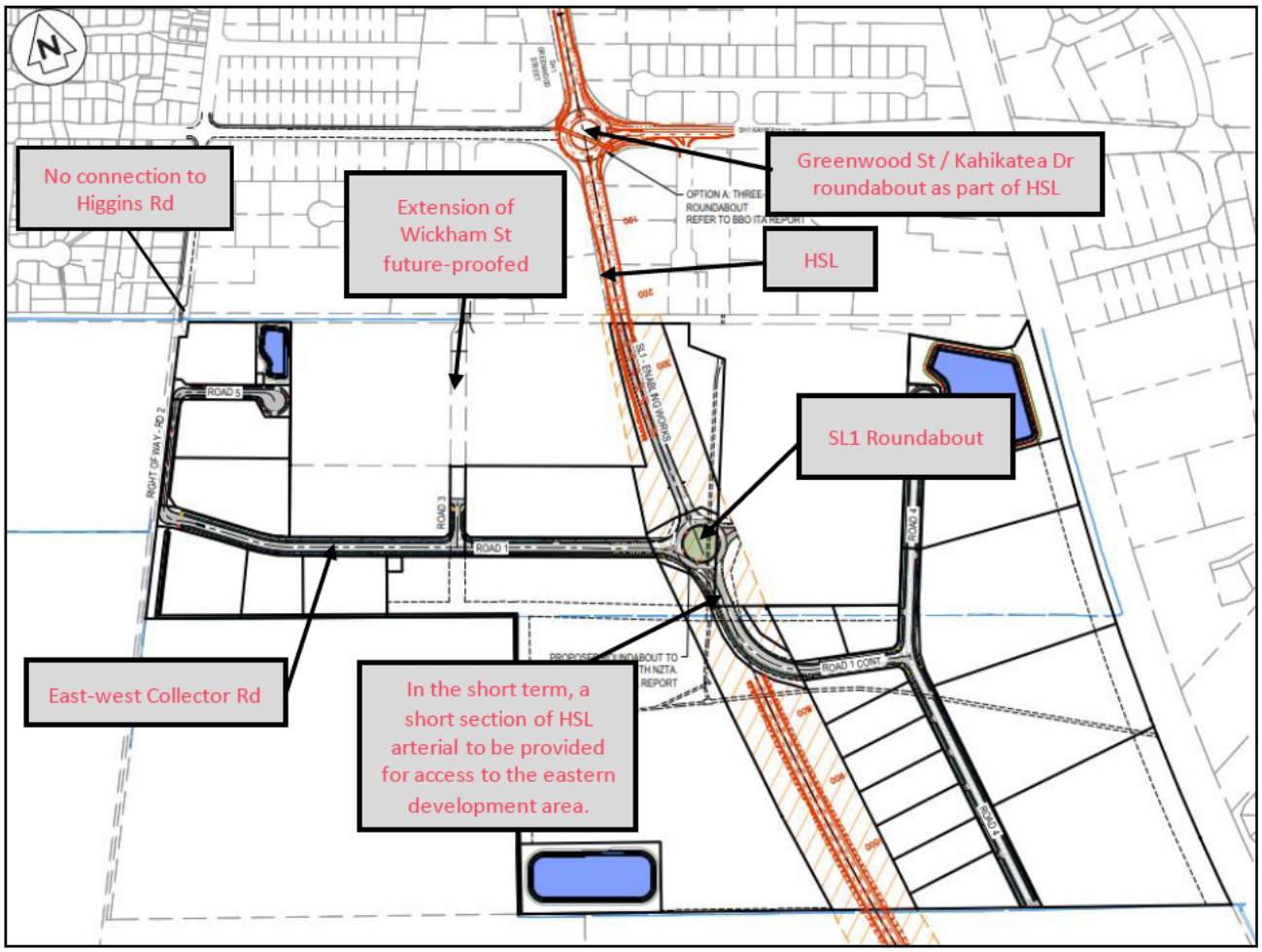


Figure 14: Option A - HSL Stage 1 constructed

8.1.2 Option B: Preferred Interim Option

The preferred access strategy (as shown in Figure 15) is Interim Option B, which does not rely on HSL Stage 1 being delivered. Under this arrangement, Industrial Development traffic is accommodated via:

- An interim four-arm roundabout at Greenwood Street / Kahikatea Drive, replacing the existing priority-controlled intersection and providing access from Greenwood Street and Kahikatea Drive.
- An interim access road between the Greenwood Street / Kahikatea Drive roundabout and east-west collector road, designed and staged so that it can transition to the ultimate HSL arrangement.

- An east-west collector road forming the primary internal movement corridor through the site.
- A temporary T-intersection on the HSL corridor connecting the interim access road to the east-west collector road.
- Extension of the interim access road further south to provide access to the eastern part of the Industrial Development.
- A walking and cycling network connecting to the existing Greenwood Street shared path and wider active mode network via Wickham Street.

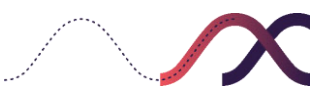
These infrastructure requirements are necessary to ensure Industrial Development traffic is served by an appropriate intersection form and access route, rather than relying on the existing Greenwood Street / Kahikatea Drive priority-controlled intersection or on access through local industrial streets alone.

The Interim Option B access arrangement can accommodate the full assessed Industrial Development and is assessed in detail in Section 15.1.1.

A conceptual layout of the four-arm Greenwood Street / Kahikatea Drive roundabout is shown in Figure 16 and is based on the ultimate HSL roundabout arrangement to minimise rework in future. Interim Option B has been discussed with NZTA, who advised that, the option appears to be worth exploring. NZTA also noted that the interim roundabout would need to be sized consistently with the ultimate HSL layout and that any interim access road should be future-proofed so that it could be incorporated into the future state highway network without significant upgrading or utility relocation.

On that basis, the interim access road south to the east-west collector road would be designed and constructed to the required HSL standard, but with only the carriageway width required for an interim two-lane operation rather than the full four-lane divided carriageway. The central median and two additional traffic lanes would be delivered with the future HSL works. NZTA has not provided in-principal approval to Interim Option B, and the detailed form, staging, funding, ownership and transition to the ultimate HSL layout would remain subject to further design development, staging review and NZTA approval.

Access is intended to transition to the ultimate network arrangement when HSL is delivered in future by NZTA. The ultimate access arrangement is described in the following sections.



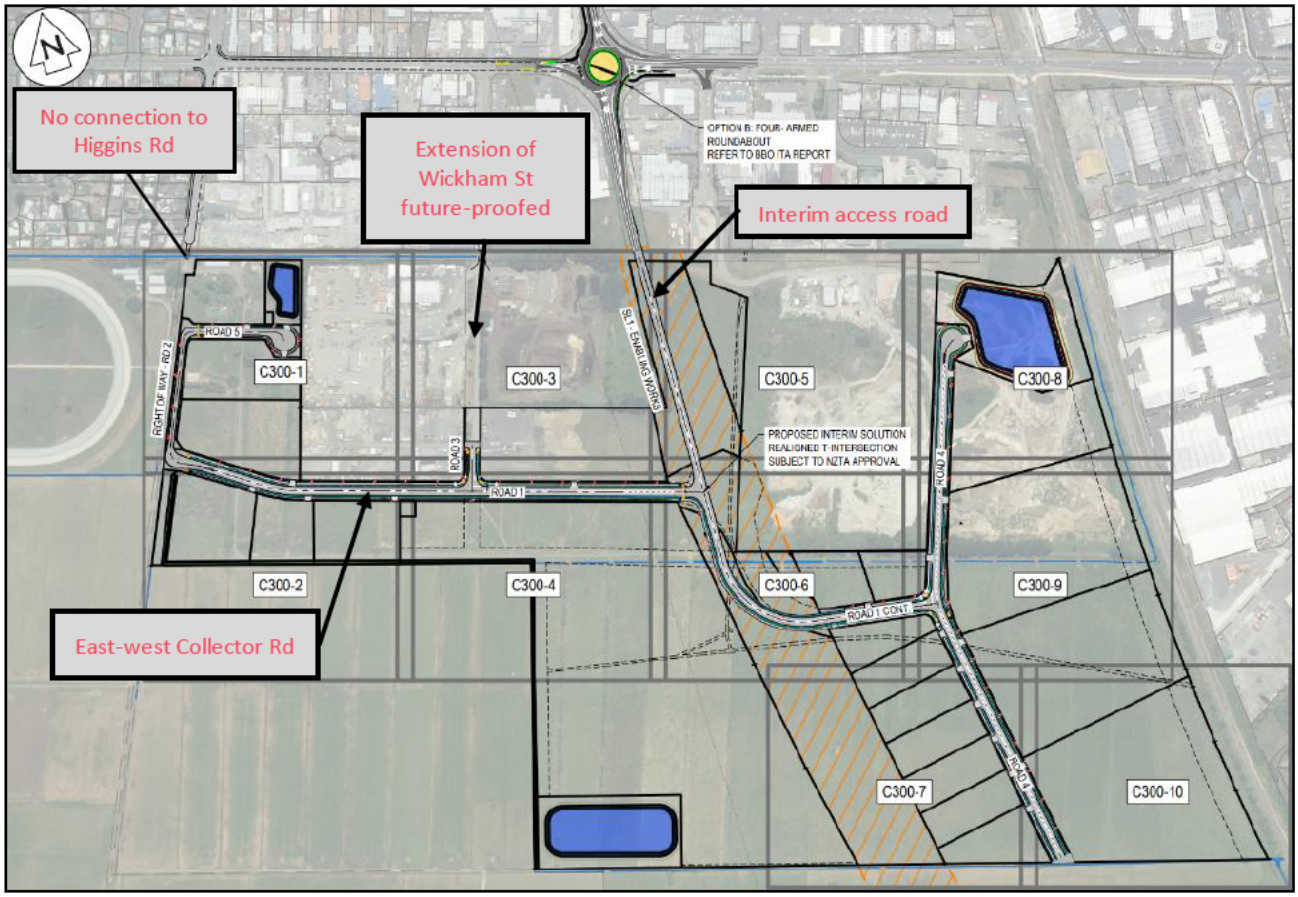


Figure 15: Interim Option B - Four-arm Roundabout and Interim Access Road



Figure 16: Interim Option B - Greenwood St (SH1C) / Kahikatea Dr Roundabout Concept Plan

8.1.3 Option C: Interim Option

Like Option B, this option is based on HSL Stage 1 construction commencing sometime after 2035.

This option involves upgrading Greenwood Street / Kahikatea Drive intersection to a three-arm roundabout as shown in Figure 17. with access to SL1 Industrial Development via Wickham Street extension.

However, this option has a developable area limitation of 23 ha due to capacity constraints with the three-arm roundabout. Development beyond 23 ha requires construction of either:

- HSL Stage 1; or
- Interim Option B four-arm roundabout arrangement and the interim access road on HSL corridor.

This is presented as Option C Stage 2 (represented by blue lines) in Figure 18.

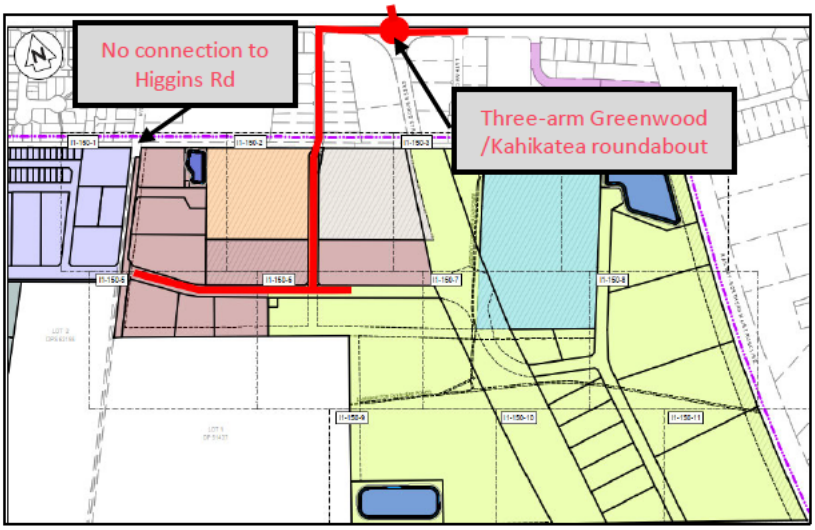


Figure 17: Option C – Stage 1 Proposed Transport Network

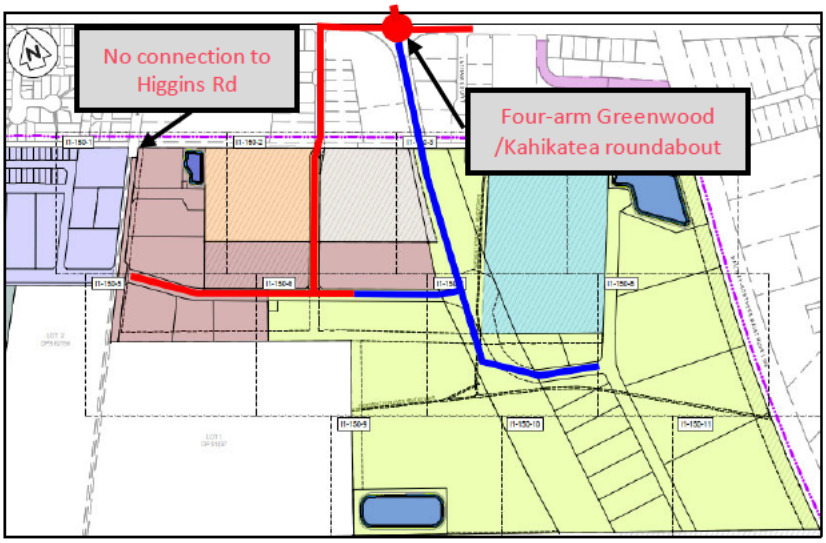


Figure 18: Option C – Stage 2 Proposed Transport Network

8.1.4 SL1 Roundabout

It was identified through consultation meetings with HCC that a direct connection from the proposed Industrial Development area to Kahikatea Drive would not be supported given the access challenges that already exist due to high traffic volumes. For this reason, HCC also advised that they have had discussions with NZTA about allowing a connection from the future HSL corridor to the Industrial Development site to avoid it becoming land-locked by the HSL designation. A direct connection to HSL enables freight and other commercial / industrial traffic to be minimised on the surrounding local roads.

A single point of access to the Industrial Development area is proposed, recognising that HSL is a RoNS where access and intersections are rationalised to maintain efficiency of the strategic road corridor.

The road connection to HSL is proposed to be a four-arm roundabout, which aligns with Safe System principles. A concept plan of the roundabout configuration is shown in Figure 19.

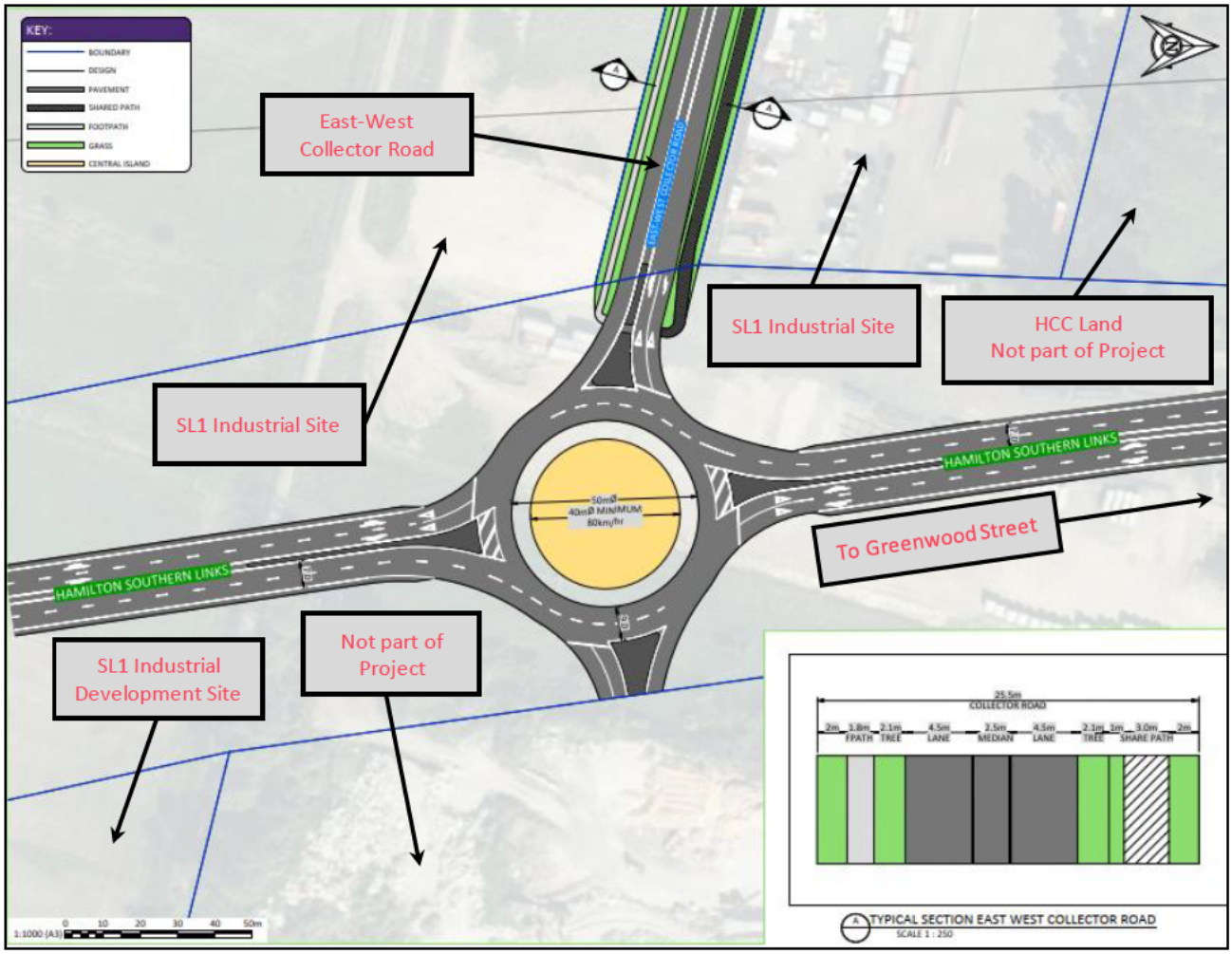


Figure 19: HSL / SL1 Roundabout Concept Design

The concept SL1 roundabout is designed in accordance with *Austroads Guide to Road Design Part 4B: Roundabouts* ("AGRD Part 4B"). A design speed of 100 km/h has been adopted for the HSL approaches.

The central island radius is 25 m and the design accommodates the tracking curves of a 19.45 m HPMV semi-trailer (refer to Appendix A - Drawing 149340-00-0200). The concept layout has been modelled to demonstrate that the expected performance and capacity of the intersection is sufficient for the transport demands of the Project and future proofed volumes on HSL.

The concept design is therefore intended to demonstrate that the proposed access location and intersection form can be accommodated within the future HSL corridor without precluding the ultimate strategic transport function of HSL. The detailed geometric design, pavement design, drainage, utilities, safety barriers, tie-ins and any other state highway-specific requirements would be subject to further design development, safety audits and NZTA's approval process before being accepted as part of the state highway network.

The land required to form the eastern arm of the proposed roundabout is outside the SL1 Industrial Development area and is not part of the current Fast-track substantive consent application. Accordingly, the eastern arm is not proposed to be delivered as part of SL1 Industrial Development but the roundabout will be future proofed for it with a stub road to the east, sized and located so as not to preclude future extension when the adjoining land to the east is brought forward for development.

There is limited guidance on separation distance between highway intersections. The proposed position of the SL1 roundabout on HSL is approximately 520 m south of the future Greenwood Street / Kahikatea Drive roundabout that connects HSL to Greenwood Street and Kahikatea Drive.

The SL1 roundabout is proposed at this location for the following reasons:

- A position further south on HSL would result in less direct access between the Industrial Development area and the strategic road network. This may encourage some industrial traffic to utilise alternative local routes to travel north to Greenwood Street and Kahikatea Drive, which is inconsistent with the objective of directing industrial and freight traffic to the strategic road network.
- It supports a direct and intuitive east-west collector road corridor between Tuhikaramea Road and HSL, which in future will replace the existing function of Kahikatea Drive Extension that passes through a residential suburb. The new collector road route will maintain a strategic road connection between Hamilton's western fringe and the Frankton industrial area. Relocating the roundabout further south creates a convoluted alignment that risks rerouting some traffic north through residential streets.
- It allows the east-west collector road to be aligned strategically between two SL1 landowners' lots without dissecting lots to any owner's disadvantage. This provides important continuity for both applicants to progress their land development aspirations.

Intersection modelling for the SL1 roundabout and the future HSL roundabout at Greenwood Street / Kahikatea Drive intersection demonstrates that the proposed 520 m separation distance is suitable for both intersections to function well under the predicted future traffic volumes without causing adverse capacity and efficiency effects to the HSL network. Refer to Section 15.1.1.

It is acknowledged that NZTA is undertaking more detailed Aimsun modelling to inform future HSL design decisions, including the operation of Duke Street and the separation between the future Greenwood Street / Kahikatea Drive roundabout and the proposed SL1 roundabout. The modelling undertaken for this ITA demonstrates that the proposed separation distance is expected to function well from a capacity and queuing perspective under the assessed concept layout and traffic demands. However, the final form and location of infrastructure within the HSL corridor will remain subject to NZTA's future design development, modelling and approval processes to ensure that future HSL design options are not precluded.

8.2 Residential Development

Transport access for the Residential Development is designed to provide for the safe and efficient movement of people in a higher density living environment with mode-choice including vehicles, walking, cycling, and public transport. A high degree of flexible transport choice is expected to assist in managing the transport effects of the development.

Three road access points are proposed to the Residential Development area:

- Saxbys Road
- McMurdo Avenue
- Forth Crescent

A new intersection on Saxbys Road will be formed at a location approximately 65 m west of Saxbys Road / Deanwell Avenue intersection.

MacMurdo Avenue and Forth Crescent are proposed to be extended into the site. Further details on each of these specific site connections is provided in the subsequent sections.



Figure 20: Proposed Site Accesses – Residential Development

8.2.1 MacMurdo Avenue Access

MacMurdo Avenue is currently a low volume no-exit road that stops at the north-eastern boundary of the site. MacMurdo Avenue is proposed to be extended further southwest connecting to the new north-south collector road at the southern end. The intersection between MacMurdo Avenue extension and the new collector road is proposed to be a roundabout.

MacMurdo Avenue extension is proposed to have an 18.0 m wide road reserve width as shown in Figure 21.

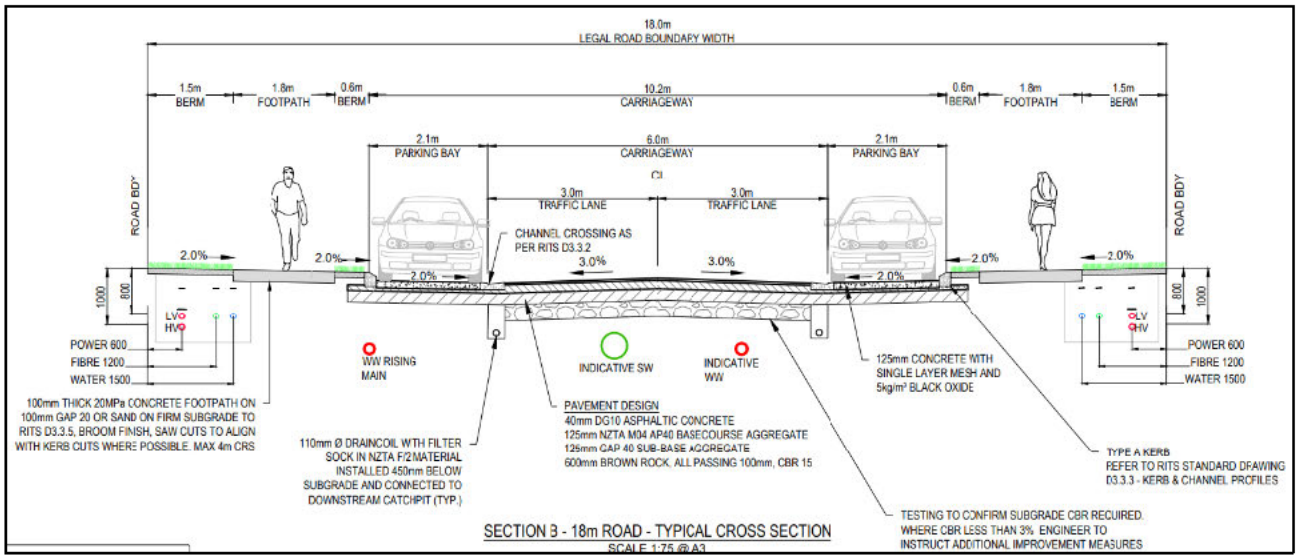


Figure 21: 18.0 m Wide MacMurdo Avenue Extension

8.2.2 Forth Crescent Access

Forth Crescent is currently a low volume road that stops at the north-eastern boundary of the Site. It is proposed to be extended further southeast connecting to MacMurdo Avenue extension at the eastern end.

Forth Crescent extension is proposed to have a 16.8 m wide road reserve width as shown in Figure 22.

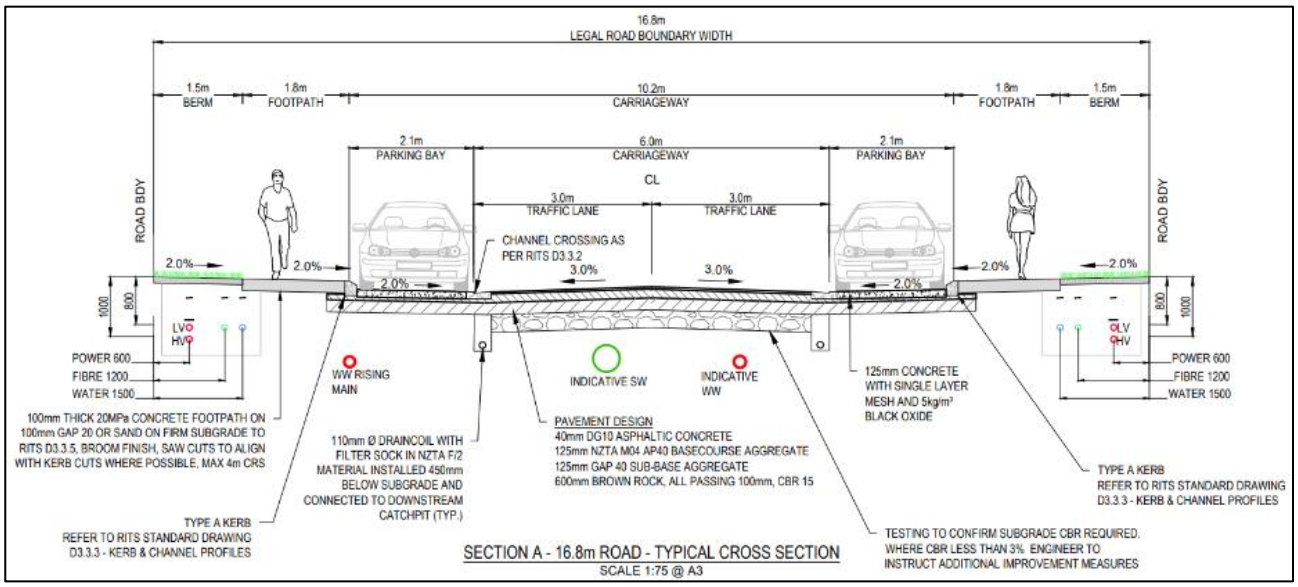


Figure 22: 16.8 m Wide Forth Cres Extension

8.2.3 Saxbys Road Access

The access intersection proposed on Saxbys Road will operate as a priority-controlled T-intersection. Traffic exiting the Residential Development will give way to traffic on Saxbys Road. Saxbys Road is closed at its western end and therefore functions as a no-exit local road.

A stop control may be required on the site access approach as preliminary assessment indicates that sight distance measured from a point 9 m back from the limit line may be restricted by the existing boundary fencing at 55 and 57 Saxbys Road. This will be confirmed through detailed design. Notwithstanding this potential constraint, the straight alignment of Saxbys Road provides available sight distances of approximately 300 m to the east and 400 m to the west. These distances exceed the minimum safe intersection sight distance ("SISD") of 114 m specified in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* ("AGRD Part 4A"), Table 3.2, for a 60 km/h design speed.

A review of the projected turning movement volumes at the proposed access, relative to the future through volumes on Saxbys Road in the 2045 full-development scenario (i.e. Modelling Scenario 4 in Section 13.2), indicates that auxiliary turning lanes or a channelised layout are not warranted under the relevant Austroads criteria[14]. Accordingly, the access intersection is expected to be appropriately designed in accordance with *Traffic Control Devices Manual Part 4* ("TCDM Part 4A"), Figure 4-14 or Figure 4-17.

The final form of control and detailed intersection layout will be confirmed at the detailed design stage.

9. Public Transport Provision

Public transport accessibility is a key component of the transport strategy for the proposed developments, particularly in managing future travel demand and reducing reliance on private vehicle travel. This section considers the extent to which the proposed Development layouts supports the existing and enables the planned bus networks identified through consultation with Waikato Regional Council ("WRC").

[14] Austroads Guide to Traffic Management Part 6, Figure 3.25

While the proposed development transport infrastructure and connections are designed to promote public transport accessibility so that public transport mode-share increases over time, the Applicants cannot require WRC to implement the necessary future services or amend exiting bus routes. The following are WRC's current plans, noting that the networks shown in Figure 23 and Figure 24 were developed in 2024 and do not fully account for all Fast-track growth cells in Hamilton, including SL1.

- WRC advised that, in the short term (to 2028), bus services are planned to continue using Saxbys Road, the olive-coloured route shown in Figure 23.
- In the medium-term (2037), the indicative bus network no longer shows services using Saxbys Road, as shown in Figure 24.
- The indicative network plans also do not show bus services using Higgins Road between Kahikatea Drive and Duke Street, which is likely to reflect the proposed closure of the Kahikatea Drive western leg at the future Greenwood Street / Kahikatea Drive intersection as part of HSL.

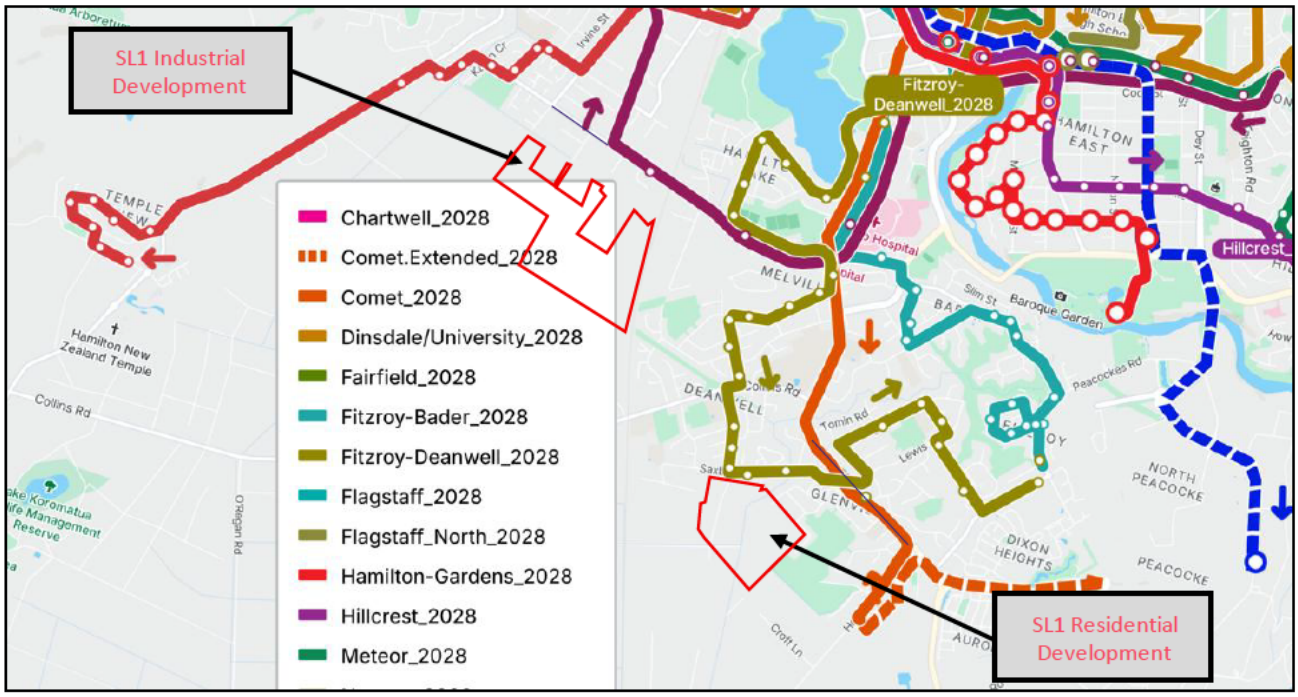


Figure 23: WRC 2028 Hamilton Bus Network Plan

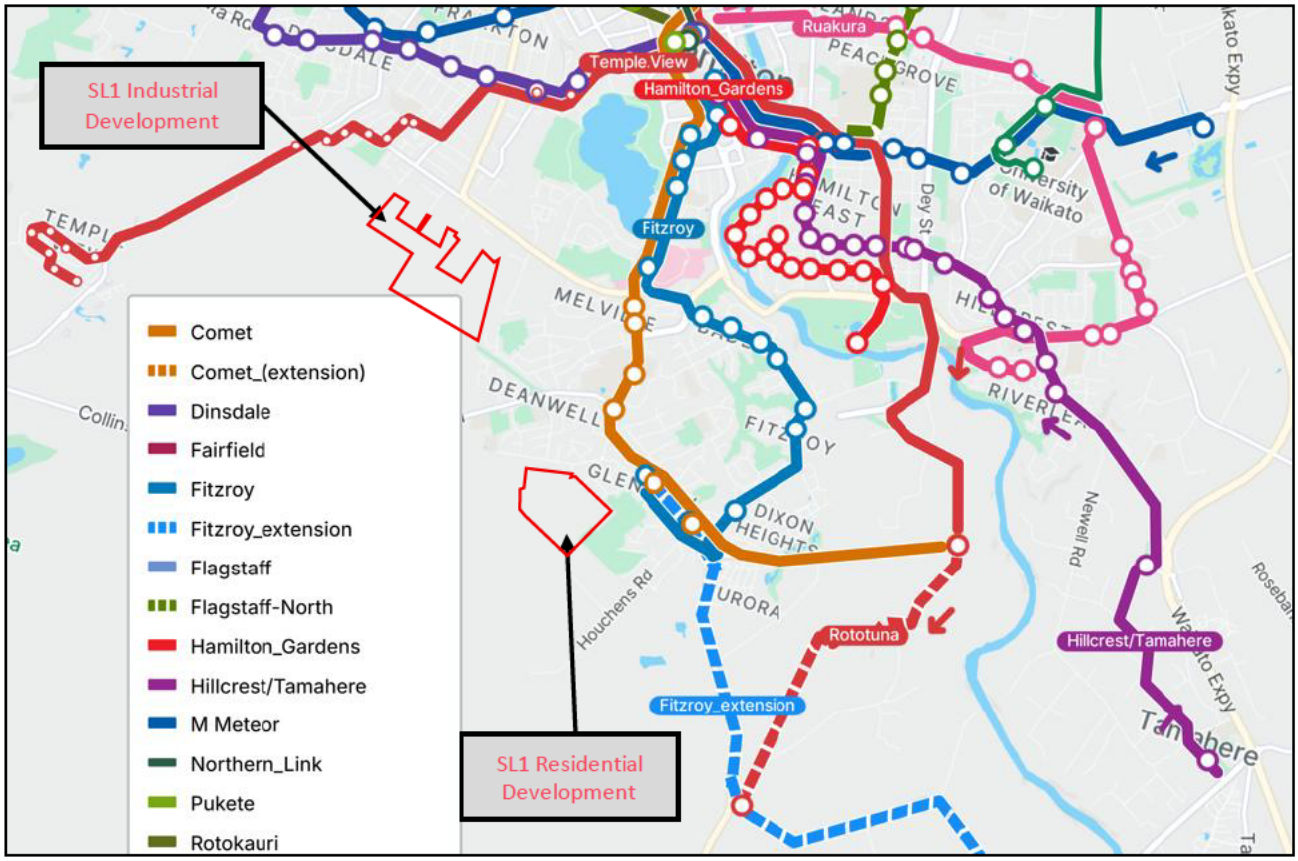


Figure 24: WRC 2037 Hamilton Bus Network Plan

9.1 Industrial Development

Public Transport services presently travel through Higgins Road and Kahikatea Drive as shown in Figure 3. This is likely to continue until the Kahikatea Drive Extension arm at the Greenwood Street / Kahikatea Drive intersection is closed as part of the HSL project. Following its closure, bus services are planned to travel via Lethborg Street.

The Industrial Development provides pedestrian access to existing and future public transport services via the proposed walking and cycling infrastructure and connections to the existing network. Future walking and cycling connections are discussed further in Section 10.1.

9.2 Residential Development

Figure 25 shows indicative bus routes through the proposed Residential Development. The proposed route represented by purple dashed lines demonstrates how it can integrate with WRC's short-term and medium-term proposed bus networks (Figure 23 and Figure 24) by looping through the subdivision and connecting back to Saxbys Road / MacDonald Road intersection.

The bus route represented by maroon dashed lines could potentially be implemented when the SL1 wider growth cell, south of the site, is developed, connecting Saxbys Road to Houchens Road via the extended minor arterial road.

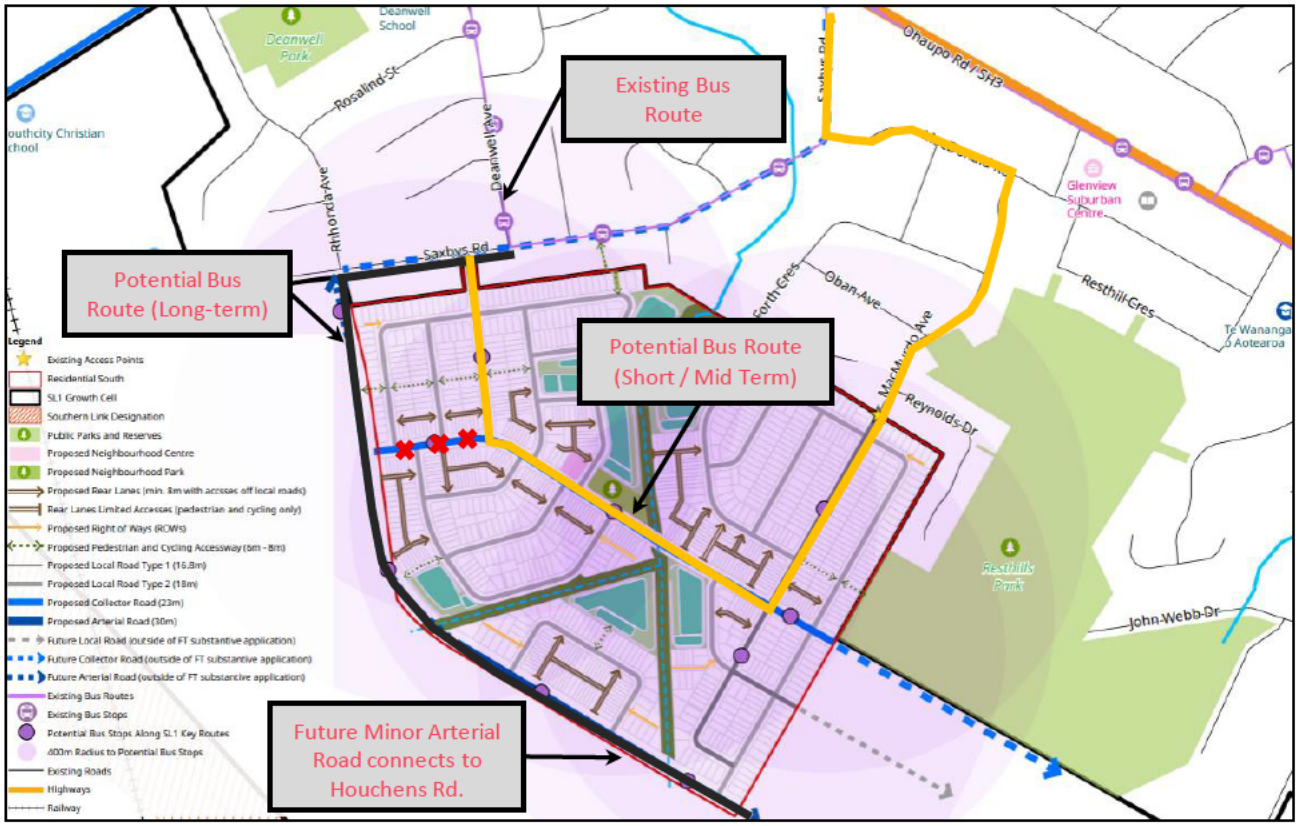


Figure 25: Proposed Bus Route through Residential Development

The Residential Development scheme plan aligns with this assessment by providing suitable road carriageway widths on:

- The minor arterial road (Figure 37) for future PT corridor.
- The internal collector road (Figure 38) for short and mid-term bus routes.
- MacMurdo Avenue extension (Figure 21)

In accordance with the ODP Table 15-5aii, all bus stops along the internal collector road will be in lane.

10. Walking and Cycling Connections

Walking and cycling infrastructure is an integral part of the SL1 transport network rather than an ancillary amenity. Increasing walking and cycling also supports increased public transport use which together, reduces reliance on private vehicles for local trips. The proposed network is designed to be direct and cohesive while prioritising safety by generally routing users away from higher-volume arterial roads to low speed, low volume roads where suitable alternative local routes exist.

Cycling infrastructure design for SL1 focuses on the following three trip types:

- Short neighbourhood trips within Glenview and Deanwell where walking may be undesirable due to distance. This would include trips to the Glenview Shopping Centre and schools (i.e. Deanwell School and Melville High School).
- Recreational trips within and potentially beyond the wider SL1 growth cell. This would likely connect to existing exploration routes such as the Western Rail Trail.

- Longer distance commuter / education trips, including between neighbourhoods and to employment nodes such as Waikato Hospital and Frankton Industrial area.

The proposed roading network provides a highly connected network of streets, which will enable walking trips to be made on direct routes within and beyond the development. Footpaths are provided to support walking accessibility throughout the Site.

The proposed network for pedestrians and cyclists is shown in Figure 26 and Figure 27. The proposed network is designed to provide direct and connected routes that support everyday trips and reduce dependence on private vehicle travel.

10.1 Industrial Development Walking and Cycling Connections

The indicative walking and cycling network for the Industrial Development is shown in Figure 26. The network has been developed to provide connections between the site, surrounding transport infrastructure, and the wider active mode network.

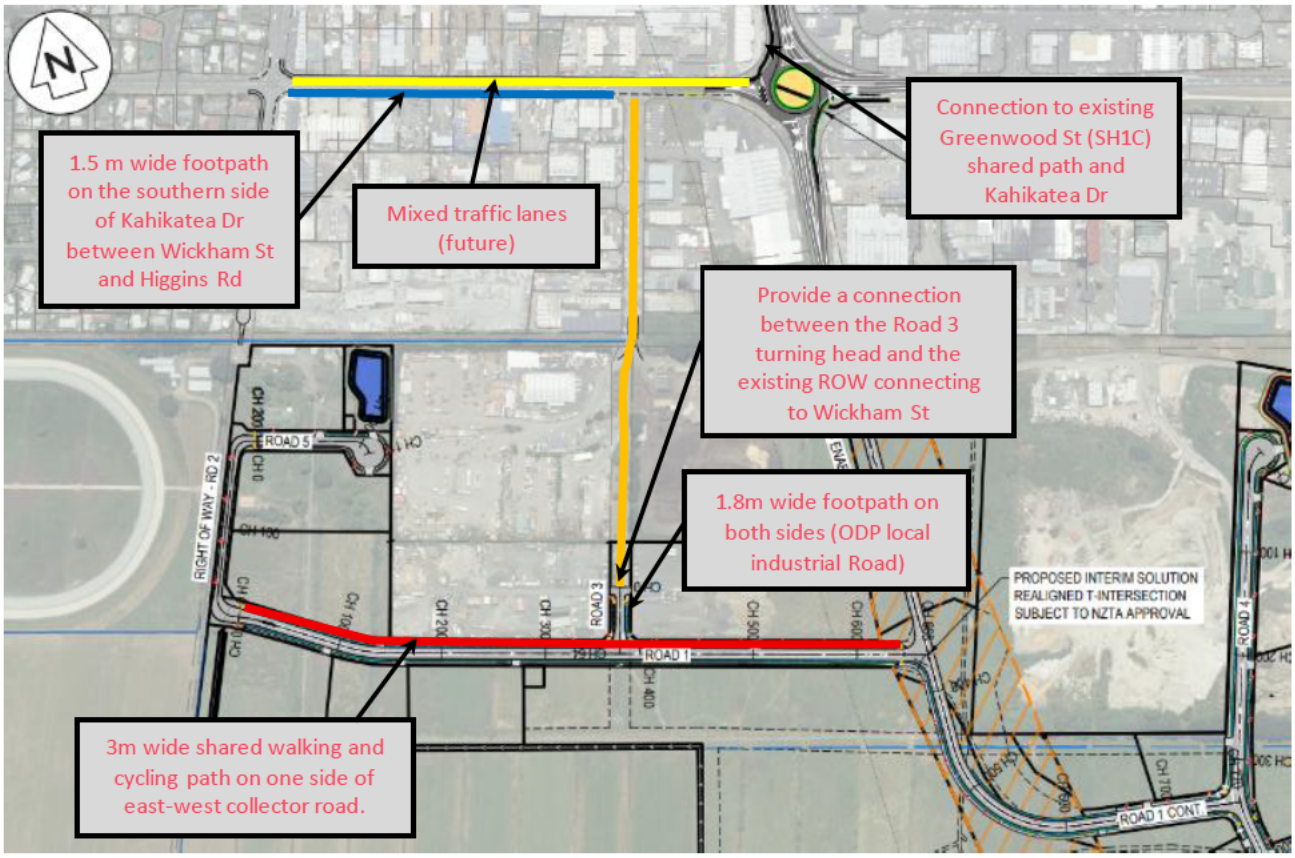


Figure 26: Industrial Development – Proposed Walking and Cycling Network

10.1.1 Shared Walking and Cycling Paths (Red Line)

A 3.0 m wide shared path is proposed along the northern side of the east-west collector road. This facility will form the primary active mode spine through the Industrial Development.

The shared path is intended to connect with the existing 3.0 m shared path on Greenwood Street via Wickham Street and the existing Right-of-Way ("ROW") south of Wickham Street (represented by orange lines in Figure 26). Cycling on Wickham Street and the existing ROW will be accommodated on-road in a shared traffic environment, as is the present case in alignment with the ODP. This arrangement provides

continuity of active mode access from the existing Greenwood Street shared path into the Industrial Development area.

In the longer term, the east-west collector road is expected to be extended westwards through the adjacent Rogerson Block towards Tuhikaramea Road. This would enable the shared path to form part of a broader east-west active mode corridor linking the Frankton industrial area, Greenwood Street shared path and cycling facilities on Tuhikaramea Road. While the timing and delivery of these wider connections are dependent on future development outside the Project area, the proposed shared path has been designed to support that future network integration.

10.1.2 New Footpath Connection (Blue Line)

A new 1.5 m wide footpath (in alignment with the ODP requirements for a collector industrial road) is proposed to provide pedestrian connectivity between the Industrial Development and existing public transport services west of the site. The footpath will enable pedestrians to access existing bus stops on Kahikatea Drive, Higgins Road and Lethborg Street and maintain connectivity to the surrounding pedestrian network.

10.1.3 Mixed Traffic Lanes (Yellow Line)

Kahikatea Drive Extension will experience substantially lower traffic volumes and operating speeds following its permanent closure at the Greenwood Street / Kahikatea Drive intersection as part of HSL Stage 1 implementation. This will create an environment suitable for mixed traffic lanes, providing an on-road cycling connection between the Industrial Development, Greenwood Street shared path and the wider active mode network. Supporting measures such as sharrow markings, wayfinding and traffic-calming treatments could be considered during the detailed design phase.

10.2 Residential Development Walking and Cycling Connections

Walking and cycling wider network connectivity general arrangement plans for the Residential Development are attached as Appendix A.

The proposed active mode network has been developed as an integrated network that connects the Residential Development to key destinations including Deanwell School, Waikato Hospital, the Western Rail Trail, MacDonald Road, Greenwood Street and the wider Hamilton cycling network. The proposed facilities have been selected having regard to corridor function, expected active mode demand, safety outcomes, and the physical constraints of the existing road reserve.

The form of facility varies by location, reflecting the surrounding street environment, available corridor width and the role each corridor performs within the wider network. Higher levels of separation are proposed where cyclist volumes, school travel demand or traffic exposure are expected to be greater, while lower-speed local roads are proposed to accommodate cyclists within the mixed traffic environment.

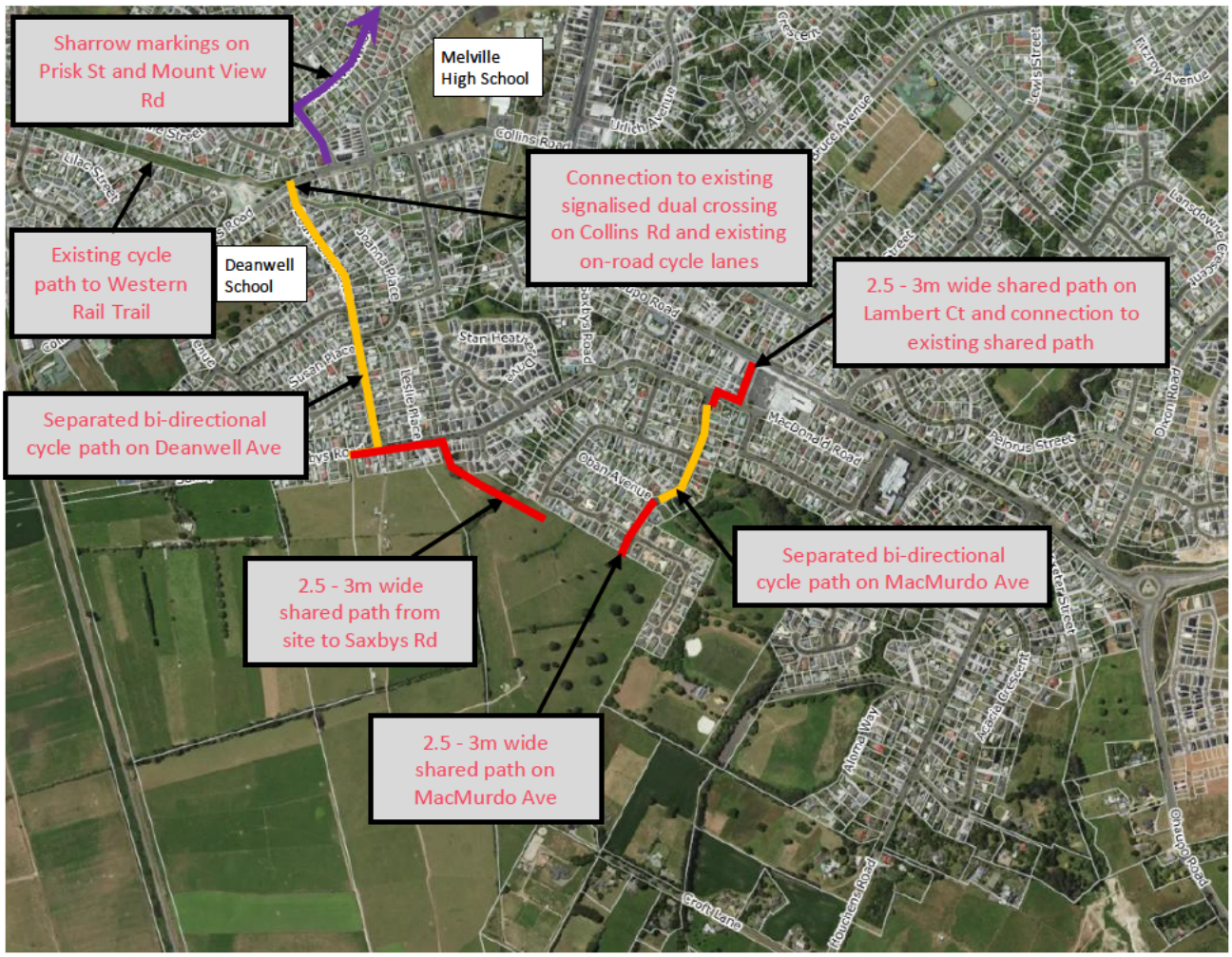


Figure 27: Residential – Proposed Walking and Cycling Network

The proposed walking and cycling network comprise three facility types:

- Separated bi-directional cycle paths: These are dedicated cycling facility on one side of the road accommodating cycling in both directions. They involve some form of physical separation (horizontal or vertical components) from motor traffic and pedestrians. In the Residential Development context, these facilities provide key connections to schools and local destinations and can generally be accommodated within the existing sealed carriageway width.
- Shared walking and cycling paths: Shared use facilities for pedestrians, cyclists, mobility devices and wheeled recreational devices, without physical separation between user types. These facilities provide a high level of separation from general traffic and are intended to support active mode trips on corridors where a shared path is appropriate.
- Mixed traffic lanes: Mixed traffic lanes are common to most roads, where no formal cycle facilities are provided and cyclists can share the roads with general traffic. Prisk Street and Mount View Road are proposed to operate in this manner, with sharrow markings, providing an alternative route to Ohaupo Road while maintaining connectivity to the existing on-road cycle lanes north of Normandy Avenue.

The proposed shared path network is intended to support active mode travel across the development for a broad range of users, while maintaining separation from general traffic lanes. This includes local trips by lower-speed users accessing destinations such as the neighbourhood centre, parks and schools.

Recognising general guidance for shared paths, the width of the shared path on the collector road is proposed at 3.5 m while the shared paths on existing residential streets are proposed at 3.0 m wide due to space constraints with existing trees and infrastructure. This is wider than the "desirable minimum width[15]" of 2.5 m for a local access path, and consistent with the typical maximum width included in Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling Edition 2.1 ("AGRD Part 6A"). The increased width supports the multi-user nature of the paths and reduces the risk of pedestrian – cyclist conflict.

10.2.1 Saxbys Road

Although Saxbys Road is identified as a local road in the ODP transport corridor hierarchy, it already performs a collector-type function by facilitating movement of people and goods between local destinations and higher-order corridors (i.e. Ohaupo Road). The Residential Development will reinforce that existing function, particularly following development beyond Stage 1, as Saxbys Road will provide the primary connection between the development's internal collector road network and Ohaupo Road.

In this context, corridor-wide upgrades to fully achieve the ODP collector road cross-section are not considered necessary. Instead, targeted improvements are proposed, comprising the walking and cycling connections described in Section 10.2 and localised rationalisation of on-street parking where required to accommodate those facilities. These works are proposed to be delivered through the development staging framework and associated consent conditions and are to be completed prior to occupation of the relevant stage of Residential Development that relies on access via Saxbys Road. This is reflected in the recommended transport infrastructure staging framework set out in Table No: 44.

The ODP collector road standard recommends a 24.6 m (based on single direction separated cycle paths on both sides of the road) or 23.3 m (based on bi-directional cycle path on one side of the road) road reserve with 6.8 m wide carriageway, 2.1 m wide recessed parallel parking bays and 2 m wide footpaths on both sides of the road. However, given the existing 20.1 m road reserve and carriageway width of approximately 10 m to 12 m, it is not practicable to fully achieve all elements of that cross-section without significant widening and associated effects. In this instance, the Project adopts a targeted, network-based response that is proportionate to the corridor's existing and future function.

Cycle facilities and a footpath on the southern side of Saxbys Road are not proposed as part of the upgrade. Instead, cycle movements are directed to an alternative parallel route via Deanwell Avenue, Mount View Road and Prisk Street, which provides a lower volume and lower speed environment that is more suitable for active mode users than the Ohaupo Road arterial corridor, while still providing direct access to key destinations including Waikato Hospital and the Western Rail Trail.

A pedestrian refuge island is proposed east of Leslie Place, as shown in Figure 24, to enable pedestrians to cross from the proposed shared path to the existing footpath on the opposite side of the road. This approach reflects a deliberate network design response that prioritises low speed and low volume routes for walking and cycling, rather than duplicating facilities on both sides of a constrained corridor.

As shown in Figure 28, a 3 m wide walking and cycling shared path could potentially be accommodated within the existing 4.5 m wide berm on the southern side of Saxbys Road between Leslie Place and Deanwell Avenue. This would likely require the removal or relocation of existing trees and power/communications feeder poles along approximately 150 m of the road corridor.

The final design and configuration of Saxbys Road will be confirmed at the detailed design stage, having regard to corridor constraints, safety outcomes, and input from HCC. The 3.0 m wide shared path along Saxbys Road, together with the associated wetland connection to the development, is to be delivered as part of Stage 1A and prior to occupation of any Stage 1A lots.

[15] Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling, Edition 2.1, Table 5.3

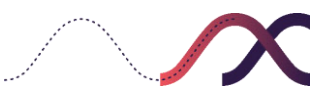




Figure 28: Indicative Alignment and Cross-section of Saxbys Rd

10.2.2 MacMurdo Avenue

MacMurdo Avenue forms an important local active mode connection between the Residential Development, MacDonald Road, Lambert Court and the wider network to the north and east. A shared path is proposed on MacMurdo Avenue between the site and Oban Avenue, transitioning to a separated bi-directional cycle path with adjoining footpath between Oban Avenue and MacDonald Road. This approach responds to the differing corridor constraints and network function along the route while maintaining continuity of connection for cyclists and pedestrians.

Between the site and Oban Avenue, where the road reserve narrows to approximately 17 m, a 3.0 m shared path can be accommodated within the existing corridor. Between Oban Avenue and MacDonald Road, a separated bi-directional cycle path is proposed so that the removal of mature trees in the eastern side road berm can be avoided. Accommodating that treatment within the existing road reserve requires removal of on-street parking along parts of the corridor and provision of localised recessed parking bays.

This response is consistent with HCC's Parking Policy (V2 March 2024)[16], which gives greater priority to safe and efficient movement of people than to long-stay parking on residential streets. While some demand for on-street parking is expected, the Project retains as much parking as practicable through recessed bays while prioritising provision of the walking and cycling connection within the constrained existing road reserve.

[16] https://hamilton.govt.nz/assets/Uploads/Documents/Policies/Hamilton-City-Parking-Policy.pdf

Location	Central City/ Commercial areas	Residential	Employment
Overarching Priority	Safety		
1st Priority	Movement and place	Movement and place	Movement and place
2nd priority	mobility parking spaces	mobility parking spaces	mobility parking spaces
3rd priority	Bus stops	Bus stops	Loading and servicing
4th priority	Loading and servicing	Residents' parking	Bus stops
5th priority	Biking and micro-mobility parking	Biking and micro-mobility parking	Biking and micro-mobility parking
6th Priority	Short to medium stay parking	Short to medium stay parking	Short to medium stay parking
7th Priority	Long-stay/ commuter parking	Long-stay/ commuter parking	Long-stay/ commuter parking

Figure 29: Prioritisation of Road Space (HCC Parking Policy – Principle Two)

The walking and cycling connection along MacMurdo Avenue, and continuing to MacDonald Road and Lambert Court, is to be delivered prior to Stage 1C of the Residential Development (approximately 198 dwellings). This reflects the point at which active mode demand is expected to become more established, and the route begins to perform a stronger wider-network function.

This is on the basis that in Stage 1A and 1B, the demand for walking and cycling infrastructure is expected to still be low, whereas cycling trips in Stage 1C are expected to increase to more than 10 users per hour based on the calculation method described in Section 12.2.2 and an aspirational active mode share target of 11.4% (i.e. target for 2045 with full development within Residential Development).

AGRD Part 6A, Figure C1 identifies that fewer than 10 users (cyclists or pedestrians) per hour is considered low volume demand. As the path volumes (i.e. both pedestrians and cyclists) on MacMurdo Avenue are expected to range between 10 to 30 users per hour across all horizon years, the risk of conflict between pedestrians and cyclists is low and therefore does not justify a bi-directional cycle path separate from the footpath.

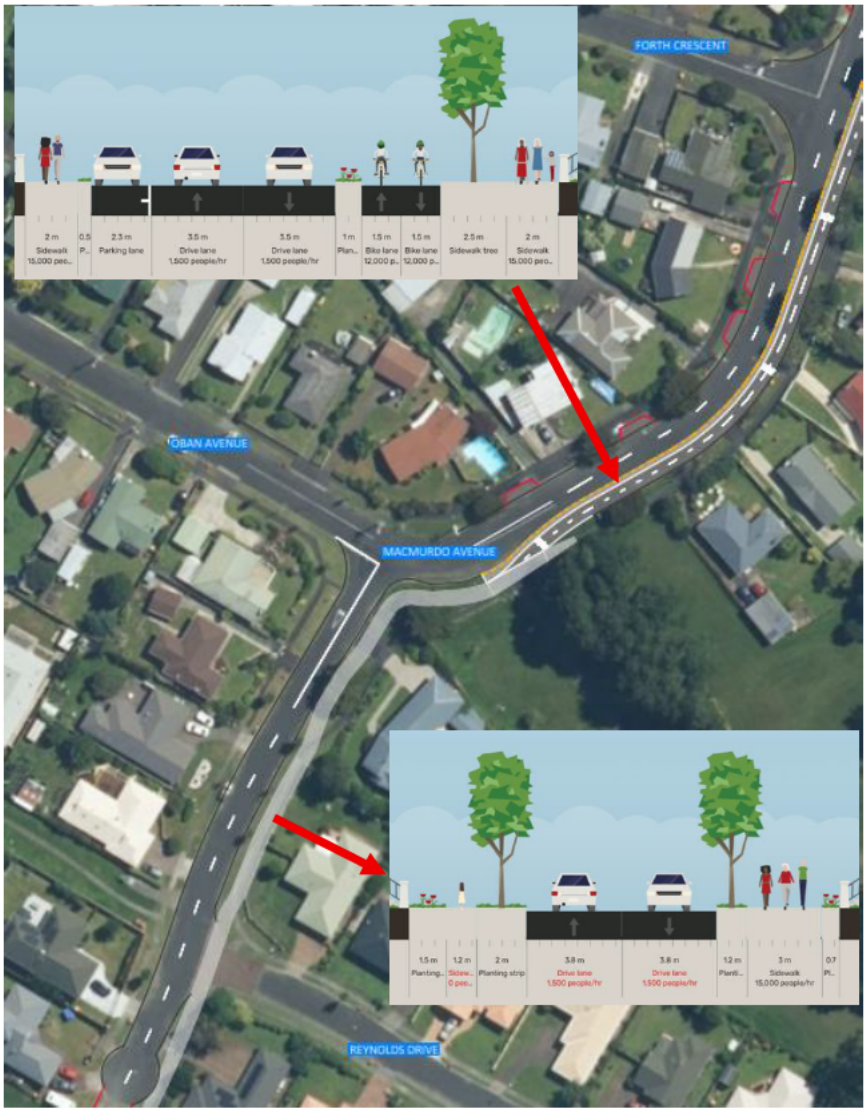


Figure 30: Indicative Alignment and Cross-section of MacMurdo Ave

10.2.3 Deanwell Avenue

Deanwell Avenue is an important transport corridor linking the Residential Development and wider Resthill residential area to Deanwell School and the Hamilton Cycle Network via the Western Rail Trail. The number of primary school aged children walking and cycling to Deanwell School is expected to increase significantly with the development of SL1, and Deanwell Avenue will also become a primary route for commuter cyclists travelling to and from Waikato Hospital and the CBD via Prisk Street and Mount View Road.

Therefore, for the safety of all cyclists, but particularly primary school aged students, a 3.0 m wide bi-directional cycle path is proposed on the western side Deanwell Avenue as shown in Figure 31.

The indicative cross-section demonstrates that a bi-directional cycle path can be accommodated within the existing 18.3 m wide road reserve. However, this involves the removal of on-street parking on the western side of the road and a reduction in traffic lane widths to 3.1 m. Existing Lane widths would be maintained on approaches and exits to existing roundabouts, while wider 3.4 m lanes are proposed adjacent to the existing bus stop shelter. There is also a 0.8 m wide buffer to allow properties to place their wheelie bins without obstructing both the path users as well as the traffic lanes.

It is recommended that the bi-directional cycle path on Deanwell Avenue and the sharrow markings on Prisk Street and Mount View Road be provided prior to Stage 3 (i.e. 725 dwellings). This is on the basis that a

moderate walking and cycling demand (i.e. approximately 30 cyclists plus 30 pedestrians per hour) is expected to be generated by the Residential Development on Deanwell Avenue based on the calculation method described in Section 12.2.2 and an aspirational active mode share target of 11.4% (i.e. target for 2045 with full development within the Residential Development). The path volumes (i.e. both pedestrians and cyclists) on Deanwell Avenue are expected to reach approximately 110 users per hour in 2045 and thus a separated cycle path is considered appropriate to limit the incidence of conflict between users.

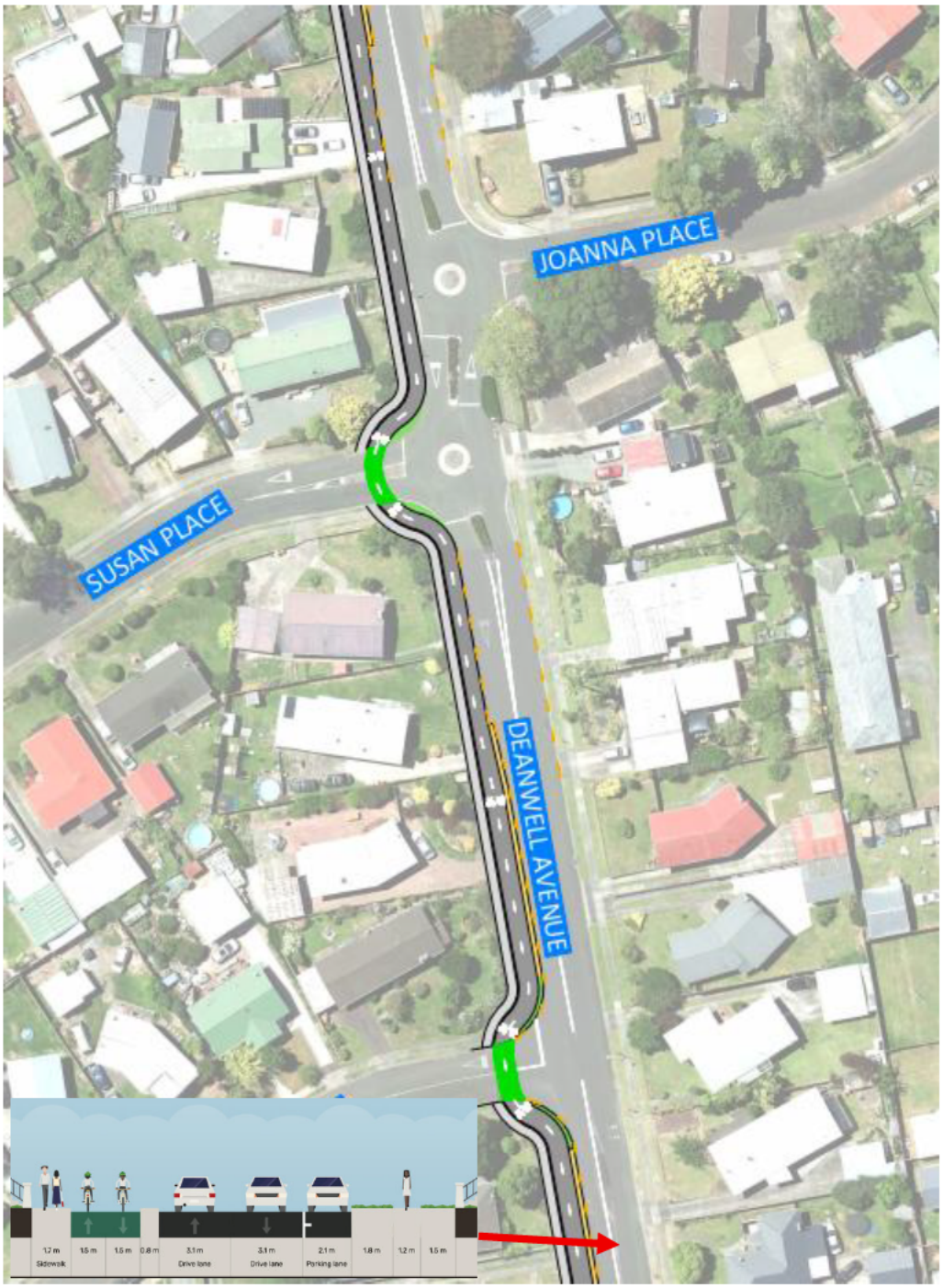


Figure 31: Indicative Alignment and Cross-section of Deanwell Ave

11. Internal Road Network

The road networks in the Industrial and Residential developments are designed to encourage multi-modal transport in response to differing operational requirements. The proposed road hierarchy reflects expected

traffic volumes including heavy vehicles, active mode requirements, future access for public transport and the surrounding land use context. The subdivision layouts were assessed against Table 15-5aii of the ODP, which provides indicative geometric standards for each road classification. Where appropriate, the proposed cross-sections have been refined to respond to the specific context, transport function and anticipated demand associated with the development.

11.1 Road Carriageway Widths

11.1.1 Industrial Development

Figure 32 illustrates the proposed road network for the Industrial Development, and the road hierarchy and widths are shown in the legend. The road corridor typologies are designed to appropriately cater for heavy vehicle traffic associated with industrial activities, along with safe provision for walking and cycling to provide travel-mode options for future workers in the area.

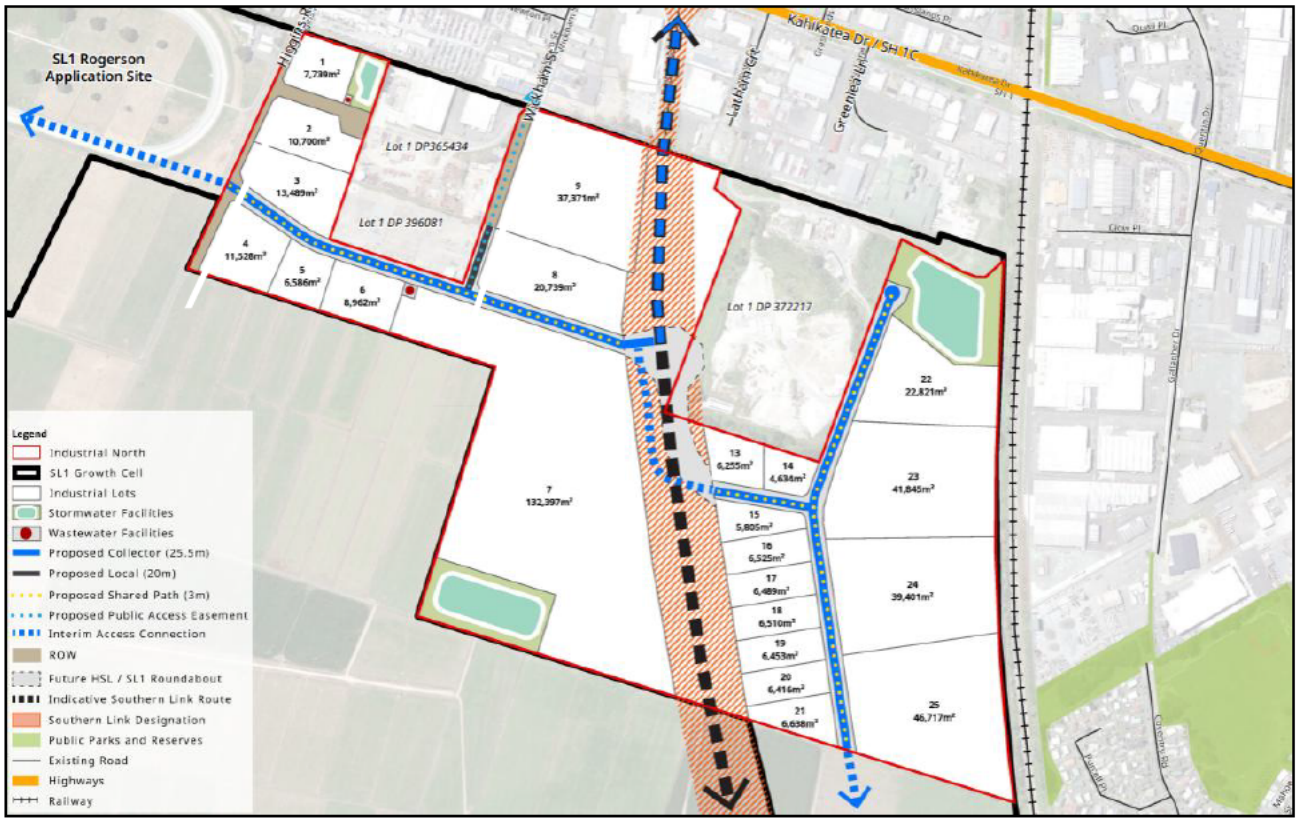


Figure 32: Industrial Development – Road Carriageway Width Hierarchy

Industrial Collector Road

The collector road will provide the principal movement corridor through the Industrial Development, with its primary connection via the SL1 roundabout on HSL. The position of the collector road future proofs it for extension west to Tuhikaramea Road to provide an integrated collector road corridor through the adjacent SL1 Rogerson Block (a Fast-Track referred project) when that area is developed.

The proposed collector road cross-section is illustrated in Figure 33. It provides a carriageway width of 11.5 m inclusive of a 2.5 m wide flush median within a 25.5 m wide road reserve. A 3.0 m wide shared walking and cycling path is provided on the northern side of the road to support active mode access within the Industrial Development and connections to the wider walking and cycling network. Pockets of recessed parallel parking bays are provided on both sides of the carriageway.

However, the proposed collector road cross-section does not fully align with the ODP standard, which recommends a 27.8 m or 26.5 m wide road reserve and provision of a separated bi-directional cycleway and footpath on both sides of the road.

This assessment finds that a single 3.0 m wide shared walking and cycling path on one side of the road is sufficient active mode infrastructure because future use is unlikely to be high as through trips by walking and cycling are expected to be low in this location on the southeastern perimeter of Hamilton. Accordingly, a 25.5 m wide road reserve width is considered appropriate. Furthermore, a shared path facility is consistent with nearby active mode facilities, including the primary network path on Greenwood Street.

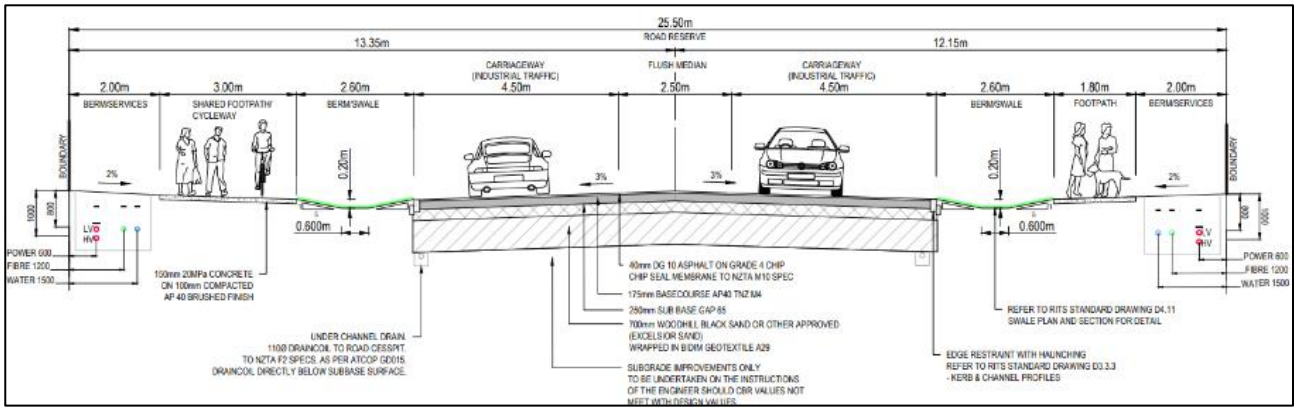


Figure 33: Industrial Development – Collector Road Indicative Typical Cross-section

Industrial Local Road

Local roads within the Industrial Development will fulfil ODP minimum requirements for a local industrial road as shown in Figure 34.

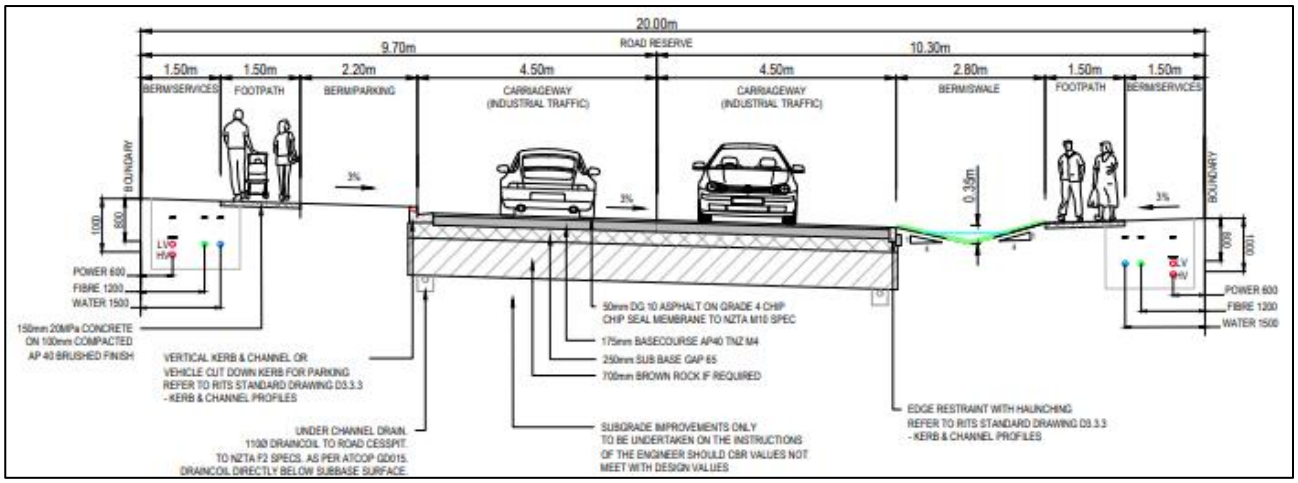


Figure 34: Industrial Local Road Indicative Typical Cross-Section

Industrial Private Right-of-Ways ("ROW") / Jointly Owned Access Lots ("JOAL")

All ROWs / JOALs are expected to be private roads. However, they have a carriageway width of 7 m which is in accordance with the Regional Infrastructure Technical Specifications V2 ("RITS"). The RITS Section 3.3.11.4 (c) specifies a minimum carriageway width of 6.4 m for an industrial private way serving two or more lots. The ROWs / JOALs can accommodate a 12.6 m rigid truck in accordance with RITS.

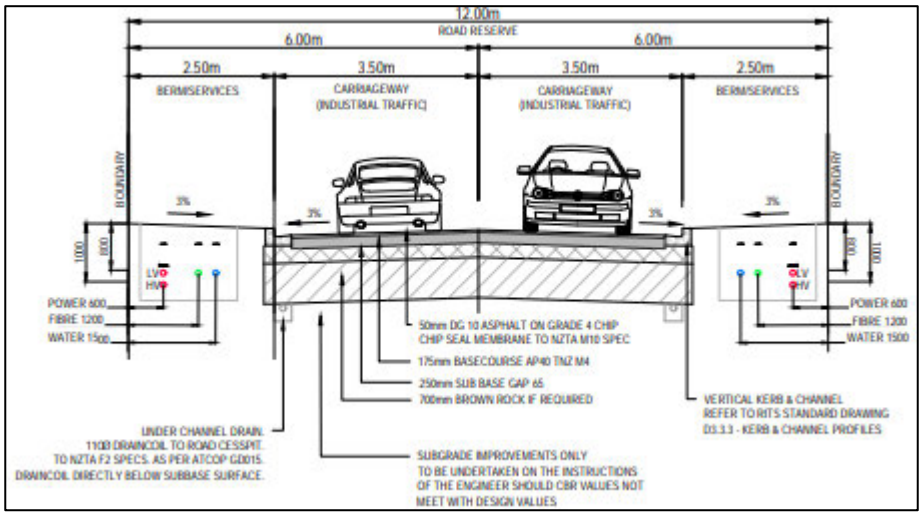


Figure 35: Industrial ROW Indicative Typical Cross-Section

11.1.2 Residential Development

Figure 36 illustrates the proposed road network for the Residential Development, and the road hierarchy and widths are shown in the legend. The road corridor typologies are designed to appropriately cater for vehicle traffic that is typically anticipated, along with safe provision for walking and cycling and PT.



Figure 36: Residential Development – Road Carriageway Width Hierarchy

Residential Minor Arterial Road

A 500 m long section of the minor arterial road is proposed to be constructed as part of the Residential Development along the southern boundary of the site. This road is expected to be extended northwards with a connection to Saxbys Road, and southwards towards Houchens Road when land surrounding the road (but not included in this Project) is developed in future.

The ODP requires minor arterial roads within a residential land use environment to be a two-lane transport corridor with a 3 m flush median. All bus stops along a minor arterial corridor are expected to be kerbside and separated cycle lanes on both sides or bi-directional off-road separated from carriageway one side is to be provided.

To maintain flexibility for the minor arterial road to potentially serve as a future bus route or frequent transit corridor, the corridor has been designed and safeguarded to enable future public transport priority measures, if required. This ITA does not assume or require dedicated public transport lanes as part of the Project. Figure 26 illustrates a representative typical cross-section.

Delivery of the full minor arterial road carriageway is not required to support the level of development proposed by the Residential Development. Accordingly, only one half of the ultimate carriageway (i.e. one lane in each direction) is proposed to be constructed initially. The balance of the carriageway can be delivered at a later stage when the wider SL1 growth cell to the south and west of the minor arterial road (not part of this Project) is developed. This will include connection of the minor arterial road to Saxbys Road and Houchens Road.

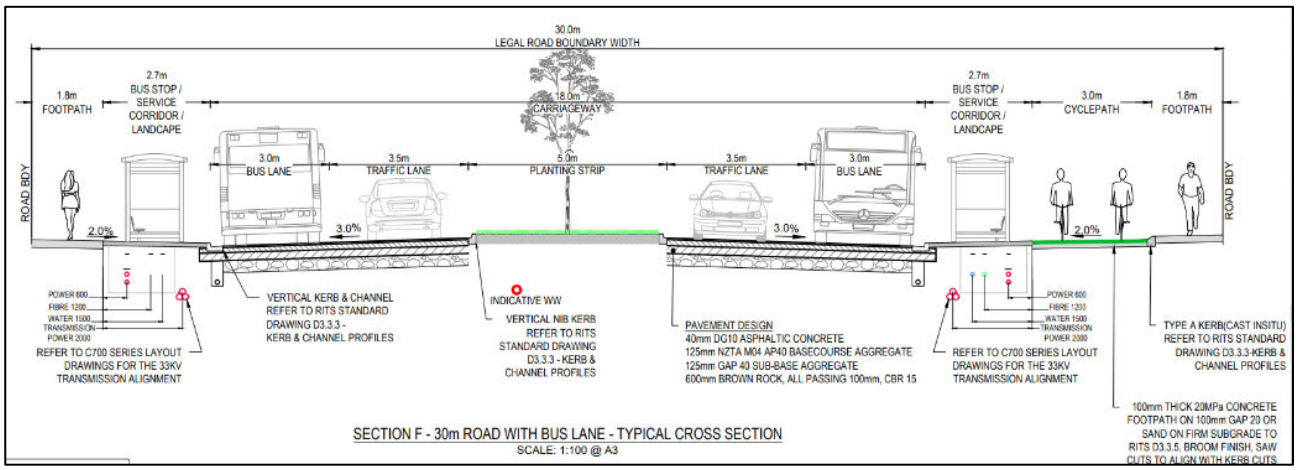


Figure 37: Residential Development – Minor Arterial Rd Indicative Typical Cross-section

Residential Collector Road

The primary access through the Residential Development is proposed via the north-south collector road. The indicative cross-section of the residential collector road is illustrated in Figure 38. This road typology provides a carriageway width of 7.0 m within a 23.0 m wide road reserve. Certain sections of the collector road include a 3.3 m wide flush median as shown in Figure 39 to facilitate right turning movements into side local roads

A 3.5 m wide shared walking and cycling path is provided on one side of the road and recessed parallel parking bays are provided on both sides of the carriageway. While separated cycleways (Table 15-5aii of the ODP) were considered during development of the cross-sections, they were not preferred due to the existing walking and cycling shared paths in the adjoining road network. A shared path will ensure the continuity of the facility type.

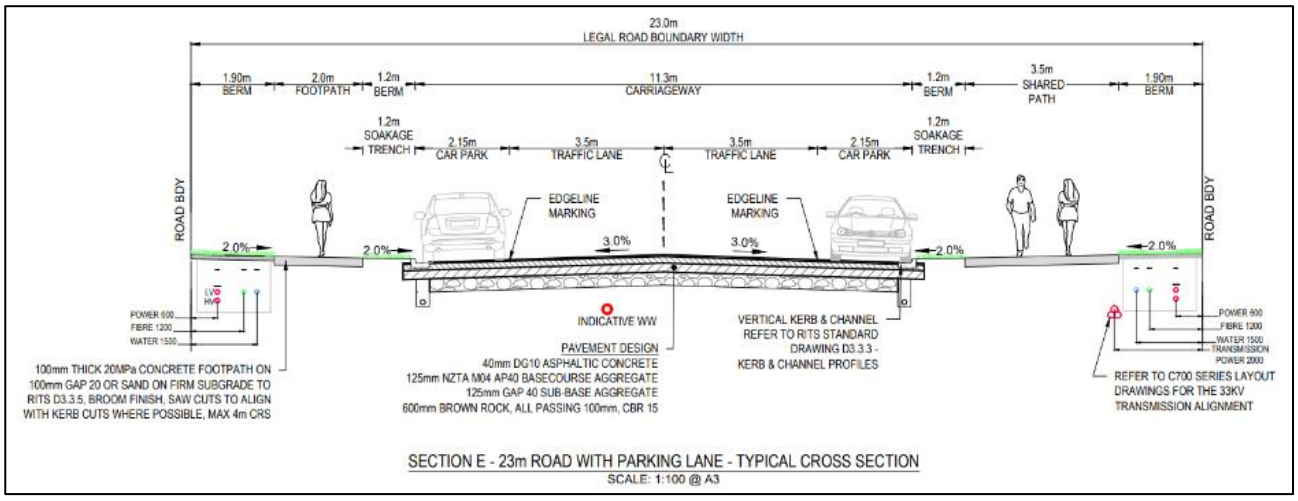


Figure 38: Residential Development – Collector Rd Indicative Typical Cross-section

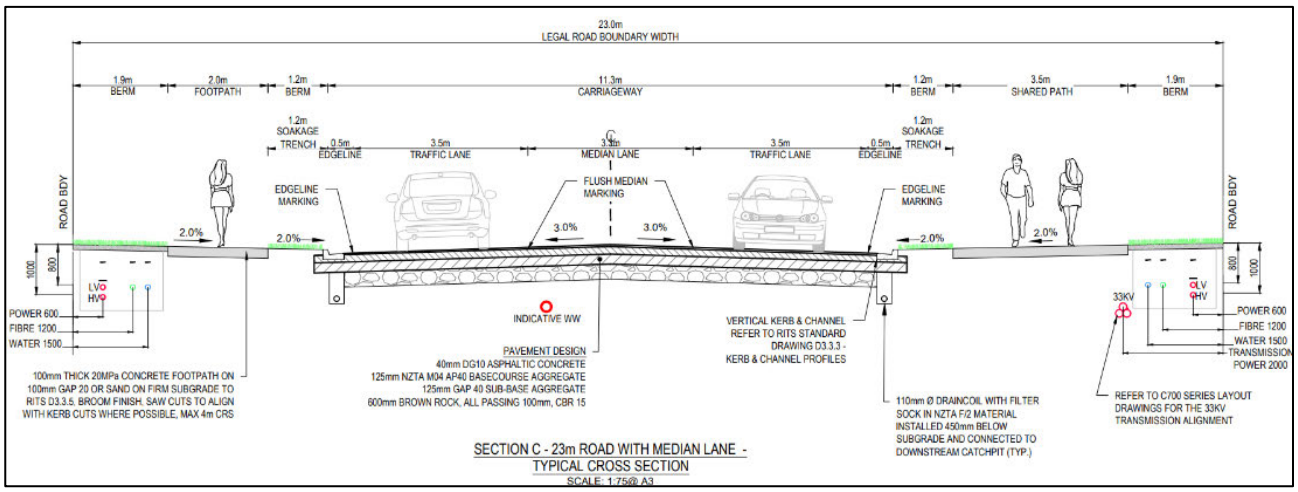


Figure 39: Residential Development – Collector Rd with Flush Median Indicative Typical Cross-section

Residential Local Road Type 1

Refer to Section 8.2.1 with regards to proposed MacMurdo Avenue extension.

Residential Local Road Type 2

All other internal roads will be designed as per the cross-section illustrated in Figure 40. This local residential road typology provides a carriageway width of 6 m within a 16.8 m wide road reserve in accordance with the ODP. 1.8 m wide footpaths and 2.1 m wide recessed parallel parking bays are provided on both sides of the carriageway. It is intended that cyclists can safely share the road with vehicles on local roads given the low vehicle speeds and volumes on these roads.

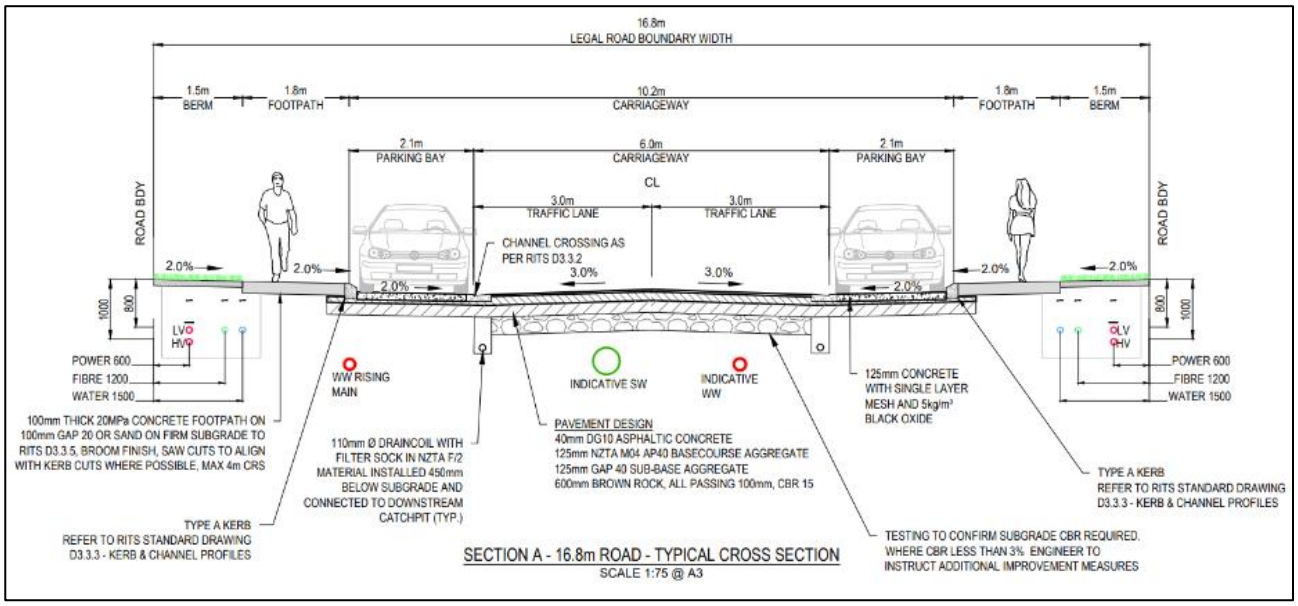


Figure 40: Residential Development – Local Rd Type 2 Indicative Typical Cross-section

JOAL / Rear Lanes

JOAL or rear lanes where proposed, will be designed in accordance with the ODP and confirmed through detailed design.

11.2 SL1 Development Intersections

The RITS requires the following separation distance between intersections. The proposed internal intersections fulfil these minimum requirements.

	LOCAL ROADS	COLLECTOR OR ARTERIAL ROADS	INDUSTRIAL ROADS
Same Side	60m	90m	200m
Opposite Side	30m	45m	100m

Figure 41: Minimum Intersection Spacing (Source: RITS)

Local road intersections are expected to be designed and constructed as priority-controlled intersections, either in the form of a T-intersection, or a crossroad with the side road giving way (or stopping). Kerb buildout could potentially be provided to support reduced pedestrian crossing lengths. This is a design detail that can be addressed at Engineer Plan Approval stage with HCC.

Specific intersections within the site will be in the form of a compact roundabout with a raised central island and mountable apron/collar.

Internal intersection designs will be addressed in detailed design phase.

Recommended Condition

All new road intersections shall be designed in accordance with the relevant Austroads Guide to Road Design and applicable Waikato Regional Infrastructure Technical Specifications, with final designs confirmed through the detailed design and engineering approval process.

12. Trip Generation

12.1 Travel Mode Splits

The future year periods assessed for the Project are 2030, 2035, 2045 and 2055. While the Project's transport effects are principally assessed through the 2030, 2035 and 2045 scenarios, a 2055 scenario has also been included to understand the longer-term performance of the wider transport network under a broader growth scenario. This scenario incorporates development beyond the Project, including other areas of the wider SL1 growth cell, and is intended to provide strategic context only.

Public Transport and active travel mode shares have been increased incrementally to take account of the increasing provision of walking and cycling facilities within the proposed development areas and on the adjoining road network. Table No: 7 and Table No: 8 below present the aspirational active mode and PT mode share targets for the various periods assessed.

The forecast mode shares should not be interpreted as guaranteed outcomes. Rather, they represent reasonable planning assumptions having regard to the proposed urban form, active mode connections, future public transport opportunities and strategic planning framework. Achievement of future mode share outcomes will be influenced by future transport investment, service provision, fuel price and travel behaviour trends.

12.1.1 Industrial Development Travel Mode Estimates

Travel mode splits in 2030 are estimated based on the 2023 Census data for travel to work in the Frankton Junction area of Hamilton (industrial zone).

The 2035 travel mode splits are based on 2023 Census data on how people travel to work in Riverlea and Ruakura (Hamilton). These statistical areas consist of industrial land use with good accessibility to walking and cycling, and PT networks to surrounding residential areas, therefore are considered reasonable proxies to anticipate the mid-term uptake of PT and active travel modes.

The 2055 travel mode splits are based on 2023 Census data on how people who work in Rongotai and Miramar South in Wellington travel to work. These statistical areas within Wellington consist of industrial land use and have high frequency routes currently servicing the areas as shown in Figure 42. This is also aligned with the Waikato Regional Transport Plan that indicates a frequent bus route is envisioned at the Kahikatea / Frankton area by 2032 (refer to Figure 9).

The 2045 travel mode splits for public transport and active modes have been adopted as reasonable and conservative assumptions having regard to the 2035 and 2055 mode share scenarios. They are intended to represent a gradual transition towards higher public transport and active mode use over time, rather than a direct interpolation between the two scenarios.

Table No: 7

Travel Mode Splits – Industrial Development				
Travel Mode	**2030[17]**	**2035**	**2045**	**2055**
Private Vehicle (Driver)	90.3%	84.5%	82.6%	78.2%
Public Transport	1.2%	2.2%	4.0%	6.8%

[17] https://tools.summaries.stats.govt.nz/places/SA2/frankton-junction#main-means-of-travel-to-work

Active Mode	3.4%	8.4%	8.5%	10.1%
Private Vehicle (Passenger)	3.2%	3.2%	3.2%	3.2%
Working from Home	0.5%	0.5%	0.5%	0.5%
Other	1.2%	1.2%	1.2%	1.2%

The working from home component shown in Table No: 7 reflects Census travel-to-work reporting for the comparator industrial areas only. It has not been applied as a reduction to the adopted Industrial Development vehicle trip generation rate (refer to Section 12.2.1), as the adopted rate is based on observed vehicle trips per developable hectare and already reflects the operational characteristics of comparable industrial activity.

12.1.2 Residential Development Travel Mode Estimates

Travel mode splits in 2030 are estimated using 2023 Census data on how people who live in Resthill, Hamilton travel to work.

2035 PT and active mode shares are based on 2023 Census data from Peachgrove-Greensboro, Hamilton East and Hillcrest (all in Hamilton). These areas currently densely populated (approximately 7,000 to 10,000 population) with good accessibility to PT and walking and cycling connections.

2045 PT and active mode shares are based on 2023 Census data from statistical areas within Wellington comprising predominantly medium density residential land use and served by existing high frequency public transport routes (i.e. Island Bay, Lyall Bay and Miramar East). These areas are not in central Wellington and have been selected because they represent suburban residential environments where frequent public transport services support higher levels of public transport and active mode use (refer to Figure 42). For context, Table No: 9 below presents the typical service frequencies for the for the three high-frequency Metlink bus routes in Wellington, based on current Metlink / Transit App data (as of April 2026).

The Wellington comparator areas are not intended to directly predict future travel behaviour within the Residential Development area. Rather, they provide examples of mode share outcomes achieved in New Zealand urban environments that are served by frequent public transport corridors and supported by high-quality walking and cycling infrastructure.

Ohaupo Road (SH3) is identified in the PT Pathways Report as a bus priority transport corridor, serving Glenview with one frequent bus services (i.e. Comet – Tier 1 frequent service). By the long-term network (i.e. 2038), this route operates at a 10-minute peak frequency which equates to approximately 6 buses per hour per direction. This level of service is consistent with the frequencies of the Metlink bus routes identified above. Therefore, this assessment considers that the adopting Census data from the identified statistical areas within Wellington provides a reasonable proxy of the mode share split that can be expected in the year 2045. Frequent bus services provide substantial passenger-carrying capacity and enables a proportion of future travel demand to be accommodated by public transport rather than additional private vehicle movements.

2055 PT and active mode shares are aspirational mode-shift from car dependence during commuter peaks, but it is supported by the proposed medium-density residential in SL1 (reduced car parking and garaging) and aligns with the "transformational" shift to PT enabled by the Rapid Transit Network key moves envisaged in the Waikato Metro Spatial Plan. The MSP Programme Business Case states in Section 1.8 that "*The assessment of the public transport and active modes share in 2051, and based upon the preferred land use scenario 2a, has concluded that the region wide mode shift would be 20%; with the ability to achieve up to 44% (forecast as 32% for public transport and 12% for walking/cycling and micromobility) in the identified*

key BRT corridors of Hamilton City.". This is further supported by the PT Pathways Report which states that the Comet – Tier 1 frequent route is expected to "*eventually transition to BRT, which would have dedicated rights-of-way or continuous bus lanes, purpose-built bus stations, and dedicated traffic signalling at all locations*".

Table No: 8

Travel Mode Splits – Residential Development				
Travel Mode	**2030[18]**	**2035**	**2045**	**2055**
Private Vehicle (Driver)	77.2%	70.6%	59.2%	44.5%
Public Transport	3.9%	4.6%	13.9%	30%
Active Mode	3.4%	9.3%	11.4%	10%
Private Vehicle (Passenger)	3.7%	3.7%	3.7%	3.7%
Working from Home	10.8%	10.8%	10.8%	10.8%
Other	1.4%	1.4%	1.4%	1.4%

[18] https://tools.summaries.stats.govt.nz/places/SA2/resthill#main-means-of-travel-to-work

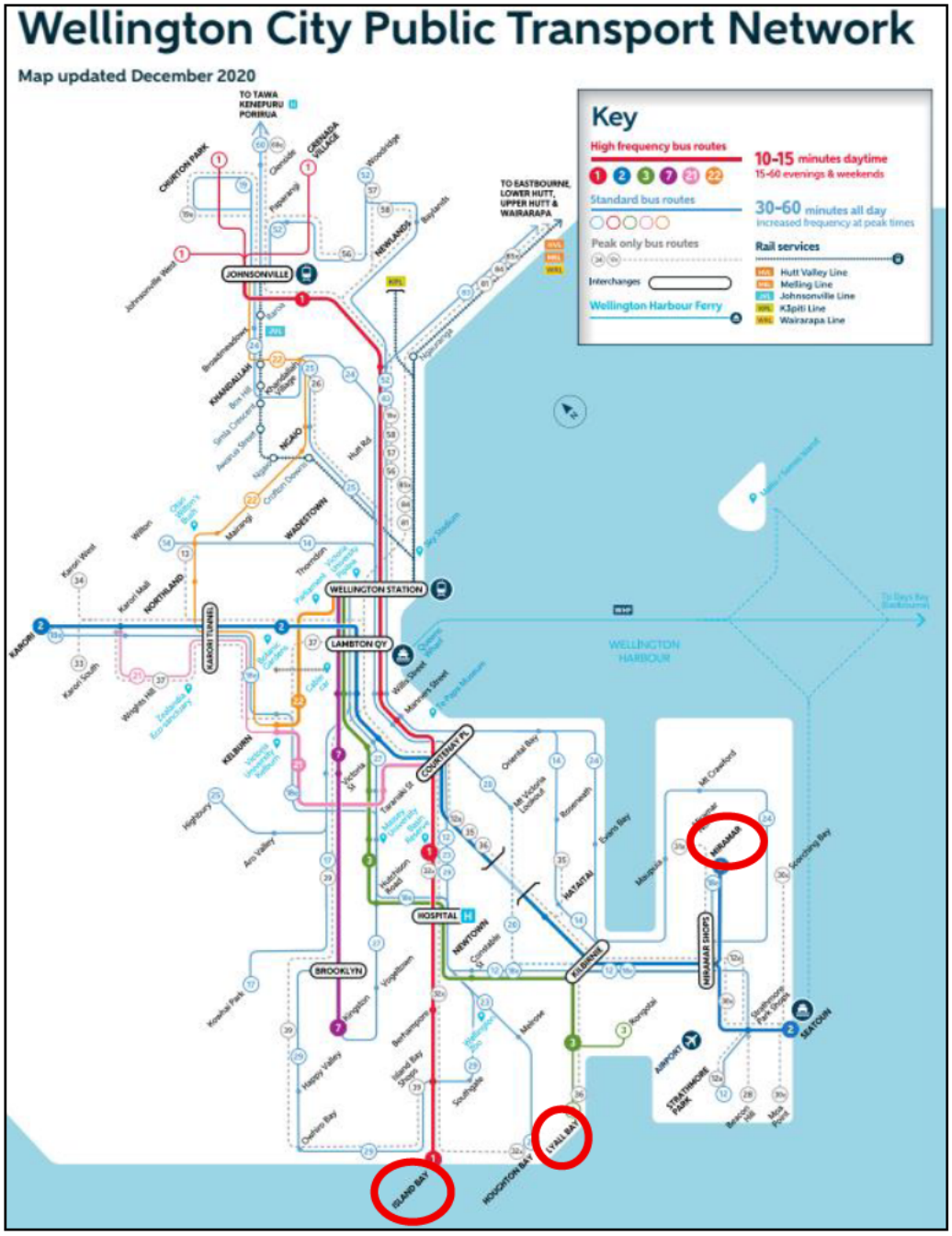


Figure 42: Wellington City PT Network (Source: Wellington Regional Public Transport Plan, 2021 – 2031)

Table No: 9

Typical Service Frequencies for Metlink Bus Routes in Wellington			
Route	**Core Corridor**	**Peak Frequency[19]**	**Buses per peak hour (per direction)[20]**
1	Johnsonville – CBD – Island Bay	8–10 min	6-8
2	Karori – CBD – Miramar/Seatoun	7–8 min	7-9

[19] Relate to headways (minutes between buses)

[20] Calculated by converting documented peak headways (by Metlink and Transit App) into buses per direction per hour

3	Lyall Bay – Newtown – CBD	7–10 min	6-9

12.2 Predicted Trip Generation

12.2.1 Industrial Development

The trip generation rates surveyed at the Central Precinct of the Airport Business Zone (Hamilton Airport - Titanium Park) are considered applicable to the proposed industrial land use in SL1. The Airport Business Zone has been gradually developed into one of the region's strategic industrial nodes and therefore provides a reasonable proxy to predict the number of trips that are likely to be generated by the proposed SL1 Industrial Development activities. Thus, a daily trip generation rate of 138.5 per developable hectare and a peak hour trip generation rate of 16.3 per developable hectare were adopted for this ITA.

It is recognised that the adopted trip generation rate pertains specifically to vehicles. It should be noted, however, that public transport accessibility as well as walking and cycling infrastructure are currently limited within the surveyed Central Precinct. As such, BBO considers that a proportion of these vehicle trips could transition to public transport or active modes, particularly in the context of the proposed Industrial Development area where new walking and cycling infrastructure linking to existing bus stops is recommended.

To recognise the potential for increased public transport and active mode uptake over time, a proportion of the vehicle trips derived from the Titanium Park surveys has been assumed to transition to public transport and active modes in future years. For the purposes of this assessment, an assumed mode shift of 5.8% has been applied in 2035, increasing to 7.7% in 2045 and 12.1% in 2055. The remaining vehicle trips were then assigned to the road network. Table No: 10 to Table No: 12 summarise the resulting trip generation assumptions.

Person-trip rates as outlined in the NSW Guide have not been adopted, as these are based on gross floor area (GFA) and the site coverage details for the Industrial Development remain unconfirmed at this time.

Table No: 10

Predicted Trip Generation – Industrial Development Year 2035 Scenarios 2 and 3						
Year	Dev Area (ha)	Peak Hour Vehicle Trip Gen Rate (veh trips / dev ha / hr)	Total no. of vehicle trips generated during peak hour	Assumed PT and Active Mode Shift (5.8%) (veh trips / hr)	Remaining Vehicle Trips (94.2%) (veh trips / hr)	
2035	40	16.3	652	38	614	
Total Trips Modelled in WRTM	35.8				536	15%

Table No: 11

Predicted Trip Generation – Industrial Development Year 2045 – Scenario 4						
Year	Dev Area (ha)	Peak Hour Vehicle Trip Gen Rate (veh trips / dev ha / hr)	Total no. of vehicle trips generated during peak hour	Assumed PT and Active Mode Shift (7.7%) (veh trips / hr)	Remaining Vehicle Trips (92.3%) (veh trips / hr)	
2045	40	16.3	652	50	602	
Total Trips Modelled in WRTM	35.8				535	12%

Table No: 12

Predicted Trip Generation – Industrial Development Year 2055 – Scenario 5						
Year	Dev Area (ha)	Peak Hour Vehicle Trip Gen Rate (veh trips / dev ha / hr)	Total no. of vehicle trips generated during peak hour	Assumed PT and Active Mode Shift (12.1%) (veh trips / hr)	Remaining Vehicle Trips (87.9%) (veh trips / hr)	
2055	40	16.3	652	79	573	
Total Trips Modelled in WRTM	35.8				507	13%

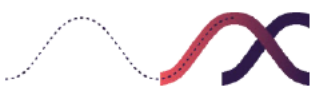
WRTM modelling for the Project was undertaken at an earlier stage of the project using the best available land use assumptions at that time. As the Masterplan has subsequently been refined, the developable area within the Industrial Development has increased relative to the land use inputs adopted in the WRTM model runs.

A comparison of the refined trip generation calculations with the WRTM outputs indicates that the WRTM model runs represent lower Industrial Development traffic than that derived from the updated developable area and adopted trip generation assumptions. The difference ranges from approximately 12% to 15% across Scenarios 2 to 5, with an average difference of approximately 13%. To ensure the intersection assessments are based on a conservative demand scenario, the Industrial Development turning movements extracted from the WRTM were increased by 13% prior to undertaking the SIDRA assessments. The additional Industrial Development traffic was distributed across the assessed intersections in accordance with the WRTM trip distribution patterns. The magnitude of the adjustment (i.e. 13%) is relatively modest and does not materially alter the strategic distribution of trips within the network but ensures that intersection performance assessments are based on a conservative demand scenario.

Accordingly, the assessment adopts WRTM-derived trip distribution patterns together with locally refined trip generation assumptions based on the updated developable area. The application of a 13% uplift to the WRTM Industrial Development traffic ensures that the intersection assessments are conservative while maintaining consistency with the strategic traffic distribution represented within the WRTM.

12.2.2 Residential Development

As the number of low, medium and high-density lots are known, person-trip rates for each residential land use were adopted from the *NSW Government Guide to Transport Impact Assessment* ("NSW Guide") to estimate the number of trips generated by the proposed development during the peak hour. For the



purposes of trip generation calculation, the proposed high-density lots have been assessed using the medium-density person-trip rate, as they do not align with the NSW Guide definition of high-density residential dwellings.

Table No: 13 to Table No: 17 outline peak hour trip generation calculation for various development scenarios.

Table No: 13

Predicted Trip Generation – Residential Development – Scenarios 1A to 1E (Year 2030 Stage 1)							
Type of Residential Unit	No. of Units	Peak Hour Person Trip Gen Rate[21] (person trips / dwelling / hr)	Total no. of person trips generated during peak hour	PT (3.9%) (person trips / hr)	Active Modes (3.4%) (person trips / hr)	Private Veh[22] (80.9%) (veh trips / hr)	Calculated Vehicle Trip Generation Rate
Lower density	119	1.15	137	5	5	85	0.72
Medium density	202	1.09	220	9	7	137	0.68
Total	321	-	357	14	12	222	-

Table No: 14

Predicted Trip Generation – Residential Development – Scenario 2 (Year 2035 Stages 1 and 2)							
Type of Residential Unit	No. of Units	Peak Hour Person Trip Gen Rate (person trips / dwelling / hr)	Total no. of person trips generated during peak hour	PT (4.6%) (person trips / hr)	Active Modes (9.3%) (person trips / hr)	Private Veh (74.3%) (veh trips / hr)	Calculated Vehicle Trip Generation Rate
Lower density	200	1.15	230	11	21	131	0.66
Medium density	343	1.09	374	17	35	214	0.62
Total	543	-	604	28	56	345	-
Total Trips Modelled in WRTM						316	9% (Difference)

[21] Based on NSW Guide. Rates are average of the AM and PM peak hour person trip generation rates.

[22] Assumes a vehicle occupancy of 1.3 persons per vehicle in accordance with NSW Guide. Vehicle trips = (Person trips x car mode share %) / (Assumed vehicle occupancy)

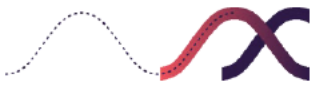


Table No: 15

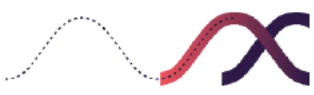
Predicted Trip Generation – Residential Development – Scenario 3 (Year 2035 Stages 1 to 3)							
Type of Residential Unit	No. of Units	Peak Hour Person Trip Gen Rate (person trips / dwelling / hr)	Total no. of person trips generated during peak hour	PT (4.6%) (person trips / hr)	Active Modes (9.3%) (person trips / hr)	Private Veh (74.3%) (veh trips / hr)	Calculated Vehicle Trip Generation Rate
Lower density	256	1.15	294	14	27	168	0.66
Medium density	474	1.09	517	24	48	295	0.62
Total	730	-	811	37	75	464	-
Total Trips Modelled in WRTM						419	11% (Difference)

Table No: 16

Predicted Trip Generation – Residential Development – Scenario 4 (Year 2045 Stages 1 to 5)							
Type of Residential Unit	No. of Units	Peak Hour Person Trip Gen Rate (person trips / dwelling / hr)	Total no. of person trips generated during peak hour	PT (13.9%) (person trips / hr)	Active Modes (11.4%) (person trips / hr)	Private Veh (62.9%) (veh trips / hr)	Calculated Vehicle Trip Generation Rate
Lower density	347	1.15	399	55	45	193	0.56
Medium density	591	1.09	644	90	73	312	0.53
Total	938	-	1,043	145	119	505	-
Total Trips Modelled in WRTM						446	13% (Difference)

Table No: 17

Predicted Trip Generation – Residential Development – Scenario 5 (Year 2055 Stages 1 to 5)							
Type of Residential Unit	No. of Units	Peak Hour Person Trip Gen Rate (person trips / dwelling / hr)	Total no. of person trips generated during peak hour	PT (30%) (person trips / hr)	Active Modes (10%) (person trips / hr)	Private Veh (48.2%) (veh trips / hr)	Calculated Vehicle Trip Generation Rate
Lower density	347	1.15	399	120	40	148	0.43
Medium density	591	1.09	644	193	64	239	0.40
Total	938	-	1,043	313	104	387	-
Total Trips Modelled in WRTM						357	8% (Difference)



Initial feedback from NZTA suggested that a 10.8% work from home factor (refer to Table No: 8) is likely to be excessive and that it would only be a justified reduction if the residential trip rates from the NSW Guide included 0% work from home factor.

The NSW Guide does not specify work-from-home assumptions. Accordingly, the resulting vehicle trip generation rates were compared against the NSW Guide vehicle trip rate benchmarks to confirm that the adopted assumptions produce reasonable transport outcomes.

Table No: 18 below provides a comparison between the NSW Guide vehicle trips rates against the calculated driver-only vehicle trip rates in Table No: 13 to Table No: 17.

Table No: 18

Vehicle Trip Generation Rates		
Type of Residential Unit	**NSW Guide Vehicle Trip Rate**	**Calculated Vehicle Trip Rate from Table No: 13 to Table No: 17**
Lower Density	0.83 – 0.84	0.43 – 0.72
Medium Density	0.41 – 0.60	0.40 – 0.68

As presented in Table No: 18, the calculated vehicle trip generation rates for lower density dwellings are below the NSW Guide vehicle trip rate range across all assessed scenarios. The difference increases in the later scenarios as greater levels of public transport and active mode uptake are assumed. This reflects the transport strategy adopted for the Residential Development, which seeks to reduce reliance on private vehicle travel through the provision of connected walking and cycling infrastructure, improved public transport accessibility and transport demand management measures.

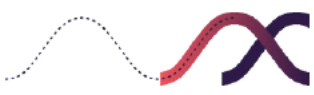
The NSW Guide notes that its lower-density residential vehicle trip rates are generally derived from surveys undertaken in areas with limited public transport accessibility. In contrast, the Residential Development is expected to be supported by progressively improved public transport access and frequency, and active mode connections over time. Accordingly, lower private vehicle trip generation rates are expected relative to the NSW Guide benchmark and are considered consistent with the transport outcomes sought for the Project.

For medium-density dwellings, the calculated vehicle trip generation rates are above the NSW Guide range in Scenario 1, generally within the NSW Guide range in Scenarios 2 to 4, and slightly below the range in Scenario 5. This reflects the increasing mode share assumptions for public transport and active modes in the later scenarios.

Data from Census 2023 indicates that Hamilton City and Glenview have work-from-home rates of approximately 12.5% and 10.0% respectively. These figures are broadly consistent with the assumptions adopted for the Residential Development trip generation calculations and support the inclusion of a work-from-home adjustment within the assessment methodology.

WRTM modelling for the Project was undertaken at an earlier stage of the project prior to final confirmation of the dwelling mix and typologies within the Residential Development. As the Masterplan has subsequently been refined, the residential yield and composition have been updated relative to the land use inputs adopted in the WRTM model runs.

Consistent with the approach adopted for the Industrial Development, a comparison of the refined trip generation calculations with the WRTM outputs indicates that the model represents slightly lower residential traffic, with an average difference of approximately 10% across Scenarios 2 to 5. To address this, the intersection modelling presented in Section 15 incorporates a 10% increase to the modelled residential trips.



The additional Residential Development traffic was applied to the relevant residential development-related turning movements at each assessed intersection, using the WRTM distribution patterns as the basis for assigning the uplift across the surrounding network. This adjustment is modest and does not materially alter the strategic distribution of trips within the network but ensures that the intersection assessments are based on a conservative demand scenario.

In addition, the site's urban context, proximity to local employment and services, and the provision of walking, cycling, and future public transport connections support reduced reliance on private vehicle travel over time. In this context, the adopted trip generation assumptions are considered appropriate and, when combined with the applied adjustment, provide a robust and proportionate basis for assessing transport effects at the intersection level.

13. Transport Modelling

BBO has undertaken a transport modelling exercise as a key input to this transport assessment. This task included undertaking trip generation calculations for the Project (refer to the previous Section 12.2), and transport modelling of those future trips on the surrounding network using the WRTM to assess the trip distribution and any resulting capacity or safety effects on affected intersections and the proposed accesses to the Site.

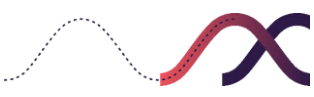
13.1 WRTM Validity

The WRTM is presently the most appropriate strategic transport planning tool for predicting transport demands of proposed and consented land-use activity zones in the Waikato.

BBO obtained the latest WRTM model run ("HSL Scenario 31") from CoLab that was developed for NZTA's Investment Case for HSL. HSL Scenario 31 included the following key network infrastructure for HSL:

- HSL Central interchange south of Peacocke, as designated
- North-south corridor (Greenwood Street), 2+2 lanes with 100 km/h posted speed limit
- SL1 at-grade roundabout, approximately 970 m south of Greenwood Street / Kahikatea Drive intersection
- Half-diamond interchange at Collins Road, as designated
- Greenwood Street / Duke Street left-in-left-out intersection
- Three-arm roundabout at Greenwood Street / Kahikatea Drive intersection with no access via Kahikatea Drive Extension.

BBO conducted a review of the WRTM network and zone structure surrounding the SL1 development areas and identified refinement work shown in Figure 43 was required to better reflect the future road network surrounding the sites.



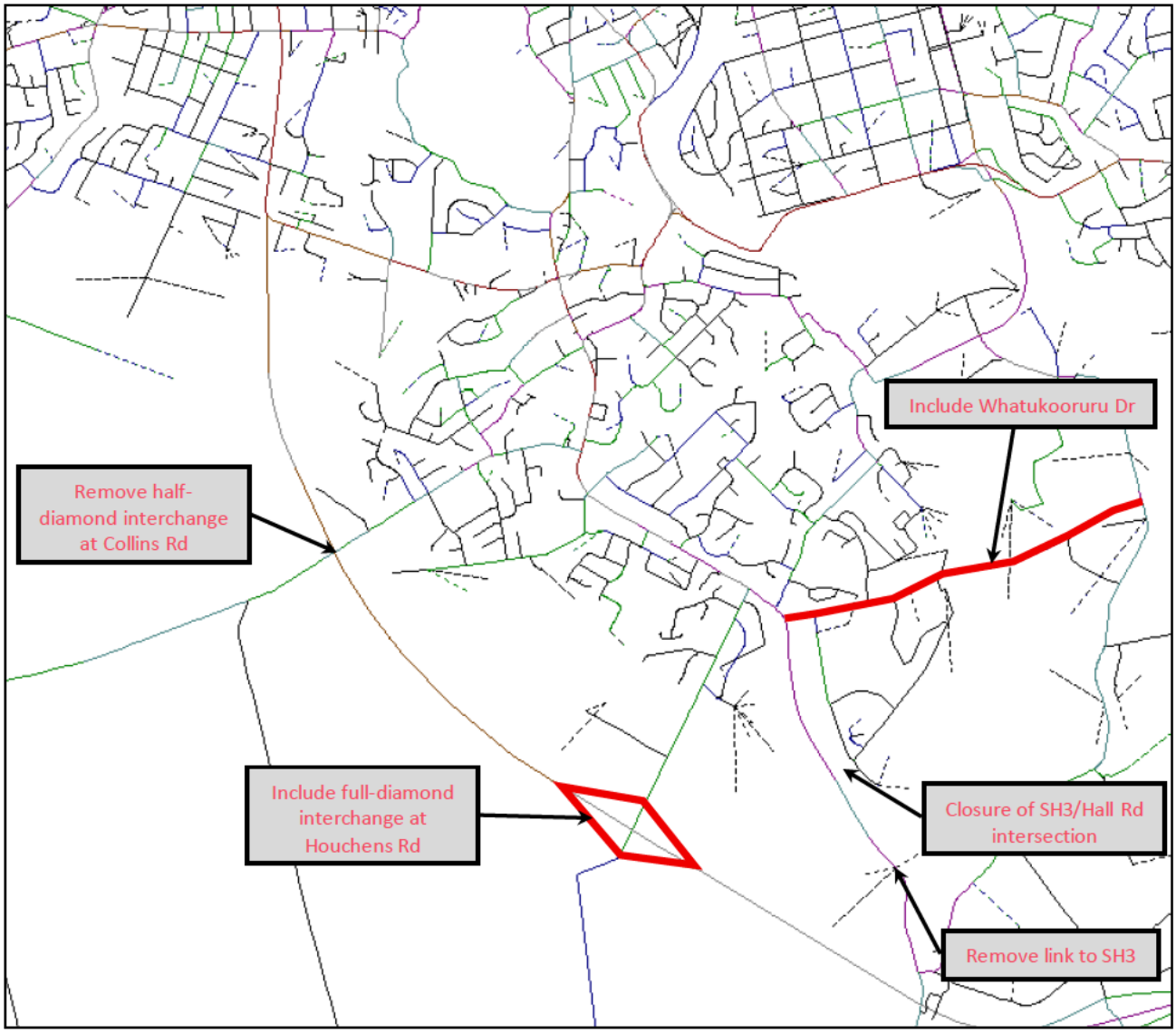


Figure 43: Required WRTM Network Amendments

13.2 Modelled Scenarios

Table No: 19 summarises the scenarios that have been assessed with the WRTM for this Project by incorporating the amendments mentioned in the preceding section.

The modelling scenarios incorporate assumptions regarding increased public transport use and active travel over time, consistent with planned investment and corridor-level improvements. Network performance improvements are therefore not attributable solely to new road infrastructure, but to the combined effects of connectivity, accessibility, and restrained growth in general traffic volumes through mode shift.

Table No: 19

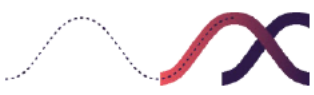
Modelling Scenarios		
Scenarios	**Transportation Infrastructure / Elements**	**Land Use Assumptions**
2035 Baseline Scenario	• No Southern Links	• No SL1 land use. • Land use within Airport Business Zone and Peacocke Structure Plan area to adopt Southern Links Scenario 31 model assumptions.
Scenario 1A (Year 2030)	• No Southern Links	• SL1 Residential Development = 59 dwellings

Scenario 1B (Year 2030)	• No Southern Links	• SL1 Residential Development = 123 dwellings
Scenario 1C (Year 2030)	• No Southern Links	• SL1 Residential Development = 198 dwellings
Scenario 1D (Year 2030)	• No Southern Links	• SL1 Residential Development = 271 dwellings
Scenario 1E (Year 2030)	• No Southern Links	• SL1 Residential Development = 321 dwellings
Scenario 2 (Year 2035)	• With Stage 1 Hamilton Southern Links (i.e. Greenwood St to SL1 roundabout) • Ohaupo Rd / Houchens Rd intersection to be signalised. • Ohaupo Rd / Resthill Cres intersection to be signalised • Collector Rd through SL1 Industrial Development area provided. • Collector Rd through SL1 Residential Development area provided.	• SL1 Residential: Development Stages 1 and 2 (575 dwellings) • SL1 Industrial: Full development (approx. 36ha developable area)
Scenario 3 (Year 2035)	• Full length of Southern Links • Remove partial interchange at Collins Rd and include full interchange at Houchens Rd. • Ohaupo Rd / Houchens Rd intersection to be signalised. • Ohaupo Rd / Resthill Cres intersection to be signalised • Collector Rd through SL1 Industrial Development area provided. • Collector Rd through SL1 Residential Development area provided.	• SL1 Residential: Stages 1 to 3 (776 dwellings) • SL1 Industrial: Full development (approx. 36ha developable area)
Scenario 4 (Year 2045)	• Full length of Southern Links • Remove partial interchange at Collins Rd and include full interchange at Houchens Rd. • Ohaupo Rd / Houchens Rd intersection to be signalised. • Ohaupo Rd / Resthill Cres intersection to be signalised • Minor arterial within SL1 Residential Development area provided.	• SL1 Residential Development: Full development (1,009 dwellings) • SL1 Industrial: Full development (approx. 36ha developable area)
Scenario 5 (Year 2055)	• Same as Scenario 4 plus: • SL1 Houchens proposed 3-arm roundabout on Ohaupo Rd. • HCVs to be banned on Houchens Rd. • Collector and Minor arterial roads within SL1 Houchens provided. • New roundabout connection on Tuhikaramea Rd providing access to SL1 Rogerson Block. • Collector Rd through Rogerson Block provided.	• Same as Scenario 4 plus: • Future Residential Areas within wider SL1 Growth Cell: 16ha industrial developable area + 4,000 dwellings • SL1 Rogerson Block: Full development (217 dwellings + 20ha industrial developable area) • SL1 Houchens: Full development (1,565 dwellings + 400 RV units + 47ha industrial developable area)

The modelling scenarios presented in Table No: 19 represent the transport modelling assumptions adopted within the WRTM and were intended to test a range of future network outcomes. They should not be interpreted as forecasts of HSL delivery timing or commitments regarding future infrastructure implementation.

The modelling scenarios have been developed to progressively assess the transport effects of the Project as development proceeds. The Rogerson Block and Houchens Development areas in the wider SL1 growth cell do not form part of this Project so were excluded in the earlier development modelling scenarios. These developments are introduced only in the 2055 scenario to test the future operation of the transport network under a broader growth scenario within the wider SL1 growth area.

While Scenarios 2 to 5 were modelled using the WRTM, Scenario 1A to 1D were based on manual distribution of traffic flows to minimise the time and cost of running numerous WRTM scenarios.



Scenarios 1A to 1E were analysed to determine if any development within the SL1 Residential Development area could be progressed in advance of HSL construction, and if so, identify the transportation infrastructure required to support the development. Scenarios 1A to 1E are assumed to be developed within the first five years (i.e. approximately 2030) which is sooner than the predicted timeline to construct HSL.

The 2030 baseline traffic volumes were derived from the surveyed peak hour traffic flows [23] and include an allowance for background traffic growth independent of the proposed development. This approach recognises that future traffic volumes on the state highway network will not be attributable solely to trips generated by the proposed developments. From the most recent data extracted from the NZTA TMS State Highway records, Greenwood Street and Ohaupo Road (SH3) have had an approximate average baseline growth of 1.2% and 1.5% per annum respectively.

A seasonal factor is applied to the surveyed traffic flows to account for traffic flow variation throughout the course of the year. To determine an appropriate factor, traffic counts from the Greenwood telemetry site on SH1C (i.e. site 97) and Ohaupo telemetry site on SH3 (i.e. site 119) have been assessed. Both telemetry sites indicate an average daily factor of 1.14 for the month of October 2025 during which the intersection count surveys were undertaken.

Additional traffic associated with the Residential Development area (i.e. Scenarios 1A to 1E) were then added to the 2030 baseline volumes to understand the effects on the intersections for a future year scenario.

13.3 Key Findings from WRTM Modelling

The following key findings have been drawn from the WRTM outputs and have informed the subsequent intersection capacity assessments in Section 15:

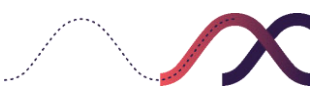
- **Ohaupo Road traffic distribution:**

  Earlier HSL Scenario 31 outputs indicated that approximately 10% of traffic from the Residential Development zones would use the Ohaupo Road / Lambert Court intersection, compared with approximately 30% using the Ohaupo Road / Resthill Crescent intersection. On that basis, Ohaupo Road / Resthill Crescent was initially considered for signalisation. However, the subsequent SL1 project WRTM model runs indicate that a greater proportion of Residential Development traffic is distributed to Ohaupo Road / Lambert Court. Accordingly, the intersection capacity assessment in Section 15.2.3 identifies Ohaupo Road / Lambert Court as the appropriate location for signalisation, rather than Resthill Crescent. On this basis and noting the proposed signalisation of both Ohaupo Road / Lambert Court and Ohaupo Road / Houchens Road, together with the nearby mid-block signalised crossing on Ohaupo Road, signalisation of Ohaupo Road / Resthill Crescent is no longer proposed. Instead, the right-turn movement out of Resthill Crescent is proposed to be removed, with southbound traffic redirected via the signalised Lambert Court intersection. This is assessed further in Section 15.2.4.

- **Adjustment of modelled development traffic:**

  Following consultation with NZTA and HCC, the updated trip generation calculations presented in Section 12 indicate that the development trips represented in the WRTM are lower than the refined estimates for both developments. Specifically, the WRTM modelled demand is approximately 13% lower for Industrial Development and approximately 10% lower for Residential Development. The modelled development trips have therefore been increased by these respective percentages for the intersection performance analyses presented in Section 15.

[23] Based on 2025 intersection count surveys undertaken by BBO.



- **Effect of HSL on baseline traffic volumes:**

  Comparison of the 2035 baseline scenarios, with and without HSL and excluding SL1 growth cell, indicates that the full length of HSL is expected to materially reduce daily traffic volumes on key corridors adjacent to the sites. Particularly, daily traffic volumes are forecast to reduce by approximately 23% on Kahikatea Drive (between Kahikatea Drive Extension and Latham Court) and by approximately 39% on Ohaupo Road (between Saxbys Road and Houchens Road). These reductions create spare capacity to accommodate traffic from the later stages of the Project, therefore effectively fulfilling the purpose of HSL being a RoNS project, stated in the current GPS for Transport. By contrast, HSL is expected to increase daily traffic volumes on Greenwood Street north of Kahikatea Drive, on Houchens Road, and on Collins Road by approximately 34%, 74%, and 21% respectively.

14. Average Daily Traffic Volume Changes

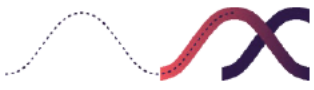
Table No: 21 provides a comparison of the changes in ADT on strategic roads surrounding the sites in the various WRTM scenario modelling undertaken for this Project. Intersections that the WRTM model runs demonstrate will experience more than 10% volume change relative to the 2035 WRTM baseline scenario without HSL, have been carried through for further assessment.

14.1 Industrial Development

Table No: 20

Changes in ADT (vehicles per day)				
Road Section	2035 Baseline without HSL	2035 Scenario 2 (% Change)	2035 Scenario 3 (% Change)	2045 Scenario 4 (% Change)
Kahikatea Dr Extn (between Melanie Ct and Higgins Rd)	5,542	3,546 (-36.0%)	4,680 (-15.6%)	4,967 (-10.4%)
Higgins Rd (between Kahikatea Dr and Duke St)	3,737[24]	4,030 (7.8%)	4,718 (26.3%)	5,407 (44.7%)
Duke St (between Higgins Rd and Greenwood St)	3,850	4,524 (17.5%)	3,664 (-4.8%)	4,731 (22.9%)
Greenwood St (between Killarney Rd and Duke St)	31,006	30,429 (-1.9%)	32,412 (4.5%)	42,280 (36.4%)
Greenwood St (between Duke St and Kahikatea Dr)	32,279	32,695 (1.3%)	36,266 (12.4%)	44,594 (38.2%)
Greenwood St (between Kahikatea Dr Latham Ct)	33,160	30,913 (-6.8%)	23,743 (-28.4%)	26,989 (-18.6%)
Killarney Rd (between Higgins Rd and Greenwood St)	21,328	23,342 (9.4%)	23,676 (11.0%)	23,647 (10.9%)
Killarney Rd (between	21,907	23,264 (6.2%)	24,002 (9.6%)	24,252 (10.7%)

[24] Based on classified traffic volume tube counts undertaken in May 2024. WRTM underestimates baseline volumes on Higgins Road (i.e. 2035 baseline volumes on Higgins Road = 979 vpd based on WRTM model run).



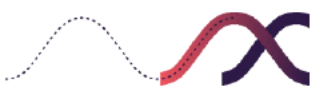
Tuhikaramea Rd and Higgins Rd)				

The Higgins Road / Duke Street intersection and Greenwood Street / Duke Street intersection have not been assessed further despite traffic volumes increasing more than 10% with the proposed Industrial Development. This is because the Greenwood Street / Duke Street is already proposed to be upgraded to a left-in-left-out intersection as part of the HSL project.

14.2 Residential Development

Table No: 21

Changes in ADT (vehicles per day)				
Road Section	2035 Baseline without HSL	2035 Scenario 2 (% Change)	2035 Scenario 3 (% Change)	2045 Scenario 4 (% Change)
Ohaupo Rd (between Normandy Ave and Urlich Ave)	28,450	29,986 (5.4%)	22,676 (-20.3%)	23,992 (-15.7%)
Ohaupo Rd (between Collins Rd and Saxbys Rd)	31,029	32,490 (4.7%)	25,577 (-17.6%)	28,066 (-9.5%)
Ohaupo Rd (between Saxbys Rd and Lambert Ct)	22,295	22,164 (-0.6%)	14,786 (-33.7%)	16,501 (-26.0%)
Ohaupo Rd (between Lambert Ct and Garden Heights Ave)	19,331	18,219 (-5.8%)	11,799 (-39.0%)	14,277 (-26.1%)
Ohaupo Rd (between Garden Heights Ave and Resthill Cres)	20,258	18,924 (-6.6%)	12,049 (-40.5%)	14,909 (-26.4%)
Ohaupo Rd (between Resthill Cres and Houchens Rd)	21,391	20,195 (-5.6%)	13,583 (-36.5%)	17,036 (-20.4%)
Ohaupo Rd (between Houchens Rd and Dixon Rd)	20,035	18,902 (-5.7%)	12,121 (-39.5%)	15,932 (-20.5%)
Collins Rd (between Ohaupo Rd and Anderson Rd)	4,740	4,863 (2.6%)	5,376 (13.4%)	6,245 (31.8%)
Collins Rd (between Deanwell Ave and Rhonda Ave)	8,967	9,188 (2.5%)	9,046 (0.9%)	9,568 (6.7%)
Saxbys Rd (between Ohaupo Rd and MacDonald Rd)	6,206	8,256 (33.0%)	9,118 (46.9%)	10,492 (69.1%)
Saxbys Rd (between Deanwell Ave and Leslie Pl)	2,689	4,045 (50.4%)	5,174 (92.4%)	7,110 (164%)
Saxbys Rd (between Rhonda Ave and Deanwell Ave)	2,606	2,840 (9%)	3,179 (22.0%)	3,211 (23.2%)



Deanwell Ave (between Collins Rd and Saxbys Rd)	3,239	3,287 (1.5%)	3,285 (1.4%)	3,376 (4.2%)
MacDonald Rd (between Saxbys Rd and MacMurdo Ave)	1,878	2,468 (31.4%)	2,540 (35.3%)	2,065 (10%)
MacDonald Rd (between Lambert Ct and Resthill Cres)	1,347	1,717 (27.5%)	1,865 (38.5%)	2,244 (66.6%)
MacMurdo Ave	2,072	3,835 (85.1%)	3,857 (86.1%)	2,731 (31.8%)
Lambert Ct	3,325	4,185 (25.9%)	4,314 (29.7%)	3,785 (13.8%)
Resthill Cres	1,627	1,877 (15.4%)	2,022 (24.3%)	2,402 (47.6%)
Houchens Rd	3,493	3,462 (-0.9%)	6,167 (76.6%)	5,678 (62.6%)

15. Intersection Capacity Performance

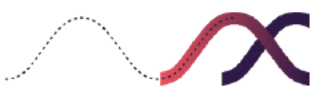
Based on Table No: 20 and Table No: 21, the area of influence of the Industrial and Residential Developments can be summarised as incorporating the following intersections which have been modelled using the industry-recognised SIDRA Intersection 10 software ("SIDRA") to assess the effects of traffic associated with this Project.

- Greenwood Street / Kahikatea Drive intersection
- SL1 Roundabout
- Kahikatea Drive / Higgins Road intersection
- Ohaupo Road / Collins Road signalised intersection
- Ohaupo Road / Saxbys Road / Tomin Road roundabout
- Ohaupo Road / Lambert Court intersection
- Ohaupo Road / Resthill Crescent intersection roundabout
- Ohaupo Road / Higgins Road intersection
- Houchens Road full-diamond interchange

SIDRA models were prepared for the key intersections assessed using the surveyed peak-hour turning movements as the base input. The base models were checked against observed queue lengths and general operating conditions from traffic surveys to confirm that the models reasonably represent existing intersection performance before future traffic demands were applied.

Future-year models were then developed using WRTM-derived traffic demands, adjusted where necessary to reflect the refined trip generation calculations set out in Sections 12.2.1 and 12.2.2. SIDRA movement summaries are provided in Appendix B to support review of the modelling outputs.

The capacity assessment results are summarised in the following sub-sections in terms of Level of Service ("LOS") with full SIDRA outputs provided in Appendix B. LOS is a standard measure for intersection performance and is based on the average delay experienced by drivers in each lane, by arm. In general, LOS levels A to C are considered acceptable, LOS D to E are considered permissible where reasonable improvements cannot be made, provided safety effects can be mitigated. LOS F is generally considered to be



an unsatisfactory level of service. Delay thresholds in seconds of delay for LOS A to F are given in Table No: 22 below.

Table No: 22

SIDRA Level of Service Definitions			
Level of Service	Average Control Delay per Vehicle (seconds)		
	Priority-Controlled Intersections	Signalised Intersections	Roundabout (SIDRA Roundabout LOS method)
A	≤ 10	≤ 10	≤ 10
B	10 – 15	10 - 20	10 - 20
C	15 – 25	20 – 35	20 – 35
D	25 – 35	35 – 55	35 – 50
E	35 – 50	55 – 80	50 – 70
F	> 50	> 80	> 70

15.1 Industrial Development

15.1.1 Greenwood Street / Kahikatea Drive Intersection

The existing intersection layout modelled within SIDRA is shown in Figure 44. The results of the intersection performance for all scenarios during the peak periods are presented in Table No: 23.

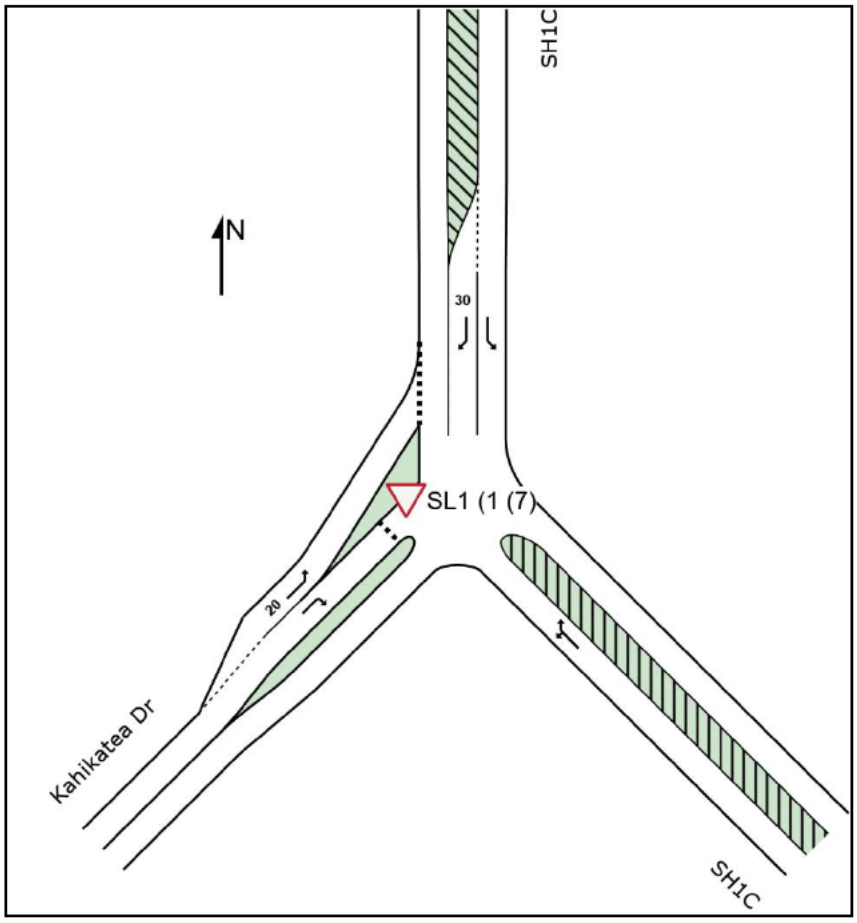


Figure 44: Existing Greenwood St (SH1C) / Kahikatea Dr Intersection Layout

Table No: 23

Existing Greenwood St / Kahikatea Dr Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.86	10.1	27.7 Kahikatea Dr (W)	NA	RT from Greenwood St (N)	60.4	18.3	F
	PM	0.77	8.0	23.1 Kahikatea Dr (W)	NA	RT from Greenwood St (N)	49.6	17.1	E
2030 Baseline + 1 ha Industrial	AM	0.89	10.6	30.5 Kahikatea Dr (W)	NA	RT from Greenwood St (N)	66.6	20.3	F
	PM	0.77	8.1	22.9 Kahikatea Dr (W)	NA	RT from Greenwood St (N)	51.0	17.6	F

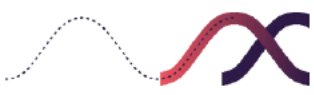
The modelling indicates that the right turn movement from Greenwood Street fails (LOS F) in the 2030 baseline scenario during the AM peak hour.

A sensitivity check was undertaken to determine the amount of developable land that can be practically and safely serviced before the average delay for the right-turn movement increases by more than 10 seconds per vehicle. A change of this magnitude is considered material in the context of the SIDRA level of service definitions presented in Table No: 22, where the delay ranges for each level of service are generally of the order of 10 seconds per vehicle. On that basis, the sensitivity testing indicates that approximately 1 ha of land within the Industrial Development can be accommodated before further transport infrastructure upgrades are required.

The three access options described in Section 8.1 were evaluated to assess how further Industrial Development could proceed.

Option A: Ultimate Network Arrangement (once HSL Stage 1 is Delivered)

Figure 45 presents NZTA's conceptual design of the Greenwood Street / Kahikatea Drive upgrade proposed as part of HSL Stage 1. However, an alternative roundabout configuration was tested for this intersection (Figure 46) to minimise potential adverse safety and capacity effects of traffic weaving from the southbound continuous left turn exit lane to the right turn lane at the proposed HSL / SL1 roundabout positioned approximately 520 m to the south.



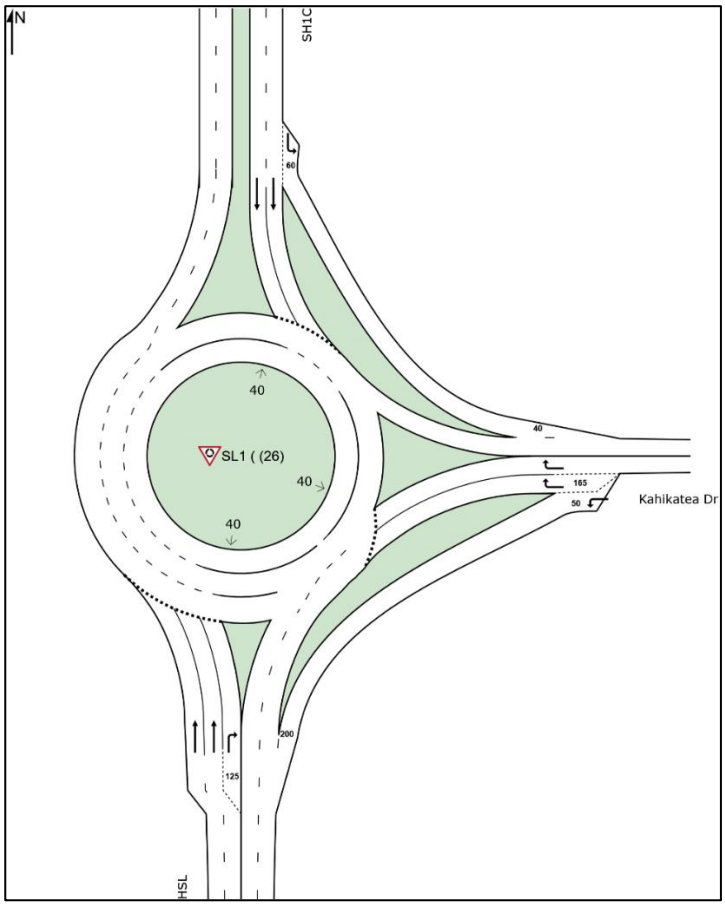


Figure 45: Greenwood St (SH1C) / Kahikatea Dr Roundabout Indicative Layout – NZTA Concept

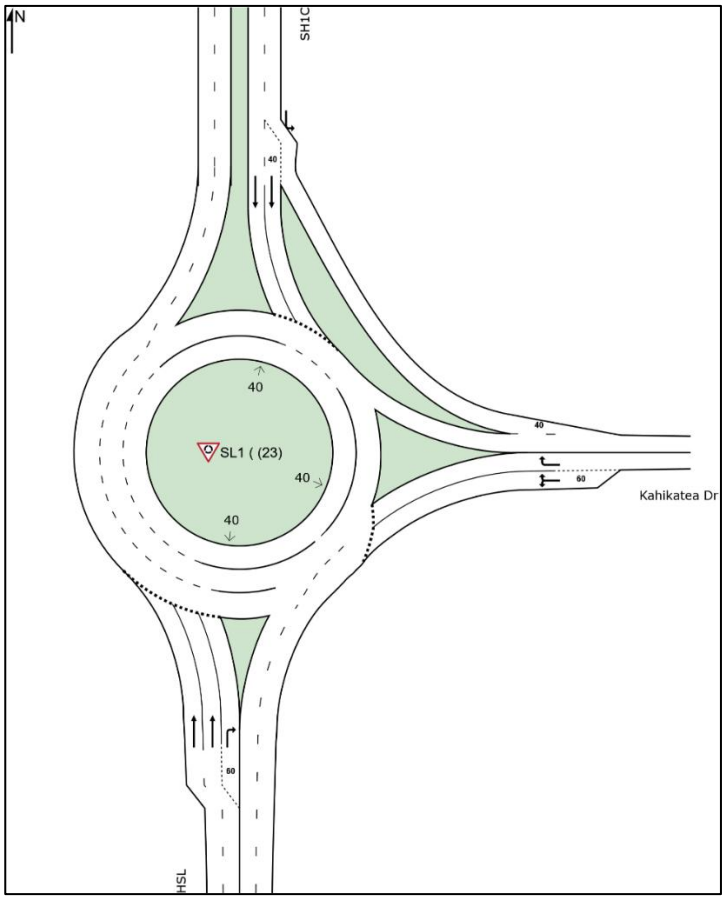


Figure 46: Greenwood St (SH1C) / Kahikatea Dr Roundabout Indicative Layout – SL1 Recommended Design

The SL1 recommended roundabout layout in Figure 46 was modelled using SIDRA for the AM and PM peak periods. It is modelled as a network with the proposed HSL / SL1 roundabout in all options. The performance results for the various model scenarios are presented in Table No: 24.

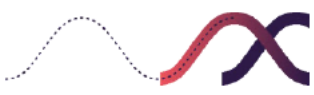
Table No: 24

Option A - Future Greenwood St / Kahikatea Dr Roundabout Recommended Design									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	Average Queue (m)	LOS	Movement	Ave Delay (s)	Average Queue (m)	LOS
2	AM	0.78	6.5	9.9 Kahikatea Dr (E)	A	RT from HSL (S)	17.1	0.7	B
	PM	0.58	6.8	12.4 Kahikatea Dr (E)	A	RT from HSL (S)	16.2	2.7	B
3	AM	0.62	8.1	13.5 Kahikatea Dr (E)	A	RT from HSL (S)	15.0	3.5	B
	PM	0.85	10.2	29.2 Kahikatea Dr (E)	B	RT from Kahikatea Dr (E)	18.7	29.2	B
4	AM	0.77	9.0	21.5 Kahikatea Dr (E)	A	RT from HSL (S)	16.8	3.3	B
	PM	0.75	9.1	20.1 Kahikatea Dr (E)	A	RT from Kahikatea Dr (E)	16.5	20.1	B
5	AM	0.90	12.1	37.5 Kahikatea Dr (E)	B	RT from Kahikatea Dr (E)	24.1	37.5	C
	PM	0.74	8.9	20.0 Kahikatea Dr (E)	A	RT from HSL (S)	15.1	4.1	B

The results show that the alternative proposed concept layout of the Greenwood Street / Kahikatea Drive three-arm roundabout operates efficiently without NZTA's proposed continuous southbound left turn lane exiting the Greenwood Street / Kahikatea Drive roundabout. The results indicate:

- Acceptable operational performance is achieved across all assessed scenarios, with intersection average delays ranging from 6.5 to 12.1 seconds per vehicle and LOS A to B overall.
- The assessed design continues to accommodate forecast traffic demand through to the 2055 scenario, although higher levels of utilisation are observed in the most demanding future year scenarios.
- Queue lengths remain manageable on all approaches, with the highest average queue of 37.5 m occurring on the Kahikatea Drive eastbound approach in the 2055 AM peak scenario.
- Enhances safety by minimising weaving effects that an added southbound lane could potentially introduce.

A sensitivity test has also been undertaken using NZTA HSL Scenario 31 2055 traffic volumes to test the proposed spacing between the future Greenwood Street / Kahikatea Drive roundabout and the proposed HSL / SL1 roundabout. This represents a conservative sensitivity test because NZTA HSL Scenario 31 includes a higher level of wider land use growth, including a higher level of residential development than the core assessment scenarios relied upon in this ITA.



The results indicate that the future Greenwood Street / Kahikatea Drive roundabout would operate with an overall LOS B in both peak periods. The PM peak hour is the critical period, with a degree of saturation of approximately 0.95 and the worst movement operating at LOS D, indicating that the roundabout would operate close to practical capacity under the conservative 2055 sensitivity demand. However, the modelled average queue remains approximately 49 m and does not indicate unacceptable queuing interaction between the Greenwood Street / Kahikatea Drive roundabout and the proposed HSL / SL1 roundabout.

The high degree of saturation in the PM peak should also be interpreted in the context of the conservative Scenario 31 2055 land use assumptions and is not representative of the core staging scenarios used to determine the development triggers in this ITA.

Accordingly, the sensitivity test does not identify a spacing-related constraint that would preclude the proposed 520 m separation under the assessed Scenario 31 2055 traffic demands. The final spacing and detailed form of the HSL corridor infrastructure would remain subject to NZTA's future design development, modelling and approval processes.

Table No: 25

NZTA HSL Scenario 31 – Future Greenwood St / Kahikatea Dr Roundabout Recommended Design									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	Average Queue (m)	LOS	Movement	Ave Delay (s)	Average Queue (m)	LOS
2055 Volumes	AM	0.82	10.8	24.1 Kahikatea Dr (E)	B	RT from Kahikatea Dr (E)	17.5	24.1	B
	PM	0.95	14.3	49.2 Kahikatea Dr (E)	B	RT from Kahikatea Dr (E)	38.4	49.2	D

Option B: Preferred Interim Option

Aside from the fourth arm, the key difference between this option and the three-arm roundabout proposed as part of HSL (Figure 46) is that three approach lanes are required on the eastern arm of Kahikatea Drive. While right-turn volumes from Kahikatea Drive remain similar to those forecast under the ultimate HSL layout (Option A), the interim arrangement introduces an additional movement to the access road and increases total demand on the eastern approach. The third lane is therefore required to accommodate the additional movement and maintain acceptable lane utilisation, queueing and overall roundabout performance.

The modelling indicates that Option B can accommodate the completed Industrial Development under the 2035 pre-HSL scenario.

The peak period intersection performance results for the 2035 scenario (excluding HSL) are presented in Table No: 26.

Table No: 26

Option B - Greenwood St / Kahikatea Dr Four-arm Roundabout									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2035 baseline + 40 ha Industrial Dev	AM	0.82	9.2	47.8 Kahikatea Dr (W)	A	RT from Industrial Dev Access Rd (S)	26.9	5.8	C
	PM	0.71	10.1	55.8 Kahikatea Dr (E)	B	RT from Kahikatea Dr (W)	39.4	42.5	D

Option C: Interim Option

Option C has a developable area limitation of 23 ha (net developable area) due to capacity constraints with the three-arm roundabout, evident by the intersection degree of saturation exceeding 0.90.

The three-arm Greenwood Street / Kahikatea Drive roundabout that was modelled in SIDRA is presented in Figure 47.

The peak period modelling result for the three-arm roundabout under the 2035 scenario with 23 ha of Industrial Development are presented in Table No: 27.

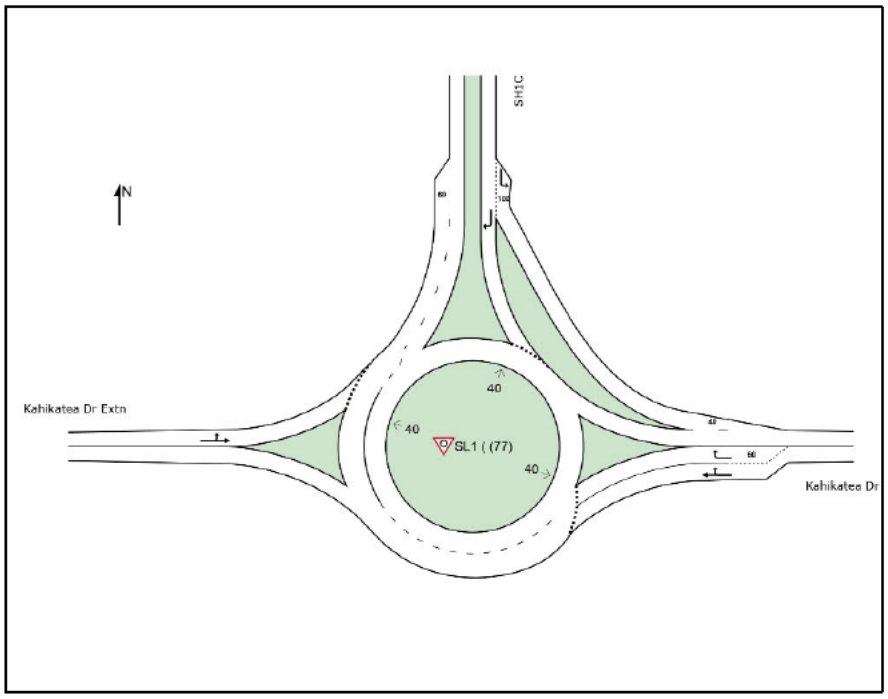


Figure 47: Option C - Greenwood St (SH1C) / Kahikatea Dr Three-arm Roundabout Indicative Layout

Table No: 27

Interim Option C - Greenwood St / Kahikatea Dr Three-arm Roundabout									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2035 baseline + 23 ha Industrial Dev	AM	0.82	8.2	17.4 Kahikatea Dr (E)	A	Thru from Kahikatea Dr (W)	22.3	17.2	C
	PM	0.90	10.3	34.8 Kahikatea Dr (W)	B	LT from Kahikatea Dr (W)	38.2	34.8	D

For the interim access assessments, the development area quantum was varied to identify the scale of development that could be accommodated under each access arrangement.

The background and wider network traffic demands remained unchanged, including the Residential Development assumption adopted in Scenario 2 (543 dwellings). This approach isolates the operational effect of Industrial Development staging while retaining robust surrounding network traffic demands.

The interim assessments demonstrate that Industrial Development can progress independently of HSL delivery, subject to the implementation of the recommended interim access arrangement and associated staging triggers.

Recommended / Preferred Interim Access Strategy

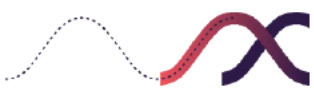
The interim access option assessments indicate that both Option B and Option C can accommodate Industrial Development under pre-HSL conditions.

However, Option B is recommended as the preferred interim access strategy because it enables a greater extent of Industrial Development to proceed prior to HSL delivery while maintaining acceptable intersection performance under the assessed traffic demands.

Given the uncertainty regarding HSL delivery timing, Option B provides the most practical and flexible interim access solution for SL1 Industrial. The timing and staging of Industrial Development are therefore not dependent on HSL delivery, provided the recommended transport infrastructure staging framework set out in Table No: 43 is implemented.

15.1.2 HSL / SL1 Roundabout Connection

The HSL / SL1 roundabout layout depends on the extent of HSL delivered at each stage. Scenario 2 assumes only HSL Stage 1 is delivered, so the intersection operates as a three-arm roundabout, per Figure 48.



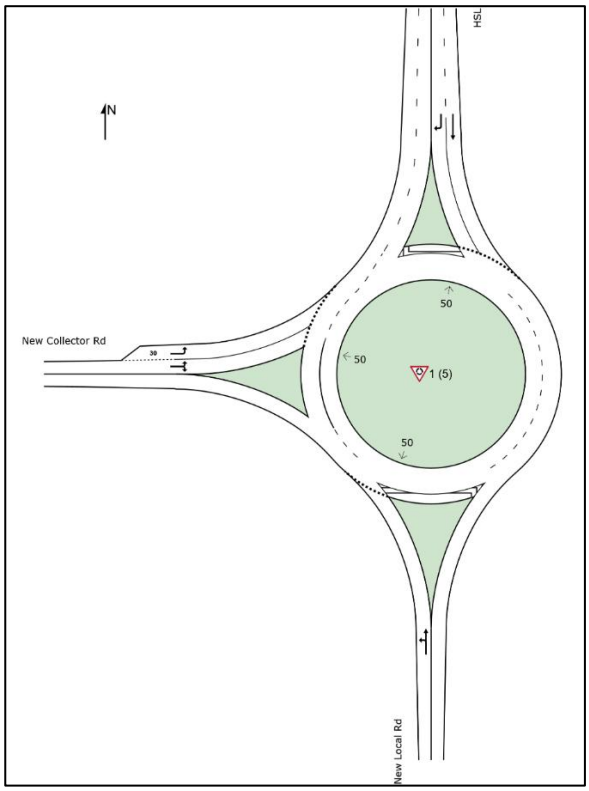


Figure 48: Proposed SL1 Roundabout Connection Scenario 2

When HSL Stage 3 is delivered, the eastern arm at the roundabout will provide access to the eastern side of the Industrial Development while HSL extends south of the SL1 collector road. at which point the intersection operates as a four-arm roundabout (Figure 49).

It is to be noted that the HSL / SL1 roundabout was modelled in SIDRA as part of a network with the proposed layout for future Greenwood Street / Kahikatea Drive three-arm roundabout (Figure 46). The results of the intersection performance for the various modelling scenarios during the peak periods are presented in Table No: 28.

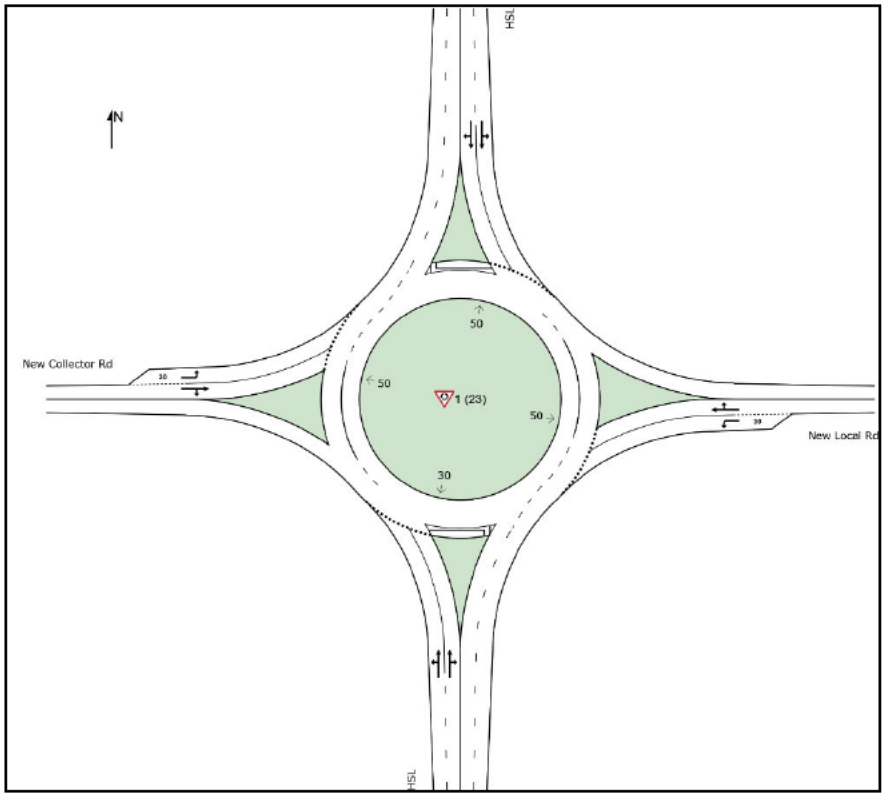


Figure 49: Proposed SL1 Roundabout Connection Scenarios 3 - 5

Table No: 28

Proposed SL1 Roundabout Connection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	Ave Queue (m)	LOS	Movement	Ave Delay (s)	Ave Queue (m)	LOS
2	AM	0.14	5.9	2.3 HSL (N)	A	RT from HSL (N)	13.0	2.2	B
	PM	0.14	2.6	2.2 Access Rd (S)	A	RT from HSL (N)	13.0	0.8	B
3	AM	0.36	7.4	7.2 HSL (S)	A	RT from HSL (S)	16.2	7.0	B
	PM	0.46	6.6	11.1 HSL (N)	A	RT from HSL (S)	16.1	6.3	B
4	AM	0.37	7.2	7.7 HSL (N)	A	RT from HSL (S)	16.2	7.4	B
	PM	0.53	6.8	14.2 HSL (N)	A	RT from HSL (S)	16.2	7.7	B
5	AM	0.69	10.6	24.7 HSL (S)	B	RT from HSL (S)	20.4	24.1	C
	PM	0.59	9.2	13.7 Collector Rd (W)	A	RT from HSL (S)	18.5	12.9	B

Overall, the model results demonstrate that the proposed HSL / SL1 roundabout performs satisfactorily with the three-arm roundabout layout of the Greenwood Street / Kahikatea Drive.

15.1.3 Kahikatea Drive / Higgins Road Intersection

The existing crossroads intersection was modelled in SIDRA as shown in Figure 50. The results of the intersection performance for all various modelling scenarios during the peak periods are presented in Table No: 29.

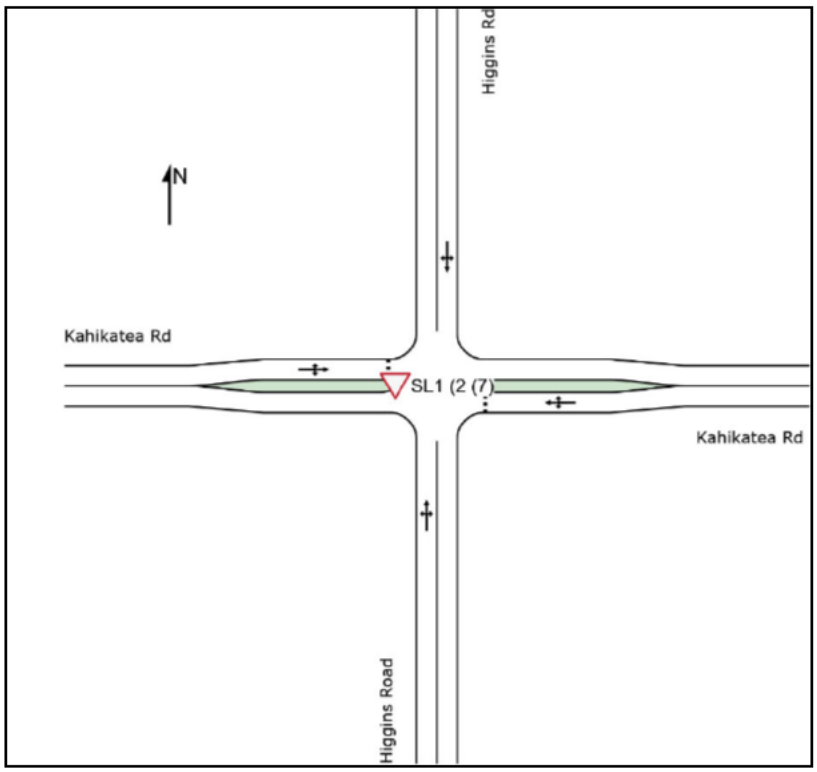


Figure 50: Existing Kahikatea Dr / Higgins Rd Intersection Layout

Table No: 29

Existing Kahikatea Dr / Higgins Rd Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2035 Baseline	AM	0.33	5.1	11.8 Kahikatea Dr (W)	NA	RT from Kahikatea Dr (E)	10.8	10.2	B
	PM	0.68	7.1	57.0 Kahikatea Dr (E)	NA	RT from Kahikatea Dr (E)	13.2	57.0	B
2	AM	0.21	4.7	7.1 Kahikatea Dr (W)	NA	RT from Kahikatea Dr (E)	9.0	1.7	A
	PM	0.23	5.1	8.9 Higgins Rd (N)	NA	RT from Kahikatea Dr (E)	9.3	6.4	A
3	AM	0.20	4.8	7.0 Higgins Rd (N)	NA	RT from Kahikatea Dr (E)	9.8	1.9	A

Existing Kahikatea Dr / Higgins Rd Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
	PM	0.32	5.7	13.9 Higgins Rd (N)	NA	RT from Kahikatea Dr (E)	14.1	10.6	B
4	AM	0.24	4.9	8.6 Kahikatea Dr (W)	NA	RT from Kahikatea Dr (E)	11.0	2.2	B
	PM	0.34	5.9	14.0 Higgins Rd (N)	NA	RT from Kahikatea Dr (E)	14.7	12.4	B
5	AM	0.34	4.7	11.8 Kahikatea Dr (W)	NA	RT from Kahikatea Dr (E)	8.3	1.9	A
	PM	0.52	6.3	17.3 Kahikatea Dr (E)	NA	RT from Kahikatea Dr (W)	25.9	13.8	D

The assessment indicates that the existing Higgins Road / Kahikatea Drive intersection continues to operate with a high level of service under all assessed future year scenarios. Intersection average delays remain low, ranging from 4.7 to 6.3 seconds per vehicle.

While some increases in queue lengths and delays are observed as traffic volumes increase, the results indicate that the intersection retains substantial operational capacity. The highest degree of saturation occurs in Scenario 5 during the PM peak period (V/C = 0.52), which remains well below practical capacity.

The results therefore indicate that the Higgins Road / Kahikatea Drive intersection is expected to continue operating acceptably under the assessed growth scenarios, including the wider network growth represented by Scenarios 4 and 5. No upgrade of the intersection is identified as being required based on the modelling undertaken.

15.2 Residential Development

15.2.1 Ohaupo Road / Collins Road Intersection

The existing intersection layout modelled within SIDRA is shown in Figure 51. The results of the intersection performance for the modelling scenarios during the peak periods are presented in Table No: 30.

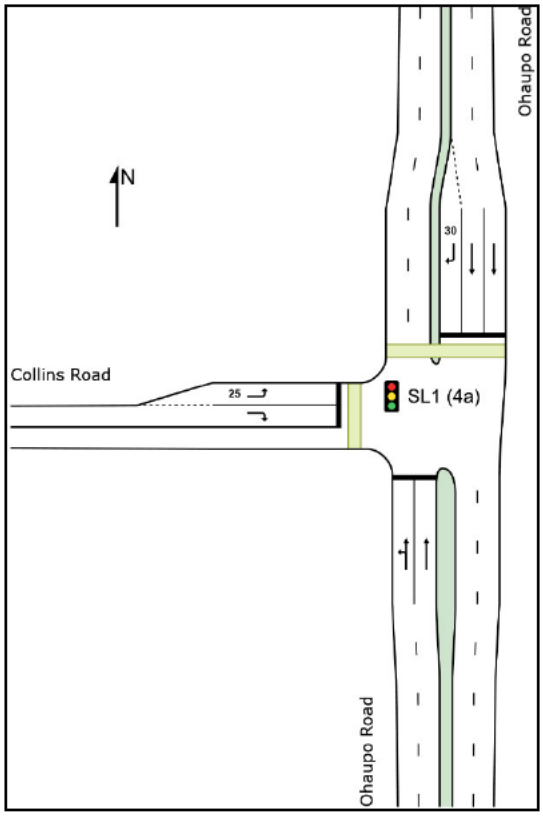


Figure 51: Existing Ohaupo Rd / Collins Rd Signalised Intersection Layout

Table No: 30

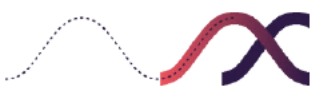
Ohaupo Rd / Collins Rd Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.88	22.0	132 Ohaupo Rd (S)	C	RT from Collins Rd	37.2	49.0	D
	PM	0.91	17.5	83.5 Ohaupo Rd (S)	B	RT from Collins Rd	41.1	36.9	D
1A	AM	0.88	22.5	136 Ohaupo Rd (S)	C	RT from Collins Rd	37.0	50.0	D
	PM	0.92	17.7	85 Ohaupo Rd (S)	B	RT from Collins Rd	43.9	39.1	D
1B	AM	0.88	22.9	140 Ohaupo Rd (S)	C	RT from Collins Rd	37.5	51.2	D
	PM	0.93	17.9	85.9 Ohaupo Rd (S)	B	RT from Collins Rd	45.5	40.2	D
1C	AM	0.88	23.4	146 Ohaupo Rd (S)	C	RT from Collins Rd	38.3	53.0	D
	PM	0.95	18.4	87.3 Ohaupo Rd (S)	B	RT from Collins Rd	53.2	45.7	D
1D	AM	0.89	24.1	153 Ohaupo Rd (S)	C	RT from Ohaupo Rd (N)	39.6	73.8	D
	PM	0.97	18.8	88.3 Ohaupo Rd (S)	B	RT from Collins Rd	58.0	49.0	E

Ohaupo Rd / Collins Rd Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
1E	AM	0.89	24.5	156 Ohaupo Rd (S)	C	RT from Ohaupo Rd (N)	40.7	75.3	D
	PM	0.93	19.1	93.7 Ohaupo Rd (S)	B	RT from Collins Rd	46.2	43.7	D
2035 Baseline	AM	0.76	15.5	187 Ohaupo Rd (S)	B	RT from Collins Rd	39.0	37.3	D
	PM	0.81	15.8	114 Ohaupo Rd (S)	B	RT from Collins Rd	32.1	27.3	C
2	AM	0.79	16.2	125 Ohaupo Rd (S)	B	RT from Collins Rd	40.5	22.7	D
	PM	0.58	19.7	108 Ohaupo Rd (N)	B	RT from Ohaupo Rd (N)	47.2	10.1	D
3	AM	0.76	19.1	113 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	39.4	18.6	D
	PM	0.76	18.0	62.6 Ohaupo Rd (N)	B	RT from Ohaupo Rd (N)	33.5	5.7	C
4	AM	0.83	22.6	128 Ohaupo Rd (S)	C	RT from Collins Rd	42.0	37.2	D
	PM	0.75	22.0	82.8 Ohaupo Rd (N)	C	RT from Ohaupo Rd (N)	39..8	6.6	D
5	AM	0.84	20.8	133 Ohaupo Rd (S)	C	RT from Ohaupo Rd (N)	38.2	17.1	D
	PM	0.60	17.4	102 Ohaupo Rd (N)	B	RT from Ohaupo Rd (N)	37.9	7.5	D

The SIDRA modelling indicates that the Ohaupo Road / Collins Road signalised intersection operates with acceptable performance across all modelled scenarios, typically achieving LOS B to C with intersection average delays generally in the order of 15 to 25 seconds per vehicle in both peak periods.

The results also indicate that right turn movements from Ohaupo Road and Collins Road consistently perform at LOS D, with the Collins Road right-turn movement operating at LOS E in Scenario 1D during the PM peak period. However, the average delay per vehicle on each approach to the intersection is no greater than 55 seconds during peak periods which aligns with the ODP Appendix 15 Table 15-2b guidance on efficiency.

Additionally, the 95th percentile queue length results for Ohaupo Road (south approach) are significant in several scenarios, however, there is no queue spillback to the Ohaupo Road / Saxbys Road / Tomin Road roundabout. On this basis, the modelling demonstrates that the intersection can accommodate the forecast traffic demand associated with the assessed development scenarios without requiring physical upgrades.



15.2.2 Ohaupo Road (SH3) / Saxbys Road / Tomin Road Roundabout

The existing roundabout layout modelled within SIDRA is shown in Figure 52. The results of the intersection performance for the modelling scenarios during the peak periods are presented in Table No: 31.

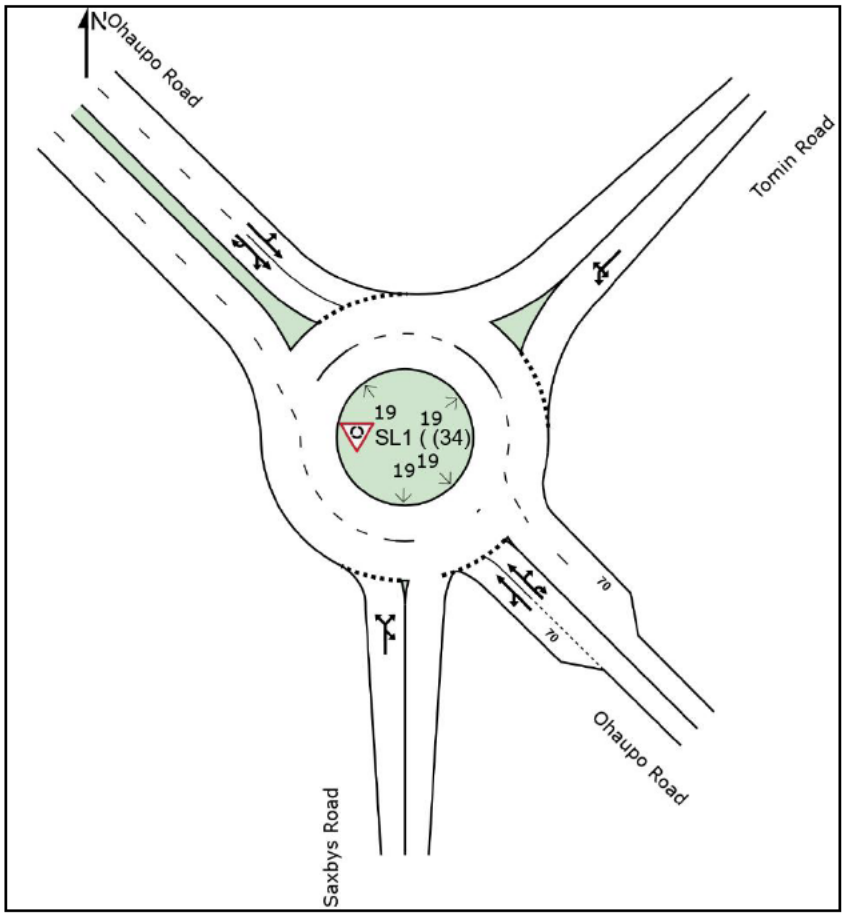


Figure 52: Existing Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout Layout

Table No: 31

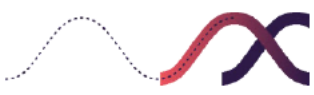
Existing Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.84	10.3	49.5 Tomin Rd	B	RT from Saxbys Rd	30.5	31.4	C
	PM	0.78	8.4	38.5 Tomin Rd	A	RT from Tomin Rd	38.2	38.5	D
1A	AM	0.84	10.7	50.8 Tomin Rd	B	RT from Saxbys Rd	32.9	33.9	C
	PM	0.80	8.7	41.1 Tomin Rd	A	RT from Tomin Rd	41.3	41.1	D
1B	AM	0.85	11.1	51.8 Tomin Rd	B	RT from Saxbys Rd	35.7	36.7	D
	PM	0.82	9.2	44.4 Tomin Rd	A	RT from Tomin Rd	45.3	44.4	D

Existing Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
1C	AM	0.88	11.8	53.4 Tomin Rd	B	RT from Saxbys Rd	40.9	41.8	D
	PM	0.85	9.8	48.8 Tomin Rd	A	RT from Tomin Rd	50.8	48.8	E
1D	AM	0.92	12.7	55.4 Tomin Rd	B	RT from Saxbys Rd	47.9	48.3	D
	PM	0.88	10.5	55.2 Tomin Rd	B	RT from Tomin Rd	58.7	55.2	E

In Scenario 1C (198 dwellings), the average delay for right turning vehicles from Tomin Rd has increased by more than 10 seconds per vehicle (i.e. approximately 13seconds) during the PM peak period resulting in the LoS to deteriorate to E. However, the average delay per vehicle is 55 seconds during peak periods on the approaches to the intersection which aligns with the maximum desirable delay in the ODP Appendix 15 Table 15-2b guidance on intersection movement efficiency.

In Scenario 1D (271 dwellings), the average delay per vehicle on Tomin Road approach exceeds 55 seconds during the PM peak period which exceeds the ODP Appendix 15 Table 15-2b guidance for minimum efficiency. The primary capacity constraint in this case is the two-to-one lane merge on the Ohaupo Road southbound exit for the roundabout.

Therefore, the capacity of the roundabout is proposed to be increased by upgrading the southbound exit to two full length lanes from the roundabout to Ohaupo Road / Lambert Court intersection, as shown in Figure 53.



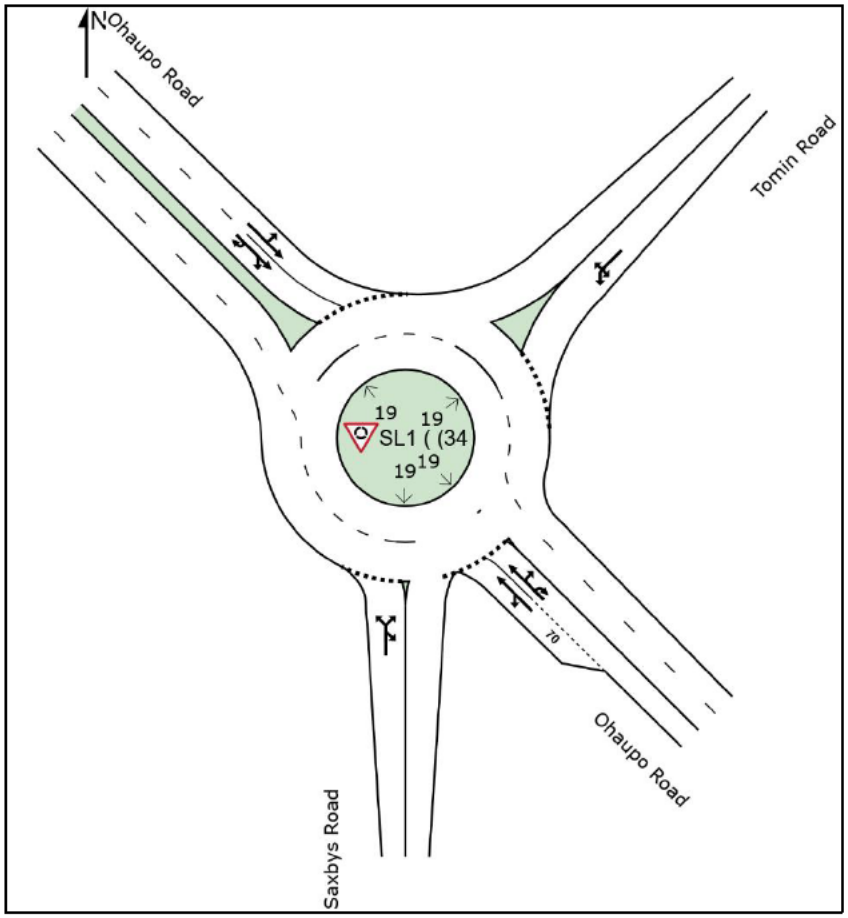


Figure 53: Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout with Proposed Dual Southbound Exit Lanes on Ohaupo Rd

Table No: 32

Proposed Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout – 2 Southbound Exit Lanes									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
1D	AM	0.92	11.5	47.9 Ohaupo Rd (S)	B	RT from Saxbys Rd	47.4	47.9	D
	PM	0.79	7.7	29.0 Saxbys Rd	A	RT from Saxbys Rd	31.2	29.0	C
1E	AM	0.95	12.3	54.6 Saxbys Rd	B	RT from Saxbys Rd	54.5	54.6	E
	PM	0.80	7.9	30.5 Saxbys Rd	A	RT from Saxbys Rd	32.4	30.5	C
2	AM	2.97	273	1,381 Saxbys Rd	F	RT from Saxbys Rd	1,801	1,381	F
	PM	1.32	30.3	271 Saxbys Rd	C	RT from Saxbys Rd	318	271	F

The additional southbound exit lane improves roundabout performance through Scenarios 1D and 1E. However, the modelling indicates that the roundabout returns to an unacceptable level of performance under Scenario 2 (543 dwellings). Under this scenario, average intersection delay increases to approximately

273 seconds per vehicle during the AM peak period, with 95th percentile queues increasing to approximately 1,381 m.

It is important to note the modelling shows the roundabout could experience significant congestion by 2035 even without traffic generated by the Residential Development. The SIDRA modelling indicates that both the Saxbys Road and Tomin Road approaches are forecast to experience high delays under future background traffic conditions. This suggests that some form of upgrade is likely to be required irrespective of the Residential Development, with the Residential Development primarily influencing the timing at which those upgrades become necessary. To address this constraint, an alternative roundabout configuration has been assessed comprising:

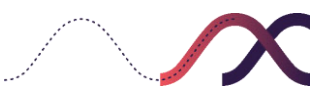
- Four-laning of Ohaupo Road between Saxbys Road and Lambert Court.
- Additional approach lanes on Saxbys Road and Tomin Road.
- Metering of the Ohaupo Road southbound approach during the AM peak period.

The assessed layout is shown in Figure 54, with the modelling results presented in Table No: 33.

The primary constraint at the roundabout is the high northbound traffic demand on Ohaupo Road during the AM peak period, which restricts opportunities for vehicles from Saxbys Road to enter the circulating carriageway. Metering of the southbound Ohaupo Road approach creates gaps within the circulating traffic stream, improving entry opportunities for vehicles from Tomin Road. This in turn increases opportunities for vehicles from Saxbys Road to enter the roundabout as northbound vehicles on Ohaupo Road will have to give way to the right (i.e. Tomin Road approach). The additional approach lanes on Saxbys Road and Tomin Road, together with four-laning of Ohaupo Road between Saxbys Road and Lambert Court, further improve the capacity and operation of the intersection.

The SIDRA modelling indicates that metering is only required during the AM peak period when southbound traffic demand on Ohaupo Road is highest. The PM peak period continues to operate at an acceptable level without requiring metering.

The metering arrangement assessed in SIDRA represents a conceptual operational treatment intended to create acceptable gaps in the circulating traffic stream. The detailed signal phasing, timing parameters, detection strategy and operational settings would be determined through subsequent design and consultation with NZTA.



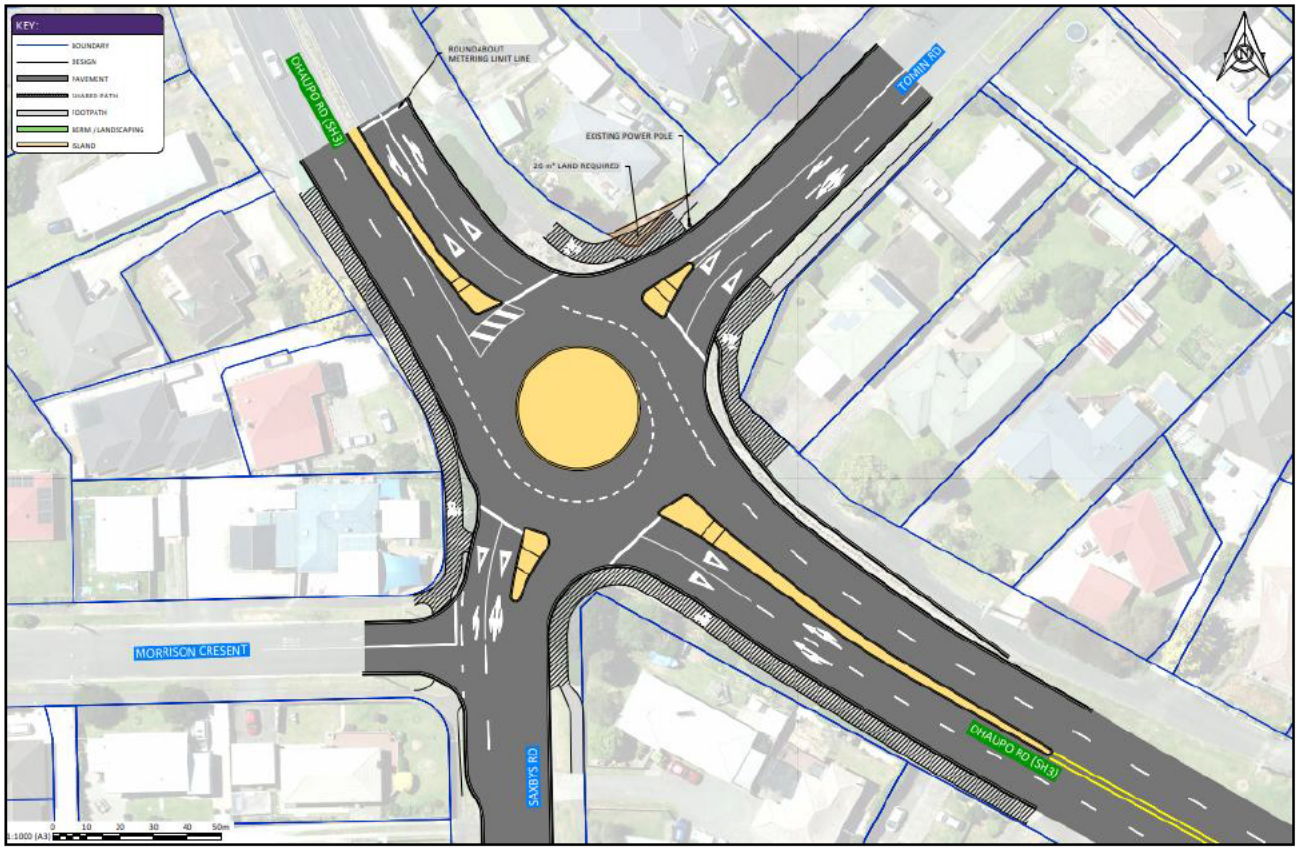


Figure 54: Ohaupo Rd / Saxbys Rd / Tomin Rd Alternative Roundabout Layout with Four Lanes on Ohaupo Rd (South), Additional Lanes on Saxbys Rd and Tomin Rd and Metering on Northern Approach

Table No: 33

Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout Metering ( )									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2	AM	1.04	19.3	126 Ohaupo Rd (N)	B	RT from Saxbys Rd	49.6	50	D
	PM	0.78	9.7	63.7 Ohaupo Rd (S)	A	RT from Tomin Rd	26.1	14.2	C
3	AM	0.86	8.6	46.9 Ohaupo Rd (N)	A	RT from Ohaupo Rd (N)	19.3	46.9	B
	PM	0.52	7.4	12.5 Ohaupo Rd (S)	A	RT from Ohaupo Rd (S)	16.4	12.1	B
4	AM	1.19	45.1	96.3 Saxbys Rd	D	RT from Saxbys Rd	182	96.3	F
	PM	0.57	7.9	15.4 Ohaupo Rd (S)	A	RT from Saxbys Rd	17.6	5.7	B
5	AM	1.39	88.2	175 Saxbys Rd	F	RT from Saxbys Rd	360	175	F
	PM	0.66	9.5	22.3 Ohaupo Rd (S)	A	RT from Ohaupo Rd (S)	24.3	20.9	C

The metered roundabout substantially improves performance under Scenario 2 in addition to the two southbound exit lane option assessed in Table No: 32. The average intersection delay reduces from approximately 273 seconds to 19 seconds per vehicle and the 95th percentile queue reduces from approximately 1,381 m to 126 m. This demonstrates that the identified capacity constraint can be effectively managed through the proposed metering and lane improvements.

The modelling indicates that the upgraded roundabout continues to operate at an acceptable level under Scenario 2. While the Saxbys Road approach experiences unacceptable delays in Scenarios 4 and 5 during the AM peak period, these scenarios either assume that HSL is operational or represent development levels beyond those assessed under a without-HSL network scenario. The PM peak period continues to operate at an acceptable level in all assessed scenarios.

Based on the assessment undertaken, the Residential Development can be demonstrated to operate with acceptable transport effects up to approximately 543 dwellings (Scenario 2) under a network scenario that does not rely on the delivery of HSL, subject to the transport infrastructure upgrades identified in this ITA being delivered. The modelling indicates that the identified roundabout constraint can be managed through the proposed upgrades at this level of development.

While Scenario 3 (730 dwellings) demonstrates that the wider transport network can continue to operate efficiently, this scenario assumes that HSL is in place and therefore does not provide a direct assessment of higher residential yields under a without-HSL network scenario.

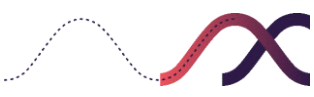
The WRTM scenarios assessed as part of this ITA demonstrate that the operation of Ohaupo Road intersections is influenced by broader land use, transport infrastructure and travel behaviour assumptions. These include the scale and timing of development within the Airport Business Zone, Peacocke Structure Plan area and other growth areas, together with assumptions regarding HSL delivery, public transport uptake and active mode uptake. Further discussion of these matters is provided in Table No: 45 in Section 15.5.2.

Accordingly, the results of this assessment should not be interpreted as indicating that development cannot proceed beyond 543 dwellings prior to HSL being delivered. Rather, the assessment demonstrates that development up to approximately 543 dwellings can be accommodated under a without-HSL scenario based on the assumptions adopted for the current modelling.

To ensure that those assumptions remain representative of the receiving transport environment as development progresses, a further ITA should be prepared before development exceeds approximately 543 dwellings. The purpose of that assessment would be to reassess the operation of the Ohaupo Road corridor, having regard to the transport network conditions, land use development, travel behaviour and transport infrastructure (existing and committed at the time (including HSL)), and to identify any further mitigation measures available to support development beyond 543 dwellings if HSL delivery remains uncertain.

This assessment requirement should be regarded as a transport reassessment trigger rather than a permanent development limit. Its purpose is to provide a mechanism for confirming whether the assumptions underpinning the current assessment remain appropriate as development progresses and whether any additional transport mitigation is required.

The reassessment trigger relates specifically to the performance of the Ohaupo Road (SH3) corridor and should not be interpreted as a constraint on the operation of the recommended Industrial Development access arrangements, or the wider strategic transport network.



15.2.3 Ohaupo Road / Lambert Court Intersection

The modelling of this intersection was based on the existing priority-controlled crossroads intersection as shown in Figure 55. The modelling results are presented in the table below.

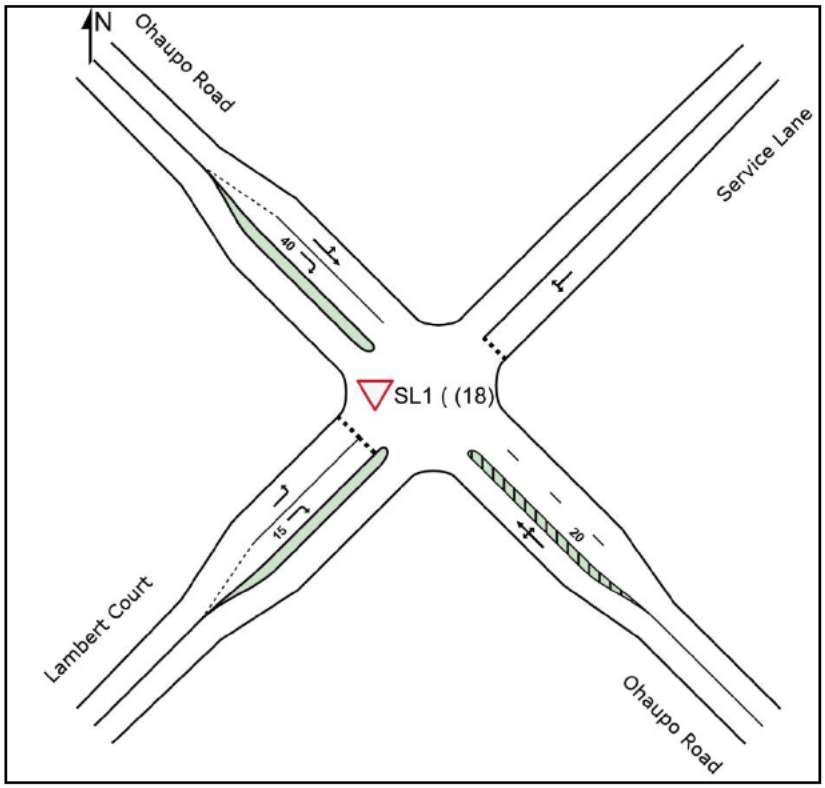


Figure 55: Existing Ohaupo Rd / Lambert Ct Intersection Layout

Table No: 34

Ohaupo Rd / Lambert Court Existing Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.63	6.1	15.8 Lambert Ct	NA	RT from Lambert Ct	109	10.6	F
	PM	0.80	8.3	26.3 Lambert Ct	NA	RT from Service Ln	495	15.6	F
1A	AM	0.90	10.3	33.2 Lambert Ct	NA	RT from Lambert Ct	154	17.6	F
	PM	0.82	8.7	28.0 Lambert Ct	NA	RT from Service Ln	514	16.2	F

Scenario 1A represents the initial stage of Residential Development and comprises approximately 59 dwellings. This scenario was assessed because these dwellings are expected to utilise the Ohaupo Road / Lambert Court intersection from the commencement of development. The assessment was undertaken to determine whether the existing priority-controlled intersection could continue to operate with less than minor effects on intersection performance once Residential Development commences and traffic is introduced via the Lambert Court corridor.

The right turn movements from Lambert Court and the residential service lane fail (LOS F) in the 2030 baseline scenario. The average delay experience by these movements only worsens in Scenario 1A when the development traffic (59 dwellings) is added to the adjoining road network. Accordingly, an upgrade of the intersection to signal control is necessary before trips are generated by the first stage of Residential Development. Figure 56 presents the upgraded intersection layout.

The separation distance between the proposed Ohaupo Road / Lambert Court intersection and the existing signalised mid-block crossing is approximately 105 m. It is not unusual to have closely spaced signal-controlled intersections as these can operate with coordinated signal timings. Below are some examples of reduced separation distances[25] between other signalised intersections in Auckland and Hamilton:

- Teed Street to Remuera Road (Newmarket, Auckland) = 53 m
- Ward Street to Bryce Street (Hamilton Central, Hamilton) = 115 m
- Sky City Hamilton to Collingwood Street (Hamilton Central, Hamilton) = 144 m

The close spacing between the proposed signalised intersection and the existing pedestrian crossing can be managed through coordinated signal operation. The pedestrian crossing is demand responsive and only interrupts traffic flow when activated.

Table No: 35 presents the modelled performance results and Figure 59 presents the optimised phase sequence.

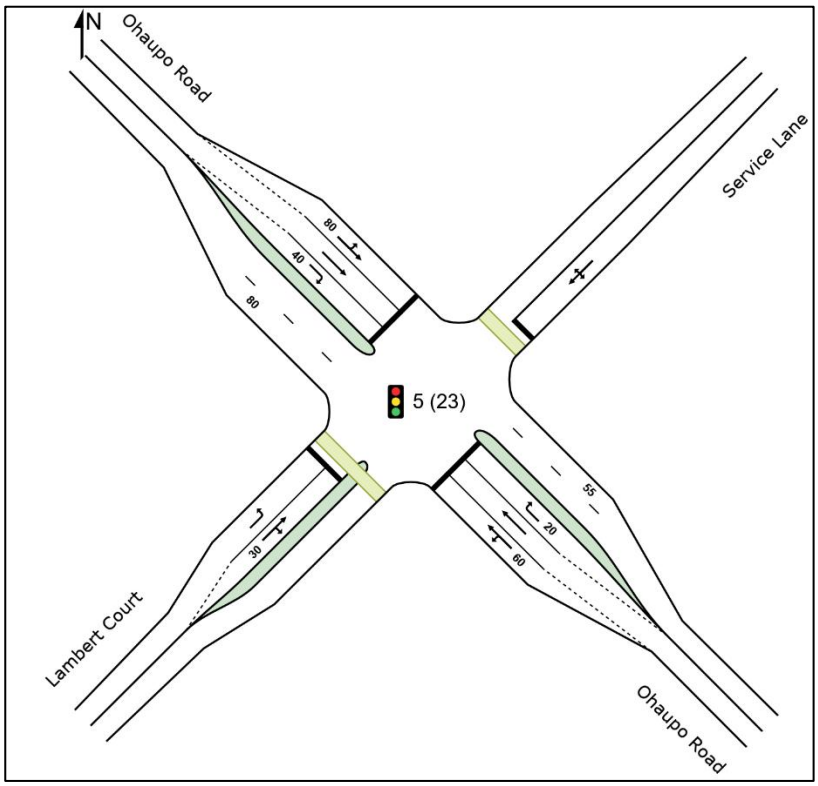


Figure 56: Proposed Ohaupo Rd / Lambert Ct Signalised Intersection Layout – Scenario 1A to 1C

[25] Separation distance is measured between primary signal displays of both the upstream and downstream signalised intersections in the same approach.

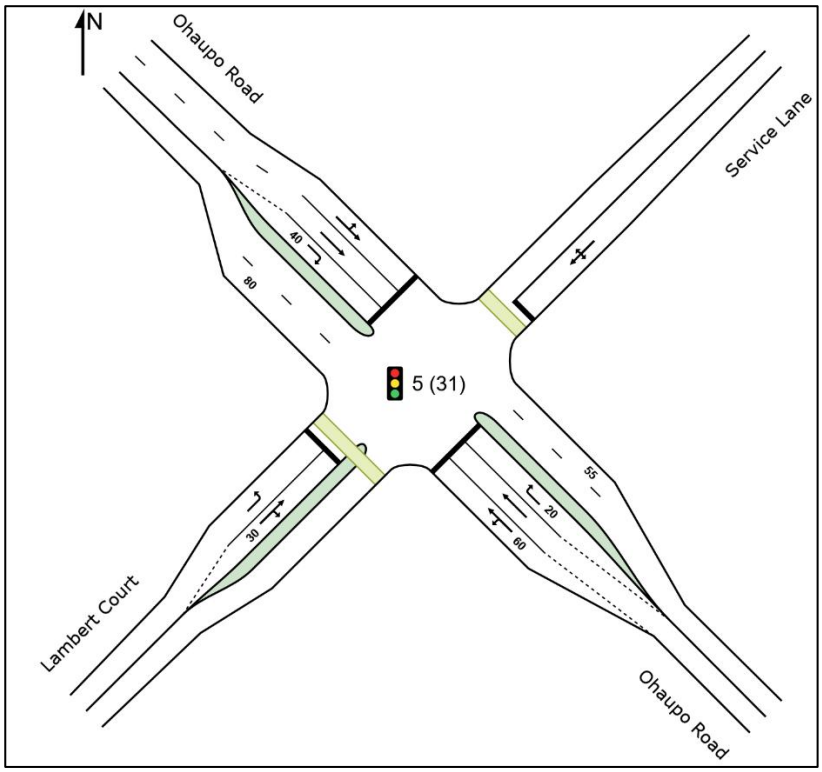


Figure 57: Proposed Ohaupo Rd / Lambert Ct Signalised Intersection Layout – Scenario 1D

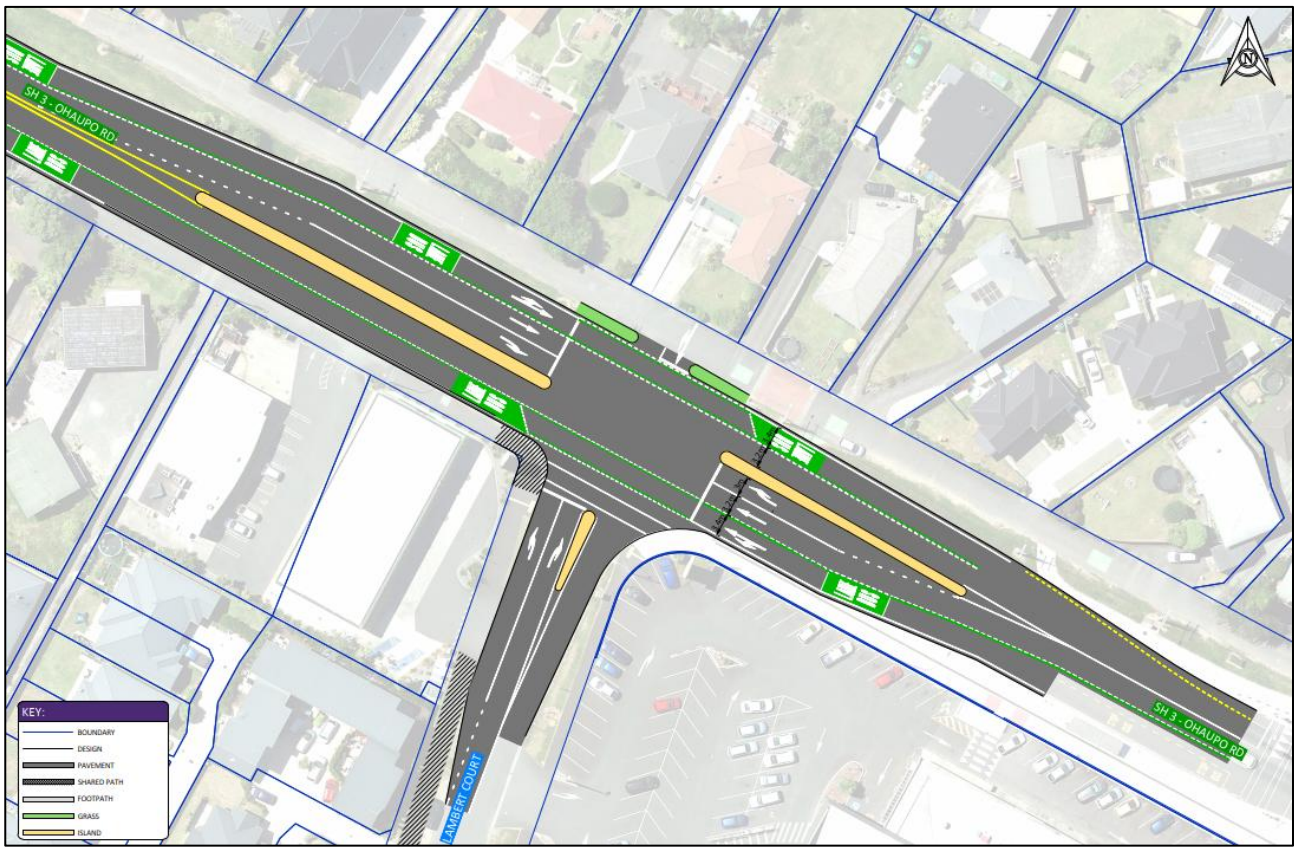


Figure 58: Proposed Ohaupo Rd / Lambert Ct Signalised Intersection Layout – Scenarios 2 to 5



Figure 59: Proposed Ohaupo Rd / Lambert Ct Signalised Intersection Phase Sequence

Table No: 35

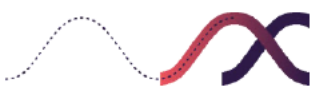
Ohaupo Rd / Lambert Ct Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.53	14.9	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	55.9	21.8	E
	PM	0.75	23.6	169 Ohaupo Rd (N)	C	RT from Lambert Ct	48.0	10.5	D
1A	AM	0.54	15.5	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	54.5	21.5	D
	PM	0.76	23.7	169 Ohaupo Rd (N)	C	RT from Lambert Ct	48.1	10.8	D
1B	AM	0.54	16.0	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	53.9	21.7	D
	PM	0.76	23.8	169 Ohaupo Rd (N)	C	RT from Lambert Ct	48.2	11.5	D
1C	AM	0.55	16.6	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	53.4	21.8	D
	PM	0.76	23.9	169 Ohaupo Rd (N)	C	RT from Lambert Ct	48.3	12.5	D

Ohaupo Rd / Lambert Ct Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
1D	AM	0.56	17.3	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	51.8	22.1	D
	PM	0.72	22.2	169 Ohaupo Rd (N)	C	RT from Lambert Ct	53.6	14.2	D
1E	AM	0.56	17.7	118 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	51.2	22.2	D
	PM	0.75	24.0	170 Ohaupo Rd (N)	C	RT from Lambert Ct	49.0	13.6	D
2	AM	0.60	21.4	59.8 Ohaupo Rd (S)	C	RT from Ohaupo Rd (N)	37.5	12.7	D
	PM	0.92	32.8	170 Ohaupo Rd (N)	C	RT from Lambert Ct	54.2	34.1	D
3	AM	0.44	22.8	42.5 Ohaupo Rd (S)	C	RT from Ohaupo Rd (N)	35.8	12.4	D
	PM	0.77	17.3	59.7 Ohaupo Rd (N)	B	RT from Lambert Ct	33.7	23.1	C
4	AM	0.61	12.5	33.1 Ohaupo Rd (N)	B	RT from Lambert Ct	30.0	16.8	C
	PM	0.89	24.6	104 Ohaupo Rd (N)	C	RT from Lambert Ct	42.6	33.7	D
5	AM	0.62	19.8	38.8 Ohaupo Rd (S)	B	RT from Lambert Ct	28.6	10.1	C
	PM	0.83	28.6	130 Ohaupo Rd (N)	C	RT from Ohaupo Rd (N)	57.7	14.9	E

The modelling results are based on the right turn movement from Resthill Crescent being banned in Scenario 2 (as discussed in Section 15.2.4). The SIDRA modelling indicates that the proposed Ohaupo Road / Lambert Court signalised intersection would operate at an acceptable level across all modelled scenarios, achieving LOS B to C with intersection-average delays generally ranging from approximately 14 to 33 seconds per vehicle in both the AM and PM peak periods. Degrees of saturation remain below capacity in all scenarios, indicating sufficient practical spare capacity at the proposed signalised intersection.

The analysis shows that the worst-performing movements are typically right-turn movements from Ohaupo Road (northern approach) or Lambert Court, which operate predominantly at LOS D and, in isolated PM peak scenario (i.e. Scenario 5), at LOS E (i.e. average delay greater than 55 seconds per vehicle). Notwithstanding this, the average delay per vehicle on each approach remains below 55 seconds during peak periods, consistent with the efficiency criteria set out in ODP Appendix 15, Table 15-2b.

The 95th percentile queue lengths achieved on all approaches do not extend to or spill back to adjacent intersections. However, the 95th percentile queue length achieved on the southern approach of Ohaupo Road reaches approximately 120 m in Scenarios 1A to 1E, extending beyond the existing mid-block signalised crossing which is 105 m from the Ohaupo Road / Lambert Court intersection. While the modelled 95th percentile queue extends beyond the pedestrian crossing in some scenarios, the average queue length is



approximately 75 m, indicating that such occurrences are infrequent and not representative of typical operating conditions. On this basis, the modelling demonstrates that the proposed Ohaupo Road / Lambert Court signalised intersection can accommodate the forecast traffic demand.

It is noted that a signalised intersection form supports Ohaupo Road being a bus priority corridor in the future. Detailed signal phasing, pedestrian crossing arrangements, geometric design and visibility requirements will be confirmed during subsequent engineering design phases.

Consideration has been given to removing access to the Ohaupo Road service lane (northern leg of the Ohaupo Road / Lambert Court intersection), since an alternative is already provided further north on Ohaupo Road. However, it is expected that the likelihood of crashes at the alternative northern access could potentially increase as vehicles exiting and heading north will have to cut across two lanes (i.e. one southbound land + flush medium existing arrangement and two southbound lanes future arrangement) to merge with through traffic. Similarly, vehicles turning right into the access will have to cut across two lanes.

To mitigate the safety risk, a central median island could be introduced on Ohaupo Rd at the alternative northern access limiting movements at the access to left-in-left-out. However, this could in return increase unsafe U-turn movements at both signalised intersections (i.e. Saxbys Rd and Lambert Ct) on either end of this section of road.

On balance, retaining the service lane as the fourth leg of the signalised intersection is considered preferable to closing the access, having regard to the operational and safety implications associated with diverting movements to the alternative northern access.

15.2.4 Ohaupo Road / Resthill Crescent Intersection

The existing intersection layout modelled within SIDRA is shown in Figure 60. The results of the intersection performance during the peak periods are presented in Table No: 36.

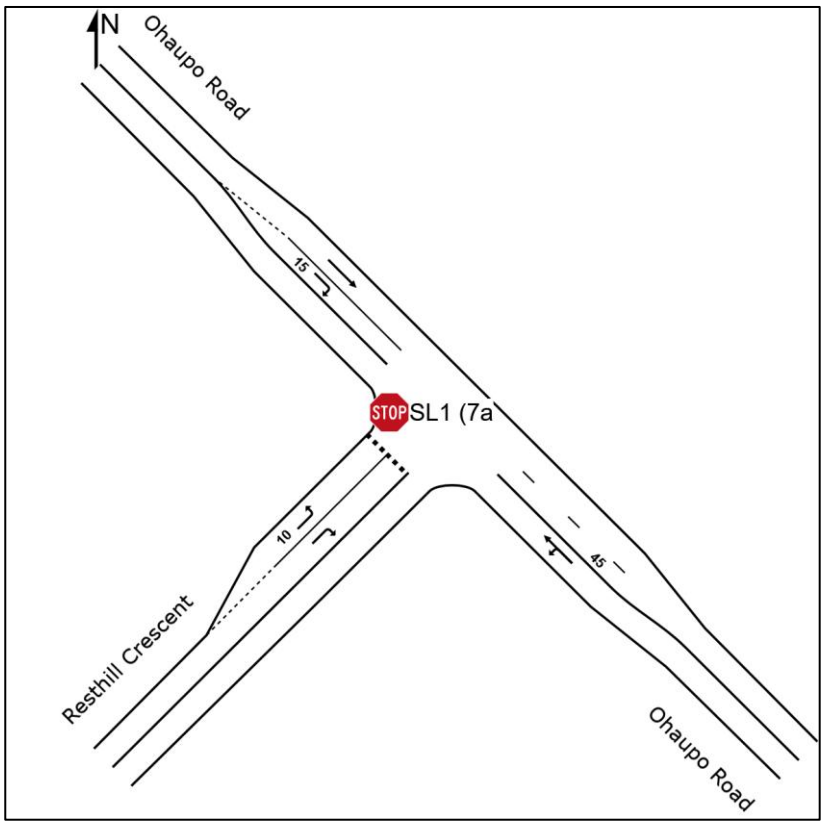


Figure 60: Existing Ohaupo Rd / Resthill Cres Intersection Layout

Table No: 36

Existing Ohaupo Rd / Resthill Cres Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.54	3.2	9.3 Resthill Cres	NA	LT from Resthill Cres	140	9.3	F
	PM	0.66	4.0	18.2 Resthill Cres	NA	LT from Resthill Cres	89.5	18.2	F
1A	AM	0.54	3.3	9.3 Resthill Cres	NA	LT from Resthill Cres	140	9.3	F
	PM	0.66	4.1	18.3 Resthill Cres	NA	LT from Resthill Cres	90.2	18.3	F
1E	AM	0.55	3.8	9.3 Resthill Cres	NA	LT from Resthill Cres	140	9.3	F
	PM	0.69	4.7	19.2 Resthill Cres	NA	LT from Resthill Cres	96.8	19.2	F

Although the left turn movement from Resthill Crescent fails in the 2030 baseline scenario, there is negligible increase in the average delay (i.e. less than 10 seconds per vehicle) for all movements for Scenarios 1A to 1E. Therefore, the Ohaupo Road / Resthill Crescent intersection is proposed to be upgraded (i.e. right turn movement out removed) prior to Scenario 2 as shown in Figure 61.

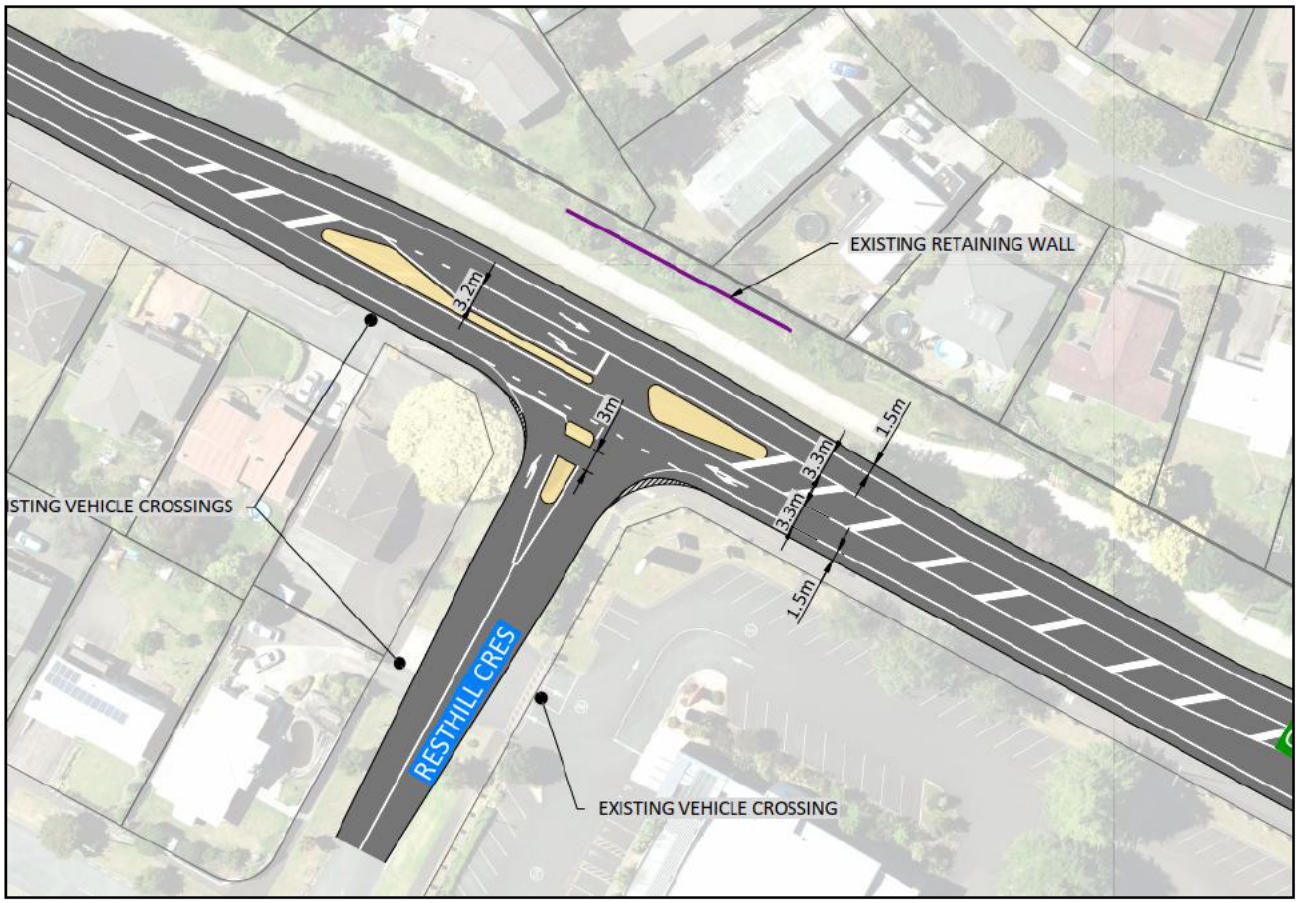


Figure 61: Proposed Ohaupo Rd / Resthill Cres Intersection Upgrade

Table No: 37

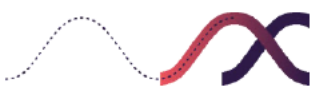
Ohaupo Rd / Resthill Cres Intersection – RT from Resthill Cres Removed									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2	AM	0.54	1.4	1.9 Ohaupo Rd (N)	NA	LT from Resthill Cres	168	1.3	F
	PM	0.58	1.6	3.2 Ohaupo Rd (N)	NA	RT from Ohaupo Rd (N)	57.2	3.2	F
3	AM	0.35	0.7	0.5 Ohaupo Rd (N)	NA	LT from Resthill Cres	29.7	0.2	D
	PM	0.37	1.0	1.1 Ohaupo Rd (N)	NA	LT from Resthill Cres	21.8	0.3	C
4	AM	0.44	0.7	0.4 Ohaupo Rd (N)	NA	LT from Resthill Cres	49.8	0.4	E
	PM	0.47	1.0	0.8 Ohaupo Rd (N)	NA	RT from Ohaupo Rd (N)	32.5	0.8	D
5	AM	0.41	0.6	0.3 Ohaupo Rd (N)	NA	LT from Resthill Cres	43.8	0.3	E
	PM	0.56	0.7	0.7 Ohaupo Rd (N)	NA	LT from Resthill Cres	23.6	0.4	C

The SIDRA modelling indicates that the Ohaupo Road / Resthill Crescent intersection, with the right-turn movement from Resthill Crescent removed, operates with low intersection-average delays, generally less than 2 seconds per vehicle in both the AM and PM peak periods. Degree of saturation remain well below capacity in all scenarios, confirming substantial practical spare capacity on the Ohaupo Road approaches.

The analysis shows that the worst-performing movements are left-turn movement from Resthill Crescent or right-turn movement from Ohaupo Road. While these movements achieve LOS D to F in some scenarios, the associated traffic volumes are low, with the left-turn movement from Resthill Crescent carrying approximately 3 to 7 vehicles per hour and the right-turn movement from the northern Ohaupo Road approach carrying approximately 10 to 35 vehicles per hour. Accordingly, the movement-specific delays reflect limited gap availability for a small number of vehicles rather than a broader operational constraint affecting intersection performance.

The 95th percentile queue lengths achieved on all approaches are considered negligible, generally less than 3 m following removal of the right-turn movement from Resthill Crescent. The modelling therefore indicates that the intersection can accommodate the forecast traffic demand without adverse operational effects on the surrounding transport network.

It is also noted that the right-turn movement from Resthill Crescent, which is removed as part of the proposed upgrade, carries approximately 20 vehicles per hour during the AM peak period and approximately 120 vehicles per hour during the PM peak period. These movements are reassigned through the proposed Ohaupo Road / Lambert Court signalised intersection, which has been demonstrated through the modelling presented in Section 15.2.3 to operate at an acceptable level under the assessed development scenarios.



15.2.5 Ohaupo Road (SH3) / Houchens Road Intersection

The existing intersection layout modelled within SIDRA is shown in Figure 62. The results of the intersection performance during the peak periods are presented in Table No: 38.

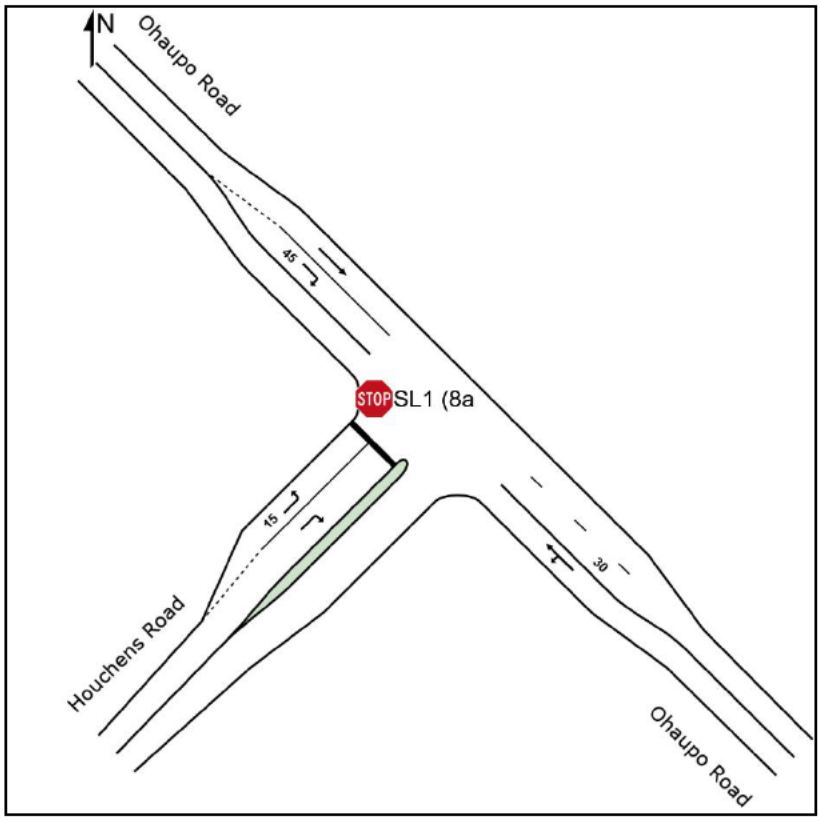


Figure 62: Existing Ohaupo Rd / Houchens Rd Intersection Layout

Table No: 38

Existing Ohaupo Rd / Houchens Rd Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
2030 Baseline	AM	0.70	7.2	25.8 Houchens Rd	NA	RT from Houchens Rd	61.2	16.6	F
	PM	0.63	5.9	23.6 Ohaupo Rd (N)	NA	RT from Houchens Rd	107	11.5	F
1A	AM	0.71	7.3	26.0 Houchens Rd	NA	RT from Houchens Rd	64.4	17.2	F
	PM	0.65	6.1	24.2 Ohaupo Rd (N)	NA	RT from Houchens Rd	110	11.8	F
1B	AM	0.71	7.4	26.3 Houchens Rd	NA	RT from Houchens Rd	67.9	17.9	F

Existing Ohaupo Rd / Houchens Rd Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
	PM	0.66	6.2	24.8 Ohaupo Rd (N)	NA	RT from Houchens Rd	115	12.2	F
1C	AM	0.74	7.7	26.8 Houchens Rd	NA	RT from Houchens Rd	73.0	18.8	F
	PM	0.67	6.5	25.6 Ohaupo Rd (N)	NA	RT from Houchens Rd	121	12.6	F

Although the right turn movement from Houchens Road operates at LOS F in the 2030 baseline scenario, there is negligible increase in the average delay (i.e. less than 10 seconds per vehicle) for Scenarios 1A and 1B. However, in Scenario 1C, the average delay for right turning vehicles from Houchens Rd increases by more than 10 seconds per vehicle during the peak periods. Therefore, the intersection is recommended to be upgraded to a signalised intersection prior to Scenario 1C (i.e. 198 dwellings).

The signalised intersection layout modelled within SIDRA is shown in Figure 63. The results of the intersection performance for Scenarios 2 to 5 during the peak periods are presented in Table No: 39.



Figure 63: Proposed Ohaupo Rd / Houchens Rd Signalised Intersection Layout

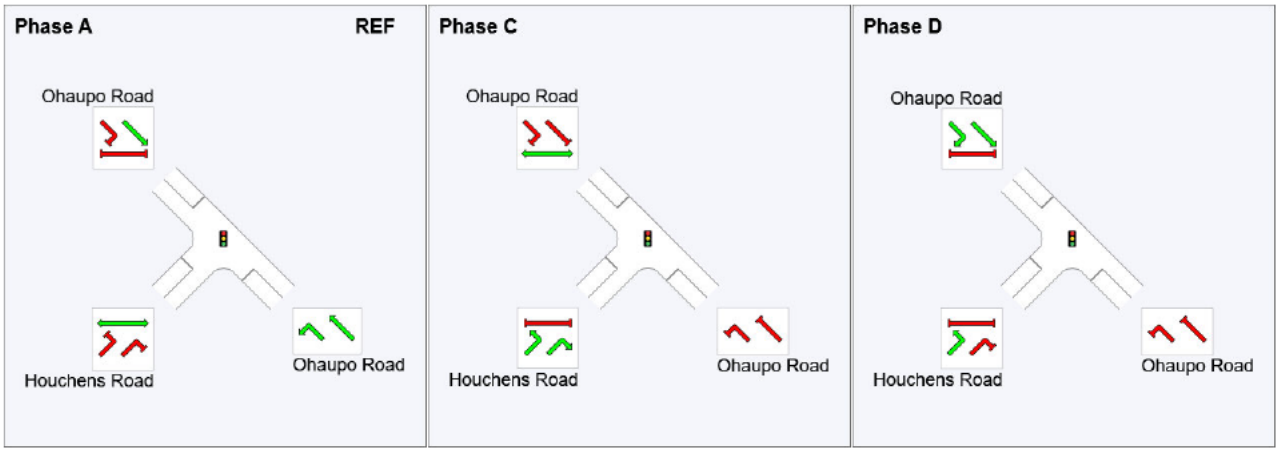


Figure 64: Proposed Ohaupo Rd / Houchens Rd Phase Sequence.

Table No: 39

Proposed Ohaupo Rd / Houchens Rd Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
1C	AM	0.42	11.7	69.1 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	42.7	8.1	D
	PM	0.58	12.8	83.0 Ohaupo Rd (N)	B	RT from Ohaupo Rd (N)	30.0	29.8	C
1D	AM	0.42	11.6	69.5 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	42.7	8.1	D
	PM	0.58	12.8	83.2 Ohaupo Rd (N)	B	RT from Ohaupo Rd (N)	30.0	29.8	C
1E	AM	0.65	12.8	119 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	41.5	7.8	D
	PM	0.67	13.1	95.2 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	35.7	34.3	D
2	AM	0.50	11.1	45.3 Ohaupo Rd (S)	B	RT from Houchens Rd	31.9	8.5	C
	PM	0.58	10.3	54.5 Ohaupo Rd (S)	B	RT from Houchens Rd	34.3	5.6	C
3	AM	0.42	16.1	33.6 Ohaupo Rd (S)	B	RT from Houchens Rd	35.5	14.3	D
	PM	0.60	17.0	31.3 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	31.7	26.7	C

Proposed Ohaupo Rd / Houchens Rd Signalised Intersection									
Scenario	Peak	Intersection Average				Worst Movements (based on delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
4	AM	0.61	15.3	36.4 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	32.5	21.8	C
	PM	0.67	16.7	45.0 Ohaupo Rd (S)	B	RT from Ohaupo Rd (N)	35.1	29.4	D
5	AM	0.61	14.3	36.0 Ohaupo Rd (S)	B	RT from Houchens Rd	25.3	17.2	C
	PM	0.61	17.8	55.4 Ohaupo Rd (S)	B	RT from Houchens Rd	45.5	30.5	D

The SIDRA modelling indicates that the proposed Ohaupo Road / Houchens Road signalised intersection operates at an acceptable level across all modelled scenarios, achieving LOS B with average delays generally in the order of approximately 12 to 18 seconds per vehicle in both the AM and PM peak periods. Degree of saturation remain below capacity in all scenarios, indicating that the intersection provides sufficient practical spare capacity to accommodate the forecast traffic demand.

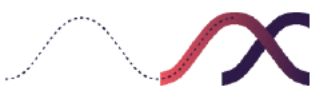
The worst-performing movements are identified as right turn movements from Ohaupo Road and Houchens Road, which operate predominantly at LOS C to D across the assessed scenarios. However, the associated average delays for these movements remain moderate, and the average delay per vehicle on each approach to the intersection remains well below 55 seconds during peak periods, consistent with the efficiency criteria set out in ODP Appendix 15, Table 15-2b.

The 95th percentile queue lengths on the Ohaupo Road approaches are relatively modest, and do not give rise to any queue spillback or interaction with adjacent intersections.

15.2.6 Future Houchens Road Full-Diamond Interchange

The suggested Houchens Road full-diamond interchange is not part of this Project. It has been assessed because it is a potential future network intervention that could materially influence traffic distribution and long-term network performance for the Residential Development area and the wider SL1 growth cell. Its inclusion is therefore for scenario-testing purposes only and does not form part of the works proposed on for this Project.

The suggested Houchens Road full-diamond interchange was analysed as a network in SIDRA with a pair of roundabouts as illustrated in Figure 56. The interchange performance results for all modelling scenarios 3 to 5 during peak periods are presented in Table No: 40 and Table No: 41.



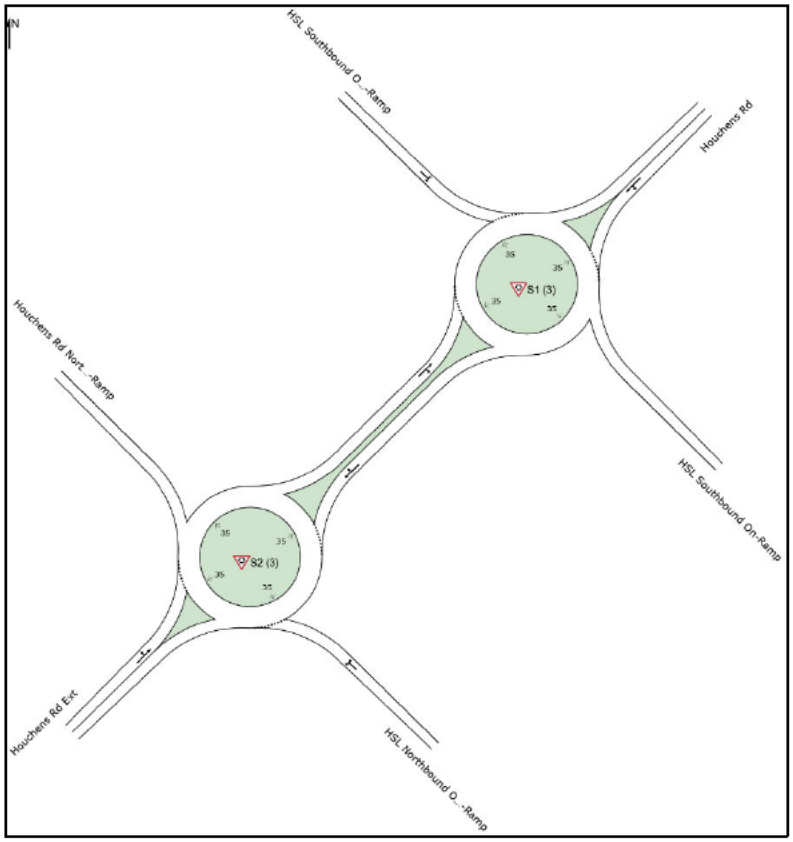


Figure 65: Future Houchens Rd Full-Diamond Interchange Layout

Table No: 40

Houchens Rd Interchange – Northern Roundabout									
Infrastructure Scenarios	Peak	Intersection Average				Worst Movements (in terms of delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
3	AM	0.18	3.0	2.9 Houchens Rd	A	RT from HSL SB Off-ramp	12.9	1.1	B
	PM	0.22	3.8	3.6 HSL SB Off-ramp	A	RT from HSL SB Off-ramp	13.2	3.6	B
4	AM	0.15	3.5	2.1 Houchens Rd	A	RT from HSL SB Off-ramp	12.6	1.1	B
	PM	0.26	4.3	4.4 HSL SB Off-ramp	A	RT from HSL SB Off-ramp	12.9	4.4	B
5	AM	0.69	3.5	25.6 Houchens Rd	A	RT from HSL SB Off-ramp	14.1	7.1	B
	PM	0.67	5.7	22.9 HSL SB Off-ramp	A	RT from HSL SB Off-ramp	21.1	22.9	C

Table No: 41

Houchens Rd Interchange – Southern Roundabout									
Infrastructure Scenarios	Peak	Intersection Average				Worst Movements (in terms of delay)			
		V/C	Ave Delay (s)	95th % Queue (m)	LOS	Movement	Ave Delay (s)	95th % Queue (m)	LOS
3	AM	0.14	7.4	2.0 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	12.6	2.0	B
	PM	0.16	8.2	2.5 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	12.5	2.5	B
4	AM	0.09	6.7	1.3 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	12.5	1.3	B
	PM	0.12	7.5	1.8 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	12.5	1.8	B
5	AM	0.37	8.2	6.1 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	16.4	6.1	B
	PM	0.49	10.5	10.6 HSL NB Off-ramp	A	RT from HSL NB Off-ramp	13.9	10.6	B

The SIDRA modelling indicates that both roundabouts forming the suggested Houchens Road full-diamond interchange operate at a high level of service across all assessed scenarios. The northern roundabout achieves intersection average delays of approximately 3 to 6 seconds per vehicle, while the southern roundabout achieves intersection average delays of approximately 7 to 11 seconds per vehicle during the peak periods.

Degrees of saturation remain well below practical capacity at both roundabouts in all scenarios, indicating substantial spare capacity is available. The worst-performing movements generally operate at LOS B, with isolated LOS C conditions occurring at the northern roundabout in Scenario 5 during the PM peak period. Notwithstanding this, movement delays remain low and do not indicate any operational constraints.

The 95th percentile queue lengths are also modest, remaining below approximately 26 m at the northern roundabout and 11 m at the southern roundabout across all assessed scenarios. The modelling therefore indicates that the future Houchens Road full-diamond interchange would operate efficiently and accommodate the forecast traffic demand associated with the assessed development scenarios.

15.3 Bus Route Modelling

Bus route modelling has been undertaken to assess the operational performance of future public transport services operating along Ohaupo Road corridor under the 2035 and 2045 modelled network conditions (i.e. Scenarios 2 to 4).

This assessment is important because the future Comet service is expected to operate as a frequent public transport corridor serving Glenview, the Residential Development and the wider southern Hamilton growth area. The assessment provides an indication of the relative performance of buses, light vehicles and heavy commercial vehicles under the future transport network scenarios considered within this ITA.

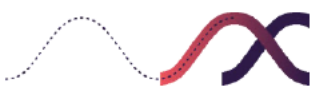


Figure 66 illustrates the future 2035 and 2045 Comet bus routes, aligned with the WRC 2028 and 2037 Network Plans (refer to Figure 23and Figure 24). Table No: 42 compares route performance for buses, light vehicles and heavy commercial vehicles using four indicators: average travel speed, average control delay, degree of saturation and effective stop rate. These indicators collectively describe travel efficiency, delay exposure, capacity resilience and stop-start operating conditions along the corridor.

The modelling indicates that bus services generally achieve travel performance comparable to, and in many cases better than, light vehicles and heavy commercial vehicles across the assessed scenarios. Bus movements typically experience lower average control delays and lower effective stop rates than other vehicle classes, indicating reduced exposure to stop-start conditions and supporting improved service reliability.

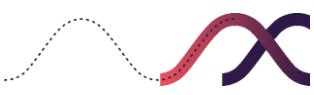
In Scenario 2 (2035 without HSL), the corridor experiences its most constrained operating conditions, particularly in the Houchens Road to Saxbys Road direction during the AM peak and the Saxbys Road to Houchens Road direction during the PM peak. Despite these conditions, buses continue to achieve comparable or higher travel speeds than general traffic and generally experience lower delays.

The introduction of HSL in Scenarios 3 and 4 generally reduces corridor degrees of saturation and provides additional network capacity, reflecting the redistribution of traffic across the wider transport network. While changes in travel speed and delay vary by direction and time period, buses continue to perform competitively relative to light vehicles and heavy commercial vehicles under all assessed scenarios.

The effective stop-rate results also indicate that buses generally experience fewer stop-start events than other vehicle classes across most scenarios. This supports smoother progression through the corridor and contributes to travel time reliability for future public transport services.

It is noted that the assessed network includes transport interventions that support public transport operation at key locations along the corridor. However, the purpose of this assessment is not to confirm the detailed design of future bus-priority measures. Rather, it is to assess the relative performance of future bus services within the wider transport network scenarios considered by the ITA.

Overall, the route travel performance results indicate that future public transport services can operate efficiently within the assessed transport network. While HSL provides additional network capacity and generally reduces corridor saturation, the modelling demonstrates that bus services remain a competitive transport option across all assessed scenarios, achieving travel speeds and operating conditions that are comparable to, and often better than, general traffic.



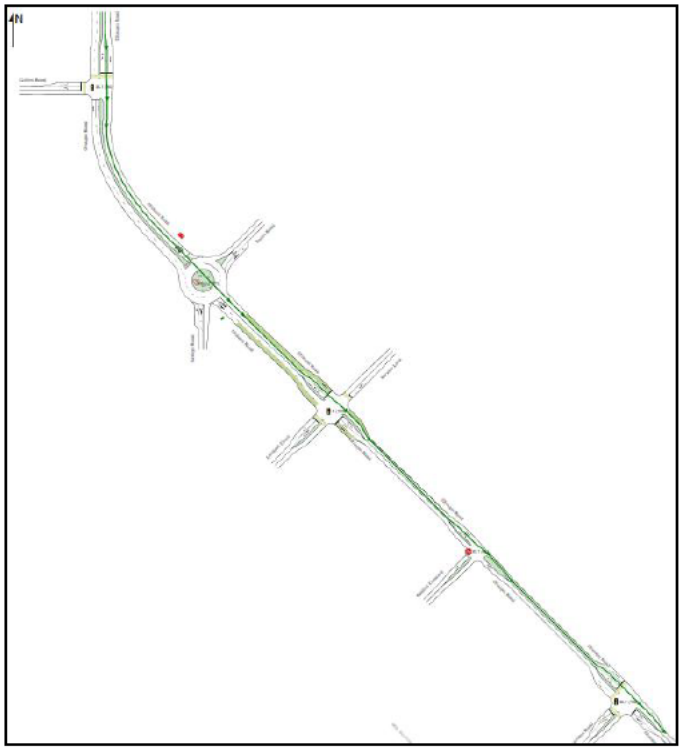


Figure 66: 2035 / 2045 Comet Bus Route – Based on WRC Network Plans

Table No: 42

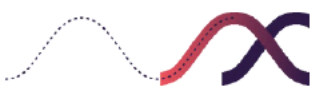
Route Travel Performance												
Performance Indicators	Average Travel Speed (km/h)			Average Control Delay (seconds)			Degree of Saturation			Effective stop rate		
Vehicle Class	Buses	LV	HCV	Buses	LV	HCV	Buses	LV	HCV	Buses	LV	HCV
Scenario 2: 2035 AM Peak Saxbys Rd to Houchens Rd	36	35	35	7.9	8.5	10.4	0.81	0.81	0.81	0.38	0.47	0.46
Scenario 2: 2035 AM Peak Houchens Rd to Saxbys Rd	33	29	29	8.5	14.5	14.8	0.87	0.87	0.87	0.50	0.72	0.74
Scenario 2: 2035 PM Peak Saxbys Rd to Houchens Rd	38	27	27	6.4	17.1	18.8	0.57	0.97	0.97	0.29	0.51	0.52
Scenario 2: 2035 PM Peak Houchens Rd to Saxbys Rd	30	27	27	12.1	16.7	17.9	0.94	0.94	0.94	0.52	0.66	0.64
Scenario 3: 2035 AM Peak Saxbys Rd to Houchens Rd – With HSL	31	36	36	13.4	8.0	9.7	0.66	0.66	0.66	0.61	0.46	0.46
Scenario 3: 2035 AM Peak Houchens Rd to	33	32	32	11.8	13.9	13.9	0.79	0.82	0.82	0.74	0.70	0.71

Route Travel Performance												
Performance Indicators	Average Travel Speed (km/h)			Average Control Delay (seconds)			Degree of Saturation			Effective stop rate		
Vehicle Class	Buses	LV	HCV	Buses	LV	HCV	Buses	LV	HCV	Buses	LV	HCV
Saxbys Rd – With HSL												
Scenario 3: 2035 PM Peak Saxbys Rd to Houchens Rd – With HSL	35	32	32	6.6	12.6	12.9	0.49	0.86	0.86	0.32	0.55	0.55
Scenario 3: 2035 PM Peak Houchens Rd to Saxbys Rd – With HSL	34	28	28	9.2	17.7	18.7	0.67	0.79	0.79	0.47	0.69	0.69
Scenario 4: 2045 AM Peak Saxbys Rd to Houchens Rd – With HSL	36	35	35	7.9	8.4	10.0	0.64	0.72	0.72	0.35	0.46	0.46
Scenario 4: 2045 AM Peak Houchens Rd to Saxbys Rd – With HSL	35	30	30	8.1	16.7	16.8	0.84	0.92	0.92	0.48	0.77	0.78
Scenario 4: 2045 PM Peak Saxbys Rd to Houchens Rd – With HSL	35	29	29	7.3	16.1	17.0	0.54	0.95	0.95	0.31	0.54	0.54
Scenario 4: 2045 PM Peak Houchens Rd to Saxbys Rd – With HSL	31	27	27	12.9	20.0	21.1	0.76	0.76	0.76	0.50	0.69	0.69

15.4 Summary of Traffic Modelling

The intersection modelling indicates that development accessing Ohaupo Road (SH3) will progressively increase demand on the surrounding transport network, particularly during the peak periods. Except for the Ohaupo Road / Saxbys Road / Tomin Road roundabout, the assessed intersections are expected to continue operating at acceptable levels of service in the future year scenarios, provided the recommended intersection upgrades are implemented. These upgrades are required to maintain acceptable operational performance, support efficient movement along the corridor, and accommodate future growth within the wider SL1 area.

The modelling identifies the Ohaupo Road / Saxbys Road / Tomin Road roundabout as the principal transport constraint within the assessed network. The assessment demonstrates that Residential Development can be accommodated with acceptable transport effects up to 543 dwellings under a network scenario that does not rely on delivery of HSL, subject to the transport infrastructure upgrades identified in this ITA being



implemented. As discussed in Sections 15.2.2 and 15.5.2, development beyond this level should be subject to a future transport reassessment.

The assessment also demonstrates the importance of a coordinated transport strategy incorporating targeted intersection upgrades, improvements for public transport, and connected walking and cycling infrastructure. While the future form and extent of public transport priority measures will be subject to further investigation and design, the route performance assessment indicates that public transport services can operate efficiently within the assessed transport network and achieve reliable route performance under the assessed scenarios.

HSL remains an important component of the long-term strategic transport context for southern Hamilton. The modelling demonstrates that HSL improves corridor performance by redistributing a proportion of through-traffic away from Ohaupo Road and improving the efficiency of the wider transport network. However, the transport strategy adopted for this Project does not rely on HSL being delivered within a specific timeframe. Instead, the assessment identifies interim and staged mitigation measures capable of managing transport effects as development progresses.

The assessment also reinforces the importance of delivering a connected walking and cycling network. As outlined elsewhere in this ITA, the proposed active mode improvements are intended to provide safe and efficient connections between the proposed developments and the wider transport network, supporting both local trips and longer-distance journeys.

15.5 Staging of Transportation Infrastructure Improvements

Table No: 43 and Table No: 44 provide a summary of the recommended infrastructure improvements and development triggers / staging from the preceding section.

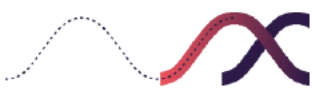
Development staging has been informed by both road network capacity and the timing of public transport and active mode infrastructure. Delivery of walking, cycling, and public transport-enabling infrastructure is a core component of the staging framework and is fundamental to supporting development without disproportionate reliance on further road capacity expansion.

Given the uncertainty surrounding the timing of HSL delivery, the transport staging framework distinguishes between infrastructure that is dependent on HSL and infrastructure that can be delivered independently of HSL. Where HSL delivery has not occurred, interim access arrangements have been identified and assessed.

15.5.1 Industrial Development Transport Infrastructure Improvements

Table No: 43

Interim Option B (Pre-HSL) - Intersections		
Intersection	**Infrastructure Upgrade**	**When?**
Greenwood St / Kahikatea Dr Interim 4-arm Roundabout (Interim Option B)	Upgrade to a four-arm roundabout Interim Option B assumes a similar Greenwood St / Kahikatea Dr roundabout footprint as the ultimate arrangement. Final staging, cross-section and transition arrangements to be confirmed	To be completed prior to completion of any subdivision beyond 1 ha within SL1 Industrial Development area.



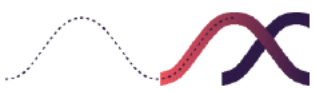
	through detailed design and NZTA review / approval.	
Interim Option B (Pre-HSL) - Transport Corridors		
Road	**Infrastructure Upgrade**	**When?**
North-South Access Rd between Greenwood St / Kahikatea Dr intersection and east-west collector road	A new access road between Kahikatea Dr and east-west collector road to be designed and constructed, including the intersection of the access road with the east-west collector road. The interim access road should be designed to be compatible with the ultimate HSL corridor. Initially, only a two-lane carriageway is required, with the final cross-section and staging to be confirmed through detailed design and NZTA review / approval.	To be completed prior to completion of any subdivision beyond 1 ha within SL1 Industrial Development area.
East-West Collector Rd	A new public road constructed in general accordance with the typical cross-section in Figure 33, including the intersection of the east-west collector road with Wickham St extension.	To be completed prior to any industrial activity being able to generate traffic within the Industrial Development.
Walking and Cycling Connection	Provide a connection between the Road 3 turning head and the existing ROW connecting to Wickham Street.	To be completed prior to any industrial activity being able to generate traffic within the Industrial Development.

15.5.2 Residential Development Transport Infrastructure Improvements

The Residential Development infrastructure staging framework is summarised below. The timing of these upgrades reflects the assessed development staging so that the transport network continues to operate at an acceptable level of service (performance) as development progresses.

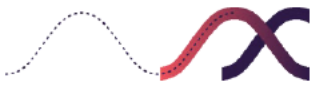
Table No: 44

Staging of Transportation Infrastructure Improvements - Intersections		
Intersection	**Infrastructure Upgrade**	**When?**
Ohaupo Rd / Saxbys Rd / Tomin Rd Roundabout	Provide southbound dual exit lanes on Ohaupo Rd from Saxbys Rd roundabout to Lambert Ct signalised intersection.	To be completed prior to Stage 1D (271 dwellings)
	Four laning of Ohaupo Rd between Saxbys Rd and Lambert Ct.	To be completed prior to Stage 2 (543 dwellings)



	Additional lanes on Saxbys Rd and Tomin Rd approaches in general accordance with Drawing 149240-00-0215. Ohaupo Rd southbound approach Signal Meter for the AM peak period.	
Ohaupo Rd / Lambert Ct	Upgrade to a four-arm signalised intersection in general accordance with Drawing 149240-00-0220.	To be completed prior to completion of residential lot subdivision.
Ohaupo Rd / Resthill Cres	Upgrade to remove right turn movement out of Resthill Cres in general accordance with Drawing 149240-00-0230.	To be completed prior to Stage 2 (543 dwellings)
Ohaupo Rd / Houchens Rd	Upgrade to a signalised T-intersection in general accordance with Drawing 149240-00-0240.	To be completed prior to Stage 1C (198 dwellings)

Staging of Transportation Infrastructure Improvements – Transport Corridors		
Road	**Infrastructure Upgrade**	**When?**
MacMurdo Avenue	Extension of MacMurdo Ave providing access to the Residential Development. To be designed and constructed in general accordance with the typical cross-section in Figure 21.	To be completed prior to any residential activity being able to generate traffic that gains access off MacMurdo Ave.
Forth Crescent	Extension of Forth Cres providing access to the to the Residential Development. To be designed and constructed in general accordance with the typical cross-section in Figure 22.	To be completed prior to any residential activity being able to generate traffic that gains access off Forth Cres.
MacMurdo Ave, MacDonald Rd and Lambert Ct	Provide a shared walking and cycling path and separated bi-directional cycle path in general accordance with Drawing 149240-00-0270 to 0275.	To be completed prior to Stage 1C (198 dwellings)
Saxbys Rd	Provide a minimum 3m wide shared walking and cycling path on southern side of Saxbys Road between Site and Deanwell Ave, a safe road crossing facility near Saxbys Rd /Deanwell Ave intersection and a pedestrian refuge island east of Saxbys Rd/Leslie Pl in general accordance with Drawing 149240-00-0250.	To be completed prior to Stage 1A.
Deanwell Ave, Saxbys Rd	Provide a minimum 3 m wide separated bi-directional cycle path on the western side of	To be completed prior to Stage 3 (730 dwellings)



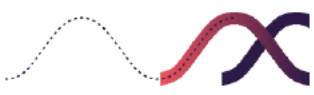
	the road in general accordance with Drawing 149240-00-0260 - 0267.	
Prisk St, Mount View Rd	Provide cycle sharrow markings to highlight the shared low speed environment.	To be completed prior to Stage 3 (730 dwellings)

Sections 15.2.2 and 15.4 of this ITA demonstrate that Residential Development of up to 543 dwellings can be accommodated, with acceptable transport effects and without HSL delivery provided the transport infrastructure upgrades identified in the above table are implemented per the timing criteria. Subdivision exceeding 543 dwellings should be subject to a further ITA having regard to the transport environment at that time and implementation of any further identified mitigation and/or development caps recommended in the ITA.

The reassessment requirement recognises that future network performance may be influenced by a range of variables affecting other developments and land use, future transport infrastructure delivery and travel behaviour assumptions. Illustrative examples of such variables are provided in Table No: 45.

Table No: 45

Illustrative Variables for Residential Development Reassessment Beyond 543 Dwellings			
Variable	**Current Assessment Assumption in Scenario 2**	**Example Alternative Assumption**	**Indicative Change to Assessment**
Residential vehicle trip generation	Scenario 2 (543 dwellings) generates approximately 345 vehicle trips per peak hour (0.66 veh / low density dwelling and 0.62 veh / medium density dwelling)	If the lower range of vehicle trip rates were adopted from the NSW Guide: low density dwelling = 0.83 veh / dwelling Medium density dwelling = 0.41 veh / dwelling A lower vehicle trip rate is likely to capture some combination of higher PT use, higher active mode use, trip chaining, internal trip, and lower vehicle ownership.	By way of illustration, if lower vehicle trip generation rates were realised in practice, the Residential Development could generate materially fewer peak-hour vehicle trips than assumed in Scenario 2. This could increase the number of dwellings accommodated before the development generates the same peak-hour traffic demand (345 vph) assessed for Scenario 2. Indicatively, this difference is equivalent to approximately 94 additional medium-density dwellings based on vehicle trip generation alone, and assuming the same trip distribution patterns as adopted in the current assessment. This does not represent a reassessment of network capacity or intersection performance.
Airport Business Zone ("ABZ") Development	Land use / employment assumptions in the ABZ is based on HSL Scenario 31 model runs undertaken by NZTA.	Development does not progress as assumed in WRTM Scenarios 2-5.	Potential reduction or increase in traffic volumes on Ohaupo Rd and change in traffic distribution at critical intersections.
Peacocke Structure Plan Development	Land use / employment assumptions in the Peacocke Structure Plan area is based on HSL Scenario 31 model runs undertaken by NZTA.	Development does not progress as assumed in WRTM Scenarios 2-5.	Potential reduction or increase in traffic volumes on Ohaupo Rd and change in traffic distribution at critical intersections.



HSL delivery	Stage 1 of HSL (section between Kahikatea Dr and Killarney Rd) is assumed to be completed in Scenario 2.	HSL fully delivered and operational.	Potential change in route choice, traffic distribution and demand on the Ohaupo Rd corridor

The examples presented in Table No: 45 are provided to illustrate how changes in key assumptions may influence the transport effects associated with future stages of the Residential Development.

For example, if the lower residential vehicle trip generation rates identified in Table No: 45 were realised, the Residential Development would generate materially fewer peak-hour vehicle trips than assumed in Scenario 2. On a trip-generation basis only, and assuming the same trip distribution patterns adopted in the current assessment, the equivalent peak-hour vehicle demand assessed in Scenario 2 would not be reached until approximately 640 dwellings.

It is also noted that the traffic forecasts adopted in the WRTM scenarios are influenced by assumptions regarding the scale and timing of development within the Airport Business Zone and Peacocke Structure Plan area. If development within these areas were to occur at a slower rate than assumed in the WRTM scenarios, traffic demand on the Ohaupo Road corridor may be lower than that adopted in the current assessment. While the magnitude of any reduction cannot be reliably quantified without further strategic transport modelling, such changes could improve the operation of the Ohaupo Road / Saxbys Road / Tomin Road roundabout, thereby potentially enabling more SL1 Residential Development before HSL is delivered.

Accordingly, the examples presented in Table No: 45 should not be interpreted as defining a fixed development limit or a fixed measure of network capacity. Rather, they illustrate how changes in key assumptions may influence the transport effects associated with future stages of development and reinforce the importance of reviewing the transport environment at the time development progresses beyond 543 dwellings.

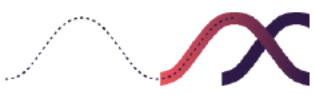
Accordingly, a consent condition aligned with the following, is recommended:

"Prior to the construction of development exceeding 543 dwellings within the Residential Development, the Consent Holder shall submit an updated Integrated Transport Assessment (ITA) prepared by a suitably qualified and experienced transport engineer.

No dwelling above the 543-dwelling threshold shall be constructed until the updated ITA has been certified by NZ Transport Agency Waka Kotahi, Hamilton City Council and Waipā District Council and any required mitigation or staging controls identified through that assessment have been confirmed

The updated ITA shall assess the transport effects of further development having regard to the best reasonably available transport information at the time, including, where relevant:

- *actual residential development yield, dwelling typology, land use and trip generation;*
- *observed and forecast traffic volumes on Ohaupo Road, Collins Road, Saxbys Road, Lambert Court, Resthill Crescent and Houchens Road;*
- *updated turning movement volumes, heavy vehicle proportions, crash history and observed congestion;*
- *development completed or committed within relevant surrounding growth areas;*
- *committed or constructed transport infrastructure upgrades on Ohaupo Road since preparation of 2026 ITA;*



- *the status, timing and form of HSL, including any relevant connections to SH3 or the local transport network, and any resulting changes to route choice and network capacity;*
- *public transport provision, mode share, and any implemented public transport priority measures;*
- *walking and cycling network delivery and active mode uptake;*
- *whether the right-turn restriction at Ohaupo Road / Resthill Crescent identified in the 2026 ITA remains necessary and, if so, its appropriate timing; and*
- *updated intersection modelling and safety effects, including average delay, 95th percentile queue lengths and degree of saturation.*

Where actual land use, infrastructure delivery, traffic growth, trip generation or travel behaviour differs from the assumptions adopted in the 2026 ITA, the updated ITA shall identify whether those differences materially increase or reduce available network capacity and confirm whether any additional mitigation or staging controls are required before further dwellings are constructed."

16. District Plan Compliance

While the Project is presently located within the Waipā District, the ITA has focused on the Hamilton City ODP transport rules and requirements given the Project's intended urban form, its direct integration with the Hamilton transport network, and because it is identified within the future southern Hamilton growth area.

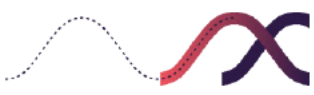
The Project has been assessed against the transport rules relevant to the transport network, subdivision, use and development in Section 25.14 of the ODP. The rules are listed below with comments on compliance of the Project with each rule. Where there is non-compliance, further assessment has been undertaken against the criteria set out in the ODP.

Several ODP transport rules are ultimately applied at the individual lot and vehicle crossing level and therefore cannot be fully confirmed until detailed engineering and land use design has been completed. Accordingly, this assessment focuses on those transport rules most likely to influence the subdivision layout or result in transport-related non-compliances at the subdivision stage, including vehicle crossing separation distances, sight distance requirements and access design considerations.

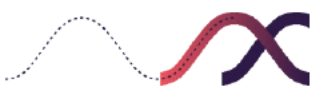
The exceptions involve access design for ROWs / JOALs, sight distances at vehicle crossing, and location of vehicle crossings. Overall, the planned road network is designed to create a slower-speed urban setting, and the required housing density makes it impractical for the Development layout to avoid every instance of non-compliance.

Table No: 46

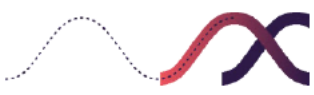
District Plan Compliance		
Transport Rule in District Plan	**Compliance**	**Comments**
Vehicle Crossings and Internal Vehicle Access		
25.14.4.1 a. Distance between vehicle crossings on the same transport corridor frontage i. Where the posted speed of the adjoining road is 60km/h or less the distance between vehicle crossings on the same side of the road shall be either: A. Less than 2m (provided no more than 2 vehicle crossings adjoin each other); or B. More than 7.5m	Yes	Both the Industrial and Residential Developments are expected to comply with this rule. There is reliance on the ODP exemption that where the separation requirements cannot be achieved the vehicle crossing shall be separated as far as possible from any other proposed vehicle crossing. This will be confirmed during detailed design stage.



iii. On local roads with a posted speed of 50km/h or less where compliance with i. or ii. above cannot be achieved as part of any land use activity the proposed vehicle crossing shall be separated as far as possible from any other existing or proposed crossing.		
25.14.4.1 c. Minimum distance between any vehicle crossing and a transport corridor intersection. Vehicle crossings shall meet the following relevant separation requirements in the tables below. The distance should be measured in accordance with the figure below. For vehicle access onto local roads with a posted speed limit of 50km/h or less and serving a listed permitted activity where the separation requirements cannot be achieved the vehicle crossing shall be located as close as reasonably practicable to the furthest site boundary from the intersection (as relevant to the property boundary indicated in the figure below). Note: The examples of exceptions can include where the property boundary frontage is less than 30m and there is no other available access point, or the topography would make it impractical to construct an access in a complying location.	No	Refer to Section 16.1.
25.14.4.1 d. Minimum distance from a dedicated pedestrian crossing facility (e.g. pedestrian crossing, mid-block pedestrian signals, refuge islands, kea crossings) The closest edge of the vehicle crossing shall be at least 7m from the centre of the pedestrian crossing facility measured in accordance with the diagram below.	Yes	Both the Industrial and Residential Developments are expected to comply with this rule. This will be confirmed during detailed design stage.
25.14.4.1 e. Minimum sight distance from any vehicle crossing Vehicle crossings shall meet and be measured in accordance with the relevant sight distance requirements below. On local roads with a posted speed limit of 50km/h or less where compliance with the sight distance is not possible, the proposed vehicle crossing shall be located to achieve the maximum sight distance possible.	No	Refer to Section 16.2
Quantity		
25.14.4.1 f. Maximum number of vehicle crossings to the transport corridor any site within a Residential Zone One, or nil where vehicle access is provided by a rear lane	Yes	The Residential Development is expected to comply with this rule. This will be confirmed during detailed design stage and addressed at land use development.
25.14.4.1 g. Maximum number of vehicle crossings to the transport corridor for any site, not within a Residential Zone i. One per frontage that is equal to or less than 20 m wide	Yes	Industrial Development is expected to comply with this rule. This will be confirmed during detailed design stage and addressed at land use development.



ii. Two per frontage that is more than 20 m wide (excluding frontages to the strategic network or arterial transport corridor iii. One per frontage to a strategic network or arterial transport corridor		
Design and Access Width		
25.14.4.1 h. Vehicle crossing and internal vehicle access shall: i. Comply with the relevant dimensions identified in the Tables below. ii. Be formed and drained with a permanent sealed or paved all weather, dust-free surface and in a manner suitable for the type and quantity of vehicles using the site. iii. Be designed and configured to meet the relevant requirements of Table 15-5ai and Table 15-6b in Appendix 15. iv. For fee simple subdivision, any internal vehicle access, other than a rear lane, serving 10 or more residential units will be required to be formed and vested in Hamilton City Council as a public road.	Yes	The widths of vehicle crossings to individual lots, vehicle access from a private way and rear lanes are expected to comply with this rule. This will be confirmed during detailed design and addressed at land use development.
25.14.4.1 i. Any internal vehicle access shall: i. Have a minimum unobstructed width at vehicle entrances and between buildings of no less than 3.5m. ii. Not be used for carparking or storage of materials, landscaping, fencing or other obstructions that would restrict access by emergency vehicles. iii. Have a minimum height clear of buildings and other obstructions of 4.0m. iv. Have splays of 2m x 2m which are clear of structures higher than 1m at any vehicle entranceway or where vision of pedestrians or oncoming vehicles is restricted.	Yes	Both the Industrial and Residential Developments are expected to comply with this rule. This will be confirmed during detailed design stage and addressed at land use development.
25.14.4.1 j. Any rear lane must: i. Have a minimum legal width of 7m and provide for a two-way vehicle movements. ii. Have a minimum unobstructed width at vehicle entrances and between buildings or structures of no less than 3.5m. iii. Not be used for carparking or storage of materials, landscaping, fencing or other obstructions that would restrict access by emergency vehicles. iv. Have a minimum height clear of buildings and other obstructions of 4.0m. v. Be connected by unrestricted access to a transport corridor in at least two locations. vi. Have a legal mechanism for ownership and ongoing maintenance of the rear lane. vii. Have a maximum length of 250m. viii. Have a maximum longitudinal grade of 1:5.	Yes	This rule applies to the Residential Development only and is expected to be complied with. This will be confirmed during detailed design stage and addressed at land use development.
25.14.4.1 m. To ensure that drivers exiting the site have clear visibility to pedestrians, cyclists, and micro-mobility users, splays	Yes	Both the Industrial and Residential Developments are expected to comply with this rule. This will be confirmed



of 5m by 2m which are clear of structures higher than 1.2m must be provided at all vehicle crossings.		during detailed design stage and addressed at land use development.
25.14.4.1 n. Where a driveway joins a transport corridor it must have an on-site platform at least 6m long and with gradient no steeper than 1 in 20 (5 per cent) so that vehicles can stop safely and check for pedestrians, cyclists, micro-mobility users, and other vehicles before entering the transport corridor.	Yes	Both the Industrial and Residential Developments are expected to comply with this rule. This will be confirmed during detailed design stage and addressed at land use development.
25.14.4.2 Parking, Loading Spaces, On-Site Drop-off Car Spaces and Manoeuvring Areas 25.14.4.2a End-of-Journey Facilities 24.14.4.2b EV Charging	N/A	These rules will be addressed at land use development.
25.14.4.3 Integrated Transport Assessment Requirements Any activity that requires an ITA under this rule is also subject to Rule 25.14.3.a. (a) A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule, in accordance with the following trigger thresholds.	Yes	Traffic generation exceeds thresholds and hence the Broad ITA has been prepared.
24.14.4.3a Travel Plan Requirements A Travel Plan must be prepared and implemented for industrial activities (including warehouses) (excluding trade and industry training facilities) where the activity status is other than permitted and the GFA is >2,500m2 GFA.	N/A	This rule will be addressed at land use development of the Industrial Development.

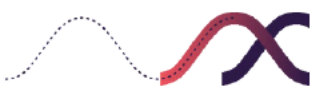
16.1 Rule 25.14.4.1 (c) Minimum Distance between any Vehicle Crossing and a Transport Corridor Intersection

The identified non-compliances generally arise on corner lots, and lots located adjacent to intersections, where achieving the specified separation distances is inherently difficult within a higher-density urban subdivision form.

The ODP requires the following minimum separation distances in a posted speed limit of 60 km/h or less environment:

- Local road frontage: 15 m separation from vehicle crossing to intersecting collector road
- Local road frontage: 20 m separation from vehicle crossing to intersecting minor arterial road
- Collector road frontage: 15 m separation from vehicle crossing to intersecting local road

These requirements are not fulfilled within the proposed Residential Development. In a development of the density proposed, it is not practical to develop a subdivision with lots that can fully comply with the rule at the outset. That would necessitate significant use of rear lots anywhere near intersections. There is reliance on the ODP exemption that where the separation requirements cannot be achieved the vehicle crossing shall be located as close as reasonably practicable to the furthest site boundary from the intersection.



16.2 Rule 25.14.4.1 (e) Minimum Sight Distance from any Vehicle Crossing

The ODP requires the following minimum sight distances:

- 45 m on a 40 km/h posted speed limit local road.
- 60 m on a 50 km/h posted speed limit local road.
- 70 m on a 50 km/h posted speed limit collector road.

Potential non-compliances with this rule are generally associated with lots located adjacent to intersections, on the inside of horizontal curves, or on corner sites where achieving the minimum sight distance requirements can be challenging within a higher-density urban subdivision layout. The precise compliance position for individual vehicle crossings will depend on their final location and detailed engineering design.

Table 15-5aii of the ODP specifies target operating and design speeds of 40 km/h or lower for all local and collector roads. For this reason, the rule appears to mandate a sight distance that exceeds what is necessary given the proposed operating speed.

A more practical approach is to reference the stopping sight distance ("SSD") specified in Austroads Guide to Road Design Part 3: Geometric Design ("AGRD Part 3"). A minimum SSD of 22 m and 34 m are required for 30 km/h and 40 km/h operating speed environment based on 1.5 seconds reaction time. These minimum requirements are expected to be fulfilled by the proposed development scheme layouts.

The sight distance from a vehicle crossing on a minor road downstream from an intersection is mainly influenced by turning speed, which depends on the kerb corner radius and carriageway widths. Based on Austroads GTRD Part 3, a turning speed of 15–20 km/h corresponds to a stopping sight distance of 9–13 m. This sight distance requirement is generally expected to be achieved, or alternatively the location of the vehicle crossing can be optimised through detailed design.

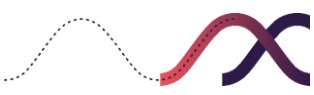
Similarly, vehicle crossings located adjacent to horizontal curves are expected to operate safely due to the reduced vehicle operating speeds typically associated with curved alignments. Any reduction in operating speed correspondingly reduces the stopping sight distance required.

The identified non-compliances are generally associated with urban subdivision design rather than locations where material safety concerns are anticipated. The ODP specifically recognises that compliance may not always be achievable on local roads and provides an exception pathway requiring vehicle crossings to be located to achieve the maximum sight distance possible. Having regard to the proposed low-speed road environment, the anticipated departures are not expected to result in material safety or operational effects and can be appropriately managed through detailed engineering design.

16.3 Reversing onto Local Roads

The proposed front-loaded terrace, duplex and detached typologies within the Residential Development will, in some instances, result in vehicles reversing from residential lots onto adjoining roads. This is a typical and accepted outcome for higher-density residential development and is common within the Hamilton urban environment.

The potential effects of reversing manoeuvres have been assessed in the context of the receiving road environment. The majority of affected lots will access low-speed local roads, where traffic volumes and operating speeds are expected to be low, and where driver awareness of frontage activity is high. In this context, occasional reversing movements can be undertaken safely and do not give rise to significant transport effects.



It is recognised that reversing manoeuvres are generally avoided on higher-order roads. However, the Residential Development scheme plan and access arrangements are primarily oriented to local roads, with no reliance on direct access to arterial routes. The Project is therefore consistent with the intent of the ODP in managing vehicle manoeuvring effects.

Overall, the proposed access arrangements are considered appropriate for the scale and typology of development and are not expected to result in adverse safety or operational effects on the surrounding road network.

17. Construction Traffic

The sites are currently vacant. To facilitate bulk earthworks and associated construction traffic, further assessment will be undertaken following resource consent to confirm staging arrangements and access points for construction vehicles, including heavy vehicle movements.

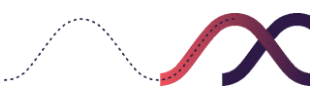
The proposed development will be undertaken in stages. Detailed design and construction sequencing will be confirmed following resource consent approval and appointment of a construction contractor.

As is typical for developments of this scale, a Construction Traffic Management Plan ("CTMP") will be required as a condition of consent. The CTMP will be prepared as part of the Construction and Earthworks Management Plan ("CEMP") and submitted to the relevant road controlling authorities for approval or certification, as required by consent conditions. The CTMP will outline construction staging, access arrangements, haul routes, anticipated construction traffic volumes for each stage, and the associated traffic management measures.

It is anticipated that construction access to the Industrial Development will primarily be provided via the proposed Greenwood Street / Kahikatea Drive interim four-arm roundabout and associated north-south access road. Wickham Street and the existing right-of-way may be used as a secondary construction access where required, subject to confirmation through the final CTMP and any necessary approvals. Construction access to the Residential Development is anticipated to be provided via Saxbys Road, Forth Crescent and MacMurdo Avenue.

The site will be managed to enable vehicles, where practicable, to enter and exit in a forward direction without reversing onto the adjoining road network. Where site constraints or delivery requirements necessitate temporary traffic management measures, these will be implemented in accordance with approved procedures and to the satisfaction of NZTA and HCC. The CTMP will include, but not be limited to:

- timing and sequencing of construction activities
- anticipated traffic volumes and access arrangements for each stage
- haul routes and heavy vehicle routing arrangements
- measures to maintain safe and efficient pedestrian and vehicle movements
- wheel washing and debris management
- route management for heavy and over-dimension vehicles
- temporary traffic management arrangements, including impacts on parking, servicing and adjacent land uses
- contact details for key site personnel.



All temporary traffic management measures will be designed and implemented in accordance with the *New Zealand Guide to Temporary Traffic Management* ("NZGTTM"). Appropriate signage and traffic control will be provided to safely manage construction impacts on the surrounding network.

It is to be noted that construction activities are temporary in nature and, with the implementation of appropriate management measures through the CEMP and CTMP, potential construction-related effects on the surrounding transport network are expected to be appropriately managed such that any adverse effects are no more than minor.

18. Transport Strategies and Policy

18.1 Government Policy Statement on Land Transport 2024 – 34

GPS 2024 was confirmed in June 2024, and it outlines the coalition Government's priorities for expenditure from the National Land Transport Fund over the next 10 years. It also provides guidance to decision-makers about where the Government will focus resources, consistent with the purpose of the Land Transport Management Act 2003, which is:

"*To contribute to an effective, efficient, and safe land transport system in the public interest.*"[26]

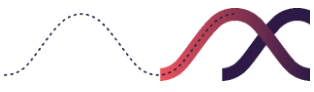
The four Strategic Priorities of GPS 2024 are:

- Economic Growth and Productivity
- Increased maintenance and resilience
- Safety
- Value for Money

The expected outcomes of the GPS 2024 are defined further as follows:

- Economic Growth and Productivity:
    - Reduced journey times and increased travel time reliability.
    - Less congestion and increased patronage on public transport.
    - Improved access to markets, employment and areas that contribute to economic growth.
    - More efficient supply chains for freight.
    - Unlocked access to greenfield land for housing development and supporting greater intensification.
- Increased Maintenance and Resilience:
    - More kilometres of the road network resealed and rehabilitated each year.
    - Fewer potholes.
    - A more resilient road and rail network.
- Improved Safety:
    - Reduction in deaths and serious injuries.

[26] Section 3 of the Land Transport Management Act 2003



- Increased enforcement.
- The primary focus of this priority is to make transport substantially safer for all.

- Value for money:
  - Better use of existing capacity.
  - Less expenditure on temporary traffic management.

The Project is generally consistent with the GPS 2024, particularly the strategic priorities of Economic Growth and Productivity, Safety, and Value for Money. It supports the release of industrial and residential land within an identified future growth area, enables improved access to employment and freight networks, and incorporates a staged transport response that focuses on targeted upgrades, mode shift, and efficient use of existing and planned infrastructure including interim transport solutions that enable development to proceed independently of HSL delivery. The Project also aligns with the resilience objectives of GPS 2024 by maintaining flexibility to integrate with future strategic transport improvements, including HSL, should those improvements proceed.

18.2 NZ Transport Agency Waka Kotahi Statement of Intent 2024 – 2028

This statement of intent ("SOI") presents a new strategic direction for NZTA and sets out how it will respond to the expectations of GPS 2024 for the next four years. The following system outcomes are the long-term changes to the transport system that NZTA is focusing on to realise its vision:

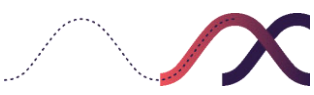
- *Meeting current and future needs - Enabler of other system outcomes and is about ensuring that the way NZTA works enables it to meet the needs of current and future users and aligns to the priorities of GPS 2024.*
- *Effectively and efficiently moving people and freight - Ensuring networks are available and reliable at consistent levels of service with a focus on increasing the uptake of efficient, cost-effective, low carbon transport options.*
- *Safe - Ensuring no one is killed or seriously injured when using or working on the transport system.*
- *Environmentally sustainable - Reducing harm to and improving the environment, with a focus on reducing greenhouse gas emissions and climate change adaptation, including reflecting expectations on NZTA set by the Carbon Neutral Government Programme.*

The Project is consistent with the SOI by supporting the outcomes of meeting current and future needs, effectively and efficiently moving people and freight, safety, and environmental sustainability. The Project provides for planned residential and industrial growth within an identified future growth area, while adopting a staged transport response that integrates with existing and planned strategic infrastructure, including HSL. It also supports improved travel choice through provision for public transport, walking and cycling, and identifies the transport upgrades required to maintain safe and efficient network operation as development occurs over time.

18.3 Waikato Regional Land Transport Plan 2024 – 2054

The Waikato Regional Land Transport Plan (2024 – 2054) ("WRLTP") sets out the strategic direction for land transport in the Waikato region over the next 30 years. The WRLTP is built around the region's key transport issues, namely:

- *Climate Change: an environmentally sustainable, energy efficient and low-carbon transport system that delivers emissions reductions and enhances communities' long-term resilience to the effects of climate change.*



- *Resilience: an efficient and resilient land transport system that ensures communities have route security and access to essential services.*
- *Growth and Economic Development: an integrated transport system that supports compact urban form and planned future growth; AND an efficient and resilient strategic corridor network that advances regional economic and social wellbeing.*
- *Accessibility and Transport Options: an integrated transport system that provides transport options for differing community access and mobility needs.*
- *Safety: a safe, accessible transport system in the Waikato region where no one is killed or seriously injured.*

The Project is aligned with the WRLTP because it supports planned growth in a way that integrates with the strategic transport network, improves travel choice, responds to identified safety and resilience issues, and supports a gradual shift toward public transport and active modes over time.

19. Stakeholder Engagement

To date, engagement with NZTA has been undertaken around the extent of assessment required to understand the traffic impacts arising from the proposed developments' traffic on the operation of the adjacent state highway corridor, trip generation calculation and assumptions as well as form and design of the proposed intersection upgrades. These discussions have informed the scope of the traffic analysis reported in this ITA. Comments from NZTA on the draft ITA (dated 19 March 2026 and 23 June 2026) are attached as Appendix C.

Similarly, discussions have also been held with HCC, Waipā District Council and WRC to ensure this ITA appropriately addresses the key transport matters.

Continued liaison with all stakeholders is expected during the Fast-track process and subsequently as the detailed design for the proposed transport infrastructure is refined.

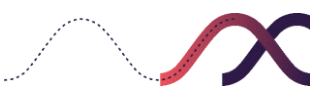
20. Conclusions

This ITA has assessed the transport effects of the proposed Industrial and Residential Developments with regard to existing transport conditions, committed and planned network upgrades, and the relevant national, regional and local transport policy framework.

The assessment is informed by site access design, staged trip generation analysis, strategic transport modelling using the WRTM, and detailed intersection capacity assessments using SIDRA Intersection software.

The key conclusions of the assessment are as follows:

- Industrial Development
    - The preferred interim access strategy is Interim Option B. This arrangement enables the full assessed Industrial Development to proceed independently of HSL delivery through provision of a four-arm Greenwood Street / Kahikatea Drive roundabout, an interim access road on the HSL corridor, and delivery of the proposed internal collector road network.
    - The assessed interim access arrangement provides a practical and flexible transport solution given the uncertainty surrounding the timing of HSL delivery.



- When HSL is delivered in future, the Industrial Development transitions to the ultimate access arrangement via the proposed HSL / SL1 roundabout and east-west collector road.

- Residential Development
  - The Residential Development can be accommodated through a staged transport infrastructure framework comprising intersection upgrades, walking and cycling improvements, and provision for future public transport services.
  - The assessment indicates that Residential Development can be accommodated with acceptable transport effects up to 543 dwellings under a network scenario that excludes HSL delivery, subject to implementation of the transport infrastructure upgrades identified in this ITA.
  - Subdivision exceeding 543 dwellings should be supported by a further / updated ITA to confirm the assumptions underpinning this ITA (2026 ITA) remain relevant for the receiving transport environment and to determine whether any additional mitigation measures or factors exist to enable further development if HSL delivery remains uncertain.

- Multi-modal transport network
  - The proposed transport network has been designed to support increased travel choice and reduce reliance on private vehicle travel over time.
  - The proposed walking, cycling and public transport infrastructure provides a high level of connectivity in and between the Development areas with the surrounding transport network. The infrastructure proposed is comprehensive and necessary to support the increasing mode share rates that support the effects assessment.

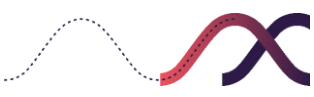
- Hamilton Southern Links
  - HSL remains an important long-term component of the future transport network for southern Hamilton. Modelling shows it will improve the distribution of traffic through southern Hamilton, provide network resilience and spare capacity on Ohaupo Road through Glenview.
  - However, the transport strategy adopted for the Project does not rely on HSL being delivered within a specific timeframe. Interim access arrangements, transport infrastructure upgrades and staging measures have been identified to manage transport effects under both interim and future network conditions.

Subject to implementation of the recommended transport infrastructure upgrades, staging measures and reassessment provisions identified in this ITA, the proposed Industrial and Residential Developments can proceed without resulting in unacceptable transport effects.

21. Recommendations

The following recommendations are made based on the findings of this ITA. Detailed infrastructure staging and upgrade requirements are summarised in Table No: 43 and Table No: 44.

- Development should proceed in accordance with the staged transport infrastructure framework assessed in this ITA, with the access, intersection and corridor upgrades identified in Table No: 43 and Table No: 44 delivered at the relevant development stages.
- Up to 1 ha of Industrial Development may be occupied prior to any upgrade at the existing Greenwood Street / Kahikatea Drive intersection, relying on the existing local industrial road network and existing access arrangements.



- Where HSL Stage 1A has not been delivered, occupation of Industrial Development beyond the initial 1 ha threshold should be supported by Interim Option B. Prior to occupation beyond this threshold, the following infrastructure should be delivered and operational:
    - an interim four-arm Greenwood Street / Kahikatea Drive roundabout;
    - an east-west collector road forming the primary internal movement corridor through the site.
    - an interim access road between Greenwood Street / Kahikatea Drive and the east-west collector road; and
    - the interim access road / east-west collector road connection required to serve the Industrial Development.
- Interim Option B should be designed and staged to remain compatible with the ultimate HSL-integrated transport network and not preclude future implementation of the HSL / Greenwood Street layout.
- Residential Development should proceed generally in accordance with the infrastructure staging framework identified in Table No: 44, including delivery of the identified intersection, corridor and active mode improvements at the relevant stages of development.
- Prior to construction of any dwelling that would result in more than 543 dwellings being established within the Residential Development, an updated ITA should be prepared by a suitably qualified and experienced transport engineer in accordance with the reassessment framework outlined in Section 15.5.2. The updated ITA should confirm whether further Residential Development can be accommodated within the receiving transport environment at that time and identify any additional mitigation measures or staging controls that may be required.
- Walking and cycling infrastructure, public transport-enabling road cross-sections, and provision for future bus routing and in-lane stops should be delivered in accordance with the staging framework relied on in this ITA.
- Detailed design should be undertaken in consultation with the relevant road controlling authorities to confirm the final form, timing and layout of the identified transport improvements, while maintaining consistency with the infrastructure and staging framework assessed in this ITA.
- A CTMP should be prepared for the relevant stages of works to manage temporary access arrangements, construction vehicle routing, effects on the surrounding road network, and protection of vulnerable road users.

Appendix A – Intersection Upgrade and Walking and Cycling Wider Connectivity Concept Plans

Appendix B – SIDRA Movement Summaries

Appendix C – Responses to NZTA and MPDC Comments

Responses in Table No: 47 and Table No: 48, are superseded by the information provided in the ITA.

Table No: 47

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
1	BBO scenarios modelled are significantly different to NZTA/Future Proof Scenario across all the SL1/Rogerson Blocks (especially households – order of 1500 households less under BBO scenario). Currently unresolved issue around significant differences in the traffic flows being predicted by WRTM for the different scenarios.	The land use within the proposed SL1 Industrial Development, Residential Development, Rogerson Block and Houchens development area are more refined now that comprehensive Masterplans have been prepared for each of these areas. As with all Masterplans, they will continue to evolve to respond to opportunities and constraints as they are identified through subsequent resource consent processes. Please refer to Attachment 1 for the WRTM land use input differences between futureproof projections and BBO's assumptions. The main differences being the Rogerson Block change of land use (previously assumed to be residential and now assumed predominantly to be industrial) and the broader refined yield within the SL1 Consortium (not the entire growth cell).
2.	Under several scenarios, Hamilton Southern Links is assumed to be operational by 2025. There is currently no construction funding so this cannot be assumed. Any mitigation (especially as it relates to SH3) may be deficient on that basis; we would expect that any infrastructure triggers will need to be framed in way whereby beyond a certain yield development cannot proceed unless Hamilton Southern Links is in place.	It is to be noted that no 2025 scenarios were modelled in the WRTM. Four development scenarios were tested for the future year 2035: 1) Year 2035 with Stage 1 HSL • SL1 Residential Development: Stages 1 and 2 (575 dwellings) • SL1 Industrial Development: Full development (approx. 36ha developable area) 2) Year 2035 with Stage 1 HSL • SL1 Residential Development: Stages 1 and 2 (575 dwellings) • SL1 Industrial Development: Full development (approx. 36ha developable area) • Rogerson Block: 90 dwellings + 7.8ha industrial • SL1 Houchens: 400 dwellings + 400 retirement village units 3) Year 2035 with Full HSL • SL1 Residential Development: Stages 1 to 3 (776 dwellings) • SL1 Industrial Development: Full development (approx. 36ha developable area) 4) Year 2035 with Full HSL • SL1 Residential Development: Stages 1 to 3 (776 dwellings) • SL1 Industrial Development: Full development (approx. 36ha developable area) • Rogerson Block: 90 dwellings + 7.8ha industrial • SL1 Houchens: 400 dwellings + 400 retirement village units + 13ha industrial Although HSL remains an important long-term strategic transport improvement, its implementation timing is

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
		currently uncertain and remains subject to future funding decisions and NLTP priorities. The 2035 WRTM modelling included scenarios with different assumed HSL network stages, including Stage 1 of HSL and the full HSL network, to test the sensitivity of the Project's transport effects under different future network conditions. For that reason, the ITA does not rely on HSL being delivered by a specific year. Rather, the assessment identifies both interim and future network scenarios and recommends staging controls, infrastructure triggers and further assessment requirements to manage transport effects as development progresses.
3.	Section 11.1.1 of the ITA states that the residential trip rate has been derived from the RTA Trip Generation Guide, taking the average for medium density flats and "dwelling houses". The above average is due to the lack of knowledge, currently, about the likely residential types. Therefore, we are unclear if the average is OK – if we end up with greater numbers of persons per household than currently assumed, the trip rate may be higher. More fundamentally, the RTA trip rates used were for vehicles, whereas the ITA assumes them to be person trips. Given the subsequent corrections for mode change over time, this means that the residential trip predictions currently included in the ITA significantly underestimate the likely outcome.	Following the meeting on 26th March 2026, BBO has undertaken trip generation calculations for the SL1 Residential Development using person-trip rates. Now that the number of low-, medium- and high-density lots can be estimated, person-trip rates for each residential land use were adopted from the NSW Government *Guide to Transport Impact Assessment* (NSW Guide). For the purposes of trip generation, the proposed high-density lots have been assessed using the medium-density person-trip rate, as they do not meet the NSW Guide definition of high-density residential dwellings. Refer to trip generation calculations in Attachment 2. Please note this is based on refined yield in the latest Masterplan. The trip generation calculation indicates that WRTM loaded networks underestimates the trips generated by the residential zones by approximately 20-60 vph in the various scenarios. BBO will increase the traffic volumes in the respective SIDRA models by 10% to address the shortfall.
4.	Section 11.1.2 states that the observed trip rates for the Hamilton Airport central precinct have been used for the employment uses. Presumably these trip rates were based on traffic counts, which will give vehicle trip rates, not person trip rates. If our assumption is correct, the subsequent corrections for mode change will again mean that the trip predictions are underestimates.	The vehicle trip rate, established through surveys in the Central Precinct of the Airport Business Zone (Hamilton Airport – Titanium Park), is deemed representative and suitable for the proposed industrial land use. BBO recognises that the adopted trip generation rate pertains specifically to vehicles. It should be noted, however, that public transport accessibility as well as walking and cycling infrastructure are currently limited within the surveyed Central Precinct. As such, BBO considers that a proportion of these vehicle trips could transition to public transport or active modes, particularly in the context of the proposed Industrial Development area where new walking and cycling infrastructure linking to existing bus stops is recommended. Person-trip rates as outlined in the NSW Guide have not been adopted, as these are based on gross floor area (GFA) and the site coverage details for the Industrial Development remain unconfirmed at this time. Please refer to Attachment 3 which includes trip generation calculations and assumed travel mode distributions.
5.	Some mode change (relative to the existing situation) is likely to be very reasonable.	Travel mode splits for Residential Development:

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	However, while the future (2055) trip rate for the industrial components is predicted to be around 86% of the existing (2023) trip rate, the figure for the residential components is around 59%. The more significant reductions are based around the assumptions that the PT mode share for this part of Hamilton will be equivalent to the existing mode share in central Wellington – this seems to be overly optimistic. Resolving the traffic generation rates will have a flow on effects on the traffic modelling presented in the ITA. As a result, the proposed mitigation measures presented in the ITA may change.	• 2035 PT and active mode shares are based on 2023 Census data from Peachgrove-Greensboro, Hamilton East and Hillcrest (all in Hamilton). These areas currently densely populated (approximately 7,000 to 10,000 population) with good accessibility to PT and walking and cycling connections • 2045 PT and active mode shares have now been updated to 13.9% (PT) and 11.4% (active mode). The draft ITA indicated 13% (PT) and 13% (active mode). These splits are based on statistical areas within Wellington that consist of medium density residential land use and high frequency routes currently servicing the areas (i.e. Island Bay, Lyall Bay and Miramar East). These areas are not in central Wellington. • 2055 PT and active mode shares have now been updated to 30% (PT) and 10% (active mode). This is an aspirational mode-shift from car dependence during commuter peaks, but it is supported by the proposed medium-density residential in SL1 (restricted car parking and garaging) and aligns with the "transformational" shift to PT enabled by the Rapid Transit Network key moves envisaged in the Waikato Metro Spatial Plan. The MSP Programme Business Case states in Section 1.8 that *"The assessment of the public transport and active modes share in 2051, and based upon the preferred land use scenario 2a, has concluded that the region wide mode shift would be 20%; with the ability to achieve up to 44% (forecast as 32% for public transport and 12% for walking/cycling and micromobility) in the identified key BRT corridors of Hamilton City."*. Travel mode splits for Industrial Development: • 2055 PT and active mode shares are lower than those assumed for residential land use. This is based on statistical areas within Wellington that consist of industrial land use and high frequency routes currently servicing the areas (i.e. Rongotai and Miramar South). This is also aligned with Waikato Regional Transport Plan that indicates a frequent bus route is envisioned at the Kahikatea / Frankton area.
6.	<u>SL1 Roundabout and SH1C Intersection Spacing</u> • The modelling by BBO for the SL1 developers concludes that the roundabouts will operate satisfactorily without free flow left turn lanes • The modelling by Aecom for NZTA concluded that free flow left turn lanes will be required. This introduces a merge and weave movement on the midblock between Kahikatea Drive and SL1, leading NZTA to conclude that the current spacing is inadequate.	We consider the following as key reasons for the volume differences between our model runs and the NZTA Scenario 31 model runs: • The presence of the half-diamond interchange at Colins Road in the NZTA S31 WRTM model runs compared with the full diamond interchange further south at Houchens Road in the BBO WRTM model runs. The Collins Road half diamond draws a significant volume of traffic through the northern part of SL1 development via Rhonda Ave and Colins Road, which is not present in the BBO WRTM model runs. • The difference in quantum of trips generated by SL1 Industrial Development, Residential Development and Rogerson Block. The difference is due to refined

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	• The spacing issue relates to weaving, for example (for southbound traffic): ○ Vehicles turning left from SH1C onto HSL will merge with mainline traffic between the intersections, with some traffic then changing lanes to enter the centre lane to turn right at the SL1 roundabout ○ Some southbound vehicles on SH1C passing straight through the Kahikatea roundabout will have to change lanes to enter the left turn lane to turn left at the SL1 roundabout • As a result, the predicted operation of the two roundabouts is critical, as this determines the need for free flow left turn lanes. • Our recent comparisons between the 2018 modelled flows and observed flows indicates that the modelled flows are high during the critical weekday evening peak. Addressing the land use/trip generations is critical. • At the current time, NZTA is unable to confirm the acceptability of the free flow left turn lanes or the current separation distance presented. • Please also note that NZTA is working through whether a 4th leg may be feasible at the Kahikatea Drive/SH1C proposed roundabout for a period prior to the current investment case design (3 leg arrangement). Addressing trip and land use assumptions (see earlier comments) will factor into this analysis.	and reduced development areas that is achievable in these areas based on further assessments that have been undertaken as part of this substantive Project. Also, some of that difference is likely due to our target PT and active mode shares adopted in the BBO WRTM model runs. This is explained in the earlier responses. The modelling undertaken by us indicates that the HSL / Kahikatea Dr roundabout operates effectively without requiring an additional southbound acceleration lane between the HSL / Kahikatea Dr roundabout and the SL1 roundabout. However, we have also undertaken a sensitivity check using the volumes obtained from the NZTA Scenario 31 model runs. The results indicate that both roundabouts perform satisfactorily with all movements performing no worse than LOS D (i.e. average delay less than 40s/veh). 95th percentile queue on Kahikatea Drive reaches approximately 120 m while 95th percentile queue on the northern approach to SL1 roundabout (i.e. HSL section between two roundabouts) reaches approximately 175 m during the PM peak period. In our opinion, the queue length on HSL is not significant considering the separation distance of 520m between both roundabouts. The queue length achieved on Kahikatea Dr will extend beyond Latham Ct. However, Latham Ct is a no-exit, low volume local road and the effects at the intersection is not expected to be more than minor. There are a few reasons why the SL1 roundabout connection is proposed approximately 520 m from the HSL / Kahikatea Dr 3-arm roundabout. • Shifting the SL1 roundabout connection further south is likely to result in trips from SL1 industrial area heading south before getting onto HSL to head north. This has the potential to add more industrial traffic to Higgins Rd which is a local road providing access to residential land use further north and therefore was not preferred. • The proposed location of the SL1 roundabout connection allows the new east-west collector road to be a straight through road from Tuhikaramea Rd to HSL. This is considered a positive for the key collector industrial connector between the western fringe and the urban Hamilton industrial environment of Frankton. If the SL1 roundabout connection is proposed further south, then the east-west collector alignment will be convoluted considering that it needs to run through Rogerson Block to provide access to industrial and residential land use. • The proposed location of the SL1 roundabout connection allows the east-west collector road to be aligned strategically between two landowners' lots without dissecting a single landowner's lot into two. This provides important continuity for how both applicants can progress with their land use aspirations.
7.	Figure 8 of the ITA indicates that in the short term, before the rest of HSL is constructed, the Application site to the east of the HSL designation is proposed to be connected via	The current position indicates that the timing of HSL delivery remains uncertain and may extend beyond the assessment period considered in this ITA. Accordingly, Industrial Development should not be prevented from proceeding

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	a short section of HSL arterial (ultimate form or sacrificial interim form). A local road connection east to the north / south road in the eastern development area is shown. In the long term that road is proposed to become a cul-de-sac when NZTA completes HSL (which is Stage 3). We are unclear how this proposal will transition from a "sacrificial road" to the ultimate HSL solution. In theory this situation could be avoided if the ultimate HSL cross section is provided at the outset, rather than a sacrificial form, but this would still appear to lead to problems as the intersection forms transition from short to long term. This is a concern for NZTA; we want to avoid a future scenario whereby we end up funding the relocation of a portion of the internal roading network.	solely because HSL has not been funded or programmed for delivery within a defined timeframe. On this basis, the ITA identifies Interim Option B as the preferred interim access strategy, enabling Industrial Development to proceed independently of HSL delivery while retaining the ability to transition to the ultimate HSL-based network arrangement if and when HSL is implemented.
8.	Ideally, U turn restrictions should be implemented at all intersections proposing to be signalised on Ohaupo Road (SH3).	This will be included as recommendations in the ITA if the proposed phase sequence at intersections prohibits U-turn movements.
9.	<u>Wickham St Access</u> • The proposed cross section (Figure 12 of the ITA) shows a 1.8 m wide shared user path on the western side of Wickham Street. • For the path to function as a shared path, it should be widened to be at least 2.5m (minimum) or 3m (desirable). • If widening of the path is not feasible due to the existing road reserve, the path should function as a footpath only, with cyclists mixing with general traffic.	The typical section was incorrect and has since been updated as shown below. There is no shared path proposed on Wickham St.
10.	<u>Ohaupo Rd / Resthill Cres</u> • The proposed concept plan will force westbound cyclists on Ohaupo Road to merge into the adjacent traffic lane at the intersection of Ohaupo Road / Resthill Crescent, which create a safety risk. • Consider shifting the proposed traffic island on Resthill Crescent south to allow sufficient room for a cyclist to travel across the intersection without merging with general traffic. • In additional to the above, it is recommended that green painted pavement markings with cycle symbols across the intersection as per the	The concept designs shared are draft versions and are still a work in progress. Westbound cyclists are expected to use the off-road shared path on both sides of Ohaupo Rd (between Saxbys Rd and Houchens Rd). Cycle on and off-ramps will be proposed on either end. This accommodates the proposed intersection upgrades along this corridor which typically involve adding more lanes within the road reserve.

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	Lambert Court / Ohaupo Road intersection (refer to the screenshot below).	
11.	<u>Ohaupo Rd / Saxbys Rd</u> • Section 14.2.2 of the ITA states that the intersection would be upgraded in two stages: ○ The first stage to upgrade the existing roundabout to include a second through departure lane on the southern leg ○ The second stage is to upgrade the existing roundabout to a set of signals. • However, the ITA indicates that the signals would fail under Scenarios 2 to 5 and it suggests that this may be OK as the intersection has been designed to support Ohaupo Road as a bus priority corridor. However, we note that the traffic assumptions already include a high proportion of public transport trips (see yesterday's email). The ITA suggests that a further mitigation measure would be to add additional traffic lanes to increase intersection capacity. To our knowledge, no traffic modelling has been undertaken to determine an appropriate intersection layout. • Undertake additional traffic modelling to confirm an appropriate layout for the signals. The provision of additional traffic lanes may require land acquisition.	The matter has been assessed in Section 15.2.2 of the ITA.
12.	<u>Ohaupo Rd / Saxbys Rd</u> • The proposed length of the dedicated right turn lane at the Saxbys Road approach will only provide storage for one vehicle. This could result in vehicles overflowing into the adjacent traffic lane, and blocking right turns into Morrison Cresent. • Consider lengthening the length of the dedicated right turn lane on Saxbys Road – however this would still appear likely to lead to challenges for vehicles exiting the signalised intersection and turning into Morrison Crescent.	The concept designs shared are draft versions and are still a work in progress. The concept design has been updated to address this matter and the revised arrangement is reflected in the current application drawings and ITA.
13.	<u>Ohaupo Rd / Saxbys Rd</u>	Westbound cyclists are expected to use the off-road shared path on both sides of Ohaupo Rd (between Saxbys Rd and Houchens Rd). Cycle on and off-ramps will be proposed on

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	• The proposed concept plan removes the on-road cycle lanes on Ohaupo Road at the Ohaupo Road / Saxbys Road intersection. • Consider installing cycle ramps in advance of the intersection to allow non-confident cyclists to use the shared user path on Ohaupo Road.	either end. This accommodates the proposed intersection upgrades along this corridor which typically involve adding more lanes within the road reserve.
14.	<u>Ohaupo Rd / Lambert Ct</u> • The proposed concept design includes converting the existing unsignalised intersection to signals, maintaining access to service lane which provides access to residential properties as the northern leg of the intersection. • Consideration should be given to closing the access to and from the service lane at this location, since queueing will extend both to the north and south. • Consider removing access to the Ohaupo Road service lane (northern leg of the Ohaupo Road / Lambert Court intersection), since an alternative is already provided (see below).	This has been considered. However, it is expected that the likelihood of crashes at the alternative northern access could potentially increase as vehicles exiting and heading north will have to cut across two lanes (i.e. one southbound land + flush medium existing arrangement and two southbound lanes future arrangement) to merge with through traffic. Similarly, vehicles turning right into the access will have to cut across two lanes. To mitigate the safety risk, a central median island could be introduced on Ohaupo Rd at the alternative northern access limiting movements at the access to left-in-left-out. However, this could in return increase unsafe U-turn movements at both signalised intersections (i.e. Saxbys Rd and Lambert Ct) on either end of this section of road. Hence, this assessment considered maintaining this intersection as a four-arm intersection safer than closing the service lane access.
15.	The ITA has undertaken intersection modelling using SIDRA Intersection software, analysing each intersection in isolation without considering corridor wide impacts. Consider undertaking a network-wide model using microsimulation or SIDRA Network, for situations with closely spaced intersections, to allow the assessment to identify the potential for queueing back.	We do not consider it necessary to undertake a network-wide model. The SIDRA models have been calibrated using surveyed peak hour traffic flows and observed 95th percentile queue lengths at intersections. This ensures that the intersections are modelled as closely as possible to how they currently operate in the existing network.
16.	<u>Ohaupo Rd / Lambert Ct</u> • The proposed merge in the southbound direction after the proposed signals is very short, and within the queuing area for the pedestrian signals [may need to consider moving the pedestrian signals to the proposed traffic signal location – this will need to be considered in the context of the location of the bus stop(s). • At closely spaced signalised intersections queues can form back to the previous signals and block them, and there is a high risk of drivers missing a red light at the first signalised intersection because they can see the	• As stated in the ITA, the separation distance between the proposed Ohaupo Road / Lambert Court intersection and the existing signalised mid-block crossing is approximately 105 m. This equates to approximately 7 seconds of travel time based on a 50 km/h operating speed. It is unlikely that speed between both intersection will be more than 40 km/h given the proximity which increases the travel time to 9 seconds. In comparison, the separation distance between Bryce St and Claudelands Rd signalised intersections on Victoria St is approximately 60 m. • Cyclists are expected to use the off-road alternatives on either side of Ohaupo Rd (between Saxbys Rd and Houchens Rd).

NZTA Comments dated 19 March 2026		
S/No	Comment	BBO Response
	green light at the next signalised intersection. • Guidance provided in Austroads suggests that intersections should be separated by at least five seconds of travel time at the design speed to provide time for drivers to process information. • The proposed signalised intersection does not appear to cater for cyclists.	
17.	Can the applicant please give consideration to providing another road link from the site to Saxbys Road, so more of the development traffic can use the SH3 Ohaupo Road/Saxbys Road intersection instead of adding additional traffic to the SH3 Ohaupo Road/Lambert Court intersection? Please see red line in the below picture	We do not support another vehicle link from the site to Saxbys Rd for the following reasons: • The intersection modelling that has been undertaken indicate that the existing Ohaupo Rd / Saxbys Rd roundabout and the future signalised intersection perform worse in comparison to the proposed Ohaupo Rd / Lambert Ct signalised intersection based on current WRTM trip distribution to both intersections. Adding more traffic to the Saxbys Rd roundabout will only exacerbate the effects. • Adding a vehicle link will result in multiple closely spaced intersections which increases the number of conflicting movements within a short section of Saxbys Rd. This increases the likelihood of crashes. Therefore, we consider a single access to Saxbys Road as a practical solution from a safety and network capacity / efficiency perspective. However, the ITA does recommend this link to be an active mode connection from the site.

Table No: 48

NZTA Comments dated 23 June 2026 – from FLOW Transportation Specialists		
S/No	Comment	BBO Response
1	Modified mode split assumptions, including not making a correction for work from home trips (for the industrial uses)	The ITA distinguishes between residential and industrial trip generation. A work-from-home (WFH) correction has been applied only to residential trip generation, as set out in Section 12.2.2. his is appropriate because WFH primarily affects home-based work travel associated with residential land use. No WFH correction has been applied to industrial land uses. This is appropriate because the adopted industrial trip generation rate is vehicle-based and was derived from comparable industrial activity, where trips are associated with on-site employment, servicing, freight and business activity rather than home-based trip generation. Accordingly, applying a WFH reduction to the industrial vehicle trip rate would not be appropriate.
2.	We are unclear about the wording on page 58, which appears to imply that work from home corrections should be made, but they have not.	A WFH correction has been applied only to residential trip generation, as shown in Table No: 13 to Table No: 17. The residential mode split components for private vehicles, public transport and active modes do not sum to 100% because a 10.8% WFH allowance has been included separately in all residential scenarios.
3.	We retain our view that a 2055 scenario with higher traffic flows (i.e. with some, but not significant mode change) needs to be assessed, to ensure suitable roundabout spacing	The ITA's 2055 scenario already includes substantial future land use beyond the Applicant's developments, including future SL1 residential areas, the Rogerson Block and SL1 Houchens land uses. NZTA has also acknowledged that it may not be the developer's responsibility to demonstrate the operation of the transport network with other uncommitted land use changes. The ITA assesses Scenarios 2 to 5 using WRTM outputs. Scenario 5 includes future land use well beyond the Industrial and Residential Developments and therefore provides a broad strategic assessment of future network conditions. Subsequent to NZTA's comment, a sensitivity assessment has been undertaken using NZTA Scenario 31 Year 2055 traffic volumes to test the operation of the proposed SH1C/HSL and HSL/SL1 roundabout arrangement under a materially higher traffic demand scenario than that adopted in the Project modelling. The NZTA Scenario 31 model includes approximately 1,500 additional households within the wider SL1 growth area and also captures a level of future development beyond the proposed Developments, including growth that may proceed through other referred projects and future growth areas within the wider SL1 growth cell. Therefore, the NZTA Scenario 31 model represents a conservative assessment of the proposed roundabout spacing relative to the proposed Developments. The results of the sensitivity assessment confirm that the proposed roundabout spacing remains appropriate under this higher-demand scenario. Accordingly, no further strategic traffic modelling is considered necessary for the purposes of assessing the Project.
4.	The report refers to the difference between the new trip predictions and the earlier	As set out in Sections 12.2.1 and 12.2.2 of the ITA, the WRTM outputs were reviewed against the refined trip generation

NZTA Comments dated 23 June 2026 – from FLOW Transportation Specialists		
S/No	Comment	BBO Response
	WRTM outputs. It claims that corrections have then been made, but we have not seen how these have been applied. Also, the report summarises the results of SIDRA analysis, but no SIDRA printouts are provided within Appendix C.	estimates for Industrial and Residential Developments. The comparison identified that the WRTM outputs represented slightly lower development traffic than the refined trip generation calculations. To address this, the intersection modelling incorporated a 13% increase over the WRTM Industrial Development volumes and a 10% increase over the WRTM Residential Development volumes. These adjustments were applied to the relevant development-related turning movements at key intersections, with distribution based on the movement patterns observed in the WRTM outputs. SIDRA movement summaries have now been included in Appendix B.
5.	Have the delays in the base SIDRA model been calibrated to existing conditions?	Yes. The base SIDRA models have been calibrated with reference to observed queue lengths from the traffic surveys. This calibration process was used to confirm that the base models reasonably reflect existing intersection operating conditions before applying future year traffic demands.
6.	There is a safety concern around any increase in traffic turning into or out from Kahikatea Drive west, with the existing layout	The ITA's existing-layout assessment relates only to a very limited initial development quantum. The assessment indicates that 1 ha of industrial development would increase traffic at the intersection by approximately 16 vehicle trips in the peak hour. This represents a minor increase in turning movement exposure relative to existing traffic volumes. On this basis, the additional operational and safety effect associated with 1 ha of industrial development is considered marginal and would not justify requiring an upgrade to the intersection at that early development stage.
7.	Through our recent work for NZTA we have recognized the potential for significant U turning at this roundabout, due to the proposed ban on right turns at the Greenwood Street/Duke Street intersection. It now appears that the WRTM run carried out for BBO did not allow U turns at the SH1C/HSL intersection, and this will adversely affect the operation of the roundabout.	BBO did not restrict U-turn movements at the SH1C / HSL intersection in the project modelling. The project model runs were developed using NZTA's Scenario 31 model outputs as the base. Accordingly, any U-turn movements included in the NZTA Scenario 31 model coding would have been carried through into the project assessment. NZTA's concern regarding potential U-turning associated with the proposed right-turn ban at Greenwood St/Duke St relates to the wider HSL network strategy rather than being a direct consequence of the Applicants' development.
8.	We accept that there does not appear to be much benefit in the proposed free flow left turn lane from Kahikatea Drive east, as vehicles are likely to be inhibited from reaching this lane, due to queueing in adjacent lanes.	Noted. No further response is required.
9.	The report considers a number of interim layouts, with and then without access to the SL1 Industrial North area from the southern leg (the future HSL). These have been assessed for the year 2035, with the scenario without a connection via the southern leg at the HSL/SH1C roundabout tested up to 23 hectares of development, at which time a volume/capacity ratio of 90% is predicted to be reached.	SIDRA movement summaries have now been included in Appendix B. For the interim layout assessments, the development quantum for Industrial Development has been varied to test the level of industrial development that can be accommodated under each access arrangement. The background traffic volumes on SH1C have been retained on a conservative basis, reflecting the Residential Development assumption of 575 dwellings. Only the Industrial Development trip generation and associated access

NZTA Comments dated 23 June 2026 – from FLOW Transportation Specialists		
S/No	Comment	BBO Response
	We would like to see the traffic flow calculations, and the SIDRA runs, to allow us to consider these proposed layouts, as the 2035 scenario with HSL Stage 1 only that was run through WRTM was based on 36 ha for SL1 North Industrial and 575 dwellings at the Mexted development	arrangements have been updated to reflect the revised development quantum and layout being tested.
10.	The ITA indicates that the existing signalized layout will continue to operate with satisfactory delays. However, the volume/capacity (V/C) ratios are stated as being quite high, i.e. very close to 100%. It is interesting to note that the V/C ratio in the 2030 PM peak is predicted to be 97% with scenario 1D (280 households), but 93% with scenario 1E (320 households). It is then predicted to improve further by 2035 (scenario 2, with 575 households), presumably due to the assumed completion of the first phase of HSL.	All 2030 scenarios are based on surveyed traffic volumes, with appropriate growth and development traffic added to the current road network. The 2035 scenarios have been assessed using WRTM outputs and include different network assumptions. In particular, Scenario 2 assumes delivery of Stage 1 HSL, while later scenarios include wider HSL-related changes, including the full length of HSL. Accordingly, variations in V/C ratios between scenarios are not inherently inconsistent. They reflect differences in network configuration, route choice and traffic redistribution between the modelled scenarios.
11.	The new ITA considers the level of upgrade required, but the layout shown in Figure 56 is fairly remarkable, with four through lanes in each direction on Ohaupo Road, but no widening on the two side roads. It seems highly unlikely that such a layout would be progressed. The ITA accepts this, noting that "this solution is not practical or operationally viable". We therefore respectfully question why such a layout was included in the ITA	The layout was included as a sensitivity test to understand the scale of intervention that would theoretically be required to accommodate the modelled traffic demand at the Ohaupo Rd/Collins Rd intersection. NZTA had requested clarity on the level of upgrade that would be required, and the layout was presented to inform that discussion. Its inclusion in the ITA does not mean BBO recommends the layout. The ITA expressly notes that the layout is not practical.
12.	We note that the other intersections along SH3 have been tested for scenarios beyond this 320 threshold, and we wonder if the predicted outcome at Ohaupo Road/Collins Road invalidates the assessment of these other intersections (as presumably the poor levels of service at the Ohaupo Road/Collins Road intersection could affect the assignment of traffic in this area	The comment appears to be under the Ohaupo Rd/Saxbys Rd section but refers to the Ohaupo Rd / Collins Rd intersection. Please confirm whether the comment is intended to refer to Ohaupo Rd/Collins Rd or Ohaupo Rd / Saxbys Rd. If the comment relates to Ohaupo Rd / Collins Rd, Section 15.2.1 of the ITA indicates that the signalised intersection operates at an acceptable level across the modelled scenarios. If the comment relates to Ohaupo Rd/Saxbys Rd, BBO considers that the WRTM assignment accounts for network conditions at a strategic level. The Residential Development is primarily served by the Ohaupo Rd corridor, with limited alternative access options available to redistribute traffic. The performance of the Ohaupo Rd/Saxbys Rd intersection therefore represents a genuine network constraint rather than an outcome of the modelling process. The ITA addresses this constraint through a transport reassessment trigger currently identified at approximately 543 dwellings. The purpose of the trigger is not to establish a permanent development cap, but rather to identify the point at which further transport assessment of the Ohaupo Rd corridor is required having regard to the network conditions, transport improvements and travel behaviour existing at that time. This approach ensures that

NZTA Comments dated 23 June 2026 – from FLOW Transportation Specialists		
S/No	Comment	BBO Response
		development beyond the currently demonstrated threshold is subject to reassessment of transport effects and consideration of any further mitigation that may be available or reasonably practicable at that time. On that basis, the identified constraint does not invalidate the assessment of other intersections, rather, it informs the staging and mitigation framework recommended in the ITA.C
13.	Also, we wonder how this 320 threshold affects the conclusions for the HSL/SH1C roundabout, as the 2035 scenario used for the intersections of relevance to the SL1 North Industrial development is based on 575 households.	The transport reassessment trigger has been updated to 543 dwellings. It is a localised staging control associated with the Residential Development and the performance of the Ohaupo Rd corridor. It does not govern the operation of the SH1C/HSL roundabout or the staging of the Industrial Development. The current transport reassessment trigger associated with the Ohaupo Rd corridor does not undermine or invalidate the SH1C/HSL roundabout assessment.
14.	This second version of the ITA still retains access from the service road into the intersection. As advised previously, there appear to be significant design challenges with this, including tight U turns, and an inability for drivers using the service road to see the signal heads when approaching from the east or west. This intersection is one of those assessed where future signalized layouts have not included full pedestrian crossings. These should be assumed to be essential.	The Ohaupo Rd/Lambert Ct intersection currently operates as an unsignalised cross-road intersection, with multiple conflict points and reliance on gap acceptance for side-road movements. The proposed signalisation of the intersection would provide a materially greater level of control by formalising vehicle movements, reducing conflict uncertainty and providing controlled pedestrian crossing opportunities where appropriate. The detailed geometric design, including the service road arrangement, U-turn movements and signal head visibility, will be resolved through the detailed design process. However, from a transport safety and operational perspective, signalisation in principle represents an improvement over the existing priority-controlled layout. Section 15.2.3 of the ITA also identifies potential safety concerns associated with removing access to the Ohaupo Rd service lane, given that an alternative access is available further north on Ohaupo Road. BBO does not agree that full pedestrian crossings on all legs of every future signalised intersection must be assumed at this stage. There is an existing signalised mid-block pedestrian crossing approximately 100 m east of the intersection. Pedestrian provision at the intersection will be confirmed through detailed design, having regard to pedestrian desire lines, safety, spacing and the existing crossing provision.
15.	Section 15.3 considers bus priority modelling, indicating that this is likely to adversely affect the operation of the route for other vehicles. This is to be expected, but without being able to review the analysis (i.e. with no SIDRA printouts provided), it is unclear if the high V/C ratios of around 140% at several locations, which implies significant spill back, will adversely affect buses.	SIDRA movement summaries have now been included in Appendix C. The purpose of the bus priority modelling is to understand the trade-off between improved bus movement and the effect on general traffic operation. The ITA recognises that reallocating road space to support bus priority is likely to increase delay for some general traffic movements. That outcome is not unexpected where priority is being given to higher-occupancy public transport movements. High V/C ratios for general traffic do not, in themselves, undermine the public transport strategy, provided that future bus priority measures are designed to protect bus travel time and reliability. The ITA adopts this approach by embedding public transport through future bus routing, road

NZTA Comments dated 23 June 2026 – from FLOW Transportation Specialists		
S/No	Comment	BBO Response
		cross-sections capable of accommodating in-lane bus stops, and safeguarding of corridors for future public transport provision. However, the detailed design of any bus priority treatment will need to confirm that queues and spillback do not materially compromise bus travel time reliability at key locations.

Appendix D – Intersection Traffic Counts

Appendix E – Draft Construction Traffic Management Plan