



Planning | Surveying | Engineering | Environmental

Integrated Transportation Assessment

Te Kowhai East Limited Partnership

Te Kowhai East Development Area, Hamilton

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TABLE OF CONTENTS

List of Abbreviations	5
Executive Summary.....	1
1 Experience and Code of Conduct.....	3
2 Introduction	6
3 Site Location.....	8
4 Existing Transport Environment.....	9
4.1 Road Network.....	9
4.2 Walking and Cycling.....	15
4.3 Public Transport.....	17
4.4 Road Safety.....	18
4.5 MegaMaps Analysis	21
5 Expected Environmental Changes	24
6 Proposal Details	28
6.1 Land Use	28
6.2 External Connectivity.....	28
6.3 Internal Connectivity and Networks.....	32
6.4 Intersection Separation	39
6.5 Intersection Sight Distance.....	40
6.6 Lot Access Separation.....	40
6.7 Lot Access Sight Distance	41
6.8 Walking and Cycling Networks	42
6.9 Public Transport Network.....	43
7 Predicted Travel Data.....	44
7.2 Trip Generation	47
7.3 Trip Distribution.....	47
7.4 Multimodal Trip Generation.....	48

8	WRTM Modelling	51
8.1	Validation.....	51
8.2	Intersections Identified for Assessment and Traffic Effects Determination	51
8.3	Intersection Analysis.....	54
8.3.2	SH39 / TKE link road roundabout	54
8.3.4	TKE link road / Onion Road.....	54
8.3.6	SH39 / Rotokauri Arterial roundabout	55
8.3.9	Gateway Drive / Great South Road / Horotiu Bridge Road	55
8.3.21	Koura Drive Interchange	57
8.4	WRTM Sensitivity Testing	59
9	Road Safety	65
10	Construction Traffic Effects.....	66
11	Compliance with Policy and Other Frameworks.....	67
11.1	Overview	67
12	Infrastructure Upgrades and Funding.....	68
13	Conclusion and Recommendations.....	70
	Appendix A – WRTM Briefing Scope	73
	Appendix B – WRTM Output Assessment.....	74
	Appendix C – Wairere Drive Corridor Assessment	75
	Appendix D – Validation Correspondence	76
	Appendix E – SIDRA Output	77
	Appendix F – Policy and Other Frameworks Compliance	87

List of Abbreviations

AEE	Assessment of Environmental Effects
ASD	Approach Sight Distance
CTMP	Construction Traffic Management Plan
DP OiP	District Plan – Operative in Part
HCC	Hamilton City Council
HCV	Heavy Commercial Vehicle
ITA	Integrated Transportation Assessment
LOS	Level of Service
LTP	Long Term Plan
NBD	Northbound
NIMTR	North Island Main Trunk Railway
NZTA	New Zealand Transport Agency Waka Kotahi
ONF	One Network Framework
PDA	Private Development Agreement
PPM	Planning Policy Manual (NZTA)
RCA	Road Controlling Authority
RITS	Regional Infrastructure Technical Specifications
RNSP	Rotokauri North Structure Plan
RPTP	Waikato Regional Public Transport Plan
RTS6	RTS6 Guidelines for Visibility at Driveways
SAR	Substantive Application Report
SBD	Southbound
SCATS	Sydney Coordinated Adaptive Traffic System
SH	State Highway
SIDRA	Signalised Intersection Design and Research Aid

SISD	Safe Intersection Sight Distance
TKE	Te Kowhai East Limited Partnership Development Site
VPD	Vehicles per Day
WDC	Waikato District Council
WRC	Waikato Regional Council
WRTM	Waikato Regional Transport Model

Executive Summary

This ITA has been prepared to support Te Kowhai East Limited Partnership application under the Fast-track Approvals Act 2024 for the proposed TKE industrial development. The proposal involves the establishment of an integrated industrial development comprising approximately 123ha of developable area supporting some 210 industrial lots, land for neighbourhood centre activities, reserves for recreation, stormwater management and ecological mitigation, and associated roading and infrastructure services. The development represents a logical extension of the existing Te Rapa industrial area located adjacent to SH39, SH1C and the wider Hamilton strategic transport network.

The assessment considered the transport effects of the proposal using a combination of the WRTM, SIDRA intersection modelling, road safety analysis, active mode assessments, and extensive consultation with WDC, HCC, NZTA and WRC. The WRTM was validated against existing traffic conditions and agreed by the relevant road controlling authorities as fit for purpose.

The proposed transport network has been designed to provide a safe, efficient and well-connected industrial development. The internal road hierarchy accommodates HCVs while incorporating high-quality walking and cycling infrastructure, future public transport capability, and direct connections to the surrounding strategic transport network. The proposed road layouts generally comply with the WDC DP OiP and RITS, with only minor departures that are not considered to result in adverse transport outcomes.

Future traffic effects have been assessed for the WRTM 2035, 2045 and 2055 assessment years. WRTM modelling demonstrates that the majority of trips generated by the development are accommodated within the existing and planned strategic transport network. As additional transport infrastructure is delivered over time, including the Onion Road connection and future Koura Drive improvements, traffic redistributes as intended and reliance on the SH39 access reduces. Sensitivity testing also confirms that four-laning of SH39 is not required to accommodate the forecast traffic demands generated by the development.

Detailed SIDRA modelling demonstrates that the proposed SH39 access roundabout and the Onion Road priority-controlled intersection are anticipated to operate efficiently with substantial spare capacity through to 2055. The proposed access arrangements are therefore considered appropriate to accommodate the forecast traffic generated by the development.

The assessment identified two existing strategic intersections where future capacity constraints are forecast: Gateway Drive / Great South Road / Horotiu Bridge Road and the SH1 Koura Drive

Interchange. However, modelling demonstrates these constraints arise primarily from background regional traffic growth rather than the proposed development. TKE contributes only a small proportion of total traffic at these locations and results in only minor increases in delay and queue lengths, with the exception of the northbound offramp at Koura Drive. Feasible engineering upgrades have been identified for both locations, and it is recommended that TKE provides proportionate financial contributions towards these future network improvements rather than fully funding infrastructure that is principally required to accommodate wider growth.

The proposal has been developed in accordance with Safe System principles and is expected to improve the existing transport environment through lower operating speeds, modern intersection layouts, improved walking and cycling facilities, and a legible industrial road hierarchy. Road safety considerations identified no unacceptable crash trends on the surrounding road network that would preclude the development, and the proposed transport infrastructure is expected to improve overall network safety compared with the existing rural environment. Construction traffic effects will be temporary and can be appropriately managed through implementation of a Construction Traffic Management Plan.

To support the development, staged transport infrastructure is proposed comprising:

- Prior to first occupation: construction of the SH39 access roundabout, a shared path along the southern side of SH39, and a grade-separated walking and cycling crossing of SH39.
- At 400 total peak hour trips: a proportionate financial contribution towards the future upgrade of the Gateway Drive / Great South Road / Horotiu Bridge Road intersection, construction of the Onion Road access, urbanisation of Onion Road between the site access and Holmes Road including walking and cycling facilities, and a proportionate financial contribution towards future improvements at the SH1 Koura Drive Interchange.

Overall, the assessment concludes that the TKE development can be accommodated within the existing and planned transport network in such a way that traffic and transport effects are appropriately managed, subject to the identified mitigations being provided.

1 Experience and Code of Conduct

1.1.1 The following is a statement of the qualifications and experience of the transportation engineers involved in preparing the ITA.

Judith Makinson, Director - CKL NZ Limited

1.1.2 I am a Chartered Professional Transportation Engineer and Director at CKL Ltd with over 25 years' experience in transport planning and assessment, particularly in relation to land use development and infrastructure projects, across the New Zealand and the United Kingdom.

1.1.3 I have extensive experience in the preparation of ITAs, Travel Plans, feasibility studies, and transport masterplanning for both public and private sector clients. My work has involved providing strategic advice on transport effects, network integration, and multimodal outcomes across a wide range of urban development projects. I am regularly engaged as an expert witness in resource management proceedings and have also served as an Independent Hearing Commissioner.

1.1.4 I am a member of the HCC Urban Design Panel, representing Engineering New Zealand, where I provide input on urban development proposals from an engineering and transport perspective.

1.1.5 My professional qualifications and memberships are as follows:

- Chartered Member of Engineering New Zealand (CMEngNZ);
- International Professional Engineer (IntPE NZ);
- Chartered Engineer (CEng), Engineering Council (UK); and
- Member of the Institution of Civil Engineers (MICE), UK.

1.1.6 In recognition of my professional contributions, I was the recipient of the Property Council New Zealand Central Region Women in Property Award and Supreme Winner Award in 2024.

1.1.7 In relation to this application, I have led stakeholder engagement and consultation for transportation matters and undertaken a substantial proportion of the technical transportation analysis. I have provided strategic oversight, advice, and guidance on transport matters, including site visits, transport modelling, and input into the overall development of the project.

1.1.8 I confirm that I have read and agree to comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses (Practice Note 2023). I am a Chartered Member of Engineering New Zealand and confirm that the opinions expressed in this report are within my area of expertise and have been prepared in accordance with my professional obligations.

Jan Franta, Principal Transportation Engineer – CKL NZ Limited

1.1.9 I am a Chartered Professional Engineer with nearly 20 years of experience across New Zealand, the United Kingdom, Europe, and the Middle East.

1.1.10 My professional background spans transport planning, traffic engineering, and civil engineering, with a particular specialisation in geometric design and road safety. This enables me to take a holistic approach to projects, from early concept and strategic planning through to detailed design, consenting, and delivery. I have been involved in a wide range of projects, providing advice on transport effects, network performance, infrastructure design, and road safety.

1.1.11 My professional qualifications and memberships are as follows:

- Chartered Member of Engineering New Zealand (CMEngNZ);
- Chartered Professional Engineer (CPEng), New Zealand; and
- Member of the Chartered Institute of Highways and Transportation (MCIHT), United Kingdom.

1.1.12 In relation to this fast-track application, I have undertaken the geometric design review of intersection designs and provided technical input, including transport modelling advice and guidance on road safety matters associated with the proposed development.

1.1.13 I confirm that I have read and agree to comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses (Practice Note 2023). I am a Chartered Member of Engineering New Zealand and confirm that the opinions expressed in this report are within my area of expertise and have been prepared in accordance with my professional obligations.

Rachel Gasson, Principal Transportation Engineer – CKL NZ Limited

1.1.14 I am a Chartered Professional Transportation Engineer at CKL NZ Ltd with over 10 years' experience in transport planning and engineering across New Zealand and Canada.

1.1.15 My experience is in transportation planning and engineering, with a focus on preparing ITAs, traffic assessments, travel plans, and transport masterplans. I have provided strategic transport advice on project design and network operations, identifying transport effects for all road users. This experience has been gained through working with both private and public sector clients across a wide range of land use activities, including large-scale residential, commercial, and mixed-use developments.

1.1.16 My professional qualifications and memberships are as follows:

- Chartered Professional Engineer (CPEng), New Zealand; and
- Member of Engineering New Zealand (MEngNZ);

1.1.17 In relation to this fast-track application, I have provided technical input including transport modelling advice and guidance on site design and road safety matters associated with the proposed development.

1.1.18 I confirm that, in my capacity as author of this ITA, I have read and agree to comply with the Environment Court of New Zealand's Code of Conduct for Expert Witnesses (Practice Note 2023), and that the opinions expressed are within my area of expertise.

2 Introduction

- 2.1.1 This ITA has assessed the impacts of the proposed TKE Masterplan, subdivision, and development on the transportation network during both the construction and operational phases. The report has been prepared to support Te Kowhai East Limited Partnership's substantive application for approvals under the Fast-track Approvals Act 2024.
- 2.1.2 The Project is a large-scale industrial development located on the north-western edge of Hamilton, adjacent to the established Te Rapa industrial area. The application provides for the creation of an integrated industrial development, including approximately 123ha of developable area supporting some 210 industrial lots, land for neighbourhood centre activities, reserves for recreation, stormwater management and ecological mitigation, and associated roading and infrastructure services. The application also seeks approval for the ultimate land use outcomes anticipated across the site, being predominantly industrial activities, along with a limited range of compatible non-industrial activities suited to an industrial environment. The development will form a logical extension of Hamilton's primary industrial node within the Upper North Island economic corridor and responds to projected growth and demand.
- 2.1.3 A comprehensive description of the Project is provided in the SAR.
- 2.1.4 This ITA includes the following sections:
- **Introduction (Section 2)** – includes an overview of the proposal and report layout;
 - **Site Location (Section 3)** – includes a description of the site location and existing land use;
 - **Existing Transport Environment (Section 4)** – includes a summary of the existing road environment, walking and cycling networks, passenger transport, and safety performance;
 - **Expected Environmental Changes (Section 5)** – includes a description transport network improvements (all modes) planned in the area;
 - **Proposal Details (Section 6)** – includes a description of the proposed development and its proposed transport network and includes an assessment of the proposed transport infrastructure against the WDC DP OiP;
 - **Predicted Travel Data (Section 7)** – includes trip generation and distribution assumptions, and a multimodal trip generation assessment;

- **WRTM Modelling (Section 8)** – includes an assessment of the forecasted base and with development traffic effects;
- **Road Safety (Section 9)** – includes any changes to the predicted levels of personal risk and levels of service to the network;
- **Construction Traffic Effects (Section 10)** – includes an assessment of predicted changes to the network due to construction;
- **Compliance with Strategic Policy and Other Frameworks (Section 11)** – includes an assessment against the WDC DP OiP policies and other national, regional and local transport planning policy documents;
- **Infrastructure Upgrades and Funding (Section 12)** – includes a summary of the infrastructure upgrades and funding recommended to support the project; and
- **Conclusions and Recommendations (Section 13)** – includes a summary of effects, recommendations and overall suitability of the proposal.

2.1.5 These and other matters will be addressed in the detail of the report that follows.

3 Site Location

- 3.1.1 The Project site comprises a large, contiguous landholding located on the north-western edge of Hamilton. It is generally bounded by Te Kowhai Road to the south, Koura Drive and SH1C to the east, and Onion Road to the north. The site is made up of multiple land titles, legal descriptions, and associated physical addresses.
- 3.1.2 For identification purposes, the site is commonly referred to by the primary addresses of 270 Te Kowhai Road and 28 Mathers Road. Full details of the landholdings are provided in the SAR. The site is identified in Figure 1 below.



Figure 1: Te Kowhai East Site

- 3.1.3 Primary access to the subdivision will be via a new roundabout on Te Kowhai Road (SH39) just west of the Koura Drive interchange. A secondary access to the subdivision is a T-intersection located on Onion Road.

4 Existing Transport Environment

4.1 Road Network

4.1.1 TKE is located directly adjacent to significant transport infrastructure, including SH1C which runs north–south immediately to the east, Koura Drive which comprises key entry to the SH1C interchange, and SH39 which runs east–west immediately to the south. Connection from the development to these key transport links is proposed via a new intersection on SH39. The development area is also connected to the existing road network via Onion Road which provides local and sub-regional connectivity.

4.1.2 The location of TKE and the surrounding roading network is shown in Figure 2.



Figure 2: Aerial Photograph of the Site¹

¹ Waikato OneView All Data CoLAB

4.1.3 A map showing the location of key roads surrounding the site is shown as Figure 3, with reference numbers used to identify the roads. The characteristics of the roads surrounding the site, including their daily traffic volumes, are summarised in Table 1. The local road vehicle volumes were sourced from Mobile Roads, and the SH1C and SH39 volumes were sourced from NZTA Traffic Monitoring System database.

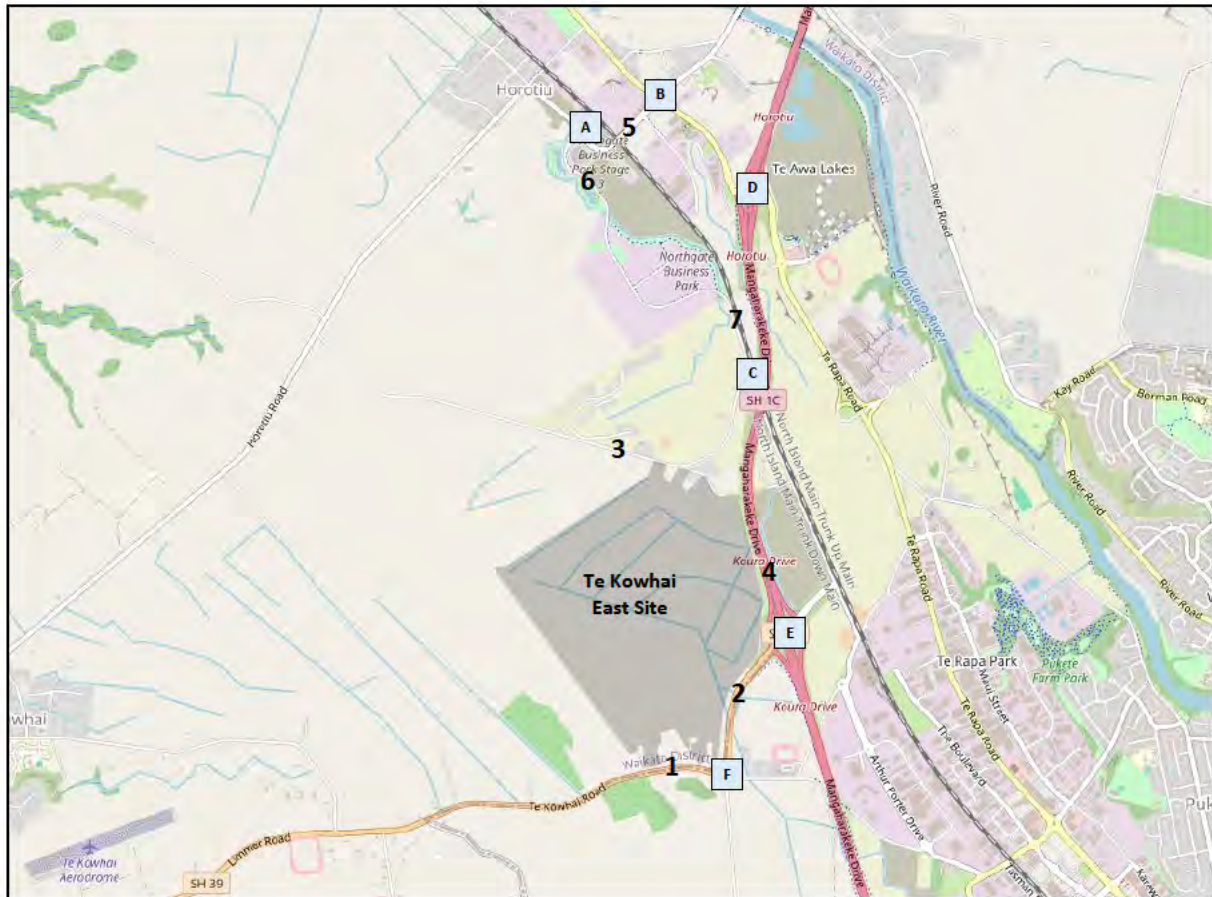


Figure 3: Key Road Section Locations (numbered) and Intersection Locations (lettered)

Table 1: Road Network Characteristics

Map Ref.	Road Environment	Hierarchy	Cross Section
1. Te Kowhai Road (SH39)	Hierarchy	Regional Arterial (WDC)	 Cross Section looking east at access to 268 Te Kowhai Rd
	Speed	80km/hr	
	Existing Cross-Section	Rural road, one lane each way	
	Traffic Volume ²	5,880 vpd, 8% HCV (West of Duck Rd, 2025)	
2. Koura Drive (SH39)	Hierarchy	Regional Arterial (WDC)	 Cross Section looking north between Te Kowhai Rd and Koura Drive Interchange
	Speed	80km/hr	
	Existing Cross-Section	Rural road, divided carriageway, one lane each way with auxiliary lanes approaching interchange	
	Traffic Volume	No data available	
3. Onion Road	Hierarchy	Local (WDC)	 Cross Section looking east at access to 239 Onion Rd
	Speed	80km/hr	
	Existing Cross-Section	Rural road, one lane each way	
	Traffic Volume ³	444 vpd, 7% HCV (East of Mathers Rd, est 2025)	

² Sourced from NZTA Traffic Monitoring Sites Database for 2025 year (AADT)³ Sourced from Mobileroad.org for local roads and NZTA for State Highways March 2026

4. SH1C	Hierarchy	National Route (WDC)	 Cross Section looking north, north of Koura Drive Interchange
	Speed	100km/hr	
	Existing Cross-Section	Rural road, divided carriageway, two lanes each way	
	Traffic Volume	13,159 vpd, 9% HCV (South of Koura Drive overbridge, 2025))	
5. Gateway Drive	Hierarchy	Local (WDC)	 Cross Section looking southeast, between of Horotiu Road and Kohia Drive
	Speed	60km/hr	
	Existing Cross-Section	Urban road, one lane each way, shared path on one side of the road	
	Traffic Volume	424 vpd (5% HCV)	
6. Kohia Drive	Hierarchy	Local (WDC)	 Cross Section looking north at 134 Kohia Drive
	Speed	50km/hr	
	Existing Cross-Section	Urban road, one lane each way, shared path on one side of the road	
	Traffic Volume	404 vpd (6% HCV)	
7. Holmes Road	Hierarchy	Local (WDC)	 Cross Section looking south between Kohia Drive and Onion Road
	Speed	80km/hr	
	Existing Cross-Section	Rural road, one lane each way with sealed shoulders	
	Traffic Volume	No data available	

4.1.4 The forms of intersection control between these corridors are summarised in Table 2, with the location of each intersection shown in Figure 3. Letters have been allocated to each intersection for reference.

Table 2: Intersection Controls

Map Ref.	Name	Form of Control	Layout ⁴
A	Gateway Drive / Kohia Drive	Single lane roundabout (approximately 50m diameter)	
B	Gateway Drive / Great South Road / Horotiu Bridge Road	Traffic signals	
C	Onion Road / Holmes Road	Give Way on Onion Road West Approach	
D	Horotiu Interchange	Grade separated interchange (Great South Road/Te Rapa Road over Waikato Expressway) with two roundabouts controlling the on and off ramps	
E	Koura Drive interchange	Grade separated interchange (Koura Drive over Waikato Expressway) with Stop controlled off ramps and Give Way control on left turns into on ramps	

⁴ Photos sourced from WDC IntraMaps or HCC GIS Maps

Map Ref.	Name	Form of Control	Layout ⁴
F	SH39 / Burbush Road roundabout	Single lane roundabout (approximately 58 diameter)	

4.1.5 The roading hierarchy in the surrounding HCC area is summarised in Figure 4. The network includes a series of existing and planned arterial and collector roads aligned broadly north–south and east–west, forming a connected grid that links directly to SH1C, Te Rapa Road, Wairere Drive, and the surrounding industrial and residential precincts, providing a strong transportation framework to support the future anticipated growth in the area.

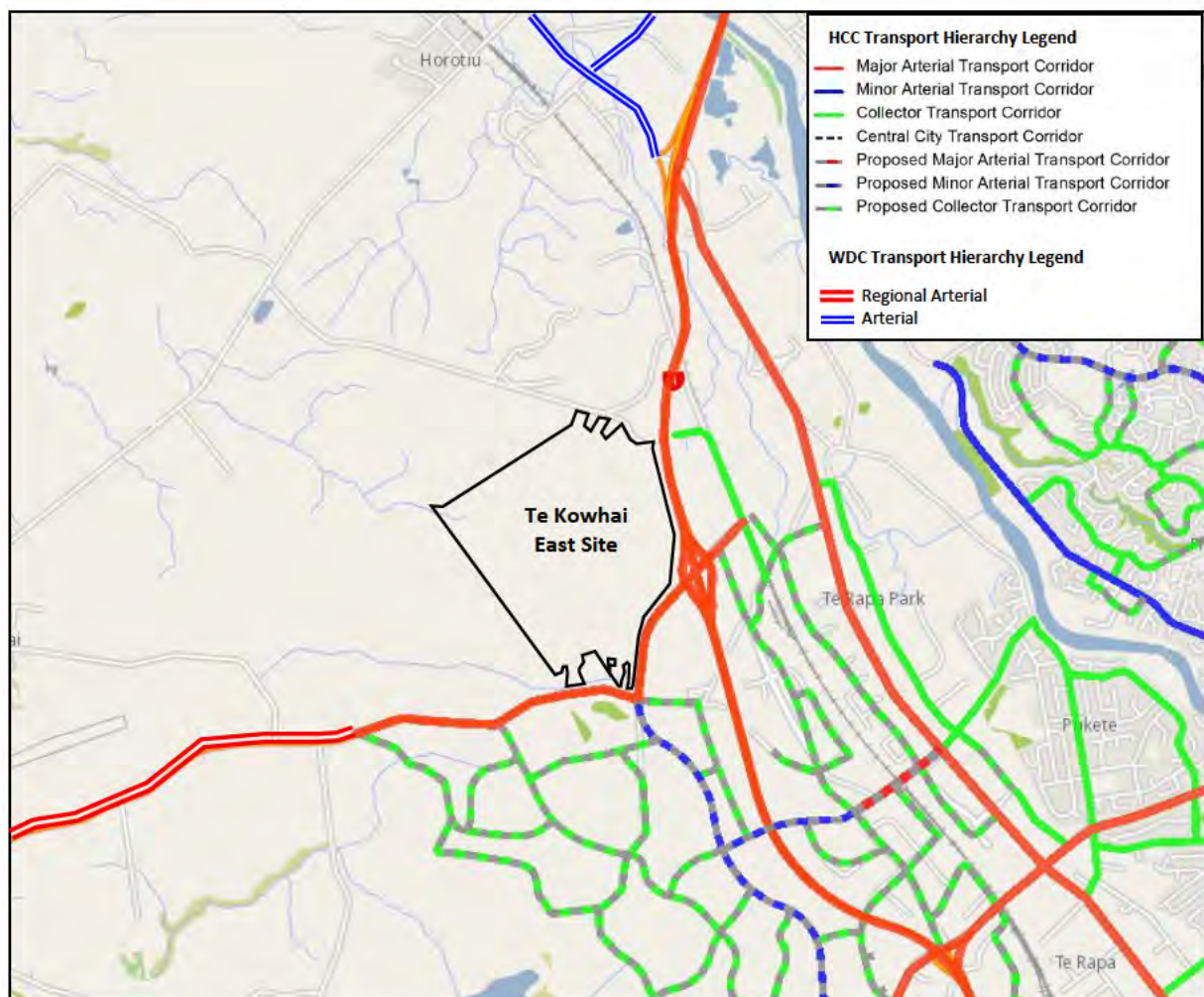


Figure 4: Transport Corridor Hierarchy

4.1.6 It is noted that WDC tabulates their road hierarchy and does not present it visually. Of relevance to TKE are the following roads, which are shown in Figure 4 above:

- SH39 – regional arterial road (HCC’s jurisdiction stops at Exelby Rd, WDC’s jurisdiction includes full extent of SH39 to the southern district boundary where it adjoins Otorohanga District);
- Great South Road –arterial road; and
- Horotiu Bridge Road – arterial road.

All other roads of relevance are classed as local roads, including Gateway Drive, Kohia Drive, Holmes Road and Onion Road.

4.2 Walking and Cycling

4.2.1 At present there is limited direct footpath connectivity for the site given the surrounding rural environment.

4.2.2 To the east of the site is a north-south cycle route along SH1C as shown in the Hamilton bike network. There are also shared paths provided on each side of the approach roads at the SH39 / Burbush Road roundabout. These do not currently connect directly with any other off-road facilities, however they do enable access to Te Kowhai Road and the SH1C shared path.

4.2.3 Onion Road north of Koura Drive to Holmes Road was recently upgraded to a peri urban standard including a shared path. There is also a shared path to the east of Holmes Road and along Kohia Drive to provide walking and cycling connectivity to the Northgate Industrial Park.

4.2.4 The SH1C path continues south where it joins to Wairere Drive. From this point, cyclists can connect with the Hamilton bike network that includes on road paths to the south along the SH1/Avalon Drive corridor, and a combination of on road lanes and off-road paths to the east, around Wairere Drive. This part of the Hamilton bike network is shown below as Figure 5.



Figure 5: HCC Existing Bike Network around Koura Drive

4.2.5 Figure 6 below highlights the area that is within a 20-minute cycling distance from the site as indicated by the blue point marker based on the current cycling network. This area includes most of Rotokauri including the public transport hub as indicated by the red star. The Northgate Industrial Park is also within a 20-minute cycling distance and this distance is expected to reduce with proposed new roads and connectivity within the subject site.

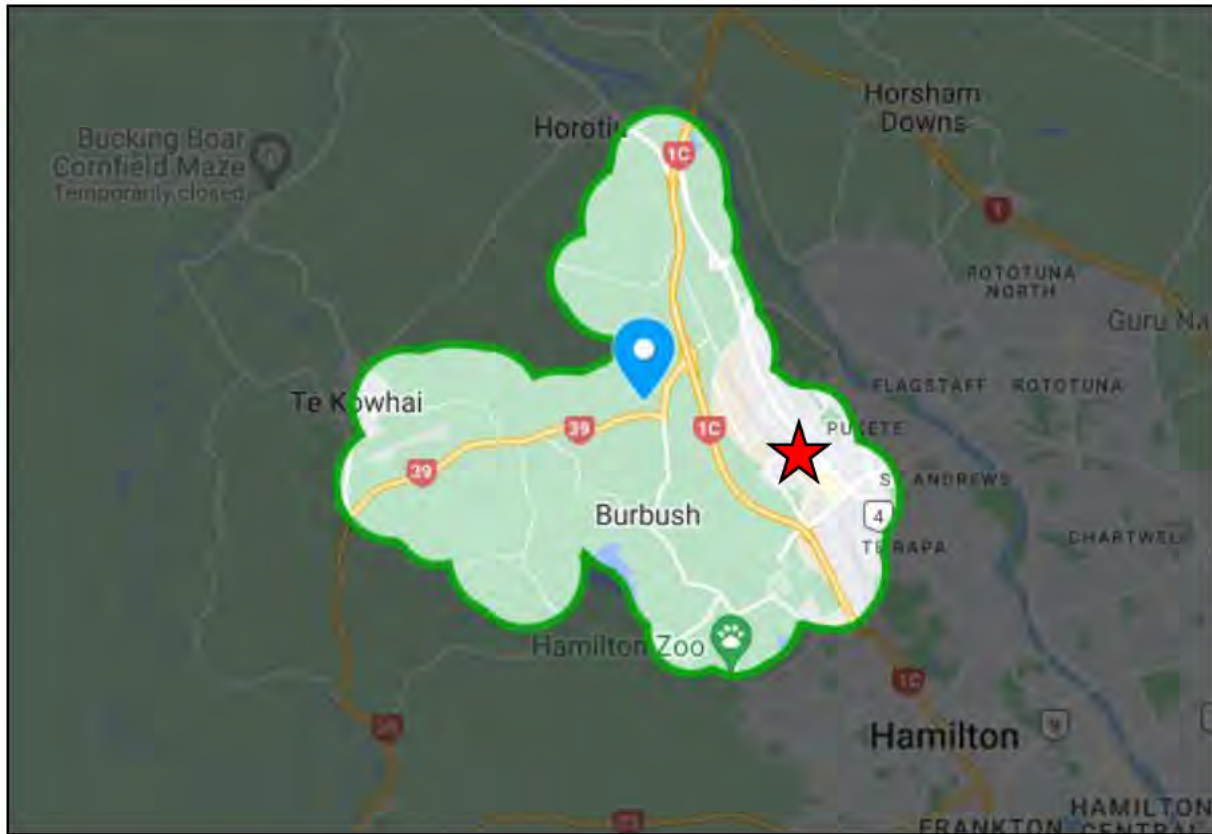


Figure 6: 20-Minute Cycling Contour

4.3 Public Transport

- 4.3.1 There is no existing public transport infrastructure in close proximity to the site, which reflects the existing rural environment.
- 4.3.2 The Rotokauri Public Transport Hub is located to the southeast of the site in the Te Rapa Gateway area of Hamilton, with additional connectivity to public transport being available via The Base shopping centre.
- 4.3.3 The Nawton and Orbiter services can be accessed from the Rotokauri Transport Hub, with the Comet, Pukete, Te Rapa and Northern Connector services available at The Base. These services connect to the Transport Centre in the Hamilton CBD and provide access to various residential, commercial and educational destinations around the city as shown in Figure 7.

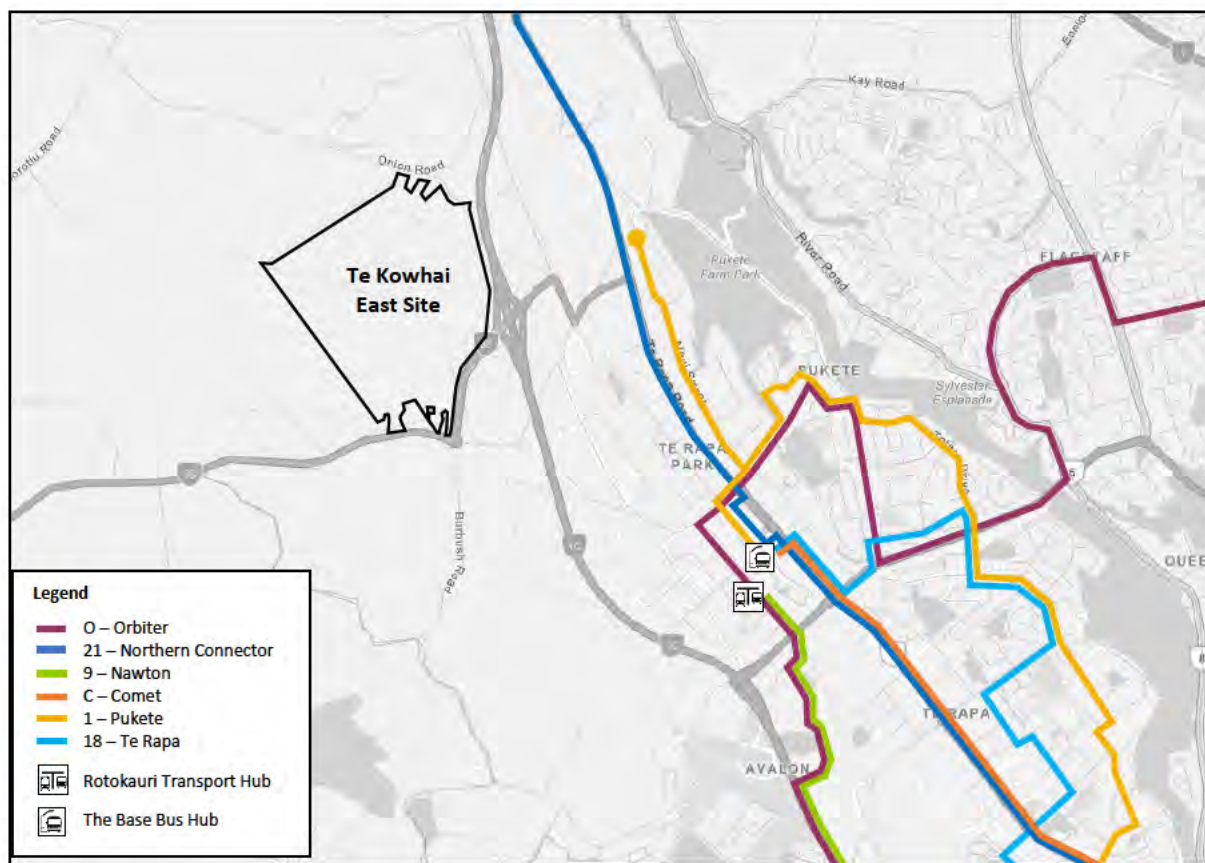


Figure 7: Public Transport Infrastructure and Services

4.3.4 The nearest pair of bus stops are located on Te Rapa Road, immediately north of Hutchinson Road, approximately 5 km from the Orion Road site access. While the pair of bus stops located on Te Rapa Road immediately north of Old Ruffell Road are geographically closer to the site, the practical travel distance for both pedestrians and vehicles is greater due to the absence of a nearby railway crossing.

4.4 Road Safety

4.4.1 A search was made of the NZTA Crash Analysis System for all crashes that had been reported within the subject area shown in Figure 8 below between 2021 and 2025, inclusive of any crashes that occurred in 2026.

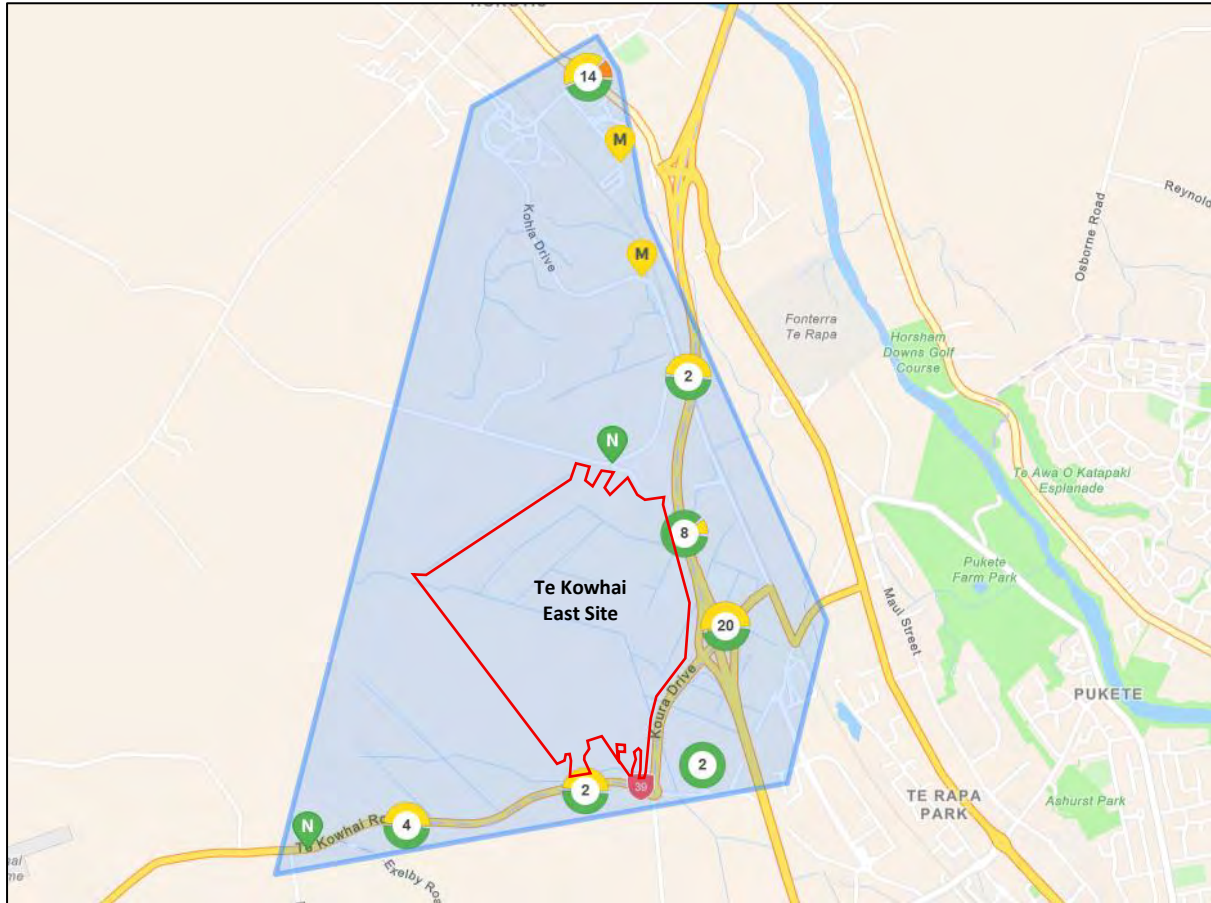


Figure 8: CAS Diagram

- 4.4.2 The search found 56 crashes had been reported which equates to an average of 11 crashes per year. Of the 56 reported crashes, 2 resulted in serious injuries, 24 resulted in minor injuries, and the remaining 30 resulted in property damage only. Crashes predominantly occur at intersections, with a higher number of crashes observed at the intersections which experience higher traffic volumes. This trend is expected as there is greater potential for vehicle conflict at intersections with high volumes.
- 4.4.3 The two intersections of note are the Koura Drive Interchange and the Great South Road / Gateway Drive / Horotiu Bridge Road intersections at which 16 and 14 crashes occurred respectively. This equates to 54% of the crashes within the study area. It is noted that the crash map above shows 20 crashes at the Koura Drive Interchange, however the cluster includes two crashes which occurred at the intersection of Koura Drive / Onion Road, and two crashes which occurred on SH1C beneath/near the interchange. As such, the number of crashes at the interchange intersections is 16.

- 4.4.4 Of the 16 crashes that occurred at the Koura Drive Interchange, 13 of these occurred at the SH1C / Koura Drive off-ramps: 9 were minor injury crashes, and 7 resulted in damage to property only. The crash types included 13 drivers failing to give way, two rear ends, and one international driver travelling the wrong way. This finding is in keeping with a high-volume stop controlled intersection.
- 4.4.5 The crash history at the Great South Road / Gateway Drive / Horotiu Bridge Road intersection includes two serious injury crashes, six minor injury crashes, and six crashes which resulted in damage to physical property only. The crashes that resulted in a serious injury are each summarised below:
- One occurred on Great South Road at around 1am when a light vehicle crashed into a pedestrian when undertaking wheelspins. The crash occurred during a large scale anti-social road user event, where the pedestrian was a participant.
 - One occurred on Great South Road around 9.30am on a weekday morning. A light vehicle did not stop at a steady red light and crashed into a truck. The crash report states there was light rain and that it was overcast.
- 4.4.6 The 12 minor and non-injury crash types at the intersection of Great South Road / Gateway Drive / Horotiu Bridge Road include three loss of control crashes, three rear end, one merging, one head on, one driver evading enforcement, one parked vehicle, one driver failing to stop at a steady red light, and one crash when the traffic signals were turned off. These crashes are considered reflective of a high traffic volume signalised intersection, as is the second of the serious injury crashes.
- 4.4.7 The remaining 26 crashes were distributed throughout the study area as shown in Figure 8. These minor and non-injury crash types include 21 loss of control crashes, two failures to give-way, two rear ends, and one overtaking crash. The notable number of loss of control crashes reflect the rural nature of the existing environment and the large study area considered, noting there is no single location where a large number of these crashes occurred.
- 4.4.8 The overall summary of crash types is provided in Table 3.

Table 3: Crash Type Summary

Crash Type	Number	%
Loss of Control	24	43
Failed to Give-Way	15	27
Rear end	7	13
Failed to Stop at steady red light	2	4
Merging/overtaking	2	4
Pedestrian	1	2
Head On	1	2
Parked Vehicle	1	2
Evading enforcement	1	2
Signals turned off	1	2
Wrong way	1	2
Total	56	100%

4.5 MegaMaps Analysis

4.5.1 The NZTA MegaMaps database has been used to identify both the personal and collective risk ratings for the road corridors described above.

- Collective risk is the measure of how likely a crash is to happen along a given stretch of road network; and
- Personal risk relates to the chance that if a crash does occur that it involves a given individual. It is not unusual to see higher personal risks on a road, particularly when there are low traffic numbers.

4.5.2 Figure 9 below shows a pictorial representation of the road network MegaMaps risk ratings and Table 4 below is a summary of the MegaMaps Risk Ratings for surrounding roads.

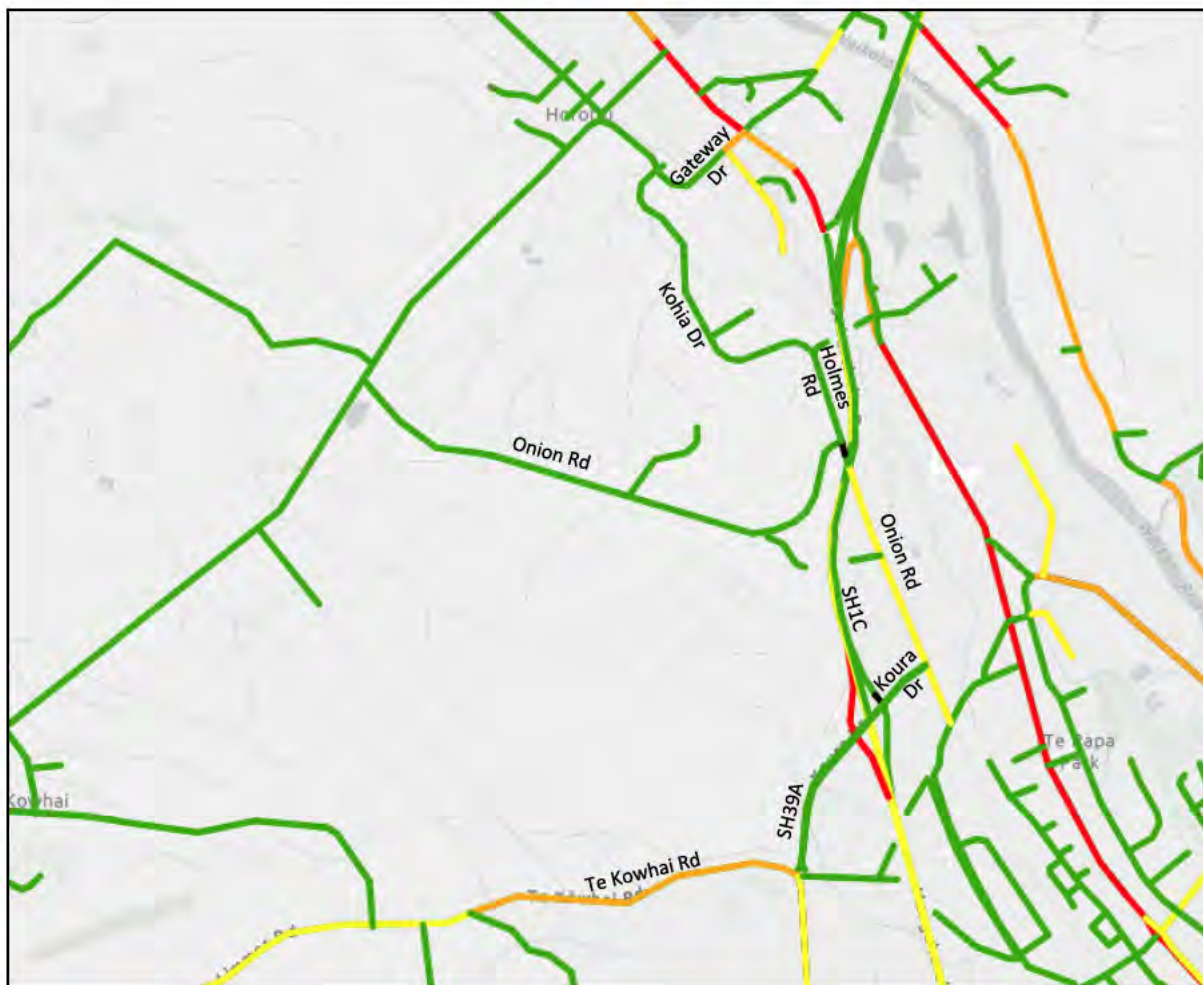


Figure 9: MegaMaps Image of Surrounding Road Network – Collective Risk

Table 4: MegaMaps Risk Ratings

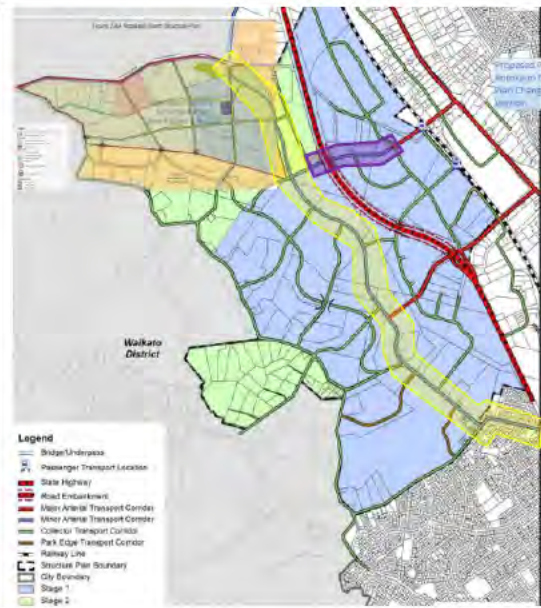
Road	Section	Collective Risk	Personal Risk
Te Kowhai Road (SH39)	Exelby Road – Koura Drive	Medium	Low
Koura Drive (SH39)	Te Kowhai Rd – Onion Rd	Low	Low
Onion Road	Holmes Rd – Horotiu Rd	Low	Low
SH1C	Waire Dr – SH1	Low Medium	Low
SH1C NBD Off-Ramp at Koura Dr	-	Medium-High	Medium-High
SH1C NBD On-Ramp at Koura Dr	-	Medium-High	Medium
SH1C SBD Off-Ramp at Koura Dr	-	High	High
SH1C SBD On-Ramp at Koura Dr	-	Low	Low
Gateway Drive	Evolution Dr – Great South Rd	Medium	Medium
Kohia Drive	Gateway Dr – Holmes Rd	Low	Low
Holmes Road	Onion Rd – Kohia Rd	Low	Low

- 4.5.3 The associated personal and collective risk ratings outlined in Table 4 above are considered to align with the observed crash record in the vicinity of the site. All road corridors/segments, excluding the SH1C ramps, operate at low to medium risk ratings. This level of risk rating is considered acceptable.
- 4.5.4 The on and off ramps at Koura Drive all operate at medium to high risk. This is considered to be an existing issue, which is likely attributable to the stop control crossroad intersections that are provided at the interchange.

5 Expected Environmental Changes

5.1.1 Two roading projects are identified for funding within HCC's LTP 2024-2034 that are relevant to the site. These are summarised in Table 5.

Table 5: HCC LTP Funded Projects

Project Name & Indicative Location	Description	Funding (Net Total \$000)
Rotokauri Minor Arterial Transport Upgrades 	The project includes the designation and construction of the arterial corridor highlighted in yellow. It also provides connections from the Rotokauri arterial road to Te Rapa Road via Wairere Drive, together with an extension of Te Kowhai East Road, as shown in purple. These connections will improve connectivity between TKE and the wider transport network.	\$56,392 2024/25 to 2033/34
Northern River Crossing 	New roading connection and bridge across the Waikato River (shown in yellow dash line) to connect growth in Rototuna with the Expressway.	\$6,066 2029/30 – 2030/31

5.1.2 The Rotokauri Structure Plan and the RNSP utilise a north-south arterial transport corridor (highlighted in yellow in Table 5) that runs from the SH39A/Burbush Road/Koura Drive roundabout in the north to Rotokauri Road, Baverstock Road and Avalon Drive in the south.

HCC is working with a private developer with regard to the delivery of the north-south portion of the Rotokauri Arterial network, notably from Te Wetini Drive to Te Kowhai Road. The east-west extension of Te Kowhai East Road will be extended under SH1C in the future and will assist in providing a grid network of arterial roads. The construction timeframe of both sections is unknown.

- 5.1.3 The RNSP is also expected to deliver a new roading network as shown in more detail in Figure 10. The RNSP envisages a new roundabout and collector road connection on SH39 to the west of the TKE site. The RNSP area also accommodates the northernmost section of the Rotokauri arterial road and its connection to the current SH39 / Burbush Road roundabout.
- 5.1.4 It is also understood that HCC has recently acquired land within RNSP and opposite the TKE site for the provision of the Rotokauri Sports Park, which is located adjacent to the site on the southern side of Te Kowhai Road (SH39).

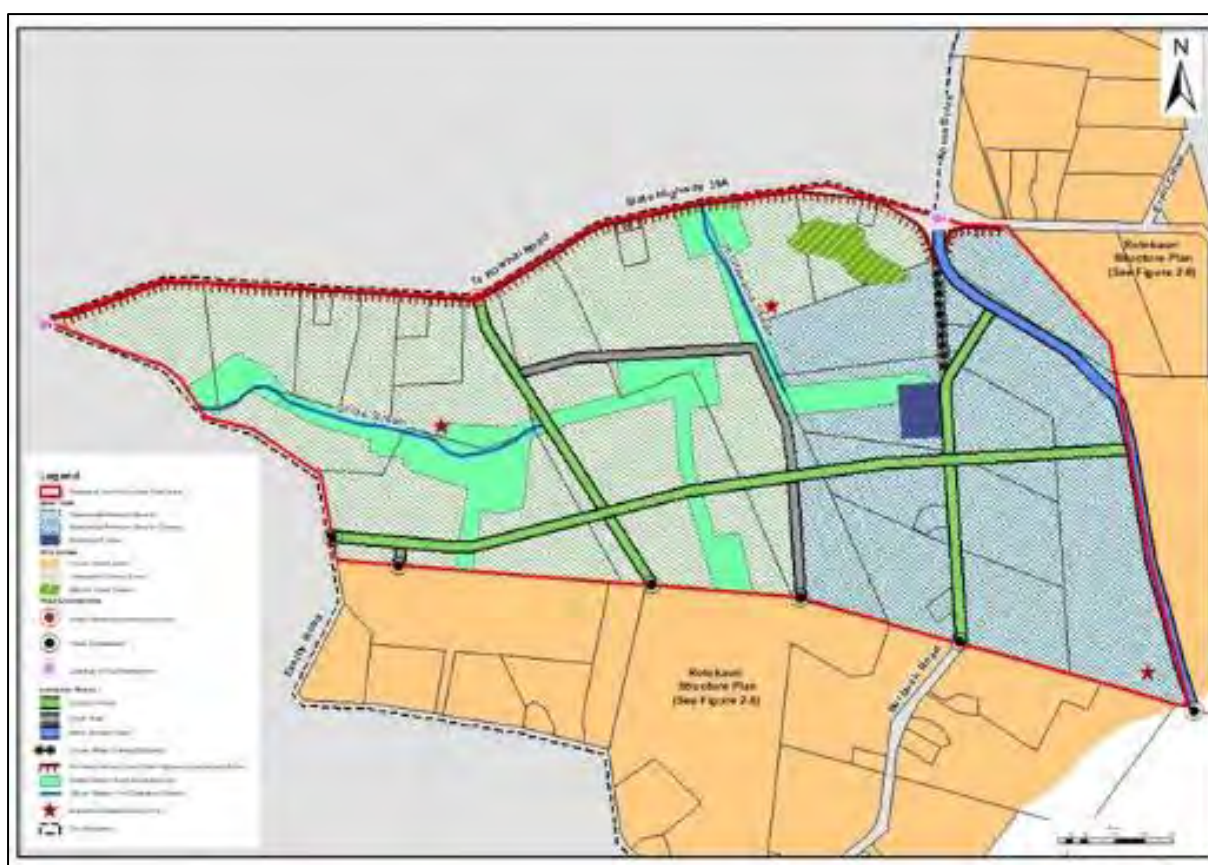


Figure 10: RNSP Roding and Transport Networks⁵

⁵ Source HCC ODP Volume 2, Appendix 2 Structure Plans, Figure 2-9: Rotokauri North - Staging and Transport Network

5.1.5 The Northern River Crossing identified in Table 5 is part of the city-wide transport programme, envisaged to connect from Kay Road in the east to Koura Drive in the west. It is expected to relieve pressure on the Pukete Bridge and connect the growing areas of Rototuna and Te Rapa North. The alignment for the connection is yet to be set, with the project being funded from 2029. Given KiwiRail's position on limiting the formation of new at-grade level crossings, it is reasonable to assume that the Northern River Crossing's interface with the NIMTR will be grade-separated.

5.1.6 While not specifically included in the current HCC LTP to 2034, it is understood that the Koura Drive Interchange has been identified for future upgrade to support the realignment of Onion Road. Correspondence from HCC via email on 26th May 2026 identified that the design is conceptual at this stage, however a single lane roundabout is anticipated to service the southbound off and onramps as shown in Figure 11. Koura Drive is expected to extend over the NIMTR through to Te Rapa Road, with Onion Road being realigned and proposed to connect to the roundabout. The Onion Road realignment will provide a connection between the grade separate roundabout and the land sandwiched between SH1C and the NIMTR. Consultation with NTZA on 10th June 2026 suggested that the form of the new roundabout is not yet set and may be subject to change, or additional infrastructure upgrades such as widening of the overbridge may be required.

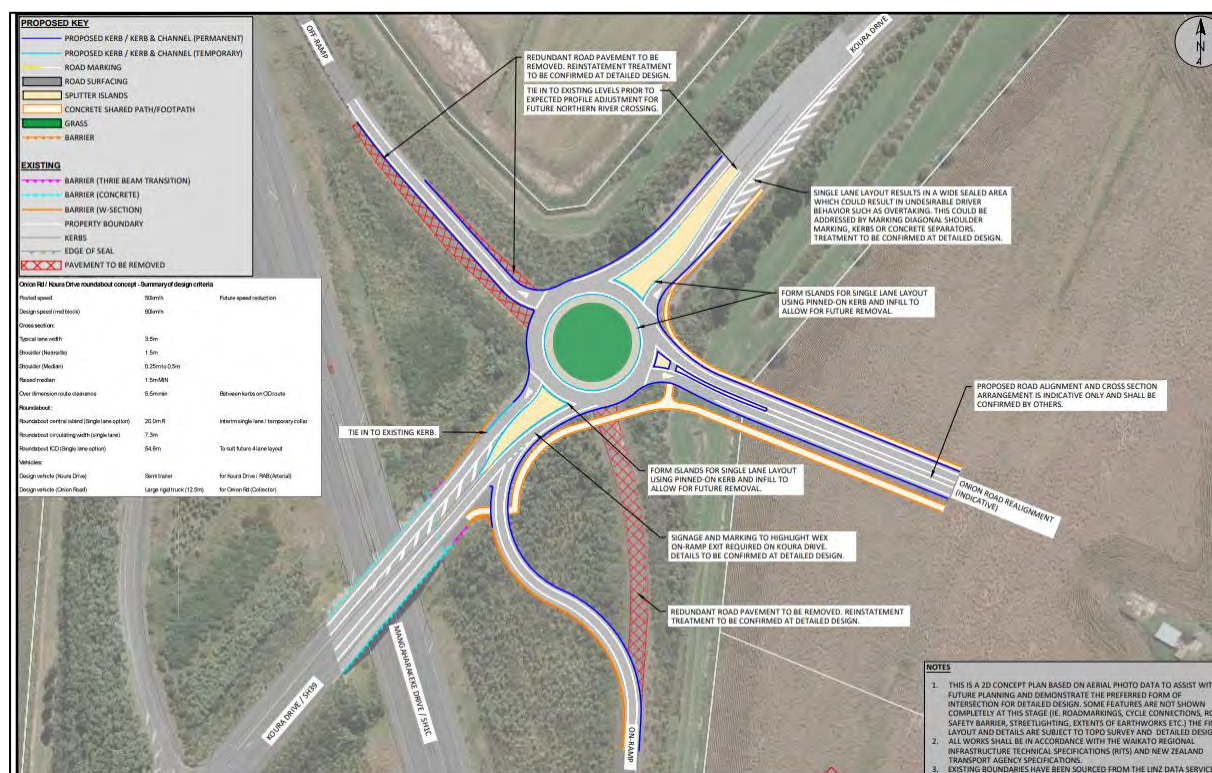


Figure 11: Concept Design for Koura Drive Interchange

5.1.7 Consultation undertaken with WRC on 15th June 2026 provided an update in relation to future public transport provision in the TKE locality. WRC has modelled demands to 2037 and is currently anticipating a public transport service along the Rotokauri arterial road to SH39. The intention of this service is to serve the Rotokauri and Rotokauri North catchments. It is understood that there is no firm commitment to the provision of this service and that its delivery will be dependent on the timing of the supporting land development.

6 Proposal Details

6.1 Land Use

6.1.1 The proposal involves the establishment of an integrated industrial development comprising approximately 123ha of developable area supporting some 210 industrial lots, land for neighbourhood centre activities, reserves for recreation, stormwater management and ecological mitigation, and associated roading and infrastructure services.

6.1.2 Further detail on the proposed land use is provided in the SAR.

6.2 External Connectivity

6.2.1 The TKE site plan, with a focus on the proposed transport network, is shown in Figure 12. A collector road is proposed to loop within the site and provide the site's access intersections to the existing road network at SH39 (south) and Onion Road (north), as shown in orange in Figure 12. All other roads within the site are proposed to be local roads. The design of each intersection will be subject detailed design and post construction safety audits.

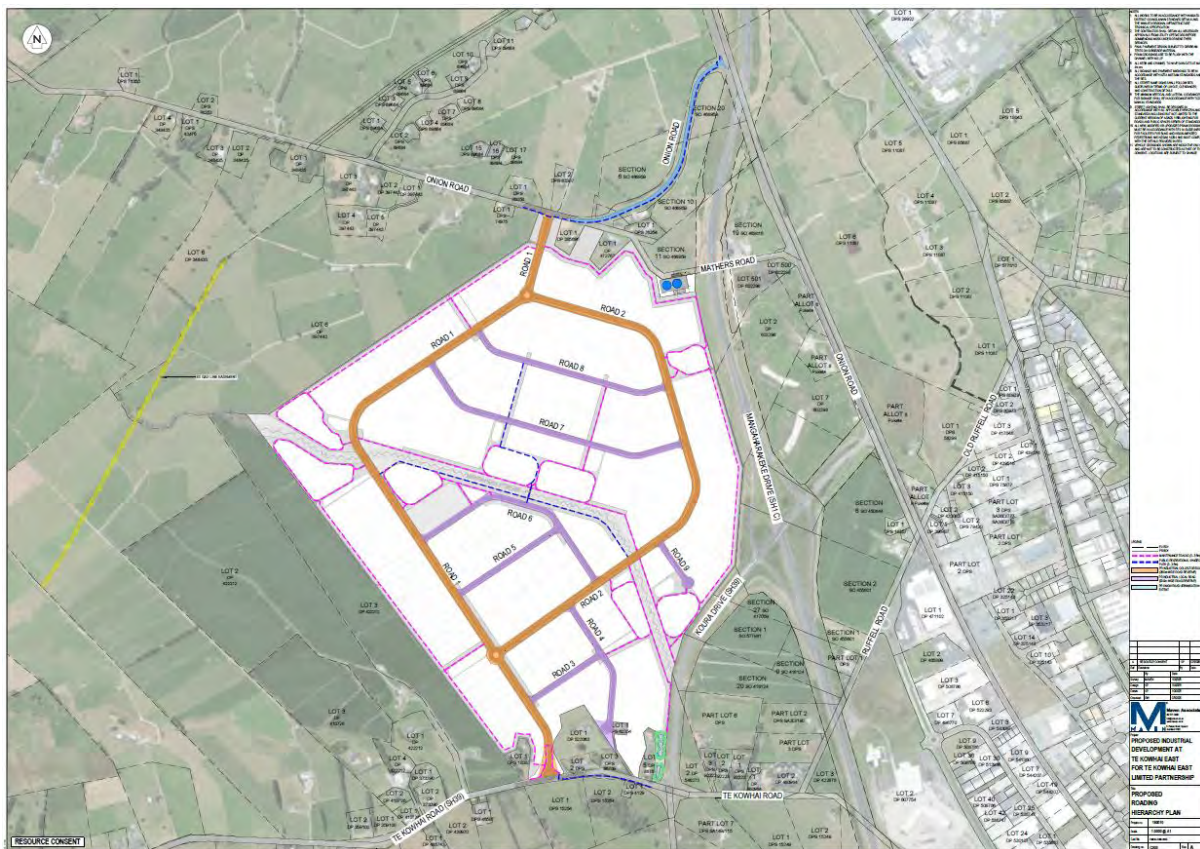


Figure 12: Road Network Concept Plan

6.2.2 The two access intersections will connect the site to the existing road network. A single lane 42m diameter roundabout is proposed at the SH39 intersection, which is to be accommodated within the site and the existing road boundary, as per the concept design shown in Figure 13. No additional land is required for the concept design, with the roundabout concept being designed for the prevailing 80 km/hr speed limit along SH39 and to relevant Austroads⁷ standards.

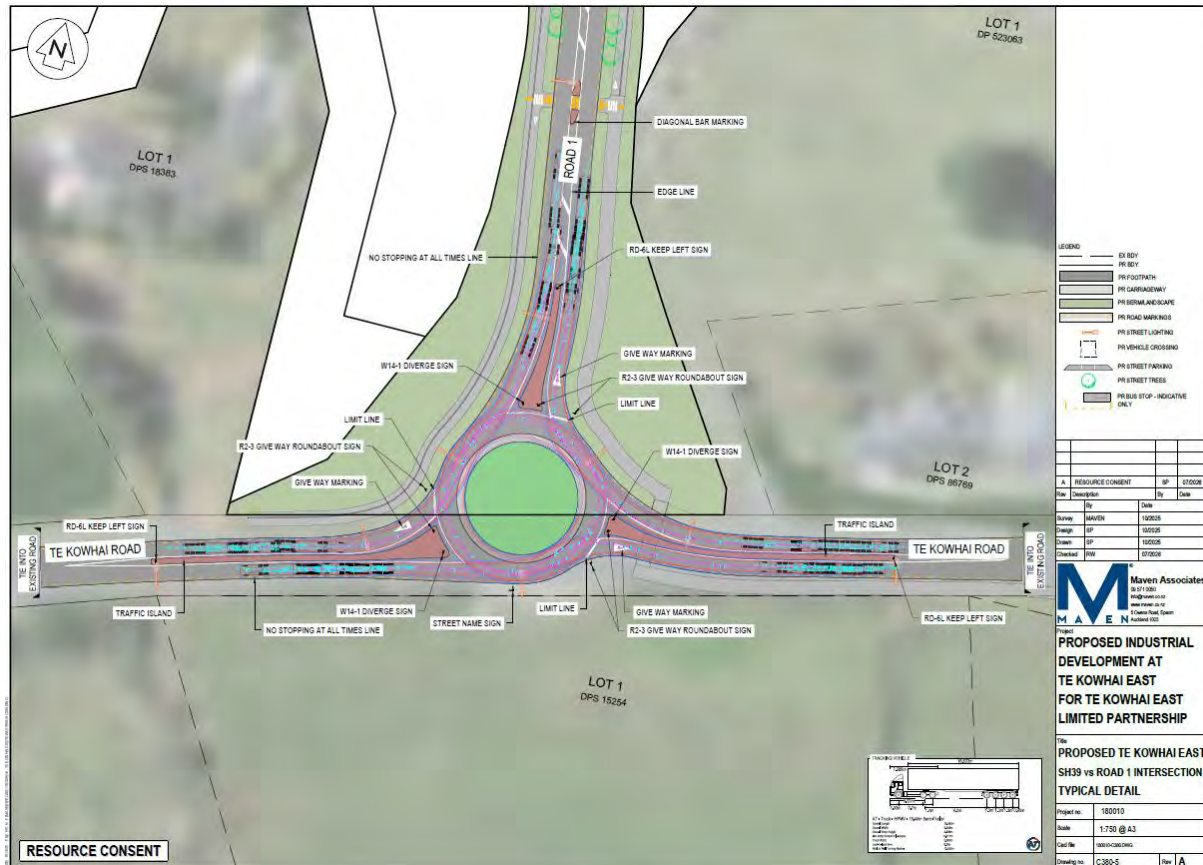


Figure 13: SH39 / Link Road Intersection Concept Design

6.2.3 Consultation with NZTA has been undertaken regarding the general form and location of this roundabout on 10th June 2026. NZTA was satisfied with the principle of the roundabout design at this meeting and no further feedback has been received regarding this to date.

6.2.4 It was also confirmed by NZTA during this consultation that urbanisation of SH39 as part of TKE was not considered appropriate as TKE of itself would be unlikely to alter the transport environment of this section of SH39. However, a shared path is included along the south side

⁷ Austroads Guide to Road Design Part 4B Roundabouts Ed3.2

of SH39 between the site access roundabout and the SH39 / Burbush Road roundabout as agreed with NZTA in discussions on 10th June 2026 and 23rd June 2026. This path is to include a grade separated crossing of SH39, and is described in more detail in Section 6.8 below.

- 6.2.5 The Onion Road intersection at the north end of TKE will be a give-way priority-controlled intersection and is shown in Figure 14 below. This includes a right turn bay on Onion Road for safety considerations rather than traffic volumes. It is noted that visibility to the east complies with the Austroads requirements for an 80km/hr speed environment⁸, however visibility to the north is limited due to the vertical crest in that direction. As such, it is anticipated that the speed limit on Onion Road needs to be reduced to 60km/hr (i.e. 70km/hr speed environment) at such time that the Onion Road connection is made.

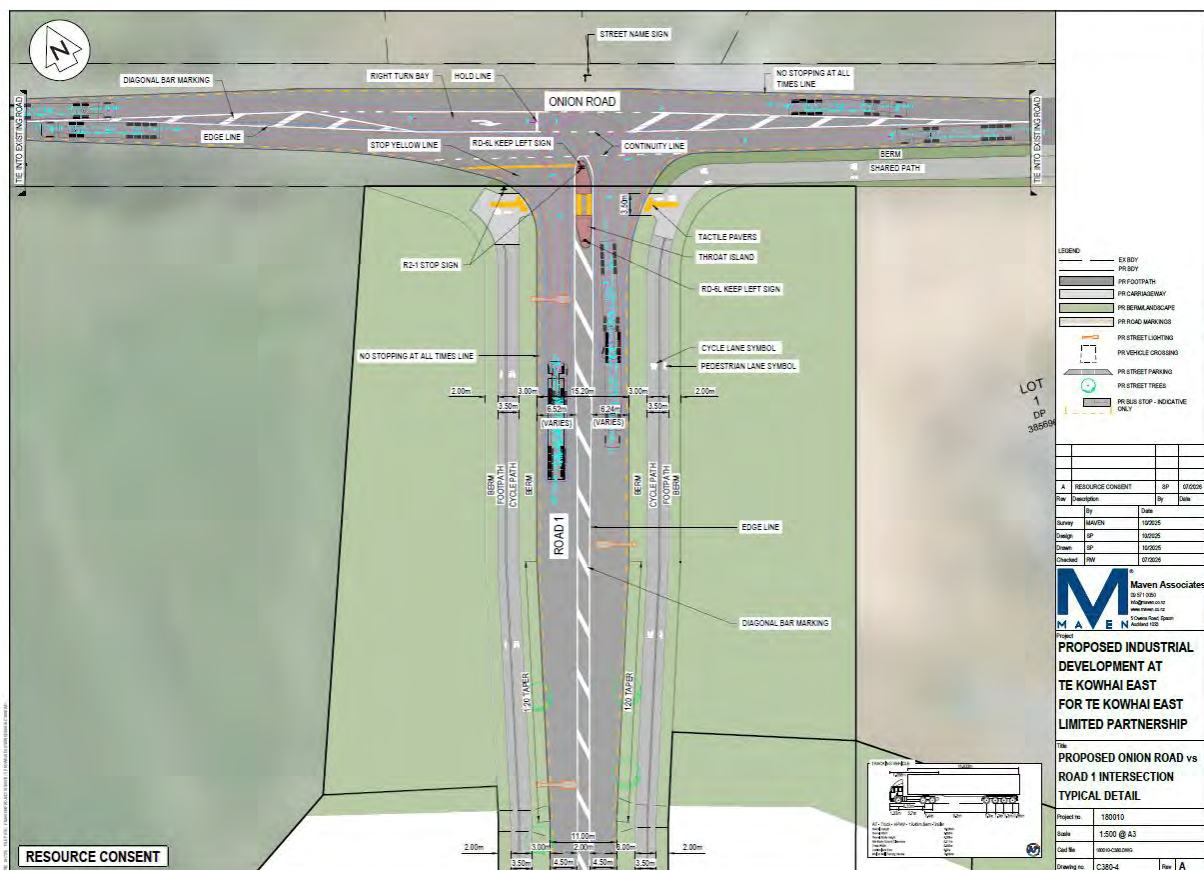


Figure 14: Onion Road / Link Road Intersection Concept Design

⁸ Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersection Ed3.2 with speed environment based on speed survey undertaken on 19th April 2026

6.2.6 During consultation with WDC on 17th June 2026, WDC confirmed that in order to support a reduced speed limit, Onion Road would need to reflect a peri-urban form rather than its current rural form. Their expectations of a peri-urban form, based on the current guidelines, are that it would include:

- Kerb and channel; and
- Footpath and cycle connectivity.

6.2.7 A footpath and cycle path are included at the new Onion Road intersection, including a pedestrian refuge island across the new TKE collector road to assist onwards walking and cycling connectivity. The intersection concept also allows for onwards extension of the walking and cycling network to the west at some point in future, dependent on WDC network planning or development by others. The alterations to Onion Road as part of the TKE development are considered to support the future peri-urban nature of the road and therefore a reduced speed limit.

6.2.8 In addition to the site accesses, the TKE site triggers the need for the intersection of Onion Road and Holmes Road to be upgraded to include a right turn bay. Figure 14 shows a concept design for this intersection.

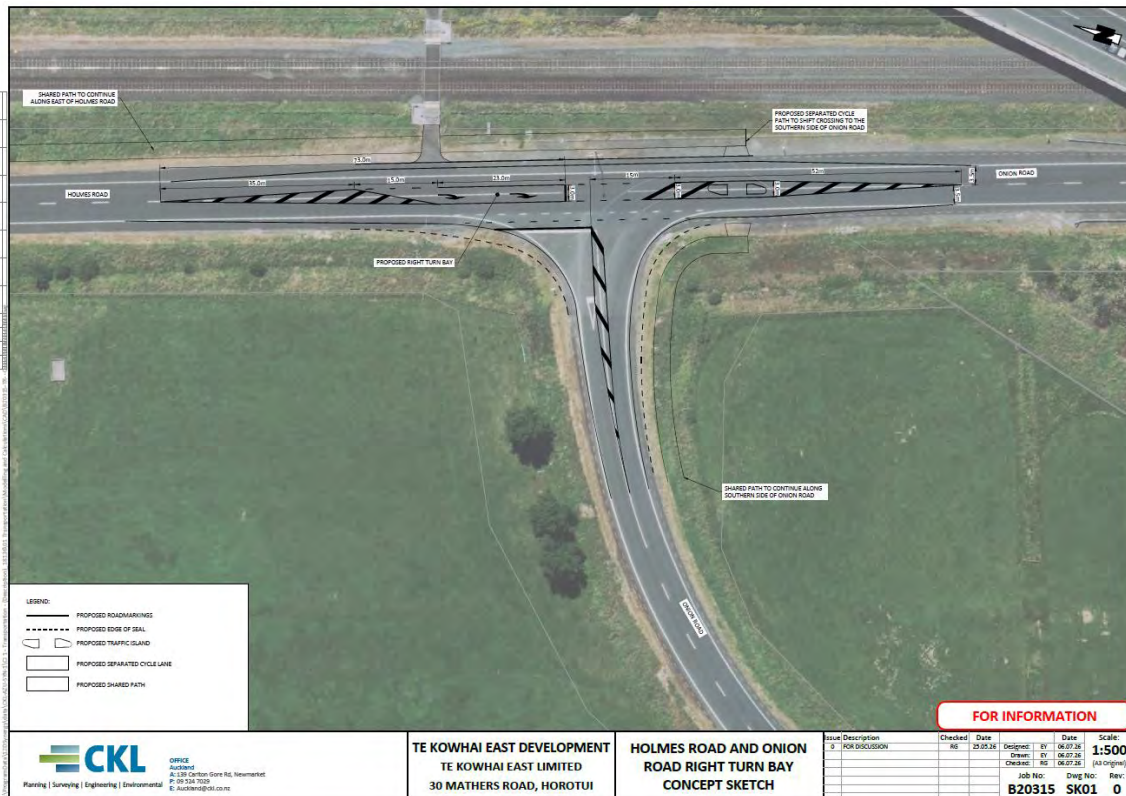


Figure 15: Onion Road / Holmes Road Intersection Concept Design

- 6.2.9 As a result of the right turn bay, the existing cycle crossing location has been relocated from the north approach to the south approach, with the upgrade design including a refuge island. This design assumes a 60km/hr speed environment based on the future peri-urban nature of the road, noting that refuge islands are not provided in high-speed rural environments.
- 6.2.10 The design also includes a shared path facility on the eastern side of Holmes Road, which is to connect to the existing shared path on Kohia Drive.

6.3 Internal Connectivity and Networks

- 6.3.1 The internal road network has been developed to reflect the industrial nature of the TKE development and to support high levels of multimodal connectivity. Negligible traffic is forecasted to travel through the industrial development, with the roads primarily providing access. As such, a feeder collector road is proposed to loop around the site, which is to be supported by local roads.

Industrial Collector Road – 28.0m

- 6.3.2 Collector roads facilitate movement of goods and people between local destinations or to higher order transport corridors for further travel and also provide some property access. Within the ONF⁹, collector roads are generally classified as either Urban Connectors or Local Streets depending on the roadside environment, and surrounding land uses. The collector road proposed for TKE will operate most comparably to an urban connector.
- 6.3.3 Two proposed typical Industrial Collector Road cross-sections are shown in Figure 16 below, one showing an example on a section of road without on street parking, and one showing a section of the proposed road with on street parking.

⁹ One Network Framework (ONF): NZ Transport Agency Waka Kotahi national road and street classification framework based on movement and place functions

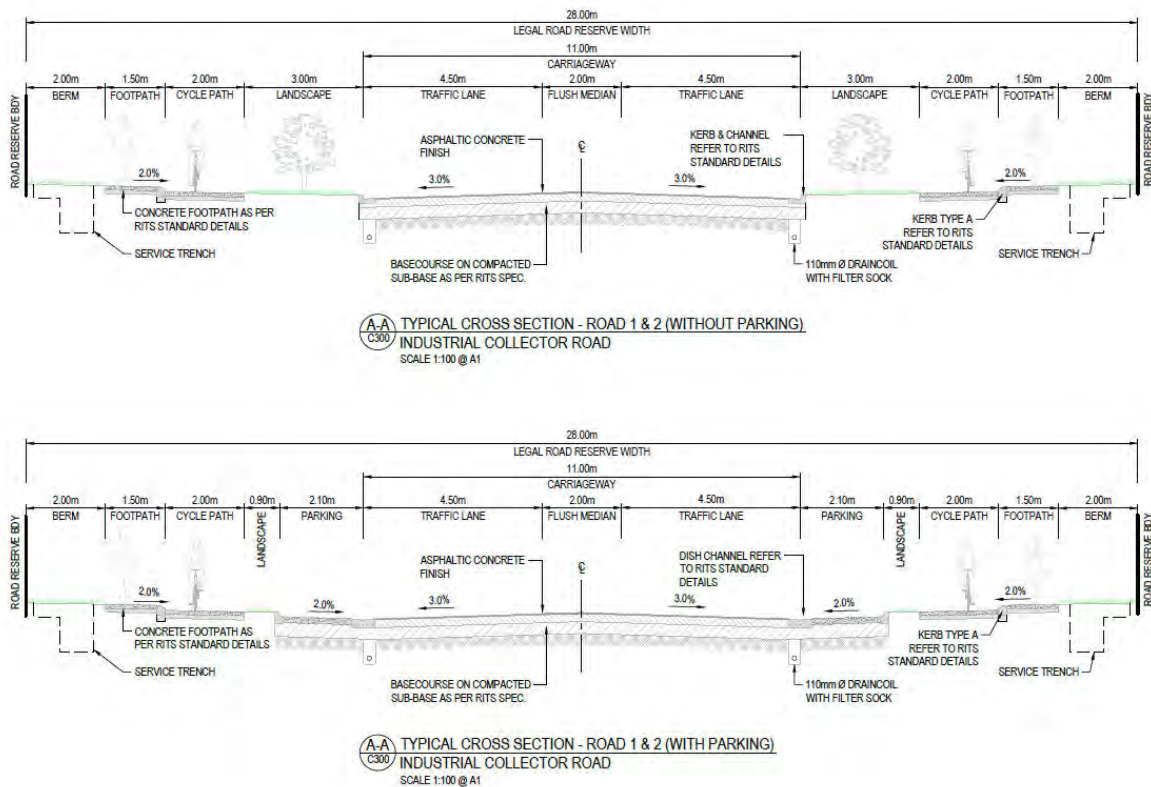


Figure 16: Cross-section of Industrial Collector Road

- 6.3.4 Both cross sections include footpaths on both sides, berms for services, active transport facilities, and incorporate underground services and stormwater infrastructure within the corridor.
- 6.3.5 The proposed industrial collector road cross section has been assessed against Part 2 TRPT Table 12 of the WDC DP OiP and summarised in Table 6. The cross section proposed was influenced by the HCC District Plan requirements, as well as other recently built or upgraded industrial collector roads in the area such as Chalmers Road and Kiriwai Kau Drive in the Te Rapa Gateway area.

Table 6: Industrial Collector Road - Proposed and Specified Dimensions

Road	Road Aspect	District Plan	Proposed	Complies With District Plan	Commentary
Collector - Industrial	Number of Allotments or Activities	>100	210 within the TKE site	Complies	Expected to comply at subsequent stages.
	Design Speed (km/h)	50	50	Yes	The design supports a future 50km/hr speed limit
	Design Vehicle	19m semi	19m semi	Yes	Complies, the collector road can accommodate 19.45m semi trailers
	Road Reserve Width (m)	22	28	Yes	Complies with DP OiP reserve width requirement
	Trafficable Carriageway (m)	7	9 (2 x 4.5m lanes)	Yes	Exceeds minimum lane width requirement
	Median Provision (m)	Subject to specific design that has been certified	2m	Expected to comply	A 2m median is considered sufficient given the lane widths
	Parking Provision	2.5m on each side	2.1m on each side, provided where vehicle crossings and road geography permits	No	Given vehicle lanes are 4.5m, and there is a 2m central median, the effect of the 0.4m reduction in the parking space width will have negligible effect.
	Total Seal Width (m)	11	11	Yes	The seal width meets the required width
	Services (m)	Subject to specific design that has been certified	2.0m back berms	Expected to comply	Not a traffic matter, however it is expected that the berms will be sufficient for servicing
	Footpath / Shared path (m)	1.8m on each side	1.5	No	1.5m footpath is considered acceptable given 2m offroad cycle paths are provided on both sides
	Kerb and Channel /Water-table	Non-mountable	Vertical kerb in accordance with RITS	Yes	Complies with DP OiP and local standards
	Turning Area for no exit roads	19m semi	19m semi	N/A	The collector road is continuous and this is not applicable.

6.3.6 Overall, the proposed collector road cross section is generally consistent with the WDC DP OiP. It has a wider than anticipated corridor which allows for the provision of a flush median and cycle path. Whilst neither of these features is required under the WDC DP OiP, they are considered to represent best practice design for industrial collector road; the median supports better turning manoeuvres to and from vehicle crossings and intersections, whilst the off road cycle path segregates cyclists from HCV traffic. It is acknowledged that as a consequence of

these features, the on-street parking bays are 0.4m narrower than the WDC DP OiP envisages, and the footpaths are some 0.3m narrower. Given the generally low level of pedestrian activity typical of industrial areas, this reduction is not considered to be significant. The final cross section of the road will be subject to detailed design and may result in amendments to the road cross sections, within the provided corridor as required.

Industrial Local Road – 20.0m

6.3.7 The principal function of local roads is to provide property access. The proposed Industrial Local Road cross-section is shown in Figure 17.

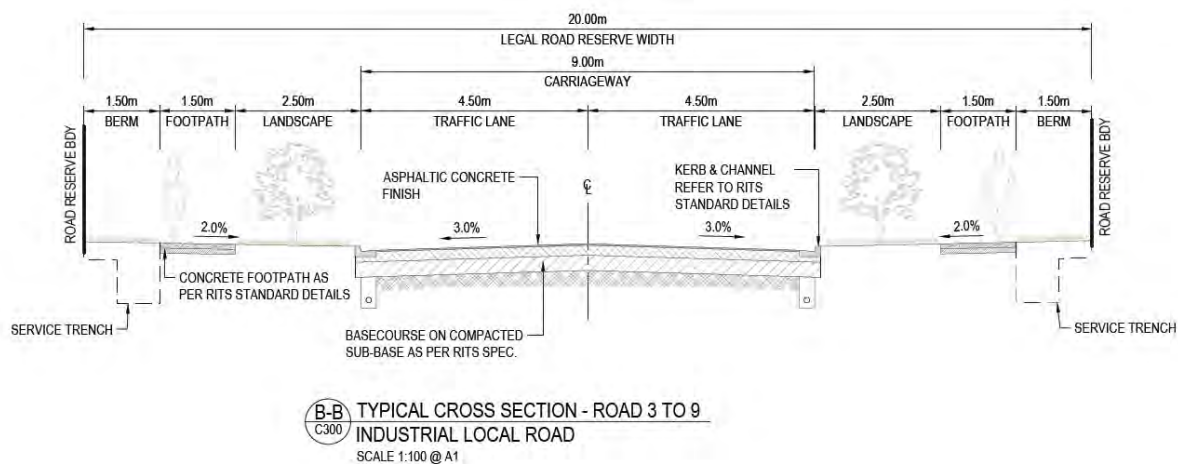


Figure 17: Cross-section of Industrial Local Road

6.3.8 This cross section accommodates two-way traffic, footpaths on both sides, and berms for services. On street parking is to be provided for within the traffic lane, with no indented bays proposed.

6.3.9 The proposed industrial local road cross section has been assessed against Part 2 TRPT Table 12 of the WDC DP OiP and summarised in Table 7. The cross section proposed was influenced by the HCC District Plan requirements, as well as other recently built or upgraded industrial local roads in the area such as Clem Newby Road and Hounsell Road in the Te Rapa Gateway area.

Table 7: Industrial Local Road - Proposed and Specified Dimensions

Road	Road Aspect	District Plan	Proposed	Complies With District Plan	Commentary
Local - Industrial	Number of Allotments or Activities	>8	8+ Allotments	Complies	Expected to comply at subsequent stages.
	Design Speed (km/h)	50	50	Yes	The design supports a future 50km/hr speed limit
	Design Vehicle	19m semi	19m semi	Yes	Complies, the collector road can accommodate 19.45m semi trailers
	Road Reserve Width (m)	20	20	Yes	Complies with DP OiP reserve width requirement
	Trafficable Carriageway (m)	9	9 (2 x 4.5m lanes)	Yes	Meets minimum lane width requirement
	Median Provision (m)	None	None	Yes	No median is required nor provided
	Parking Provision	Optional	Provided where vehicle crossings and road geography permits	Yes	Parking provision is optional with no specified parking space width
	Total Seal Width (m)	9	9	Yes	The seal width meets the required width
	Services (m)	Subject to specific design that has been certified	1.5 back berms	Expected to comply	Not a traffic matter, however it is expected that the berms will be sufficient for servicing
	Footpath / Shared path (m)	1.8m on each side	1.5	No	1.5m footpath is considered acceptable, noting the likelihood of two wheelchairs needing to pass one another in an industrial area is very low. Should this be required, a vehicle crossing could be used for this infrequent event.
	Kerb and Channel /Water-table	Non-mountable	Vertical kerb in accordance with RITS	Yes	Complies with DP OiP and local standards
	Turning Area for no exit roads	19m semi	19m semi	Yes	The local road no exit roads can accommodate a 19m semi

6.3.10 Overall, the proposed local road cross section is generally consistent with the WDC DP OiP, providing compliant carriageway, cycleway, and parking dimensions.

6.3.11 The 20.0m industrial local cross section maintains key functional elements such as carriageway width, footpaths, parking provision and service corridor provision; however, it does not comply with WDC DP OiP requirements for footpath widths. A 1.5m footpath is considered acceptable, noting the likelihood of two wheelchairs needing to pass one another in an industrial area is very low. Should this be required, a vehicle crossing could be used for this infrequent event.

Intersections

6.3.12 All new intersections are subject to detailed design and post construction safety audits. The proposed intersections designs are detailed below.

6.3.13 The internal collector road / collector road intersections are proposed to be roundabouts as shown in Figure 18. The roundabout design includes 3.5m wide refuge islands on all approaches to accommodate both pedestrian and cyclists. The refuge islands can accommodate a standard bicycle with at least 2.0m of storage depth available.

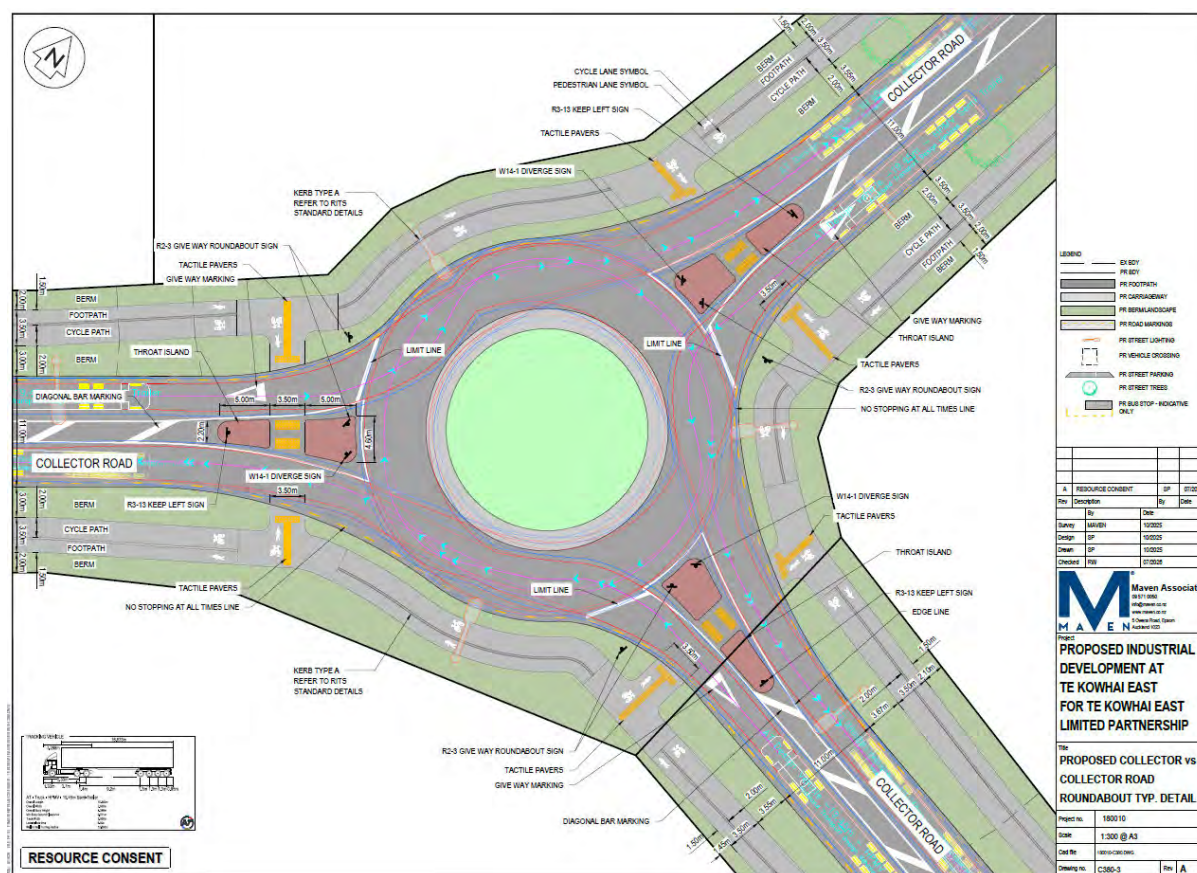


Figure 18: Internal Collector Road / Collector Road Intersection

6.3.14 Collector road / local road intersections are intended to be give-way t-intersections. Pedestrian refuge islands will be provided on one of the collector approaches as well as the local road approach to ensure pedestrians and cyclists can cross safely. The refuge islands are 3.5m long and therefore can accommodate both pedestrians and cyclists. The width of the refuge islands is 1.8m as per RITS, which is Austroads minimum width for a refuge island for cyclists given a bicycle is approximately 1.75m long.

6.3.15 It is envisaged that right turning vehicles onto the local roads will use the flush median on the collector road to wait out of the through traffic flow. Mid-block pedestrian refuge islands may also be provided across the collector road to support walking and cycling connectivity and safety.

6.3.16 An example of this type of intersections is shown in Figure 19.

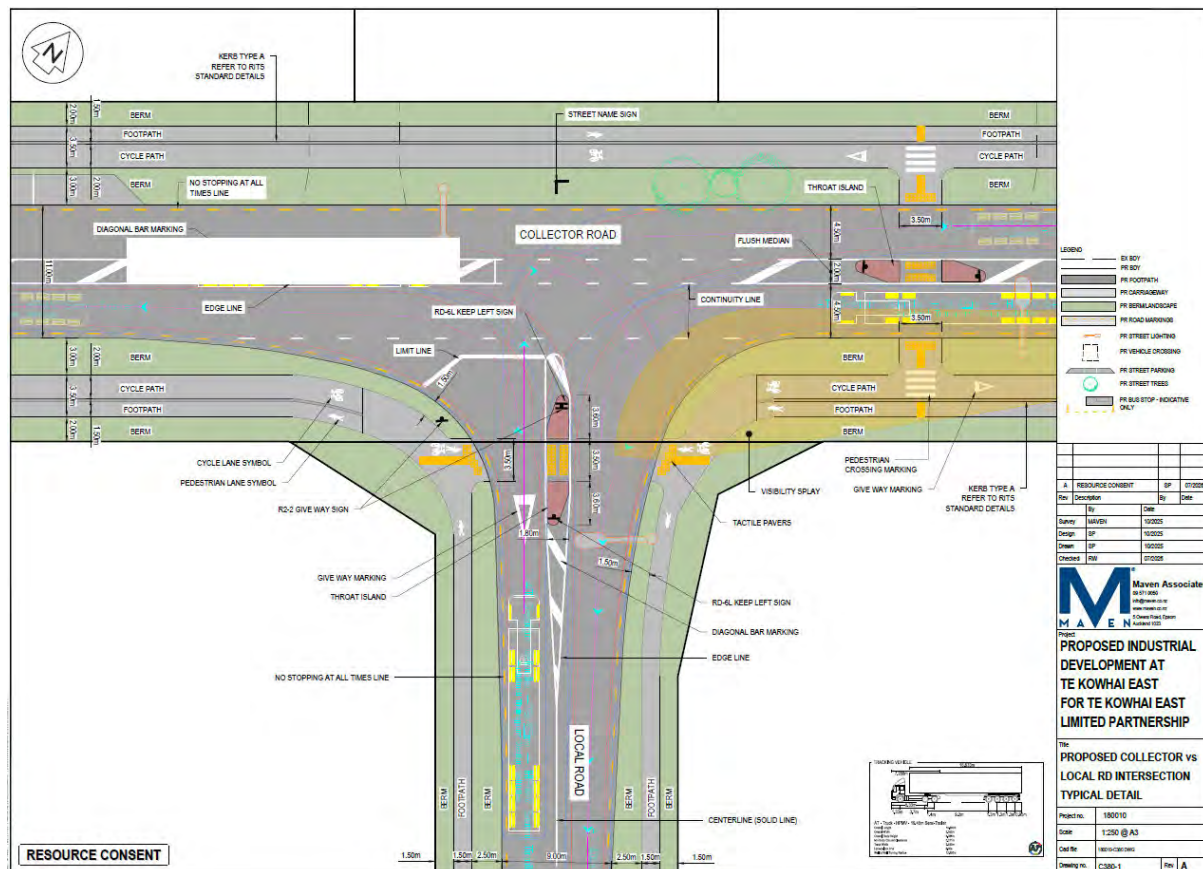


Figure 19: Internal Collector Road / Local Road Intersection

6.3.17 The local road /local road intersections are also intended to be give-way t-intersections. Given the lower traffic volumes, no pedestrian refuge islands are proposed, however pram crossings

will be included to facilitate pedestrian connectivity. An example of this form of intersection is shown in Figure 20.

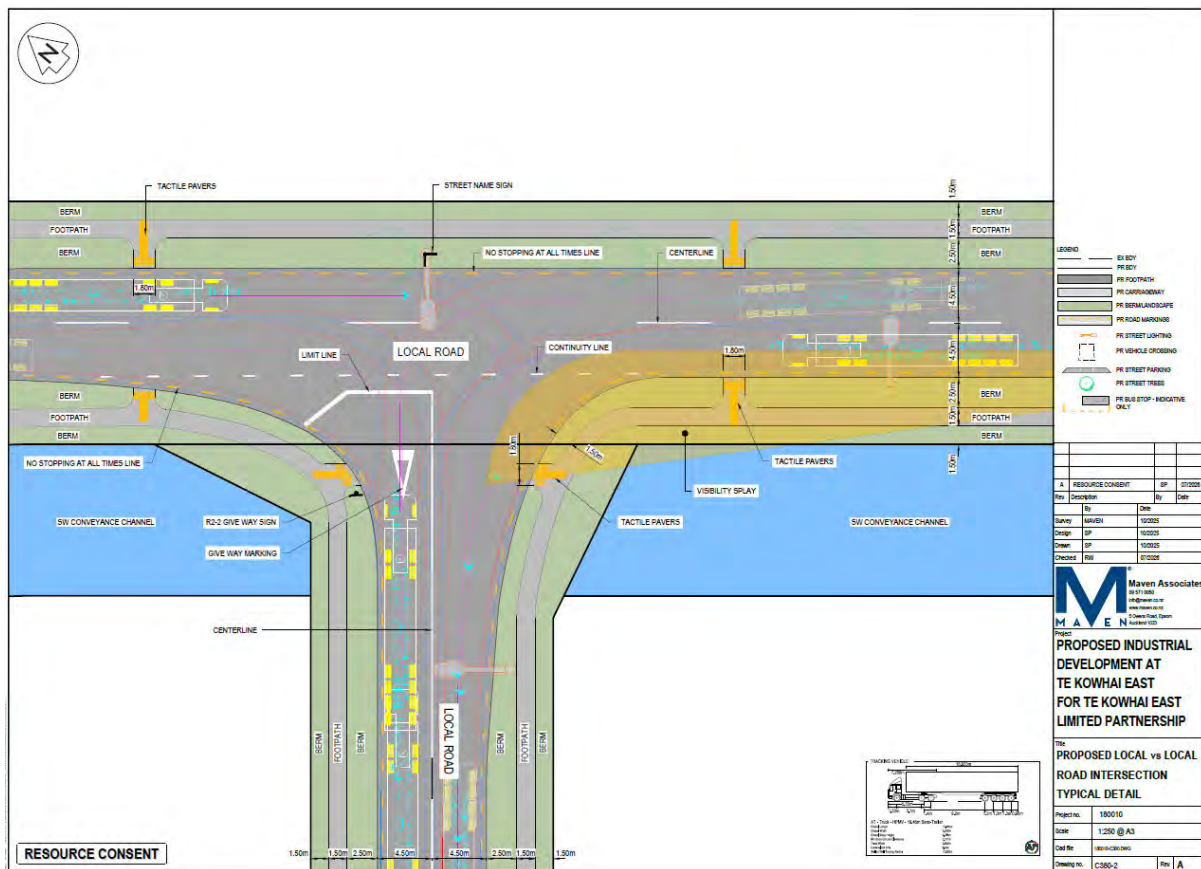


Figure 20: Internal Local Road / Local Road Intersection

6.4 Intersection Separation

- 6.4.1 The new TKE intersection with SH39 is required to meet the NZTA PPM standard. As per the PPM, for an 80km/hr posted speed limit the desirable spacing to an access on a major road is 330m. The TKE collector road roundabout is approximately 330m from the SH39 / Burbush Road roundabout, to the east, and therefore the intersection is considered to comply.
- 6.4.2 There is no dedicated guideline which addresses spacing standards between local road intersections and state highway intersections. As such, the PPM separation between a vehicle access and a SH intersection has been used to provide guidance in this regard. This applies to Road 3 within the development. For a 50km/hr posted speed limit, as is proposed with the site, the desirable spacing between the state highway and next adjacent intersection within

the site would be 75m. Road 3 is located more than 200m from SH39 and therefore meets this guidance.

6.4.3 The RITS rule 3.3.9.7 specifies the intersection spacing requirement for WDC roads. This guide requires 100m to 200m intersection separation for industrial roads, dependent on whether the intersections are on the opposite or same side of the corridor respectively. All intersections meet this standard with the exception of the following intersections:

- Road 2 and Road 3 have 193m separation along Road 1; and
- Road 7 and Road 8 have 193m separation along Road 1.

6.4.4 A 7m shortfall on a 200m requirement is equivalent to a 3.5% deviation, which is very small. As such, the effect of the reduced separation on the intersection operation and safety is considered negligible.

6.5 Intersection Sight Distance

6.5.1 All internal roads are designed to a 50km/hr speed limit, and therefore the Austroads standard requires 97m SISD. Most intersections achieve 97m SISD with the exception of Road 3 / Road 4. The Road 3 approach looking right has approximately 88m visibility. This is considered acceptable for the following reasons:

- Road 4 is a no exit road and therefore will be a low volume and low speed road;
- For a 50km/hr operating speed, with a reduced reaction time of 1.5seconds, 90m visibility is required which the proposal is close to achieving; and
- For a 40km/hr operating speed, which is anticipated on Road 4 given it is a short no exit road and a large portion of the traffic will be turning left into Road 3, 73m SISD is required, which is achieved.

6.5.2 Street trees have been placed to ensure 90m sightlines at vehicle crossings and 97m sightlines at intersections.

6.6 Lot Access Separation

6.6.1 The guideline for vehicle crossing separation to a state highway intersection is specified in the PPM. A vehicle crossing on the on-site collector road needs to be 75m from the new SH39 / collector road intersection based on a future 50km./hr speed limit on the collector road. The nearest access to SH39 is more than 140m north of the proposed new roundabout, and therefore meets this standard.

- 6.6.2 WDC requires vehicle crossings to be at least 20m - 30m from intersections, with the separation requirement dependent on the priority level of the road at the intersection as per Part 2 TRPT Table 1 of the WDC DP OiP. For the TKE site, 30m separation is required between vehicle crossings and intersection on the collector road, and 20m separation is required on the local roads. Table 1 also specifies there must be at least 15m separation between vehicle crossings.
- 6.6.3 The engineering drawings prepared by Maven include placement of vehicle crossings as a proof of concept, confirming that the current site and lot layout is able to generally comply with these standards. However, it is recognised that the vehicle crossings are subject to change at subdivision stage, depending on the final lot layout, sizes and shapes and the eventual development outcome on each lot
- 6.6.4 It is noted that the site is able to achieve at least 15m separation between crossings, complying with this requirement of the WDC DP OiP. Generally, the vehicle crossings are located more than 20m-30m from intersections, however given the site density there will be a number of vehicle crossings which do not comply. Where this occurs, the vehicle crossings are recommended to be provided as far from the intersection as practicable, which is what has been shown in the proof-of-concept design.

6.7 Lot Access Sight Distance

- 6.7.1 Part 2 TRPT Table 2 of the WDC DP OiP specifies sight distance requirements. For a design speed of 50km/hr, high volume vehicle crossings in urban areas are required to have 90m sight distance. It is expected that at least 90m sight distance can be achieved from vehicles crossings on the collector road.
- 6.7.2 The horizontal bends on the local roads limit visibility at a number of the conceptual vehicle crossings and subsequently the visibility at these crossing results in non-compliance. Where this occurs, there is at least 40m visibility as per RTS6 and 55m ASD as required by Austroads¹⁰. As such, appropriate sight distances can be achieved.

¹⁰ Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections Ed3.2

6.8 Walking and Cycling Networks

6.8.1 Travel by active modes (walking, cycling and other micro mobility devices) will be supported within the development as follows:

- Segregated off road footpaths and cycle paths along the internal collector roads;
- Footpaths to both side of local road with cyclists sharing road space;
- Refuge islands at collector road / local road intersections both on the side road and across the collector road;
- Recreational paths in and around greenspaces and stormwater reserves as appropriate; and
- Footbridge crossing across Mangaheka Stream to create direct walking route from the north side of the stream to the neighbourhood centre.

6.8.2 The site also includes reserves as amenities for future workers. The local neighbourhood centre will include a range of supporting activities including the likes of a dairy or bakery, a supermarket, a childcare facility, and a gymnasium to cater for the surrounding work force, reducing the trip generation potential to the wider road network. These amenities will be within walking distance for many developments within the TKE Site, reducing the need for people to travel by private vehicles.

6.8.3 Pedestrians and cyclists are accommodated at the SH39 access intersection, through:

- A grade separated crossing of SH39 to the south side of the road, which could be provided as either an overpass or an underpass with the final form to be confirmed through detailed design; and
- A shared path along the southern side of SH39 which connects the proposed SH39 site access to the existing SH39 / Burbush Road roundabout.

6.8.4 These features have been agreed with NZTA and provide a direct and continuous connection between TKE and the existing walking and cycling network at the SH39 / Burbush Road roundabout. This infrastructure is part of the main access works.

6.8.5 Similarly, the proposed urbanisation of Onion Road is forecast to occur when the Onion Road access is constructed, and includes:

- Kerb and channel between Holmes Road and the Onion Road access;
- 3.0m shared path on south side of Onion Road;
- New right turn bay at the Holmes Road / Onion Road intersection;

- Relocated median island to support walking and cycling access from Onion Road to the expressway shared path; and
- Extending the shared path on Holmes Road from Onion Road to Kohia Drive.

6.9 Public Transport Network

6.9.1 Public transport was discussed with WRC at a meeting on 15th June 2026. It is understood that there is no commitment to provide public bus services in the short-medium term, and the long term is beyond what WRC typically plans for (i.e. more than 10 years). The internal roads have been designed to accommodate buses should WRC choose to provide this service in the future. The collector road loop can accommodate either a loop or through service on the site, depending on the public transport policy relevant at the time. There is no expectation that any future bus service will utilise the proposed local roads, with the function of these roads being to provide access rather than movement of people or goods.

6.9.2 The masterplan has also incorporated high level planning for bus stop locations which are approximately 800m apart being appropriate for industrial development, as per WRC advice on 15th June 2026. It is noted that a small portion of Road 2, notably the midsection, is located more than 800m from a bus stop. Given this applies to a small portion of the site, and the bus stop locations are indicative, this is considered acceptable.

6.10 Bus stops will be provided to RPTP standards. This includes:

- Basic Stops: Include a hard stand area, raised accessible kerbs, and road signage and markings. To be used where passenger demand is low; and
- Standard Stops: Include a hard stand area, raised accessible kerbs, shelter, lighting, real time passenger information, and road signage and markings. To be used where passenger demand is low.

6.11 It is assessed that there is sufficient width within the front berm (3.0m) or parking bays plus landscaping strip (2.1m + 0.9m) to accommodate bus stops in the future. Further, shelters can either be provided off-set from the bus stops, to avoid impacting walking and cycling networks, or the back berm can be reduced in width. These are detailed design matters to be resolved if/when public transport services are provided.

6.12 Given future bus services are dependent on delivery of the Rotokauri growth cell and RNSP area, bus stops will be addressed through a consent condition requiring engagement with WRC for each stage to confirm public transport infrastructure provisions.

7 Predicted Travel Data

- 7.1.1 The potential transport effects of the proposed development have been assessed using a combination of the WRTM and SIDRA intersection modelling.
- 7.1.2 The WRTM¹¹ has been used as a strategic modelling tool to assess the redistribution of travel demand across the wider transport network under future growth scenarios.
- 7.1.3 A WRTM Scoping Document prepared by CKL, dated 25th March 2026 and attached as Appendix A sets out the methodology and inputs for modelling TKE using the WRTM. The document includes the definitions of how land use, staging, and the transport network will be represented to assess the effects of development on the wider Hamilton and Waikato road network. The modelling brief and methodology was developed in consultation with HCC, NZTA and WDC as relevant road controlling authorities and was agreed by them in advance of any WRTM or SIDRA modelling being undertaken.
- 7.1.4 The WRTM scoping document defines a staged development approach for TKE, with land use progressively introduced across three key assessment years. The simplified staging of the TKE development that was adopted for the modelling assessment is shown in Figure 21¹². Development is expected to generally occur south to north and west to east across the site.

¹¹ WRTM is owned and managed by Co-Lab, and is used to analyse and forecast traffic patterns and transportation needs within the Waikato region

¹² The development stages as per the masterplan/engineering drawings have been combined for the purpose of transport modelling

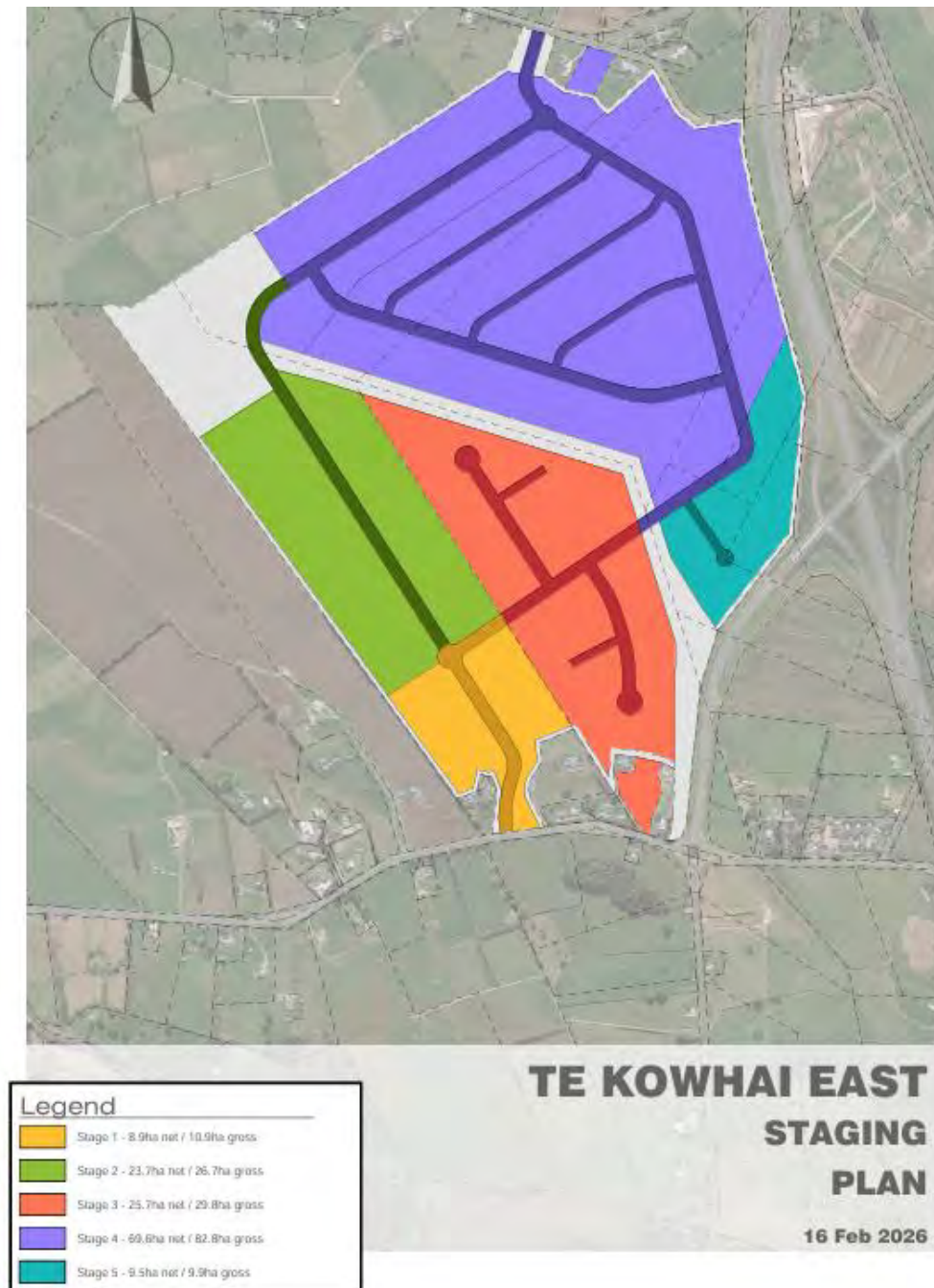


Figure 21: Simplified Staging for Traffic Modelling Purposes

7.1.5 WRTM model runs with and without TKE development have been completed for the 2035, 2045 and 2055 WRTM model years. This aligns with the development staging as follows:

- 2035 - Development Stages 1, 2 and 3 of the simplified staging plan used for transport modelling (67.4ha gross industrial development); and
- 2045 – Development Stages 4 and 5 of the simplified staging plan used for transport modelling (160.1ha gross industrial development)- full build out.

- 7.1.6 Both 2045 and 2055 horizon years include full build out of TKE, and reflect the wider strategic growth and infrastructure scenarios anticipated by HCC, WDC and other Councils. This staged approach is reflected in the WRTM land use inputs and enables the assessment of how traffic effects evolve over time as both development intensity and supporting transport infrastructure increase. It is also noted that the assessment of the full TKE development, including land forecast for growth outside of this application, ensures that any infrastructure is appropriately sized and located for the overall area.
- 7.1.7 The following infrastructure changes are expected to be in place at each of the WRTM model years, noting that some of these reflect TKE project infrastructure, and some represent wider network changes by RCAs:
- 2035:
 - o SH39 roundabout access to TKE (by TKE); and
 - o Rotokauri Arterial which connects SH39 at Burbush Road in the north to Te Wetini Drive at Taiatea Drive in the south (by HCC).
 - 2045
 - o Koura Drive Interchange upgrade including roundabout at the southbound offramp and a new connection to Onion Road at this intersection (by HCC/NZTA);
 - o Koura Drive extension over the NIMTR, terminating at a new intersection with Te Rapa Road (by HCC/NZTA);
 - o Onion Road priority controlled intersection access to TKE (by TKE); and
 - o Internal main collector road complete, connecting SH39 and Onion Road (by TKE).
 - 2055
 - o Northern River Crossing connecting the Koura Drive extension to Resolution Drive (HCC).
- 7.1.8 The internal road networks would be developed as part of subdivision activities, and with the exception of the main collector road, are not relevant in terms of WRTM analysis.
- 7.1.9 For the purposes of individual intersection assessment, traffic volumes have been extracted from the WRTM model outputs and used as the basis for SIDRA modelling. SIDRA is a traffic modelling software package used to assess the operational performance of intersections and

small road networks. Its primary purpose is to evaluate how traffic is expected to operate under existing or future conditions and to test the effectiveness of potential improvements. The modelling assesses key operational performance measures, including delay, queue length, degree of saturation, and Level of Service, to determine whether the transport network can accommodate the proposed development and to identify any mitigation measures that may be required.

7.1.10 This approach ensures that the intersection analysis reflects fully assigned traffic flows, including the effects of network-wide redistribution and interaction with surrounding growth and infrastructure.

7.1.11 It is noted that WRTM operates on a two-hour peak period basis. For the purposes of SIDRA intersection modelling, modelled flows have been converted to equivalent peak hour volumes using standard WRTM conversion factor 0.52 for the AM peak and PM peak. SIDRA analysis has been undertaken and is presented in Section 8 of this report.

7.2 Trip Generation

7.2.1 Trip generation for TKE has been derived using the WRTM.

7.2.2 Unlike traditional traffic impact assessments that apply fixed trip rates (e.g. trips per dwelling or per square metre of gross floor area), the WRTM estimates travel demand through an integrated modelling framework. In this approach, trip generation is not calculated as a standalone step but is embedded within the broader modelling process and reflects observed regional travel behaviour.

7.2.3 The model incorporates a development assumption of industrial employment comparable to approximately 1,696 jobs within the TKE site. The land use and employment assumptions for traffic modelling purposes are detailed in the WRTM Briefing Scope, included as Appendix A.

7.2.4 These inputs are coded within the WRTM zone system and form the basis for estimating trip productions (from residential areas) and trip attractions (to employment areas). The number and type of jobs for TKE were agreed with HCC, WDC and NZTA as part of the modelling brief.

7.3 Trip Distribution

7.3.1 Trip distribution within the WRTM is undertaken using a gravity-based modelling framework, whereby trips generated from the TKE site are distributed between zones based on the relative attractiveness of destinations and the generalised cost of travel. Destination

attractiveness is primarily a function of land use characteristics, including population, employment, and activity type within each zone, while generalised cost reflects travel time, distance, and network performance.

- 7.3.2 The assessment is based on a comparison of modelled traffic conditions between “with development” and “without development” scenarios for the 2035, 2045 and 2055 assessment years. The resulting trips are then assigned to the transport network using an equilibrium process, which accounts for route choice and congestion effects. Link flow difference plots and selected link (origin–destination) analysis are used to identify changes in traffic volumes and travel patterns associated with the TKE Site.
- 7.3.3 The WRTM output is reviewed in detail within Appendix B, however it is noted that one key finding is the majority of TKE traffic is to and from the north and uses SH1C in the 2035 model scenarios, then transfers to the local road network (Onion Road) once that connection is established at 2045.
- 7.3.4 The link flow analysis from the WRTM, in conjunction with the WRTM LOS analysis, identifies intersections that are approaching capacity and that have been further assessed using the SIDRA software and this analysis is documented in Section 8 of this report.

7.4 Multimodal Trip Generation

- 7.4.1 This section assesses trips generated by alternative transport modes and is separate to the WRTM analysis. The Commuter Waka interactive tool provides Census-based origin-destination data for work and education journeys at the statistical area level.
- 7.4.2 TKE is located within the Te Kowhai Census Area. However, given the Te Kowhai Census Area is generally of rural nature, it is unlikely to be comparable to the full urbanisation of the TKE Site. Therefore, Te Rapa North Census Area, located immediately east of the Te Kowhai area has been used for comparison purposes for industrial trips.
- 7.4.3 The 2023 Census recorded 7,563 people who travel to Te Rapa North for work (100%), with no record of people living and working within Te Rapa North. Figure 22 shows the Census data for Te Rapa North (green) workplace arrivals, with dark shades of blue portraying areas where higher volumes of trips originated.

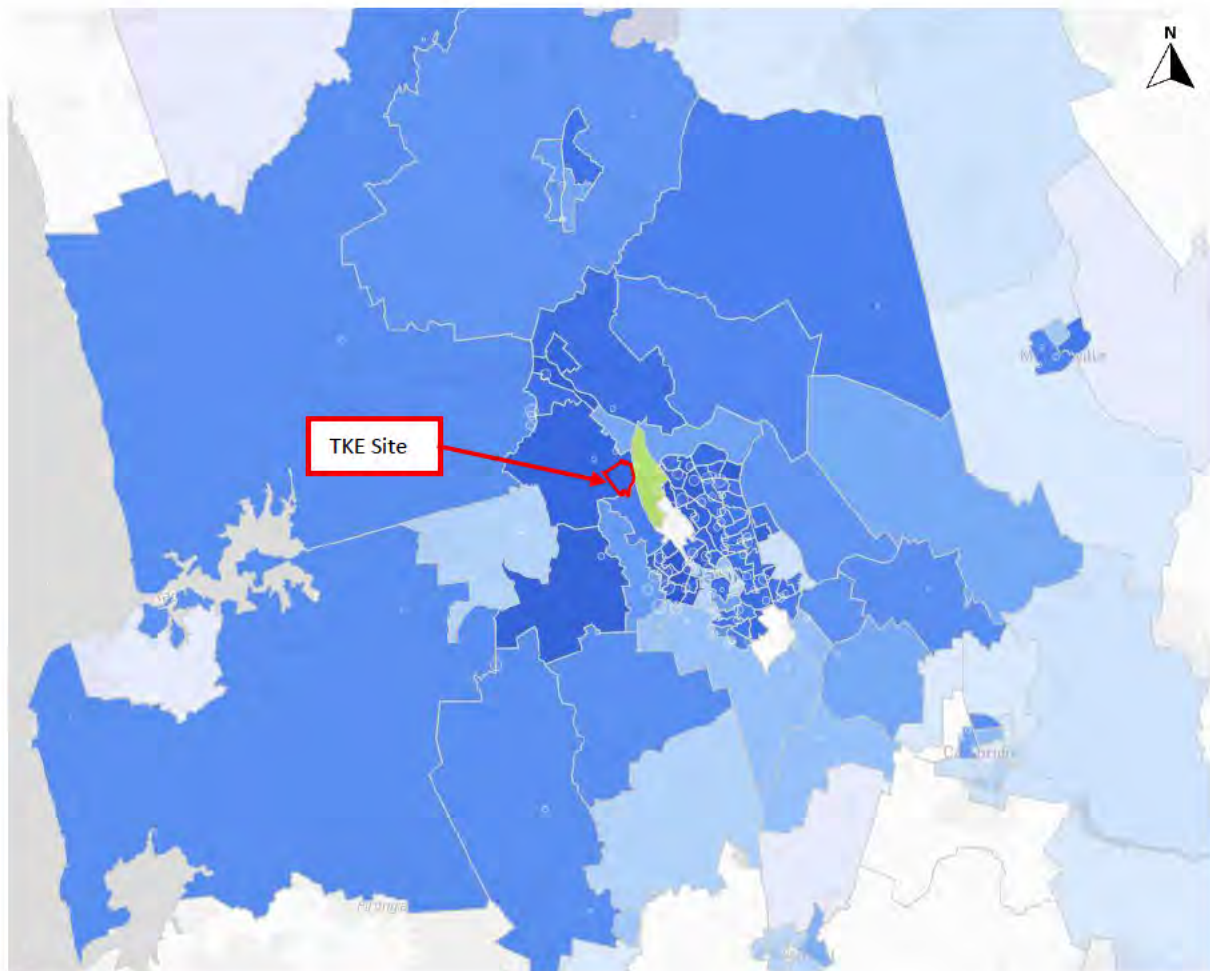


Figure 22: Te Rapa North Census Area Workplace Arrivals Map

7.4.4 Similarly to the analysis of TKE, Te Rapa North is an emerging development area where urbanisation is ongoing. As such, it is considered that the following assumptions are also applicable:

- Higher private vehicle dependency due to limited alternatives;
- Underrepresentation of potential future public transport and active mode use; and
- Travel patterns that may not reflect a fully established community.

7.4.5 The predominant mode of travel for work trips is driving a private car, truck, or van, which represents 72% of all arrivals. The complete mode share breakdown is:

- 72% drive private vehicles;
- 21% use company vehicles;
- 3% travel as passengers;

- 1% bicycle to work;
- 1% bus to work;
- 1% use other methods (eg micromobility);
- <1% walk to work or work from home; and
- 0% train or ferry (these modes are not available in the area).

- 7.4.6 With approximately 1,696 jobs anticipated within the TKE Site, travel patterns are expected to broadly reflect those observed in comparable employment areas such as Te Rapa North Census Area, which includes Te Rapa Gateway, while recognising that these patterns will evolve as the area develops.
- 7.4.7 Industrial travel demand is expected to be strongly influenced by the nature of employment activities, with a high proportion of trips likely to occur during peak shift periods and a continued reliance on private vehicles. The majority of trips are anticipated to be undertaken by drivers of private or company vehicles, reflecting both the dispersed nature of the workforce and the operational requirements of industrial activities.
- 7.4.8 Active modes, including walking and cycling, are expected to account for a modest share of trips, particularly where employees are located within close proximity to the employment area or where supporting infrastructure is provided. Public transport usage is anticipated to be relatively low in the short term, given typical service limitations and the alignment of shift-based travel patterns, though there is potential for gradual increase as services improve.
- 7.4.9 Other modes, including travel as passengers and working from home, are expected to represent a small proportion of overall trips, noting that remote work opportunities are generally more limited within industrial sectors.
- 7.4.10 Overall, the projected mode split for industrial trips within TKE is expected to remain predominantly vehicle-oriented, with incremental increases in alternative modes over time as accessibility, infrastructure, and service provision improve.

8 WRTM Modelling

8.1 Validation

- 8.1.1 A validation assessment was undertaken to evaluate how well the WRTM represents existing traffic conditions on the road network surrounding the site. This was assessed as part of the WRTM Brief in Appendix A. The validation analysis found the model to be well aligned in the north at the Gateway Drive / Great South Road / Horotiu Bridge Road intersection. Alignment with WRTM reduced to the south, with the Ruffell Road / Te Rapa Road and Te Rapa Road / Wairere Drive intersections only meeting the best practice validation threshold for the intersection overall, not per movement.
- 8.1.2 The intersection of Wairere Drive / Arther Porter Drive / SH1C Interchange did not validate well, and therefore a more detailed review of the Wairere Drive corridor was undertaken between the SH1C northbound off ramp and Te Rapa Road. A revised validation approach was therefore agreed with HCC given the reduced 'fit' in their jurisdiction. This included rebalancing the input flow based on the ratio of SCATS to WRTM per movement in 2025, and modelling the updated vehicle volumes in SIDRA. This assessment is included as Appendix C.
- 8.1.3 The original and revised validation information provided to HCC, WDC and NZTA is attached in Appendix D. WDC and NZTA have provided have confirmed that they accept WRTM is fit for purpose in relation to the operation of their networks. No formal confirmation has been received from HCC, however, validation of WRTM was not identified as one of the three outstanding issues for discussion at a meeting held with them on 7th August 2026. General acceptance of WRTM as generally fit for purpose has been taken as being implied on that basis.

8.2 Intersections Identified for Assessment and Traffic Effects Determination

- 8.2.1 As described in the WRTM Link Flow Analysis report dated 21st May 2026 (refer to Appendix B), intersections identified for further analysis have been selected based on the following reasons:
- Ongoing consultation and meetings with the relevant RCAs including HCC, WDC, and NZTA has been occurring since the project establishment in 2024. As part of the correspondence, a number of intersections have been identified to be of particular interest to the relevant parties.

- Performance threshold triggers based on the WRTM output were used to identify traffic effects, notably link flow and LOS analysis; and
- Intersections near to the TKE site which notable volumes of site trips are anticipated to travel through and therefore should be assessed regardless of threshold triggers.

8.2.2 This section of the report will focus on the key results that will determine any external roading upgrade or intersection arrangement upgrade to support the future TKE traffic. The summarised results include the degree of saturation, LOS, and the 95th percentile queuing length. Full SIDRA outputs are attached as Appendix E.

Waikato District Council Key Intersections

8.2.3 The following intersections were identified by WDC as being of particular interest in terms of potential effects arising from TKE:

- SH39 / Horotiu Road;
- Horotiu Road / Ngaruawahia Road;
- Horotiu Road / Onion Road;
- Gateway Drive / Kohia Drive;
- Gateway Drive / Great South Road / Horotiu Bridge Road;
- Onion Road / Holmes Road;
- Horotiu Bridge Road / River Road;
- River Road / Lake Road;
- Lake Road / SH1C northbound off ramp; and
- Lake Road / SH1 Waikato Expressway southbound on ramp.

8.2.4 As can be seen from the threshold trigger assessment in Appendix B, with the exception of Gateway Drive / Great South Road / Horotiu Bridge Road the WRTM analysis has confirmed that all of these intersections operate at LOS A/B/C with the TKE traffic in place and therefore no further consideration or analysis is considered necessary at these intersections. Further analysis of Gateway Drive / Great South Road / Horotiu Bridge Road has been undertaken given the forecasted LOS and future site traffic forecasted through this intersection.

8.2.5 WDC was consulted with following the WRTM analysis and agreed with these findings, notably that only Gateway Drive / Great South Road / Horotiu Bridge Road is to be assessed further.

New Zealand Transport Agency Key Intersections

- 8.2.6 As part of the consultation with NZTA, the Koura Drive Interchange, notably the northbound off ramp was identified as being of particular interest and is also pertinent due to the proximity and connection to the TKE site. NZTA was also interested in the operation of the Horotiu Interchange.
- 8.2.7 During consultation on 10th June 2026, NZTA confirmed that they were satisfied that no detailed analysis of Horotiu Interchange was warranted based on the limited traffic demands at 2035 from TKE and the diversion of TKE traffic to the local road network at the 2045 and 2055 assessment years horizon. As such, detailed analysis has only been undertaken at the Koura Drive interchange.

Hamilton City Council Key Intersections

- 8.2.8 HCC did not identify any particular intersections of interest, preferring to wait until the WRTM analysis identified where the three agreed thresholds were met. During the validation process, due to the poor turning movement alignment between WRTM and current SCATS data at the Wairere Drive intersections with both Arthur Porter Drive and Te Rapa Road, it was agreed that SIDRA analysis would be undertaken to assess TKE traffic effects. The outcome of this was reported back to HCC via technical memo dated 16th June 2026 included as Appendix C. This showed that:
- The corridor is constrained under base conditions;
 - The effect of the TKE traffic on the Wairere Drive corridor is negligible; and
 - No mitigation measures are required on the Wairere Drive corridor as a consequence of the Te Kowhai East development.
- 8.2.9 Feedback from HCC in relation not traffic modelling was received during a meeting held on 7th August 2026. Their three areas of interest related to:
- The number of wholesale retail trips assigned to the 'with TKE' WRTM analysis;
 - what the effects of development would be if the Rotokauri arterial road network was not in place by 2035 ; and
 - the basis for partial funding mechanisms for off-site intersection upgrades identified in the ITA.

8.2.10 The outcome of the discussion was that:

- a consent condition regarding assessing wholesale retail trips based on the proposed scale and type of specific activity will be put forward;
- the risk of non-delivery of the Rotokauri arterial road and subsequent traffic is a matter for HCC to consider as it is identified in their LTP. RFI responses by TKE have provided a subjective assessment of the effects of this roading not being in place and it was agreed that no SIDRA analysis of intersections along Te Rapa Road and the most likely diversion route by TKE was required; and
- the basis for partial funding was confirmed as being proportionate to future traffic flow, noting that all intersections affected are outside of HCC's jurisdiction as RCA.

8.3 Intersection Analysis

8.3.1 The following sections summarise the SIDRA modelling results for the five intersections identified above that require further assessment.

8.3.2 SH39 / TKE link road roundabout

8.3.3 As the primary access to the TKE Site, SIDRA analysis of this roundabout has been undertaken. The model shows all turning movements, in both the morning and afternoon peak periods, operate at LOS A for all of the horizon years (2035, 2045 and 2055). In 2055, the SIDRA model shows the degree of saturation is 0.41/0.40 (AM/PM), the 95th percentile queue is no more than four vehicles, and the average intersection delay is less than 5 seconds. As such, the single lane roundabout proposed is anticipated to operate efficiently.

8.3.4 TKE link road / Onion Road

8.3.5 The Onion Road access to the site is proposed as a give-way priority-controlled intersection with a right-turn bay on Onion Road. SIDRA analysis of this intersection shows all turning movements operating at LOS A during both the morning and afternoon peak period for the 2045 and 2055 horizon years. The 95th percentile queue in all periods is shown to be no more than one vehicle, the average intersection delay is less than 5 seconds, and in 2055 the degree of saturation is less than 0.1 in both peak periods with TKE traffic. Given the intersection is shown to operate efficiently as a give-way controlled intersection, this intersection form is considered appropriate, noting that the right turn bay has been provided for safety, rather than capacity reasons.

8.3.6 SH39 / Rotokauri Arterial roundabout

8.3.7 The WRTM model shows this intersection to operate acceptably in both peak periods for all horizon years, however given the volume of site traffic that is anticipated to travel to/from Koura Drive further analysis has been undertaken.

8.3.8 The SIDRA model for this intersection shows all turning movements operating at LOS A or B in both peak periods for all-horizon years. In 2055 this intersection is shown to operate with a degree of saturation of 0.45/0.62 (AM/PM), a 95th percentile queue no more than 7 vehicles long, and average intersection delays less than 5 seconds. As such, the existing single lane roundabout is anticipated to operate efficiently.

8.3.9 Gateway Drive / Great South Road / Horotiu Bridge Road

8.3.10 The operation of Gateway Drive / Great South Road / Horotiu Bridge Road was assessed to warrant a detailed assessment based on the WRTM output. This section assesses the SIDRA modelling for each of the horizon periods.

2035

8.3.11 SIDRA modelling indicates that the Gateway Drive / Great South Road intersection is approaching capacity in the 2035 horizon year under the base traffic scenario (without TKE), operating overall at LOS E during both the AM and PM peak periods.

8.3.12 With traffic generated by the TKE development included, the intersection continues to operate at a similar overall level of service. The additional traffic results in only minor changes to intersection performance, with:

- average vehicle delays increasing by approximately 2-3 seconds (around 4-5%);
- 95th percentile queues increasing by no more than approximately 15 m (around two vehicles); and
- no material change to the overall operation of the intersection.

2045

8.3.13 By 2045, the intersection is forecast to operate beyond practical capacity under the background traffic scenario, with an overall LOS F during both peak periods. This deterioration is primarily attributable to regional traffic growth rather than traffic generated by the proposed development.

8.3.14 The inclusion of TKE traffic results in only a minor increase in delays (less than 3 seconds or approximately 5%) and queue lengths (generally less than 30 m). The modelling demonstrates that the proposed development does not materially alter the overall performance of the intersection.

2055

8.3.15 The 2055 modelling includes the Northern River Crossing, which provides an alternative route for a proportion of traffic and improves operation of the intersection compared with the 2045 scenario. Under the background traffic scenario, the intersection is forecast to operate at an overall LOS E.

8.3.16 The addition of TKE traffic has a negligible effect on intersection performance, with increases in average delay of less than 3 seconds and queue length changes generally less than 6 m.

Mitigation Assessment

8.3.17 Potential upgrades comprising additional approach lanes on the east and west approaches together with revised signal phasing were also tested. These improvements reduce the 2045 operation from LOS F to an overall LOS D, demonstrating that there are feasible engineering solutions available should future upgrades be required.

Overall Findings

8.3.18 The SIDRA modelling demonstrates that:

- the Gateway Drive / Great South Road intersection is forecast to experience capacity constraints in the future irrespective of the proposed development;
- these constraints are driven by background traffic growth rather than traffic generated by TKE;
- TKE contributes only a small proportion of total traffic at the intersection (approximately 2-3%);
- the additional traffic generated by the development results in only minor increases in delays and queue lengths across all assessment years; and
- the intersection operation can be improved by providing additional approach lanes on the east and west approaches together with revised signal phasing.

8.3.19 Detailed modelling results are provided in Appendix E.

8.3.20 Following consultation with WDC, it was agreed that any future intersection upgrades should be considered as part of the wider transport network, as the need for improvements is driven predominantly by background growth rather than the proposed development. Accordingly, any future works are more appropriately funded through district-wide transport funding mechanisms rather than being attributed solely to the TKE development.

8.3.21 Koura Drive Interchange

8.3.22 Koura Drive Interchange was identified as an intersection for further assessment by NZTA as well as the WRTM output. This section assesses the SIDRA modelling for the future horizon periods.

2035

8.3.23 The Koura Drive Interchange is forecast to operate efficiently in 2035 with expected extent of TKE development in place. SIDRA modelling shows all movements operating at LOS C or better in both the AM and PM peak periods, with average delays of less than 20. This indicates that the interchange has sufficient capacity to accommodate the forecast 2035 traffic demands.

2045

8.3.24 By 2045, upgrades to the eastern side of the interchange are anticipated, including a single-lane roundabout connecting Koura Drive, the SH1 southbound ramps, and potentially a realigned Onion Road extension. Koura Drive is also expected to extend over the railway line to Te Rapa Road. NZTA confirmed during consultation on 10th June 2026 that no upgrade is currently anticipated on the western side of the interchange.

8.3.25 The 2045 SIDRA modelling shows that the upgraded eastern roundabout is forecast to operate well under both the base and with-development scenarios. However, the western side of the interchange, particularly the SH1 northbound off-ramp right-turn movement, is forecast to operate poorly under the base scenario, with the movement operating at LOS F and notable delay and queuing. This constraint arises regardless of whether the TKE development proceeds.

8.3.26 When TKE traffic is included, the operation of the interchange remains broadly similar, although the northbound off-ramp right-turn movement experiences additional delay and queuing. The modelling therefore indicates that the principal capacity constraint is an existing/future network issue, rather than one caused by the TKE development.

2055

- 8.3.27 No modelling was undertaken for 2055 given the extent of delay and queue reported in the 2045 horizon year without TKE traffic.

Mitigation Assessment

- 8.3.28 Two mitigation options were considered: signalising the western side of the interchange, or banning the right turn from the SH1 northbound off-ramp and requiring traffic to turn left and u-turn at the SH39 / Burbush Road roundabout. The signal option improved modelled performance but was not progressed further due to operational concerns raised by NZTA regarding interaction with the new roundabout at the eastern side of the interchange.
- 8.3.29 The right-turn ban option was therefore assessed further. The modelling indicates that this option can operate effectively in 2045 with the TKE development in place, without adversely affecting the operation of the Koura Drive / Burbush Road roundabout. In the longer term, by 2055, the new eastern roundabout would need to have dual circulating lanes and short approach lanes would be required to accommodate the higher forecast traffic volumes.
- 8.3.30 The mitigation assessment included further assessment of SH39 / Burbush Road roundabout, notably accounting for the banned right turn movement by including these vehicles as u-turn movements. In 2055 the model shows all approaches are forecast to operate at LOS C or better in both the AM and PM peak periods.

Overall Findings

- 8.3.31 Overall, the modelling demonstrates that:
- the Koura Drive Interchange operates efficiently in 2035 with TKE traffic;
 - the key future constraint relates to the SH1 northbound off-ramp right-turn movement;
 - this constraint occurs in the base network and is not caused by the TKE development;
 - TKE traffic contributes to, but is not the root cause of, the future capacity issue; and
 - feasible mitigation is available to address the constraint.
- 8.3.32 NZTA acknowledged during consultation that the need to address the SH1 northbound off-ramp is an existing/future network issue. Accordingly, it is recommended that TKE contributes an appropriate funding share toward the right-turn ban and associated roundabout upgrades, as discussed in Section 12.

8.4 WRTM Sensitivity Testing

8.4.1 Four sensitivity testing scenarios were identified by HCC, NZTA and WDC through development of the WRTM model brief. The purpose of the sensitivity tests was to understand the potential effects of the presence or otherwise of key infrastructure and also whether TKE development timing and land use location within the site affected traffic patterns.

8.4.2 Sensitivity Test 1 – Four Laning SH39

8.4.3 Four-laning of SH39 between the proposed TKE Road 1 intersection and the Koura Drive Interchange was assessed using the WRTM.

8.4.4 The modelling indicated that providing four lanes would result in negligible changes to traffic patterns. Furthermore, in the 2055 with the TKE development scenario, the WRTM predicts a maximum two-hour directional traffic volume of 1,152 vehicles. This equates to an approximate peak hour directional flow of 600 vehicles.

8.4.5 These traffic volumes are well below the theoretical capacity of a traffic lane, which typically ranges from approximately 800 vehicles per hour on narrow, low-speed roads to around 1,800 vehicles per hour on high-speed roads with low side friction. As such, the existing single lane in each direction can accommodate the forecasted future volume.

8.4.6 During consultation with NZTA on 10th June 2026, it was agreed that four-laning of SH39 is not required.

8.4.7 Sensitivity Test 2 – Without Northern River Crossing

8.4.8 The initial modelling methodology proposed the base case would exclude the Northern River Crossing in 2055 as documented in Appendix A, however the data received included this infrastructure. As such, this sensitivity test has evolved to be an assessment of the network without river crossing.

8.4.9 During the morning peak hour, the absence of the Northern River Crossing results in higher vehicle volumes on the following routes, as also shown in the difference plot in Figure 23:

- Te Rapa Road, Great South Road;
- Resolution Road, SH1, SH1C;
- River Road, Horotiu Bridge Road; and
- Wairere Drive.

8.4.10 The difference plot illustrates the change in traffic volumes between the scenarios with and without the Northern River Crossing. Red corridors indicate routes that would carry higher traffic volumes without the river crossing, while green corridors indicate routes where traffic volumes are reduced as a result of the river crossing providing an alternative route.

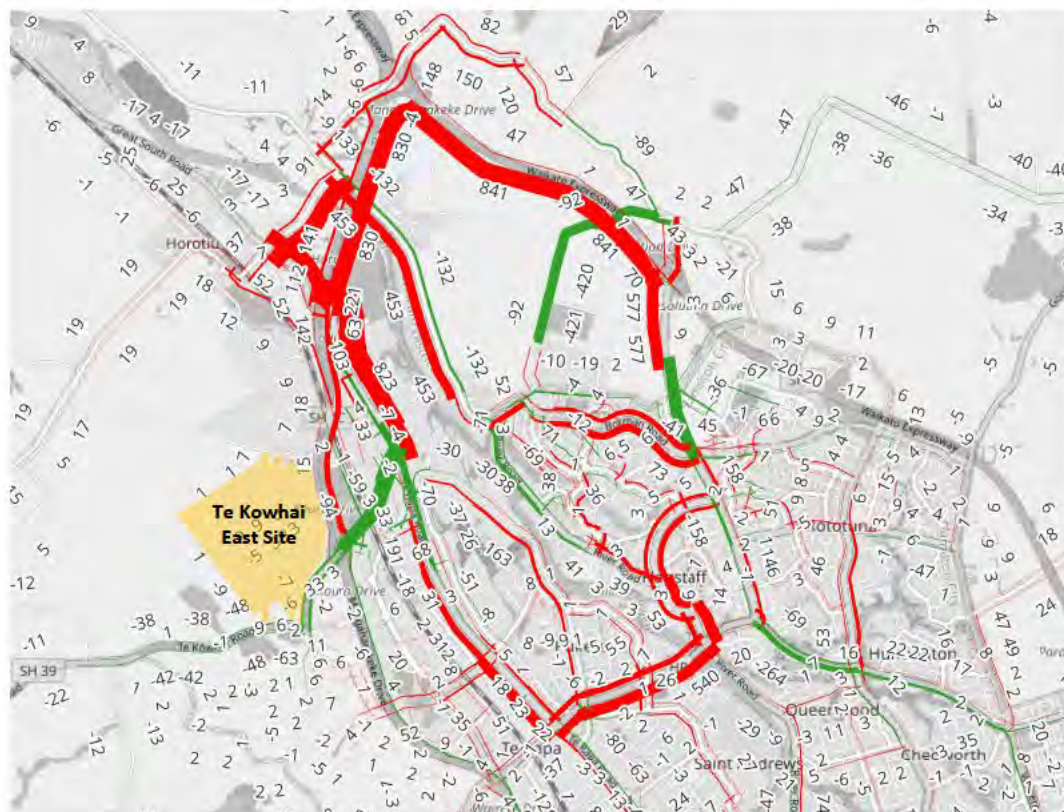


Figure 23: 2055 AM with TKE Difference Plot of without versus with the Northern River Crossing¹³

8.4.11 The modelling assessment assumes full buildout of TKE is complete in 2045, and therefore this model has been used to understand the TKE trip distributions prior to the river crossing. As shown by the 2045 select link analysis¹⁴ in Figure 24, TKE is forecast to generate minimal trips on Te Rapa Road, Resolution Drive, SH1C, and River Road; and some trips on Great South Road, SH1, Horotiu Bridge Road and Wairere Drive.

¹³ Red is an increase in vehicle volumes, green is a reduction in vehicle volumes

¹⁴ Modelling output which shows the origin, destination and route of TKE trips. Dark corridors are trips via the SH39 access, pastel corridors are trips via the Onion Road access. Green corridors are arrival trips, red corridors are departure trips.

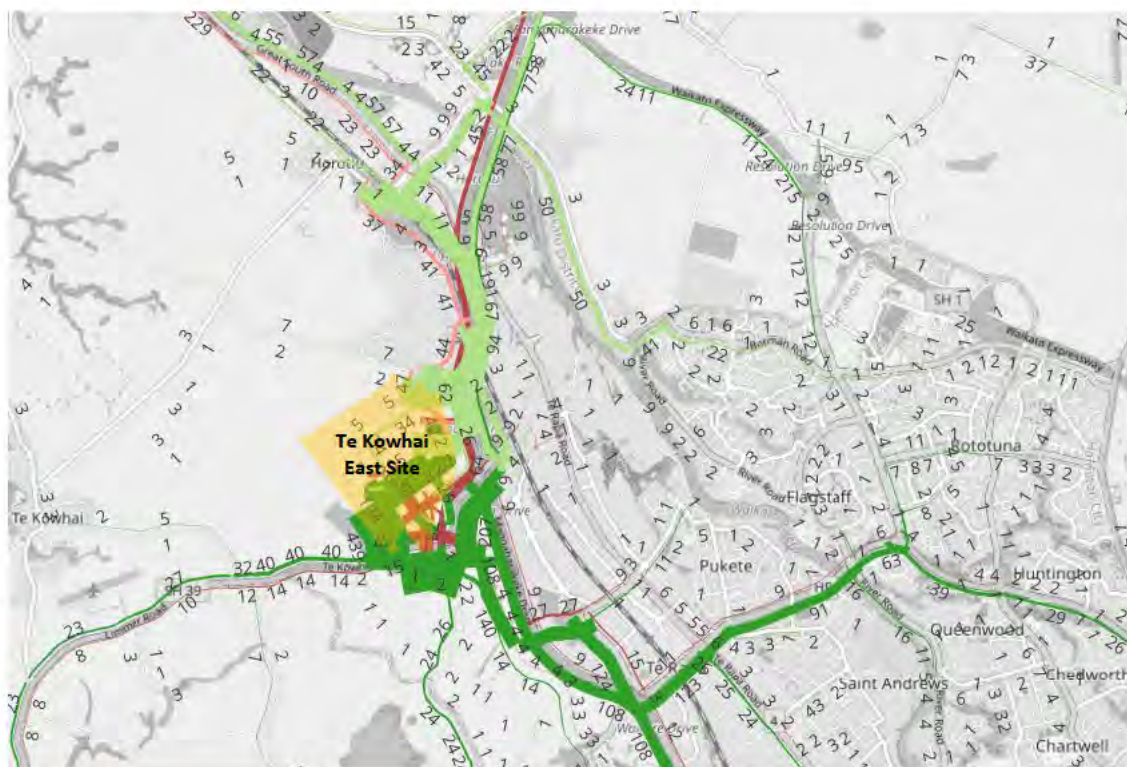


Figure 24: TKE Trip Distribution in the AM Peak Hour in 2045

8.4.12 Great South Road, SH1, Horotiu Bridge Road and Wairere Drive are all arterial corridors which carry notable base traffic volumes. As such, the TKE trips equate to a 2.7-5.4% percentage of the total trips and therefore the effect of the TKE trips is considered less than minor.

8.4.13 Furthermore, the effect of the TKE Site on Great South Road and Horotiu Bridge Road is already accounted for with the upgrade of Gateway Drive / Great South Road / Horotiu Bridge Road as detailed in Section 8.4.8. In 2045, with full buildout of the TKE site and without the Northern River Crossing, this intersection is considered to operate acceptably when upgraded. Any additional traffic in the 2055 model is background growth, and therefore the effect of TKE trips in 2055 would be less given the portion of traffic would be less. Similarly, the effect of the TKE site on Wairere Drive is assessed to be negligible in the Wairere Drive corridor assessment in Appendix C. Wairere Drive is constrained under base conditions, with the volumes of TKE trips equating to less than 1% of traffic.

8.4.14 During the afternoon peak hour, the absence of the Northern River Crossing results in higher vehicle volumes on similar routes as listed below, and as shown in the difference plot in Figure 25:

- SH1C, SH1, Lake Road, Horsham Downs Road;
- SH1C, SH1, Lake Road, River Road;
- Holmes Road, Kohia Drive, Gateway Drive, Horotiu Bridge Road, River Road;
- Te Rapa Road; and
- Wairere Drive.

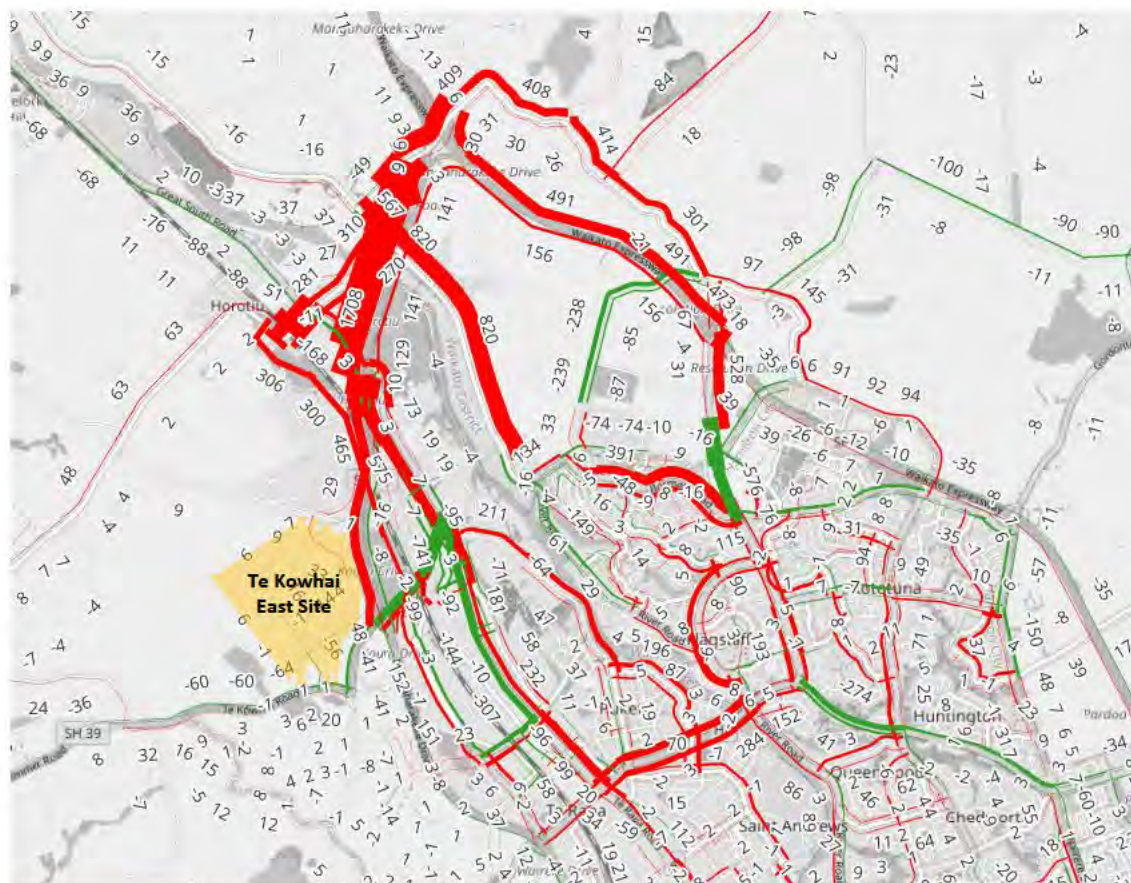


Figure 25: 2055 PM with TKE Difference Plot of without versus with the Northern River Crossing

8.4.15 The 2045 select link analysis, as shown in Figure 26, shows that TKE is forecast to generate minimal trips on Lake Road, Horsham Downs Road, River Road, Horotiu Bridge Road, Te Rapa Road, and Wairere Drive; and some trips on SH1C, SH1, Holmes Road, Kohia Drive, and Gateway Drive.

8.4.16 SH1C and SH1 are both arterial corridors, and therefore the TKE trips equate to a small percentage (3.0-4.0%) of the total trips and are considered minor.

8.4.17 Holmes Road, Kohia Drive, and Gateway Drive are all local roads which carry lower vehicle volumes. As such, a closer review of the WRTM LOS plots was undertaken for these corridors

and showed two intersections on these corridors to be affected being Gateway Drive / Great South Road / Horotiu Bridge and Gateway Drive / Kohia Road.

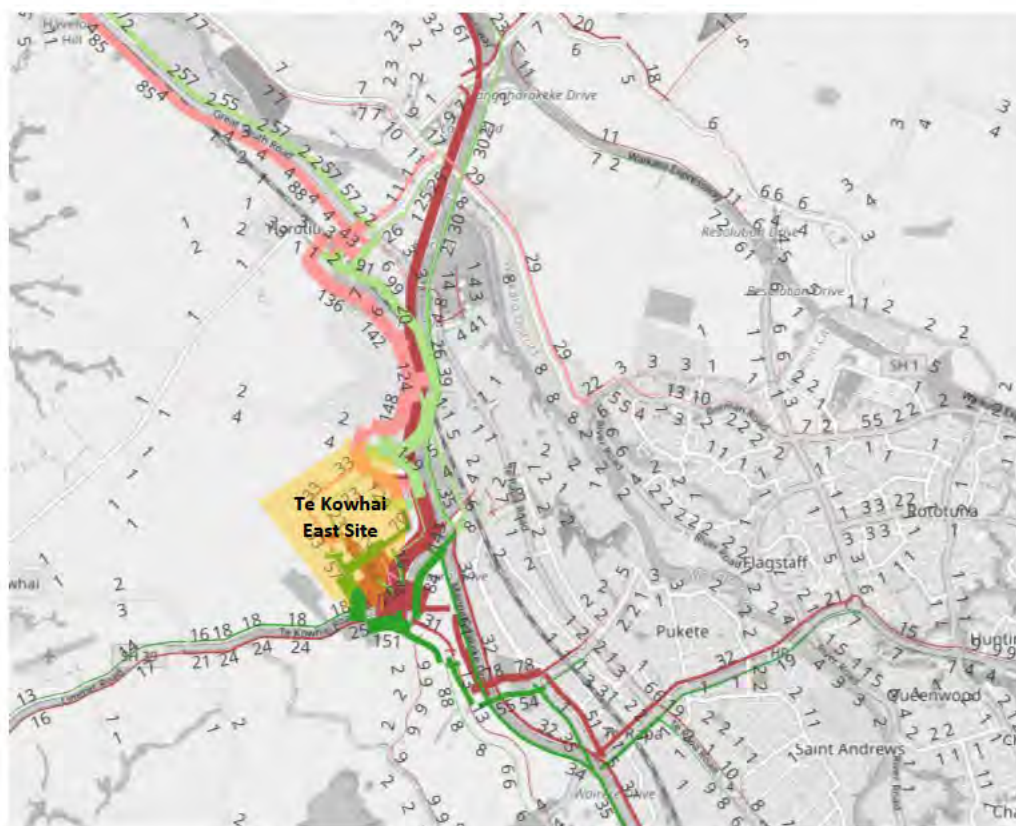


Figure 26: TKE Trip Distribution in the PM Peak Hour in 2045

8.4.18 As per the AM peak hour, the effect of the TKE Site on the Gateway Drive / Great South Road / Horotiu Bridge intersection is already assessed in Section 8.3.9.

8.4.19 The intersection of Gateway Drive / Kohia Road operates acceptably with the TKE site under all other scenarios and horizons years, and therefore the change in level of service is likely a result of the absence of the Northern River Crossing.

8.4.20 Sensitivity Test 3 and 4 – Wholesale Member Retail

8.4.21 Sensitivity test 3 includes 5ha of wholesale member retail in 2035, while sensitivity test 4 includes 5ha of wholesale member retail in 2045. In addition to background growth, the model zone location site access options change across these two scenarios with the Onion Road access forecasted for 2045.

8.4.22 In 2035, the addition of wholesale member retail has negligible effect on the WRTM output when compared against the 2035 with development base case.

8.4.23 In 2045, two scenarios were assessed being:

- Option A: Wholesale member retail located in southeastern portion of the site; and
- Option B: Wholesale member retail located in northern portion of the site.

8.4.24 The location of the wholesale member retail was found to have minimal effect on the trip distributions, with majority of trips accessing the TKE development via SH39 regardless of the wholesale member retail location.

8.4.25 Furthermore, as per the 2035 model, the addition of wholesale member retail has negligible effect on the WRTM output when compared against the 2045 with development base case.

8.4.26 Sensitivity Testing Conclusion

8.4.27 The sensitivity testing confirms that no material effect compared to the main modelling. As such, no additional controls or mitigation is required as a result of the sensitivity testing.

9 Road Safety

- 9.1 The existing network is characterised by relatively low crash severity, with no fatal and minimal serious crashes (2/56) recorded in the study area over the past five years. The crash patterns identified are consistent with the respective intersection controls.
- 9.2 The proposed transport network has been designed in accordance with Safe System principles and incorporates:
- Reduced speed environments (generally 50 km/h) consistent with urbanisation;
 - Intersection forms that reduce conflict points, notably roundabouts where appropriate;
 - A clear road hierarchy that separates through movements from local access;
 - Provision of footpaths and cycle facilities to reduce conflict between vehicles and vulnerable users;
 - All proposed road corridors comply with road reserve width requirements as stated in the WDC DP OiP and align with the classified road function as stated in the ONF;
 - Proposed pedestrian footpaths are 1.5m as typical pedestrian activity in industrial areas is low;
 - Cycle facilities are proposed on the collector roads, which separates cyclists from other road users;
 - Walking and cycling crossing facilities are provided including a grade separated crossing of SH39; and
 - All roads have been designed to accommodate HCVs given the high likelihood of such vehicles accessing these roads.
- 9.3 These measures will reduce both the likelihood and severity of crashes compared to the existing rural road environment.
- 9.4 While traffic volumes will increase as a result of development, the improved network form, lower operating speeds, and provision of multimodal infrastructure are expected to result in an overall improvement in safety.

10 Construction Traffic Effects

10.1.1 It is standard practice for a development of this size, that a CTMP is developed to outline how construction related traffic to and from the site will be managed and mitigated. It is recommended that this is required as a condition of consent. The CTMP should include the following:

- Objective of how construction traffic is to be managed;
- Construction dates and hours of operation including any specific non-working hours for traffic congestion, noise, etc;
- Diagrams identifying which routes trucks will use to travel to and from the site;
- Temporary traffic management signage / details to appropriately manage vehicles and pedestrians in the vicinity of the site; and
- Details of site access / egress over the entire construction period noting that all access points to be located so that appropriate visibility is achieved onto the adjacent road network.

10.1.2 The primary construction route to the site is anticipated to be via SH39, with SH1C providing wider network connectivity. As such, the primary access pattern is anticipated to result in vehicles turning right into the site and left out of the site. Once the SH39 roundabout site access is constructed, construction traffic is anticipated to be predominantly via the internal collector road.

10.1.3 The proposed construction methodology is to balance cut and fill within the site wherever practicable, with excavated cut to be hauled directly to fill areas. The Earthworks Management Plan estimates approximately 1.1 million m³ of structural cut and a broadly equivalent fill requirement, with most of this material retained and redistributed internally. This methodology reduces the number of heavy vehicle movements that would otherwise be required on the surrounding road network.

10.1.4 Based on experience with the construction planning and traffic management associated with similar developments, it is considered that construction activities can be managed to ensure an appropriately low level of construction traffic effects. Of note, the construction activities are temporary and with appropriate measures in place, it is considered that construction activities can be managed to ensure any generated traffic effects are appropriately mitigated.

11 Compliance with Policy and Other Frameworks

11.1 Overview

11.1.1 The following national, regional and local transport policy document have been reviewed:

- National Strategies & Plans:
 - Arataki – Waka Kotahi’s 30 Year Plan for the land transport system
 - Government Policy Statement on Land Transport Funding (2024-34)
 - Emissions Reduction Plan (ERP) (2026)
- Regional:
 - Waikato Regional Land Transport Plan (2024-54)
 - Waikato Regional Public Transport Plan 2022-2032
- Local:
 - Waikato District Plan – Operative in Part

11.1.2 TKE has been assessed against these documents and is considered to be well aligned from a transportation perspective as the development supports key objectives relating to economic growth, integrated land use and transport planning, network resilience, accessibility, safety, and environmental sustainability. Furthermore, its location adjacent to the existing Te Rapa and Horotiu industrial areas, SH39, the Waikato Expressway, and planned growth areas enables efficient freight movement, supports employment growth, and reinforces the Hamilton-Waikato metropolitan growth pattern.

11.1.3 A detailed review is provided in Appendix F.

12 Infrastructure Upgrades and Funding

12.1.1 Rather than being tied to specific assessment years, the timing of infrastructure delivery is linked to the scale of development. This ensures that transport mitigation is implemented in response to the transport demand generated by the development, irrespective of the rate at which development occurs.

12.1.2 The infrastructure required to support the TKE Site and the associated triggers are summarised in Table 8 below.

Table 8: Proposed Infrastructure Upgrades and Triggers

Development Trigger	Infrastructure/Contribution Required	
	TKE Responsibility	Road Controlling Authority Responsibility
Prior to first occupation	- SH39 roundabout at access to TKE - Shared path on the southern side of SH39 between TKE roundabout and Burbush Road Roundabout - Shared path grade separated crossing at TKE roundabout	----
400 total peak hour trips	3% Contribution towards Gateway Drive / Great South Road / Horotiu Bridge Road upgrade - Onion Road give-way access to TKE - Shared path and kerb and channel on southern side of Onion Road between the site access and Holmes Road 5% Contribution towards Koura Drive upgrade	- Construction of Gateway Drive / Great South Road / Horotiu Bridge Road upgrade - Construction of Koura Drive upgrade

	including right turn ban and converting the roundabout to dual circulating lanes	
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- 12.1.3 Where the infrastructure upgrade is not required solely as a result of the proposal, funding contributions are proposed. One possible method for this is a PDA. Regardless of the method adopted for contributions, the funding contributions are proposed to be proportionate to the effects of the proposal.
- 12.1.4 At Gateway Drive / Great South Road TKE equates to 1 - 3% of traffic, or a 4 - 5% increase in overall delay. As such, a 3% contribution towards the upgrade is proposed.
- 12.1.5 At the Koura Drive Interchange TKE equates to 5 - 10% of traffic through the interchange. It is noted that delay is not considered an appropriate measure for this intersection as once an intersection approaches capacity, as is the case for the right turn from the northbound offramp, the change in performance is exponential.
- 12.1.6 In addition to the specific transport mitigation measures identified, a suite of general transport engineering conditions are proposed in the AEE to ensure coordinated design, staging and delivery of transport infrastructure associated with the development. These conditions address matters including detailed engineering design, subdivision and road vesting, access arrangements, visibility, vehicle crossing locations and separation to intersections and adjacent crossings, signage, lighting, road safety auditing, and compliance with applicable engineering standards. These matters are expected to be in general accordance with the current WDC DP OiP and will also be captured in the consent conditions for clarity. They also require the approval of detailed designs by the relevant road controlling authorities, where applicable, and provide for the staged delivery of transport infrastructure in line with the progression of development.
- 12.1.7 Implementation mechanisms, including Development Staging Plans and any necessary PDAs or Private Works Agreements, are also required to ensure that transport infrastructure is delivered in a coordinated manner and that development remains within the infrastructure thresholds established through the transport assessment.

13 Conclusion and Recommendations

- 13.1.1 This ITA has considered the transport effects of the proposed TKE Masterplan, subdivision and associated industrial development on the surrounding transport network.
- 13.1.2 The proposed transport network has been designed to provide a safe, efficient and well-connected industrial development. The internal road hierarchy is appropriate for the anticipated industrial activities, can accommodate HCVs, and incorporates walking and cycling infrastructure that will improve connectivity within the site and to the surrounding network. The layout has also been designed to accommodate future public transport services should these be introduced as the surrounding growth areas develop.
- 13.1.3 The WRTM demonstrates that the majority of traffic generated by the development is accommodated within the existing and planned strategic transport network. Traffic redistributes across the wider network as planned infrastructure is progressively delivered, with the Onion Road access forecast to reduce reliance on SH39 and the Koura Drive Interchange.
- 13.1.4 SIDRA assessments confirm that the proposed SH39 access roundabout, Onion Road access intersection and SH39 / Burbush Road roundabout all operate with substantial spare capacity through to the 2055 assessment year.
- 13.1.5 The Gateway Drive / Great South Road / Horotiu Bridge Road intersection and the Koura Drive Interchange are forecast to experience operational constraints under future background growth irrespective of the TKE development. The modelling demonstrates that TKE makes only a minor contribution to these capacity constraints, generally increasing delays by only a small percentage. The need for upgrades at these locations is therefore driven principally by wider network growth rather than by the proposed development.
- 13.1.6 Appropriate mitigation measures have been identified where required. At Gateway Drive / Great South Road / Horotiu Bridge Road, additional approach lanes and revised signal phasing would restore an acceptable level of service through to 2045. At the Koura Drive Interchange, future improvements associated with the northbound off-ramp and roundabout arrangement will ultimately be required. Both mitigation measures are required regardless of TKE.
- 13.1.7 Sensitivity testing confirms that four-laning of SH39 between the proposed site access and the Koura Drive Interchange is not required to accommodate TKE traffic. The absence of the Northern River Crossing increases traffic on the surrounding network, but TKE contributes

only a minor share of these increases, with network performance remaining primarily influenced by background growth. The modelling also demonstrates that changes to land use distribution within the site have negligible influence on wider network performance.

13.1.8 The proposal has been developed in accordance with Safe System principles and will improve the existing transport environment through lower operating speeds, modern intersection treatments, improved provision for walking and cycling, and a legible road hierarchy appropriate for industrial development. Subject to implementation of the proposed transport infrastructure and recommended mitigation measures, no unacceptable road safety effects are anticipated.

13.1.9 The recommended transport infrastructure upgrades include:

- Prior to first occupation: SH39 roundabout at access to TKE, shared path on southern side of SH39 between TKE roundabout and Burbush Road Roundabout, shared path bridge/underpass at TKE roundabout;
- 400 total peak hour trips: 3% contribution towards Gateway Drive / Great South Road / Horotiu Bridge Road upgrade, Onion Road give-way access to TKE, shared path and kerb and channel on southern side of Onion Road between the site access and Holmes Road, upgrade of Onion Road / Holmes Road intersection, 5% contribution towards Koura Drive upgrade including banning the right turn and dual laning the roundabout.

13.1.10 Construction traffic effects will be temporary and can be appropriately managed through the preparation and implementation of a Construction Traffic Management Plan.

13.1.11 It is anticipated that matters relating to detailed design of road and transportation infrastructure will be governed by appropriate consent conditions requiring engineering plan approval by the relevant road controlling authorities and that both detailed design and post construction safe system audits will also be required. In terms of the location of vehicle crossings, widths, designs, visibility, location and separation, these will be in general accordance with the current WDC DP OiP and will also be captured in the consent conditions for clarity. These conditions are included in the AEE.

13.1.12 Overall, the assessment demonstrates that the TKE development can be accommodated within the existing and planned transport network without resulting in unacceptable adverse transport effects. Subject to the proposed transport infrastructure, recommended conditions of consent, and appropriate agreements relating to future network upgrades where required,

it is concluded that the proposal is appropriate from a transportation perspective and is consistent with the relevant national, regional and local transport planning framework.

CKL

Appendix A – WRTM Briefing Scope

MEMO

To: Tony Denton / Victor Devyatov – Hamilton City Council **Date:** 25 March 2026

Mark Rushworth / Alan Catchpole – NZTA

Virendra Pradash / Matthew Epps – Waikato DC

From: Judith Makinson - Director **CC:**

Reviewed: Judith Makinson - Director **CKL Ref:** B20315

Re: 30 Mathers Road, Horotiu Fast Track Application – Traffic Modelling Brief

1 Introduction

The following is revised traffic modelling brief following consultation and feedback from HCC, NZTA and WDC. The purpose of the brief is to agree the inputs and extent of analysis with the three primary road controlling authorities where traffic effects may occur as a result of the proposed development. The purpose of the traffic modelling is to understand the strategic and localised traffic effects of the Te Kowhai East (TKE) site which is some 188ha (gross) and 128ha (net) of future industrial zoned land as shown in Figure 1. This land is currently in the Waikato District:



Figure 1: TKE site location

It has frontage to State Highway 39 (SH39), Mathers Road / Onion Road and State Highway 1C (SH1C). It is intended to access site from both SH39 and Mathers Road / Onion Road, with no access from SH1C.

2 TKE Development Outline

In terms of proposed development under the TKE fast track application, approximately 188ha (gross) of industrial activities including supporting services (such as childcares and local food and beverage outlets), wholesale trade, transport depots and warehousing / logistics activities are envisaged, similar to the existing Te Rapa Gateway industrial area in Hamilton.

Development delivery is expected to be staged as shown in Figure 2. Development is expected to generally occur south to north and west to east across the site.

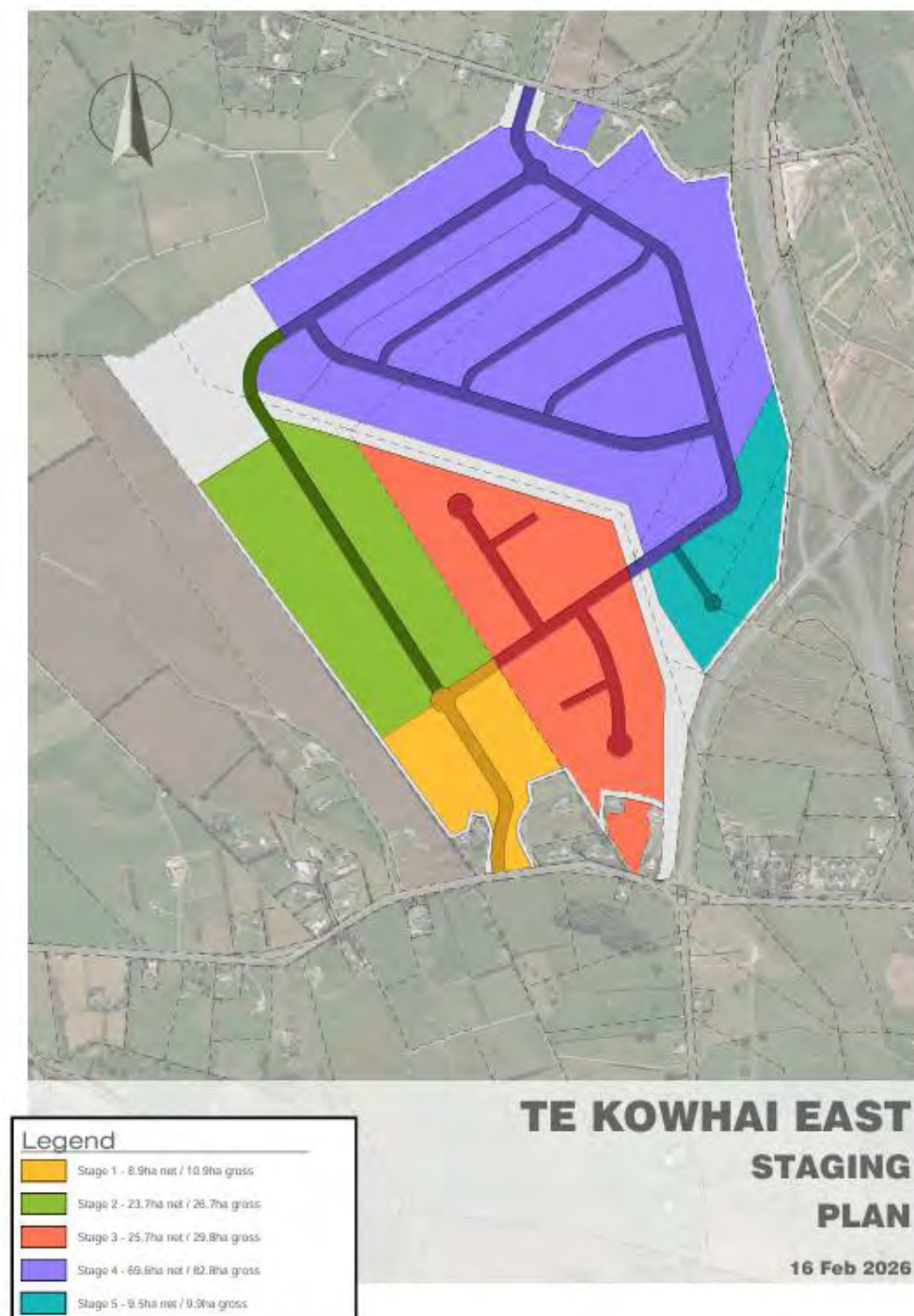


Figure 2: TKE Development Staging Plan

In more detail, the gross development stage areas, including roading etc, are:

- Stage 1 is ~10.9ha and will include construction of a new roundabout on SH39 and the first section of the primary collector road, including the roundabout that will provide access to Stage 3 of the development;
- Stage 2 is ~26.7ha and will include the remainder of the north / south section of the primary collector road running through the site;
- Stage 3 is ~29.8ha and will include the first part of the secondary collector loop road around the site, heading east from the Stage 1 roundabout;
- Stage 4 is ~82.8ha and will complete both the primary and secondary collector roads, including the connection to Onion Road and the northern primary collector / secondary collector roundabout; and
- Stage 5 is ~9.9ha, with no significant roading infrastructure being envisaged as part of this stage.

Assuming 2028 start date and delivery of approximately 10ha /year, delivery of the development in relation to WRTM model years is expected as follows:

- o 2035 = 67.4ha development (Development Stages 1, 2 and 3)
- o 2045 = 160.1ha development (Development Stages 3 and 4)

Development is expected to be completed by 2045.

3 WRTM Approach

3.1 Model Years

WRTM will be used to assess the effects of the proposed development across the current model years of 2025, 2035, 2045 and 2055. A number of different base models are available within the area. Consultation with HCC and Stantec has confirmed the following models will be used to assess the effects of TKE:

- 2025 WRTM base (E6 scenario) for validation purposes only
- 2035 WRTM Rotokauri base used for PC12 (Z3 scenario)
- 2045 WRTM Rotokauri base used for PC12 – it is assumed that the required update to land uses and road networks as an HCC task separate to this model brief has been completed (Z4 scenario)
- 2055 WRTM Rotokauri base used for PC12 (Z5 scenario)

A sensitivity test option will also be considered using the Te Rapa Plan Change WRTM model for to assess effects once the Northern River crossing is in place.

Analysis of AM and PM peak period models only is required.

3.2 Zones

TKE site is currently within Zone 807, with connectors to the road network at Hartstone Road and also to Te Kowhai Road close to the intersection with Horotiu Road. This is shown in Figure 3.

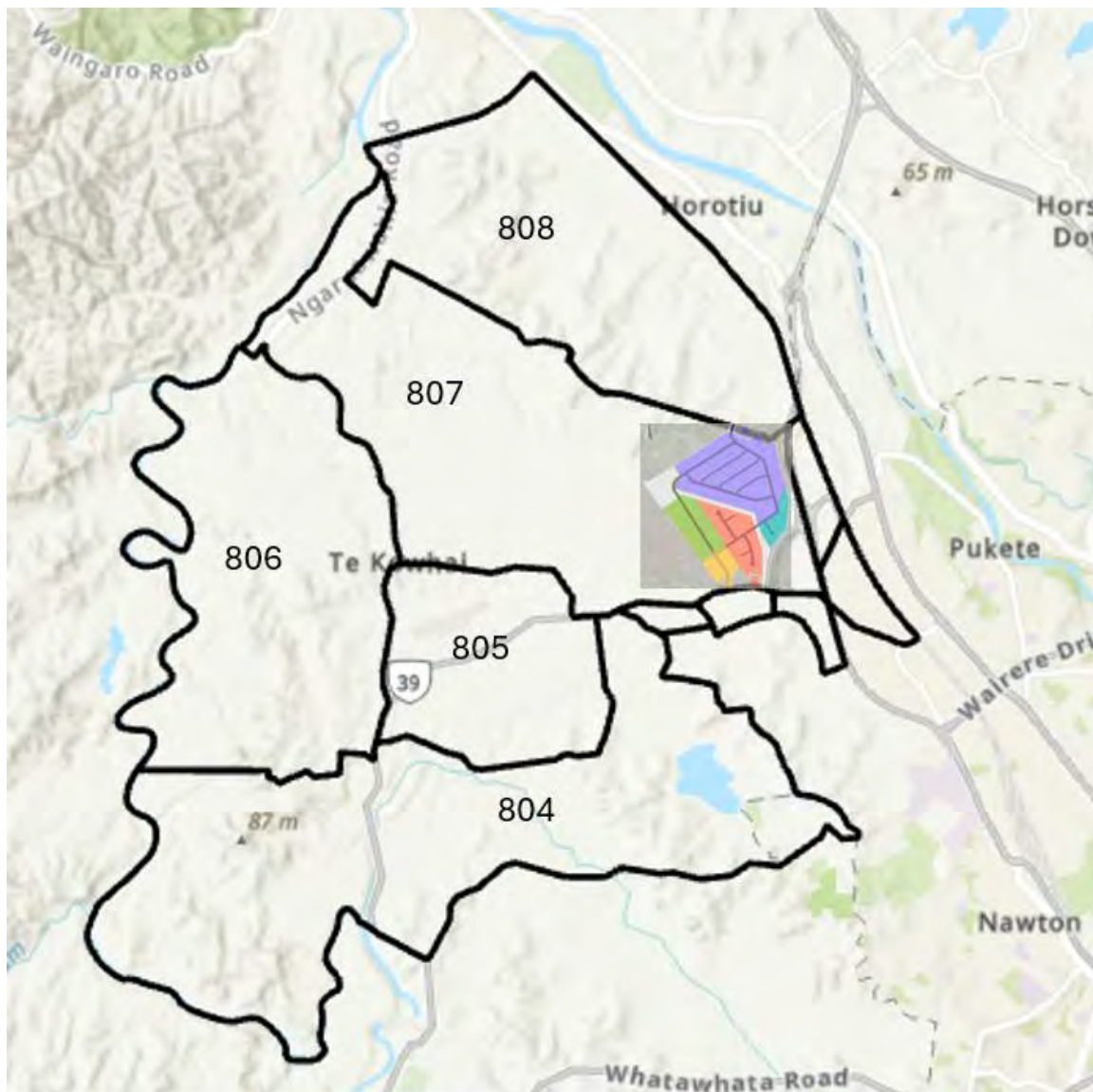


Figure 3: Current 2025 WRTM Model Zones covering TKE Site

It is proposed that the TKE development be represented by three WRTM model zones. Following consultation with Stantec, it is understood that a number of empty model zones have already been allocated to other projects. As such, the model zones used to represent TKE will be referred to as 'Spare 1', 'Spare 2' and 'Spare 3', with Stantec allocating suitable spare zones from WRTM. Stantec will advise on the allocated model zones as part of the modelling outputs. The proposed amendments to the WRTM zone location and connections to represent the TKE development are shown in Figure 4. These are:

- Spare 1 covering ~37.6ha (gross) of Stage 1 and 2 development;
 - One zone connector is proposed to primary collector road (red dotted line)
- Spare 2 covering ~29.8ha (gross) of Stage 3 of development
 - Two zone connections are proposed to each of the secondary collector roads through the zone (white dotted lines)
- Spare 3 covering ~92.7ha (gross) of Stage 4 and 5 development
 - One zone connector to the secondary collector road through the zone (white dotted lines)

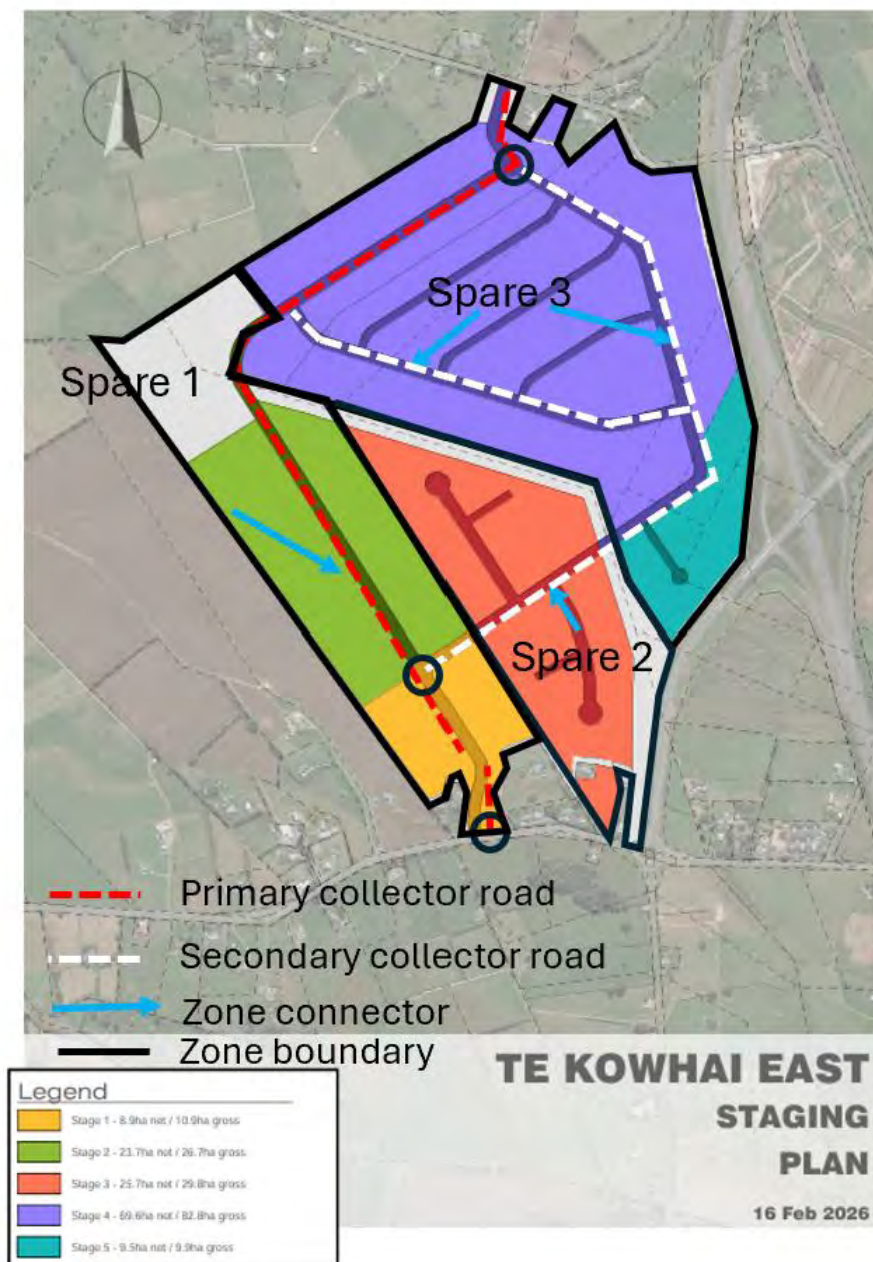


Figure 4: TKE Development Zones and Connections

3.3 Industrial Jobs

HCC has stated a preference of referring to the Ruakura Industrial Park zone, however the applicant prefers retaining more flexibility to allow for a wider range of potential activities. For modelling purposes, reference has been made to the Te Rapa Gateway and Te Rapa North areas as being broadly representative of a range of ‘clean industry’ and supporting non-industrial activities e.g child cares, small food and beverage outlets etc. which are envisaged.

The types of industrial activities envisaged by the applicant are as follows:

- Industrial activities excluding noxious and offensive activities; motor vehicle dismantling, recycling plants; incineration or flaring of trade waste; manufacture or blending of bulk products, fertiliser, animal feed, roading materials, gardening materials, concentrate and aggregate; and the slaughter and processing of meat products

- Light industry
- Logistics and freight handling
- Ancillary offices
- Ancillary retail
- Public transport facilities
- Parking lots and parking buildings
- Emergency service facilities
- Battery storage facilities
- Transport depots
- Boarding kennels and catteries
- Yard based retail building improvement centres

Specific additional activities are also anticipated for a number of WRTM zones. The expected activity mix for each zone is as follows (gross areas):

- Spare 1:
 - 2ha service station:
 - Fuel and EV charging facilities.
 - Parking, rest, and amenity facilities.
 - Drive through services
 - 2ha neighbourhood centre retail including:
 - Small scale retail and food and beverage activities.
 - Health care services.
 - Childcare facilities.
 - Banks and community centre
 - Gymnasium
 - Small scale places of worship
 - Tertiary or specialised training facilities
 - Remaining 33.6ha expected industrial activities as listed
- Spare 2:
 - 2ha childcare /place of assembly/ outdoor recreation
 - Remaining 27.8ha expected industrial activities as listed
- Spare 3:
 - 8ha storage sheds / warehousing
 - Remaining 84.7ha expected industrial activities as listed

The number and categories of jobs in the Te Rapa North (Zone 251) and Te Rapa Gateway (Zones 253 and 254) have been reviewed at 2035, 2045 and 2055 and are as shown in Table 1 and Figure 5.

The TOTAL column in Table 1 is greater than the sum of the component columns as not all retail jobs are included in the categorisations in WRTM. Some job categories (agricultural and accommodation), have not been included in the table as they represent 0 – 1 jobs only.

When comparing the Te Rapa North (Zone 251) and Te Rapa Gateway areas (Zones 253 and 254), it is clear that wholesale retail and other supporting activities are more evident in the Te Rapa Gateway area (Zone 253 and 254). As such, jobs for general industrial aspects of the TKE development should be pro-rated from Zone 251, with wholesale retail, neighbourhood centre, childcare, places of assembly and outdoor recreation being reasonably represented by the job mix from Zones 253 and 254.

Service centre activity has also been considered in relation to jobs. Zone 813 is a largely rural zone but it includes the Taupiri Service Centre, as shown in Figure 6. Given the generally rural nature of the WRTM zone, and the scale of the Taupiri Service centre being some 2ha, it is reasonable to apply the retail job aspect of Zone 813 to the proposed 2ha service centre activity within the TKE development. Taking the retail jobs from this zone as a proxy for the service centre activity is considered appropriate.



Figure 5: Te Rapa WRTM Zones



Figure 6: Taupiri Service Centre WRTM Zone

Table 1: Industrial Jobs by Category

Year	Zone	REtail	MANufatcuring	WHOLEsale	OFFice	COMMunity	TOTAL
2035	251	0	75	109	261	45	871
	253	13	16	39	4	2	126
	254	11	14	19	4	2	94
	813	5	35	7	20	11	372
2045	251	0	68	124	297	50	960
	253	14	19	46	5	2	144
	254	13	17	22	4	2	108
	813	5	36	7	21	12	384
2055	251	0	74	135	321	55	1028
	253	14	20	50	5	5	156
	254	13	18	24	5	2	117
	813	5	39	8	21	13	395

For clarity, the proposed WRTM zone to be used as the basis for assessing future jobs number in the TKE development are summarised in Table 2.

Table 2: WRTM Zones for Estimating TKE Jobs

TKE Model Zone	Activity	Area	WRTM Model Zone as source of Jobs
Spare 1	Service centre	2ha	813 retail jobs
	Neighbourhood centre	2ha	253 and 254
	Industrial	33.6ha	251
Spare 2	Childcare, place of assembly, outdoor recreation	2ha	253 and 254
	Industrial	27.8ha	251
Spare 3	Warehousing / Storage Sheds	8ha	251
	Industrial	84.7ha	251

3.4 Road Networks

The primary collector road between SH39 and Onion Road (red dotted line in Figure 4) is expected to be completed by 2045 and is included in Spare 1 and Spare 3. At 2035, all Spare 1 traffic is expected to access site via SH39. The form of this primary collector road is not yet confirmed but should be included in WRTM as a two-way two-lane road with flush median. It will be defined in WRTM as follows:

- Link Lanes = 1
- Road Hierarchy = 6 -collector
- Posted Limit = 5 – 50km/h
- ONRC Code = 3 – Secondary
- Attractiveness = 0 – No Special Attractiveness
- Environment = 0 – Urban, Undivided, Level

The secondary collector road network (white dotted lines in Figure 4) is included in Spare 2 and Spare 3 and is also expected to be completed by 2045. These will also be two-lane, two-way roads with a flush median. These will be defined in WRTM as follows:

- Link Lanes = 1
- Road Hierarchy = 6 –Collector
- Posted Limit = 5 – 50km/h
- ONRC Code = 3 – Secondary
- Attractiveness = 0 – No Special Attractiveness
- Environment = 0 – Urban, Undivided, Level

Three roundabouts are proposed as part of the development, at the following intersections as shown by circles on Figure 4:

- Primary collector road / SH39 (main site access);

- Primary collector road / secondary collector ring road (southern end); and
- Primary collector road / secondary collector ring road (northern end). The main site access roundabout at SH39 is expected to be a dual lane roundabout, with internal roundabouts being single lane only

All other intersections along the primary collector road and secondary collector road network, including the Primary Collector Road / Onion Road intersection will be priority controlled t-intersections and are likely to include right turn bays.

The amendments to WRTM road network to reflect the expected changes to the internal and external road networks are as follows:

- Amended Nodes:
 - o 14397 (SH39) amended from a mid-link node to dual lane roundabout with a new link representing the primary connector road to the north. All approaches to the roundabout should have 2 entry and 2 exit lanes for all model years;
- New Nodes:
 - o Primary Collector / Onion Road intersection on Onion Road between nodes 2867 and 6590. It is expected that this new node will be located closer to Node 6590. This should be in all model years; and
 - o All other internal intersections as outlined previously and Figure 4.

The expected TKE on site road network at 2035 is shown in Figure 7. The extent of the primary collector is shown by the red dotted line, the secondary collector by the white dotted line and two roundabouts by black circles:

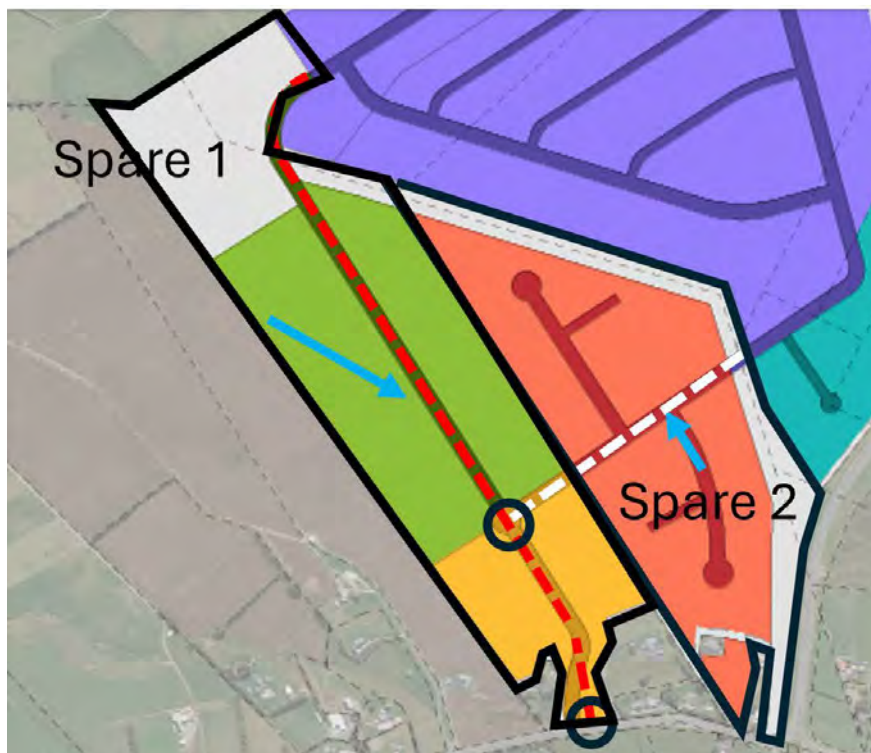


Figure 7: 2035 TKE Road Network

The expected TKE on-site road network at 2045 and 2055 is shown in Figure 8. This is the full extent of on-site roading and external intersection connections (roundabout at SH39 and priority t-intersection at Onion Road):

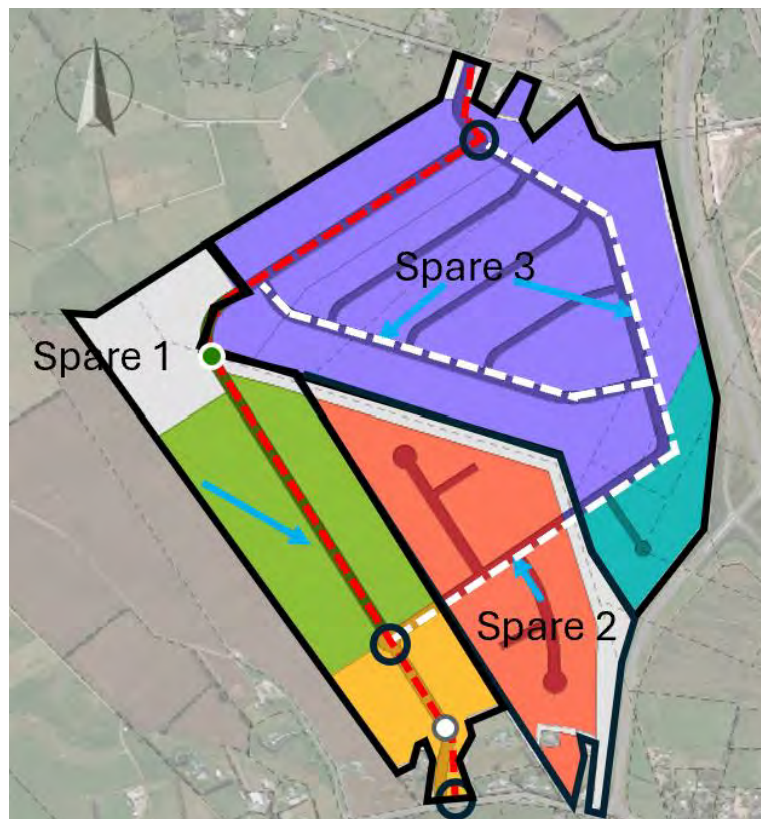


Figure 8: 2045 and 2055 TKE Road Network

4 Sensitivity Scenarios

A number of sensitivity tests are proposed. Each sensitivity test is to be run independently of the others with no overlap of variables being tested.

4.1 Sensitivity Test #1 – Four laning SH39

Initial analysis suggests that SH39 between Koura Drive and the new Primary Collector Road / SH39 roundabout to be upgraded to a 4-lane two way road at some point in the future due to a range of potential and planned developments in the area, such as the Rotokauri North Structure Plan area, Plan Change 17 and TKE. Given this has the potential to represent a significant change in road capacity immediately adjacent to the site, and there is likely to be a range of contributing land uses to any such upgrade, it is considered prudent to test this potential upgrade through WRTM.

- Amended links:
 - Link 14397- 2717 make two way – 4 lane road;
 - Ensure node 2717 is coded as dual lane roundabout;

This test is to be run for the 2045 model year AM and PM peak periods with and without TKE development. This provides a comparison with the 'no -four laning' main scenario and also allows us to interpolate performance at 2055 based on changes in traffic volumes and patterns between the 2045 comparison cases. This is to be undertaken for the primary test land uses only.

4.2 Sensitivity Test #2 – Northern River Crossing

HCC has requested that a sensitivity test be undertaken using the Te Rapa Plan Change at 2045 and 2055. This is so that the effects of development on the Northern River Crossing are understood.

The 2035 (Z3) and 2045 (Z4) Rotokauri network analysis will identify if the TKE development can be accommodated in advance of the Northern River Crossing and provides sufficient information to assess whether:

- the effects are such that they can be accepted on the road network in the expectation of the Northern River crossing being completed;
- the Northern River Crossing needs to be brought forward to mitigate the effects of the TKE development or not; or
- the extent of development prior to the Northern River crossing being delivered needs to be capped.

The 2055 Northern River Crossing WRTM network analysis provides a comparison of traffic patterns against the 2055 Rotokauri network (no Northern River Crossing) and as such, provides the long-term strategic view of TKE in the context of both road network options. As such only a 2055 Northern River Crossing assessment is considered necessary.

4.3 Sensitivity Test #3 – Wholesale Retail Land Use

There is potential for up to 5ha of wholesale retail to be included within the TKE development. This is envisaged as either being part of Stage 4 or may be part of Stages 1 – 3. As such, it is proposed to undertake a land use sensitivity test at 2035 and 2045 to test the potential traffic effects of this option. The change in land use activity, associated jobs and where which Zone they are loaded to will alter as shown in Tables 3 and 4.

Table 3: Option A - Wholesale Retail Developed at 2035

TKE Model Zone	Activity	Area	WRTM Model Zone as source of Jobs
Spare 1	Service centre	2ha	813 retail jobs
	Neighbourhood centre	2ha	253 and 254
	Industrial	33.6ha	251
Spare 2	Childcare, place of assembly, outdoor recreation	2ha	253 and 254
	Industrial	22.8ha	251
	Wholesale retail	5ha	253 and 254
Spare 3	Warehousing / Storage Sheds	8ha	251
	Industrial	84.7ha	251

Table 4: Option B - Wholesale Retail Developed at 2045

TKE Model Zone	Activity	Area	WRTM Model Zone as source of Jobs
Spare 1	Service centre	2ha	813 retail jobs
	Neighbourhood centre	2ha	253 and 254
	Industrial	33.6ha	251
Spare 2	Childcare, place of assembly, outdoor recreation	2ha	253 and 254
	Industrial	27.8ha	251
Spare 3	Warehousing / Storage Sheds	8ha	251
	Industrial	79.7ha	251
	Wholesale Retail	5ha	253 and 254

The Option A and Option B development scenarios will need to be tested at 2035 and 2045 using the TKE base roading network as set out in Figure 7 and 8.

5 TKE Model Scenarios

A total of 16 model scenarios are proposed to be assessed in relation to the TKE fast track application. These will be referred to as the primary scenarios (14 in total) to differentiate them from other sensitivity scenarios (14 in total). The primary scenarios are based on the following:

- Four different years (2025, 2035, 2045, 2055).
- Two peak periods (AM, PM)
- With and without development

The sensitivity test scenario considers also the effects of development on the Northern River Crossing at 2055, the need for four-laning of SH39 at 2045 and the effects of alternative land use activities at 2035 and 2045.

If AADT volumes are required at any point, IP model runs may be instructed separately Table 5 below summarises the land use and network modelled for each scenario.

Table 5: TKE Scenario Summary

Year	AM Peak	PM Peak
2025	1. Base land use and E6 Rotokauri network for validation	2. Base land use and E6 Rotokauri network for validation
2035	3. Base land use and Z3 Rotokauri network 4. TKE 2035 industrial land use and primary connector road (Figure 7)	5. Base land use and Z3 Rotokauri network 6. TKE 2035 industrial land use and primary connector road (Figure 7)

2045	7. Base land use and Z4 Rotokauri network 8. TKE 2045 industrial land use, primary connector road and collector road network (Figure 8)	9. Base land use and Z4 Rotokauri network 10. TKE 2045 industrial land use, primary connector road and collector road network (Figure 8)
2055	11. Base land use and Z5 Rotokauri network 12. TKE 2045 industrial land use, primary connector road and collector road network (Figure 8)	13. Base land use and Z5 Rotokauri network 14. TKE 2045 industrial land use, primary connector road and collector road network (Figure 8)
2045 Road Network Sensitivity Test #1 (4-laning SH39)	15. Base land use and Z4 Rotokauri network with a four lane SH39 16. TKE 2045 industrial land use, primary connector road and collector road network with 4-laning of SH39 between primary collector road and Koura Drive roundabout (Figure 8)	17. Base land use and Z4 Rotokauri network with a four lane SH39 18. TKE 2045 industrial land use, primary connector road and collector road network with 4-laning of SH39 between primary collector road and Koura Drive roundabout (Figure 8)
2055 Road Network Sensitivity Test #2 (Northern River Crossing)	19. TKE 2045 industrial land use, primary connector road and collector road network with the Northern River Crossing base network (Figure 8)	20. TKE 2045 industrial land use, primary connector road and collector road network with the Northern River Crossing base network (Figure 8)
2035 Land Use Sensitivity Test #3	21. TKE Option A land use and 2035 road network (Figure 7) 22. TKE Option B land use and 2035 road network (Figure 7)	23. TKE Option A land use and 2035 road network (Figure 7) 24. TKE Option B land use and 2035 road network (Figure 7)
2045 Land Use Sensitivity Test #3	25. TKE Option A land use and 2045 road network (Figure 8) 26. TKE Option A land use and 2045 road network (Figure 8)	27. TKE Option A land use and 2045 road network (Figure 8) 28. TKE Option A land use and 2045 road network (Figure 8)

6 Validation

SCATS counts at the Te Rapa Road / Wairere Drive and Arthur Porter Drive / Wairere Drive intersections along with any other recent intersection count data which HCC may have in the area will be used for the purposes of validating the WRTM model. The SCATS counts and modelled counts from the base 2025 scenario will be compared using the GEH statistic which is defined as follows:

$$GEH = \sqrt{\frac{(m - o)^2}{(m + o) \cdot 2}}$$

Where **m** is the modelled count
and **o** is the observed amount

The NZTA Transport Model Development Guidelines indicate that GEH values for individual turning movements for a strategic model should achieve the following:

- GEH < 5 for >75% of turns.
- GEH < 7.5 for >80% of turns.
- GEH < 10 for >85% of turns.

The model will be considered to be appropriately validating if the above criteria are achieved. If the criteria are not achieved, further review of the model inputs will be required to ensure that the modelling is appropriately validated.

7 Model Outputs

The outputs from the WRTM modelling assessment for the primary and sensitivity scenarios will include the following:

- Loaded Networks to be viewed in NexView (.NL and .CRD files) with separate loaded networks for all vehicles, light vehicles and heavy vehicles for each assessment scenario;
- GIS outputs that allow review of the following:
 - Total Link Volumes for each scenario for all vehicles, light vehicles and heavy vehicles
 - Volume Difference 'with' and 'without' TKE
 - Select Link analysis for trips related to TKE zones for all vehicles, light vehicles and heavy vehicles on the following roads:
 - primary collector road immediately north of SH39
 - primary collector road immediately south of Onion Road
 - LOS ratings for intersections, with a focus on intersections with LOS D/E/F

The locations for select link analysis are shown in Figure 9:

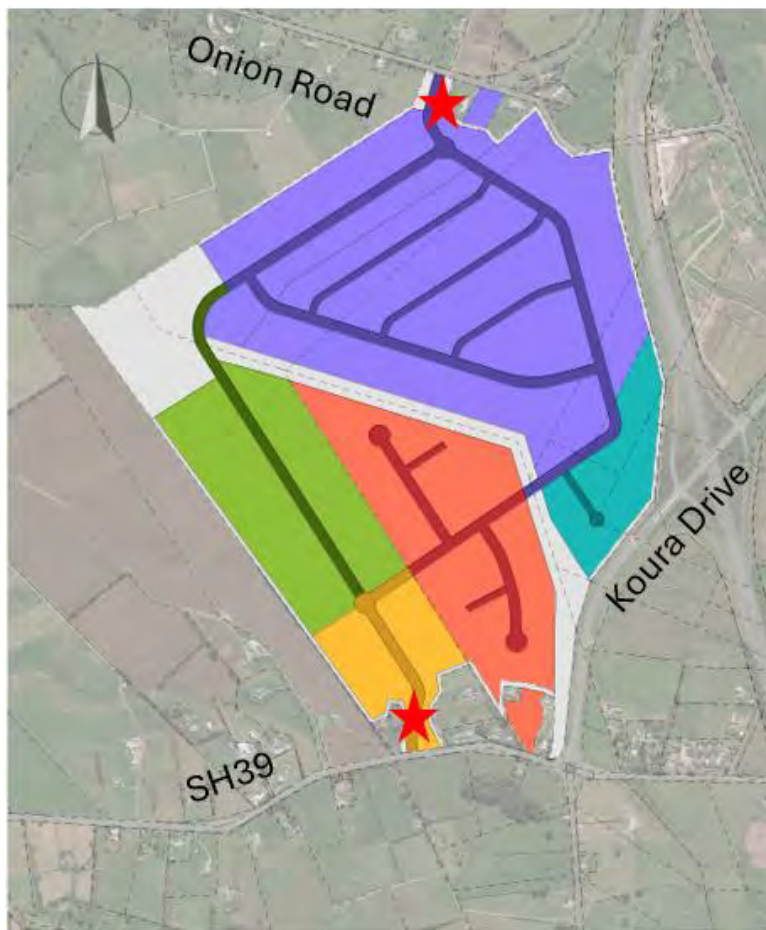


Figure 9: Select Link Analysis locations

Both are on the new primary access road, one to the immediate south of Onion Road and one to the immediate North of SH39.

In terms of intersection and network performance, the area of interest broadly covers the area defined below and illustrated in Figure 10:

- Northern extent = SH1 WEX / SH1C interchange
- Western extent = Horotiu Road / SH39 intersection in Te Kowhai
- Southern / Eastern extent = Te Rapa Road / Forest Lake Road signals

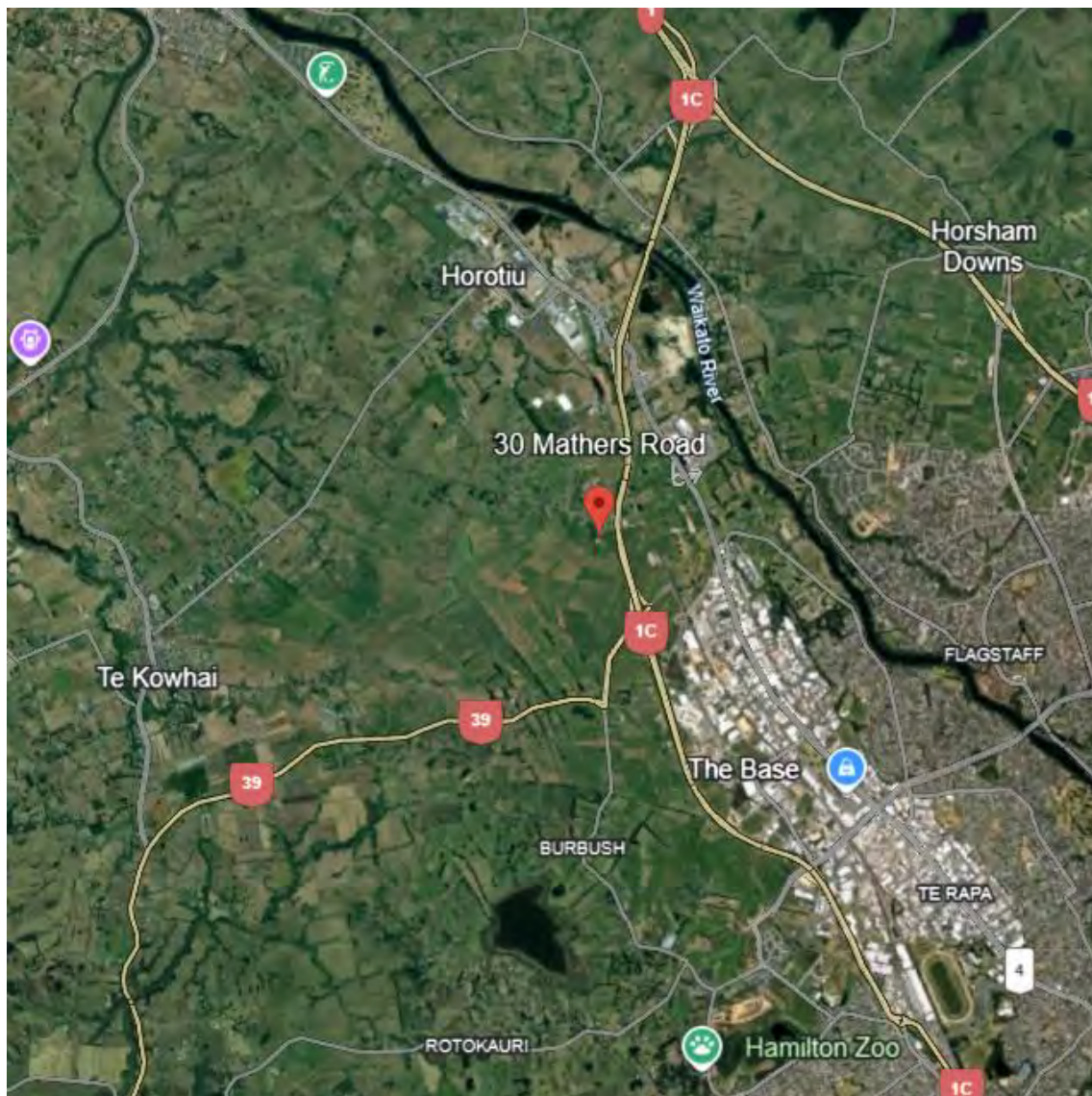


Figure 10: Area of Interest for WRTM outputs

Based on feedback from WDC, intersections of particular interest include those shown in Figure 7:

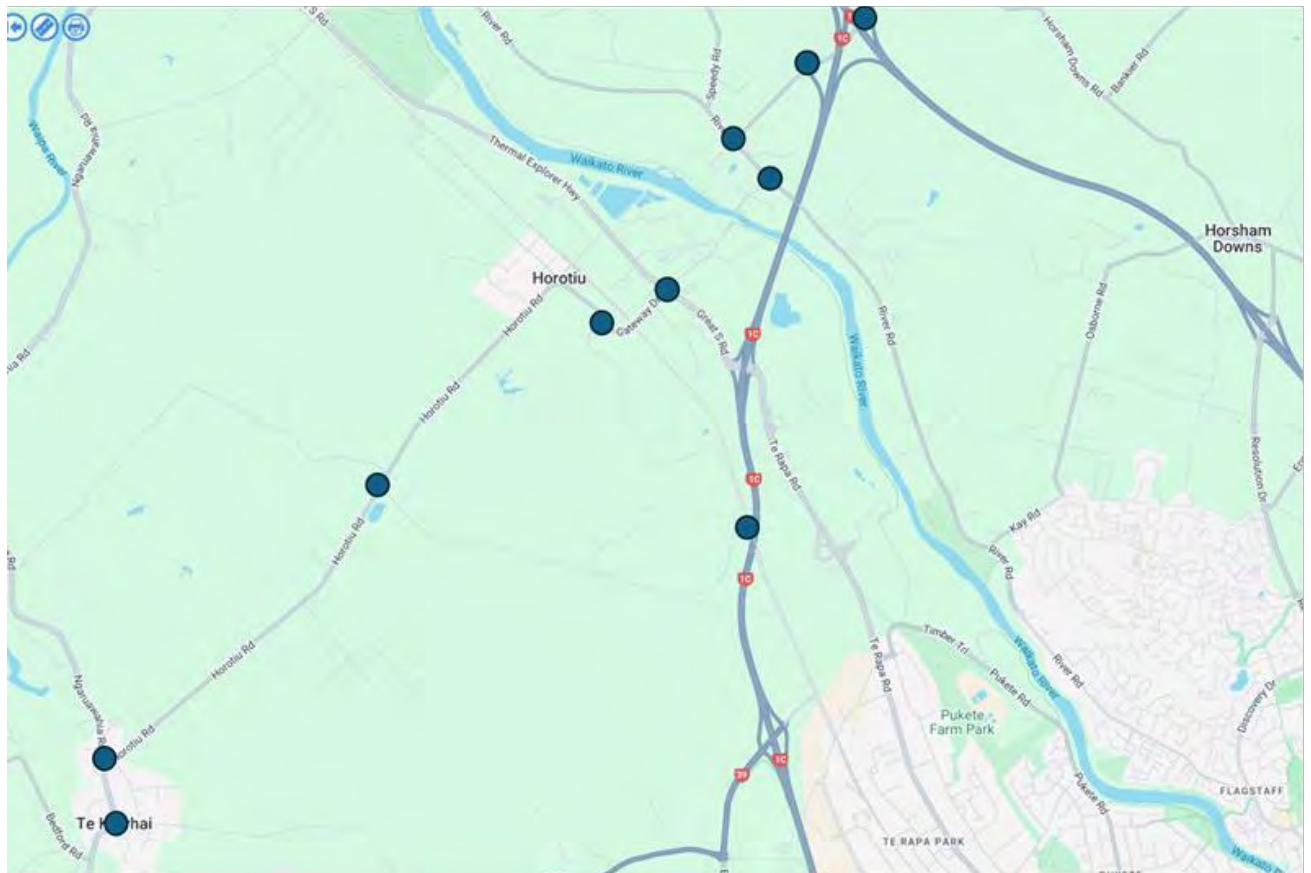


Figure 10: WDC Intersections of Interest

These are:

- SH39 / Horotiu Road
- Horotiu Road / Ngaruawahia Road
- Horotiu Road / Onion Road
- Gateway Drive / Kohia Drive
- Gateway Drive / Great South Road / Horotiu Bridge Road
- Onion Road / Holmes Road
- Horotiu Bridge Road / River Road
- River Road / Lake Road
- Lake Road / SH1C northbound off ramp
- Lake Road / SH1 WEX southbound on ramp

Feedback from NZTA is that they are particularly interested in the operation of the northbound off ramp intersection at the Koura Drive interchange.

8 Additional Considerations

8.1 WRTM costs

Please provide the costs for undertaking the WRTM discussed above in four separate groups in order to assist with cost management for the applicant and to ensure that the need for sensitivity tests can be assessed once the main WRTM deliverables have been provided:

- Group 1: 14 TKE primary scenarios
- Group 2: 2 TKE Northern River Crossing sensitivity tests
- Group 3: 4 TKE SH39 upgrade sensitivity tests
- Group 4: TKE land use activity sensitivity tests

8.2 Daily Traffic Volumes

If AADT volumes are required at any point, IP model runs may be instructed separately

8.3 Further non-WRTM modelling

The output traffic demands from WRTM will be used as inputs to SIDRA intersection analysis to identify the scale of works which may be needed at specific points on the road network.

- Intersection performs at LOS E or F and;
- Intersection LOS has increased between base land use scenario and a 'with TKE' scenario and;
- Total Intersection traffic volumes have increased by more than 5% (as per WRTM) and;
- Total Intersection traffic volumes have increased by more than 100 vehicles in WRTM outputs (this would be approximately 60 vehicles per hour given WRTM is a 2-hour model).

Those intersections identified as being of key interest by WDC and NZTA will be reviewed against the assessment criteria and the appropriateness of additional analysis confirmed.

In addition to the above, the following intersections will be assessed in greater detail regardless of their WRTM performance:

- Horotiu Road / Great South Road / Gateway Drive
- Horotiu Interchange
- Koura Drive interchange
- SH39 / Rotokauri Arterial roundabout
- SH39 / TKE link road roundabout
- TKE link road / Onion Road

The additional analysis would be undertaken using SIDRA software. The SIDRA modelling would determine what treatment may be required to mitigate traffic demands.

CKL

Appendix B – WRTM Output Assessment

To: Tony Denton / Victor Devyatov – HCC, Alan Cathpole– NZTA, Virendra Prasad / Matthew Epps – Waikato DC
From: Rachel Gasson / Judith Makinson - CKL
Reviewed: Judith Makinson - CKL
Re: ITA - 30 Mathers Road, Horotiu
Date: 21 May 2026
CC:
CKL Ref: B20315

WRTM Output Review

1 Introduction

1.1 Purpose

This memo provides a more detailed overview of the Waikato Regional Traffic Model (WRTM) outputs assessing the effects of the proposed Te Kowhai East (TKE) development on the surrounding road network. The analysis focuses on changes in modelled link flows on key corridors and the redistribution of travel demand across the network as a result of development-generated traffic and associated changes in travel times. The memo also reviews the need for SIDRA intersection analysis at specific intersections of interest to Hamilton City Council (HCC), NZTA, and Waikato District Council (WDC), as well as identifying whether any other intersections require more detailed analysis based on a number of performance thresholds.

The scope of WRTM analysis has been covered in a separate memo.

1.2 Data sources and outputs

WRTM outputs have been provided by Co-Lab as follows:

- 1. Select link (origin–destination) analysis**
Select link O/D outputs for nominated screen lines to describe the origins and destinations of trips using key links, and to support interpretation of the modelled rerouting and redistribution patterns.
- 2. Link flow difference plots**
Modelled differences in link flows between the “without development” and “with development” scenarios for 2035, 2045 and 2055, for the relevant peak periods.
- 3. Level of Service (LOS) plots**
Plots identifying link and intersection LOS across the network “without” and “with” development across the model years of 2035, 2045 and 2055 assisting in identifying where additional more detailed intersection SIDRA analysis is needed.

2 Select Link Origin–Destination Analysis

Select link (origin–destination) analysis provides additional detail on the origins and destinations of trips using the nominated screen lines, supporting interpretation of the link flow change patterns described in Section 2. The screen line locations are shown in Figure 1, with detailed future-year outputs provided on the following pages.

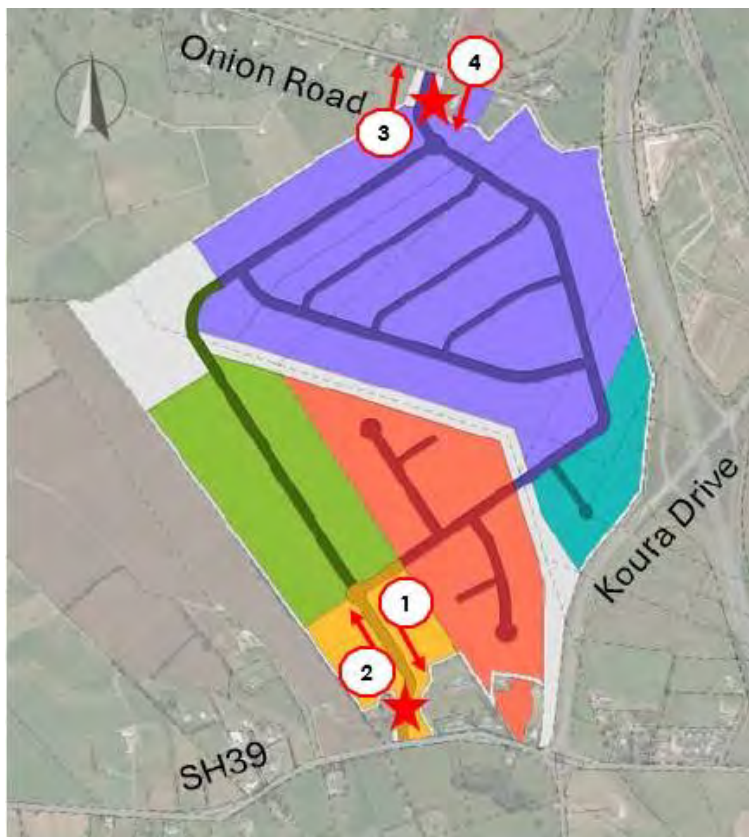


Figure 1: Location of Screen Lines

The green bands represent inbound movements, while the red bands represent outbound movements. The dark red and green bands are trips accessing the site via the primary access on Te Kowhai Road (SH39), while the pastel red and green bands are trips accessing the site via the secondary access on Onion Road.

2.1 S1 and S2: Site Access just north of SH39

S1 and S2 represent a screen line on the new collector road servicing the site, just north of the SH39 site access intersection. In 2035 this is the only access to the site, and therefore traffic using this link originates from all directions. By 2045 the Onion Road access is anticipated to be in place, and therefore in 2045 and 2055 traffic using this link originates from the south, west, and east. The results clearly show that the majority of TKE traffic demand is to and from the north, with minor demands only to and from the south, west and east. These lesser southern and eastern demands focus around Arthur Porter Drive, Mangaharakeke Drive and Wairere Drive, with minimal use of Te Rapa Road.

2.2 S3 and S4: Site Access just south of Onion Road

S3 and S4 are located on the new collector road servicing the site, just south of the Onion Road intersection with the site access. This select link is located at the northern extent of the site and is not present in the 2035 model network. In later forecast years, the outputs indicate strong demand to/from the north, with this access providing a local road connection to Horotiu and Ngāruawāhia. This connection diverts the earlier 2035 flows away from SH1C and both the Koura Drive and Horotiu interchanges.

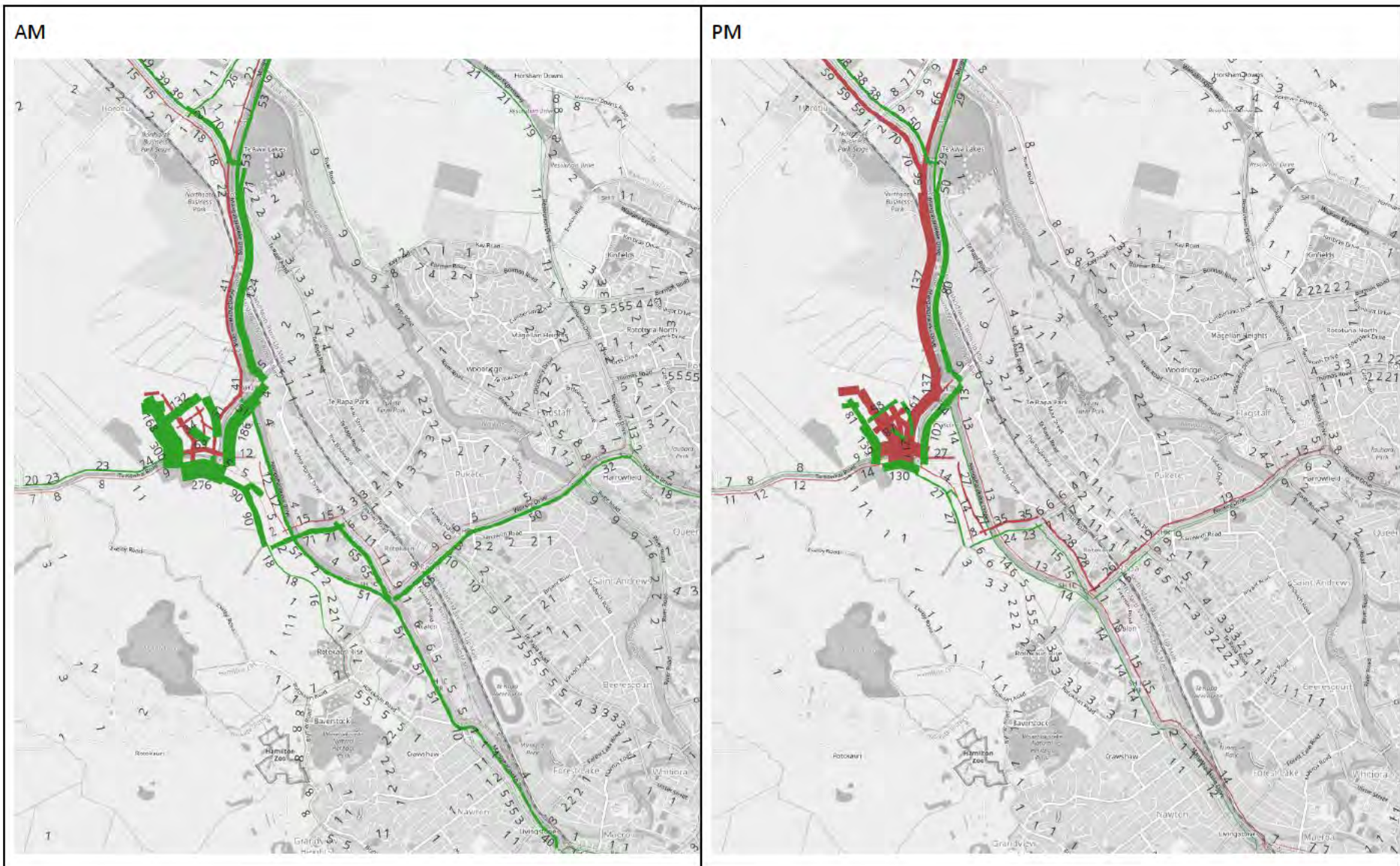


Figure 2: 2035 Flow Difference

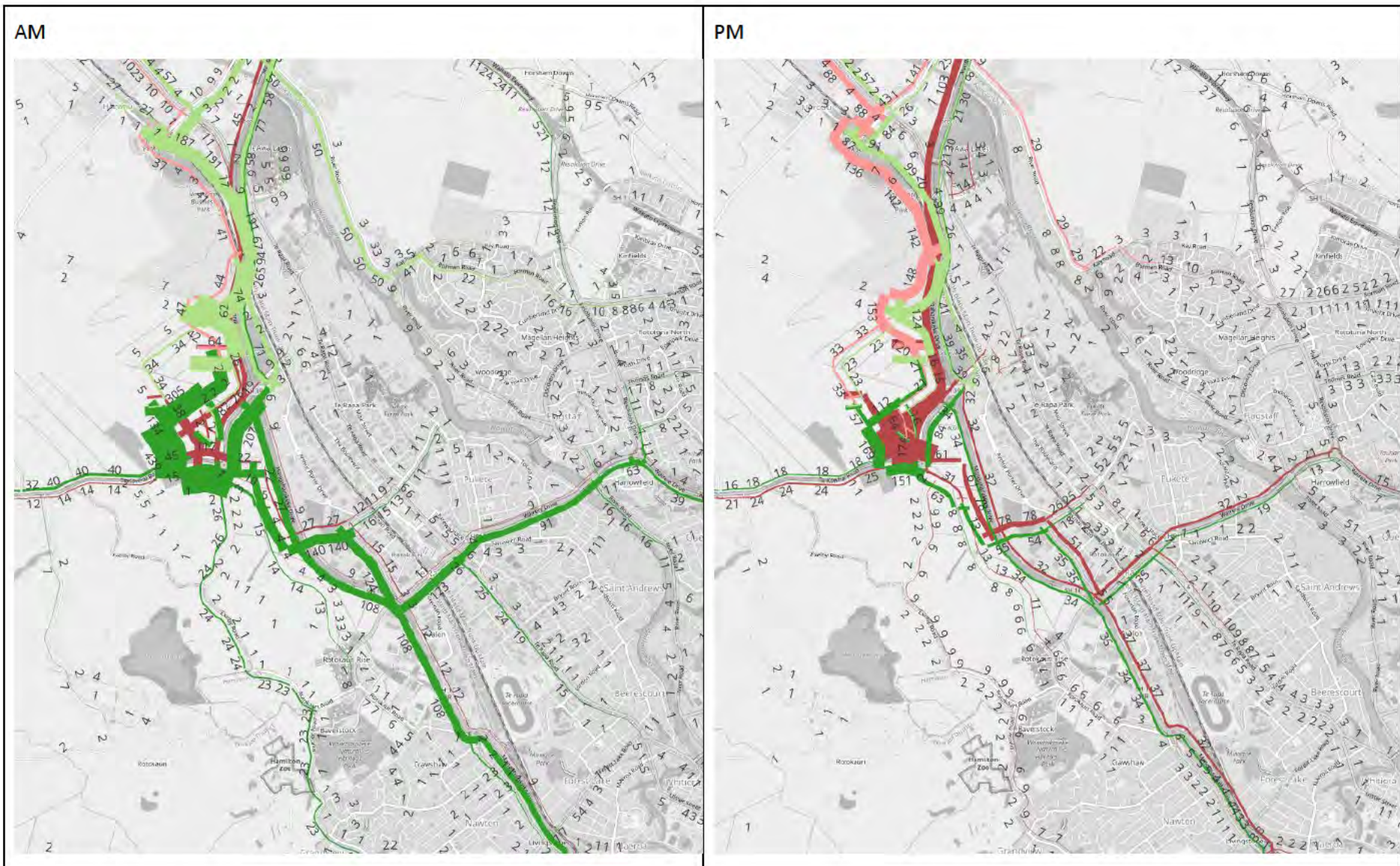


Figure 3: 2045 Flow Difference

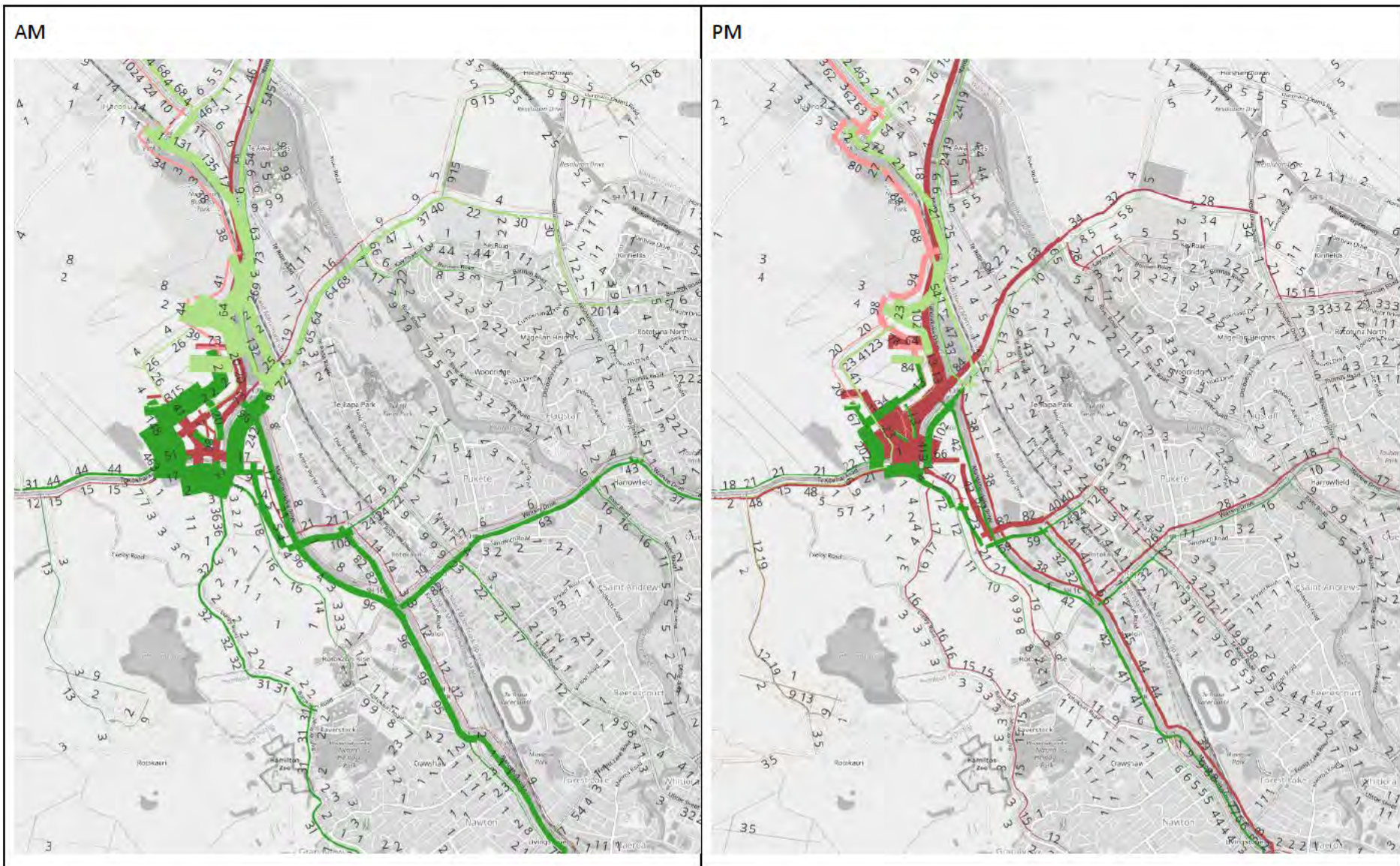


Figure 4: 2055 Flow Difference

3 Link Flow Changes

The following figures illustrate the change in modelled link flows between the “without development” and “with development” scenarios for 2035, 2045 and 2055. The red represents an increase in vehicle volumes while the green represents a decrease in vehicle volumes.

Across all assessment years and time periods, SH1C exhibits an increase in modelled traffic volumes north of the site, however, once the Onion Road connection is in place, the increase is more limited as traffic diverts to the local road network to connect to Horotiu and Ngaruawahia. Similarly, to the south of the site, there is a consistent increase in modelled traffic volumes on the Rotokauri Arterial, Te Kowhai East Road, Arthur Porter Drive route. These two routes are considered direct routes for many trips, and therefore the increased traffic on these corridors is reasonable.

Further away from the site, there are a number of locations in each of the assessment years and time periods where traffic has relocated to an alternate corridor, as marked in Figure 1 - Figure 3. The location of traffic relocation varies by time period and year, with no inherent trends. Given the traffic relocations are localised to corridors, and that the Select Link analysis shows minimal traffic routing along the corridors where the relocations occur, it is thought that these changes are a result of some variation in route choice unlikely to be related to TKE given the location of the changes and the negligible development traffic volumes in these areas.

Figure 1: 2035 Flow Difference

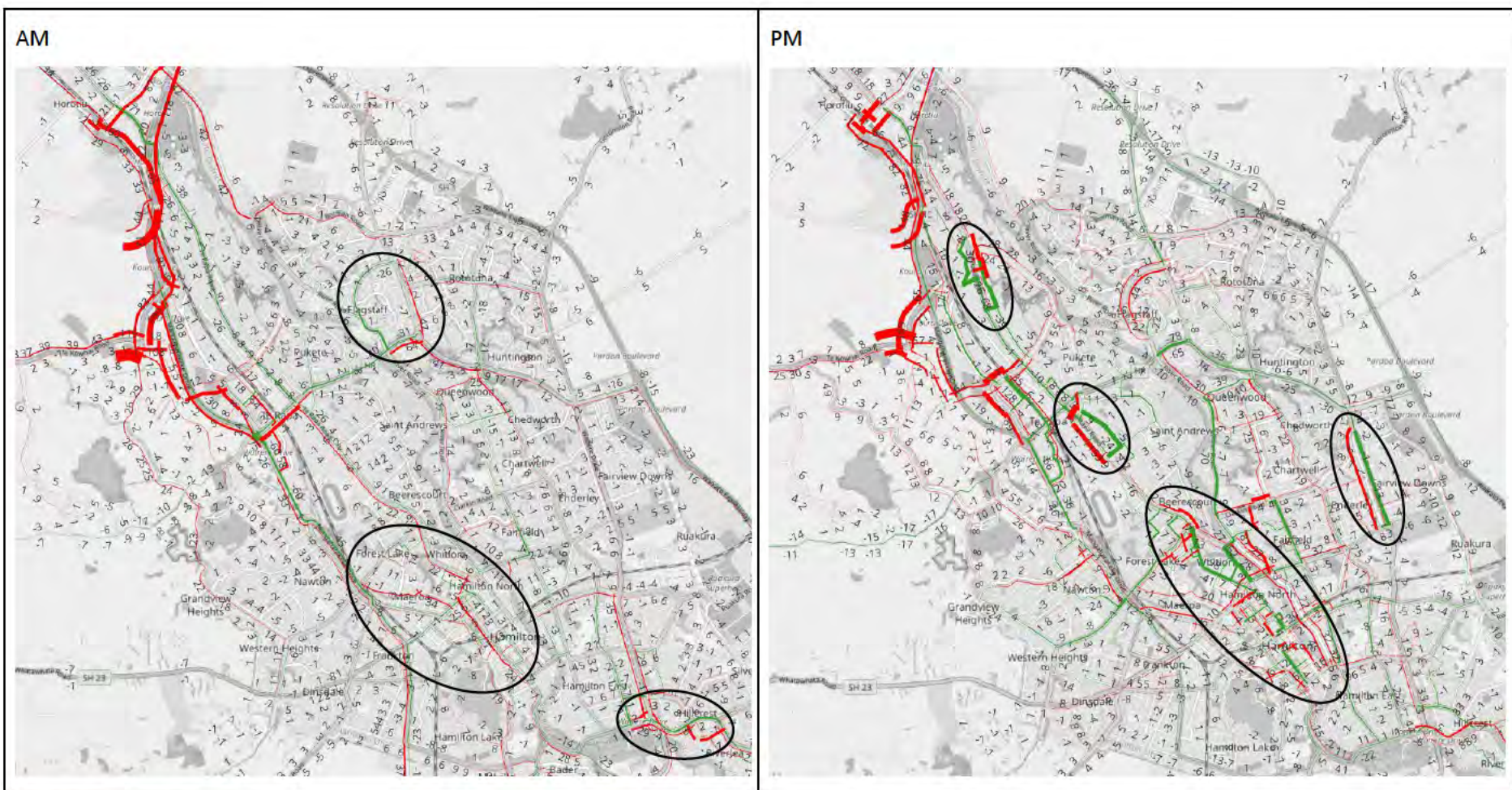


Figure 2: 2045 Flow Difference

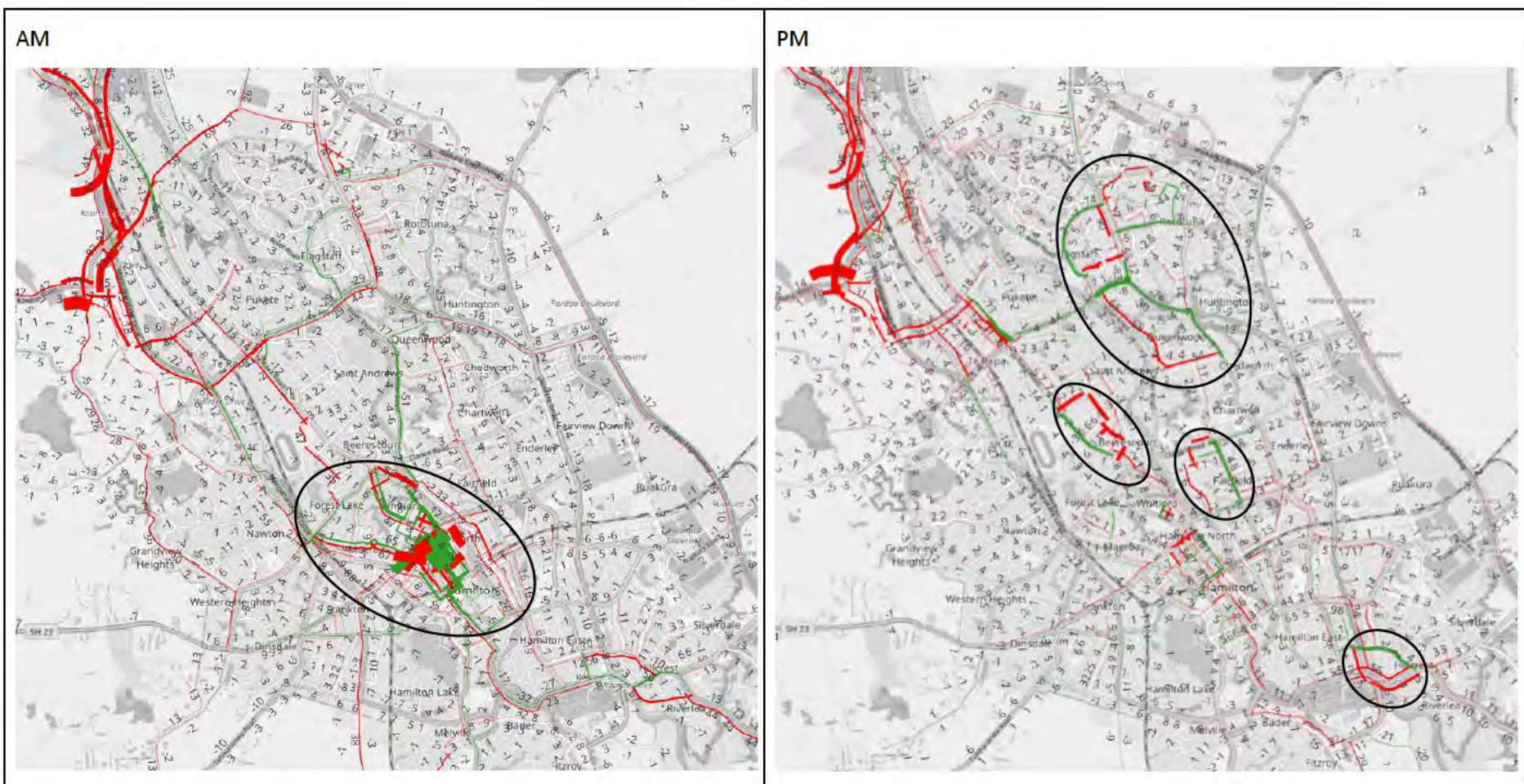


Figure 3: 2055 Flow Difference

4 Level of Service (LOS) Plot Comparisons

The WRTM briefing document identified a number of intersection performance parameters that would trigger detailed intersection analysis using SIDRA, as well as a list of intersections that would be subject to detailed analysis, regardless, due to them being of significance to HCC, NZTA and WDC. A number of additional intersections of interest were also proposed by WDC and NZTA and the performance of these has been assessed based on the performance criteria.

The LOS plot figures are provided at the end of this document.

4.1 Performance Thresholds

The performance thresholds triggering more detail SIDRA intersection analysis are as follows:

- Intersection performs at LOS E or F; and
- Intersection LOS has increased between base land use scenario and a with TKE scenario; and
- Total Intersection traffic volumes have increased by more than 5% (as per WRTM) and;
- Total Intersection traffic volumes have increased by more than 100 vehicles in WRTM outputs (this would be approximately 60 vehicles per hour given WRTM is a 2-hour model).

All intersections where there has been a change in LOS between “without” and “with” development assessment scenarios for AM and PM peak periods across the 2035, 2045 and 2055 model years have been identified, with the more refined traffic volume increase tests being used to further assess whether detailed intersection analysis is needed. The full performance threshold analysis is provided at the end of this document and is summarised in Table 1:

Table 1: Intersections Triggering Performance Criteria for Detailed SIDRA Analysis

	AM Peak	PM Peak
2035	<i>No intersections trigger further assessment</i>	<i>No intersections trigger further assessment</i>
2045	<i>No intersections trigger further assessment</i>	<i>No intersections trigger further assessment</i>
2055	• Koura Drive / SH1c northbound off ramp	• Koura Drive / SH1c northbound off ramp

4.2 Intersections of Special Interest

Waikato District Council identified a number of intersections of being of particular interest in terms of potential effects arising from TKE traffic. These were:

- SH39 / Horotiu Road
- Horotiu Road / Ngaruawahia Road
- Horotiu Road / Onion Road
- Gateway Drive / Kohia Drive
- Gateway Drive / Great South Road / Horotiu Bridge Road

- Onion Road / Holmes Road
- Horotiu Bridge Road / River Road
- River Road / Lake Road
- Lake Road / SH1C northbound off ramp
- Lake Road SH1 WEX southbound on ramp

With the exception of Gateway Drive / Great South Road / Horotiu Bridge Road, the WRTM analysis has confirmed that all other intersections identified by WDC operate at LOS A/B/C with the TKE traffic in place and therefore no further consideration is required.

The intersection of Gateway Drive / Great South Road / Horotiu Bridge Road does not trigger the percentage change threshold for any of the assessment periods but does trigger the 100-vehicle threshold only in the 2045 PM period. More detailed analysis of this intersection is considered appropriate given the level of traffic demand expected at this intersection and its inclusion in the WDC interest list.

NZTA identified the Koura Drive / SH1C northbound off ramp as being an initial point of interest. The LOS for this intersection is LOS C in 2035, LOS C/D in 2045, and LOS E/F in 2055. Furthermore, vehicle volumes are assessed as increasing by some 7% - 19% and by at least 197 vehicles across all assessment periods. More detailed analysis of this intersection is considered appropriate, regardless of its inclusion in the agreed intersections identified in Section 4.3.

4.3 Agreed Intersections

The following intersections will be analysed in greater detail, regardless of the outcome of Table 1:

- Gateway Drive / Great South Road / Horotiu Bridge Road - this is the key connection point for industrial trips to Horotiu and will be assessed in 2035, 2045 and 2055;
- Koura Drive Interchange – this is the primary connection point to SH1C and will be analysed at 2035, 2045 and 2055;
- SH39 / Rotokauri Arterial roundabout – this is a key connection point to SH1C and will be assessed in 2035, 2045 and 2055;
- SH39 / TKE link road roundabout – this new intersection is a key connection point to the road network and will be assessed in 2035, 2045 and 2055;
- TKE link road / Onion Road – this new intersection is a key connection point to the road network and will be assessed in 2045 and 2055;
- Arthur Porter Drive / Wairere Drive – given the validation showed the WRTM fit in this location was poor, and site trips travel through this intersection, this intersection will be assessed in 2035, 2045, 2055 with manual updates to the WRTM volumes; and
- Wairere Drive / Te Rapa Road – given the proximity of this intersection to Arthur Porter Drive / Wairere Drive, this intersection will be assessed in 2035, 2045, 2055 with manual updates to the WRTM volumes.

It is acknowledged that the Traffic Modelling Brief dated 25 March 2026 included assessment of Horotiu Interchange regardless of the performance threshold assessment. However, the select link

analysis shows minimal traffic (42 vehicles or less) through the interchange in both peak periods in 2045 and 2055. For these future horizon years, the model routes trips between the site and Horotiu via the local road network, notably the new Onion Road access to the site, Onion Road, Holmes Road, and Kohia Drive. Site traffic using SH1C to travel to and from the north is typically using the Koura Drive interchange for that purpose

For completeness, it is noted that the select link analysis shows the vehicle volumes through the interchange in 2035 to be 90 vehicles in the AM period and 120 vehicles in the PM period. Given the base vehicle volumes through the interchange in 2035 exceed 3000 vehicles in both peaks (i.e. the site trips equate to less than a 5% increase), any effect at the 2035 horizon is mitigated by the TKE connection to Onion Road.

4.4 Other Outcomes

When reviewing the LOS plots, a number of additional observations have been made about the performance of the road network as assessed by WRTM:

- The Gateway Drive / Kohia Drive intersection is not included in the 2035 model. Given the Onion Road access is forecasted for 2045, and that the intersections neighbouring Gateway Drive / Kohia Drive operate acceptably in 2035, this intersection is anticipated to operate acceptably in 2035. No further modelling is considered required.
- The capacity of the Arthur Porter Drive / Wairere Drive intersection appears to improve in 2035PM and 2045AM with the development in place. The improvement in intersection performance is likely to be related to congestion upstream limiting the vehicle volumes accessing this intersection.
- There is a reduction in traffic along Wairere Drive, notably in the 2045 and 2055 PM peak periods, with the TKE development in place. This is likely to be due to congestion of the corridor, resulting in vehicle rerouting to alternate corridors.
- Sensitivity Test 1 – Four laning of SH39. The base modelling across all assessment years shows SH39 between the site and the Rotokauri Arterial roundabout as operating at LOS A. This does not change with the development in place, indicating that four-laning is not triggered by the TKE development.
- Sensitivity Test 2 – Norther River Crossing. This is being repeated as the Northern River Crossing was included in both the base and test cases.
- Sensitivity Test 3 and 4 – Land Use Sensitivity. This tested whether changing the location and timing of the wholesale retail activity within TKE altered traffic patterns. The analysis showed that there was no change in relation to the general traffic pattern outcomes or intersections that warrant further analysis.

CKL.

Forecast: 35 Years AM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	204	80	276			560	202	84	288			574	3%	14	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	299	40	222			561	301	40	220			561	0%	0	No
Horotiu Road	/ Onion Road	C	C	136	14	91			241	135	14	90			239	-1%	-2	No
Gateway Drive	/ Kohia Drive								0						0	#DIV/0!	0	No
Gateway Drive	/ Great South Road	D	D	1313	1076	1147	371	0	3907	1337	1097	1162	371	0	3967	2%	60	No
Onion Road	/ Holmes Road	AB	AB	0	14	31			45	0	14	31			45	0%	0	No
Horotiu Bridge Road	/ River Road	C	C	921	946	486			2353	932	953	483			2368	1%	15	No
River Road	/ Lake Road	C	C	830	351	412	0		1593	832	359	410	0		1601	1%	8	No
Lake Road	/ SH1C northbound off ramp	C	C	300	132	235			667	306	137	232			675	1%	8	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	139	710				849	137	710				847	0%	-2	No
Koura Drive	/ SH1C northbound off ramp	C	C	382	326	476			1184	513	370	525			1408	19%	224	No
Wairere Drive	/ Te Rapa Road	E	E	1220	3921	1185	2694		9020	1215	3946	1208	2704		9073	1%	53	No
Wairere Drive	/ Karewa Place	F	F	143	3878	1694			5715	141	3904	1724			5769	1%	54	No
Wairere Drive	/ Pukete Road	E	E	1043	5812	810	1626		9291	1039	5821	814	1636		9310	0%	19	No
Wairere Drive	/ River Road	F	F	2432	4149	1330	2189		10100	2411	4169	1327	2187		10094	0%	-6	No
Wairere Drive	/ Resolution Drive	F	F	3097	2315	1896			7308	3107	2322	1881			7310	0%	2	No
Te Rapa Road	/ Manchester Place	D	D	1569	1465	1535	216		4785	1559	1462	1559	216		4796	0%	11	No
Te Rapa Road	/ Garrick Place	E	E	1087	337	2820			4244	1086	337	2846			4269	1%	25	No
Te Rapa Road	/ Storey Avenue	E	E	1372	2854	78			4304	1365	2880	77			4322	0%	18	No
Victoria Street	/ Fairfield Bridge	F	F	536	2104	1652			4292	538	2107	1660			4305	0%	13	No
Lincoln Street	/ Chilcott Road	F	F	2301	4	2109			4414	2291	4	2126			4421	0%	7	No
Lincoln Street	/ Edgar Street	E	E	2301	39	2151	47		4538	2291	39	2168	47		4545	0%	7	No
Lincoln Street	/ West Street	F	F	2221	2151	29			4401	2212	2168	29			4409	0%	8	No
Lincoln Street	/ Massey Street	D	D	2250	2036	1793	1138		7217	2241	2034	1806	1137		7218	0%	1	No

Forecast: 35 Years PM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	227	228	391			846	227	226	398			851	1%	5	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	256	59	402			717	255	59	393			707	-1%	-10	No
Horotiu Road	/ Onion Road	C	C	124	61	126			311	124	66	126			316	2%	5	No
Gateway Drive	/ Kohia Drive								0						0	#DIV/0!	0	No
Gateway Drive	/ Great South Road	D	D	885	444	1970	725	0	4024	910	449	2017	724	0	4100	2%	76	No
Onion Road	/ Holmes Road	AB	AB	0	61	11			72	0	66	12			78	8%	6	No
Horotiu Bridge Road	/ River Road	AB	AB	582	471	1052			2105	590	468	1059			2117	1%	12	No
River Road	/ Lake Road	C	C	584	594	467	0		1645	585	607	465	0		1657	1%	12	No
Lake Road	/ SH1C northbound off ramp	C	C	214	709	319			1242	212	743	317			1272	2%	30	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	217	1325				1542	225	1321				1546	0%	4	No
Koura Drive	/ SH1C northbound off ramp	C	C	803	230	522			1555	862	241	688			1791	15%	236	No
Great South Road	/ Anzac Street East	D	D	1043	1695	421			3159	1066	1730	421			3217	2%	58	No
Wairere Drive	/ Arthur Porter Drive southbound on ramp	D	C	935	2676	2893			6504	954	2695	2971			6620	2%	116	No
Wairere Drive	/ Te Rapa Road	F	F	3335	2046	2220	2998		10599	3352	2050	2219	3010		10631	0%	32	No
Wairere Drive	/ Karewa Place	F	F	730	2016	3744			6490	702	2020	3761			6483	0%	-7	No
Wairere Drive	/ Pukete Road	F	F	777	3039	2373	4264		10453	780	3037	2375	4253		10445	0%	-8	No
Wairere Drive	/ River Road	F	F	1283	2607	1090	6271		11251	1300	2570	1074	6275		11219	0%	-32	No
Wairere Drive	/ Resolution Drive	F	F	1766	2047	3901			7714	1737	2065	3883			7685	0%	-29	No
River Road	/ Endeavour Avenue	E	E	177	211	2689	822		3899	157	210	2698	859		3924	1%	25	No
Resolution Drive	/ Thomas Road	E	E	1289	713	2469			4471	1266	686	2467			4419	-1%	-52	No
Pukete Road	/ Sandwich Road	F	F	1374	334	2290			3998	1319	330	2311			3960	-1%	-38	No
Pukete Road	/ Vickery Street	F	F	933	1164	1864			3961	935	1117	1912			3964	0%	3	No
Te Rapa Road	/ Manchester Place	F	F	1954	824	2502	1025		6305	1966	814	2554	1025		6359	1%	54	No
Te Rapa Road	/ Home Straight	E	E	3254	1366	2212			6832	3251	1365	2236			6852	0%	20	No
Te Rapa Road	/ Garrick Place	F	F	4093	331	2423			6847	4095	331	2435			6861	0%	14	No
Te Rapa Road	/ Storey Avenue	F	F	4065	2553	7			6625	4062	2566	7			6635	0%	10	No
Lincoln Street	/ Forest Lake Road	E	E	802	2200	1414	864		5280	805	2209	1399	873		5286	0%	6	No
Lincoln Street	/ Mangaharekeke Drive	D	D	1132	2957	1354	2500	1333	9276	1139	2962	1344	2493	1329	9267	0%	-9	No
Lincoln Street	/ Chilcott Road	E	E	1823	33	2469			4325	1837	32	2463			4332	0%	7	No
Lincoln Street	/ Edgar Street	D	D	1825	139	2463	30		4457	1839	141	2453	33		4466	0%	9	No
Lincoln Street	/ West Street	E	E	1871	2475	2			4348	1887	2465	2			4354	0%	6	No
Lincoln Street	/ Massey Street	D	D	1873	2605	2172	769		7419	1889	2604	2164	759		7416	0%	-3	No

Forecast: 45 Years AM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	201	109	345			655	199	113	372			684	4%	29	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	324	46	233			603	326	45	231			602	0%	-1	No
Horotiu Road	/ Onion Road	C	C	131	3	117			251	134	5	119			258	3%	7	No
Gateway Drive	/ Kohia Drive	AB	AB	338	735	150			1223	373	853	179			1405	15%	182	No
Gateway Drive	/ Great South Road	E	E	1417	1642	1299	410	0	4768	1379	1734	1261	431	0	4805	1%	37	No
Onion Road	/ Holmes Road	C	AB	312	335	14			661	477	400	58			935	41%	274	No
Horotiu Bridge Road	/ River Road	C	C	1179	1238	515			2932	1221	1280	517			3018	3%	86	No
River Road	/ Lake Road	C	C	951	514	430	0		1895	959	542	435	0		1936	2%	41	No
Lake Road	/ SH1C northbound off ramp	C	C	443	211	229			883	476	203	223			902	2%	19	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	154	687				841	148	687				835	-1%	-6	No
Koura Drive	/ SH1C northbound off ramp	D	D	579	777	875			2231	666	884	958			2508	12%	277	No
Great South Road	/ Washer Road	D	D	1610	346	843			2799	1584	345	837			2766	-1%	-33	No
Mangaharakeke Drive	/ Koura Drive West	D	D	579	777	875			2231	666	884	958			2508	12%	277	No
Wairere Drive	/ Arthur Porter Drive southbound on ramp	F	E	699	2415	2887			6001	698	2522	2784			6004	0%	3	No
Wairere Drive	/ Te Rapa Road	E	E	1545	4182	1581	2383		9691	1527	4219	1611	2352		9709	0%	18	No
Wairere Drive	/ Karewa Place	F	F	137	4143	1769			6049	131	4178	1753			6062	0%	13	No
Wairere Drive	/ Pukete Road	E	E	992	6156	815	1702		9665	980	6157	816	1671		9624	0%	-41	No
Wairere Drive	/ River Road	F	F	2411	4453	1394	2276		10534	2348	4517	1389	2236		10490	0%	-44	No
Wairere Drive	/ Resolution Drive	F	F	3150	2403	1987			7540	3197	2444	1956			7597	1%	57	No
Wairere Drive	/ Huntington Drive West	F	F	1852	205	2450			4507	1841	197	2467			4505	0%	-2	No
Wairere Drive	/ Huntington Drive East	E	E	1856	367	2320			4543	1846	371	2332			4549	0%	6	No
Resolution Drive	/ Rototuna Road	F	F	2434	716	1128			4278	2474	723	1121			4318	1%	40	No
Resolution Drive	/ Thomas Road	D	E	2236	954	1211			4401	2264	956	1204			4424	1%	23	No
Te Rapa Road	/ Manchester Place	E	D	1727	1474	1995	239		5435	1708	1463	2023	238		5432	0%	-3	No
Te Rapa Road	/ Garrick Place	F	F	1180	399	3508			5087	1171	398	3534			5103	0%	16	No
Te Rapa Road	/ Storey Avenue	F	F	1487	3477	91			5055	1467	3498	89			5054	0%	-1	No
Te Rapa Road	/ Forest Lake Road	E	E	2164	1281	1942	969		6356	2151	1279	1974	963		6367	0%	11	No
Victoria Street	/ Fairfield Bridge	F	F	568	2172	1830			4570	548	2170	1818			4536	-1%	-34	No
Lincoln Street	/ Forest Lake Road	E	E	1241	1503	1471	1345		5560	1231	1520	1473	1343		5567	0%	7	No
Lincoln Street	/ Mangaharekeke Drive	D	D	1612	2732	1180	2592	1569	9685	1604	2687	1188	2614	1567	9660	0%	-25	No
Lincoln Street	/ Chilcott Road	F	F	2443	18	2577			5038	2412	18	2600			5030	0%	-8	No
Lincoln Street	/ Edgar Street	E	E	2388	29	2547	137		5101	2358	29	2562	144		5093	0%	-8	No
Lincoln Street	/ West Street	F	F	2334	2549	20			4903	2307	2564	26			4897	0%	-6	No
Lincoln Street	/ Massey Street	D	D	2355	1973	2621	1083		8032	2334	1957	2651	1060		8002	0%	-30	No
Greenwood Street	/ Bandon Street	F	F	2587	39	2508	229		5363	2561	41	2537	232		5371	0%	8	No
Greenwood Street	/ Killarney Road	E	E	2261	837	3048	1792		7938	2235	835	3079	1778		7927	0%	-11	No
Greenwood Street	/ Duke Street	F	F	2857	137	3468	205		6667	2831	137	3501	206		6675	0%	8	No
Greenwood Street	/ Kahikatea Drive	E	E	2600	1978	2400	628		7606	2577	1982	2437	623		7619	0%	13	No

Forecast: 45 Years PM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	248	308	477			1033	244	331	479			1054	2%	21	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	254	82	484			820	250	81	481			812	-1%	-8	No
Horotiu Road	/ Onion Road	C	C	152	14	145			311	152	19	147			318	2%	7	No
Gateway Drive	/ Kohia Drive	AB	AB	294	657	1069			2020	299	803	1141			2243	11%	223	No
Gateway Drive	/ Great South Road	F	F	997	650	1623	1598	0	4868	1012	659	1579	1760	0	5010	3%	142	No
Onion Road	/ Holmes Road	C	AB	542	720	4			1266	617	700	152			1469	16%	203	No
Horotiu Bridge Road	/ River Road	C	C	874	611	1494			2979	872	605	1521			2998	1%	19	No
River Road	/ Lake Road	C	C	650	995	635	0		2280	655	1001	639	0		2295	1%	15	No
Lake Road	/ SH1C northbound off ramp	C	C	268	1565	419			2252	270	1558	415			2243	0%	-9	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	511	1136				1647	487	1125				1612	-2%	-35	No
Koura Drive	/ SH1C northbound off ramp	C	C	1383	406	795			2584	1387	430	964			2781	8%	197	No
Great South Road	/ Washer Road	D	D	1411	184	1617			3212	1429	182	1627			3238	1%	26	No
Great South Road	/ Anzac Street East	E	E	1155	1756	418			3329	1172	1765	418			3355	1%	26	No
Wairere Drive	/ Arthur Porter Drive southbound on ramp	F	F	966	2819	2399			6184	998	2782	2411			6191	0%	7	No
Wairere Drive	/ Te Rapa Road	F	F	3841	2216	2591	2579		11227	3849	2213	2512	2549		11123	-1%	-104	No
Wairere Drive	/ Karewa Place	F	F	968	2191	3604			6763	938	2185	3578			6701	-1%	-62	No
Wairere Drive	/ Pukete Road	F	F	871	3254	2374	4381		10880	776	3230	2447	4323		10776	-1%	-104	No
Wairere Drive	/ River Road	F	F	1253	2775	1227	6443		11698	1248	2710	1218	6444		11620	-1%	-78	No
Wairere Drive	/ Resolution Drive	F	F	1753	2160	3961			7874	1745	2146	3883			7774	-1%	-100	No
River Road	/ Endeavour Avenue	E	E	211	221	2719	823		3974	189	219	2713	837		3958	0%	-16	No
Resolution Drive	/ Thomas Road	F	E	1377	736	2468			4581	1375	715	2471			4561	0%	-20	No
Pukete Road	/ Sandwich Road	F	F	1395	351	2301			4047	1385	343	2364			4092	1%	45	No
Pukete Road	/ Vickery Street	F	F	995	1241	1794			4030	985	1096	1971			4052	1%	22	No
Te Rapa Road	/ Manchester Place	F	F	2280	853	2758	1128		7019	2283	818	2904	1126		7131	2%	112	No
Te Rapa Road	/ Home Straight	F	F	3826	1444	2604			7874	3844	1442	2589			7875	0%	1	No
Te Rapa Road	/ Garrick Place	F	F	4650	366	2817			7833	4662	365	2796			7823	0%	-10	No
Te Rapa Road	/ Dalgliesh Avenue	D	D	4661	2732	143			7536	4674	2710	143			7527	0%	-9	No
Te Rapa Road	/ Storey Avenue	F	F	4637	2933	6			7576	4683	2904	6			7593	0%	17	No
Mangaharekeke Drive	/ Avalon Drive	D	D	4495	256	3016	1776		9543	4460	255	3028	1778		9521	0%	-22	No
Lincoln Street	/ Forest Lake Road	E	E	1161	2590	1337	1007		6095	1136	2596	1296	1004		6032	-1%	-63	No
Lincoln Street	/ Mangaharekeke Drive	D	D	1632	3144	1107	2630	1346	9859	1629	3146	1115	2603	1345	9838	0%	-21	No
Lincoln Street	/ Chilcott Road	D	D	2472	128	2597			5197	2461	118	2570			5149	-1%	-48	No
Lincoln Street	/ Edgar Street	E	E	2521	61	2579	41		5202	2499	70	2553	40		5162	-1%	-40	No
Lincoln Street	/ Massey Street	D	D	2301	2799	2410	752		8262	2285	2798	2409	755		8247	0%	-15	No

Forecast: 55 Years AM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	195	142	367			704	193	144	393			730	4%	26	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	337	43	254			634	337	43	252			632	0%	-2	No
Horotiu Road	/ Onion Road	C	C	127	3	98			228	131	5	101			237	4%	9	No
Gateway Drive	/ Kohia Drive	AB	AB	299	676	147			1122	311	769	174			1254	12%	132	No
Gateway Drive	/ Great South Road	D	E	1308	1138	1302	377	0	4125	1321	1188	1290	397	0	4196	2%	71	No
Onion Road	/ Holmes Road	C	AB	263	329	14			606	381	457	55			893	47%	287	No
Horotiu Bridge Road	/ River Road	C	C	1239	1013	453			2705	1270	1001	452			2723	1%	18	No
River Road	/ Lake Road	C	C	1113	437	496	0		2046	1117	462	494	0		2073	1%	27	No
Lake Road	/ SH1C northbound off ramp	C	C	365	144	240			749	389	146	234			769	3%	20	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	134	662				796	130	664				794	0%	-2	No
Koura Drive	/ SH1C northbound off ramp	E	F	889	777	1307	0	0	2973	1016	860	1404	0	0	3280	10%	307	Yes
Great South Road	/ Washer Road	D	D	1493	350	872			2715	1511	346	883			2740	1%	25	No
Te Rapa Road	/ Koura Drive Extension	E	E	1648	2625	1130	415		5818	1597	2684	1117	426		5824	0%	6	No
Te Rapa Road	/ McKee Street	F	F	2633	661	1144			4438	2560	649	1149			4358	-2%	-80	No
Osborne Road	/ Koura Drive Extension	C	D	448	1212	453			2113	474	1238	453			2165	2%	52	No
Wairere Drive	/ Arthur Porter Drive southbound on ramp	C	D	901	2817	3124			6842	893	2878	3096			6867	0%	25	No
Wairere Drive	/ Te Rapa Road	E	E	1325	3889	1636	3092		9942	1318	3979	1673	3084		10054	1%	112	No
Wairere Drive	/ Karewa Place	F	F	130	3847	1802			5779	127	3935	1824			5886	2%	107	No
Wairere Drive	/ Pukete Road	F	E	1037	5921	874	1687		9519	1021	5950	881	1690		9542	0%	23	No
Wairere Drive	/ River Road	F	F	2101	4525	1484	2242		10352	2056	4569	1489	2213		10327	0%	-25	No
Wairere Drive	/ Resolution Drive	F	F	3061	2617	2045			7723	3109	2622	2016			7747	0%	24	No
Wairere Drive	/ Huntington Drive West	F	F	1893	205	2572			4670	1877	206	2591			4674	0%	4	No
Wairere Drive	/ Huntington Drive East	F	F	1894	367	2451			4712	1878	368	2469			4715	0%	3	No
Resolution Drive	/ Rototuna Road	F	F	2346	715	1142			4203	2404	706	1140			4250	1%	47	No
Resolution Drive	/ Thomas Road	D	F	2226	1011	1220			4457	2259	1020	1218			4497	1%	40	No
Te Rapa Road	/ Manchester Place	E	E	1855	1540	2083	256		5734	1866	1480	2143	256		5745	0%	11	No
Te Rapa Road	/ Mahana Road	D	D	1746	79	3436			5261	1743	79	3484			5306	1%	45	No
Te Rapa Road	/ Garrick Place	F	F	1209	423	3489			5121	1209	423	3492			5124	0%	3	No
Te Rapa Road	/ Storey Avenue	F	F	1504	3430	81			5015	1499	3443	83			5025	0%	10	No
Te Rapa Road	/ Forest Lake Road	E	E	2179	1282	1984	926		6371	2186	1260	2057	909		6412	1%	41	No
Victoria Street	/ Fairfield Bridge	F	F	588	2144	1836			4568	742	2109	1709			4560	0%	-8	No
Avalon Drive	/ Mangaharekeke Drive	D	D	3339	70	3213	2730		9352	3304	70	3220	2735		9329	0%	-23	No
Avalon Drive	/ Rotokauri Road	D	D	1367	2040	1265			4672	1355	2063	1255			4673	0%	1	No
Avalon Drive	/ Dominion Road	D	D	1114	1876	542			3532	1101	1891	535			3527	0%	-5	No
Lincoln Street	/ Forest Lake Road	E	E	1210	1581	1397	1571		5759	1167	1599	1397	1611		5774	0%	15	No
Lincoln Street	/ Chilcott Road	F	F	2594	7	2667			5268	2603	7	2675			5285	0%	17	No
Lincoln Street	/ Edgar Street	F	F	2596	42	2726	42		5406	2604	42	2734	42		5422	0%	16	No
Lincoln Street	/ West Street	F	F	2542	2732	5			5279	2550	2741	5			5296	0%	17	No
Lincoln Street	/ Massey Street	D	D	2546	2043	2638	1366		8593	2555	2055	2653	1356		8619	0%	26	No
Greenwood Street	/ Bandon Street	F	F	2723	40	2504	250		5517	2708	40	2527	250		5525	0%	8	No
Greenwood Street	/ Killarney Road	E	E	2348	860	3037	1926		8171	2350	849	3068	1896		8163	0%	-8	No
Greenwood Street	/ Duke Street	F	F	2972	142	3460	227		6801	2962	142	3497	225		6826	0%	25	No
Greenwood Street	/ Kahikatea Drive	E	E	2731	1967	2425	742		7865	2724	1974	2463	734		7895	0%	30	No
Kahikatea Drive	/ Grasslands Place	E	D	62	2030	2272			4364	62	2037	2264			4363	0%	-1	No
Kahikatea Drive	/ Alison Street	F	F	201	2558	1267			4026	205	2559	1262			4026	0%	0	No

Forecast: 55 Years PM																		
Intersection		No Dev LOS	With Dev LOS	No Dev Vol 1	No Dev Vol 2	No Dev Vol 3	No Dev Vol 4	No Dev Vol 5	No Dev Vol Tot	With Dev Vol 1	With Dev Vol 2	With Dev Vol 3	With Dev Vol 4	With Dev Vol 5	With Dev Vol Tot	% Change	# Change	SIDRA Required
SH39	/ Horotiu Road	C	C	278	326	506			1110	277	339	513			1129	2%	19	No
Horotiu Road	/ Ngaruawahia Road	AB	AB	317	87	436			840	315	85	433			833	-1%	-7	No
Horotiu Road	/ Onion Road	C	C	164	19	116			299	165	23	116			304	2%	5	No
Gateway Drive	/ Kohia Drive	AB	AB	266	608	868			1742	265	670	921			1856	7%	114	No
Gateway Drive	/ Great South Road	E	E	1012	531	1601	1322	0	4466	1035	541	1598	1371	0	4545	2%	79	No
Onion Road	/ Holmes Road	C	AB	547	545	6			1098	617	575	101			1293	18%	195	No
Horotiu Bridge Road	/ River Road	C	C	685	740	1295			2720	696	727	1302			2725	0%	5	No
River Road	/ Lake Road	C	C	751	609	947	0		2307	755	620	941	0		2316	0%	9	No
Lake Road	/ SH1C northbound off ramp	C	C	267	709	512			1488	271	740	507			1518	2%	30	No
Lake Road	/ SH1 WEX southbound on ramp	AB	AB	344	1433				1777	344	1440				1784	0%	7	No
Koura Drive	/ SH1C northbound off ramp	D	E	1764	523	1122	0	0	3409	1764	549	1341	0	0	3654	7%	245	Yes
Great South Road	/ Washer Road	D	D	1419	178	1548			3145	1444	177	1589			3210	2%	65	No
Great South Road	/ Anzac Street East	D	E	1150	1694	422			3266	1172	1733	422			3327	2%	61	No
Koura Drive	/ SH1C southbound off ramp	D	E	966	1150	884	800		3800	1007	1142	852	901		3902	3%	102	No
Te Rapa Road	/ Koura Drive Extension	E	E	1995	798	2896	917		6606	2022	792	2943	931		6688	1%	82	No
River Road	/ Koura Drive Extension	C	D	1123	403	837	2899		5262	1125	383	845	2923		5276	0%	14	No
Wairere Drive	/ Arthur Porter Drive southbound on ramp	D	D	1503	3063	2798			7364	1558	3053	2769			7380	0%	16	No
Wairere Drive	/ Te Rapa Road	F	F	3156	2338	2608	3134		11236	3272	2347	2603	3150		11372	1%	136	No
Wairere Drive	/ Karewa Place	F	F	848	2263	3536			6647	705	2294	3631			6630	0%	-17	No
Wairere Drive	/ Pukete Road	F	F	802	3273	2534	4145		10754	805	3274	2522	4124		10725	0%	-29	No
Wairere Drive	/ River Road	F	F	1313	2777	1346	6239		11675	1302	2769	1340	6202		11613	-1%	-62	No
Wairere Drive	/ Resolution Drive	F	F	1722	2290	3822			7834	1734	2260	3672			7666	-2%	-168	No
River Road	/ Endeavour Avenue	D	E	204	224	2660	861		3949	204	225	2679	849		3957	0%	8	No
Resolution Drive	/ Thomas Road	E	E	1413	803	2324			4540	1430	798	2338			4566	1%	26	No
Pukete Road	/ Sandwich Road	F	F	1440	351	2422			4213	1424	353	2418			4195	0%	-18	No
Pukete Road	/ Vickery Street	F	F	994	1257	1974			4225	993	1260	1973			4226	0%	1	No
Te Rapa Road	/ The Base Parade	D	D	1856	635	2088	1490		6069	1912	704	2095	1488		6199	2%	130	No
Te Rapa Road	/ Manchester Place	F	F	2272	868	2860	1204		7204	2302	871	2839	1203		7215	0%	11	No
Te Rapa Road	/ Home Straight	F	F	3890	1474	2594			7958	3791	1473	2560			7824	-2%	-134	No
Te Rapa Road	/ Garrick Place	F	F	4680	387	2781			7848	4590	387	2782			7759	-1%	-89	No
Te Rapa Road	/ Dalgliesh Avenue	D	E	4683	2687	155			7525	4613	2688	160			7461	-1%	-64	No
Te Rapa Road	/ Storey Avenue	F	F	4634	2897	6			7537	4683	2904	6			7593	1%	56	No
Mangaharekeke Drive	/ Avalon Drive	D	D	4479	282	3025	2119		9905	4470	281	3028	2108		9887	0%	-18	No
Lincoln Street	/ Forest Lake Road	E	E	1175	2823	1457	1122		6577	1176	2823	1455	1123		6577	0%	0	No
Lincoln Street	/ Mangaharekeke Drive	D	D	1759	3141	1118	2742	1383	10143	1768	3139	1119	2744	1367	10137	0%	-6	No
Lincoln Street	/ Chilcott Road	E	E	2690	90	2715			5495	2687	92	2717			5496	0%	1	No
Lincoln Street	/ Edgar Street	E	E	2750	107	2731	13		5601	2750	104	2734	16		5604	0%	3	No
Lincoln Street	/ Massey Street	D	D	2712	2904	2515	789		8920	2710	2906	2517	804		8937	0%	17	No
Greenwood Street	/ Bandon Street	F	F	2913	197	2445	149		5704	2910	198	2441	153		5702	0%	-2	No
Greenwood Street	/ Killarney Road	E	E	2556	2217	3069	1216		9058	2547	2210	3065	1210		9032	0%	-26	No
Greenwood Street	/ Duke Street	F	F	3274	544	3224	249		7291	3266	542	3219	246		7273	0%	-18	No
Greenwood Street	/ Kahikatea Drive	E	E	3436	2579	2025	1208		9248	3425	2585	2016	1207		9233	0%	-15	No

City Wide Overview

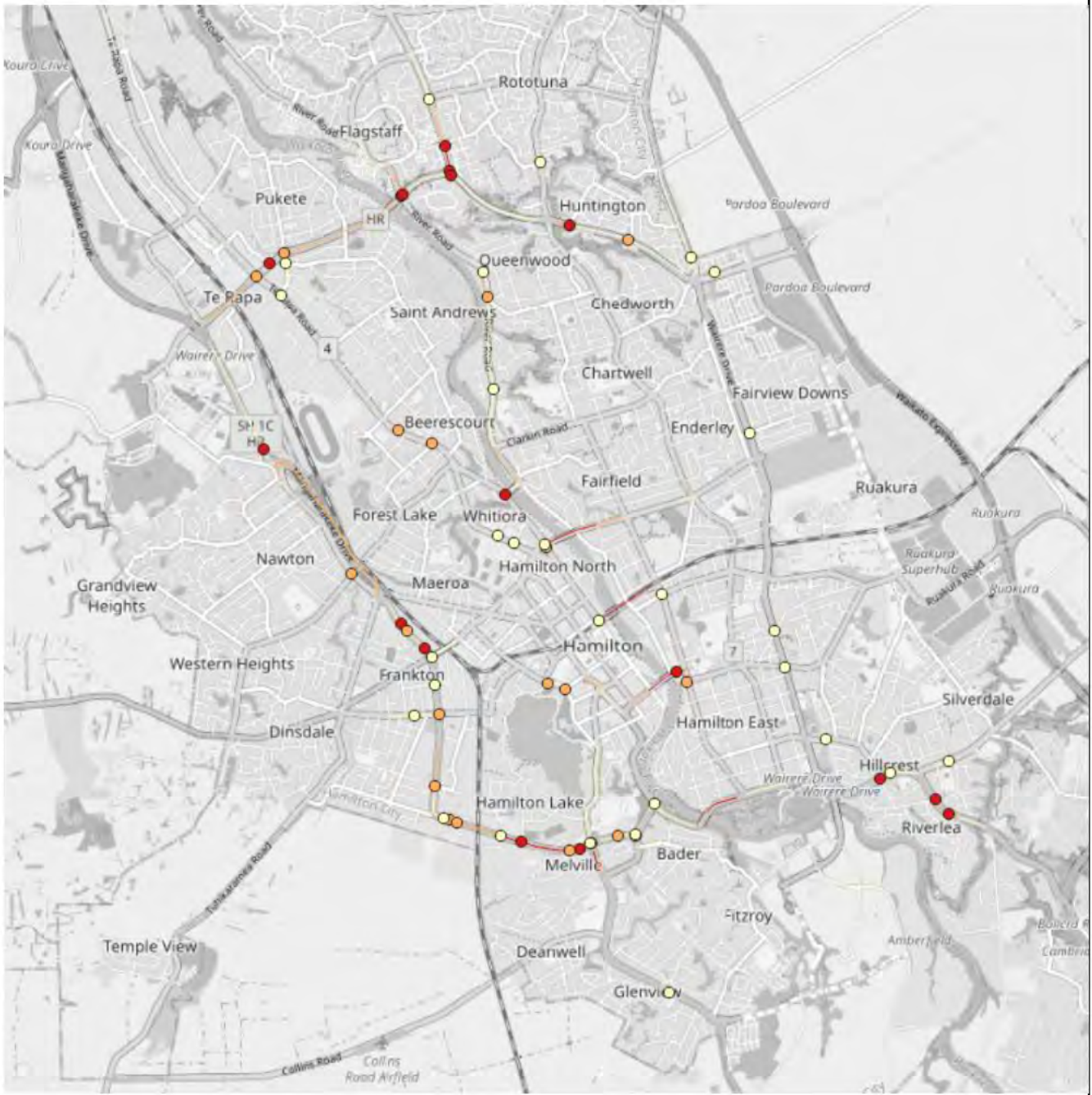
Pressure points in AM base are around SH1C network, Wairere Drive and at bridges.

With Development added in, seeing very little change as most traffic heads north to Horotiu and that part of the network is operating at LOS C or better at present.

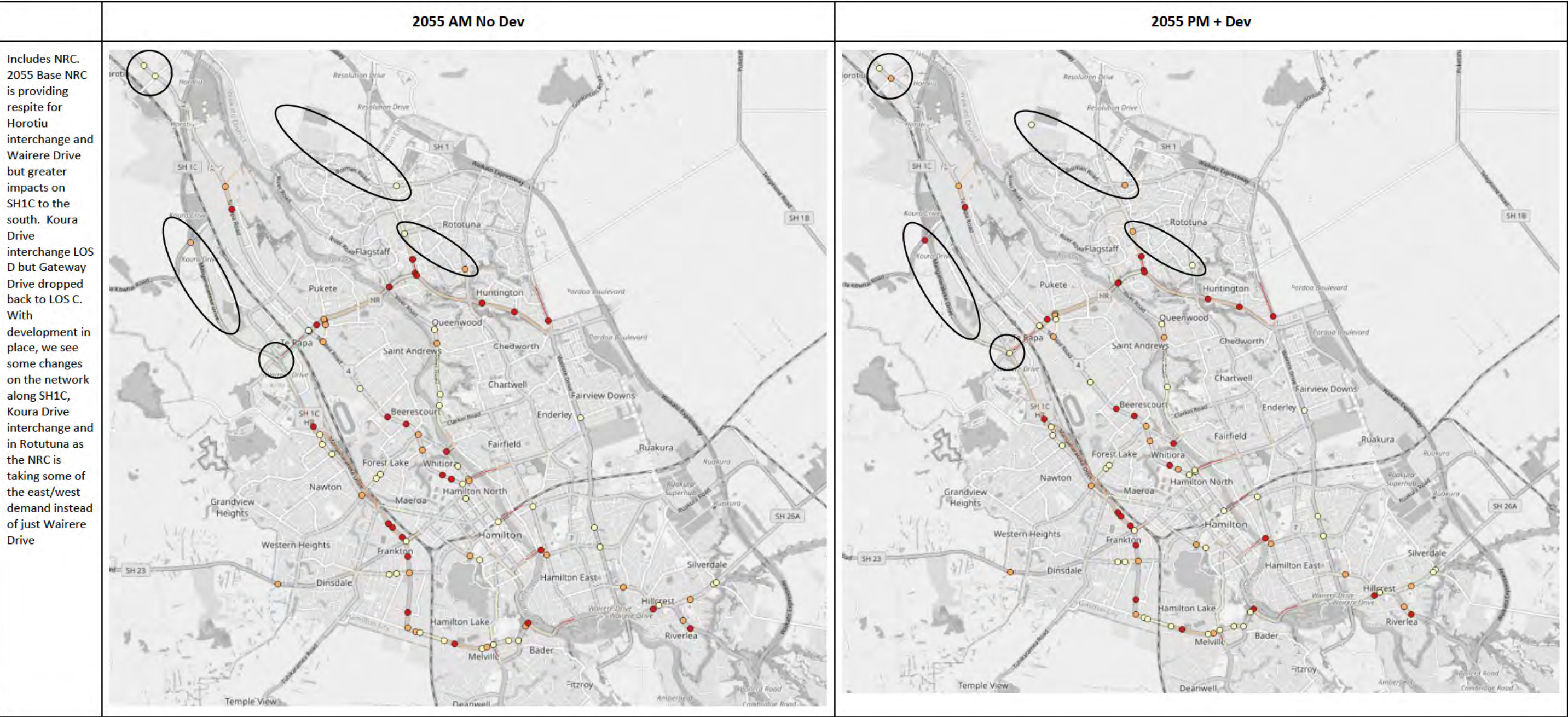
2035 AM No Dev

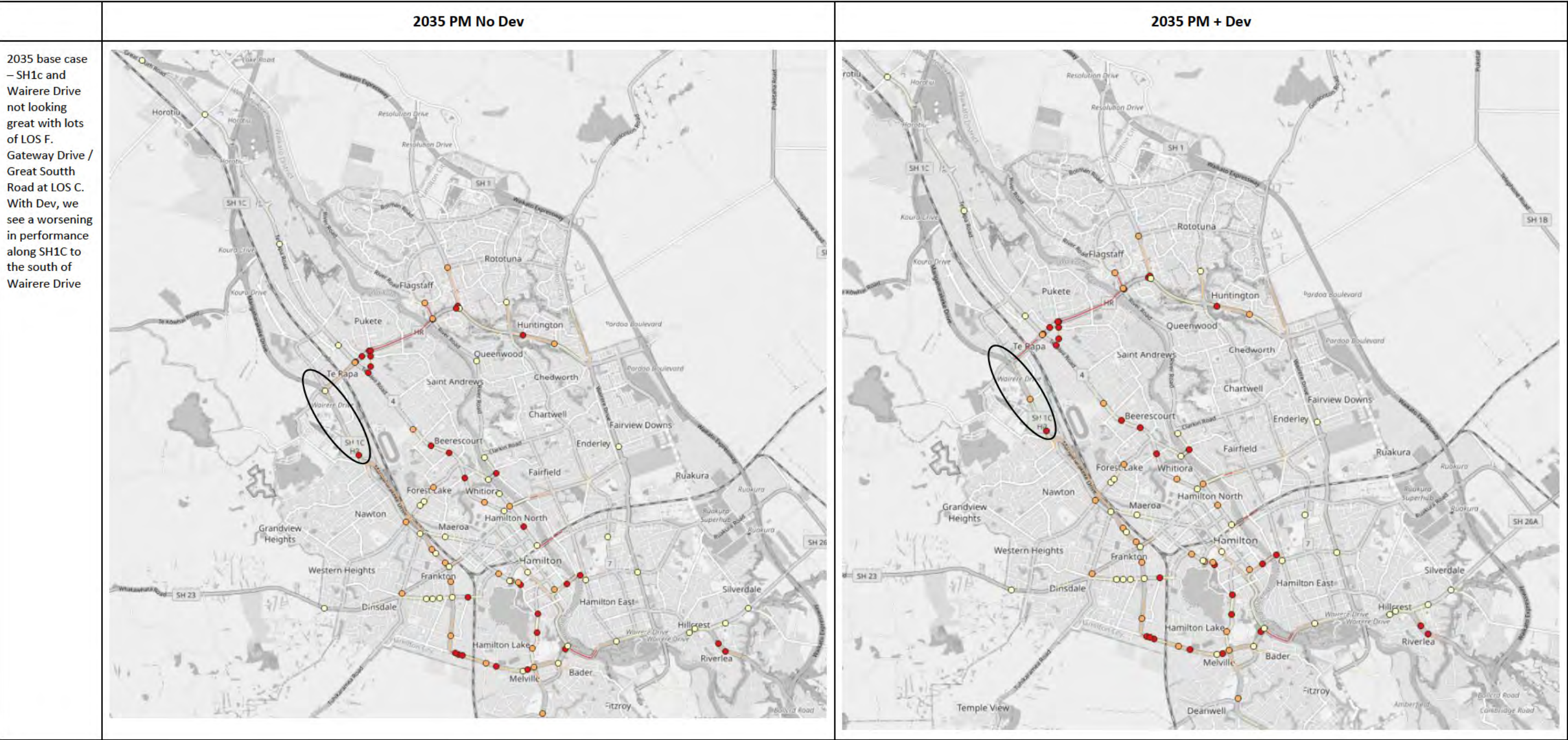


2035 AM + Dev

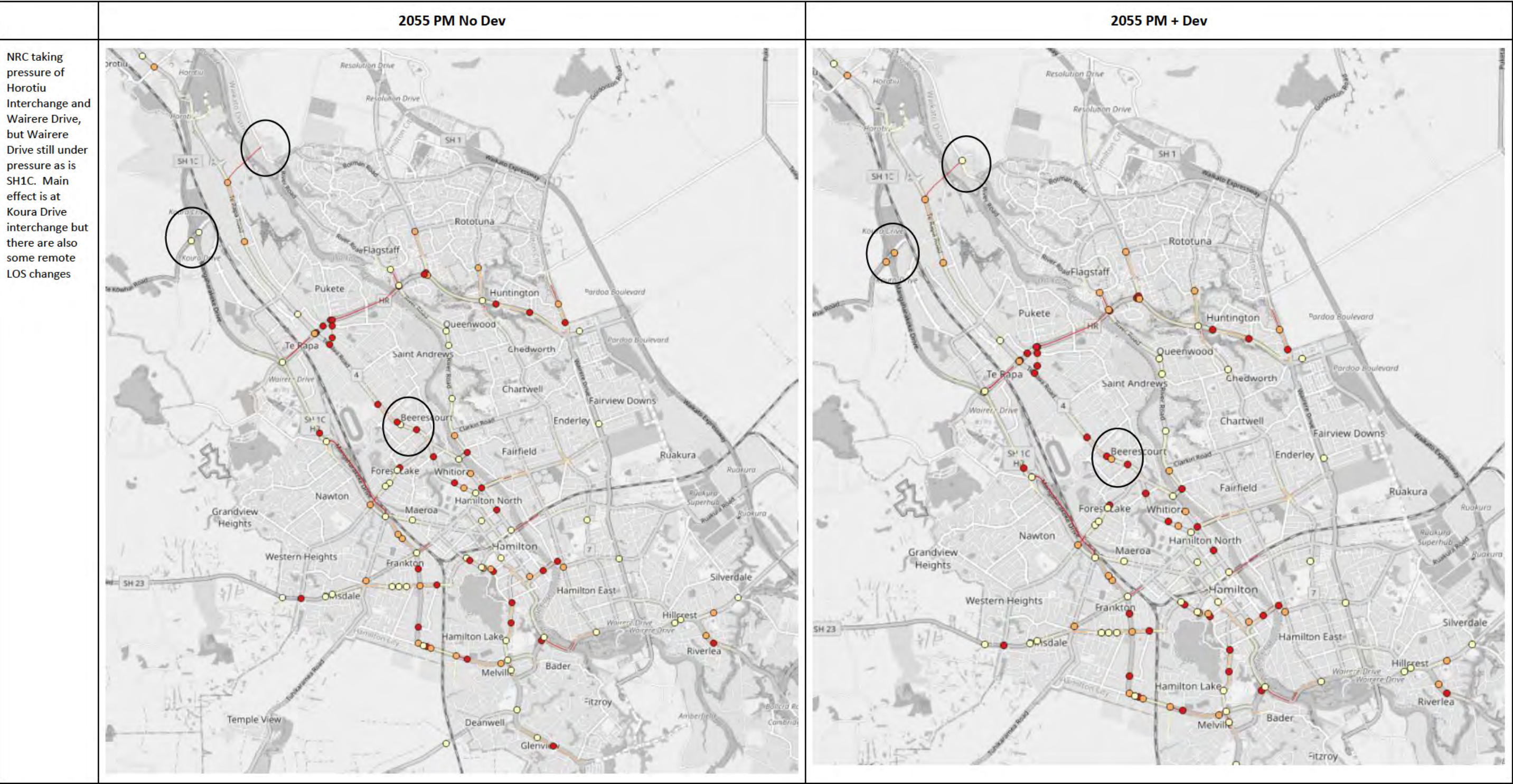








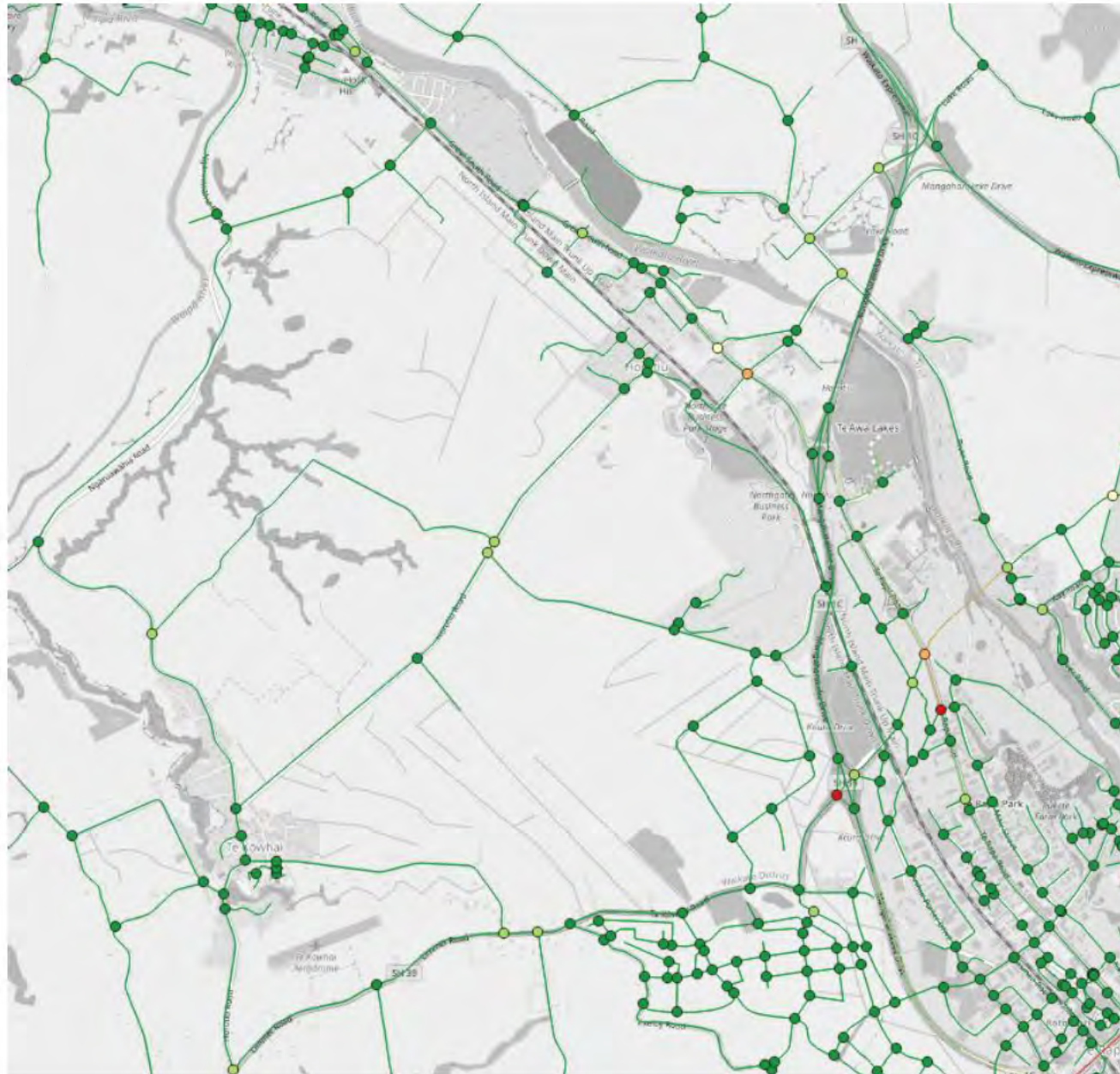




WDC Specific Intersections

All intersections of specific interest operating a LOS A – C, with the exception being Great South Road / Gateway Drive.

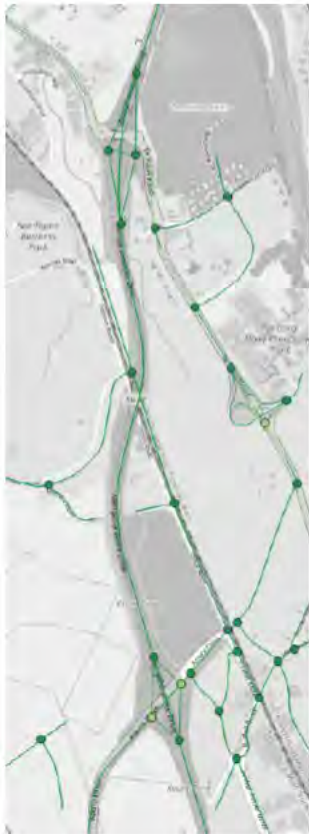
2055 AM + Dev



2055 PM + Dev



NZTA Specific Intersections

	2035 AM No Dev	2035 PM + Dev
No change		

	2045 AM No Dev	2045 AM + Dev
No change – Te Rapa Road between Horotiu Interchange and the Te Awa Lakes access roundabout remains at LOS F in both scenarios		

	2035 PM No Dev	2035 PM + Dev
No Change		

	2045 PM No Dev	2045 PM + Dev
No change – road sections at LOS E remain the same		

	2055 PM No Dev	2055 PM + Dev
Decrease in LOS at Koura Drive interchange, no change at Horotiu interchange		

Appendix C – Wairere Drive Corridor Assessment

MEMO

To:	Tony Denton / Victor Devyatov / Alejandro Cifuentes – HCC, Jon Crooks / GD Jones / Nathan York – TKE General Partner Ltd	Date:	16 June 2026
From:	Jan Franta, Principal Transportation Engineer	CC:	Kathryn Drew / Emily Patterson - BBO
Reviewed:	Rachel Gasson, Principal Transportation Engineer	CKL Ref:	B20315
Re:	Wairere Drive Corridor WRTM Appraisal		

1 Introduction

This memorandum supports the Integrated Transport Assessment (ITA) for the proposed Te Kowhai East (TKE) development at 30 Mathers Road, Horotiu. It establishes the basis on which the Waikato Regional Transport Model (WRTM) outputs are interpreted for the Wairere Drive corridor (specifically the Wairere Drive / Te Rapa Road, Wairere Drive / Arthur Porter Drive, and Te Wetini Drive / SH1C Off-Ramp intersections) and assesses the effect of development traffic on that corridor.

2 WRTM Strategic Model

2.1 Modelled Scenarios

The WRTM serves as the strategic model for assessing the impact of the development. Modelling runs for the 2025, 2035, 2045, and 2055 model years during both AM and PM peak periods were obtained for the purposes of assessing the impacts of the proposed TKE development. Accordingly, the models included the following staging:

- 2025 - no development (validation baseline);
- 2035 - approximately 67.4 ha developed; and
- 2045 - full buildout.

2.2 WRTM Validation

The 2025 base scenario was compared against observed data to confirm that the model is fit for purpose. The most suitable observed data are SCATS records from signalised intersections. As the site is located in a rural / peri-urban area with few nearby signalised intersections, the available validation points are limited to:

- Great South Road / Gateway Drive;
- Te Rapa Road / Ruffell Road;
- Te Rapa Road / Wairere Drive; and
- Arthur Porter Drive / Wairere Drive.

Consistent with the modelling brief, SCATS counts at the two Wairere Drive intersections, together with other recent HCC count data, were compared against the 2025 base model using the GEH statistic and the NZTA strategic model targets set out below in Table 1.

Table 1: GEH Criteria

GEH threshold	Strategic model validation target
GEH < 5	More than 75% of turning movements
GEH < 7.5	More than 80% of turning movements
GEH < 10	More than 85% of turning movements

Gateway Drive validated well at the turning movement level. The two Wairere Drive intersections did not achieve the per movement GEH targets; at the whole intersection level the fit was materially better, with the AM peak generally validating and the PM peak close to the relevant threshold. Arthur Porter Drive / Wairere Drive East was the principal exception. Detailed GEH outputs are presented in Table 2, Table 3 & Table 4 below.

Table 2: Te Rapa Road / Wairere Drive GEH Analysis

Te Rapa Road / Wairere Drive

Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left	147	202	4.1	463	774	12.5
	Through	701	317	17.0	865	722	5.1
	Right	98	57	4.7	384	258	7.0
	Total	946	576	13.4	1712	1754	1.0
East	Left	143	46	10.0	37	35	0.3
	Through	595	762	6.4	415	459	2.1
	Right	509	1003	17.9	467	380	4.2
	Total	1247	1811	14.4	919	874	1.5
South	Left	129	112	1.5	233	340	6.3
	Through	556	294	12.7	755	557	7.7
	Right	73	45	3.7	161	79	7.5
	Total	758	451	12.5	1149	976	5.3
West	Left	223	429	11.4	293	216	4.8
	Through	496	557	2.7	494	813	12.5
	Right	273	279	0.4	239	166	5.1
	Total	991	1265	8.1	1025	1195	5.1
		3943	4103	2.5	4805	4799	0.1
		GEH <5	37.50%		GEH <5	37.50%	
		GEH <7.5	43.75%		GEH <7.5	81.25%	
		GEH <10	56.25%		GEH <10	87.50%	

Table 3: Wairere Drive / SH1C Offramp (West) GEH Analysis

Arthur Porter Drive / Wairere Drive WEST							
Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left						
	Through						
	Right						
	Total						
East	Through	307	147	10.6	468	254	11.3
South	Left		20			17	
	Right	882	1149	8.4	656	935	9.9
	Total						
West	Through	450	263	9.9	305	223	5.0
		1639	1559	2.0	1429	1412	0.4
			GEH <5	0.00%		GEH <5	33.33%
			GEH <7.5	0.00%		GEH <7.5	33.33%
			GEH <10	66.67%		GEH <10	66.67%

Table 4: Arthur Porter Drive / Wairere / SH1C Onramp (East) Drive GEH Analysis

Arthur Porter Drive / Wairere Drive EAST							
Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left		23			127	
	Through						
	Right	229	66	13.4	669	242	20.0
	Total						
East	Left	373	691	13.8	615	745	5.0
	Through						
	Right	449	241	11.2	417	311	5.5
	Total	822	932	3.7	1032	1056	0.8
South	Left						
	Through						
	Right						
	Total						
West	Left	520	162	19.4	274	82	14.4
	Through						
	Right	869	1250	11.7	792	1076	9.3
	Total	1389	1412	0.6	1066	1158	2.8
		2067	1719	8.0	2151	1711	10.0

2.3 Review of the Validation Issue

The validation outcome was raised with HCC. Following discussion with the model provider (Stantec), HCC advised that the result was not unexpected for a model of this type, noting that:

- the 2025 WRTM is a future projection model;
- the earlier Rotokauri validation targeted specific locations rather than the full network;
- the selected intersections are complex and are affected by interacting travel patterns;
- forcing a closer fit across all movements could introduce imbalances elsewhere; and
- detailed intersection modelling is the appropriate tool for testing local operation.

On this basis, HCC supported proceeding with the WRTM as is for strategic assessment, placing greater weight on changes in traffic flows when identifying intersections for further analysis. WDC confirmed the same position.

2.4 Comparison Against Detailed Assessment Triggers

The WRTM outputs were assessed against the agreed detailed assessment triggers, which are cumulative and require an intersection to:

- operate at LOS E or F;
- exhibit a deterioration in LOS between the without development and with development scenarios;
- have a total volume increase of more than 5%; and
- have an absolute increase of more than 100 vehicles within the two-hour WRTM peak period.

The Wairere Drive intersections do not satisfy this combined test. While the WRTM indicates that Wairere Drive is already under pressure in the future baseline, with some intersections operating at LOS E or F irrespective of TKE, the changes attributable to the development do not meet the combined thresholds, and the model does not indicate a material worsening of the corridor attributable to TKE.

Notwithstanding this, CKL has retained Wairere Drive / Te Rapa Road, Arthur Porter Drive / Wairere Drive, and Te Wetini Drive / SH1C Off-Ramp for detailed SIDRA assessment as a robustness measure, on the basis that:

- the validation review identified that the WRTM represents individual turning movements poorly at these intersections;
- some TKE traffic is forecast to travel through Arthur Porter Drive / Wairere Drive;
- the two intersections are located close together on the same local corridor; and
- signalised performance is sensitive to turning movement proportions, such that local modelling with corrected inputs provides a more reliable test of the incremental TKE effect.

Table 5: Wairere Corridor Locations for Assessment

Intersection / corridor	WRTM trigger	Assessment decision
Arthur Porter Drive / Wairere Drive and Te Wetini Drive / SH1C Off-Ramp	Not met	Retained for detailed SIDRA assessment as a robustness check, reflecting the poor WRTM validation fit and the TKE traffic forecast to travel through the intersection.
Wairere Drive / Te Rapa Road	Not met	Retained for detailed SIDRA assessment, reflecting its proximity to Arthur Porter Drive / Wairere Drive and the known local validation limitations.
Wider Wairere Drive corridor	Not met	No broader corridor assessment or mitigation is proposed; the assessment is limited to the two intersections identified above.

The SIDRA assessment is not intended to resolve existing or future baseline congestion on Wairere Drive. Rather, it assesses whether TKE traffic produces a material incremental effect at the two intersections once the WRTM volumes have been adjusted to reflect observed turning patterns (Section 3). No broader corridor mitigation is proposed unless that modelling identifies a material TKE effect.

3 Input Flow Rebalancing

Because validation identified differences between the observed SCATS turning movements and the 2025 WRTM at the Wairere Drive intersections, the raw WRTM turning proportions were not relied upon directly. Instead, the forecast volumes were rebalanced to reflect observed turning patterns on a movement by movement basis.

For each turning movement, an adjustment factor was derived from the 2025 data:

$$\text{Adjustment factor} = \frac{\text{Observed SCATS volume}}{\text{2025 WRTM modelled volume}}$$

These factors were then applied to the corresponding movements in the future WRTM forecast years. The resulting flows retain the observed turning movement distribution while preserving the future growth and the without development versus with development change forecast by the WRTM.

This approach is considered proportionate, as the validation issue concerns turning movement distribution rather than the strategic use of the corridor. It also avoids a local recalibration of the WRTM, which would be disproportionate to the level of TKE traffic using Wairere Drive and could introduce inconsistencies elsewhere in the model.

Given the discrepancy between the SCATS data and the WRTM data, the factored horizons years were further rebalanced such that the total volume through each intersection matched the total volume in the WRTM model for the respective horizon year. This step ensured that a realistic

volume of traffic was assigned to the intersection, recognising that the WRTM redirects some traffic when intersections reach capacity.

The final rebalancing step included balancing the traffic volumes along Wairere Drive, ensuring that there was no more than 5% or 50 vehicles difference between the number of vehicles departing one intersection and arriving at the next intersection. This was an iterative process, ensuring that the total volume matched the WRTM model total.

The rebalanced flows form the basis of the SIDRA assessment of Wairere Drive / Te Rapa Road, Arthur Porter Drive / Wairere Drive, and Te Wetini Drive / SH1C Off-Ramp.

4 SIDRA Intersection Modelling

4.1 Methodology and Assessment Framework

The operational performance of the Wairere Drive corridor has been assessed using SIDRA Intersection (Version 9.1.1) network modelling software. A coordinated network model was developed to represent the three signalised intersections that govern corridor operation:

- **Te Rapa Road / Wairere Drive** - the principal corridor intersection;
- **Arthur Porter Drive / Wairere Drive;** and
- **Te Wetini Drive / SH1C Off-Ramp.**

The network layout is shown in Figure 1. The road layout remains unchanged in all modelled scenarios and no upgrade works are proposed / modelled.



Figure 1: SIDRA Network Arrangement

Network modelling has been used in preference to intersection assessments in isolation to ensure that all interactions between adjacent intersections, including the throttling effects of oversaturated movements, is captured appropriately (refer Section 0). The Arthur Porter Drive and Te Wetini Drive intersections are modelled together as a Common Control Group to reflect their coordinated (linked) signal operation

Performance has been assessed for three future years (**2035, 2045 and 2055**) across both the weekday AM and PM commuter peak periods, under two scenarios:

- **Base** - the future network without the proposed Te Kowhai East (“TKE”) development; and

- **Development** - the future network with TKE generated traffic added.

Intersection performance is reported using four standard measures: Degree of Saturation (DoS, the volume to capacity ratio), average control delay, Level of Service (LOS), and the 95th percentile back of queue. Raw Sidra outputs are presented in Appendix 1.

4.2 Base Case Network Performance

The base case establishes the future performance of the corridor independent of the proposed development. The results show that corridor operation is governed by the Te Rapa Road / Wairere Drive intersection, which is over capacity in every modelled year and peak period.

4.2.1 Te Rapa Road / Wairere Drive

This intersection operates at LOS F overall, and across effectively all approaches in both peak periods for the 2035 base case, with a DoS of 1.14 (AM) and 1.26 (PM). It is therefore already failing by 2035, before any development traffic is introduced. Performance deteriorates progressively through the later horizons, reaching a DoS of 1.38 and an average delay exceeding four minutes in the 2045 PM peak, with a 95th percentile queue approaching 835 m.

4.2.2 Arthur Porter Drive / Wairere Drive

This intersection operates within capacity through to 2045, ranging between LOS B and LOS D depending on the peak, with the right turn movements the critical elements. By the 2055 PM peak the intersection reaches LOS F (DoS 1.17) in the base case, reflecting the cumulative growth in background traffic along the corridor.

4.2.3 Te Wetini Drive / SH1C Off-Ramp

This intersection operates comfortably within capacity in all horizons and peaks, retaining LOS B throughout with DoS values between 0.41 and 0.69. It has substantial reserve capacity across the assessment period.

4.3 Effect of the Proposed Development

The tables below compare base and development performance at each intersection. Across every matched scenario (the three horizon years, two peaks, for all three intersections), **the intersection Level of Service is unchanged by the addition of TKE traffic**. Differences in Degree of Saturation, delay and queue length are marginal and, in several cases, below the resolution of the model.

4.3.1 Te Rapa Road / Wairere Drive

The intersection remains at LOS F with and without TKE in every scenario. The development increases the Degree of Saturation by no more than 0.03, and the 95th percentile queue by between 0 m and 28 m. This level of change is negligible, a change in the order of up to four vehicles on a queue already 30 to 50 vehicles long. As such, the development neither causes nor materially worsens the constraint at this intersection.

Table 6: Te Rapa Road / Wairere Drive Results Comparison

Year / Peak	Baseline			With Development		
	DoS	Delay/LOS	95% Queue m	DoS	Delay/LOS	95% Queue m
2035 AM	1.14	123 / F	538	1.14	130 / F	542
2035 PM	1.26	196 / F	614	1.26	197 / F	614
2045 AM	1.15	152 / F	600	1.17	164 / F	625
2045 PM	1.38	267 / F	835	1.38	269 / F	839
2055 AM	1.27	197 / F	623	1.30	207 / F	651
2055 PM	1.35	245 / F	619	1.36	252 / F	626

4.3.2 Arthur Porter Drive / Wairere Drive

The intersection retains its base case Level of Service in all horizons and peaks. The transition to LOS F in the 2055 PM peak is a feature of the base case and is not introduced by the development; with TKE the DoS shifts only from 1.17 to 1.18.

Table 7: Arthur Porter Drive / Wairere Drive Results Comparison

Year / Peak	Baseline			With Development		
	DoS	Delay/LOS	95% Queue m	DoS	Delay/LOS	95% Queue m
2035 AM	0.86	23 / C	98	0.87	23 / C	98
2035 PM	0.90	47 / D	214	0.91	50 / D	228
2045 AM	0.68	19 / B	74	0.73	19 / B	83
2045 PM	0.90	37 / D	194	0.90	37 / D	204
2055 AM	0.96	34 / C	335	0.94	34 / C	321
2055 PM	1.17	120 / F	617	1.18	122 / F	634

4.3.3 Te Wetini Drive / SH1C Off-Ramp

The development has no discernible effect on this intersection, which remains at LOS B with ample reserve capacity in every scenario.

Table 8: Te Wetini Drive / SH1C Off-Ramp Results Comparison

Year / Peak	Baseline			With Development		
	DoS	Delay/LOS	95% Queue m	DoS	Delay/LOS	95% Queue m
2035 AM	0.52	17 / B	61	0.55	17 / B	63
2035 PM	0.41	19 / B	148	0.42	19 / B	163
2045 AM	0.54	15 / B	57	0.54	15 / B	57
2045 PM	0.69	16 / B	78	0.69	16 / B	78
2055 AM	0.52	14 / B	55	0.55	15 / B	66
2055 PM	0.57	19 / B	220	0.58	19 / B	218

4.4 Upstream Capacity Constraint (Suppressed Demand)

Because the network is modelled as a coordinated system, SIDRA reports the arrival flow at each downstream movement after accounting for any demand that cannot physically reach it. As such, some demand is held back in queues at upstream capacity constrained intersections. Where the arrival flow is below the demand flow, an Upstream Capacity Constraint is in effect. These flows are indicated by yellow highlight in the raw SIDRA outputs in Appendix 1. This is known as throttling, with throttling occurring almost exclusively on the Wairere Drive movements beyond the Te Rapa Road / Wairere Drive bottleneck.

This effect is relevant to interpreting the results in two ways. First, it means the favourable performance of the downstream Arthur Porter Drive and Te Wetini Drive intersections is partly a consequence of demand being held upstream; their results should be read as demand constrained rather than as evidence of unconstrained spare capacity. Second, and more importantly for the assessment of development effects, the magnitude of the suppressed demand is small and is essentially unchanged between the base and development scenarios, as shown in Table 9.

Table 9: Network suppressed demand - base vs development (all intersections combined)

Year / Peak	Held (Base) veh/h	Held (Dev) veh/h	% Demand (Base)	% Demand (Dev)
2035 AM	105	89	1.0%	0.9%
2035 PM	73	74	0.6%	0.6%
2045 AM	91	106	0.9%	1.0%
2045 PM	120	128	1.0%	1.1%
2055 AM	163	188	1.4%	1.6%
2055 PM	290	304	2.3%	2.4%

Across the assessment period the suppressed demand represents between 0.6% and 2.4% of total network demand. The development increases this share by no more than approximately 0.2 percentage points, or around 15 vehicles per hour across the entire network in the worst case (2055 PM). The development therefore does not materially increase the volume of demand held back, nor the upstream queues in which that demand accumulates. The negligible development effect is consistent whether measured at the constrained intersection itself or in the suppressed downstream flows.

4.5 Modelling Summary

The SIDRA modelling supports the following conclusions:

- Corridor operation is governed by the Te Rapa Road / Wairere Drive intersection, which operates over capacity (LOS F) in every modelled horizon and peak in the base case. This is a preexisting condition on the Wairere Drive corridor, independent of the proposed development.
- Arthur Porter Drive / Wairere Drive operates within capacity to 2045 and reaches LOS F only in the 2055 PM base case; Te Wetini Drive / SH1C Off-Ramp retains LOS B throughout. Neither failure mode is created by the development.
- In every matched scenario, the addition of TKE traffic does not change the Level of Service at any intersection, with the Degree of Saturation changing by no more than 0.03 and the 95th percentile queue by no more than 28 m at the critical intersection.
- The upstream capacity constraint on Wairere Drive is present in the base case and is increased by the development by under 0.2% of network demand, confirming that development traffic is not being concealed within upstream queues.

The detailed modelling therefore demonstrates that the proposed development produces no change in Level of Service at any assessed intersection and only marginal changes in saturation, delay and queuing. The constraints identified are attributes of the future base network rather than consequences of Te Kowhai East.

5 Conclusion

This memorandum has assessed the effect of the proposed Te Kowhai East development on the Wairere Drive corridor using both strategic (WRTM) and detailed (SIDRA) modelling.

At the strategic level, the WRTM outputs do not trigger the agreed detailed assessment criteria at any Wairere Drive intersection. The corridor is forecast to be under pressure in the future baseline irrespective of the development; however, the changes attributable to TKE do not satisfy the combined LOS, percentage change and absolute volume thresholds, and the model does not indicate a material worsening of the corridor attributable to the development.

As a robustness measure, the Te Rapa Road / Wairere Drive and Arthur Porter Drive / Wairere Drive intersections were nonetheless carried into detailed SIDRA assessment, using WRTM forecast flows rebalanced to observed SCATS turning patterns. The detailed modelling confirms the strategic position: the Te Rapa Road / Wairere Drive intersection operates over capacity in the base case across all modelled years and peaks, a preexisting corridor constraint. Furthermore, the addition of TKE traffic does not alter the Level of Service at any assessed intersection and changes saturation, delay and queuing only marginally, adding less than 1.5% of total flows.

Both strands of the assessment therefore reach the same conclusion: the effect of the Te Kowhai East development on the operation of the Wairere Drive corridor is negligible. The constraints identified on the corridor are attributes of the existing and future base network and are neither caused nor materially worsened by the development. On this basis, no Wairere Drive corridor mitigation is required as a consequence of the Te Kowhai East development, and the development is supportable in terms of its effect on the operation of the surrounding road network.

CKL

Appendix 1

SIDRA RESULTS

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2035 BASE AM]

Output prj[YO2035]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg Satn	Aver Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
Site: 101 [TeWet Dr / SH1C OFF 2035 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	236	2.7	236	2.7	0.226	9.4	LOS A	1.9	14	0.35	0.7	0.35	52.2
3	R2	All MCs	728	5.8	728	5.8	0.52	28.8	LOS C	8.3	61.3	0.87	0.82	0.87	35.7
Approach			964	5	964	5	0.52	24	LOS C	8.3	61.3	0.74	0.79	0.74	40.8
East: Wairere Dr															
5	T1	All MCs	522	4.6	492	4.8	0.336	9.7	LOS A	6.5	47.7	0.57	0.48	0.57	40.6
Approach			522	4.6	492	4.8	0.336	9.7	LOS A	6.5	47.7	0.57	0.48	0.57	40.6
West: Te Wetini Dr															
11	T1	All MCs	600	3.7	600	3.7	0.245	10.2	LOS B	4.5	32.8	0.59	0.5	0.59	39.2
Approach			600	3.7	600	3.7	0.245	10.2	LOS B	4.5	32.8	0.59	0.5	0.59	39.2
All Vehicles			2066	4.5	2056	4.6	0.52	16.6	LOS B	8.3	61.3	0.66	0.63	0.66	40.3
Site: 101 [Art Dr / Wai Dr 2035 AM]															
East: Wairere Dr															
4	L2	All MCs	302	5.9	283	6.1	0.291	11.7	LOS B	3.5	25.8	0.49	0.73	0.49	62.3
5	T1	All MCs	474	4.2	443	4.4	+ 0.863	41	LOS D	12.9	93.6	1	1.01	1.34	38.1
6	R2	All MCs	392	4.3	366	4.4	0.863	40.7	LOS D	12.5	90.9	0.97	0.91	1.16	41.9
Approach			1167	4.7	1092	4.8	0.863	33.3	LOS C	12.9	93.6	0.86	0.9	1.06	45.1
North: Arthur Porter Dr															
7	L2	All MCs	572	9	572	9	0.562	8.7	LOS A	7.9	59.9	0.56	0.71	0.56	40.7
8	T1	All MCs	162	28.6	162	28.6	+ 0.294	25	LOS C	3.2	28.2	0.87	0.7	0.87	39.6
9	R2	All MCs	53	38	53	38	0.294	29.7	LOS C	3	27.4	0.87	0.72	0.87	29.2
Approach			786	15	786	15	0.562	13.4	LOS B	7.9	59.9	0.65	0.71	0.65	39.4
West: Wairere Dr															
10	L2	All MCs	596	9.2	596	9.2	0.356	13.6	LOS B	6.2	46.5	0.47	0.67	0.47	38.9
11	T1	All MCs	606	4.3	606	4.3	0.829	23.2	LOS C	13.4	97.9	0.84	0.77	0.91	11.5
12	R2	All MCs	141	6	141	6	+ 0.829	24.9	LOS C	13.4	97.9	0.91	0.88	1.02	37.4
Approach			1343	6.7	1343	6.7	0.829	19.2	LOS B	13.4	97.9	0.69	0.74	0.73	31.1
All Vehicles			3297	8	3222	8.1	0.863	22.6	LOS C	13.4	97.9	0.73	0.79	0.82	39.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpeltik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Des.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow ped/h	Delay sec		[First ped	Dist] m		Stop Rate			
Site: 101 [TeWet Dr / SH1C OFF 2035 AM]											
South: SH1C Off-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Te Wetini Dr											
P4	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		105	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
Site: 101 [Art Dr / Wai Dr 2035 AM]											
South: SH1C On-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
East: Wairere Dr											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
North: Arthur Porter Dr											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Wairere Dr											
P4B	Slip/Bypass	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		211	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2035 AM (Site Folder: YO2035 BASE)]

Output prj\YO2035\]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %	1/c	sec		[Veh. veh	Dist] m				km/h
South: Te Rapa Rd															
1	L2	All MCs	244	10.3	244	10.3	0.24	69.2	LOS E	7.4	56.2	0.52	0.7	0.52	31.4
2	T1	All MCs	723	12.1	723	12.1	1.027	149.3	LOS F	38.9	300.9	1	1.36	1.59	17.7
3	R2	All MCs	95	5.6	95	5.6	+ 1.061	185.7	LOS F	9.6	70.4	1	1.16	1.89	12.9
Approach			1062	11.1	1062	11.1	1.061	134.1	LOS F	38.9	300.9	0.89	1.19	1.37	18
East: Waiere Dr															
4	L2	All MCs	128	5.7	128	5.7	0.15	64.8	LOS E	4.7	34.2	0.6	0.73	0.6	38.1
5	T1	All MCs	820	3.1	820	3.1	+ 1.140	165.4	LOS F	74.9	537.8	0.97	1.39	1.7	7.9
6	R2	All MCs	537	3.9	537	3.9	0.904	63.1	LOS E	15.4	111.4	1	0.97	1.27	28.3
Approach			1485	3.6	1485	3.6	1.14	119.7	LOS F	74.9	537.8	0.95	1.18	1.45	14.6
North: Te Rapa Rd															
7	L2	All MCs	135	11.7	135	11.7	0.118	66.3	LOS E	2.3	17.5	0.32	0.63	0.32	49.8
8	T1	All MCs	920	14.9	920	14.9	+ 1.112	192.3	LOS F	56.7	447.6	1	1.62	1.88	13.2
9	R2	All MCs	131	16.9	131	16.9	0.982	101	LOS F	8.1	65.3	1	0.98	1.46	14.3
Approach			1185	14.7	1185	14.7	1.112	167.9	LOS F	56.7	447.6	0.92	1.44	1.66	14.6
West: Waiere Dr															
10	L2	All MCs	195	3.8	195	3.8	0.205	22.9	LOS C	6.3	45.7	0.56	0.74	0.56	51.9
11	T1	All MCs	612	4.8	612	4.8	0.581	30.9	LOS C	14.1	103	0.91	0.77	0.91	51
12	R2	All MCs	399	4.7	399	4.7	+ 1.110	157.9	LOS F	35.1	256	1	1.33	1.89	16.8
Approach			1205	4.6	1205	4.6	1.11	71.6	LOS E	35.1	256	0.89	0.95	1.18	31.1
All Vehicles			4938	8.1	4938	8.1	1.14	122.7	LOS F	74.9	537.8	0.91	1.19	1.42	18.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	Dist] m					
South: Te Rapa Rd											
P1	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
East: Waiere Dr											
P2	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
North: Te Rapa Rd											
P3	Full	53	36.2	LOS D	0.1	0.1	0.92	0.92	190	200	1.05
West: Waiere Dr											
P4	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
All Pedestrians		211	57.3	LOS E	0.2	0.2	0.95	0.95	211.1	200	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2035 BASE PM]

Output prx[Y02035]]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Des. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2035 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	106	3	106	3	0.092	7.7	LOS A	0.4	2.5	0.11	0.64	0.11	53.5
3	R2	All MCs	527	7	527	7	0.412	40.7	LOS D	12.6	93.6	0.8	0.81	0.8	29
Approach			634	6.3	634	6.3	0.412	35.1	LOS D	12.6	93.6	0.68	0.78	0.68	33.4
East: Wairere Dr															
5	T1	All MCs	609	2.6	598	2.6	0.379	0.8	LOS A	0.8	5.8	0.03	0.03	0.03	49.2
Approach			609	2.6	598	2.6	0.379	0.8	LOS A	0.8	5.8	0.03	0.03	0.03	49.2
West: Te Wetini Dr															
11	T1	All MCs	867	2.3	867	2.3	0.413	18.5	LOS B	20.7	148.1	0.63	0.55	0.63	33.4
Approach			867	2.3	867	2.3	0.413	18.5	LOS B	20.7	148.1	0.63	0.55	0.63	33.4
All Vehicles			2111	3.6	2099	3.6	0.413	18.5	LOS B	20.7	148.1	0.48	0.47	0.48	36.9
Site: 101 [Art Dr / Wai Dr 2035 PM]															
East: Wairere Dr															
4	L2	All MCs	528	4	503	4	0.714	23.6	LOS C	20	144.9	0.73	0.84	0.73	54.5
5	T1	All MCs	248	2.5	236	2.6	0.641	56.1	LOS E	14	100	0.98	0.83	0.98	32.3
6	R2	All MCs	497	5.3	473	5.4	0.896	69.8	LOS E	22	161.4	0.98	0.92	1.14	33.3
Approach			1274	4.2	1212	4.3	0.896	48	LOS D	22	161.4	0.88	0.87	0.94	40.1
North: Arthur Porter Dr															
7	L2	All MCs	445	3.5	445	3.5	0.455	14.1	LOS B	12.8	92.2	0.55	0.71	0.55	36.4
8	T1	All MCs	243	9.1	243	9.1	0.52	45.3	LOS D	13.3	100.3	0.91	0.77	0.91	34
9	R2	All MCs	385	13.4	385	13.4	0.895	68.5	LOS E	27.4	213.6	1	1.02	1.22	17.8
Approach			1074	8.3	1074	8.3	0.895	40.6	LOS D	27.4	213.6	0.79	0.83	0.87	27.3
West: Wairere Dr															
10	L2	All MCs	253	20.8	253	20.8	0.142	22.1	LOS C	4.2	34.7	0.43	0.58	0.43	37.4
11	T1	All MCs	672	3.1	672	3.1	0.903	58.8	LOS E	13.7	97.9	0.93	0.85	0.97	6.3
12	R2	All MCs	495	2.6	495	2.6	0.903	55.5	LOS E	13.7	97.9	1	0.99	1.14	24
Approach			1419	6.1	1419	6.1	0.903	51.1	LOS D	13.7	97.9	0.87	0.85	0.93	20
All Vehicles			3766	6.1	3705	6.2	0.903	47.1	LOS D	27.4	213.6	0.85	0.85	0.92	30.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dom.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		P95b.	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow	Delay		[Ped.	Dist.	Que.	Stop Rate			
ped/h											
Site: 101 (TeWet Dr / SH1C OFF 2035 PM)											
South: SH1C Off-Ramp											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
West: Te Wetini Dr											
P4	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
All Pedestrians		105	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
Site: 101 (Art Dr / Wai Dr 2035 PM)											
South: SH1C On-Ramp											
P1	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
East: Wairere Dr											
P2	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
North: Arthur Porter Dr											
P3	Full	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
West: Wairere Dr											
P4B	Slip/Bypass	53	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94
All Pedestrians		211	59.3	LOS E	0.2	0.2	0.96	0.96	213.1	200	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2035 PM (Site Folder: YO2035 BASE)]

Output prx[YO2035]]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total Veh/h	[HV] %	[Total Veh/h	[HV] %				[Veh. Veh	[Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	342	3.4	342	3.4	0.317	89.1	LOS F	11.5	83.2	0.54	0.71	0.54	30.4
2	T1	All MCs	909	8.4	909	8.4	+ 1.248	333.7	LOS F	70.6	529.8	1	1.93	2.33	8.7
3	R2	All MCs	222	4.3	222	4.3	1.226	330.8	LOS F	31.6	229.5	1	1.52	2.31	7.6
Approach			1474	6.6	1474	6.6	1.248	276.5	LOS F	70.6	529.8	0.89	1.59	1.91	9.2
East: Waiere Dr															
4	L2	All MCs	38	5.6	38	5.6	0.045	65.8	LOS E	1.4	10.2	0.57	0.69	0.57	37.8
5	T1	All MCs	537	4.3	537	4.3	0.96	85.9	LOS F	34.7	251.8	0.97	1.01	1.21	14.3
6	R2	All MCs	641	7.1	641	7.1	+ 1.236	275.3	LOS F	41.1	305.2	1	1.45	2.31	9
Approach			1216	5.8	1216	5.8	1.236	185.1	LOS F	41.1	305.2	0.98	1.23	1.77	10.3
North: Te Rapa Rd															
7	L2	All MCs	537	1.8	537	1.8	0.496	67	LOS E	18.4	130.9	0.57	1.17	0.57	45.9
8	T1	All MCs	998	6.9	998	6.9	1.194	266.2	LOS F	82.8	613.5	1	1.82	2.12	10.1
9	R2	All MCs	429	2.9	429	2.9	+ 1.261	253.9	LOS F	45.6	327	0.99	1.33	1.99	6.7
Approach			1964	4.6	1964	4.6	1.261	209.1	LOS F	82.8	613.5	0.88	1.54	1.67	12.1
West: Waiere Dr															
10	L2	All MCs	192	3.8	192	3.8	0.204	25.7	LOS C	7	50.4	0.58	0.74	0.58	50.3
11	T1	All MCs	589	2.3	589	2.3	+ 0.719	49.1	LOS D	17.5	124.7	0.99	0.83	0.99	43.7
12	R2	All MCs	365	6.1	365	6.1	+ 1.099	161.5	LOS F	32.2	236.9	1	1.3	1.8	17
Approach			1146	3.8	1146	3.8	1.099	81	LOS F	32.2	236.9	0.92	0.97	1.18	30.1
All Vehicles			5800	5.2	5800	5.2	1.261	195.9	LOS F	82.8	613.5	0.91	1.37	1.65	13.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

+ Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dist. Flow ped/m	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	[Dist m					
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	45.3	LOS E	0.2	0.2	0.92	0.92	199.2	200	1
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	63.3	LOS F	0.2	0.2	0.95	0.95	217.1	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2035 DEV AM]

Output pro[Y02035]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Des. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
Site: 101 [TeWet Dr / SH1C OFF 2035 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	236	2.7	236	2.7	0.228	9.2	LOS A	1.8	13	0.34	0.69	0.34	52.4
3	R2	All MCs	728	5.8	728	5.8	0.545	29.7	LOS C	8.5	62.7	0.89	0.82	0.89	35.1
Approach			964	5	964	5	0.545	24.7	LOS C	8.5	62.7	0.75	0.79	0.75	40.3
East: Waiwera Dr															
5	T1	All MCs	522	4.6	497	4.8	0.33	9.1	LOS A	6.4	46.9	0.55	0.47	0.55	41
Approach			522	4.6	497	4.8	0.33	9.1	LOS A	6.4	46.9	0.55	0.47	0.55	41
West: Te Wetini Dr															
11	T1	All MCs	600	3.7	600	3.7	0.238	9.6	LOS A	4.4	31.8	0.57	0.48	0.57	39.7
Approach			600	3.7	600	3.7	0.238	9.6	LOS A	4.4	31.8	0.57	0.48	0.57	39.7
All Vehicles			2066	4.5	2061	4.6	0.545	16.6	LOS B	8.5	62.7	0.65	0.62	0.65	40.3
Site: 101 [Art Dr / Wai Dr 2035 AM]															
East: Waiwera Dr															
4	L2	All MCs	302	5.9	206	6	0.293	11.7	LOS B	3.6	26.2	0.49	0.73	0.49	62.3
5	T1	All MCs	474	4.2	449	4.3	0.848	39.3	LOS D	13.3	96.5	1	0.99	1.29	39
6	R2	All MCs	427	3.9	405	4	0.848	39.5	LOS D	12.9	93.4	0.96	0.91	1.13	42.4
Approach			1203	4.5	1139	4.6	0.848	32.4	LOS C	13.3	96.5	0.86	0.9	1.03	45.5
North: Arthur Porter Dr															
7	L2	All MCs	577	8.9	577	8.9	0.57	9.1	LOS A	8.4	63.6	0.59	0.72	0.59	40.3
8	T1	All MCs	163	29	163	29	0.296	25	LOS C	3.2	28.4	0.87	0.7	0.87	39.6
9	R2	All MCs	53	38	53	38	0.296	29.7	LOS C	3.1	27.7	0.87	0.72	0.87	29.2
Approach			793	15	793	15	0.57	13.7	LOS B	8.4	63.6	0.66	0.72	0.66	39.2
West: Waiwera Dr															
10	L2	All MCs	596	9.2	596	9.2	0.365	14	LOS B	6.2	47	0.48	0.67	0.48	38.7
11	T1	All MCs	606	4.3	606	4.3	0.868	25	LOS C	13.4	97.9	0.86	0.82	0.96	10.8
12	R2	All MCs	141	6	141	6	0.868	27	LOS C	13.4	97.9	0.95	0.94	1.1	36.1
Approach			1343	6.7	1343	6.7	0.868	20.3	LOS C	13.4	97.9	0.7	0.76	0.76	30.4
All Vehicles			3339	7.9	3275	8	0.868	22.9	LOS C	13.4	97.9	0.75	0.8	0.83	39.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Des.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow veh/h	Delay sec		[West ped	Dist m		Stop Rate			
Site: 101 [TeWet Dr / SH1C Off 2035 AM]											
South: SH1C Off-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Te Wetini Dr											
P4	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		105	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
Site: 101 [Art Dr / Wai Dr 2035 AM]											
South: SH1C On-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
East: Waiwera Dr											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
North: Arthur Porter Dr											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Waiwera Dr											
P4B	Slip/bypass	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		211	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2035 AM (Site Folder: YO2035 DEV)]

Output prj\YO2035\]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	249	10.1	249	10.1	0.251	79.6	LOS E	8.5	64.8	0.54	0.7	0.54	29.6
2	T1	All MCs	723	12.1	723	12.1	1.045	169.7	LOS F	42.2	326.2	1	1.39	1.62	16.1
3	R2	All MCs	95	5.6	95	5.6	+ 1.136	256.4	LOS F	11.7	85.5	1	1.23	2.08	9.6
Approach			1067	11	1067	11	1.136	156.4	LOS F	42.2	326.2	0.89	1.22	1.41	16
East: Waiere Dr															
4	L2	All MCs	128	5.7	128	5.7	0.148	69.2	LOS E	4.9	36.2	0.59	0.73	0.59	37.6
5	T1	All MCs	849	3	849	3	+ 1.103	149.3	LOS F	75.5	541.9	0.97	1.3	1.53	8.9
6	R2	All MCs	537	3.9	537	3.9	0.825	55.1	LOS E	14.2	102.6	1	0.88	1.12	32.2
Approach			1515	3.5	1515	3.5	1.103	109.1	LOS F	75.5	541.9	0.95	1.11	1.31	16.5
North: Te Rapa Rd															
7	L2	All MCs	135	11.7	135	11.7	0.118	74	LOS E	2.3	18.1	0.3	0.63	0.3	49.8
8	T1	All MCs	920	14.9	920	14.9	+ 1.131	213.5	LOS F	61	481.8	1	1.64	1.9	12.2
9	R2	All MCs	131	16.9	131	16.9	1.052	135.1	LOS F	9.8	78.3	1	1.03	1.58	11.4
Approach			1185	14.7	1185	14.7	1.131	189	LOS F	61	481.8	0.92	1.46	1.68	13.4
West: Waiere Dr															
10	L2	All MCs	195	3.8	195	3.8	0.206	23.4	LOS C	6.7	48.3	0.55	0.74	0.55	51.6
11	T1	All MCs	615	4.8	615	4.8	0.567	32.8	LOS C	15.2	110.6	0.91	0.77	0.91	49.9
12	R2	All MCs	401	4.7	401	4.7	+ 1.116	165.2	LOS F	36	261.8	1	1.32	1.85	16.2
Approach			1211	4.6	1211	4.6	1.116	75.2	LOS E	36	261.8	0.88	0.95	1.16	30.2
All Vehicles			4978	8.1	4978	8.1	1.136	130	LOS F	75.5	541.9	0.91	1.17	1.38	18.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dist. Flow ped/m	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	Dist] m					
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	41.5	LOS E	0.2	0.2	0.92	0.92	196.3	200	1.02
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.3	LOS F	0.2	0.2	0.95	0.95	216.2	200	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2035 DEV PM]

Output pro[Y02035]

EQUISAT (Fixed-Time/S

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg Satn	Aver Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2035 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	106	3	106	3	0.092	7.7	LOS A	0.4	2.5	0.1	0.63	0.1	53.5
3	R2	All MCs	527	7	527	7	0.417	43.7	LOS D	13.9	102.8	0.8	0.81	0.8	27.7
Approach			634	6.3	634	6.3	0.417	37.6	LOS D	13.9	102.8	0.69	0.78	0.69	32.2
East: Wairere Dr															
5	T1	All MCs	609	2.6	598	2.6	0.371	0.7	LOS A	0.8	6	0.03	0.03	0.03	49.2
Approach			609	2.6	598	2.6	0.371	0.7	LOS A	0.8	6	0.03	0.03	0.03	49.2
West: Te Wetini Dr															
11	T1	All MCs	867	2.3	867	2.3	0.405	18.9	LOS B	22.8	162.7	0.61	0.54	0.61	33.2
Approach			867	2.3	867	2.3	0.405	18.9	LOS B	22.8	162.7	0.61	0.54	0.61	33.2
All Vehicles			2111	3.6	2099	3.6	0.417	19.4	LOS B	22.8	162.7	0.47	0.47	0.47	36.3
Site: 101 [Art Dr / Wai Dr 2035 PM]															
East: Wairere Dr															
4	L2	All MCs	528	4	503	4	0.702	24.7	LOS C	21.3	154.3	0.72	0.84	0.72	53.9
5	T1	All MCs	248	2.5	236	2.6	0.616	58.8	LOS E	14.8	106.2	0.97	0.82	0.97	31.4
6	R2	All MCs	505	5.2	481	5.3	+ 0.876	71.1	LOS E	23.3	170.2	0.98	0.9	1.1	33
Approach			1282	4.2	1221	4.2	0.876	49.6	LOS D	23.3	170.2	0.87	0.86	0.92	39.5
North: Arthur Porter Dr															
7	L2	All MCs	460	3.4	460	3.4	0.466	14.9	LOS B	14.4	104	0.55	0.71	0.55	35.8
8	T1	All MCs	244	9.1	244	9.1	0.516	49.2	LOS D	14.3	107.7	0.91	0.77	0.91	33.1
9	R2	All MCs	385	13.4	385	13.4	+ 0.897	73.4	LOS E	29.2	228.2	1	1.01	1.2	17.2
Approach			1089	8.2	1089	8.2	0.897	43.3	LOS D	29.2	228.2	0.79	0.83	0.86	26.6
West: Wairere Dr															
10	L2	All MCs	253	20.8	253	20.8	0.142	23.8	LOS C	4.6	37.9	0.44	0.58	0.44	36.9
11	T1	All MCs	672	3.1	672	3.1	+ 0.906	63.9	LOS E	13.7	97.9	0.93	0.86	0.97	5.9
12	R2	All MCs	495	2.6	495	2.6	0.906	59.1	LOS E	13.7	97.9	1	0.99	1.12	23.1
Approach			1419	6.1	1419	6.1	0.906	55	LOS E	13.7	97.9	0.87	0.86	0.93	19.1
All Vehicles			3791	6.1	3729	6.2	0.906	49.8	LOS D	29.2	228.2	0.85	0.85	0.91	30

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpeltik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dens. Flow ped/s/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[West ped	[East m					
Site: 101 [TeWet Dr / SH1C OFF 2035 PM]											
South: SH1C Off-Ramp											
P1	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
West: Te Wetini Dr											
P4	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
All Pedestrians		105	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
Site: 101 [Art Dr / Wai Dr 2035 PM]											
South: SH1C On-Ramp											
P1	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
East: Wairere Dr											
P2	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
North: Arthur Porter Dr											
P3	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
West: Wairere Dr											
P4B	Slip/Bypass	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
All Pedestrians		211	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | License: NETWORK / 1PC | Processed: Monday, June 8, 2026 4:02:50 PM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2035 PM (Site Folder: YO2035 DEV)]

Output prx[YO2035]]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %	1/c	sec		[Veh. veh	Dist] m				km/h
South: Te Rapa Rd															
1	L2	All MCs	345	3.4	345	3.4	0.321	89.1	LOS F	11.7	84.3	0.54	0.71	0.54	30.4
2	T1	All MCs	909	8.4	909	8.4	+ 1.251	336	LOS F	71	533.1	1	1.94	2.34	8.7
3	R2	All MCs	222	4.3	222	4.3	1.226	331.1	LOS F	31.6	229.6	1	1.52	2.31	7.5
Approach			1477	6.6	1477	6.6	1.251	277.6	LOS F	71	533.1	0.89	1.59	1.91	9.2
East: Waiere Dr															
4	L2	All MCs	38	5.6	38	5.6	0.045	66.4	LOS E	1.4	10.2	0.57	0.69	0.57	37.8
5	T1	All MCs	541	4.3	541	4.3	+ 0.967	88	LOS F	35.5	257.7	0.98	1.02	1.22	14
6	R2	All MCs	642	7	642	7	+ 1.238	277	LOS F	41.3	306.6	1	1.45	2.31	9
Approach			1221	5.8	1221	5.8	1.238	186.7	LOS F	41.3	306.6	0.98	1.24	1.78	10.2
North: Te Rapa Rd															
7	L2	All MCs	537	1.8	537	1.8	0.497	67	LOS E	18.5	131.3	0.57	1.17	0.57	45.9
8	T1	All MCs	998	6.9	998	6.9	1.194	266.2	LOS F	82.8	613.5	1	1.82	2.12	10.1
9	R2	All MCs	429	2.9	429	2.9	+ 1.261	253.9	LOS F	45.6	327	0.99	1.33	1.99	6.7
Approach			1964	4.6	1964	4.6	1.261	209.1	LOS F	82.8	613.5	0.88	1.54	1.67	12.1
West: Waiere Dr															
10	L2	All MCs	192	3.8	192	3.8	0.204	25.7	LOS C	7	50.4	0.58	0.74	0.58	50.3
11	T1	All MCs	600	2.3	600	2.3	0.733	50	LOS D	18	128.3	0.99	0.84	1.01	43.5
12	R2	All MCs	369	6	369	6	+ 1.111	171.7	LOS F	33.6	247.1	1	1.32	1.85	16.4
Approach			1161	3.7	1161	3.7	1.111	84.7	LOS F	33.6	247.1	0.93	0.98	1.2	29.4
All Vehicles			5823	5.2	5823	5.2	1.261	197	LOS F	82.8	613.5	0.91	1.38	1.66	13.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

+ Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que.	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow	Delay		[Ped	Dist]		Stop Rate			
		ped/h	sec		ped	m			sec	m	m/sec
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	45.3	LOS E	0.2	0.2	0.92	0.92	199.2	200	1
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	63.3	LOS F	0.2	0.2	0.95	0.95	217.1	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2045 BASE AM]

Output prc[YO2045]]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	[HV]	[Total	[HV]				[Veh.	[Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2045 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	220	2.9	220	2.9	0.196	8.1	LOS A	0.8	5.8	0.22	0.66	0.22	53.1
3	R2	All MCs	708	5.8	708	5.8	0.537	31.1	LOS C	7.8	57.2	0.9	0.82	0.9	34.2
Approach			928	5.1	928	5.1	0.537	25.7	LOS C	7.8	57.2	0.74	0.78	0.74	39.5
East: Waiwera Dr															
5	T1	All MCs	463	4.5	439	4.7	0.276	0.7	LOS A	0.4	2.9	0.05	0.04	0.05	49.3
Approach			463	4.5	439	4.7	0.276	0.7	LOS A	0.4	2.9	0.05	0.04	0.05	49.3
West: Te Wetini Dr															
11	T1	All MCs	553	3.6	553	3.6	0.191	8.2	LOS A	3.4	24.6	0.53	0.44	0.53	40.9
Approach			553	3.6	553	3.6	0.191	8.2	LOS A	3.4	24.6	0.53	0.44	0.53	40.9
All Vehicles			1944	4.5	1920	4.6	0.537	14.9	LOS B	7.8	57.2	0.52	0.51	0.52	41.8
Site: 101 [Art Dr / Wai Dr 2045 AM]															
East: Waiwera Dr															
4	L2	All MCs	251	5.9	235	6.1	0.247	11.8	LOS B	2.8	20.6	0.45	0.72	0.45	62.3
5	T1	All MCs	397	4.2	372	4.4	0.682	30.9	LOS C	10.2	74.4	0.96	0.85	1.01	43.8
6	R2	All MCs	428	4.2	402	4.3	0.682	34	LOS C	9.9	71.7	0.93	0.83	0.96	44.5
Approach			1076	4.6	1010	4.8	0.682	27.7	LOS C	10.2	74.4	0.83	0.81	0.86	48
North: Arthur Porter Dr															
7	L2	All MCs	726	9	726	9	0.642	7.2	LOS A	8.4	63	0.51	0.7	0.51	42
8	T1	All MCs	294	28.7	294	28.7	0.507	26.5	LOS C	5.9	51.5	0.92	0.76	0.92	39
9	R2	All MCs	78	37.8	78	37.8	0.507	31.2	LOS C	5.6	50.4	0.92	0.77	0.92	28.6
Approach			1098	16.3	1098	16.3	0.642	14	LOS B	8.4	63	0.65	0.72	0.65	39.7
West: Waiwera Dr															
10	L2	All MCs	764	9.1	764	9.1	0.508	13.1	LOS B	9.3	70.4	0.53	0.7	0.53	38.1
11	T1	All MCs	376	4.2	376	4.2	0.615	18.5	LOS B	7.8	56.7	0.71	0.64	0.71	12.8
12	R2	All MCs	121	6.1	121	6.1	0.615	20.7	LOS C	7.8	56.7	0.76	0.69	0.76	40.1
Approach			1261	7.3	1261	7.3	0.615	15.5	LOS B	9.3	70.4	0.61	0.68	0.61	34.6
All Vehicles			3435	9.3	3368	9.5	0.682	18.7	LOS B	10.2	74.4	0.69	0.73	0.7	41.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpeltik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance [CCG]											
Mov	Crossing	Dem.	Aver.	Level of	AVERAGE BACK OF QUEUE		Prop.	Eff.	Travel Time	Travel Dist.	Aver. Speed
ID		Flow	Delay	Service	(Feet)	(Dist)	Que.	Stop Rate	sec	m	m/sec
		ped/h	sec		ped	m					
Site: 101 [TeWet Dr / SH1C OFF 2045 AM]											
South: SH1C Off-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Te Wetini Dr											
P4	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		105	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
Site: 101 [Art Dr / Wai Dr 2045 AM]											
South: SH1C On-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
East: Waiwera Dr											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
North: Arthur Porter Dr											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Waiwera Dr											
P4B	Slip/Bypass	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		211	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-11C1-1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2045 AM (Site Folder: YO2045 BASE)]

Output prj[YO2045]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	[HV]	[Total	[HV]				[Veh.	[Dist.]				
			veh/h	%	veh/h	%				veh	m				
South: Te Rapa Rd															
1	L2	All MCs	299	10.2	299	10.2	0.261	79.3	LOS E	8.1	62	0.44	0.68	0.44	34.5
2	T1	All MCs	979	12.2	979	12.2	1.097	204	LOS F	63.6	491.2	1	1.56	1.76	13.8
3	R2	All MCs	109	5.8	109	5.8	+ 1.151	270.3	LOS F	13.8	101.5	1	1.28	2.12	9.2
Approach			1387	11.2	1387	11.2	1.151	182.3	LOS F	63.6	491.2	0.88	1.35	1.51	14.1
East: Waiere Dr															
4	L2	All MCs	55	5.8	55	5.8	0.073	82.1	LOS F	2.3	16.7	0.64	0.71	0.64	35.1
5	T1	All MCs	700	3	700	3	+ 1.150	177.5	LOS F	64.9	465.9	0.98	1.33	1.67	7.4
6	R2	All MCs	659	3.8	659	3.8	0.976	83.8	LOS F	24.4	176.5	1	1.01	1.4	23.9
Approach			1414	3.5	1414	3.5	1.15	130.1	LOS F	64.9	465.9	0.97	1.16	1.51	14.4
North: Te Rapa Rd															
7	L2	All MCs	221	11.4	221	11.4	0.182	73.6	LOS E	4.1	31.3	0.32	0.64	0.32	49.7
8	T1	All MCs	1086	14.9	1086	14.9	+ 1.140	221.1	LOS F	76	600.4	1	1.68	1.91	12
9	R2	All MCs	87	16.9	87	16.9	0.938	101.4	LOS F	5.4	43.4	1	0.91	1.39	14.5
Approach			1395	14.5	1395	14.5	1.14	190.2	LOS F	76	600.4	0.89	1.47	1.63	13.9
West: Waiere Dr															
10	L2	All MCs	139	3.8	139	3.8	0.177	32.1	LOS C	5.8	41.9	0.66	0.75	0.66	47.2
11	T1	All MCs	537	4.7	537	4.7	0.645	44.1	LOS D	15	109.2	0.96	0.81	0.96	45.4
12	R2	All MCs	432	4.6	432	4.6	+ 1.125	178.7	LOS F	41.3	300.9	1	1.33	1.88	15.8
Approach			1107	4.6	1107	4.6	1.125	95	LOS F	41.3	300.9	0.94	1	1.28	26.8
All Vehicles			5303	8.6	5303	8.6	1.151	152.3	LOS F	76	600.4	0.92	1.26	1.49	16.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	[Dist m					
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	43	LOS E	0.2	0.2	0.92	0.92	196.9	200	1.02
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.7	LOS F	0.2	0.2	0.95	0.95	215.6	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2045 DEV AM]

Output pro[Y02045]]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2045 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	220	2.9	220	2.9	0.195	8.1	LOS A	0.8	5.8	0.22	0.66	0.22	53.1
3	R2	All MCs	708	5.8	708	5.8	0.537	31.1	LOS C	7.8	57.2	0.9	0.82	0.9	34.2
Approach			928	5.1	928	5.1	0.537	25.7	LOS C	7.8	57.2	0.74	0.78	0.74	39.5
East: Waiwera Dr															
5	T1	All MCs	463	4.5	436	4.8	0.275	0.7	LOS A	0.4	3	0.05	0.04	0.05	49.3
Approach			463	4.5	436	4.8	0.275	0.7	LOS A	0.4	3	0.05	0.04	0.05	49.3
West: Te Wetini Dr															
11	T1	All MCs	553	3.6	553	3.6	0.191	8.2	LOS A	3.4	24.6	0.53	0.44	0.53	40.9
Approach			553	3.6	553	3.6	0.191	8.2	LOS A	3.4	24.6	0.53	0.44	0.53	40.9
All Vehicles			1944	4.5	1917	4.6	0.537	15	LOS B	7.8	57.2	0.52	0.51	0.52	41.7
Site: 101 [Art Dr / Wai Dr 2045 AM]															
East: Waiwera Dr															
4	L2	All MCs	251	5.9	233	6.1	0.246	11.8	LOS B	2.8	20.4	0.45	0.72	0.45	62.3
5	T1	All MCs	397	4.2	370	4.4	+ 0.732	32.2	LOS C	11.4	83	0.98	0.88	1.07	43.1
6	R2	All MCs	496	3.8	462	4	0.732	35.1	LOS D	11	79.5	0.94	0.85	1	44
Approach			1143	4.4	1065	4.6	0.732	29	LOS C	11.4	83	0.85	0.83	0.91	47.2
North: Arthur Porter Dr															
7	L2	All MCs	733	9.1	733	9.1	0.648	7.2	LOS A	8.5	64.2	0.52	0.7	0.52	41.9
8	T1	All MCs	296	28.8	296	28.8	+ 0.510	26.5	LOS C	5.9	51.9	0.92	0.76	0.92	39
9	R2	All MCs	78	37.8	78	37.8	0.51	31.3	LOS C	5.7	50.8	0.92	0.77	0.92	26.6
Approach			1106	16.4	1106	16.4	0.648	14	LOS B	8.5	64.2	0.65	0.72	0.65	39.6
West: Waiwera Dr															
10	L2	All MCs	764	9.1	764	9.1	0.508	13.2	LOS B	9.3	70.4	0.53	0.7	0.53	38.1
11	T1	All MCs	376	4.2	376	4.2	+ 0.615	18.5	LOS B	7.8	56.7	0.71	0.64	0.71	12.8
12	R2	All MCs	121	6.1	121	6.1	0.615	20.7	LOS C	7.8	56.7	0.76	0.69	0.76	40.1
Approach			1261	7.3	1261	7.3	0.615	15.5	LOS B	9.3	70.4	0.61	0.68	0.61	34.6
All Vehicles			3511	9.2	3432	9.4	0.732	19.2	LOS B	11.4	83	0.7	0.74	0.72	41.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkpelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance [CCG]											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que.	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Feet ped	[Dist m					
Site: 101 [TeWet Dr / SH1C Off 2045 AM]											
South: SH1C Off Ramp											
P1	Full	53	29.3	LOS C	0.1		0.92	0.92	183.2	200	1.09
West: Te Wetini Dr											
P4	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		105	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
Site: 101 [Art Dr / Wai Dr 2045 AM]											
South: SH1C On Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
East: Waiwera Dr											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
North: Arthur Porter Dr											
P3	Full	53	29.3	LOS C	0.1		0.92	0.92	183.2	200	1.09
West: Waiwera Dr											
P4B	Slip/Bypass	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		211	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-11C1-1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2045 AM (Site Folder: YO2045 DEV)]

Output prj[YO2045]]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	[HV] %	[Total veh/h	[HV] %				[Veh. veh	[Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	314	9.7	314	9.7	0.278	81	LOS F	9	68.3	0.46	0.69	0.46	33.6
2	T1	All MCs	979	12.2	979	12.2	1.124	226.5	LOS F	66.9	517.4	1	1.64	1.87	12.6
3	R2	All MCs	109	5.8	109	5.8	+ 1.151	270.9	LOS F	13.8	101.5	1	1.28	2.12	9.2
Approach			1402	11.1	1402	11.1	1.151	197.4	LOS F	66.9	517.4	0.88	1.4	1.57	13.1
East: Waiere Dr															
4	L2	All MCs	55	5.8	55	5.8	0.071	82.6	LOS F	2.2	16.3	0.62	0.71	0.62	35.7
5	T1	All MCs	753	2.8	753	2.8	+ 1.167	187.3	LOS F	71.7	514.2	0.98	1.37	1.72	7.1
6	R2	All MCs	659	3.8	659	3.8	0.943	72.7	LOS E	22.4	161.9	1	0.99	1.31	26.1
Approach			1466	3.4	1466	3.4	1.167	131.9	LOS F	71.7	514.2	0.97	1.17	1.49	14.1
North: Te Rapa Rd															
7	L2	All MCs	224	11.3	224	11.3	0.184	74.6	LOS E	4.1	31.8	0.32	0.64	0.32	49.7
8	T1	All MCs	1086	14.9	1086	14.9	+ 1.165	243.6	LOS F	79.2	625.3	1	1.76	2.01	11.1
9	R2	All MCs	87	16.9	87	16.9	0.938	101.8	LOS F	5.4	43.4	1	0.91	1.39	14.5
Approach			1398	14.5	1398	14.5	1.165	207.6	LOS F	79.2	625.3	0.89	1.53	1.7	12.9
West: Waiere Dr															
10	L2	All MCs	139	3.8	139	3.8	0.177	30.9	LOS C	5.7	41	0.64	0.75	0.64	47.7
11	T1	All MCs	540	4.7	540	4.7	0.649	43.5	LOS D	14.8	107.6	0.96	0.81	0.96	46
12	R2	All MCs	435	4.6	435	4.6	+ 1.170	216.6	LOS F	45.7	332.7	1	1.39	2.04	13.8
Approach			1114	4.5	1114	4.5	1.17	109.5	LOS F	45.7	332.7	0.94	1.03	1.35	24.6
All Vehicles			5380	8.5	5380	8.5	1.17	164	LOS F	79.2	625.3	0.92	1.29	1.54	15.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
					[Ped ped]	[Dist m]			sec	m	m/sec
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	42	LOS E	0.2	0.2	0.92	0.92	196.8	200	1.02
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.4	LOS F	0.2	0.2	0.95	0.95	216.3	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2045 BASE PM]

Output pr[Y02045]]

EQUISAT (Fixed-Time/S

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg Satn	Aver Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 102 [TeWet Dr / SH1C OFF 2045 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	129	2.4	129	2.4	0.135	7.8	LOS A	0.4	3.1	0.13	0.64	0.13	53.4
3	R2	All MCs	422	7	422	7	0.686	57.2	LOS E	10.5	77.8	0.99	0.84	1.08	23.1
Approach			552	5.9	552	5.9	0.686	45.6	LOS D	10.5	77.8	0.79	0.8	0.85	29.4
East: Waiwera Dr															
5	T1	All MCs	612	2.6	595	2.6	0.283	0.4	LOS A	0.6	4.1	0.03	0.02	0.03	49.6
Approach			612	2.6	595	2.6	0.283	0.4	LOS A	0.6	4.1	0.03	0.02	0.03	49.6
West: Te Wetini Dr															
11	T1	All MCs	622	2.2	622	2.2	0.209	5.1	LOS A	7	49.6	0.34	0.3	0.34	44
Approach			622	2.2	622	2.2	0.209	5.1	LOS A	7	49.6	0.34	0.3	0.34	44
All Vehicles			1785	3.5	1769	3.5	0.686	16.2	LOS B	10.5	77.8	0.38	0.36	0.4	38.8
Site: 101 [Art Dr / Wai Dr 2045 PM]															
East: Waiwera Dr															
4	L2	All MCs	443	4	411	4.1	0.427	15.7	LOS B	9.7	70.1	0.53	0.75	0.53	59.7
5	T1	All MCs	231	2.3	214	2.3	0.371	36	LOS D	9	64.6	0.84	0.76	0.84	41
6	R2	All MCs	764	5.2	709	5.3	+ 0.861	50.4	LOS D	26.5	193.7	0.95	0.9	1.06	38.5
Approach			1438	4.4	1334	4.5	0.861	37.4	LOS D	26.5	193.7	0.8	0.83	0.86	43.9
North: Arthur Porter Dr															
7	L2	All MCs	457	3.5	457	3.5	0.399	8.4	LOS A	7.3	52.7	0.4	0.65	0.4	40.9
8	T1	All MCs	243	9.1	243	9.1	0.519	38.3	LOS D	11.3	85.4	0.91	0.77	0.91	36.3
9	R2	All MCs	369	13.2	389	13.2	+ 0.902	61.9	LOS E	24.3	189.3	1	1.05	1.28	19
Approach			1089	8.2	1089	8.2	0.902	34.2	LOS C	24.3	189.3	0.73	0.82	0.83	29.5
West: Waiwera Dr															
10	L2	All MCs	297	20.9	297	20.9	0.202	22.5	LOS C	4.2	34.3	0.42	0.63	0.42	36.6
11	T1	All MCs	528	3.2	528	3.2	+ 0.889	46.6	LOS D	13.6	97.9	0.89	0.81	0.96	7.2
12	R2	All MCs	223	2.8	223	2.8	0.889	42	LOS D	13.6	97.9	0.98	0.94	1.1	28.7
Approach			1048	8.1	1048	8.1	0.889	38.8	LOS D	13.6	97.9	0.78	0.79	0.84	22.9
All Vehicles			3576	6.7	3472	6.9	0.902	36.8	LOS D	26.5	193.7	0.77	0.81	0.84	35.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpeltik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Demand	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		Flow per/h	Delay sec		[Yrd post	Dist m					
Site: 102 [TeWet Dr / SH1C OFF 2045 PM]											
South: SH1C Off-Ramp											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
West: Te Wetini Dr											
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
All Pedestrians		105	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
Site: 101 [Art Dr / Wai Dr 2045 PM]											
South: SH1C On-Ramp											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
East: Waiwera Dr											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
North: Arthur Porter Dr											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
West: Waiwera Dr											
P4B	Slip/Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | License: NETWORK / 1PC | Processed: Monday, June 8, 2025 1:16:36 PM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2045 PM (Site Folder: YO2045 BASE)]

Output prx[YO2045]]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	425	3.5	425	3.5	0.428	95.4	LOS F	17	122.3	0.63	0.75	0.63	28.2
2	T1	All MCs	964	8.4	964	8.4	+ 1.368	439.9	LOS F	88.9	667.5	1	2.21	2.7	6.7
3	R2	All MCs	239	4	239	4	1.347	439.2	LOS F	39.4	285.2	1	1.7	2.68	5.7
Approach			1648	6.5	1648	6.5	1.368	350.9	LOS F	88.9	667.5	0.9	1.76	2.17	7.2
East: Waiere Dr															
4	L2	All MCs	34	6.3	34	6.3	0.041	72.2	LOS E	1.3	9.3	0.58	0.69	0.58	37.5
5	T1	All MCs	582	4.2	582	4.2	+ 1.038	115.9	LOS F	43.7	316.5	0.98	1.12	1.38	11
6	R2	All MCs	704	7	704	7	+ 1.357	381.8	LOS F	53.5	397.2	1	1.58	2.69	7
Approach			1320	5.7	1320	5.7	1.357	256.6	LOS F	53.5	397.2	0.98	1.36	2.06	7.9
North: Te Rapa Rd															
7	L2	All MCs	537	1.8	537	1.8	0.472	75.3	LOS E	16.7	118.3	0.52	0.95	0.52	47.3
8	T1	All MCs	1154	6.8	1154	6.8	1.331	390.8	LOS F	112.6	834.5	1	2.18	2.58	7.3
9	R2	All MCs	469	2.9	469	2.9	+ 1.378	330	LOS F	56.8	407.8	1	1.45	2.24	5.3
Approach			2160	4.7	2160	4.7	1.378	299.2	LOS F	112.6	834.5	0.88	1.71	2	8.9
West: Waiere Dr															
10	L2	All MCs	151	4.2	151	4.2	0.161	25.2	LOS C	5.3	38.7	0.57	0.73	0.57	50.6
11	T1	All MCs	516	2.4	516	2.4	0.63	47	LOS D	14.9	106.2	0.96	0.8	0.96	44.3
12	R2	All MCs	354	6	354	6	+ 1.054	133.3	LOS F	28.3	208.1	1	1.25	1.68	19.1
Approach			1020	3.9	1020	3.9	1.054	73.7	LOS E	28.3	208.1	0.92	0.95	1.15	31.2
All Vehicles			6148	5.3	6148	5.3	1.378	266.5	LOS F	112.6	834.5	0.91	1.52	1.91	9.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dist. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped	Dist] m					
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	45.3	LOS E	0.2	0.2	0.92	0.92	199.2	200	1
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	63.3	LOS F	0.2	0.2	0.95	0.95	217.1	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2045 DEV PM]

Output prc[YO2045]]

EQUISAT (Fixed-Time/S

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Des. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 102 [TeWet Dr / SH1C OFF 2045 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	129	2.4	129	2.4	0.135	7.8	LOS A	0.4	3.1	0.13	0.64	0.13	53.4
3	R2	All MCs	422	7	422	7	0.686	57.2	LOS E	10.5	77.8	0.99	0.84	1.08	23.1
Approach			552	5.9	552	5.9	0.686	45.6	LOS D	10.5	77.8	0.79	0.8	0.85	29.4
East: Waiwera Dr															
5	T1	All MCs	612	2.6	594	2.6	0.283	0.4	LOS A	0.6	4.1	0.03	0.02	0.03	49.6
Approach			612	2.6	594	2.6	0.283	0.4	LOS A	0.6	4.1	0.03	0.02	0.03	49.6
West: Te Wetini Dr															
11	T1	All MCs	622	2.2	622	2.2	0.209	5.1	LOS A	7	49.6	0.34	0.3	0.34	44
Approach			622	2.2	622	2.2	0.209	5.1	LOS A	7	49.6	0.34	0.3	0.34	44
All Vehicles			1785	3.5	1768	3.5	0.686	16.2	LOS B	10.5	77.8	0.38	0.36	0.4	38.8
Site: 101 [Art Dr / Wai Dr 2045 PM]															
East: Waiwera Dr															
4	L2	All MCs	443	4	409	4.1	0.427	15.7	LOS B	9.6	69.9	0.53	0.75	0.53	59.7
5	T1	All MCs	231	2.3	213	2.3	0.369	36	LOS D	9	64.2	0.83	0.76	0.83	41
6	R2	All MCs	784	5.2	725	5.3	+ 0.880	52	LOS D	27.9	204.2	0.95	0.91	1.08	38
Approach			1458	4.4	1347	4.5	0.88	38.5	LOS D	27.9	204.2	0.81	0.84	0.87	43.4
North: Arthur Porter Dr															
7	L2	All MCs	482	3.5	482	3.5	0.421	8.5	LOS A	7.9	57.2	0.41	0.65	0.41	40.8
8	T1	All MCs	246	9.4	246	9.4	0.527	38.4	LOS D	11.5	86.9	0.91	0.77	0.91	36.2
9	R2	All MCs	389	13.2	389	13.2	+ 0.902	61.9	LOS E	24.3	189.3	1	1.05	1.28	19
Approach			1118	8.2	1118	8.2	0.902	33.7	LOS C	24.3	189.3	0.73	0.82	0.82	29.6
West: Waiwera Dr															
10	L2	All MCs	297	20.9	297	20.9	0.202	22.5	LOS C	4.2	34.3	0.42	0.63	0.42	36.6
11	T1	All MCs	528	3.2	528	3.2	+ 0.889	46.6	LOS D	13.6	97.9	0.89	0.81	0.96	7.2
12	R2	All MCs	223	2.8	223	2.8	0.889	42	LOS D	13.6	97.9	0.98	0.94	1.1	28.7
Approach			1048	8.1	1048	8.1	0.889	38.8	LOS D	13.6	97.9	0.78	0.79	0.84	22.9
All Vehicles			3624	6.7	3513	6.9	0.902	37	LOS D	27.9	204.2	0.77	0.82	0.85	35.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkpelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop.	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow	Delay		[Feet	Dist]	Que	Stop Rate]			
Site: 102 [TeWet Dr / SH1C OFF 2045 PM]											
South: SH1C Off-Ramp											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
West: Te Wetini Dr											
P4	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
All Pedestrians		105	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
Site: 101 [Art Dr / Wai Dr 2045 PM]											
South: SH1C On-Ramp											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
East: Waiwera Dr											
P2	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
North: Arthur Porter Dr											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
West: Waiwera Dr											
P4B	Slip/Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98
All Pedestrians		211	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2045 PM (Site Folder: YO2045 DEV)]

Output from [YO2045]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	[HV] %	[Total veh/h	[HV] %				[Veh. veh	[Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	434	3.4	434	3.4	0.438	95.5	LOS F	17.5	126.3	0.64	0.75	0.64	28.1
2	T1	All MCs	984	8.4	984	8.4	+ 1.371	442.7	LOS F	89.4	671.5	1	2.21	2.71	6.7
3	R2	All MCs	239	4	239	4	1.347	439.4	LOS F	39.4	285.2	1	1.7	2.68	5.7
Approach			1657	6.5	1657	6.5	1.371	351.3	LOS F	89.4	671.5	0.9	1.76	2.17	7.2
East: Waiere Dr															
4	L2	All MCs	34	6.3	34	6.3	0.041	73.4	LOS E	1.3	9.3	0.58	0.69	0.58	37.5
5	T1	All MCs	593	4.1	593	4.1	+ 1.056	125.1	LOS F	45.9	332.6	0.98	1.15	1.43	10.3
6	R2	All MCs	705	7	705	7	+ 1.359	383.5	LOS F	53.7	398.7	1	1.58	2.69	6.9
Approach			1332	5.7	1332	5.7	1.359	260.7	LOS F	53.7	398.7	0.98	1.37	2.08	7.8
North: Te Rapa Rd															
7	L2	All MCs	539	1.8	539	1.8	0.477	75.5	LOS E	16.9	119.9	0.53	0.95	0.53	47.3
8	T1	All MCs	1156	6.8	1156	6.8	1.334	393.3	LOS F	113.2	838.5	1	2.19	2.59	7.2
9	R2	All MCs	469	2.9	469	2.9	+ 1.378	330.1	LOS F	56.8	407.8	1	1.45	2.24	5.3
Approach			2164	4.7	2164	4.7	1.378	300.4	LOS F	113.2	838.5	0.88	1.72	2	8.9
West: Waiere Dr															
10	L2	All MCs	151	4.2	151	4.2	0.161	25.2	LOS C	5.3	38.7	0.57	0.73	0.57	50.6
11	T1	All MCs	532	2.4	532	2.4	0.649	47.8	LOS D	15.4	109.9	0.97	0.81	0.97	44.2
12	R2	All MCs	362	5.8	362	5.8	+ 1.088	152.3	LOS F	30.9	227.4	1	1.29	1.76	17.6
Approach			1044	3.8	1044	3.8	1.088	80.8	LOS F	30.9	227.4	0.92	0.96	1.19	29.9
All Vehicles			6197	5.2	6197	5.2	1.378	268.5	LOS F	113.2	838.5	0.92	1.53	1.92	9.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow ped/h	Delay sec		[Ped ped	[Dist m		Stop Rate			
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	45.3	LOS E	0.2	0.2	0.92	0.92	199.2	200	1
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	63.3	LOS F	0.2	0.2	0.95	0.95	217.1	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2055 BASE AM]

Output prx[YO2055]]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2055 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	227	2.8	227	2.8	0.204	8.1	LOS A	0.9	6.1	0.22	0.66	0.22	53.1
3	R2	All MCs	621	5.8	621	5.8	0.515	31	LOS C	7.4	54.5	0.9	0.81	0.9	34.2
Approach			848	5	848	5	0.515	24.9	LOS C	7.4	54.5	0.71	0.77	0.71	40.2
East: Waiwera Dr															
5	T1	All MCs	499	4.6	460	4.9	0.29	0.7	LOS A	0.5	3.4	0.05	0.04	0.05	49.2
Approach			499	4.6	460	4.9	0.29	0.7	LOS A	0.5	3.4	0.05	0.04	0.05	49.2
West: Te Wetini Dr															
11	T1	All MCs	646	3.7	646	3.7	0.245	8.6	LOS A	4.5	32.7	0.54	0.46	0.54	40.6
Approach			646	3.7	646	3.7	0.245	8.6	LOS A	4.5	32.7	0.54	0.46	0.54	40.6
All Vehicles			1994	4.5	1954	4.6	0.515	13.8	LOS B	7.4	54.5	0.5	0.5	0.5	42.1
Site: 101 [Art Dr / Wai Dr 2055 AM]															
East: Waiwera Dr															
4	L2	All MCs	258	5.7	234	5.9	0.26	12.4	LOS B	3	21.9	0.48	0.72	0.48	61.8
5	T1	All MCs	431	4.2	391	4.3	0.901	44.2	LOS D	16.4	119.1	1	1.07	1.42	36.9
6	R2	All MCs	638	4.1	579	4.3	0.916	45.2	LOS D	16.5	119.6	0.97	0.97	1.29	40.2
Approach			1326	4.4	1204	4.6	0.916	38.5	LOS D	16.5	119.6	0.88	0.96	1.17	42.6
North: Arthur Porter Dr															
7	L2	All MCs	1025	8.9	1025	8.9	0.963	46.1	LOS D	44.5	335.1	1	1.19	1.46	22.9
8	T1	All MCs	309	28.6	309	28.6	0.483	26.1	LOS C	5.9	51.1	0.91	0.75	0.91	39.4
9	R2	All MCs	68	36.9	68	36.9	0.483	30.2	LOS C	5.6	50.1	0.91	0.76	0.91	29.2
Approach			1403	14.6	1403	14.6	0.963	40.9	LOS D	44.5	335.1	0.97	1.07	1.31	27.2
West: Waiwera Dr															
10	L2	All MCs	608	9.2	608	9.2	0.387	14.9	LOS B	7	52.7	0.52	0.68	0.52	38.2
11	T1	All MCs	505	4.4	505	4.4	0.854	27.6	LOS C	13.4	97.9	0.88	0.82	0.98	10.2
12	R2	All MCs	154	6.2	154	6.2	0.854	28.4	LOS C	13.4	97.9	0.95	0.93	1.1	35
Approach			1267	6.9	1267	6.9	0.854	21.6	LOS C	13.4	97.9	0.71	0.77	0.77	30.6
All Vehicles			3997	8.8	3874	9.1	0.963	33.8	LOS C	44.5	335.1	0.86	0.94	1.09	34.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpelli M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov (#)	Crossing	Dem.	Aves.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que.	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		Flow veh/h	Delay sec		[Feet per m	Dist] m					
Site: 101 [TeWet Dr / SH1C OFF 2055 AM]											
South: SH1C Off-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Te Wetini Dr											
P4	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		105	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
Site: 101 [Art Dr / Wai Dr 2055 AM]											
South: SH1C On-Ramp											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
East: Waiwera Dr											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
North: Arthur Porter Dr											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
West: Waiwera Dr											
P4B	Slip/Bypass	53	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09
All Pedestrians		211	29.3	LOS C	0.1	0.1	0.92	0.92	183.2	200	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2055 AM (Site Folder: YO2055 BASE)]

Output from [YO2055]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	[HV] %	[Total veh/h	[HV] %				[Veh. veh	[Dist.] m				
South: Te Rapa Rd															
1	L2	All MCs	364	10.4	364	10.4	0.335	85.4	LOS F	11.5	87.3	0.51	0.71	0.51	32.1
2	T1	All MCs	889	12.1	889	12.1	+ 1.270	355.1	LOS F	76.2	588.4	1	1.98	2.4	8.2
3	R2	All MCs	99	5.3	99	5.3	1.185	303.7	LOS F	13.2	97	1	1.29	2.24	8.3
Approach			1353	11.1	1353	11.1	1.27	278.7	LOS F	76.2	588.4	0.87	1.59	1.88	9.1
East: Waiere Dr															
4	L2	All MCs	77	5.5	77	5.5	0.099	84	LOS F	3.2	23.2	0.63	0.72	0.63	35.5
5	T1	All MCs	807	3.1	807	3.1	+ 1.239	233.9	LOS F	86.7	622.9	0.98	1.51	1.92	5.7
6	R2	All MCs	479	4	479	4	0.765	47.7	LOS D	12.3	89.3	1	0.85	1.07	32.8
Approach			1363	3.6	1363	3.6	1.239	160	LOS F	86.7	622.9	0.97	1.24	1.55	11.4
North: Te Rapa Rd															
7	L2	All MCs	137	11.5	137	11.5	0.124	78.9	LOS E	2.8	21.7	0.35	0.64	0.35	48.6
8	T1	All MCs	966	14.9	966	14.9	1.185	259.5	LOS F	69.8	551.3	1	1.79	2.09	10.3
9	R2	All MCs	121	16.5	121	16.5	+ 1.112	169	LOS F	10.2	81.4	1	1.07	1.73	9.4
Approach			1224	14.7	1224	14.7	1.185	230.4	LOS F	69.8	551.3	0.93	1.59	1.86	11.3
West: Waiere Dr															
10	L2	All MCs	240	3.9	240	3.9	0.254	23	LOS C	8.3	59.8	0.56	0.75	0.56	51.8
11	T1	All MCs	700	4.8	700	4.8	0.656	43.2	LOS D	19.6	143	0.94	0.83	0.94	47.8
12	R2	All MCs	563	4.7	563	4.7	+ 1.246	286.1	LOS F	66.9	487.2	1	1.49	2.3	11.5
Approach			1503	4.6	1503	4.6	1.246	131	LOS F	66.9	487.2	0.9	1.06	1.38	22.6
All Vehicles			5443	8.2	5443	8.2	1.27	197.3	LOS F	86.7	622.9	0.91	1.36	1.66	13.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dist. Flow ped/hr	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[Ped ped]	[Dist m]					
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	42	LOS E	0.2	0.2	0.92	0.92	196.8	200	1.02
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.4	LOS F	0.2	0.2	0.95	0.95	216.3	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2055 BASE PM]

Output pro[Y02055]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg Satn	Aver Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2055 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	140	3	140	3	0.148	8.2	LOS A	1	7.1	0.15	0.65	0.15	53.2
3	R2	All MCs	433	7.1	433	7.1	0.573	62.9	LOS E	19.5	144.8	0.94	0.82	0.94	21.5
Approach			573	6.1	573	6.1	0.573	49.6	LOS D	19.5	144.8	0.74	0.78	0.74	28.1
East: Waiwera Dr															
5	T1	All MCs	794	2.5	700	2.5	0.352	3.8	LOS A	5.7	40.7	0.2	0.17	0.2	45.9
Approach			794	2.5	700	2.5	0.352	3.8	LOS A	5.7	40.7	0.2	0.17	0.2	45.9
West: Te Wetini Dr															
11	T1	All MCs	682	2.3	682	2.3	0.283	9.7	LOS A	30.7	219.5	0.42	0.36	0.42	39.7
Approach			682	2.3	682	2.3	0.283	9.7	LOS A	30.7	219.5	0.42	0.36	0.42	39.7
All Vehicles			2048	3.4	1955	3.6	0.573	19.3	LOS B	30.7	219.5	0.43	0.42	0.43	36.5
Site: 101 [Art Dr / Wai Dr 2055 PM]															
East: Waiwera Dr															
4	L2	All MCs	347	3.9	311	4	0.338	19.8	LOS B	10.3	74.7	0.53	0.75	0.53	56.8
5	T1	All MCs	192	2.2	171	2.2	0.316	57.6	LOS E	9.8	70	0.84	0.76	0.84	34.9
6	R2	All MCs	987	5.2	883	5.3	+ 1.154	175.3	LOS F	73.5	538.3	0.97	1.14	1.6	20.1
Approach			1526	4.6	1365	4.6	1.154	125.2	LOS F	73.5	538.3	0.86	1	1.26	24.8
North: Arthur Porter Dr															
7	L2	All MCs	666	3.6	666	3.6	0.556	12.8	LOS B	20.7	149.3	0.53	0.71	0.53	37.3
8	T1	All MCs	337	9.1	337	9.1	0.499	60	LOS E	18.9	142.5	0.83	0.72	0.83	36
9	R2	All MCs	608	13.3	608	13.3	+ 1.156	237.9	LOS F	79.1	616.7	1	1.5	1.97	7.4
Approach			1612	8.4	1612	8.4	1.156	107.7	LOS F	79.1	616.7	0.77	1.01	1.13	16.3
West: Waiwera Dr															
10	L2	All MCs	343	20.9	343	20.9	0.239	30.3	LOS C	7.6	62.8	0.45	0.65	0.45	35
11	T1	All MCs	568	3.1	568	3.1	1.165	155.1	LOS F	13.7	97.9	0.98	1.22	1.5	2.1
12	R2	All MCs	252	2.5	252	2.5	+ 1.165	213.4	LOS F	13.7	97.9	1	1.53	1.94	8.5
Approach			1163	8.2	1163	8.2	1.165	130.9	LOS F	13.7	97.9	0.83	1.12	1.29	8.9
All Vehicles			4301	7	4140	7.3	1.165	120	LOS F	79.1	616.7	0.81	1.04	1.22	17.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Des.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop.	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow	Delay		(Yrd)	(Dist)	Que	Stop Rate			
Site: 101 [TeWet Dr / SH1C OFF 2055 PM]											
South: SH1C Off-Ramp											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
West: Te Wetini Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		105	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
Site: 101 [Art Dr / Wai Dr 2055 PM]											
South: SH1C On-Ramp											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiwera Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Arthur Porter Dr											
P3	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
West: Waiwera Dr											
P4B	Slip/Bypass	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.slp

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2055 PM (Site Folder: YO2055 BASE)]

Output prj[YO2055]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	55% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	[HV] %	[Total veh/h	[HV] %				[Veh. veh	[Dist. m				
South: Te Rapa Rd															
1	L2	All MCs	511	3.5	511	3.5	0.504	90.4	LOS F	20.7	149.4	0.66	1.08	0.66	28.2
2	T1	All MCs	896	8.5	896	8.5	+ 1.353	427	LOS F	82.4	618.7	1	2.16	2.67	6.9
3	R2	All MCs	232	4.1	232	4.1	1.304	400.8	LOS F	36.4	263.8	1	1.63	2.55	6.3
Approach			1638	6.3	1638	6.3	1.353	318.3	LOS F	82.4	618.7	0.89	1.75	2.02	7.7
East: Wairere Dr															
4	L2	All MCs	63	5	63	5	0.075	79.4	LOS E	2.4	17.5	0.59	0.71	0.59	37.3
5	T1	All MCs	678	4.2	678	4.2	+ 1.235	234.2	LOS F	71.9	521.3	0.98	1.46	1.92	5.7
6	R2	All MCs	673	7	673	7	1.189	234.8	LOS F	40.2	298.4	1	1.39	2.14	10.3
Approach			1414	5.6	1414	5.6	1.235	227.6	LOS F	71.9	521.3	0.97	1.39	1.96	8.6
North: Te Rapa Rd															
7	L2	All MCs	480	1.8	480	1.8	0.413	67.1	LOS E	13.8	97.8	0.48	1.01	0.48	47.9
8	T1	All MCs	949	6.9	949	6.9	1.231	293.6	LOS F	81.1	601.3	1	1.91	2.26	9.1
9	R2	All MCs	392	3	392	3	+ 1.353	310.8	LOS F	46.2	331.8	1	1.41	2.2	5.5
Approach			1821	4.7	1821	4.7	1.353	237.6	LOS F	81.1	601.3	0.86	1.57	1.78	10.7
West: Wairere Dr															
10	L2	All MCs	196	3.8	190	3.8	0.202	25.7	LOS C	6.9	50	0.58	0.74	0.58	50.3
11	T1	All MCs	544	2.3	529	2.3	0.59	48.1	LOS D	14.8	105.9	0.94	0.79	0.94	45.4
12	R2	All MCs	537	6.1	522	6.1	+ 1.332	363.4	LOS F	71.8	529.3	1	1.6	2.59	9.5
Approach			1277	4.1	1241	4.2	1.332	177.2	LOS F	71.8	529.3	0.91	1.12	1.58	18
All Vehicles			6149	5.2	6113	5.2	1.353	244.7	LOS F	82.4	618.7	0.91	1.49	1.85	10.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

+ Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Demand Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE (Ped. ped Dist. m)		Prop. Que.	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Wairere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	43.6	LOS E	0.2	0.2	0.92	0.92	197.4	200	1.01
West: Wairere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.9	LOS F	0.2	0.2	0.95	0.95	216.7	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2055 DEV AM]

Output prx[YO2055]]

EQUISAT (Fixed-Time/S)

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Desg Statn	Aver Delay	Level of Service	95% Back Of Queue		Prop Que	Eff Stop Rate	Aver No. of Cycles	Aver Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2055 AM]															
South: SH1C Off-Ramp															
1	L2	All MCs	227	2.8	227	2.8	0.203	8	LOS A	0.9	6.1	0.19	0.66	0.19	53.2
3	R2	All MCs	621	5.8	621	5.8	0.554	35.3	LOS D	9	65.8	0.91	0.82	0.91	31.7
Approach			848	5	848	5	0.554	28	LOS C	9	65.8	0.72	0.78	0.72	38.2
East: Waiwera Dr															
5	T1	All MCs	499	4.6	455	4.9	0.272	0.7	LOS A	0.5	3.5	0.05	0.04	0.05	49.2
Approach			499	4.6	455	4.9	0.272	0.7	LOS A	0.5	3.5	0.05	0.04	0.05	49.2
West: Te Wetini Dr															
11	T1	All MCs	646	3.7	646	3.7	0.242	8.5	LOS A	5	36.3	0.51	0.44	0.51	40.7
Approach			646	3.7	646	3.7	0.242	8.5	LOS A	5	36.3	0.51	0.44	0.51	40.7
All Vehicles			1994	4.5	1949	4.6	0.554	15.2	LOS B	9	65.8	0.49	0.49	0.49	41
Site: 101 [Art Dr / Wai Dr 2055 AM]															
East: Waiwera Dr															
4	L2	All MCs	258	5.7	231	5.9	0.246	13	LOS B	3.5	25.4	0.49	0.73	0.49	61.4
5	T1	All MCs	431	4.2	385	4.3	0.855	42.8	LOS D	16.8	121.8	1	1	1.25	37.6
6	R2	All MCs	683	4	612	4.1	+ 0.930	51	LOS D	20.1	146	0.97	0.98	1.28	38.3
Approach			1372	4.4	1228	4.5	0.93	41.3	LOS D	20.1	146	0.89	0.94	1.12	41.5
North: Arthur Porter Dr															
7	L2	All MCs	1031	9	1031	9	0.938	38.3	LOS D	42.6	321.1	0.98	1.09	1.27	25.5
8	T1	All MCs	312	28.7	312	28.7	+ 0.429	27.5	LOS C	6.4	55.6	0.87	0.73	0.87	39
9	R2	All MCs	68	36.9	68	36.9	0.429	31.1	LOS C	6.1	54.5	0.87	0.74	0.87	28.8
Approach			1411	14.7	1411	14.7	0.938	35.5	LOS D	42.6	321.1	0.95	1	1.16	29.3
West: Waiwera Dr															
10	L2	All MCs	608	9.2	608	9.2	0.385	16.2	LOS B	7.8	58.6	0.5	0.68	0.5	37.9
11	T1	All MCs	505	4.4	505	4.4	+ 0.894	33.3	LOS C	13.4	97.9	0.9	0.85	1.02	8.8
12	R2	All MCs	154	6.2	154	6.2	0.894	33.8	LOS C	13.4	97.9	0.98	0.98	1.17	32.1
Approach			1267	6.9	1267	6.9	0.894	25.2	LOS C	13.4	97.9	0.72	0.78	0.79	28.9
All Vehicles			4049	8.8	3906	9.1	0.938	34	LOS C	42.6	321.1	0.85	0.91	1.03	34.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Desig.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que.	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow	Delay		[Ped.	Dist]		Stop Rate			
Site: 101 [TeWet Dr / SH1C OFF 2055 AM]											
South: SH1C Off-Ramp											
P1	Full	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
West: Te Wetiini Dr											
P4	Full	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
All Pedestrians		105	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
Site: 101 [Art Dr / Wai Dr 2055 AM]											
South: SH1C On-Ramp											
P1	Full	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
East: Waiwera Dr											
P2	Full	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
North: Arthur Porter Dr											
P3	Full	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
West: Waiwera Dr											
P4B	Slip/Bypass	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06
All Pedestrians		211	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2055 AM (Site Folder: YO2055 DEV)]

Output from [YO2055]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Te Rapa Rd															
1	L2	All MCs	377	10.1	377	10.1	0.345	78.1	LOS E	11.2	84.9	0.52	0.71	0.52	32.6
2	T1	All MCs	889	12.1	889	12.1	+ 1.278	355	LOS F	74.7	577.3	1	2.04	2.53	8.2
3	R2	All MCs	99	5.3	99	5.3	1.29	387.6	LOS F	15	109.7	1	1.42	2.67	6.5
Approach			1365	11	1365	11	1.29	280.9	LOS F	74.7	577.3	0.87	1.63	1.98	8.9
East: Waiere Dr															
4	L2	All MCs	77	5.5	77	5.5	0.097	76.9	LOS E	2.9	21.3	0.62	0.72	0.62	36.9
5	T1	All MCs	840	3	840	3	+ 1.265	245.7	LOS F	90.7	650.9	0.98	1.58	2.05	5.5
6	R2	All MCs	479	4	479	4	0.884	55.9	LOS E	13.3	96.5	1	0.91	1.25	30.3
Approach			1396	3.5	1396	3.5	1.265	171.3	LOS F	90.7	650.9	0.97	1.31	1.7	10.7
North: Te Rapa Rd															
7	L2	All MCs	138	11.5	138	11.5	0.125	71.2	LOS E	2.5	19.1	0.33	0.64	0.33	49.4
8	T1	All MCs	966	14.9	966	14.9	1.198	265.1	LOS F	68.7	542.7	1	1.88	2.22	10.1
9	R2	All MCs	121	16.5	121	16.5	+ 1.211	224.5	LOS F	11.7	93.5	1	1.16	2.02	7.4
Approach			1225	14.7	1225	14.7	1.211	239.3	LOS F	68.7	542.7	0.93	1.67	1.99	10.9
West: Waiere Dr															
10	L2	All MCs	240	3.9	240	3.9	0.246	22.3	LOS C	7.8	56.1	0.56	0.75	0.56	52.2
11	T1	All MCs	703	4.8	703	4.8	0.605	40	LOS D	16.9	123.4	0.91	0.77	0.91	50.6
12	R2	All MCs	565	4.7	565	4.7	+ 1.295	329.8	LOS F	72.8	530.3	1	1.59	2.57	10.4
Approach			1508	4.6	1508	4.6	1.295	145.8	LOS F	72.8	530.3	0.89	1.07	1.47	21.2
All Vehicles			5495	8.2	5495	8.2	1.295	206.7	LOS F	90.7	650.9	0.91	1.4	1.77	12.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Alkellik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[Ped	Dist]					
South: Te Rapa Rd											
P1	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
East: Waiere Dr											
P2	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
North: Te Rapa Rd											
P3	Full	53	37.1	LOS D	0.1	0.1	0.92	0.92	191	200	1.05
West: Waiere Dr											
P4	Full	53	64.3	LOS F	0.2	0.2	0.96	0.96	218.1	200	0.92
All Pedestrians		211	57.5	LOS E	0.2	0.2	0.95	0.95	211.3	200	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [Te Wet Dr / SH1C OFF | Art Dr / Wai Dr CCG 2055 DEV PM]

Output pro[Y02055]]

EQUISAT (Fixed-Time/S

Vehicle Movement Performance (CCG)

Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg Satn	Aver Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
Site: 101 [TeWet Dr / SH1C OFF 2055 PM]															
South: SH1C Off-Ramp															
1	L2	All MCs	140	3	140	3	0.148	8.2	LOS A	1	7.1	0.15	0.65	0.15	53.2
3	R2	All MCs	433	7.1	433	7.1	0.577	63	LOS E	19.4	144	0.94	0.82	0.94	21.5
Approach			573	6.1	573	6.1	0.577	49.6	LOS D	19.4	144	0.75	0.78	0.75	28.1
East: Waiwera Dr															
5	T1	All MCs	794	2.5	692	2.5	0.348	3.9	LOS A	5.7	40.5	0.2	0.17	0.2	45.8
Approach			794	2.5	692	2.5	0.348	3.9	LOS A	5.7	40.5	0.2	0.17	0.2	45.8
West: Te Wetini Dr															
11	T1	All MCs	682	2.3	682	2.3	0.285	9.7	LOS A	30.6	218.4	0.42	0.37	0.42	39.7
Approach			682	2.3	682	2.3	0.285	9.7	LOS A	30.6	218.4	0.42	0.37	0.42	39.7
All Vehicles			2048	3.4	1947	3.6	0.577	19.4	LOS B	30.6	218.4	0.44	0.42	0.44	36.5
Site: 101 [Art Dr / Wai Dr 2055 PM]															
East: Waiwera Dr															
4	L2	All MCs	347	3.9	310	4	0.337	20.3	LOS C	10.5	75.7	0.54	0.76	0.54	56.5
5	T1	All MCs	192	2.2	171	2.2	0.31	56.1	LOS E	9.7	69.1	0.83	0.76	0.83	35.3
6	R2	All MCs	1005	5.2	897	5.3	+ 1.151	173	LOS F	74.1	542.2	0.97	1.14	1.59	20.4
Approach			1544	4.6	1377	4.7	1.151	124.1	LOS F	74.1	542.2	0.86	1	1.26	25
North: Arthur Porter Dr															
7	L2	All MCs	685	3.7	685	3.7	0.573	13	LOS B	21.7	157	0.54	0.71	0.54	37.2
8	T1	All MCs	341	9.3	341	9.3	0.515	61.5	LOS E	19.4	146.5	0.84	0.73	0.84	35.6
9	R2	All MCs	608	13.3	608	13.3	+ 1.175	254.2	LOS F	81.3	634.2	1	1.54	2.04	7
Approach			1635	8.4	1635	8.4	1.175	112.9	LOS F	81.3	634.2	0.77	1.02	1.16	15.8
West: Waiwera Dr															
10	L2	All MCs	343	20.9	343	20.9	0.242	30.6	LOS C	7.7	63.7	0.46	0.65	0.46	34.8
11	T1	All MCs	568	3.1	568	3.1	1.164	154.3	LOS F	13.7	97.9	0.98	1.21	1.49	2.2
12	R2	All MCs	252	2.5	252	2.5	+ 1.164	212.1	LOS F	13.7	97.9	1	1.52	1.94	8.6
Approach			1163	8.2	1163	8.2	1.164	130.3	LOS F	13.7	97.9	0.83	1.11	1.28	8.9
All Vehicles			4342	7	4175	7.3	1.175	121.5	LOS F	81.3	634.2	0.82	1.04	1.23	17.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is Included).

Gap-Acceptance Capacity Formula: SIDRA Standard (Alpeltik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Mode Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Des. Flow veh/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
					[West ped	Dist] m					
Site: 101 [TeWet Dr / SH1C OFF 2055 PM]											
South: SH1C Off-Ramp											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
West: Te Wetini Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		105	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
Site: 101 [Art Dr / Wai Dr 2055 PM]											
South: SH1C On-Ramp											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiwera Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Arthur Porter Dr											
P3	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
West: Waiwera Dr											
P4B	Slip/Bypass	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Network TKE\B20315-TR - SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [TeRap Dr / Wai Dr 2055 PM (Site Folder: YO2055 DEV)]

Output prj: YO2055]]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed)

Vehicle Movement Performance															
Mov ID	Turn	Mov. Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	m				
South: Te Rapa Rd															
1	L2	All MCs	520	3.4	520	3.4	0.513	90.4	LOS F	21.1	152.1	0.66	1.11	0.66	28.1
2	T1	All MCs	896	8.5	896	8.5	+ 1.356	429.6	LOS F	82.9	622.3	1	2.17	2.68	6.8
3	R2	All MCs	232	4.1	232	4.1	1.276	376.3	LOS F	35.2	255.3	1	1.6	2.47	6.7
Approach			1647	6.3	1647	6.3	1.356	315	LOS F	82.9	622.3	0.89	1.75	2.01	7.8
East: Waiere Dr															
4	L2	All MCs	63	5	63	5	0.074	79.6	LOS E	2.4	17.3	0.59	0.71	0.59	37.6
5	T1	All MCs	686	4.1	686	4.1	+ 1.250	244	LOS F	74.3	538.3	0.98	1.48	1.96	5.5
6	R2	All MCs	675	7	675	7	1.192	237.8	LOS F	40.6	301.2	1	1.39	2.15	10.2
Approach			1424	5.5	1424	5.5	1.25	233.8	LOS F	74.3	538.3	0.97	1.41	1.99	8.4
North: Te Rapa Rd															
7	L2	All MCs	487	1.7	487	1.7	0.424	69	LOS E	14.4	102.4	0.5	1.01	0.5	47.5
8	T1	All MCs	951	6.9	951	6.9	1.262	321.7	LOS F	84.4	625.5	1	1.99	2.37	8.4
9	R2	All MCs	392	3	392	3	+ 1.353	310.8	LOS F	46.2	331.8	1	1.41	2.2	5.5
Approach			1829	4.7	1829	4.7	1.353	252	LOS F	84.4	625.5	0.87	1.61	1.83	10.2
West: Waiere Dr															
10	L2	All MCs	196	3.8	190	3.8	0.202	25.7	LOS C	6.9	50	0.58	0.74	0.58	50.3
11	T1	All MCs	551	2.3	535	2.3	0.597	48.5	LOS D	15	107.4	0.94	0.79	0.94	45.4
12	R2	All MCs	548	6	533	6	+ 1.361	389.1	LOS F	76.3	561.7	1	1.63	2.68	9
Approach			1295	4.1	1259	4.1	1.361	189.3	LOS F	76.3	561.7	0.91	1.14	1.62	17.2
All Vehicles			6196	5.2	6160	5.2	1.361	251.8	LOS F	84.4	625.5	0.91	1.5	1.87	10.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem.	Aver.	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff.	Travel Time	Travel Dist.	Aver. Speed
		Flow ped/h	Delay sec		[Ped ped	Dist] m		Stop Rate			
South: Te Rapa Rd											
P1	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
East: Waiere Dr											
P2	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
North: Te Rapa Rd											
P3	Full	53	43.6	LOS E	0.2	0.2	0.92	0.92	197.4	200	1.01
West: Waiere Dr											
P4	Full	53	69.3	LOS F	0.2	0.2	0.96	0.96	223.1	200	0.9
All Pedestrians		211	62.9	LOS F	0.2	0.2	0.95	0.95	216.7	200	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay).

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix D – Validation Correspondence

Rachel Gasson

From: Victor Devyatov [REDACTED]
Sent: Thursday, 21 May 2026 11:51 am
To: Judith Makinson; Tony Denton; [REDACTED] Virendra Prasad (Guest);
Matthew Epps; Alejandro Cifuentes
Cc: GD Jones; Jon Crooks; Nathan York; [REDACTED] Rachel Gasson; Hunter, Dave;
Ballantyne, Julie
Subject: RE: [#CKL B20315] TKE - WRTM Validation
Importance: High

Hi Judith,

Thank you for working through the validation and for the detailed note.

We've had a number of discussions on this outside of the email chain, including with Stantec, and are comfortable proceeding with the approach you've outlined.

On validation, it's worth noting that the 2025 model is a future projection model, and the local validation undertaken as part of the Rotokauri work was targeted at improving flows at specific locations (Te Kowhai Rd area), rather than a full network wide validation. As discussed with Stantec, the intersections selected for wider validation are relatively complex, with a range of interacting travel patterns, and it can be difficult to achieve a close fit across all movements without introducing imbalances elsewhere. In that sense, the level of fit observed is not unexpected for a model of this type.

In terms of distribution, Stantec have reviewed the assignment and are comfortable that the model is behaving reasonably. Trip distributions reflect the broader land use patterns across the network, with the development attracting trips from a wide range of origins rather than just adjacent areas.

The routing observed, including the influence of network changes such as the Northern River Crossing, is considered to be generally sensible.

On that basis, we're comfortable that the model is suitable for this stage of strategic assessment.

We support your proposed approach of proceeding with the model as is, placing greater weight on changes in flows when identifying intersections for further analysis, and testing those in more detail at the intersection level as required. This aligns with Stantec's view that more detailed intersection modelling is the appropriate way to test and refine the results at these locations.

Regards,

Victor Devyatov
Senior Transport Engineer
Transport Planning, Strategy and Programming
Infrastructure and Assets Group
DDI: [REDACTED]



From: Judith Makinson [REDACTED]
Sent: Monday, 11 May 2026 8:15 am
To: Tony Denton [REDACTED]; Victor Devyatov [REDACTED]
[REDACTED]; Virendra Prasad (Guest) [REDACTED]; Matthew Epps
[REDACTED]; Alejandro Cifuentes [REDACTED]
Cc: GD Jones [REDACTED]; Jon Crooks [REDACTED]; Nathan York [REDACTED]
[REDACTED] Rachel Gasson [REDACTED]
Subject: [#CKL B20315] TKE - WRTM Validation
Importance: High

Hi All

This is an update on where we are at with the WRTM modelling. We have received the full data from Stantec and have been looking at the validation which as you can guess from the long radio silence, has not gone smoothly.

The WRTM project brief states that we will use the NZTA best practice validation of seeing a certain percentage of GEH values on individual turning movements meeting certain thresholds. We agreed to use a number of signalised intersection along Te Rapa Road as well as the Great South Road / Gateway Drive intersection and compared the 2025 WRTM flows to current SCATS data. Other than at Great South Road / Gateway Drive which hits the GEH stats thresholds at a **turning movement** level no problem, the other intersections do not. However when we look at an **intersection** level, the AM peak period validates to the GEH thresholds and the PM is on the cusp, with only Arthur Porter Drive / Wairere Drive East have a total intersection GEH = 10. All the rest come out as under 5.

Great South Road / Gateway Drive								
Location	Movement	AM 8:00 - 9:00				PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic		SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left	597	541		2.3	419	401	
	Through							
	Right	30	21		1.8	24	9	
	Total	627	562		2.6	442	410	
East	Left	355	304		2.8	142	134	
	Through	172	174		0.1	107	86	
	Right							
	Total	526	477		2.2	249	219	
South	Left	408	480		3.4	724	751	
	Through							
	Right	44	62		2.5	130	118	
	Total	452	542		4.0	854	868	
West	Left	28	12		3.5	44	33	
	Through	163	177		1.1	211	294	
	Right							
	Total	191	190		0.1	255	327	
		1796	1771		0.6	1800	1825	
			GEH <5	100.00%			GEH <5	91.00%
			GEH <7.5	100.00%			GEH <7.5	100.00%
			GEH <10	100.00%			GEH <10	100.00%

Te Rapa Road / Ruffell Road								
Location	Movement	AM 8:00-9:00				PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic		SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Through	862	495		14.1	506	483	
	Right	25	91		8.8	5	161	
	Total	887	586		11.1	511	644	
South	Through	339	313		1.5	925	643	
	Left	38	112		8.6	14	181	
	Total	377	425		2.4	939	824	
West	Left	7	82		11.2	22	74	
	Right	17	145		14.2	36	117	
	Total	25	227		18.0	59	191	
		1289	1238		1.4	1509	1660	
			GEH <5	22.22%			GEH <5	22.22%
			GEH <7.5	22.22%			GEH <10	44.44%
			GEH <10	44.44%			GEH <7.5	55.56%

Te Rapa Road / Wairere Drive							
Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left	147	202	 4.1	463	774	
	Through	701	317	 17.0	865	722	
	Right	98	57	 4.7	384	258	
	Total	946	576	 13.4	1712	1754	
East	Left	143	46	 10.0	37	35	
	Through	595	762	 6.4	415	459	
	Right	509	1003	 17.9	467	380	
	Total	1247	1811	 14.4	919	874	
South	Left	129	112	 1.5	233	340	
	Through	556	294	 12.7	755	557	
	Right	73	45	 3.7	161	79	
	Total	758	451	 12.5	1149	976	
West	Left	223	429	 11.4	293	216	
	Through	496	557	 2.7	494	813	
	Right	273	279	 0.4	239	166	
	Total	991	1265	 8.1	1025	1195	
		3943	4103	 2.5	4805	4799	
			GEH <5	37.50%		GEH <5	37.50%
			GEH <7.5	43.75%		GEH <7.5	81.25%
			GEH <10	56.25%		GEH <10	87.50%

Arthur Porter Drive / Wairere Drive WEST							
Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left						
	Through						
	Right						
	Total						
East	Through	307	147	10.6	468	254	11.3
South	Left		20			17	
	Right	882	1149	8.4	656	935	9.9
	Total						
West	Through	450	263	9.9	305	223	5.0
		1639	1559	2.0	1429	1412	0.4
			GEH <5	0.00%		GEH <5	33.33%
			GEH <7.5	0.00%		GEH <7.5	33.33%
			GEH <10	66.67%		GEH <10	66.67%

Arthur Porter Drive / Wairere Drive EAST							
Location	Movement	AM 8:00-9:00			PM 4:00-5:00		
		SCATs (Obs)	WRMT (Mod)	GEH Statistic	SCATs (Obs)	WRMT (Mod)	GEH Statistic
North	Left		23			127	
	Through						
	Right	229	66	13.4	669	242	2
	Total						
East	Left	373	691	13.8	615	745	
	Through	449	241	11.2	417	311	
	Right						
	Total	822	932	3.7	1032	1056	
South	Left						
	Through						
	Right						
	Total						
West	Left	520	162	19.4	274	82	1
	Through						
	Right	869	1250	11.7	792	1076	
	Total	1389	1412	0.6	1066	1158	
		2067	1719	8.0	2151	1711	1

Because of this, we have gone back to look at the level of fit between the 2018 base line and 2025 WRTM. There are three sites of interest from the 2018 data , these being count site 901 Ruffell Road west of Te Rapa Road, 903 Wairere Drive, West of Te Rapa Road, and count sites 9264 / 9266 Te Rapa Rd / Northgate Blvd.

On Ruffell Road the GEH for the northeast and southwest directions were found to be 2.7 or less in both directions during the AM and PM peak. On Wairere Drive the GEH for the east and west directions were found to be 3.2 or less in both directions during the AM and PM peak. On Te Rapa Road the GEH for the north and south directions were generally found to be less than 5 in both directions during the AM and PM peak with the following exceptions:

- AM North Approach South Direction GEH of 6.2
- AM South Approach North Direction GEH of 5.1
- PM South Approach South Direction GEH of 10.1

The GEH values in the AM are both less than the 7.5 target, and relatively close to the 5.0 target. The GEH value of 10.1 in the PM is notable, with the volume discrepancy being 801 vehicles and 29%. As such, the 2018 model is generally a good fit near the study intersections, with the exception of one data point (PM south approach in the south direction) on Te Rapa Road.

It would also be very helpful to understand the validation that CHCC completed for the recent change to the Rotokauri land use as this could add helpful information to the overall picture.

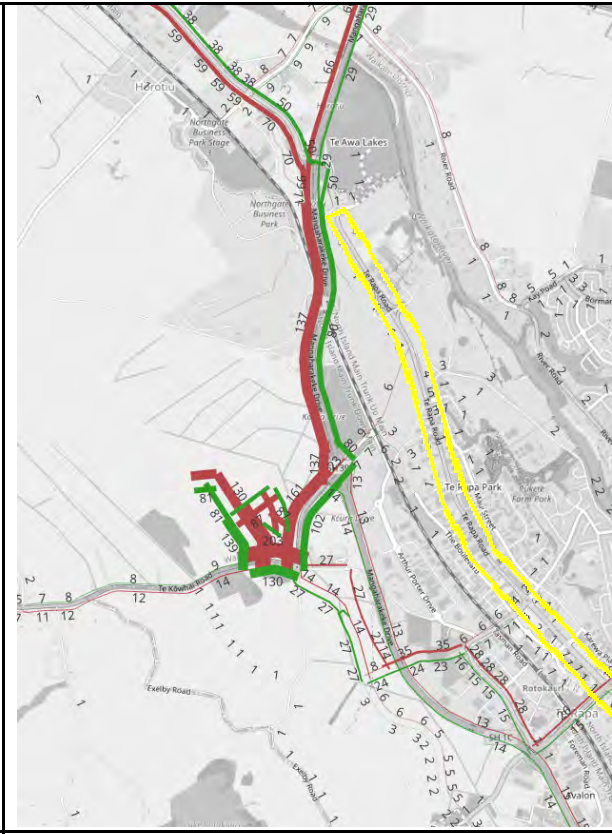
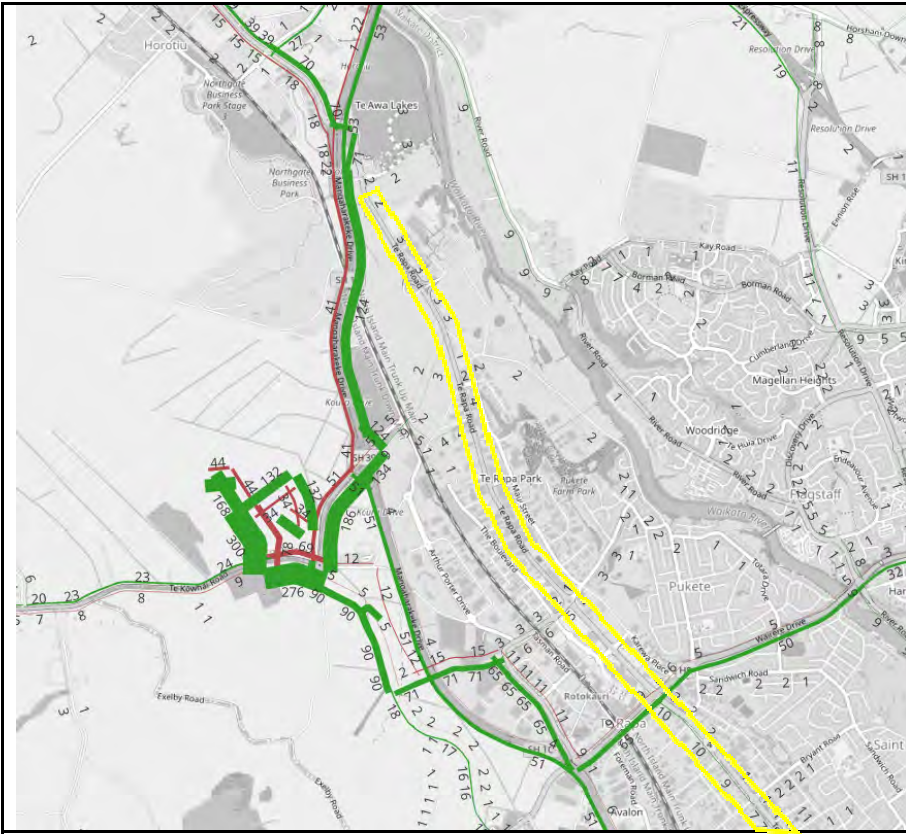
We have also looked at where the TKE traffic demands lie to see if this Te Rapa Road lack of fit is significant. What we are seeing is that:

2035 – the majority of TKE traffic is heading to and from the north to Horotiu with some also heading south through Rotokauri and then along Wairere Drive. There is little to no traffic using Te rapa Road (outline in yellow)

2045 – we see a similar pattern but with the additional traffic using Onion Road as a northbound route as the connection through the TKE site is completed. Demands through Rotokauri and along Wairere Drive also increase but Te Rapa Road remains quiet

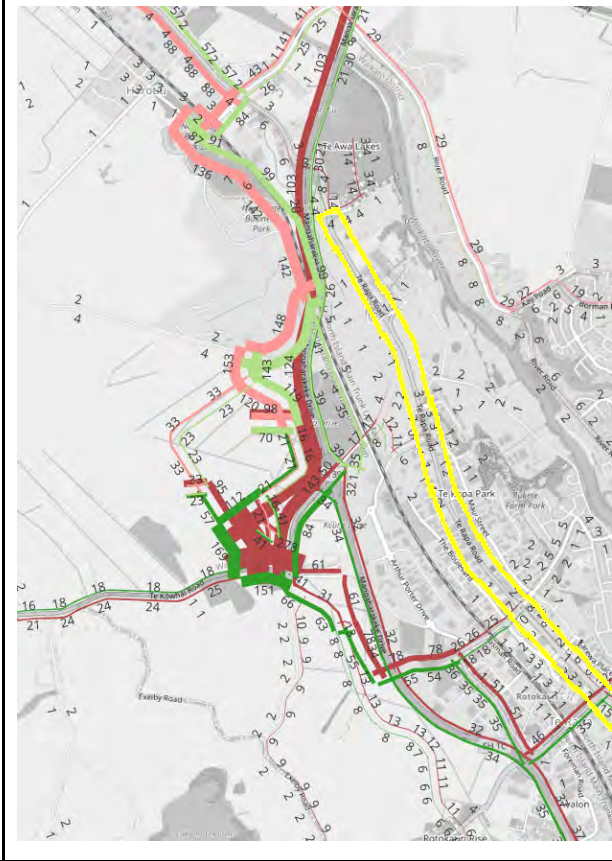
2055 – more of the same but with the Northern River Crossing taking some of the TKE demand off Wairere Drive

2035 AM	2035 PM
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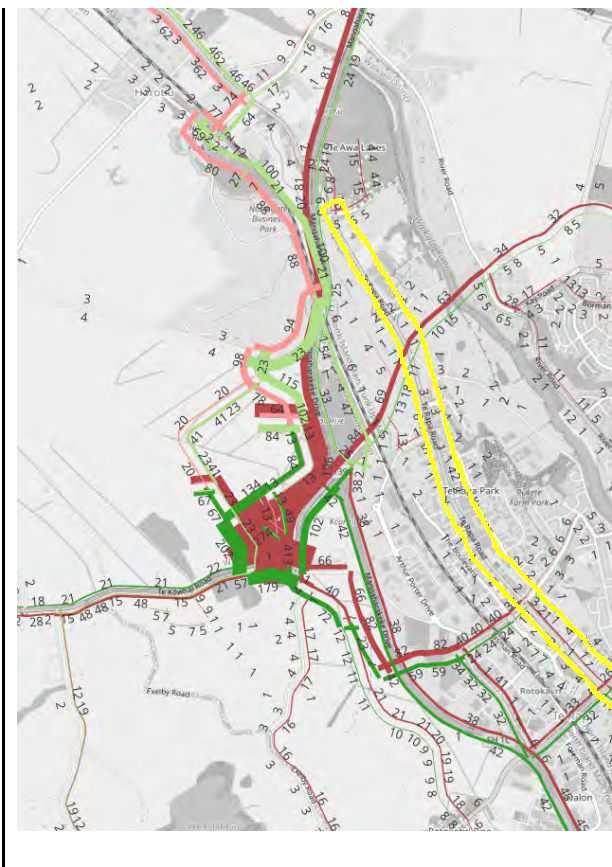
2045 AM

2045 PM



2055 AM

2055 PM



Moving Forwards

Given the excellent model fit to the north where the majority of TKE traffic goes and the OK fit to the Wairere Drive intersections at an **intersection** level, we propose adopting the model 'as is' but when it comes to identifying intersections for further analysis based on the three thresholds (change in LOS D or worse, % change in traffic demands and >100vph increase), we will put more weight on the second two for intersections along the Wairere Drive corridor and south along SH1C. We can make manual adjustments to turning movement proportions accordingly along those corridors. We propose this modified approach as the balance of turning movements can change LOS significantly and we need to test whether the variation between WRTM and what is currently observed makes a difference.

I'm happy to have a quick Teams call if necessary to go through this, but if you are happy with what we are proposing on the basis of this email, please confirm by return and we can move forwards.

Regards

J

Judith Makinson

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Appendix E – SIDRA Output

Gateway Drive / Great South Road / Horotiu Bridge Road

2035

The SIDRA analysis for Gateway Drive / Great South Road, shows the intersection is approaching capacity in 2035 for both the morning and afternoon peak hours for the base vehicle traffic volumes. In both peak periods, the overall LOS of the intersection is LOS E, the degree of saturation is 0.89/0.87 (AM/PM), and a number of movements are operating at LOS E and F.

With the TKE development, the 2035 SIDRA models operate at LOS E/F and degree of saturation of 0.87/1.05 (AM/PM). The physical effect of the additional traffic is considered minimal, with the overall average delay increasing by 2 - 3 seconds and up to two additional vehicles of 95th percentile queue. This works out to be a 4 - 5% change in delay, and the change to queue is no more than 15m.

Table 9 and Table 10 present a comparison of the 2035 SIDRA results for the Gateway Drive / Great South Road intersection under the without-development and with-development scenarios for the morning and afternoon peak hours, respectively.

Table 9: Gateway Drive / Great South Road Intersection 2035 AM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	35.5	LOS D	104	38.1	LOS D	113.8
	Through	52.3	LOS D	104	57.1	LOS E	113.8
	Right	68.1	LOS E	28.9	78.6	LOS E	32.3
Horotiu Bridge Rd (East)	Left	51.3	LOS D	138.9	50	LOS D	142.5
	Through	33.6	LOS C	56.5	35.2	LOS D	58.2
	Right	38.2	LOS D	56.5	39.7	LOS D	58.2
Great South Rd (North)	Left	81.3	LOS F	142.4	79.2	LOS E	153.5
	Through	111.6	LOS F	142.4	113.8	LOS F	153.5
	Right	77.1	LOS E	9.5	86.5	LOS F	10.1
Gateway Dr (West)	Left	44.3	LOS D	4.3	49.7	LOS D	4.8
	Through	41.8	LOS D	68.1	48.4	LOS D	77.2
	Right	46.5	LOS D	68.1	53.1	LOS D	77.2
All Vehicles		67.9	LOS E	142.4	70.8	LOS E	153.5

Table 10: Gateway Drive / Great South Road Intersection 2035 PM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	31.9	LOS C	211.3	36.6	LOS D	226.6
	Through	63.2	LOS E	211.3	68.5	LOS E	226.6
	Right	93.9	LOS F	53.1	97	LOS F	56
Horotiu Bridge Rd (East)	Left	59.9	LOS E	65.9	60.2	LOS E	67.4
	Through	48.9	LOS D	34.6	48.8	LOS D	34.2
	Right	53.4	LOS D	34.6	53.4	LOS D	34.2
Great South Rd (North)	Left	17.9	LOS B	73.2	17.9	LOS B	75.9
	Through	40.3	LOS D	75.6	40.9	LOS D	78.2
	Right	71.3	LOS E	4.5	72.1	LOS E	4.5
Gateway Dr (West)	Left	47	LOS D	14.1	46.9	LOS D	13.7
	Through	57.2	LOS E	166.6	57.2	LOS E	166.6
	Right	61.8	LOS E	166.6	61.8	LOS E	166.6
All Vehicles		55.5	LOS E	211.3	58.1	LOS E	226.6

2045

By 2045 this intersection is saturated, with the SIDRA output for this intersection showing an overall LOS of LOS F and a degree of saturation of 1.05/1.01 (AM/PM) for the base vehicle traffic volumes. Overall average vehicle delays are forecast to be 112 seconds in the morning peak period and 88 seconds in the afternoon peak period. This is demonstrated in Tables 10 and 11 below.

The 2045 horizon year with TKE also operates similar to the base models, with the overall delay change being less than 3 seconds or 5% change, and the 95th percentile queue change on any approach being no more than 4 - 5 vehicles or 30m. While the maximum increase in queue on one approach is 30m, due to redistribution of signal phases, the queue on some approaches decreases.

A comparison of the 2045 SIDRA results for the Gateway Drive / Great South Road intersection under the without-development and with-development scenarios is provided in Table 11 and Table 12.

Table 11: Gateway Drive / Great South Road Intersection 2045 AM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	62.1	LOS E	176.7	64.7	LOS E	174.7
	Through	87.3	LOS F	176.7	89.4	LOS F	174.7
	Right	107.2	LOS F	45.3	104.4	LOS F	44

Horotiu Bridge Rd (East)	Left	141.5	LOS F	364.9	144.8	LOS F	367.6
	Through	47.2	LOS D	114.9	50.4	LOS D	149.8
	Right	51.8	LOS D	114.9	54.9	LOS D	149.8
Great South Rd (North)	Left	139	LOS F	238.3	146.1	LOS F	230.5
	Through	174.5	LOS F	238.3	182.2	LOS F	230.5
	Right	106.5	LOS F	38.3	145.9	LOS F	55.9
Gateway Dr (West)	Left	55.1	LOS E	13.4	55.4	LOS E	17
	Through	53.9	LOS D	87.1	54.2	LOS D	88.7
	Right	58.6	LOS E	87.1	58.9	LOS E	88.7
All Vehicles		112.2	LOS F	364.9	114.9	LOS F	367.6

Table 12: Gateway Drive / Great South Road Intersection 2045 PM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	75.9	LOS E	261.3	74.4	LOS E	254.4
	Through	127.8	LOS F	261.3	127.7	LOS F	254.4
	Right	114.8	LOS F	53.9	109.4	LOS F	51.2
Horotiu Bridge Rd (East)	Left	76.3	LOS E	110.6	71.3	LOS E	102
	Through	50.3	LOS D	54.3	50.8	LOS D	60.4
	Right	54.9	LOS D	54.3	55.3	LOS E	60.4
Great South Rd (North)	Left	28.5	LOS C	96.8	29.3	LOS C	96.3
	Through	60.8	LOS E	96.8	61.5	LOS E	96.3
	Right	84.8	LOS F	23.1	86.5	LOS F	34.6
Gateway Dr (West)	Left	48.2	LOS D	90.8	49.4	LOS D	118.3
	Through	102.8	LOS F	369.5	119	LOS F	399.5
	Right	107.4	LOS F	369.5	123.6	LOS F	399.5
All Vehicles		87.8	LOS F	369.5	88.8	LOS F	399.5

2055

In 2055, the Northern River Crossing is included in the WRTM, which provides an alternate route for a number of trips. As such, Gateway Drive / Great South Road intersection is forecasted to operate comparable to the 2035 operation in 2055. With only the base traffic, the intersection is forecast to have an overall LOS of LOS E and a degree of saturation of 0.85/0.88 (AM/PM).

The effect of TKE in 2055 horizon year is negligible compared to the base models. The overall delay change is shown to be less than 3 seconds or 5% change, and the 95th percentile queue change on any approach is no more than 1 vehicles or 6m.

The SIDRA movement summary output for the 2055 horizon year without and with development for both peak periods is summarised in Table 13 and Table 14.

Table 13: Gateway Drive / Great South Road Intersection 2055 AM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	35.6	LOS D	121.6	38.8	LOS D	126.6
	Through	52.3	LOS D	121.6	55.6	LOS E	126.6
	Right	60.8	LOS E	23	60.9	LOS E	23
Horotiu Bridge Rd (East)	Left	38.3	LOS D	84.2	37.3	LOS D	84.1
	Through	32.1	LOS C	94.3	31.5	LOS C	100.2
	Right	36.6	LOS D	94.3	36	LOS D	100.2
Great South Rd (North)	Left	79.7	LOS E	118.4	88.1	LOS F	122.5
	Through	105.2	LOS F	118.4	114.8	LOS F	122.5
	Right	67.3	LOS E	24.7	71.4	LOS E	36.3
Gateway Dr (West)	Left	39.7	LOS D	9.1	39.9	LOS D	12
	Through	36.7	LOS D	57.8	36.7	LOS D	57.4
	Right	41.4	LOS D	57.8	41.4	LOS D	57.4
All Vehicles		60.1	LOS E	121.6	63	LOS E	126.6

Table 14: Gateway Drive / Great South Road Intersection 2055 PM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	32.7	LOS C	197	32.6	LOS C	196.4
	Through	78.8	LOS E	197	78.7	LOS E	196.4
	Right	98.5	LOS F	36.7	98.5	LOS F	36.7
Horotiu Bridge Rd (East)	Left	59.9	LOS E	66	59.8	LOS E	65
	Through	50.2	LOS D	52.6	50.5	LOS D	56.1
	Right	54.8	LOS D	52.6	55	LOS E	56.1
Great South Rd (North)	Left	26	LOS C	95.1	25.9	LOS C	94.9
	Through	55.7	LOS E	95.1	55.2	LOS E	94.9
	Right	85.1	LOS F	21.7	87	LOS F	31.4
Gateway Dr (West)	Left	44.4	LOS D	65.9	44.9	LOS D	75.9
	Through	56	LOS E	236.8	56.8	LOS E	238.9
	Right	60.6	LOS E	236.8	61.4	LOS E	238.9
All Vehicles		60.7	LOS E	236.8	60.8	LOS E	238.9

Conclusion

The intersection operation without the TKE development is below desired thresholds in all horizon years. While the TKE development will not significantly worsen the thresholds, the proposed development generates vehicle traffic through this intersection and therefore mitigation was considered. To improve the operation of this intersection additional approach lanes are recommended on the east and west approaches, and double diamond signal phasing is recommended. If these upgrades are to be made, the model shows the intersection to operate with an overall LOS of LOS D in 2045, noting 2045 is when the intersection is forecast to be most constrained. A summary of the mitigated Gateway Drive / Great South Road intersection is shown in Table 15.

During consultation with WDC it was agreed that it is WDC's responsibility to address the intersection's performance as Te Kowhai East is estimated to contribute only 2–3% of total traffic volumes. Funding mechanisms such as district-wide transport charges were discussed as an appropriate means for funding such improvements.

Table 15: Gateway Drive / Great South Road Intersection 2045 with Development Mitigated in the AM and PM Peak Hours

Approach	Movement	AM With Dev			PM With Dev		
		Avg Delay (s)	LOS	95% Q (m)	Avg Delay (s)	LOS	95% Q (m)
Great South Rd (South)	Left	28.3	LOS C	83.5	41.3	LOS D	144
	Through	31.9	LOS C	83.5	52.6	LOS D	144
	Right	46.9	LOS D	25	68	LOS E	35.7
Horotiu Bridge Rd (East)	Left	30.1	LOS C	133.8	20.8	LOS C	41.6
	Through	46	LOS D	102	22.4	LOS C	30.3
	Right	60.9	LOS E	9.3	48.3	LOS D	5.4
Great South Rd (North)	Left	27.3	LOS C	95.7	27.8	LOS C	68.6
	Through	36.7	LOS D	95.7	35.5	LOS D	68.6
	Right	54.9	LOS D	27.2	58.2	LOS E	25.8
Gateway Dr (West)	Left	19.1	LOS B	7.3	25.7	LOS C	73.4
	Through	23.4	LOS C	22.7	50.8	LOS D	168.2
	Right	49.8	LOS D	33.2	68.4	LOS E	38.7
All Vehicles		36.2	LOS D	133.8	42.1	LOS D	168.2

Koura Drive Interchange

In 2035, the SIDRA model shows all movements at the Koura Drive Interchange to operate at LOS C or better in both the AM and PM peak periods with the TKE traffic. The average delay of all

movements is less than 20 seconds, and therefore this interchange is anticipated to operate efficiently in 2035 both with and without the development in place.

Table 16 below summarises the forecasted performance of Koura Drive Interchange in 2035 with TKE traffic.

Table 16: Koura Drive Interchange 2035 AM and PM Peak Hours

Approach	Movement	AM With Dev			PM With Dev		
		Avg Delay (s)	LOS	Avg Q (m)	Avg Delay (s)	LOS	Avg Q (m)
Koura Dr (East)	Left	7.6	LOS A	0.6	7.4	LOS A	1.3
	Through	0	LOS A	0	0	LOS A	0
SH1 SB Offramp	Left	11.1	LOS B	1	10.5	LOS B	0.5
	Right	14.3	LOS B	5.6	16.4	LOS C	8.1
Koura Dr (West)	Through	0	LOS A	0	0	LOS A	0
	Right	6.7	LOS A	0.4	7.5	LOS A	0.2
All Vehicles		6.9	NA	5.6	6.9	NA	8.1
SH1 NB Offramp	Left	10.8	LOS B	0.7	11.5	LOS B	1
	Right	15.5	LOS C	4.1	17.1	LOS C	1.6
Koura Dr (East)	Through	0	LOS A	0	0	LOS A	0
	Right	7.5	LOS A	0.4	7	LOS A	1.1
Koura Dr (West)	Left	7.6	LOS A	1.1	7.9	LOS A	2.7
	Through	0	LOS A	0	0	LOS A	0
All Vehicles		5.4	NA	4.1	5.2	NA	2.7

By 2045 the Koura Drive Interchange is anticipated to be upgraded by NZTA / HCC, including a single lane roundabout for the eastern portion of the interchange. The roundabout is anticipated to include the southbound offramp, Koura Drive east and west, the southbound onramp, and may include a realigned extension of Onion Road. If this is what is developed, noting that this has been assessed as per the WRTM analysis and the preliminary concepts shared by HCC, the roundabout will operate as a five-arm roundabout. Koura Drive will also extend over the railway line and terminate at Te Rapa Road. NZTA confirmed during consultation on 10th June 2026 that no upgrade is anticipated at the western portion of the interchange.

The SIDRA model shows that the roundabout operates well in 2045 with the base traffic volumes, however noting that a small number of vehicles are not reaching the western approach. The stop-controlled portion of the intersection, notably the northbound offramp is shown to operate at LOS F with an average queue and delay of 145m and 3+ minutes for this approach in the AM peak hour. It is these vehicles that are not reaching the roundabout to the east. As such, some form of mitigation is required in 2045 regardless of whether TKE is developed.

When the TKE vehicle volumes are added to the interchange, the intersection operates somewhat similarly, however the northbound offramp right turn movement average delay and queue increase by 166 seconds and 75m in the AM peak period. In the PM peak period, the effect on the average delay and queue are less at 51 seconds and 14m.

Table 17 and Table 18 present a comparison of the 2035 SIDRA results for the Koura Drive Interchange under the without-development and with-development scenarios for the morning and afternoon peak hours, respectively.

Table 17: Koura Drive Interchange 2045 AM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	Avg Q (m)	Avg Delay (s)	LOS	Avg Q (m)
New Road (South East)	Left Left	5.4	LOS A	2.9	5.7	LOS A	3.1
	Left	5	LOS A	2.9	5.4	LOS A	3.1
	Right	10.7	LOS B	2.9	11	LOS B	3.1
Koura Dr (East)	Left Left	8.6	LOS A	4.2	9.4	LOS A	4.8
	Left	9.1	LOS A	4.2	10.3	LOS B	4.8
	Through	11.7	LOS B	4.2	12.5	LOS B	4.8
SH1 SB Offramp	Left Left	14.9	LOS B	16.8	16.5	LOS B	22
	Left	12.1	LOS B	16.8	13.5	LOS B	22
	Right	15.5	LOS B	16.8	17	LOS B	22
	Right Right	20.2	LOS C	16.8	21.7	LOS C	22
Koura Dr (West)	Through	6.4	LOS A	10.6	6.4	LOS A	10
	Right	6.6	LOS A	10.6	6.6	LOS A	10
	Right Right	8.3	LOS A	10.6	8.3	LOS A	10
All Vehicles		10.2	LOS B	16.8	11.3	LOS B	22
SH1 NB Offramp	Left	11.3	LOS B	0.4	11.6	LOS B	1.2
	Right	205	LOS F	144.5	370.6	LOS F	219.8
Koura Dr (East)	Through	0	LOS A	0	0	LOS A	0
	Right	8.3	LOS A	0.5	8.3	LOS A	0.5
Koura Dr (West)	Left	7.6	LOS A	1.7	7.6	LOS A	2
	Through	0	LOS A	0	0	LOS A	0
All Vehicles		67.5	NA	144.5	107.9	NA	219.8

Table 18: Koura Drive Interchange 2045 PM Peak Hour

Approach	Movement	No Dev			With Dev		
		Avg Delay (s)	LOS	Avg Q (m)	Avg Delay (s)	LOS	Avg Q (m)
New Road (South East)	Left Left	15.9	LOS B	21.8	16.4	LOS B	21.6
	Left	15.4	LOS B	21.8	16	LOS B	21.6
	Right	21.4	LOS C	21.8	22	LOS C	21.6

Koura Dr (East)	Left Left	11.9	LOS B	23	13.5	LOS B	25.2
	Left	11.2	LOS B	23	12.8	LOS B	25.2
	Through	14.6	LOS B	23	16.2	LOS B	25.2
SH1 SB Offramp	Left Left	8.1	LOS A	8.4	8.4	LOS A	8.7
	Left	5.1	LOS A	8.4	5.3	LOS A	8.7
	Right	8.7	LOS A	8.4	8.9	LOS A	8.7
	Right Right	13.2	LOS B	8.4	13.4	LOS B	8.7
Koura Dr (West)	Through	6.6	LOS A	4.1	6.6	LOS A	4.6
	Right	6.8	LOS A	4.1	6.8	LOS A	4.6
	Right Right	8.4	LOS A	4.1	8.5	LOS A	4.6
All Vehicles		12.5	LOS B	23	13.1	LOS B	25.2
SH1 NB Offramp	Left	13.4	LOS B	1.2	13.9	LOS B	1.5
	Right	100	LOS F	28.3	150.6	LOS F	42
Koura Dr (East)	Through	0	LOS A	0	0	LOS A	0
	Right	7	LOS A	1.8	7.1	LOS A	1.6
Koura Dr (West)	Left	8.2	LOS A	3.6	8.2	LOS A	4.3
	Through	0	LOS A	0	0	LOS A	0
All Vehicles		14.3	NA	28.3	18.7	NA	42

Two mitigation measures were considered, one being to signalise the stop control portion of the intersection, and the other being to ban the right turn movement at the northbound offramp, requiring all traffic to turn left then u-turn at the SH39 / Burbush Rad roundabout to travel back to the east. Both of these measures were assessed in 2055, being the time period assessed with the greatest vehicle volumes, noting that the mitigation is required regardless of TKE.

In 2055, the signal option results in the interchange operating at overall LOS of B/C (west/east) in the AM peak period and B/D (west/east) in the PM peak period. The roundabout is approaching capacity with a degree of saturation of 0.88 in the AM peak and 0.98 in the PM peak, however the signal portion of the intersection has remaining capacity. The model shows the signals improve the roundabout operation, which is thought to be as a result of informal metering. During consultation NZTA raised concerns about how the signals would operate with the roundabout, and therefore this option is not reported on further.

In 2055, the right turn ban unlocks the traffic which was previously being held at the stop control in the do-nothing model. This traffic has the flow on effect of locking up the southbound offramp in the AM peak hour. In order for the right turn ban to work in 2055 for both the base and with development scenario, the Koura Drive roundabout needs to be upgraded to a dual lane roundabout with short approach lanes on both Koura Drive approaches and the southbound offramp. Further analysis of the right turn ban option shows that this option can work with a single lane roundabout

at Koura Drive in 2045 with TKE development. A summary of the mitigated interchange performance is shown in Table 19.

It was acknowledged by NZTA that the need to address the northbound off ramp would be an 'existing' issue at 2045 / 2055 and that the root cause of the capacity issues is not TKE. As such, it is recommended that a funding share be agreed such that TKE contributes a share of the overall cost of the right turn ban and roundabout upgrade. This can be included in an appropriate PDA and is discussed further in Section 12.

Table 19: Koura Drive Interchange 2045 with Development Mitigated in the AM and PM Peak Hours

Approach	Movement	AM With Dev			PM With Dev		
		Avg Delay (s)	LOS	Avg Q (m)	Avg Delay (s)	LOS	Avg Q (m)
New Road (South East)	Left Left	6.6	LOS A	3.8	13.7	LOS B	18.8
	Left	5.9	LOS A	3.8	13.3	LOS B	18.8
	Right	11.9	LOS B	3.8	19	LOS B	18.8
Koura Dr (East)	Left Left	7.6	LOS A	7.3	8	LOS A	5.9
	Left	7.5	LOS A	7.3	7	LOS A	5.9
	Through	10.8	LOS B	4.9	10.2	LOS B	9
SH1 SB Offramp	Left Left	11.2	LOS B	6.1	11.1	LOS B	3.9
	Left	8.1	LOS A	6.1	7.8	LOS A	3.9
	Right	10.4	LOS B	5.5	10.4	LOS B	9
	Right Right	15	LOS B	5.5	14.9	LOS B	9
Koura Dr (West)	Through	6.5	LOS A	7.8	7.1	LOS A	6.2
	Right	6.7	LOS A	5.1	7.7	LOS A	2.7
	Right Right	8.5	LOS A	5.1	9.4	LOS A	2.7
All Vehicles		8.7	LOS A	7.8	11.1	LOS B	18.8
SH1 NB Offramp	Left	18.6	LOS C	17.8	33.2	LOS D	18.3
Koura Dr (East)	Through	0	LOS A	0	0	LOS A	0
	Right	14.4	LOS B	1.3	9.2	LOS A	2.1
Koura Dr (West)	Left	7.6	LOS A	2.9	8.1	LOS A	4.7
	Through	0.1	LOS A	0	0.1	LOS A	0
All Vehicles		5.5	NA	17.8	6.8	NA	18.3

SITE LAYOUT

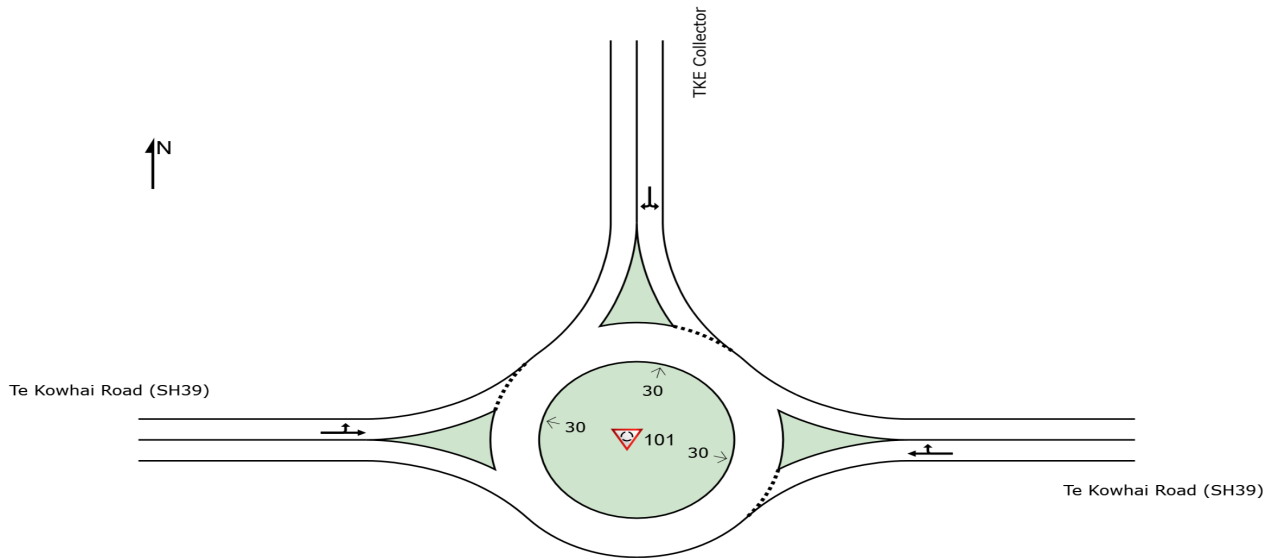
 **Site: 101 [AM SH39 / TKE (Site Folder: 2035 w TKE)]**

New Site

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Organisation: CKL | Licence: NETWORK / 1PC | Created: Thursday, July 9, 2026 2:44:35 PM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [AM SH39 / TKE (Site Folder: 2035 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Veh. veh]	[Dist]									
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: Te Kowhai Road (SH39)															
5	T1	All MCs	182	6.9	182	6.9	0.198	1.9	LOS A	1.3	9.1	0.05	0.43	0.05	46.9
6	R2	All MCs	152	2.1	152	2.1	0.198	7.5	LOS A	1.3	9.1	0.05	0.43	0.05	46.3
Approach			334	4.7	334	4.7	0.198	4.4	LOS A	1.3	9.1	0.05	0.43	0.05	46.6
North: TKE Collector															
7	L2	All MCs	38	8.3	38	8.3	0.041	3.8	LOS A	0.2	1.6	0.46	0.49	0.46	46.5
9	R2	All MCs	5	20.0	5	20.0	0.041	9.2	LOS A	0.2	1.6	0.46	0.49	0.46	45.9
Approach			43	9.8	43	9.8	0.041	4.5	LOS A	0.2	1.6	0.46	0.49	0.46	46.4
West: Te Kowhai Road (SH39)															
10	L2	All MCs	14	7.7	14	7.7	0.260	3.2	LOS A	1.5	10.7	0.34	0.33	0.34	47.0
11	T1	All MCs	325	4.2	325	4.2	0.260	2.7	LOS A	1.5	10.7	0.34	0.33	0.34	47.2
Approach			339	4.3	339	4.3	0.260	2.7	LOS A	1.5	10.7	0.34	0.33	0.34	47.2
All Vehicles			716	4.9	716	4.9	0.260	3.6	LOS A	1.5	10.7	0.22	0.38	0.22	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 101 [PM SH39 / TKE (Site Folder: 2035 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
East: Te Kowhai Road (SH39)															
5	T1	All MCs	378	3.1	378	3.1	0.265	1.9	LOS A	1.7	12.5	0.06	0.30	0.06	47.8
6	R2	All MCs	72	2.9	72	2.9	0.265	7.5	LOS A	1.7	12.5	0.06	0.30	0.06	47.2
Approach			449	3.0	449	3.0	0.265	2.8	LOS A	1.7	12.5	0.06	0.30	0.06	47.7
North: TKE Collector															
7	L2	All MCs	112	2.8	112	2.8	0.099	3.3	LOS A	0.5	3.6	0.38	0.44	0.38	46.8
9	R2	All MCs	7	0.0	7	0.0	0.099	8.4	LOS A	0.5	3.6	0.38	0.44	0.38	46.5
Approach			119	2.7	119	2.7	0.099	3.6	LOS A	0.5	3.6	0.38	0.44	0.38	46.8
West: Te Kowhai Road (SH39)															
10	L2	All MCs	5	0.0	5	0.0	0.158	2.6	LOS A	0.8	6.0	0.21	0.26	0.21	47.5
11	T1	All MCs	217	5.3	217	5.3	0.158	2.2	LOS A	0.8	6.0	0.21	0.26	0.21	47.7
Approach			222	5.2	222	5.2	0.158	2.2	LOS A	0.8	6.0	0.21	0.26	0.21	47.7
All Vehicles			791	3.6	791	3.6	0.265	2.8	LOS A	1.7	12.5	0.15	0.31	0.15	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 101 [AM SH39 / TKE (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Veh. veh]	[Dist]									
East: Te Kowhai Road (SH39)															
5	T1	All MCs	202	8.9	202	8.9	0.253	2.0	LOS A	1.7	12.7	0.08	0.44	0.08	46.6
6	R2	All MCs	217	2.4	217	2.4	0.253	7.5	LOS A	1.7	12.7	0.08	0.44	0.08	46.0
Approach			419	5.5	419	5.5	0.253	4.8	LOS A	1.7	12.7	0.08	0.44	0.08	46.3
North: TKE Collector															
7	L2	All MCs	64	8.2	64	8.2	0.074	4.3	LOS A	0.4	3.1	0.53	0.53	0.53	46.3
9	R2	All MCs	9	11.1	9	11.1	0.074	9.5	LOS A	0.4	3.1	0.53	0.53	0.53	45.8
Approach			74	8.6	74	8.6	0.074	4.9	LOS A	0.4	3.1	0.53	0.53	0.53	46.2
West: Te Kowhai Road (SH39)															
10	L2	All MCs	25	4.2	25	4.2	0.343	3.6	LOS A	2.1	15.4	0.45	0.39	0.45	46.6
11	T1	All MCs	394	5.1	394	5.1	0.343	3.2	LOS A	2.1	15.4	0.45	0.39	0.45	46.9
Approach			419	5.0	419	5.0	0.343	3.2	LOS A	2.1	15.4	0.45	0.39	0.45	46.8
All Vehicles			912	5.5	912	5.5	0.343	4.1	LOS A	2.1	15.4	0.29	0.42	0.29	46.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM SH39 / TKE (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Veh. veh]	[Dist]									
			veh/h	%	veh/h	%	v/c	sec			m				km/h
East: Te Kowhai Road (SH39)															
5	T1	All MCs	476	3.3	476	3.3	0.336	2.0	LOS A	2.4	17.4	0.10	0.29	0.10	47.7
6	R2	All MCs	82	5.1	82	5.1	0.336	7.5	LOS A	2.4	17.4	0.10	0.29	0.10	47.0
Approach			558	3.6	558	3.6	0.336	2.8	LOS A	2.4	17.4	0.10	0.29	0.10	47.6
North: TKE Collector															
7	L2	All MCs	153	3.4	153	3.4	0.142	3.5	LOS A	0.8	5.5	0.42	0.46	0.42	46.7
9	R2	All MCs	14	7.7	14	7.7	0.142	8.7	LOS A	0.8	5.5	0.42	0.46	0.42	46.2
Approach			166	3.8	166	3.8	0.142	3.9	LOS A	0.8	5.5	0.42	0.46	0.42	46.7
West: Te Kowhai Road (SH39)															
10	L2	All MCs	11	10.0	11	10.0	0.182	2.8	LOS A	1.0	7.2	0.24	0.27	0.24	47.4
11	T1	All MCs	241	6.1	241	6.1	0.182	2.3	LOS A	1.0	7.2	0.24	0.27	0.24	47.6
Approach			252	6.3	252	6.3	0.182	2.3	LOS A	1.0	7.2	0.24	0.27	0.24	47.6
All Vehicles			976	4.3	976	4.3	0.336	2.8	LOS A	2.4	17.4	0.19	0.32	0.19	47.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 101 [AM SH39 / TKE (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
veh/h															
%															
v/c															
sec															
[Veh. veh															
m															
km/h															
East: Te Kowhai Road (SH39)															
5	T1	All MCs	239	7.9	239	7.9	0.280	1.9	LOS A	2.0	14.8	0.09	0.43	0.09	46.7
6	R2	All MCs	225	2.8	225	2.8	0.280	7.5	LOS A	2.0	14.8	0.09	0.43	0.09	46.1
Approach			464	5.4	464	5.4	0.280	4.6	LOS A	2.0	14.8	0.09	0.43	0.09	46.4
North: TKE Collector															
7	L2	All MCs	72	8.8	72	8.8	0.088	4.8	LOS A	0.5	3.8	0.59	0.57	0.59	46.1
9	R2	All MCs	9	11.1	9	11.1	0.088	10.0	LOS A	0.5	3.8	0.59	0.57	0.59	45.6
Approach			81	9.1	81	9.1	0.088	5.4	LOS A	0.5	3.8	0.59	0.57	0.59	46.1
West: Te Kowhai Road (SH39)															
10	L2	All MCs	29	3.6	29	3.6	0.410	3.7	LOS A	2.7	19.7	0.48	0.40	0.48	46.5
11	T1	All MCs	474	4.4	474	4.4	0.410	3.3	LOS A	2.7	19.7	0.48	0.40	0.48	46.7
Approach			503	4.4	503	4.4	0.410	3.4	LOS A	2.7	19.7	0.48	0.40	0.48	46.7
All Vehicles			1048	5.2	1048	5.2	0.410	4.1	LOS A	2.7	19.7	0.32	0.43	0.32	46.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM SH39 / TKE (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
veh/h															
%															
v/c															
sec															
km/h															
East: Te Kowhai Road (SH39)															
5	T1	All MCs	532	3.8	532	3.8	0.398	2.1	LOS A	3.2	22.9	0.19	0.30	0.19	47.4
6	R2	All MCs	98	5.4	98	5.4	0.398	7.7	LOS A	3.2	22.9	0.19	0.30	0.19	46.7
Approach			629	4.0	629	4.0	0.398	2.9	LOS A	3.2	22.9	0.19	0.30	0.19	47.3
North: TKE Collector															
7	L2	All MCs	194	2.7	194	2.7	0.204	3.9	LOS A	1.2	8.4	0.50	0.51	0.50	46.3
9	R2	All MCs	33	3.2	33	3.2	0.204	9.1	LOS A	1.2	8.4	0.50	0.51	0.50	45.9
Approach			226	2.8	226	2.8	0.204	4.7	LOS A	1.2	8.4	0.50	0.51	0.50	46.3
West: Te Kowhai Road (SH39)															
10	L2	All MCs	13	8.3	13	8.3	0.241	2.8	LOS A	1.4	10.3	0.28	0.29	0.28	47.2
11	T1	All MCs	317	5.3	317	5.3	0.241	2.4	LOS A	1.4	10.3	0.28	0.29	0.28	47.5
Approach			329	5.4	329	5.4	0.241	2.4	LOS A	1.4	10.3	0.28	0.29	0.28	47.5
All Vehicles			1185	4.2	1185	4.2	0.398	3.1	LOS A	3.2	22.9	0.28	0.34	0.28	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

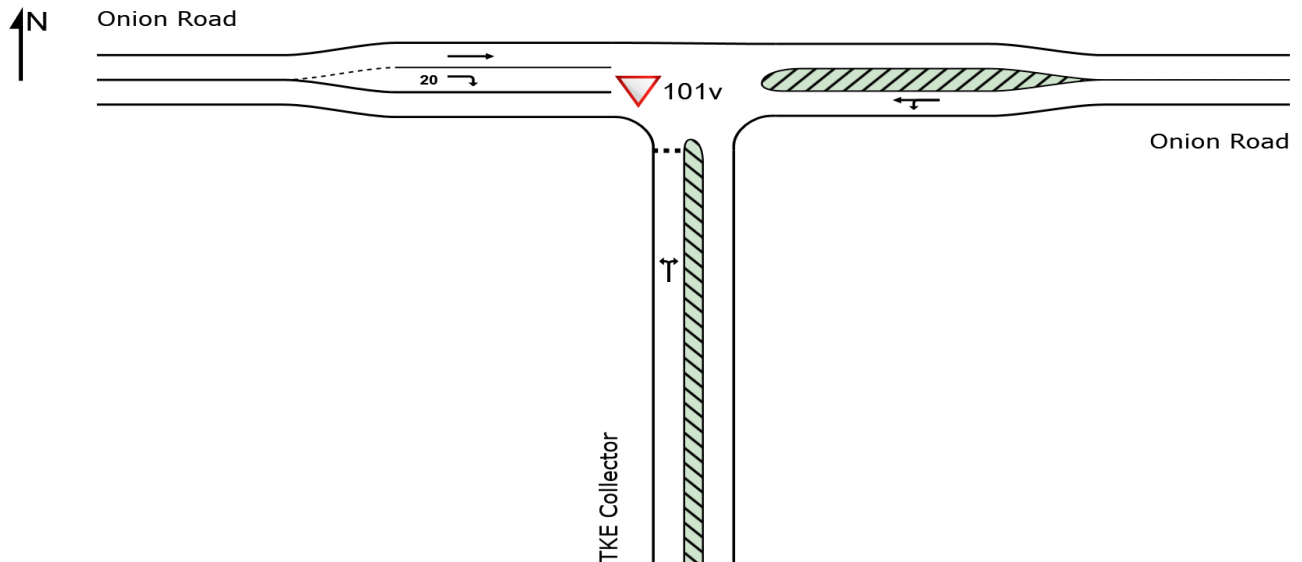
 Site: 101v [AM Onion Rd / TKE (Site Folder: 2045 w TKE)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

MOVEMENT SUMMARY

Site: 101v [AM Onion Rd / TKE (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh]	[Dist] m				km/h
South: TKE Collector															
1	L2	All MCs	1	0.0	1	0.0	0.023	4.6	LOS A	0.1	0.6	0.12	0.50	0.12	45.7
3	R2	All MCs	24	4.3	24	4.3	0.023	5.0	LOS A	0.1	0.6	0.12	0.50	0.12	45.6
Approach			25	4.2	25	4.2	0.023	5.0	LOS A	0.1	0.6	0.12	0.50	0.12	45.6
East: Onion Road															
4	L2	All MCs	145	0.7	145	0.7	0.080	4.6	LOS A	0.0	0.0	0.00	0.52	0.00	46.0
5	T1	All MCs	2	0.0	2	0.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.52	0.00	47.1
Approach			147	0.7	147	0.7	0.080	4.5	NA	0.0	0.0	0.00	0.52	0.00	46.0
West: Onion Road															
11	T1	All MCs	7	0.0	7	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	All MCs	4	0.0	4	0.0	0.003	5.0	LOS A	0.0	0.1	0.25	0.50	0.25	45.3
Approach			12	0.0	12	0.0	0.004	1.8	NA	0.0	0.1	0.09	0.18	0.09	48.2
All Vehicles			184	1.1	184	1.1	0.080	4.4	NA	0.1	0.6	0.02	0.50	0.02	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [PM Onion Rd / TKE (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: TKE Collector															
1	L2	All MCs	3	0.0	3	0.0	0.074	4.6	LOS A	0.3	2.1	0.13	0.51	0.13	45.7
3	R2	All MCs	81	1.3	81	1.3	0.074	4.8	LOS A	0.3	2.1	0.13	0.51	0.13	45.6
Approach			84	1.3	84	1.3	0.074	4.8	LOS A	0.3	2.1	0.13	0.51	0.13	45.6
East: Onion Road															
4	L2	All MCs	77	1.4	77	1.4	0.046	4.6	LOS A	0.0	0.0	0.00	0.48	0.00	46.2
5	T1	All MCs	7	0.0	7	0.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.48	0.00	47.3
Approach			84	1.3	84	1.3	0.046	4.2	NA	0.0	0.0	0.00	0.48	0.00	46.3
West: Onion Road															
11	T1	All MCs	2	0.0	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	All MCs	2	0.0	2	0.0	0.001	4.8	LOS A	0.0	0.0	0.18	0.49	0.18	45.4
Approach			4	0.0	4	0.0	0.001	2.4	NA	0.0	0.0	0.09	0.25	0.09	47.6
All Vehicles			173	1.2	173	1.2	0.074	4.5	NA	0.3	2.1	0.07	0.49	0.07	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [AM Onion Rd / TKE (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh]	[Dist] m				km/h
South: TKE Collector															
1	L2	All MCs	2	0.0	2	0.0	0.023	4.6	LOS A	0.1	0.6	0.09	0.51	0.09	45.7
3	R2	All MCs	23	4.5	23	4.5	0.023	5.1	LOS A	0.1	0.6	0.09	0.51	0.09	45.6
Approach			25	4.2	25	4.2	0.023	5.0	LOS A	0.1	0.6	0.09	0.51	0.09	45.6
East: Onion Road															
4	L2	All MCs	147	0.7	147	0.7	0.081	4.6	LOS A	0.0	0.0	0.00	0.52	0.00	46.0
5	T1	All MCs	2	0.0	2	0.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.52	0.00	47.1
Approach			149	0.7	149	0.7	0.081	4.5	NA	0.0	0.0	0.00	0.52	0.00	46.0
West: Onion Road															
11	T1	All MCs	7	0.0	7	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	All MCs	4	0.0	4	0.0	0.003	5.0	LOS A	0.0	0.1	0.25	0.50	0.25	45.3
Approach			12	0.0	12	0.0	0.004	1.8	NA	0.0	0.1	0.09	0.18	0.09	48.2
All Vehicles			186	1.1	186	1.1	0.081	4.4	NA	0.1	0.6	0.02	0.50	0.02	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101v [PM Onion Rd / TKE (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: TKE Collector															
1	L2	All MCs	2	0.0	2	0.0	0.048	4.6	LOS A	0.2	1.3	0.15	0.51	0.15	45.6
3	R2	All MCs	52	2.0	52	2.0	0.048	4.9	LOS A	0.2	1.3	0.15	0.51	0.15	45.5
Approach			54	2.0	54	2.0	0.048	4.9	LOS A	0.2	1.3	0.15	0.51	0.15	45.6
East: Onion Road															
4	L2	All MCs	84	1.3	84	1.3	0.051	4.6	LOS A	0.0	0.0	0.00	0.47	0.00	46.2
5	T1	All MCs	11	10.0	11	10.0	0.051	0.0	LOS A	0.0	0.0	0.00	0.47	0.00	47.3
Approach			95	2.2	95	2.2	0.051	4.1	NA	0.0	0.0	0.00	0.47	0.00	46.3
West: Onion Road															
11	T1	All MCs	4	0.0	4	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	All MCs	2	0.0	2	0.0	0.001	4.8	LOS A	0.0	0.0	0.19	0.49	0.19	45.4
Approach			6	0.0	6	0.0	0.002	1.6	NA	0.0	0.0	0.06	0.16	0.06	48.4
All Vehicles			155	2.0	155	2.0	0.051	4.3	NA	0.2	1.3	0.05	0.47	0.05	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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SITE LAYOUT

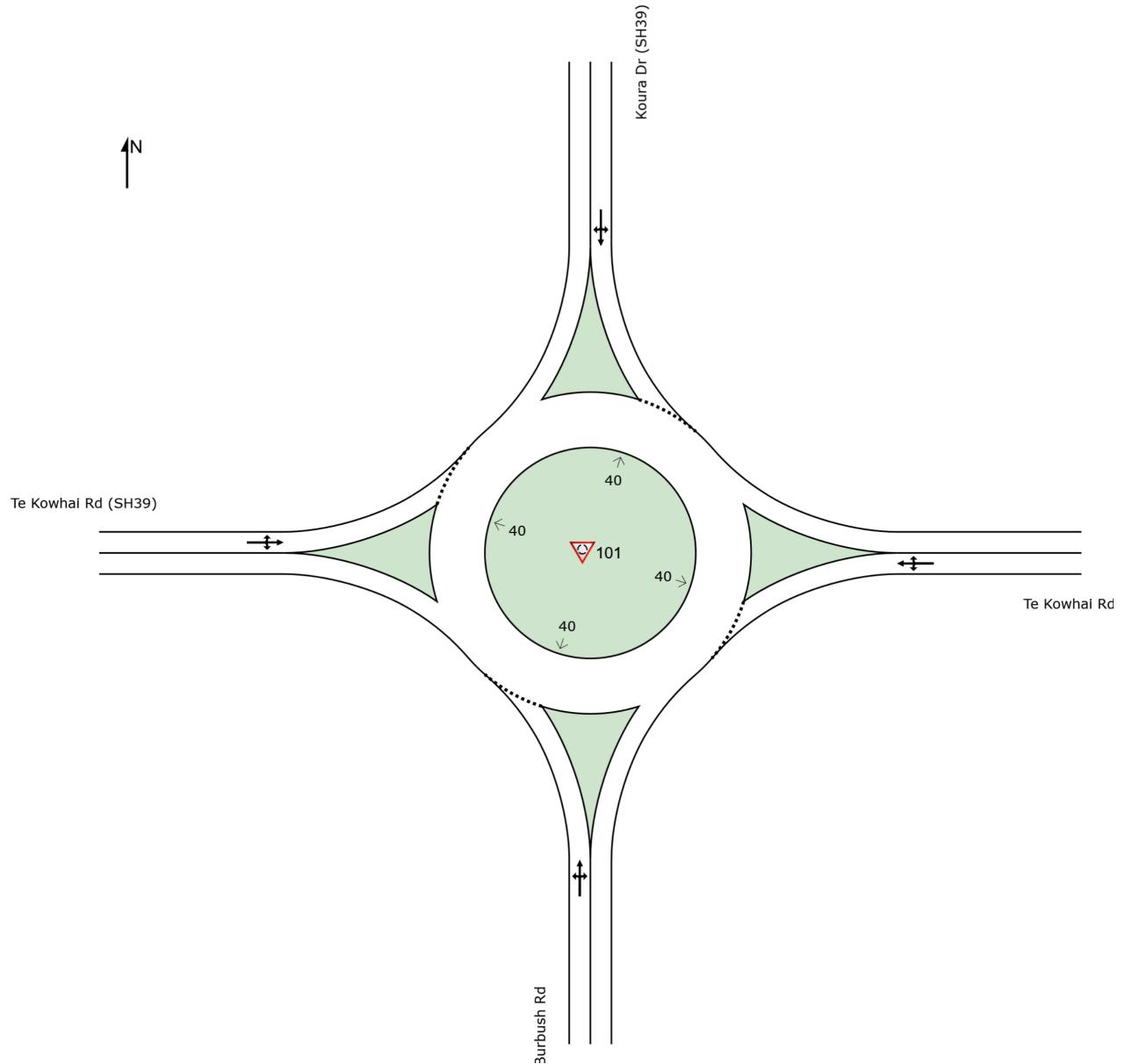
 Site: 101 [AM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2035 w TKE)]

New Site

Site Category: (None)

Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

 Site: 101 [AM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2035 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Burbush Rd															
1	L2	All MCs	112	4.7	112	4.7	0.131	2.7	LOS A	0.7	5.2	0.39	0.34	0.39	47.3
2	T1	All MCs	56	5.7	56	5.7	0.131	2.2	LOS A	0.7	5.2	0.39	0.34	0.39	47.5
3	R2	All MCs	1	0.0	1	0.0	0.131	8.3	LOS A	0.7	5.2	0.39	0.34	0.39	46.9
Approach			168	5.0	168	5.0	0.131	2.6	LOS A	0.7	5.2	0.39	0.34	0.39	47.3
East: Te Kowhai Rd															
4	L2	All MCs	1	0.0	1	0.0	0.003	2.9	LOS A	0.0	0.1	0.44	0.40	0.44	46.3
5	T1	All MCs	1	0.0	1	0.0	0.003	2.4	LOS A	0.0	0.1	0.44	0.40	0.44	46.5
6	R2	All MCs	1	0.0	1	0.0	0.003	8.6	LOS A	0.0	0.1	0.44	0.40	0.44	45.9
Approach			3	0.0	3	0.0	0.003	4.6	LOS A	0.0	0.1	0.44	0.40	0.44	46.2
North: Koura Dr (SH39)															
7	L2	All MCs	1	0.0	1	0.0	0.210	2.3	LOS A	1.2	8.7	0.31	0.49	0.31	45.5
8	T1	All MCs	76	2.8	76	2.8	0.210	1.8	LOS A	1.2	8.7	0.31	0.49	0.31	45.6
9	R2	All MCs	222	4.7	222	4.7	0.210	8.1	LOS A	1.2	8.7	0.31	0.49	0.31	45.1
Approach			299	4.2	299	4.2	0.210	6.4	LOS A	1.2	8.7	0.31	0.49	0.31	45.2
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	232	4.5	232	4.5	0.234	2.1	LOS A	1.5	10.7	0.21	0.29	0.21	47.6
11	T1	All MCs	94	5.6	94	5.6	0.234	1.5	LOS A	1.5	10.7	0.21	0.29	0.21	47.8
12	R2	All MCs	38	5.6	38	5.6	0.234	7.7	LOS A	1.5	10.7	0.21	0.29	0.21	47.2
Approach			363	4.9	363	4.9	0.234	2.5	LOS A	1.5	10.7	0.21	0.29	0.21	47.6
All Vehicles			834	4.7	834	4.7	0.234	3.9	LOS A	1.5	10.7	0.29	0.37	0.29	46.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: 101 [PM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2035 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Burbush Rd															
1	L2	All MCs	135	3.1	135	3.1	0.219	3.3	LOS A	1.3	9.3	0.49	0.38	0.49	46.9
2	T1	All MCs	134	2.4	134	2.4	0.219	2.7	LOS A	1.3	9.3	0.49	0.38	0.49	47.1
3	R2	All MCs	1	0.0	1	0.0	0.219	8.8	LOS A	1.3	9.3	0.49	0.38	0.49	46.6
Approach			269	2.7	269	2.7	0.219	3.0	LOS A	1.3	9.3	0.49	0.38	0.49	47.0
East: Te Kowhai Rd															
4	L2	All MCs	1	0.0	1	0.0	0.003	3.4	LOS A	0.0	0.1	0.50	0.43	0.50	46.1
5	T1	All MCs	1	0.0	1	0.0	0.003	2.8	LOS A	0.0	0.1	0.50	0.43	0.50	46.3
6	R2	All MCs	1	0.0	1	0.0	0.003	9.0	LOS A	0.0	0.1	0.50	0.43	0.50	45.7
Approach			3	0.0	3	0.0	0.003	5.1	LOS A	0.0	0.1	0.50	0.43	0.50	46.0
North: Koura Dr (SH39)															
7	L2	All MCs	1	0.0	1	0.0	0.275	2.2	LOS A	1.8	12.6	0.27	0.48	0.27	45.6
8	T1	All MCs	102	2.1	102	2.1	0.275	1.6	LOS A	1.8	12.6	0.27	0.48	0.27	45.7
9	R2	All MCs	315	3.3	315	3.3	0.275	7.8	LOS A	1.8	12.6	0.27	0.48	0.27	45.2
Approach			418	3.0	418	3.0	0.275	6.3	LOS A	1.8	12.6	0.27	0.48	0.27	45.3
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	243	3.9	243	3.9	0.232	2.4	LOS A	1.5	10.6	0.34	0.34	0.34	47.3
11	T1	All MCs	60	5.3	60	5.3	0.232	1.8	LOS A	1.5	10.6	0.34	0.34	0.34	47.5
12	R2	All MCs	24	4.3	24	4.3	0.232	8.1	LOS A	1.5	10.6	0.34	0.34	0.34	46.9
Approach			327	4.2	327	4.2	0.232	2.7	LOS A	1.5	10.6	0.34	0.34	0.34	47.3
All Vehicles			1018	3.3	1018	3.3	0.275	4.3	LOS A	1.8	12.6	0.35	0.41	0.35	46.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: 101 [AM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Burbush Rd															
1	L2	All MCs	59	10.7	59	10.7	0.218	3.7	LOS A	1.3	9.5	0.53	0.38	0.53	46.7
2	T1	All MCs	194	4.3	194	4.3	0.218	3.0	LOS A	1.3	9.5	0.53	0.38	0.53	46.9
3	R2	All MCs	1	0.0	1	0.0	0.218	9.1	LOS A	1.3	9.5	0.53	0.38	0.53	46.4
Approach			254	5.8	254	5.8	0.218	3.1	LOS A	1.3	9.5	0.53	0.38	0.53	46.9
East: Te Kowhai Rd															
4	L2	All MCs	2	0.0	2	0.0	0.100	3.7	LOS A	0.6	4.0	0.55	0.40	0.55	46.5
5	T1	All MCs	103	0.0	103	0.0	0.100	3.1	LOS A	0.6	4.0	0.55	0.40	0.55	46.6
6	R2	All MCs	7	0.0	7	0.0	0.100	9.3	LOS A	0.6	4.0	0.55	0.40	0.55	46.1
Approach			113	0.0	113	0.0	0.100	3.5	LOS A	0.6	4.0	0.55	0.40	0.55	46.6
North: Koura Dr (SH39)															
7	L2	All MCs	5	0.0	5	0.0	0.297	2.4	LOS A	2.0	14.5	0.37	0.45	0.37	45.7
8	T1	All MCs	156	4.7	156	4.7	0.297	1.9	LOS A	2.0	14.5	0.37	0.45	0.37	45.9
9	R2	All MCs	256	6.6	256	6.6	0.297	8.2	LOS A	2.0	14.5	0.37	0.45	0.37	45.3
Approach			417	5.8	417	5.8	0.297	5.7	LOS A	2.0	14.5	0.37	0.45	0.37	45.5
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	323	4.6	323	4.6	0.347	2.9	LOS A	2.4	17.7	0.47	0.39	0.47	46.9
11	T1	All MCs	98	8.6	98	8.6	0.347	2.3	LOS A	2.4	17.7	0.47	0.39	0.47	47.0
12	R2	All MCs	37	5.7	37	5.7	0.347	8.5	LOS A	2.4	17.7	0.47	0.39	0.47	46.4
Approach			458	5.5	458	5.5	0.347	3.2	LOS A	2.4	17.7	0.47	0.39	0.47	46.9
All Vehicles			1241	5.2	1241	5.2	0.347	4.1	LOS A	2.4	17.7	0.45	0.41	0.45	46.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: 101 [PM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2045 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Burbush Rd															
1	L2	All MCs	158	3.3	158	3.3	0.358	4.0	LOS A	2.4	17.4	0.62	0.45	0.62	46.5
2	T1	All MCs	249	3.0	249	3.0	0.358	3.4	LOS A	2.4	17.4	0.62	0.45	0.62	46.6
3	R2	All MCs	1	0.0	1	0.0	0.358	9.5	LOS A	2.4	17.4	0.62	0.45	0.62	46.1
Approach			408	3.1	408	3.1	0.358	3.6	LOS A	2.4	17.4	0.62	0.45	0.62	46.6
East: Te Kowhai Rd															
4	L2	All MCs	1	0.0	1	0.0	0.004	4.7	LOS A	0.0	0.2	0.66	0.52	0.66	45.1
5	T1	All MCs	1	0.0	1	0.0	0.004	4.1	LOS A	0.0	0.2	0.66	0.52	0.66	45.3
6	R2	All MCs	2	0.0	2	0.0	0.004	10.3	LOS B	0.0	0.2	0.66	0.52	0.66	44.8
Approach			4	0.0	4	0.0	0.004	7.4	LOS A	0.0	0.2	0.66	0.52	0.66	45.0
North: Koura Dr (SH39)															
7	L2	All MCs	8	0.0	8	0.0	0.441	2.3	LOS A	3.5	25.5	0.36	0.44	0.36	45.8
8	T1	All MCs	257	2.5	257	2.5	0.441	1.8	LOS A	3.5	25.5	0.36	0.44	0.36	45.9
9	R2	All MCs	400	3.7	400	3.7	0.441	8.0	LOS A	3.5	25.5	0.36	0.44	0.36	45.4
Approach			665	3.2	665	3.2	0.441	5.5	LOS A	3.5	25.5	0.36	0.44	0.36	45.6
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	276	4.6	276	4.6	0.299	3.1	LOS A	2.0	14.8	0.51	0.42	0.51	46.8
11	T1	All MCs	74	5.7	74	5.7	0.299	2.5	LOS A	2.0	14.8	0.51	0.42	0.51	47.0
12	R2	All MCs	23	9.1	23	9.1	0.299	8.8	LOS A	2.0	14.8	0.51	0.42	0.51	46.3
Approach			373	5.1	373	5.1	0.299	3.3	LOS A	2.0	14.8	0.51	0.42	0.51	46.8
All Vehicles			1451	3.6	1451	3.6	0.441	4.4	LOS A	3.5	25.5	0.47	0.44	0.47	46.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: 101 [AM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Burbush Rd															
1	L2	All MCs	60	10.5	60	10.5	0.359	4.3	LOS A	2.4	17.4	0.62	0.44	0.62	46.3
2	T1	All MCs	343	3.7	343	3.7	0.359	3.5	LOS A	2.4	17.4	0.62	0.44	0.62	46.5
3	R2	All MCs	1	0.0	1	0.0	0.359	9.6	LOS A	2.4	17.4	0.62	0.44	0.62	46.0
Approach			404	4.7	404	4.7	0.359	3.6	LOS A	2.4	17.4	0.62	0.44	0.62	46.5
East: Te Kowhai Rd															
4	L2	All MCs	2	0.0	2	0.0	0.099	4.4	LOS A	0.6	4.2	0.64	0.50	0.64	46.0
5	T1	All MCs	85	0.0	85	0.0	0.099	3.9	LOS A	0.6	4.2	0.64	0.50	0.64	46.2
6	R2	All MCs	13	0.0	13	0.0	0.099	10.1	LOS B	0.6	4.2	0.64	0.50	0.64	45.6
Approach			100	0.0	100	0.0	0.099	4.7	LOS A	0.6	4.2	0.64	0.50	0.64	46.1
North: Koura Dr (SH39)															
7	L2	All MCs	4	0.0	4	0.0	0.394	2.3	LOS A	3.1	22.7	0.37	0.42	0.37	45.9
8	T1	All MCs	256	4.5	256	4.5	0.394	1.8	LOS A	3.1	22.7	0.37	0.42	0.37	46.1
9	R2	All MCs	319	5.9	319	5.9	0.394	8.0	LOS A	3.1	22.7	0.37	0.42	0.37	45.5
Approach			579	5.3	579	5.3	0.394	5.2	LOS A	3.1	22.7	0.37	0.42	0.37	45.8
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	414	4.6	414	4.6	0.451	3.9	LOS A	3.4	25.2	0.67	0.51	0.67	46.4
11	T1	All MCs	95	7.8	95	7.8	0.451	3.4	LOS A	3.4	25.2	0.67	0.51	0.67	46.6
12	R2	All MCs	6	33.3	6	33.3	0.451	10.4	LOS B	3.4	25.2	0.67	0.51	0.67	45.8
Approach			515	5.5	515	5.5	0.451	3.9	LOS A	3.4	25.2	0.67	0.51	0.67	46.5
All Vehicles			1598	4.9	1598	4.9	0.451	4.4	LOS A	3.4	25.2	0.55	0.46	0.55	46.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: 101 [PM SH39 / Rotokauri Art (Burbush Rd) (Site Folder: 2055 w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Burbush Rd															
1	L2	All MCs	165	3.8	165	3.8	0.496	4.8	LOS A	4.0	28.6	0.76	0.55	0.77	45.9
2	T1	All MCs	358	2.9	358	2.9	0.496	4.2	LOS A	4.0	28.6	0.76	0.55	0.77	46.1
3	R2	All MCs	1	0.0	1	0.0	0.496	10.4	LOS B	4.0	28.6	0.76	0.55	0.77	45.6
Approach			524	3.2	524	3.2	0.496	4.4	LOS A	4.0	28.6	0.76	0.55	0.77	46.0
East: Te Kowhai Rd															
4	L2	All MCs	1	0.0	1	0.0	0.008	7.1	LOS A	0.1	0.4	0.85	0.60	0.85	43.8
5	T1	All MCs	1	0.0	1	0.0	0.008	6.6	LOS A	0.1	0.4	0.85	0.60	0.85	43.9
6	R2	All MCs	3	0.0	3	0.0	0.008	12.8	LOS B	0.1	0.4	0.85	0.60	0.85	43.5
Approach			5	0.0	5	0.0	0.008	10.4	LOS B	0.1	0.4	0.85	0.60	0.85	43.6
North: Koura Dr (SH39)															
7	L2	All MCs	12	0.0	12	0.0	0.622	2.8	LOS A	6.5	46.9	0.56	0.44	0.56	45.5
8	T1	All MCs	423	2.5	423	2.5	0.622	2.3	LOS A	6.5	46.9	0.56	0.44	0.56	45.6
9	R2	All MCs	464	4.1	464	4.1	0.622	8.5	LOS A	6.5	46.9	0.56	0.44	0.56	45.1
Approach			899	3.3	899	3.3	0.622	5.5	LOS A	6.5	46.9	0.56	0.44	0.56	45.4
West: Te Kowhai Rd (SH39)															
10	L2	All MCs	374	4.5	374	4.5	0.454	3.9	LOS A	3.6	26.0	0.69	0.53	0.69	46.2
11	T1	All MCs	86	4.9	86	4.9	0.454	3.4	LOS A	3.6	26.0	0.69	0.53	0.69	46.3
12	R2	All MCs	52	4.1	52	4.1	0.454	9.6	LOS A	3.6	26.0	0.69	0.53	0.69	45.8
Approach			512	4.5	512	4.5	0.454	4.4	LOS A	3.6	26.0	0.69	0.53	0.69	46.2
All Vehicles			1940	3.6	1940	3.6	0.622	4.9	LOS A	6.5	46.9	0.65	0.49	0.65	45.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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SITE LAYOUT

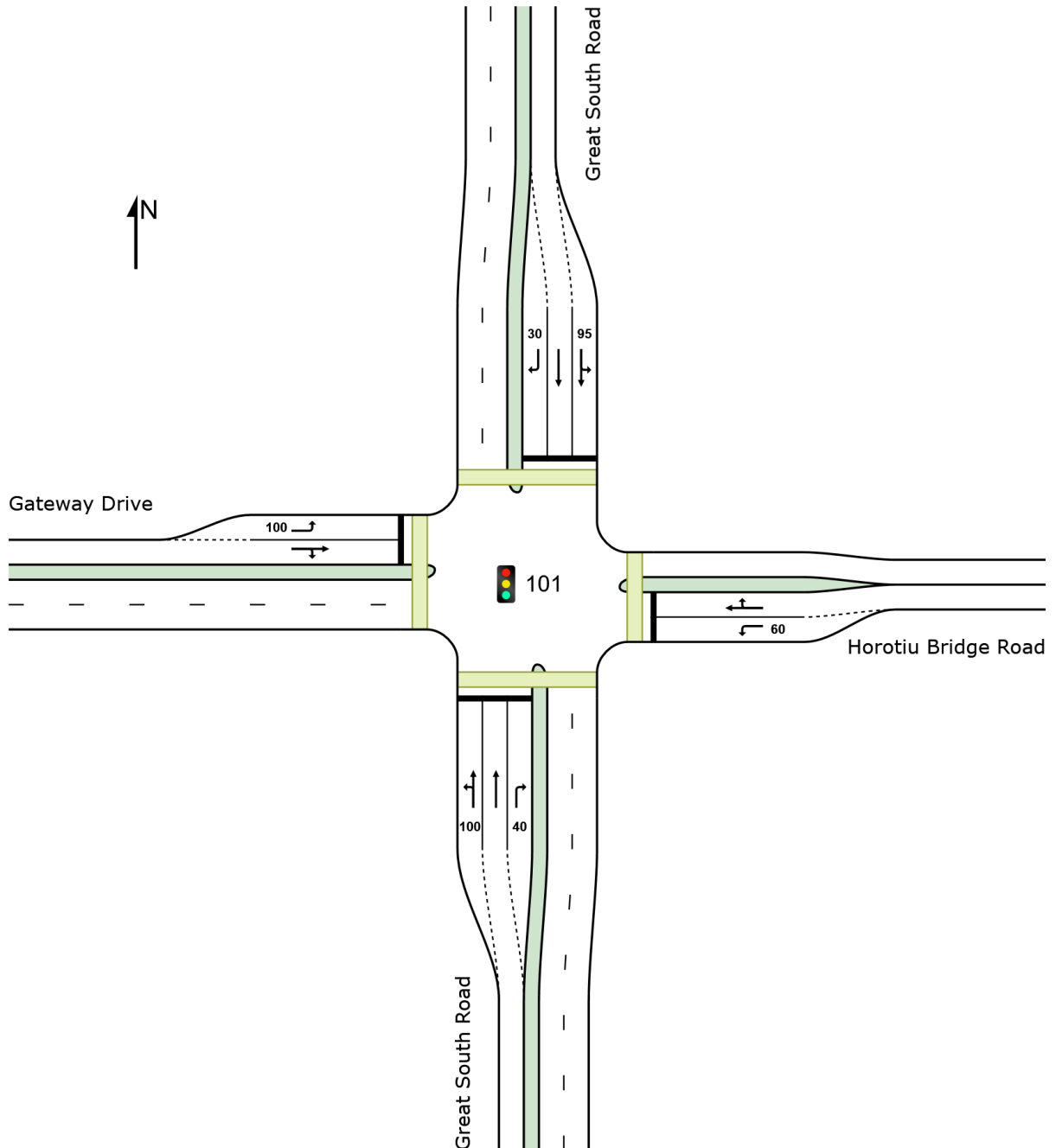
 Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2035 Base)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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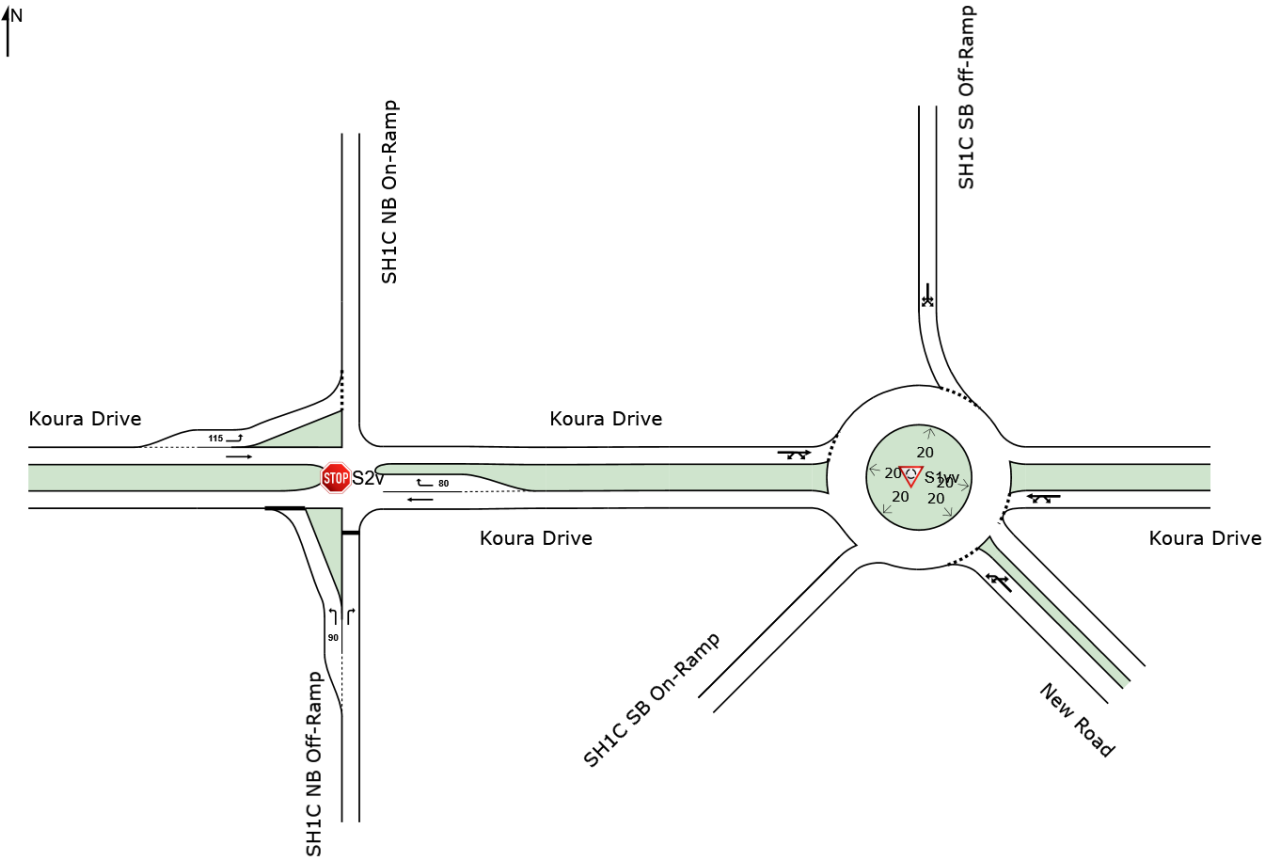
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NETWORK LAYOUT

■ Network: UDI [Unsignalised Diamond Interchange NZ
(Network Folder: Koura Drive Interchange 2045 AM w/o TKE)]

Unsignalised Diamond Interchange
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	CCG ID	Site Name
S1w	NA	2045 AM East
S2v	NA	2045 AM West

MOVEMENT SUMMARY

Site: S1vv [2045 AM East (Site Folder: Koura Dr Interchange w/o TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w/o TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
SouthEast: New Road														
21	L2	All MCs	57	22.2	57	22.2	0.158	5.4	LOS A	0.4	2.9	0.57	0.58	45.3
21a	L1	All MCs	55	21.2	55	21.2	0.158	5.0	LOS A	0.4	2.9	0.57	0.58	42.9
23b	R3	All MCs	23	18.2	23	18.2	0.158	10.7	LOS B	0.4	2.9	0.57	0.58	45.0
Approach			135	21.1	135	21.1	0.158	6.2	LOS A	0.4	2.9	0.57	0.58	44.6
East: Koura Drive														
4b	L3	All MCs	29	14.3	29	14.3	0.201	8.6	LOS A	0.5	4.2	0.78	0.71	46.5
4a	L1	All MCs	45	37.2	45	37.2	0.201	9.1	LOS A	0.5	4.2	0.78	0.71	46.9
2	T1	All MCs	45	14.0	45	14.0	0.201	11.7	LOS B	0.5	4.2	0.78	0.71	45.3
Approach			120	22.8	120	22.8	0.201	9.9	LOS A	0.5	4.2	0.78	0.71	46.4
North: SH1C SB Off-Ramp														
3	L2	All MCs	64	3.3	64	3.3	0.584	14.9	LOS B	2.3	16.8	0.89	0.87	47.4
7a	L1	All MCs	146	7.9	146	7.9	0.584	12.1	LOS B	2.3	16.8	0.89	0.87	40.2
9a	R1	All MCs	1	0.0	1	0.0	0.584	15.5	LOS B	2.3	16.8	0.89	0.87	39.6
4	R2	All MCs	218	4.8	218	4.8	0.584	20.2	LOS C	2.3	16.8	0.89	0.87	29.0
Approach			429	5.6	429	5.6	0.584	16.6	LOS B	2.3	16.8	0.89	0.87	37.9
West: Koura Drive														
5	T1	All MCs	373	5.9	339	5.7	0.395	6.4	LOS A	1.5	10.6	0.19	0.52	55.8
12a	R1	All MCs	237	5.3	216	5.1	0.395	6.6	LOS A	1.5	10.6	0.19	0.52	45.2
12b	R3	All MCs	60	0.0	55	0.0	0.395	8.3	LOS A	1.5	10.6	0.19	0.52	45.3
Approach			669	5.2	609	5.0	0.395	6.6	LOS A	1.5	10.6	0.19	0.52	50.6
All Vehicles			1354	8.5	1293	8.9	0.584	10.2	LOS B	2.3	16.8	0.52	0.66	45.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

MOVEMENT SUMMARY

 Site: S2v [2045 AM West (Site Folder: Koura Dr Interchange w/o TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

■ ■ Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w/o TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec							
South: SH1C NB Off-Ramp															
1	L2	All MCs	35	6.1	35	6.1	0.035	11.3	LOS B	0.1	0.4	0.40	0.85	0.40	54.1
2	R2	All MCs	391	7.0	391	7.0	1.182	205.0	LOS F	19.5	144.5	1.00	3.09	9.51	3.6
Approach			425	6.9	425	6.9	1.182	189.1	LOS F	19.5	144.5	0.95	2.90	8.77	4.6
East: Koura Drive															
3	T1	All MCs	274	6.9	274	6.9	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
4	R2	All MCs	43	24.4	43	24.4	0.037	8.3	LOS A	0.1	0.5	0.39	0.63	0.39	44.8
Approach			317	9.3	317	9.3	0.147	1.1	NA	0.1	0.5	0.05	0.09	0.05	75.0
West: Koura Drive															
5	L2	All MCs	200	5.8	200	5.8	0.131	7.6	LOS A	0.2	1.7	0.14	0.57	0.14	58.2
6	T1	All MCs	278	2.7	278	2.7	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach			478	4.0	478	4.0	0.145	3.2	LOS A	0.2	1.7	0.06	0.24	0.06	67.3
All Vehicles			1220	6.4	1220	6.4	1.182	67.5	NA	19.5	144.5	0.37	1.13	3.09	19.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: S1vv [2045 PM East (Site Folder: Koura Dr Interchange w/o TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w/o TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m			km/h	
SouthEast: New Road															
21	L2	All MCs	176	6.6	176	6.6	0.671	15.9	LOS B	3.0	21.8	0.99	1.02	1.42	40.5
21a	L1	All MCs	195	4.9	195	4.9	0.671	15.4	LOS B	3.0	21.8	0.99	1.02	1.42	34.9
23b	R3	All MCs	46	9.1	46	9.1	0.671	21.4	LOS C	3.0	21.8	0.99	1.02	1.42	40.1
Approach			417	6.1	417	6.1	0.671	16.3	LOS B	3.0	21.8	0.99	1.02	1.42	38.5
East: Koura Drive															
4b	L3	All MCs	64	8.2	64	8.2	0.669	11.9	LOS B	3.2	23.0	0.92	0.85	1.20	45.7
4a	L1	All MCs	202	6.8	202	6.8	0.669	11.2	LOS B	3.2	23.0	0.92	0.85	1.20	46.1
2	T1	All MCs	280	2.6	280	2.6	0.669	14.6	LOS B	3.2	23.0	0.92	0.85	1.20	43.7
Approach			546	4.8	546	4.8	0.669	13.0	LOS B	3.2	23.0	0.92	0.85	1.20	45.2
North: SH1C SB Off-Ramp															
3	L2	All MCs	38	5.6	38	5.6	0.399	8.1	LOS A	1.2	8.4	0.62	0.64	0.62	52.9
7a	L1	All MCs	85	8.6	85	8.6	0.399	5.1	LOS A	1.2	8.4	0.62	0.64	0.62	44.5
9a	R1	All MCs	1	0.0	1	0.0	0.399	8.7	LOS A	1.2	8.4	0.62	0.64	0.62	43.8
4	R2	All MCs	281	3.4	281	3.4	0.399	13.2	LOS B	1.2	8.4	0.62	0.64	0.62	37.3
Approach			405	4.7	405	4.7	0.399	11.0	LOS B	1.2	8.4	0.62	0.64	0.62	42.2
West: Koura Drive															
5	T1	All MCs	121	15.7	121	15.7	0.175	6.6	LOS A	0.5	4.1	0.25	0.51	0.25	52.5
12a	R1	All MCs	97	10.9	97	10.9	0.175	6.8	LOS A	0.5	4.1	0.25	0.51	0.25	44.8
12b	R3	All MCs	13	0.0	13	0.0	0.175	8.4	LOS A	0.5	4.1	0.25	0.51	0.25	44.9
Approach			231	12.8	231	12.8	0.175	6.8	LOS A	0.5	4.1	0.25	0.51	0.25	48.5
All Vehicles			1599	6.3	1599	6.3	0.671	12.5	LOS B	3.2	23.0	0.77	0.79	0.97	42.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2045 PM West (Site Folder: Koura Dr Interchange w/o TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

■ ■ Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w/o TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV] veh/h	%	[Total HV] veh/h	%	v/c	sec	[Veh. veh	Dist] m				km/h	
South: SH1C NB Off-Ramp															
1	L2	All MCs	74	1.4	74	1.4	0.105	13.4	LOS B	0.2	1.2	0.57	0.95	0.57	53.5
2	R2	All MCs	148	16.3	148	16.3	0.964	100.0	LOS F	3.5	28.3	0.99	1.58	3.63	7.2
Approach			222	11.4	222	11.4	0.964	71.3	LOS F	3.5	28.3	0.85	1.37	2.61	15.7
East: Koura Drive															
3	T1	All MCs	549	3.1	549	3.1	0.287	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
4	R2	All MCs	207	4.6	207	4.6	0.127	7.0	LOS A	0.3	1.8	0.20	0.60	0.20	48.6
Approach			757	3.5	757	3.5	0.287	1.9	NA	0.3	1.8	0.06	0.16	0.06	71.6
West: Koura Drive															
5	L2	All MCs	351	3.0	351	3.0	0.263	8.2	LOS A	0.5	3.6	0.35	0.62	0.35	57.2
6	T1	All MCs	84	7.5	84	7.5	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach			435	3.9	435	3.9	0.263	6.6	LOS A	0.5	3.6	0.28	0.50	0.28	59.7
All Vehicles			1414	4.8	1414	4.8	0.964	14.3	NA	3.5	28.3	0.25	0.46	0.53	50.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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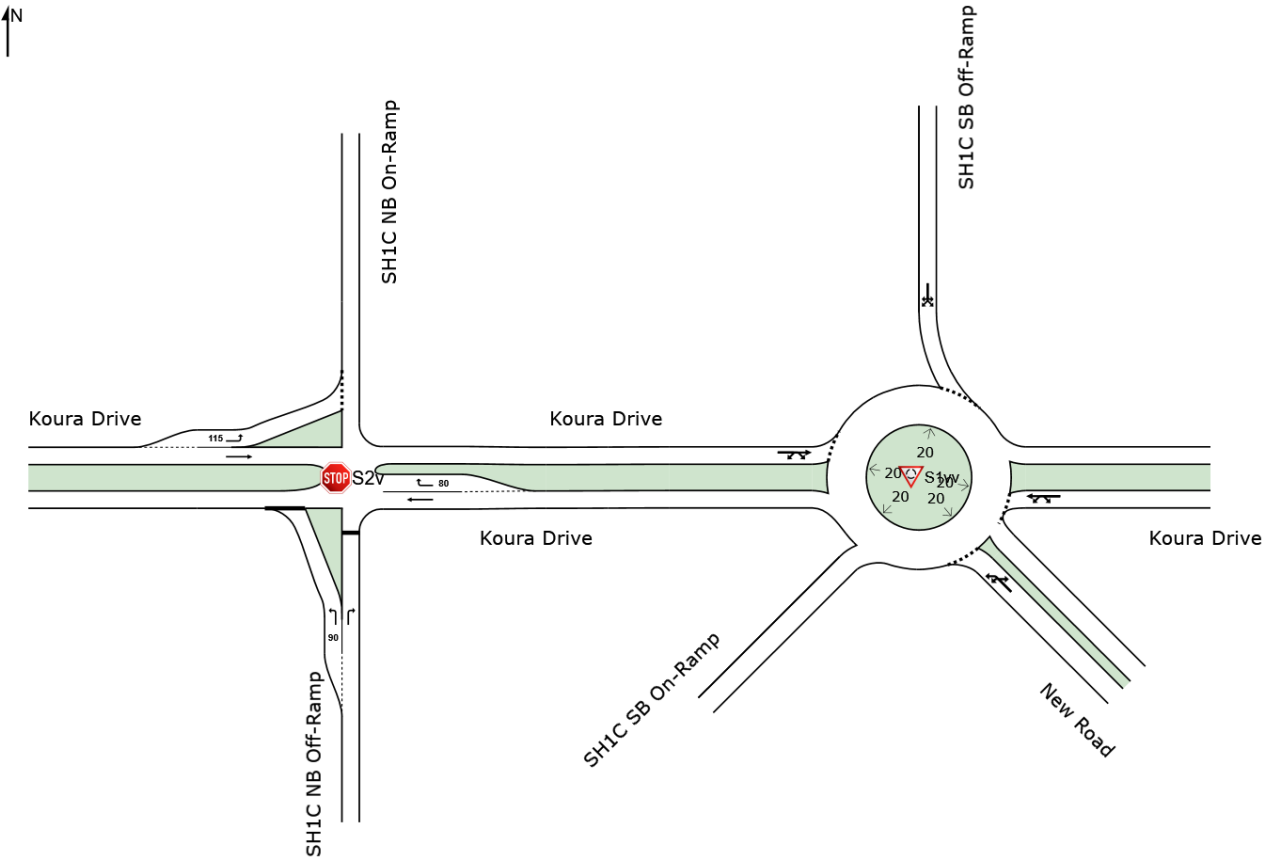
Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

NETWORK LAYOUT

■ Network: UDI [Unsignalised Diamond Interchange NZ
(Network Folder: Koura Drive Interchange 2045 AM w TKE)]

Unsignalised Diamond Interchange
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	CCG ID	Site Name
S1w	NA	2045 AM East
S2v	NA	2045 AM West

MOVEMENT SUMMARY

 Site: S1vv [2045 AM East (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
SouthEast: New Road														
21	L2	All MCs	58	21.8	58	21.8	0.165	5.7	LOS A	0.4	3.1	0.61	0.61	45.2
21a	L1	All MCs	52	22.4	52	22.4	0.165	5.4	LOS A	0.4	3.1	0.61	0.61	42.6
23b	R3	All MCs	24	17.4	24	17.4	0.165	11.0	LOS B	0.4	3.1	0.61	0.61	44.8
Approach			134	21.3	134	21.3	0.165	6.6	LOS A	0.4	3.1	0.61	0.61	44.4
East: Koura Drive														
4b	L3	All MCs	33	12.9	33	12.9	0.224	9.4	LOS A	0.6	4.8	0.83	0.83	46.1
4a	L1	All MCs	42	40.0	42	40.0	0.224	10.3	LOS B	0.6	4.8	0.83	0.83	46.4
2	T1	All MCs	46	13.6	46	13.6	0.224	12.5	LOS B	0.6	4.8	0.83	0.83	44.4
Approach			121	22.6	121	22.6	0.224	10.9	LOS B	0.6	4.8	0.83	0.83	45.8
North: SH1C SB Off-Ramp														
3	L2	All MCs	55	3.8	55	3.8	0.660	16.5	LOS B	3.0	22.0	0.93	1.30	46.0
7a	L1	All MCs	177	6.0	177	6.0	0.660	13.5	LOS B	3.0	22.0	0.93	1.30	39.2
9a	R1	All MCs	1	0.0	1	0.0	0.660	17.0	LOS B	3.0	22.0	0.93	1.30	38.7
4	R2	All MCs	266	4.7	266	4.7	0.660	21.7	LOS C	3.0	22.0	0.93	1.30	27.5
Approach			499	5.1	499	5.1	0.660	18.2	LOS B	3.0	22.0	0.93	1.30	36.0
West: Koura Drive														
5	T1	All MCs	377	5.9	319	5.5	0.379	6.4	LOS A	1.4	10.0	0.20	0.20	55.8
12a	R1	All MCs	247	5.1	209	4.8	0.379	6.6	LOS A	1.4	10.0	0.20	0.20	45.2
12b	R3	All MCs	63	0.0	54	0.0	0.379	8.3	LOS A	1.4	10.0	0.20	0.20	45.3
Approach			687	5.1	581	4.7	0.379	6.6	LOS A	1.4	10.0	0.20	0.20	50.4
All Vehicles			1441	8.0	1335	8.7	0.660	11.3	LOS B	3.0	22.0	0.57	0.71	44.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2045 AM West (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]				
			veh/h	%	veh/h	%				veh	m			km/h	
South: SH1C NB Off-Ramp															
1	L2	All MCs	92	3.4	92	3.4	0.096	11.6	LOS B	0.2	1.2	0.45	0.88	0.45	54.6
2	R2	All MCs	392	7.0	392	7.0	1.372	370.6	LOS F	29.6	219.8	1.00	3.94	13.47	2.0
Approach			483	6.3	483	6.3	1.372	302.5	LOS F	29.6	219.8	0.90	3.36	11.00	3.5
East: Koura Drive															
3	T1	All MCs	325	6.5	325	6.5	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
4	R2	All MCs	40	23.7	40	23.7	0.035	8.3	LOS A	0.1	0.5	0.40	0.64	0.40	44.9
Approach			365	8.4	365	8.4	0.174	0.9	NA	0.1	0.5	0.04	0.07	0.04	76.0
West: Koura Drive															
5	L2	All MCs	228	6.5	228	6.5	0.150	7.6	LOS A	0.3	2.0	0.13	0.57	0.13	58.2
6	T1	All MCs	297	2.8	297	2.8	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach			525	4.4	525	4.4	0.155	3.3	LOS A	0.3	2.0	0.06	0.25	0.06	66.9
All Vehicles			1374	6.1	1374	6.1	1.372	107.9	NA	29.6	219.8	0.35	1.30	3.90	14.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S1vv [2045 PM East (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]				
			veh/h	%	veh/h	%				veh	m			km/h	
SouthEast: New Road															
21	L2	All MCs	179	5.9	179	5.9	0.668	16.4	LOS B	2.9	21.6	0.99	1.02	1.43	40.2
21a	L1	All MCs	179	5.3	179	5.3	0.668	16.0	LOS B	2.9	21.6	0.99	1.02	1.43	34.6
23b	R3	All MCs	45	9.3	45	9.3	0.668	22.0	LOS C	2.9	21.6	0.99	1.02	1.43	39.9
Approach			403	6.0	403	6.0	0.668	16.9	LOS B	2.9	21.6	0.99	1.02	1.43	38.3
East: Koura Drive															
4b	L3	All MCs	67	7.8	67	7.8	0.696	13.5	LOS B	3.5	25.2	0.96	0.91	1.31	44.9
4a	L1	All MCs	192	7.1	192	7.1	0.696	12.8	LOS B	3.5	25.2	0.96	0.91	1.31	45.3
2	T1	All MCs	286	2.6	286	2.6	0.696	16.2	LOS B	3.5	25.2	0.96	0.91	1.31	42.3
Approach			545	4.8	545	4.8	0.696	14.6	LOS B	3.5	25.2	0.96	0.91	1.31	44.1
North: SH1C SB Off-Ramp															
3	L2	All MCs	20	5.3	20	5.3	0.413	8.4	LOS A	1.2	8.7	0.65	0.65	0.65	52.6
7a	L1	All MCs	95	7.8	95	7.8	0.413	5.3	LOS A	1.2	8.7	0.65	0.65	0.65	44.2
9a	R1	All MCs	1	0.0	1	0.0	0.413	8.9	LOS A	1.2	8.7	0.65	0.65	0.65	43.6
4	R2	All MCs	293	3.6	293	3.6	0.413	13.4	LOS B	1.2	8.7	0.65	0.65	0.65	36.8
Approach			408	4.6	408	4.6	0.413	11.3	LOS B	1.2	8.7	0.65	0.65	0.65	41.1
West: Koura Drive															
5	T1	All MCs	133	15.1	129	14.9	0.193	6.6	LOS A	0.6	4.6	0.25	0.52	0.25	52.4
12a	R1	All MCs	100	11.6	97	11.5	0.193	6.8	LOS A	0.6	4.6	0.25	0.52	0.25	44.6
12b	R3	All MCs	32	3.3	31	3.3	0.193	8.5	LOS A	0.6	4.6	0.25	0.52	0.25	44.7
Approach			264	12.4	256	12.2	0.193	6.9	LOS A	0.6	4.6	0.25	0.52	0.25	48.2
All Vehicles			1621	6.3	1613	6.3	0.696	13.1	LOS B	3.5	25.2	0.77	0.81	1.00	42.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2045 PM West (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

■ ■ Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Veh. veh	Dist]									
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: SH1C NB Off-Ramp															
1	L2	All MCs	86	2.4	86	2.4	0.131	13.9	LOS B	0.2	1.5	0.59	0.98	0.59	52.7
2	R2	All MCs	149	16.2	149	16.2	1.057	150.6	LOS F	5.3	42.0	1.00	1.84	4.86	4.9
Approach			236	11.2	236	11.2	1.057	100.6	LOS F	5.3	42.0	0.85	1.52	3.30	12.2
East: Koura Drive															
3	T1	All MCs	579	3.3	579	3.3	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
4	R2	All MCs	180	4.7	180	4.7	0.114	7.1	LOS A	0.2	1.6	0.24	0.60	0.24	48.4
Approach			759	3.6	759	3.6	0.303	1.7	NA	0.2	1.6	0.06	0.14	0.06	72.6
West: Koura Drive															
5	L2	All MCs	414	3.1	414	3.1	0.302	8.2	LOS A	0.6	4.3	0.34	0.61	0.34	57.3
6	T1	All MCs	113	6.5	113	6.5	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach			526	3.8	526	3.8	0.302	6.4	LOS A	0.6	4.3	0.27	0.48	0.27	60.1
All Vehicles			1521	4.8	1521	4.8	1.057	18.7	NA	5.3	42.0	0.25	0.47	0.63	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: S1vv [2055 AM East (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 AM w TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
SouthEast: New Road														
21	L2	All MCs	59	25.0	59	25.0	0.266	6.6	LOS A	0.5	3.9	0.67	0.73	44.7
21a	L1	All MCs	73	17.4	73	17.4	0.266	5.8	LOS A	0.5	3.9	0.67	0.73	41.8
23b	R3	All MCs	45	23.3	45	23.3	0.266	11.9	LOS B	0.5	3.9	0.67	0.73	44.3
Approach			177	21.4	177	21.4	0.266	7.6	LOS A	0.5	3.9	0.67	0.73	43.8
East: Koura Drive														
4b	L3	All MCs	198	5.3	198	5.3	0.832	17.9	LOS B	3.8	28.2	1.00	1.18	41.7
4a	L1	All MCs	103	20.4	103	20.4	0.832	18.6	LOS B	3.8	28.2	1.00	1.18	42.0
2	T1	All MCs	207	6.1	207	6.1	0.832	21.0	LOS C	3.8	28.2	1.00	1.18	36.9
Approach			508	8.7	508	8.7	0.832	19.3	LOS B	3.8	28.2	1.00	1.18	40.4
North: SH1C SB Off-Ramp														
3	L2	All MCs	79	5.3	79	5.3	0.745	15.8	LOS B	3.0	21.8	0.95	1.01	46.3
7a	L1	All MCs	177	7.7	177	7.7	0.745	12.9	LOS B	3.0	21.8	0.95	1.01	39.7
9a	R1	All MCs	1	0.0	1	0.0	0.745	16.1	LOS B	3.0	21.8	0.95	1.01	39.1
4	R2	All MCs	277	5.3	277	5.3	0.745	21.0	LOS C	3.0	21.8	0.95	1.01	28.2
Approach			534	6.1	534	6.1	0.745	17.5	LOS B	3.0	21.8	0.95	1.01	37.0
West: Koura Drive														
5	T1	All MCs	514	5.5	350	4.6	0.402	6.6	LOS A	1.5	11.2	0.32	0.49	55.8
12a	R1	All MCs	285	4.4	195	3.6	0.402	6.7	LOS A	1.5	11.2	0.32	0.49	45.0
12b	R3	All MCs	52	0.0	36	0.0	0.402	8.5	LOS A	1.5	11.2	0.32	0.49	45.1
Approach			851	4.8	581	4.0	0.402	6.7	LOS A	1.5	11.2	0.32	0.49	51.0
All Vehicles			2069	7.5	1800	8.7	0.832	13.6	LOS B	3.8	28.2	0.73	0.87	43.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2055 AM West (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 AM w TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]				
			veh/h	%	veh/h	%				veh	m			km/h	
South: SH1C NB Off-Ramp															
1	L2	All MCs	77	1.4	77	1.4	0.103	13.0	LOS B	0.2	1.2	0.55	0.94	0.55	53.9
2	R2	All MCs	394	6.7	394	6.7	3.169	1999.1	LOS F	68.8	509.6	1.00	4.83	19.75	0.4
Approach			471	5.8	471	5.8	3.169	1674.8	LOS F	68.8	509.6	0.93	4.20	16.61	0.6
East: Koura Drive															
3	T1	All MCs	503	5.9	503	5.9	0.268	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
4	R2	All MCs	54	19.6	54	19.6	0.056	9.2	LOS A	0.1	0.8	0.50	0.71	0.50	44.3
Approach			557	7.2	557	7.2	0.268	0.9	NA	0.1	0.8	0.05	0.07	0.05	76.3
West: Koura Drive															
5	L2	All MCs	312	5.4	312	5.4	0.206	7.6	LOS A	0.4	2.9	0.16	0.57	0.16	58.1
6	T1	All MCs	457	3.2	457	3.2	0.239	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			768	4.1	768	4.1	0.239	3.1	LOS A	0.4	2.9	0.07	0.23	0.07	67.4
All Vehicles			1796	5.5	1796	5.5	3.169	440.4	NA	68.8	509.6	0.29	1.22	4.40	4.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S1vv [2055 PM East (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 PM w TKE)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%	v/c	sec			m			
SouthEast: New Road														
21	L2	All MCs	154	6.2	154	6.2	0.962	66.0	LOS E	9.7	71.0	1.00	2.02	26.0
21a	L1	All MCs	168	5.6	168	5.6	0.962	65.6	LOS E	9.7	71.0	1.00	2.02	18.1
23b	R3	All MCs	143	5.9	143	5.9	0.962	71.4	LOS E	9.7	71.0	1.00	2.02	25.9
Approach			465	5.9	465	5.9	0.962	67.5	LOS E	9.7	71.0	1.00	2.02	23.6
East: Koura Drive														
4b	L3	All MCs	77	11.0	77	11.0	0.940	40.6	LOS D	9.8	72.0	1.00	1.59	34.2
4a	L1	All MCs	154	8.9	154	8.9	0.940	39.8	LOS D	9.8	72.0	1.00	1.59	34.5
2	T1	All MCs	394	3.7	394	3.7	0.940	43.1	LOS D	9.8	72.0	1.00	1.59	26.9
Approach			624	5.9	624	5.9	0.940	42.0	LOS D	9.8	72.0	1.00	1.59	30.4
North: SH1C SB Off-Ramp														
3	L2	All MCs	35	9.1	35	9.1	0.670	14.6	LOS B	3.1	23.0	0.91	0.86	46.3
7a	L1	All MCs	115	10.1	115	10.1	0.670	11.5	LOS B	3.1	23.0	0.91	0.86	40.3
9a	R1	All MCs	1	0.0	1	0.0	0.670	14.8	LOS B	3.1	23.0	0.91	0.86	39.8
4	R2	All MCs	402	3.7	402	3.7	0.670	19.4	LOS B	3.1	23.0	0.91	0.86	29.5
Approach			553	5.3	553	5.3	0.670	17.4	LOS B	3.1	23.0	0.91	0.86	34.9
West: Koura Drive														
5	T1	All MCs	358	7.1	245	5.4	0.292	7.3	LOS A	0.9	6.8	0.48	0.53	55.5
12a	R1	All MCs	102	10.3	69	7.9	0.292	7.5	LOS A	0.9	6.8	0.48	0.53	44.9
12b	R3	All MCs	34	3.1	23	2.3	0.292	9.2	LOS A	0.9	6.8	0.48	0.53	45.0
Approach			494	7.5	337	5.7	0.292	7.5	LOS A	0.9	6.8	0.48	0.53	52.1
All Vehicles			2136	6.1	1980	6.6	0.962	35.2	LOS D	9.8	72.0	0.89	1.31	30.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2055 PM West (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 PM w TKE)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
South: SH1C NB Off-Ramp														
1	L2	All MCs	96	2.2	96	2.2	0.227	18.3	LOS C	0.3	2.5	0.75	1.01	48.8
2	R2	All MCs	204	11.3	204	11.3	4.260	3027.8	LOS F	40.1	307.9	1.00	3.16	0.3
Approach			300	8.4	300	8.4	4.260	2066.9	LOS F	40.1	307.9	0.92	2.48	0.7
East: Koura Drive														
3	T1	All MCs	804	3.4	804	3.4	0.422	0.0	LOS A	0.0	0.0	0.00	0.00	79.6
4	R2	All MCs	160	7.2	160	7.2	0.123	7.9	LOS A	0.2	1.7	0.40	0.66	47.1
Approach			964	4.0	964	4.0	0.422	1.3	NA	0.2	1.7	0.07	0.11	74.3
West: Koura Drive														
5	L2	All MCs	446	3.3	446	3.3	0.321	8.1	LOS A	0.7	4.7	0.33	0.60	57.4
6	T1	All MCs	288	4.4	288	4.4	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach			735	3.7	735	3.7	0.321	4.9	LOS A	0.7	4.7	0.20	0.36	62.9
All Vehicles			1999	4.6	1999	4.6	4.260	312.7	NA	40.1	307.9	0.24	0.56	6.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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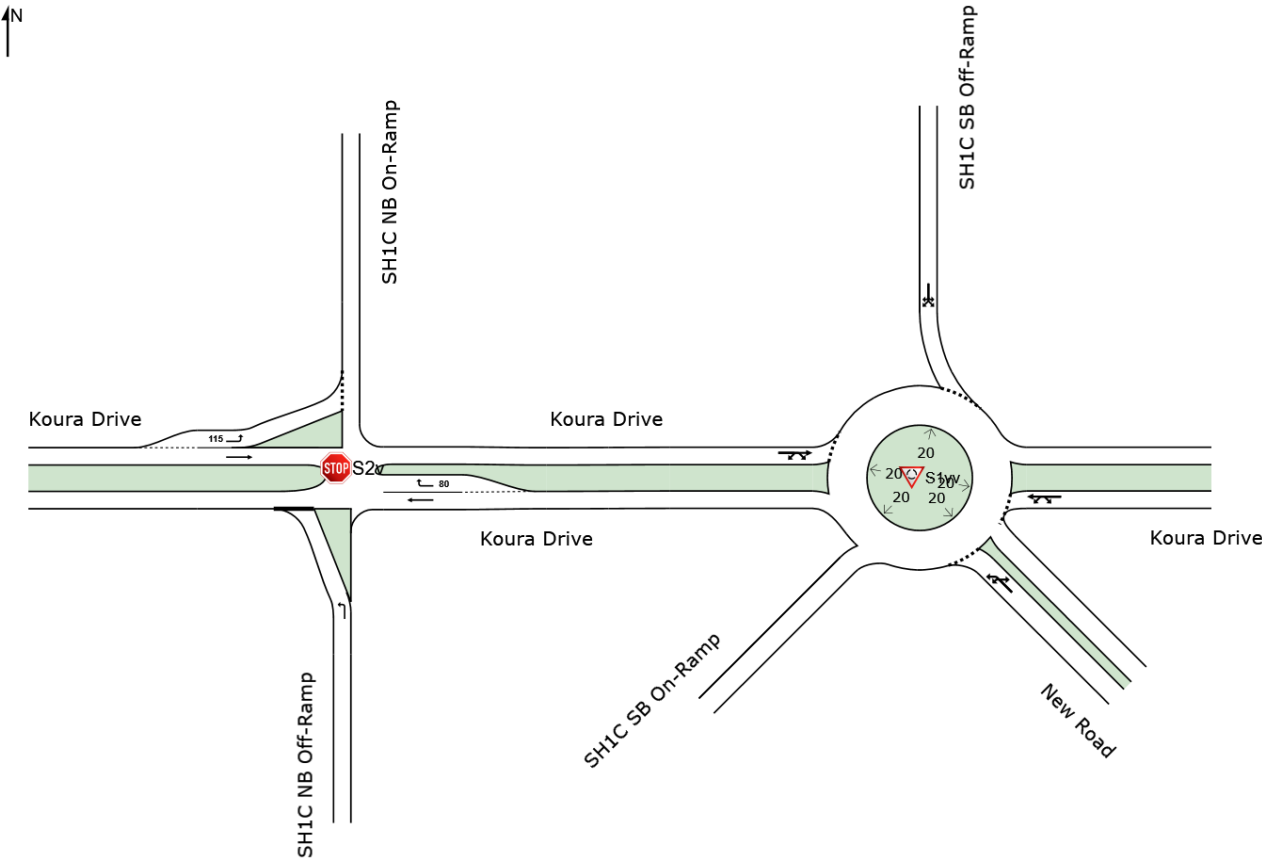
Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

NETWORK LAYOUT

■ Network: UDI [Unsignalised Diamond Interchange NZ
(Network Folder: Koura Drive Interchange 2045 AM w TKE
Mitigated w RT Ban)]

Unsignalised Diamond Interchange
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	CCG ID	Site Name
S1w	NA	2045 AM East - Mitigated w RT Ban
S2v	NA	2045 AM West - Mitigated w RT Ban

MOVEMENT SUMMARY

 Site: S1vv [2045 AM East - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w TKE Mitigated w RT Ban)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%					m				
SouthEast: New Road															
21	L2	All MCs	58	21.8	58	21.8	0.167	5.8	LOS A	0.4	3.2	0.61	0.61	0.61	45.1
21a	L1	All MCs	52	22.4	52	22.4	0.167	5.4	LOS A	0.4	3.2	0.61	0.61	0.61	42.5
23b	R3	All MCs	24	17.4	24	17.4	0.167	11.1	LOS B	0.4	3.2	0.61	0.61	0.61	44.7
Approach			134	21.3	134	21.3	0.167	6.6	LOS A	0.4	3.2	0.61	0.61	0.61	44.4
East: Koura Drive															
4b	L3	All MCs	33	12.9	33	12.9	0.238	10.0	LOS A	0.6	5.2	0.85	0.75	0.85	45.7
4a	L1	All MCs	42	40.0	42	40.0	0.238	11.0	LOS B	0.6	5.2	0.85	0.75	0.85	46.0
2	T1	All MCs	46	13.6	46	13.6	0.238	13.2	LOS B	0.6	5.2	0.85	0.75	0.85	43.7
Approach			121	22.6	121	22.6	0.238	11.6	LOS B	0.6	5.2	0.85	0.75	0.85	45.3
North: SH1C SB Off-Ramp															
3	L2	All MCs	55	3.8	55	3.8	0.732	22.1	LOS C	3.9	28.5	1.00	1.06	1.63	41.9
7a	L1	All MCs	177	6.0	177	6.0	0.732	19.1	LOS B	3.9	28.5	1.00	1.06	1.63	36.2
9a	R1	All MCs	1	0.0	1	0.0	0.732	22.5	LOS C	3.9	28.5	1.00	1.06	1.63	35.7
4	R2	All MCs	266	4.7	266	4.7	0.732	27.3	LOS C	3.9	28.5	1.00	1.06	1.63	23.3
Approach			499	5.1	499	5.1	0.732	23.8	LOS C	3.9	28.5	1.00	1.06	1.63	32.2
West: Koura Drive															
5	T1	All MCs	377	5.9	377	5.9	0.445	6.4	LOS A	1.8	13.0	0.21	0.51	0.21	55.6
12a	R1	All MCs	247	5.1	247	5.1	0.445	6.6	LOS A	1.8	13.0	0.21	0.51	0.21	45.1
12b	R3	All MCs	63	0.0	63	0.0	0.445	8.4	LOS A	1.8	13.0	0.21	0.51	0.21	45.2
Approach			687	5.1	687	5.1	0.445	6.7	LOS A	1.8	13.0	0.21	0.51	0.21	50.3
All Vehicles			1441	8.0	1441	8.0	0.732	13.0	LOS B	3.9	28.5	0.58	0.73	0.80	43.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2045 AM West - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

■ ■ Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 AM w TKE Mitigated w RT Ban)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]									[Veh. veh
			veh/h	%	veh/h	%	v/c	sec							km/h
South: SH1C NB Off-Ramp															
1	L2	All MCs	92	3.4	92	3.4	0.096	11.6	LOS B	0.2	1.2	0.45	0.88	0.45	54.6
Approach			92	3.4	92	3.4	0.096	11.6	LOS B	0.2	1.2	0.45	0.88	0.45	54.6
East: Koura Drive															
3	T1	All MCs	325	6.5	325	6.5	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
4	R2	All MCs	40	23.7	40	23.7	0.065	11.9	LOS B	0.1	0.8	0.62	0.82	0.62	40.6
Approach			365	8.4	365	8.4	0.174	1.3	NA	0.1	0.8	0.07	0.09	0.07	75.1
West: Koura Drive															
5	L2	All MCs	228	6.5	228	6.5	0.150	7.6	LOS A	0.3	2.0	0.13	0.57	0.13	58.2
6	T1	All MCs	688	5.2	688	5.2	0.365	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			917	5.5	917	5.5	0.365	1.9	LOS A	0.3	2.0	0.03	0.14	0.03	71.3
All Vehicles			1374	6.1	1374	6.1	0.365	2.4	NA	0.3	2.0	0.07	0.18	0.07	70.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: S1vv [2045 PM East - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w TKE Mitigated w RT Ban)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]				
			veh/h	%	veh/h	%				veh	m			km/h	
SouthEast: New Road															
21	L2	All MCs	179	5.9	179	5.9	0.670	16.5	LOS B	2.9	21.7	0.99	1.03	1.44	40.2
21a	L1	All MCs	179	5.3	179	5.3	0.670	16.1	LOS B	2.9	21.7	0.99	1.03	1.44	34.5
23b	R3	All MCs	45	9.3	45	9.3	0.670	22.1	LOS C	2.9	21.7	0.99	1.03	1.44	39.9
Approach			403	6.0	403	6.0	0.670	17.0	LOS B	2.9	21.7	0.99	1.03	1.44	38.3
East: Koura Drive															
4b	L3	All MCs	67	7.8	67	7.8	0.699	13.7	LOS B	3.5	25.5	0.96	0.91	1.32	44.8
4a	L1	All MCs	192	7.1	192	7.1	0.699	13.0	LOS B	3.5	25.5	0.96	0.91	1.32	45.2
2	T1	All MCs	286	2.6	286	2.6	0.699	16.4	LOS B	3.5	25.5	0.96	0.91	1.32	42.1
Approach			545	4.8	545	4.8	0.699	14.8	LOS B	3.5	25.5	0.96	0.91	1.32	44.0
North: SH1C SB Off-Ramp															
3	L2	All MCs	20	5.3	20	5.3	0.417	8.4	LOS A	1.2	8.8	0.65	0.66	0.65	52.5
7a	L1	All MCs	95	7.8	95	7.8	0.417	5.4	LOS A	1.2	8.8	0.65	0.66	0.65	44.2
9a	R1	All MCs	1	0.0	1	0.0	0.417	9.0	LOS A	1.2	8.8	0.65	0.66	0.65	43.5
4	R2	All MCs	293	3.6	293	3.6	0.417	13.5	LOS B	1.2	8.8	0.65	0.66	0.65	36.6
Approach			408	4.6	408	4.6	0.417	11.4	LOS B	1.2	8.8	0.65	0.66	0.65	41.0
West: Koura Drive															
5	T1	All MCs	133	15.1	133	15.1	0.199	6.6	LOS A	0.6	4.8	0.25	0.52	0.25	52.4
12a	R1	All MCs	100	11.6	100	11.6	0.199	6.8	LOS A	0.6	4.8	0.25	0.52	0.25	44.6
12b	R3	All MCs	32	3.3	32	3.3	0.199	8.5	LOS A	0.6	4.8	0.25	0.52	0.25	44.7
Approach			264	12.4	264	12.4	0.199	6.9	LOS A	0.6	4.8	0.25	0.52	0.25	48.2
All Vehicles			1621	6.3	1621	6.3	0.699	13.2	LOS B	3.5	25.5	0.78	0.81	1.01	42.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2045 PM West - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2045 PM w TKE Mitigated w RT Ban)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m			km/h
South: SH1C NB Off-Ramp														
1	L2	All MCs	86	2.4	86	2.4	0.131	13.9	LOS B	0.2	1.5	0.59	0.59	52.7
Approach			86	2.4	86	2.4	0.131	13.9	LOS B	0.2	1.5	0.59	0.59	52.7
East: Koura Drive														
3	T1	All MCs	579	3.3	579	3.3	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
4	R2	All MCs	180	4.7	180	4.7	0.134	7.7	LOS A	0.2	1.8	0.39	0.39	47.5
Approach			759	3.6	759	3.6	0.303	1.9	NA	0.2	1.8	0.09	0.09	72.3
West: Koura Drive														
5	L2	All MCs	414	3.1	414	3.1	0.302	8.2	LOS A	0.6	4.3	0.34	0.34	57.3
6	T1	All MCs	262	12.0	262	12.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach			676	6.5	676	6.5	0.302	5.0	LOS A	0.6	4.3	0.21	0.21	62.8
All Vehicles			1521	4.8	1521	4.8	0.303	3.9	NA	0.6	4.3	0.17	0.17	66.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S1vv [2055 AM East - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 AM w TKE Mitigated w RT Ban)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
SouthEast: New Road														
21	L2	All MCs	59	25.0	59	25.0	0.272	8.1	LOS A	0.7	5.5	0.76	0.71	43.9
21a	L1	All MCs	73	17.4	73	17.4	0.272	7.4	LOS A	0.7	5.5	0.76	0.71	40.4
23b	R3	All MCs	45	23.3	45	23.3	0.272	13.5	LOS B	0.7	5.5	0.76	0.71	43.5
Approach			177	21.4	177	21.4	0.272	9.2	LOS A	0.7	5.5	0.76	0.71	42.8
East: Koura Drive														
4b	L3	All MCs	198	5.3	198	5.3	0.933	49.3	LOS D	8.7	65.5	1.00	1.71	30.8
4a	L1	All MCs	103	20.4	103	20.4	0.933	50.0	LOS D	8.7	65.5	1.00	1.71	30.9
2	T1	All MCs	207	6.1	207	6.1	0.933	52.4	LOS D	8.7	65.5	1.00	1.71	22.8
Approach			508	8.7	508	8.7	0.933	50.7	LOS D	8.7	65.5	1.00	1.71	28.2
North: SH1C SB Off-Ramp														
3	L2	All MCs	79	5.3	79	5.3	1.015	91.9	LOS F	14.2	104.8	1.00	2.22	19.9
7a	L1	All MCs	177	7.7	177	7.7	1.015	89.0	LOS F	14.2	104.8	1.00	2.22	18.5
9a	R1	All MCs	1	0.0	1	0.0	1.015	92.1	LOS F	14.2	104.8	1.00	2.22	18.4
4	R2	All MCs	277	5.3	277	5.3	1.015	97.0	LOS F	14.2	104.8	1.00	2.22	8.0
Approach			534	6.1	534	6.1	1.015	93.6	LOS F	14.2	104.8	1.00	2.22	14.0
West: Koura Drive														
5	T1	All MCs	514	5.5	514	5.5	0.580	6.7	LOS A	2.9	20.9	0.39	0.49	55.2
12a	R1	All MCs	285	4.4	285	4.4	0.580	6.9	LOS A	2.9	20.9	0.39	0.49	44.8
12b	R3	All MCs	52	0.0	52	0.0	0.580	8.7	LOS A	2.9	20.9	0.39	0.49	44.9
Approach			851	4.8	851	4.8	0.580	6.9	LOS A	2.9	20.9	0.39	0.49	50.5
All Vehicles			2069	7.5	2069	7.5	1.015	40.2	LOS D	14.2	104.8	0.73	1.25	29.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2055 AM West - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 AM w TKE Mitigated w RT Ban)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m			km/h
South: SH1C NB Off-Ramp														
1	L2	All MCs	471	5.8	471	5.8	0.656	18.5	LOS C	2.4	17.6	0.76	1.16	47.9
Approach			471	5.8	471	5.8	0.656	18.5	LOS C	2.4	17.6	0.76	1.16	47.9
East: Koura Drive														
3	T1	All MCs	503	5.9	500	5.9	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
4	R2	All MCs	54	19.6	53	19.6	0.117	14.4	LOS B	0.2	1.3	0.72	0.90	38.3
Approach			557	7.2	553	7.2	0.266	1.4	NA	0.2	1.3	0.07	0.09	75.1
West: Koura Drive														
5	L2	All MCs	312	5.4	312	5.4	0.206	7.6	LOS A	0.4	2.9	0.16	0.57	58.1
6	T1	All MCs	851	4.7	851	4.7	0.450	0.1	LOS A	0.0	0.0	0.00	0.00	79.6
Approach			1162	4.9	1162	4.9	0.450	2.1	LOS A	0.4	2.9	0.04	0.15	70.7
All Vehicles			2189	5.7	2185	5.7	0.656	5.5	NA	2.4	17.6	0.20	0.35	64.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S1vv [2055 PM East - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 PM w TKE Mitigated w RT Ban)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				
SouthEast: New Road															
21	L2	All MCs	154	6.2	154	6.2	0.973	71.3	LOS E	10.3	75.5	1.00	2.10	3.52	25.1
21a	L1	All MCs	168	5.6	168	5.6	0.973	70.9	LOS E	10.3	75.5	1.00	2.10	3.52	17.2
23b	R3	All MCs	143	5.9	143	5.9	0.973	76.6	LOS E	10.3	75.5	1.00	2.10	3.52	25.0
Approach			465	5.9	465	5.9	0.973	72.8	LOS E	10.3	75.5	1.00	2.10	3.52	22.7
East: Koura Drive															
4b	L3	All MCs	77	11.0	77	11.0	0.999	64.8	LOS E	13.8	101.7	1.00	2.00	3.65	28.0
4a	L1	All MCs	154	8.9	154	8.9	0.999	63.9	LOS E	13.8	101.7	1.00	2.00	3.65	28.1
2	T1	All MCs	394	3.7	394	3.7	0.999	67.2	LOS E	13.8	101.7	1.00	2.00	3.65	20.0
Approach			624	5.9	624	5.9	0.999	66.1	LOS E	13.8	101.7	1.00	2.00	3.65	23.6
North: SH1C SB Off-Ramp															
3	L2	All MCs	35	9.1	35	9.1	0.797	24.2	LOS C	5.0	36.5	1.00	1.12	1.76	39.7
7a	L1	All MCs	115	10.1	115	10.1	0.797	21.2	LOS C	5.0	36.5	1.00	1.12	1.76	35.2
9a	R1	All MCs	1	0.0	1	0.0	0.797	24.3	LOS C	5.0	36.5	1.00	1.12	1.76	34.8
4	R2	All MCs	402	3.7	402	3.7	0.797	29.0	LOS C	5.0	36.5	1.00	1.12	1.76	22.3
Approach			553	5.3	553	5.3	0.797	27.0	LOS C	5.0	36.5	1.00	1.12	1.76	28.0
West: Koura Drive															
5	T1	All MCs	358	7.1	358	7.1	0.422	7.5	LOS A	1.5	11.5	0.55	0.54	0.55	54.6
12a	R1	All MCs	102	10.3	102	10.3	0.422	7.7	LOS A	1.5	11.5	0.55	0.54	0.55	44.6
12b	R3	All MCs	34	3.1	34	3.1	0.422	9.4	LOS A	1.5	11.5	0.55	0.54	0.55	44.7
Approach			494	7.5	494	7.5	0.422	7.7	LOS A	1.5	11.5	0.55	0.54	0.55	51.5
All Vehicles			2136	6.1	2136	6.1	0.999	43.9	LOS D	13.8	101.7	0.90	1.46	2.41	27.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 Site: S2v [2055 PM West - Mitigated w RT Ban (Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

■ ■ Network: UDI [Unsignalised Diamond Interchange NZ (Network Folder: Koura Drive Interchange 2055 PM w TKE Mitigated w RT Ban)]

Unsignalised Diamond Interchange (UDI) Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%								
			veh/h		veh/h		v/c	sec		[Veh. veh	Dist] m			km/h
South: SH1C NB Off-Ramp														
1	L2	All MCs	300	8.4	300	8.4	0.794	33.2	LOS D	2.4	18.3	0.92	1.33	37.6
Approach			300	8.4	300	8.4	0.794	33.2	LOS D	2.4	18.3	0.92	1.33	37.6
East: Koura Drive														
3	T1	All MCs	804	3.4	804	3.4	0.422	0.0	LOS A	0.0	0.0	0.00	0.00	79.6
4	R2	All MCs	160	7.2	160	7.2	0.161	9.2	LOS A	0.3	2.1	0.54	0.76	45.6
Approach			964	4.0	964	4.0	0.422	1.6	NA	0.3	2.1	0.09	0.13	74.0
West: Koura Drive														
5	L2	All MCs	446	3.3	446	3.3	0.321	8.1	LOS A	0.7	4.7	0.33	0.60	57.4
6	T1	All MCs	493	7.3	493	7.3	0.265	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
Approach			939	5.4	939	5.4	0.321	3.9	LOS A	0.7	4.7	0.16	0.28	65.4
All Vehicles			2203	5.2	2203	5.2	0.794	6.8	NA	2.4	18.3	0.23	0.36	61.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

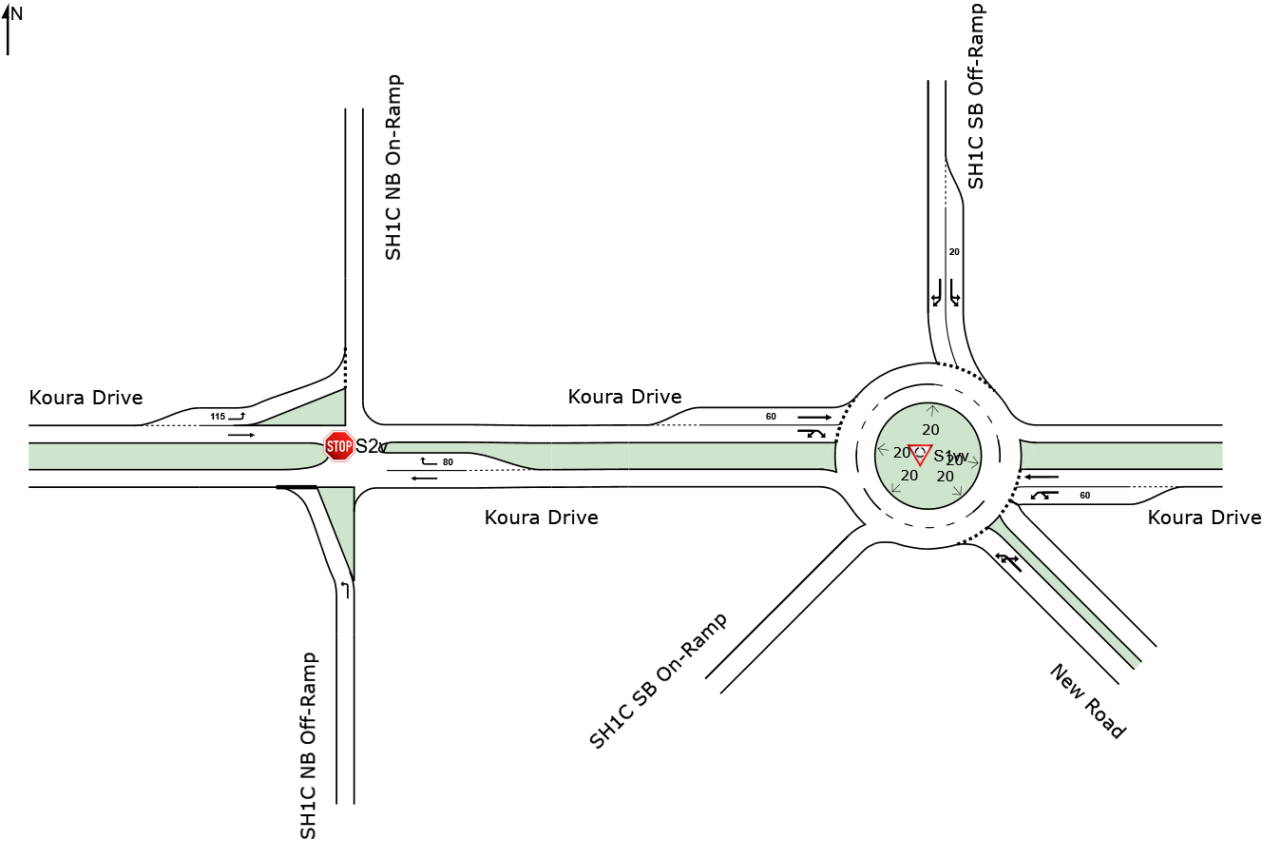
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

NETWORK LAYOUT

■ Network: UDI [Unsignalised Diamond Interchange NZ
(Network Folder: Koura Drive Interchange 2055 AM w TKE
Mitigated w RT Ban and extra lanes)]

Unsignalised Diamond Interchange
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	CCG ID	Site Name
S1w	NA	2055 AM East - Mitigated w RT Ban w extra lanes
S2v	NA	2055 AM West - Mitigated w RT Ban w extra lanes

MOVEMENT SUMMARY

 Site: S1vv [2055 AM East - Mitigated w RT Ban w extra lanes
(Site Folder: Koura Dr Interchange w TKE)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

 Network: UDI [Unsignalised
Diamond Interchange NZ
(Network Folder: Koura Drive
Interchange 2055 AM w TKE
Mitigated w RT Ban and extra
lanes)]

Signalised Diamond Interchange (SDI) Site
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh. veh	Dist]			km/h
			veh/h	%	veh/h	%					m			
SouthEast: New Road														
21	L2	All MCs	59	25.0	59	25.0	0.269	6.6	LOS A	0.5	3.8	0.61	0.70	44.6
21a	L1	All MCs	73	17.4	73	17.4	0.269	5.9	LOS A	0.5	3.8	0.61	0.70	41.8
23b	R3	All MCs	45	23.3	45	23.3	0.269	11.9	LOS B	0.5	3.8	0.61	0.70	44.2
Approach			177	21.4	177	21.4	0.269	7.7	LOS A	0.5	3.8	0.61	0.70	43.7
East: Koura Drive														
4b	L3	All MCs	198	5.3	198	5.3	0.411	7.6	LOS A	1.0	7.3	0.74	0.78	44.5
4a	L1	All MCs	103	20.4	103	20.4	0.411	7.5	LOS A	1.0	7.3	0.74	0.78	44.9
2	T1	All MCs	207	6.1	207	6.1	0.331	10.8	LOS B	0.7	4.9	0.72	0.78	55.2
Approach			508	8.7	508	8.7	0.411	8.9	LOS A	1.0	7.3	0.73	0.78	47.0
North: SH1C SB Off-Ramp														
3	L2	All MCs	79	5.3	79	5.3	0.391	11.2	LOS B	0.8	6.1	0.73	0.80	51.5
7a	L1	All MCs	177	7.7	177	7.7	0.391	8.1	LOS A	0.8	6.1	0.73	0.80	43.4
9a	R1	All MCs	1	0.0	1	0.0	0.362	10.4	LOS B	0.8	5.5	0.71	0.83	42.3
4	R2	All MCs	277	5.3	277	5.3	0.362	15.0	LOS B	0.8	5.5	0.71	0.83	34.3
Approach			534	6.1	534	6.1	0.391	12.2	LOS B	0.8	6.1	0.72	0.82	41.8
West: Koura Drive														
5	T1	All MCs	514	5.5	514	5.5	0.355	6.5	LOS A	1.1	7.8	0.24	0.47	59.1
12a	R1	All MCs	285	4.4	285	4.4	0.269	6.7	LOS A	0.7	5.1	0.23	0.54	42.5
12b	R3	All MCs	52	0.0	52	0.0	0.269	8.5	LOS A	0.7	5.1	0.23	0.54	42.6
Approach			851	4.8	851	4.8	0.355	6.7	LOS A	1.1	7.8	0.24	0.50	51.2
All Vehicles			2069	7.5	2069	7.5	0.411	8.7	LOS A	1.1	7.8	0.51	0.67	47.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 **Site: S2v [2055 AM West - Mitigated w RT Ban w extra lanes
(Site Folder: Koura Dr Interchange w TKE)]**

Output produced by **SIDRA INTERSECTION** Version: 9.1.1.200

 **Network: UDI [Unsignalised
Diamond Interchange NZ
(Network Folder: Koura Drive
Interchange 2055 AM w TKE
Mitigated w RT Ban and extra
lanes)]**

Unsignalised Diamond Interchange (UDI) Site

Site Category: (None)

Stop (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m			km/h
South: SH1C NB Off-Ramp														
1	L2	All MCs	471	5.8	471	5.8	0.660	18.6	LOS C	2.4	17.8	0.76	1.17	47.7
Approach			471	5.8	471	5.8	0.660	18.6	LOS C	2.4	17.8	0.76	1.17	47.7
East: Koura Drive														
3	T1	All MCs	503	5.9	503	5.9	0.268	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
4	R2	All MCs	54	19.6	54	19.6	0.117	14.4	LOS B	0.2	1.3	0.72	0.90	38.3
Approach			557	7.2	557	7.2	0.268	1.4	NA	0.2	1.3	0.07	0.09	75.1
West: Koura Drive														
5	L2	All MCs	312	5.4	312	5.4	0.206	7.6	LOS A	0.4	2.9	0.16	0.57	58.1
6	T1	All MCs	851	4.7	851	4.7	0.450	0.1	LOS A	0.0	0.0	0.00	0.00	79.6
Approach			1162	4.9	1162	4.9	0.450	2.1	LOS A	0.4	2.9	0.04	0.15	70.7
All Vehicles			2189	5.7	2189	5.7	0.660	5.5	NA	2.4	17.8	0.21	0.35	64.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2035 Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Great South Road															
1	L2	All MCs	167	11.3	167	11.3	0.737	35.5	LOS D	13.7	104.0	0.98	0.88	1.06	30.7
2	T1	All MCs	388	8.1	388	8.1	0.737	52.3	LOS D	13.7	104.0	0.99	0.89	1.06	31.6
3	R2	All MCs	73	8.7	73	8.7	*0.692	68.1	LOS E	3.8	28.9	1.00	0.85	1.17	27.2
Approach			628	9.0	628	9.0	0.737	49.6	LOS D	13.7	104.0	0.99	0.88	1.07	30.8
East: Horotiu Bridge Road															
4	L2	All MCs	383	3.3	383	3.3	0.820	51.3	LOS D	19.3	138.9	1.00	0.93	1.14	30.1
5	T1	All MCs	173	3.7	173	3.7	0.353	33.6	LOS C	7.9	56.5	0.82	0.70	0.82	35.6
6	R2	All MCs	35	0.0	35	0.0	0.353	38.2	LOS D	7.9	56.5	0.82	0.70	0.82	35.1
Approach			591	3.2	591	3.2	0.820	45.4	LOS D	19.3	138.9	0.94	0.85	1.03	31.8
North: Great South Road															
7	L2	All MCs	31	0.0	31	0.0	*0.891	81.3	LOS F	19.7	142.4	1.00	1.12	1.29	27.7
8	T1	All MCs	662	4.1	662	4.1	*0.891	111.6	LOS F	19.7	142.4	1.00	1.11	1.30	28.5
9	R2	All MCs	26	4.0	26	4.0	0.243	77.1	LOS E	1.3	9.5	0.99	0.71	0.99	27.9
Approach			719	4.0	719	4.0	0.891	109.0	LOS F	19.7	142.4	1.00	1.09	1.28	28.4
West: Gateway Drive															
10	L2	All MCs	14	7.7	14	7.7	0.052	44.3	LOS D	0.6	4.3	0.88	0.68	0.88	30.6
11	T1	All MCs	75	9.9	75	9.9	*0.606	41.8	LOS D	8.8	68.1	0.97	0.81	0.97	31.1
12	R2	All MCs	115	14.7	115	14.7	0.606	46.5	LOS D	8.8	68.1	0.97	0.81	0.97	30.7
Approach			203	12.4	203	12.4	0.606	44.6	LOS D	8.8	68.1	0.97	0.80	0.97	30.8
All Vehicles			2141	6.0	2141	6.0	0.891	67.9	LOS E	19.7	142.4	0.98	0.94	1.12	30.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Horotiu Bridge Road												

P2 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Great South Road											
P3 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Gateway Drive											
P4 Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians	200	211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2035 Base)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay; Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | Licence: NETWORK / 1PC | Processed: Monday, May 25, 2026 10:47:23 AM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2045 Base)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | Licence: NETWORK / 1PC | Processed: Monday, May 25, 2026 9:53:39 AM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

MOVEMENT SUMMARY

Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2045 Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Great South Road															
1	L2	All MCs	198	10.1	198	10.1	* 1.011	75.9	LOS E	35.2	261.3	1.00	1.31	1.59	20.6
2	T1	All MCs	588	4.1	588	4.1	1.011	127.8	LOS F	35.2	261.3	1.00	1.37	1.60	20.9
3	R2	All MCs	102	3.1	102	3.1	* 0.963	114.8	LOS F	7.5	53.9	1.00	1.11	1.65	22.3
Approach			888	5.3	888	5.3	1.011	114.8	LOS F	35.2	261.3	1.00	1.32	1.60	21.0
East: Horotiu Bridge Road															
4	L2	All MCs	219	5.3	219	5.3	* 0.918	76.3	LOS E	15.1	110.6	1.00	1.04	1.38	24.2
5	T1	All MCs	119	6.2	119	6.2	0.462	50.3	LOS D	7.4	54.3	0.96	0.77	0.96	29.5
6	R2	All MCs	18	0.0	18	0.0	0.462	54.9	LOS D	7.4	54.3	0.96	0.77	0.96	29.1
Approach			356	5.3	356	5.3	0.918	66.5	LOS E	15.1	110.6	0.98	0.94	1.22	26.0
North: Great South Road															
7	L2	All MCs	36	0.0	36	0.0	0.610	28.5	LOS C	13.3	96.8	0.95	0.86	0.95	28.2
8	T1	All MCs	457	5.1	457	5.1	0.610	60.8	LOS E	13.3	96.8	0.95	0.83	0.95	29.8
9	R2	All MCs	53	4.0	53	4.0	0.500	84.8	LOS F	3.2	23.1	1.00	0.75	1.00	25.7
Approach			545	4.6	545	4.6	0.610	61.0	LOS E	13.3	96.8	0.96	0.82	0.96	29.2
West: Gateway Drive															
10	L2	All MCs	280	1.1	280	1.1	0.456	48.2	LOS D	12.9	90.8	0.84	0.80	0.84	32.3
11	T1	All MCs	489	2.4	489	2.4	1.008	102.8	LOS F	51.1	369.5	1.00	1.35	1.51	22.0
12	R2	All MCs	105	11.0	105	11.0	1.008	107.4	LOS F	51.1	369.5	1.00	1.35	1.51	21.8
Approach			875	3.0	875	3.0	1.008	85.9	LOS F	51.1	369.5	0.95	1.18	1.30	24.4
All Vehicles			2664	4.4	2664	4.4	1.011	87.8	LOS F	51.1	369.5	0.97	1.12	1.32	24.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2055 Base)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
East: Horotiu Bridge Road												

P2 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
North: Great South Road											
P3 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
West: Gateway Drive											
P4 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
All Pedestrians	200	211	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | Licence: NETWORK / 1PC | Processed: Monday, May 25, 2026 10:28:33 AM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2055 Base)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2035 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
East: Horotiu Bridge Road												

P2 Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
North: Great South Road											
P3 Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
West: Gateway Drive											
P4 Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
All Pedestrians	200	211	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2035 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: CKL | Licence: NETWORK / 1PC | Processed: Thursday, May 21, 2026 3:29:15 PM

Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2045 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2045 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2055 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
East: Horotiu Bridge Road												

P2 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
North: Great South Road											
P3 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
West: Gateway Drive											
P4 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
All Pedestrians	200	211	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2055 w TKE)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
East: Horotiu Bridge Road												

P2 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
North: Great South Road											
P3 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
West: Gateway Drive											
P4 Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96
All Pedestrians	200	211	54.3	LOS E	0.2	0.2	0.95	0.95	208.1	200.0	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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SITE LAYOUT

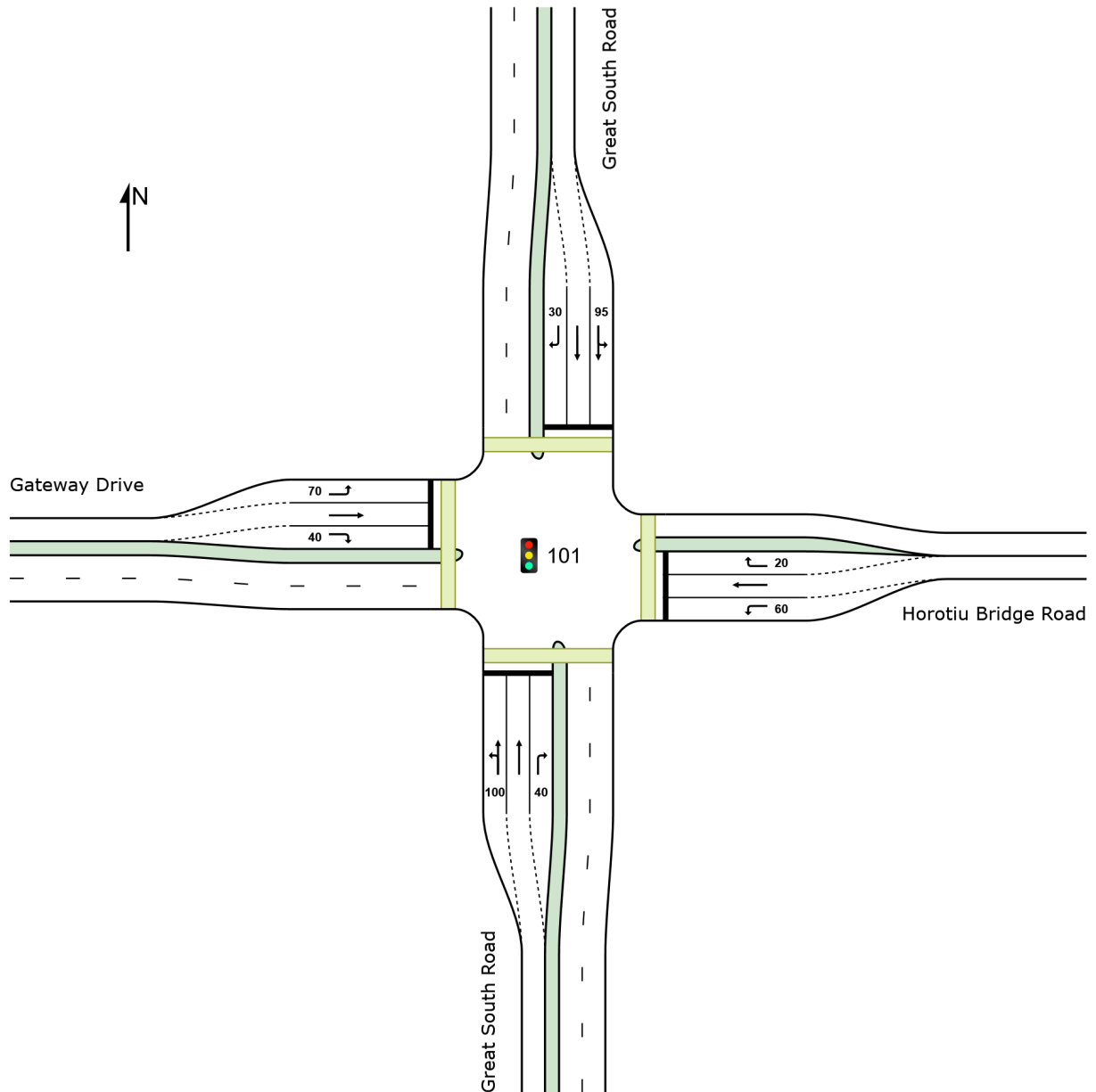
 **Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2045 w TKE Mitigated)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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Site: 101 [AM Great South Rd / Gateway Dr (Site Folder: 2045 w TKE Mitigated)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
 Vehicle movement LOS values are based on average delay per movement.
 Intersection and Approach LOS values are based on average delay for all vehicle movements.
 Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
 Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
 Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
 Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

- * Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
East: Horotiu Bridge Road												

P2 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
North: Great South Road											
P3 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
West: Gateway Drive											
P4 Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians	200	211	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Site: 101 [PM Great South Rd / Gateway Dr (Site Folder: 2045 w TKE Mitigated)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
South: Great South Road												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
East: Horotiu Bridge Road												

P2 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
North: Great South Road											
P3 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
West: Gateway Drive											
P4 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04
All Pedestrians	200	211	39.3	LOS D	0.1	0.1	0.94	0.94	193.1	200.0	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\ProgramData\12DSynergy\data\CKL-AZU-SYN-1\CI 1 - Transportation - (Description)_18136\01 Transportation\Modelling and Calculations\SIDRA Fast Track 2026\B20315-TR- -SIDRA.sip9

Appendix F – Policy and Other Frameworks Compliance

Our Ref: B20315
Site Address: 30 Mathers Road, Horotiu

9 July 2026

Noted by: Rachel Gasson

Subject: Te Kowhai East Policy Assessment

This note summarises the alignment between the proposed Te Kowhai East development and the following Policies and Other Frameworks:

- **National Strategies & Plans:**
 - Arataki – Waka Kotahi’s 30 Year Plan for the land transport system
 - Government Policy Statement on Land Transport Funding (2024-2034)
 - Emissions Reduction Plan (ERP) (2026)
- **Regional:**
 - Waikato Regional Land Transport Plan (2024-54)
 - Waikato Regional Public Transport Plan 2022-2032
- **Local:**
 - Waikato District Plan – Operative in Part

By way of summary, the Te Kowhai East proposal is strongly aligned with national, regional, and district transport and growth planning documents. Across all relevant policy frameworks the proposal is assessed as supporting key objectives relating to economic growth, integrated land use and transport planning, network resilience, accessibility, safety, and environmental sustainability. Its location adjacent to the existing Te Rapa and Horotiu industrial areas, SH39, the Waikato Expressway, and planned growth areas enables efficient freight movement, supports employment growth, and reinforces the Hamilton-Waikato metropolitan growth pattern.

The proposal also incorporates features that support long-term transport and environmental outcomes, including a connected road hierarchy, multiple access points, walking and cycling infrastructure, opportunities for future public transport integration, stormwater management, ecological mitigation, and supporting community facilities. By consolidating industrial development within an established employment corridor and leveraging existing and planned infrastructure, the project promotes a coordinated and efficient urban form while supporting future resilience, transport choice, safety, and lower-emission transport outcomes. Overall, the proposal is considered consistent with the strategic direction and objectives of the relevant national, regional, and district planning frameworks.

Arataki – Waka Kotahi's 30-Year Plan

Arataki is Waka Kotahi's long-term strategic framework for New Zealand's transport system. It provides a 30-year view of the challenges facing the transport network and identifies the outcomes sought through future investment and planning. The document recognises the importance of integrating land use and transport planning, supporting economic productivity, improving safety and resilience, and transitioning to a lower-emissions transport system. The document identifies five key transport outcomes. The alignment of the Te Kowhai East proposal against each is summarised in the following Table.

Outcome	Assessment
Economic Prosperity	Supports The proposal provides industrial land in a strategically important location adjacent to SH39, the Waikato Expressway (WEX) and the existing Te Rapa industrial area. The site benefits from direct access to the strategic freight network and is located alongside existing and planned growth areas and transport infrastructure. This supports efficient freight movement, improves access to employment land and contributes to economic productivity and economic growth within the wider Waikato and upper North Island regions. The proposal also supports the broader pattern of growth anticipated within the Hamilton-Waikato metropolitan area. The site is located adjacent to existing industrial and employment areas, including Te Rapa and Horotiu, and in close proximity to the planned residential growth areas at Rotokauri. This co-location of employment and residential growth supports labour market accessibility, reduces the need for dispersed industrial development and contributes to a more efficient urban form. The proposal also supports the broader pattern of growth anticipated within the Hamilton-Waikato metropolitan area. The site is located adjacent to existing industrial and employment areas, including Te Rapa and Horotiu, and close to the planned residential growth areas at Rotokauri. This co-location of employment and residential growth supports labour market accessibility, reduces the need for dispersed industrial development and contributes to a more efficient urban form.
Resilience and Security	Supports The site is located adjacent to a number of existing and planned strategic transport corridors, including SH39, SH1C and the future Rotokauri Strategic Infrastructure Corridor. The proposed road hierarchy and multiple external access points provide route choice for freight and employee travel and reduce reliance on any single connection to the wider transport network. The proposal therefore supports a resilient transport network capable of accommodating future growth and responding to network disruption.

Inclusive Access	Supports The proposal incorporates footpaths throughout the development and dedicated cycling facilities along the primary collector route. The location adjacent to Hamilton's urban area also provides opportunities for future public transport and active mode connections. The site's location adjacent to existing and planned residential growth areas also provides opportunities for employees to access employment by a range of modes, including walking, cycling and, potentially, future public transport services as the surrounding transport network develops.
Healthy and Safe People	Supports The proposal incorporates a comprehensive active mode network, including footpaths throughout the development and dedicated cycling facilities along the primary collector route. These facilities provide opportunities for employees and visitors to access the site by walking and cycling, while the proposed road hierarchy separates higher-order traffic movements from local access functions. Together, these measures support a safe, legible and accessible transport environment and encourage travel choices beyond private vehicle use where practicable.
Environmental Sustainability	Supports The proposal is located adjacent to strategic freight routes and existing industrial areas, including Te Rapa and Horotiu, supporting efficient freight movement and reducing the need for freight traffic to travel through urban areas. The co-location of industrial activities within an established employment area also supports efficient supply chains and reduces the need for more dispersed industrial development across the wider region. The masterplan incorporates walking and cycling facilities to support lower-emission travel options for employees where practical, and its proximity to existing and planned urban growth areas provides opportunities for shorter commuting distances and future transport choice. While industrial development will continue to generate transport demand and freight movements, the proposal's location adjacent to the strategic transport network represents an integrated land use and transport outcome that supports efficient movement of people and goods while retaining the ability to benefit from future lower-emission vehicle and freight technologies. As such, the proposal generally aligns with the intent of Arataki.

Government Policy Statement on Land Transport 2024-2034

The Government Policy Statement on Land Transport (GPS) sets out the Government's strategic direction for investment in New Zealand's land transport system and guides expenditure from the National Land Transport Fund. The GPS identifies four strategic priorities:

- Economic Growth and Productivity;
- Increased Maintenance and Resilience;
- Safety; and
- Value for Money.

Economic Growth and Productivity is identified as the overarching strategic priority. The alignment of the Te Kowhai East proposal against each is summarised in the following Table.

Strategic Priority	Assessment
Economic Growth and Productivity	Supports The proposal provides industrial land in a strategically important location adjacent to SH39, the WEX and the existing Te Rapa industrial area. The site benefits from direct access to the strategic freight network and is located alongside existing and planned growth areas and transport infrastructure. This supports efficient freight movement, improves access to employment opportunities and employment land, contributes to more efficient freight supply chains, and supports economic productivity and economic growth within the wider Waikato region and upper North Island.
Increased Maintenance and Resilience	Supports The site is located adjacent to a number of existing and planned strategic transport corridors, including SH39, SH1C and the future Rotokauri Strategic Infrastructure Corridor. The proposed road hierarchy and multiple external access points provide route choice for freight and employee travel and reduce reliance on any single connection to the wider transport network. The proposal therefore supports a resilient transport network capable of accommodating future growth and responding to network disruption.
Safety	Supports The proposal incorporates a clear road hierarchy that separates higher-order freight movements from local access functions. Footpaths are provided throughout the development and dedicated cycling facilities are proposed along the primary collector route. Together, these measures support a safe, legible and accessible transport environment and help reduce potential conflicts between heavy vehicles, pedestrians, cyclists and other road users.
Value for Money	Supports The proposal is located adjacent to existing strategic transport infrastructure, including SH39, the WEX and the Te Rapa industrial area. The development therefore has the ability to utilise and build upon existing and planned transport infrastructure rather than requiring entirely new strategic transport connections. This represents an efficient land use and transport outcome that aligns with the value-for-money focus of GPS 2024.

Emissions Reduction Plan (2026)

The Emissions Reduction Plan (ERP) sets out the Government's strategy for meeting New Zealand's emissions budgets and achieving the long-term target of net zero emissions by 2050. The ERP identifies actions across a range of sectors, including transport, energy, industry and land use, with a focus on reducing emissions in a cost-effective manner while supporting economic growth and productivity.

For transport, the relevant themes include integrated land use and transport planning, supporting lower-emission travel choices, enabling efficient freight and economic activity, and supporting the transition to lower-emission vehicle and freight technologies.

The alignment of the Te Kowhai East proposal against these themes is summarised in the following Table.

Theme	Assessment
Integrated Land Use and Transport Planning	Supports The ERP recognises integrated land use and transport planning as an important mechanism for reducing transport emissions by locating activities in areas that can be efficiently served by existing and planned transport infrastructure and a range of travel options. The proposal locates industrial development adjacent to the existing Te Rapa industrial area and strategic transport corridors, including SH39 and the WEX. The site is also located adjacent to existing and planned urban growth areas, including Rotokauri, providing opportunities for future public transport and active mode connections as the surrounding transport network develops and enabling employment opportunities to be located in close proximity to future residential growth. This represents an integrated land use and transport outcome, enabling employment-generating activities to be located in close proximity to the strategic freight network, existing urban development and future transport infrastructure.
Lower-Emission Travel Choices	Supports The ERP promotes increased use of active and shared transport modes as a means of reducing transport emissions and providing people with alternatives to private vehicle travel. The masterplan incorporates footpaths throughout the development and dedicated cycling facilities along the primary collector route, providing opportunities for employees and visitors to access the site by walking and cycling. The site's proximity to existing and planned urban growth areas may also support future public transport connections as the surrounding transport network develops. While the industrial nature of the development means freight and vehicle travel will remain important, the proposal provides opportunities for lower-emission

	travel choices and supports future transport choice as the surrounding area continues to develop.
Efficient Freight and Economic Activity	The ERP recognises that economic activity and freight movement remain essential to New Zealand's economy and seeks to support these activities while transitioning to a lower-emissions transport system. The proposal is located adjacent to strategic freight routes and existing industrial areas, including Te Rapa and Horotiu, supporting efficient freight movement, supply chains and business-to-business connections. The co-location of industrial activities within an established employment area also supports a more efficient urban form and reduces the need for more dispersed industrial development across the wider region. While the proposal will generate additional freight and employee travel demand associated with industrial activities, the ERP recognises that emissions reductions will be achieved through a combination of integrated land use planning, travel choice and the transition to lower-emission transport technologies. The proposal does not constrain future adoption of these technologies and has the same opportunity as other industrial and employment areas to benefit from ongoing vehicle and freight fleet decarbonisation.

Waikato Regional Land Transport Plan (2024-54)

The Waikato Regional Land Transport Plan (RLTP) 2024-2054 is the principal strategic transport planning document for the Waikato region. It sets the long-term direction for transport investment and identifies the policies, programmes and activities required to support the region's growth over the next 30 years. The RLTP recognises the significant population and employment growth anticipated within the Hamilton-Waikato metropolitan area and emphasises the importance of integrating land use and transport planning, supporting economic development, improving freight efficiency, enhancing network resilience, providing transport choice, and reducing transport-related emissions. The RLTP is underpinned by five strategic objectives relating to:

- Climate Change: reducing transport emissions and supporting an environmentally sustainable, energy-efficient and low-carbon transport system;
- Resilience: ensuring communities have reliable access to essential services through an efficient and resilient transport network;
- Growth and Economic Development: supporting planned growth, economic productivity and the efficient movement of people and freight;
- Accessibility and Transport Options: providing transport options that support the differing access and mobility needs of communities; and
- Safety: creating a transport system where no one is killed or seriously injured.

The proposal is located within the Hamilton-Waikato metropolitan area, adjacent to strategic freight routes and planned transport infrastructure. As such, the proposal has particular relevance to the RLTP's objectives relating to growth and economic development, freight movement, network resilience and integrated land use and transport planning.

Outcome Area	Assessment
Climate Change	Supports The RLTP seeks to reduce transport emissions through integrated land use and transport planning, increased transport choice and the transition to a lower-carbon transport system. The Te Kowhai East proposal locates a significant industrial employment area adjacent to existing industrial activities, strategic freight routes and planned urban growth areas within the Hamilton-Waikato metropolitan area. This supports an efficient land use pattern by integrating employment activities with existing and planned urban development and transport infrastructure. The proposal also incorporates walking and cycling facilities and does not constrain future public transport connections or the adoption of lower-emission vehicle and freight technologies.
Resilience	The RLTP seeks to develop a resilient transport network that provides reliable access for communities and businesses and is able to respond to disruption and future growth. The Te Kowhai East proposal is located adjacent to the WEX, SH39 and a number of existing and planned strategic transport corridors. The proposed road hierarchy and multiple external access points provide route choice and reduce reliance on any single connection to the wider transport network. The proposal is also located in proximity to a number of planned transport improvements identified through the Hamilton-Waikato Metro Spatial Plan and RLTP, including the Northern River Crossing and wider Rotokauri transport network improvements. Together, these existing and planned connections will support network resilience, connectivity and accessibility as growth occurs within the wider metropolitan area.
Growth and Economic Development	Supports The RLTP recognises that significant population and employment growth is anticipated within the Hamilton-Waikato metropolitan area and seeks to support this growth through an integrated transport system and efficient strategic corridor network. The Te Kowhai East proposal provides a substantial area of industrial land in a location identified for future growth, adjacent to the existing Te Rapa and Horotiu industrial areas, strategic freight routes and planned urban development areas. The proposal supports the efficient movement of people and freight and complements the broader growth pattern anticipated through the Hamilton-Waikato Metro Spatial Plan by providing additional industrial and

	employment capacity alongside existing and planned residential growth areas.
Accessibility and Transport Options	The RLTP seeks to provide a transport system that supports the differing access and mobility needs of communities through a range of transport options. The Te Kowhai East proposal incorporates footpaths throughout the development and dedicated cycling facilities along the primary collector route, providing opportunities for employees and visitors to access the site by walking and cycling. The proposal is located adjacent to existing and planned urban growth areas within the Hamilton-Waikato metropolitan area and does not preclude future public transport connections as the surrounding transport network develops.
Safety	Supports The RLTP seeks to create a transport system where no one is killed or seriously injured, recognising the importance of safe infrastructure and transport networks that accommodate all users. The Te Kowhai East proposal incorporates a clear road hierarchy and dedicated active mode infrastructure that support the safe movement of people and freight throughout the development. These features support a legible and accessible transport environment and help reduce potential conflicts between heavy vehicles, pedestrians, cyclists and other road users. The proposal also provides opportunities to incorporate safe intersection design, appropriate speed environments and active mode facilities as detailed design progresses.

Waikato Regional Public Transport Plan 2022-2032

The Waikato Regional Public Transport Plan (RPTP) 2022–2032 provides the framework for the development and operation of public transport services across the Waikato region.

The RPTP seeks to improve accessibility and wellbeing through an integrated public transport network, support more sustainable travel choices, and align transport and land use planning to enable a more accessible and efficient urban form. Particular emphasis is placed on the Hamilton-Waikato Metropolitan Area, where significant future population and employment growth is anticipated and where the plan envisages the progressive development of a more comprehensive and frequent public transport network.

This includes the identification of Rotokauri/The Base as a primary public transport interchange and the progressive expansion of frequent and rapid public transport services through the north-west Hamilton growth corridor, including Te Rapa North and Horotiu. While Te Kowhai East is not specifically identified within the future network diagrams, the proposal is located immediately adjacent to these areas has the opportunity for future integration with the metropolitan public transport network as it and the surrounding urban area develop.

Waikato District Plan – Operative in Part

In summary, the Waikato District Plan seeks to achieve well-planned and sustainable growth by directing urban and industrial development to appropriate locations, supporting economic development and employment opportunities, ensuring the efficient provision and use of infrastructure, protecting natural and ecological resources, managing environmental effects, and promoting the social, cultural, environmental, and economic wellbeing of communities. Relevant objectives and policies encourage the integration of land use and infrastructure planning, the consolidation of growth around existing urban areas and employment hubs, the provision of adequate servicing and transport networks, the management of stormwater and environmental impacts, and the creation of high-quality developments that contribute positively to the district's long-term development and resilience.

Overall, the project gives effect to the Waikato District Plan's strategic direction by delivering a comprehensively planned industrial expansion in a logical growth location, supporting economic development, making efficient use of infrastructure, and incorporating environmental and community outcomes. The proposal is therefore generally consistent with the relevant objectives and policies relating to industrial growth, integrated development, infrastructure efficiency, and environmental management.

Outcome Area	Assessment
Growth and Economic Development	Supports The project provides a substantial expansion of industrial land adjacent to the established Te Rapa industrial area, supporting the District Plan's objectives to promote economic growth, employment opportunities, and business activity in locations that are strategically connected to existing industrial centres. By accommodating approximately 210 industrial lots, the development contributes to the long-term supply of industrial land needed to meet regional growth demands.
Integrated Land Use and Transport Planning	Locating the development on the north-western edge of Hamilton and adjoining an existing industrial precinct promotes a logical and efficient urban form. This aligns with objectives and policies that seek to direct growth to appropriate locations where it can utilise and extend existing infrastructure networks, rather than creating isolated or fragmented development patterns. The proposal adopts a comprehensive master-planned approach that includes industrial activities, neighbourhood centre land, transport connections, reserves, stormwater management systems, and ecological mitigation areas. This integrated design is consistent with policies encouraging coordinated development that provides for both employment and supporting services while managing environmental effects.