Technical Report 33

Assessment of Temporary Traffic Effects

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Revision History

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1 Executive Summary

The MacKays to Peka Peka Expressway Project forms part of the Wellington Northern Corridor, running from Wellington Airport to Levin. This corridor is one of the seven Roads of National Significance (RoNS) named in the Government Policy Statement on Land Transport Funding 2009/10-2018/19, which focuses on supporting New Zealand's productivity and economic growth.

The MacKays to Peka Peka Alliance has been commissioned by the NZTA to undertake a transport assessment to assess the potential effects during construction of the MacKays to Peka Peka Project (the Project). This will inform the *Assessment of Environmental Effects* (AEE) for the Project.

This assessment provides an appraisal of the traffic impacts arising from construction of the Project and associated temporary traffic management methodologies. It provides a description of possible alternative locations or methods for undertaking the activity, where appropriate. It also proposes measures to mitigate the identified impacts, where possible.

The approach proposed for addressing transport construction effects follows established precedent and practices from previously approved NZ Transport Agency projects.

In general it is expected that traffic impacts will primarily be monitored and managed in accordance with the *Construction Traffic Management Plan* (CTMP) (CEMP Appendix O, Volume 4) which forms part of the *Construction Environmental Management Plan* (CEMP, Volume 4) suite of documents.

Once detailed construction planning has commenced detailed site-specific work on traffic management and mitigation measures can be confirmed. This allows traffic management measures to be refined to best meet the needs of stakeholders, affected parties and the needs of construction. This assessment therefore reflects the current understanding of likely traffic management methodologies required for the construction works, and is based on similar road construction activities used across New Zealand.

The proposed Expressway Alignment passes through urban, semi-urban and rural areas, and will connect or cross a number of Secondary Arterial roads in the Kāpiti district. These include Poplar Avenue, Raumati Road, Kāpiti Road, Mazengarb Road, Otaihanga Road, and Te Moana Road. The Project will also alter Ngarara Road, Smithfield Road, and Peka Peka Road. The proposed Expressway Alignment crosses the Wharemauku Stream trail and Waikanae River trail.

The full extent and scope of the Project has been reviewed in preparation of this assessment and stage-by-stage traffic methodologies developed. The construction activities and required traffic management activities for each area have been assessed for their expected traffic impacts and mitigation measures proposed.

1.1. Traffic Effects of Construction Vehicle Movements

The construction of the Project will generate periods of significant construction vehicle movements around particular localities in the Project area.

An analysis of the increased movements due to construction traffic has been carried out for each link and intersection that construction vehicles are expected to use. This revealed that the effects are greatest on the existing SH1/ Poplar Avenue (including traffic re-routed from Leinster Avenue), Otaihanga Road, and the existing SH1/ Otaihanga Road. These areas were found to require specific mitigation measures which are set out in this report.

Protocols and practices will operate across the Project area to lessen effects to a practical minimum while enabling construction to be achieved in a timely fashion. These protocols and practices are outlined in the CTMP.

Examples are:

- Construction vehicles will be required to use the major roads where possible, particularly the existing SH1, to avoid residential streets.
- Drivers will be required to take extra care while passing 'sensitive' areas, such as schools, hospitals, parks, and pools, and be extra vigilant of children or mobility impaired persons.
- Construction traffic will be required to avoid using the existing SH1/ Poplar Avenue intersection during the evening peak period, particularly when Leinster Avenue is closed. The effect of the Leinster Avenue traffic on the intersection is expected to be mitigated by alternative route choice. During high seasonal flows, it is expected that some motorists will use the KCDC network to travel north of Poplar Avenue rather than the existing SH1.
- The main Project office and yard area will be established off Otaihanga Road. This yard will be the administrative centre, main access point to the alignment, pre-cast concrete yard, and main delivery point for materials. As such, the yard is expected to generate a large number of construction vehicle movements, with approximately 480 round trips per day at the peak of construction. Additional pavement width will be constructed to allow construction vehicles to pull off Otaihanga Road when slowing and turning into the site access.
- The construction traffic which access Otaihanga Road will also use the Otaihanga Road / existing SH1 Intersection, which is already a heavily trafficked priority intersection with a poor crash history. The intersection is planned to be upgraded to a roundabout intersection to maintain the efficiency of the intersection with the additional construction traffic.

1.2. Traffic Management Impacts and Mitigation

Other effects arising from the Project's construction are expected to be centred on and limited to discrete construction sites where the proposed Expressway Alignment connects or crosses the exiting road network. The majority of construction sites are expected to have similar impacts in nature, involving bridge construction and intersection/ interchange construction.

Traffic management impacts are expected to be limited to staged lane realignments and overnight road closures and detours for bridge beam placement.

The construction of the Project will affect a number of pedestrian and cycle facilities, such as those associated with Kāpiti Road, Te Moana Road and the river trails. Pedestrian and cycle facilities will be maintained on each side of a road where current facilities exist, where possible. If this is not possible, justification as to why this is the case will be provided.

Temporary pedestrian routes will either divert pedestrians onto the opposite footpath, onto a temporary path, or detour pedestrians down an alternative route. Appropriate controls, signage and delineation (e.g. pedestrian ramps and refuges or controlled crossings) will be installed to provide a safe and clear temporary pedestrian route.

Cycle routes will be maintained by either maintaining the existing traffic lanes through the construction area where cyclists are using the existing road or a temporary cycle route will be established. In addition, temporary speed limits could be installed where appropriate.

1.3. Conclusion

In general the effects outlined in this assessment are expected to be able to be mitigated acceptably provided the procedures outlined by the CTMP are followed. The effects are not anticipated to be significantly greater or unusual compared with other major road construction projects completed in the Wellington region in the last five to ten years. As such, the NZTA has considerable experience and a strong track record of successfully managing the effects of construction on traffic that will be carried through onto the MacKays to Peka Peka Project.

2 Introduction

2.1 Background

The MacKays to Peka Peka Expressway Project forms part of the Wellington Northern Corridor, running from Wellington Airport to Levin. This corridor is one of the seven Roads of National Significance (RoNS) named in the Government Policy Statement on Land Transport Funding 2009/10-2018/19, which focuses on supporting New Zealand's productivity and economic growth.

The Expressway is a proposed new route for State Highway 1 within Kāpiti running approximately 16km from Poplar Avenue in the south to Peka Peka Road in the north.

In 2011, the NZTA confirmed its intension that the MacKays to Peka Peka Project would be lodged with the Environmental Protection Authority as a Proposal of National Significance.

The MacKays to Peka Peka Alliance has been commissioned by the NZTA to undertake a transport assessment to assess the potential effects during construction of the MacKays to Peka Peka Project (the Project). This will inform the *Assessment of Environmental Effects* (AEE) for the Project.

2.2 Report Structure

This assessment provides an appraisal of the traffic impacts arising from construction of the Project and associated temporary traffic management methodologies. It provides a description of any possible alternative locations or methods for undertaking the activity, where appropriate. It also proposes measures to mitigate the identified impacts, where possible.

In general it is expected that traffic impacts will primarily be monitored and managed in accordance with the *Construction Traffic Management Plan* (CTMP) (CEMP Appendix O, Volume 4), which forms part of the *Construction Environmental Management Plan* (CEMP, Volume 4) suite of documents.

The construction traffic effects described in this report arise directly out of the construction activities and traffic methodologies required to construct the Project which are described in the *Construction Methodology Report* (Technical Report 4, Volume 3). This *Construction Methodology Report* forms part of the AEE and should be read in conjunction with this report as it describes the proposed staging and programming of the works in more detail.

While this report compares the traffic impacts of construction to the existing environment, a full description of the existing environment is not included in this report. A summary of the existing environment is included in Section 3. Please refer to the *Assessment of Transport Effects* (Technical Report 32, Volume 3) for a full description of the existing traffic environment.

Procedures for the planning, management, operation and monitoring of traffic control, which applies to all the activities noted above, can be found in the CTMP (CEMP Appendix O, Volume 4). As such, this assessment should be read in conjunction with the CTMP. The CTMP outlines the standards, methodologies and procedures necessary to mitigate the traffic impacts of construction and the associated traffic management methodologies adopted for the Project.

It is expected that the temporary traffic management activities identified in this assessment will be refined during development of Site Specific Traffic Management Plans (SSTMPs), at a time closer to construction commencing. At that time, the specific impacts of each activity at that stage will be better understood and detailed mitigation strategies will be able to be developed, agreed and implemented.

While this assessment discusses physical works which will form part of the temporary works, it is important to note that it does not prescribe or limit the activities that may become part of the final design.

2.3 Other Reports

The main transport assessment is documented in the *Assessment of Transport Effects (ATE)* (Technical Report 32, Volume 3). The Transport Assessment is supported by the *Traffic Modelling Report* (Technical Report 34, Volume 3).

This assessment is the *Assessment of Temporary Traffic Effects*, which appraises the traffic impacts of the construction of the Project. It is supported by the *Construction Traffic Management Plan* (CTMP) (CEMP Appendix O, Volume 4).

2.4 Performance Standards and Specifications

Temporary Traffic Management (TTM) is governed by New Zealand legislation, in particular, the Land Transport Act 1998. Land Transport Rules made pursuant to that Act, which relate to TTM, include:

- Land Transport (Road User) Rule 2004
- Land Transport Rule: Traffic Control Devices 2004
- Land Transport Rule: Setting of Speed Limits 2003

NZTA's Traffic Control Devices Manual (TCD Manual) provides guidance on industry good practice, including, where necessary, practice mandated by law in relation to the use of traffic control devices. The primary standard (which forms part of the TCD Manual) that will be adhered to in planning, coordinating and implementing TTM for this Project is NZTA's Code of Practice for Temporary Traffic Management (COPTTM) (including the local road supplement and Road Controlling Authority (RCA)--specific procedures).

The TCD Manual includes and will supersede previous stand-alone documents relevant to TTM, such as COPTTM and the Manual of Traffic Signs and Markings (MOTSAM). NZTA's State Highway Geometric Design Manual (Draft) also provides design standards and procedures for the State highway work.

Further information on the standards, procedures and guidelines necessary for implementation of temporary traffic management on the Project are contained in the CTMP.

3 Existing Environment

The existing State Highway 1 (the existing SH1) at the southern end of the Project (MacKays Crossing) is a divided 4-lane highway, with a posted speed limit of 100 kilometres per hour (kph) and a current annual average daily traffic (AADT) volume of approximately 23,800. At the northern end of the Project (Peka Peka), the existing SH1 is an undivided two lane highway, with a posted speed limit of 100 kph and a current AADT of approximately 16,800.

The proposed Expressway Alignment will connect or cross a number of Secondary Arterial roads (as defined by the Kāpiti Coast District Council (KCDC) Road Hierarchy) in the KCDC road network, including Poplar Avenue, Raumati Road, Kāpiti Road, Mazengarb Road, Otaihanga Road, and Te Moana Road. These roads typically have a generous two lane cross-section, 50/ 80 kph environment, with average daily traffic (ADT) flows between 20,600 (Kāpiti Road) and 3,900 (Poplar Avenue). Project construction works will also occur on Ngarara Road, Smithfield Road, and Peka Peka Road. The proposed Expressway Alignment crosses the Wharemauku Stream trail and Waikanae River trail.

Figure 3.1 below illustrates the areas (shown with stars) where the Project will impact on the existing traffic environment.

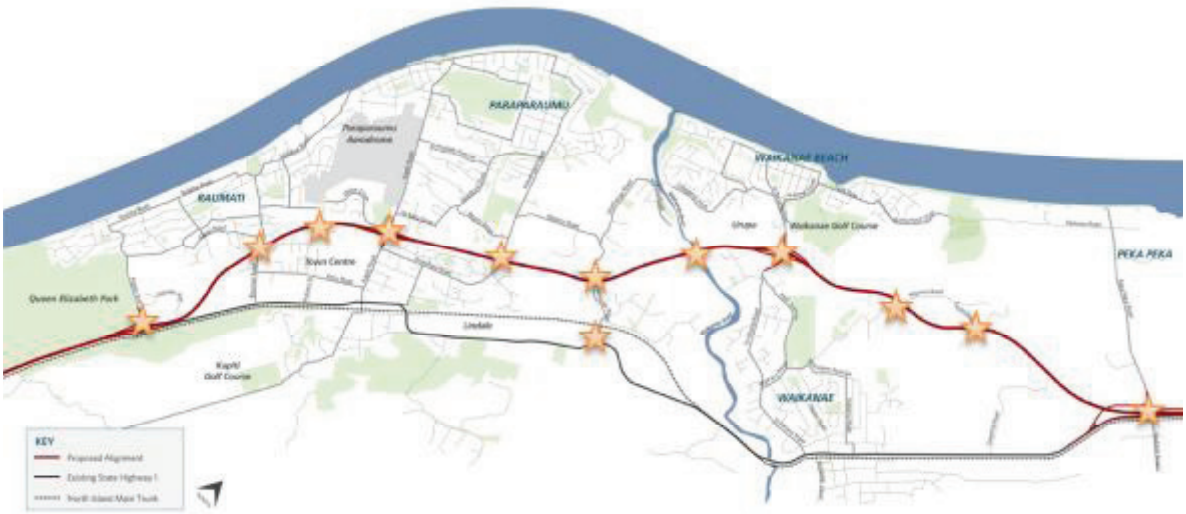


Figure 3.1 – Areas where construction will impact on the existing traffic environment

A full description of the existing traffic and transport environment in the Kāpiti area is included in the *Assessment of Transport Effects* (Technical Report 32, Volume 3).

4 Project Description

Please refer to the full Project description (Construction & Operation) within Part D, Chapters 7 and 8, Volume 2 of the AEE.

The Project has been divided into 4 sectors, based on the different environmental areas of the Project. The sector delineation is outlined in the site description AEE documentation.

The construction activities and traffic management approach to each sector can be broadly described as follows:

4.1 Sector 1 – Southern End

Poplar Avenue and the existing SH1 / Poplar Avenue intersection are planned to be realigned under three phases to allow off line construction of the Poplar Avenue interchange.

The existing SH1 / Leinster Avenue intersection will be closed permanently.

4.2 Sector 2 - Paraparaumu

The construction of overbridges on Raumati Road and Mazengarb Road and the lowering of Mazengarb Road are planned to be constructed under a staged process. The Mazengarb Road lanes and shoulder are proposed to be narrowed and realigned around the construction works. Pedestrians will be diverted to the opposite footpath to the construction area. Bridge beams are planned to be lifted in place overnight under a detour.

During the Wharemauku Stream Bridge construction pedestrians and cyclist on the Wharemauku Stream trail will be temporarily diverted around the construction area.

The construction of the Kāpiti Interchange is planned to be constructed under three phases. Kāpiti Road is planned to be realigned in each phase around the construction area with narrowed lane widths.

4.3 Sector 3 – Otaihanga / Waikanae

The main Project office and yard are planned to be established off Otaihanga Road. The resulting high construction traffic volume on Otaihanga Road is considered to require the construction of a roundabout at the existing SH1/ Otaihanga Road intersection.

The construction of the existing SH1/ Otaihanga Road roundabout and Otaihanga Road Bridge are planned to be staged, requiring traffic lanes to be realigned around the construction works, maintaining bi-directional flow. The Otaihanga Road Bridge beams are planned to be lifted in place overnight under a detour.

The construction of the Waikanae River Bridge is expected to require the realignment of the Waikanae River trail. Pedestrian and cycle detours are expected to be required during abutment construction and bridge beam placement.

The construction of the Te Moana Road Interchange is planned to be constructed under three phases. Te Moana Road is planned to be realigned in each phase around the construction area with narrowed lanes. The Te Moana Road Bridge beams are planned to be lifted in place overnight under a detour

4.4 Sector 4 – Peka Peka

The Ngarara Road Overbridge and Smithfield Road Extension are planned to be constructed using a single lane flow operation. Construction vehicles will access the site along a haul route from Peka Peka Road.

The construction of the Peka Peka Interchange is planned to be constructed under three phases over a period of three years. Peka Peka Road is planned to be diverted down the proposed service road to a temporary intersection with the existing SH1 at the location of the southern roundabout. Once the service road between Peka Peka Road and Te Kowhai Road is completed and opened, the existing SH1/ Te Kowhai Road will be permanently closed. The connection works and reconstruction of the existing highway will be constructed using short term traffic management measures.

5 Overview of Traffic Impacts and Proposed Mitigation Measures

This section describes the generic traffic management activities and the associated impacts that are expected to arise from the construction of the Project.

Only once detailed construction planning has commenced can detailed site-specific work on traffic management and mitigation measures be confirmed. This allows traffic management measures to be refined to best meet the needs of stakeholders, affected parties and the needs of construction. This assessment therefore reflects the best understanding of likely traffic management methodologies required for the construction works, and is based on similar road construction activities used across the country.

The impacts of the traffic control activities described in the following sections can be broken up into six broad categories, which are included in Table 5.1 below. The six categories of impacts generally arise from a number of traffic management activities, which are also shown.

At this stage of planning, the Project is only expected to impact the traffic environment in discrete areas, having little network wide effect.

Table 5.1 - Summary of Impacts and Traffic Control Activity

Impact Category	Traffic management activity
1. Impacts on capacity of existing carriageways	- Shoulder narrowing - Lane narrowing - Lane realignment (long term realignment of lane marking) - Temporary lane realignments (short term realignment using cones) - Temporary intersections - Temporary speed limit
2. Temporary closures of existing carriageways	- Lane closure - alternating flow operation (two-way traffic using a single lane alternately in each direction) - Lane closure - contra-flow operation (opposing traffic operating on the same side of the road) - Lane closure - one-direction closure (reduction in available lanes on a multiple lane road) - Road closure / detour - Short term closures for installation of long-term closures / traffic control measures - Temporary speed limit - Intersection part closure (which may include installation of lane closures on the approaches to the intersection to safely divert traffic around the works). - Intersection full closure (which may include installation of full closures on the approaches to the intersection to safely divert traffic around the works).
3. Impacts arising from site access locations and movements	- Site access from a local road or highway - Construction vehicle movements
4. Impacts on public transport provision	- Bus route detours - Bus stop closures/ relocations
5. Impacts on pedestrians, cyclists, and mobility routes or	- Footpath closure/ detours/ diversion - Temporary footpath realignment and narrowing - Cycle lane closures / detours

Impact Category	Traffic management activity
crossings	- Temporary cycle way realignment and narrowing
6. Impacts on property access, parking, and manoeuvring	- Shoulder narrowing - Lane narrowing - Lane realignment - Temporary lane realignments - Temporary intersections - Temporary speed limit

Each of these impacts are discussed more in depth for each sector in Section 6 and beyond below. The remainder of this section discusses traffic management activities, impacts and their mitigation which are common to most areas.

5.1 General Traffic Management Effects

Lane Realignments

The short term temporary lane realignments and shoulder closures and long term remarked lane arrangements are not expected to impact the capacity of the existing intersection or roads. Short term activities will occur outside peak hour traffic flows to minimise disruption to road users. The alignment for each stage will be designed in accordance with NZTA and KCDC requirements. The road marking will be clearly re-marked to safely direct road users along the new alignment.

Road Closure and Detours

The full closure of roads and associated detours during bridge beam placement will significantly increase the time and distance that road users have to travel. The closure will occur overnight, during low traffic flow to minimise the impact on road users. Variable message sign (VMS) preconditioning will be installed prior to the closure and on the night to alert road users to the closure and allow them to make early decisions on their choice of route. Letters will be distributed to residential and commercial properties in the area well before the road closure.

Overdimension Routes

The NZTA Overdimension Vehicle Route Maps identify the existing SH1, Marae Lane, Te Moana Road (between the existing SH1 and Marae Lane), and Ngaio Road (between the existing SH1 and Marae Lane) as an Overdimension Vehicle Route. These routes will be maintained throughout the duration of the works. The NZTA's Project team[1] will endeavour to accommodate any other over-dimension movements required through the Project areas during construction when approached.

[1] This Technical Report refers to the Project team as carrying out works on behalf of and as contracted by the NZTA. The NZTA is the requiring authority and the consent holder.

5.2 Traffic Effects of Construction Vehicle Movements

The construction of the Project will generate a number of construction vehicle movements on the existing SH1 and the KCDC network as described in the tables below. The construction vehicles will typically be large rigid vehicles used to transport materials, such as aggregates, concrete, prefabricated units, and other building materials. Most of these movements will originate from the local quarries and precast yards. Passenger vehicles will also be required for transport of construction personnel between construction sites.

The expected number of construction vehicle movements has been estimated for the duration of the Project. The volume estimate was based on the quantity of materials required for each construction activity and each construction site against the construction programme. An allowance has also been made for personnel transport. These volumes were then disaggregated for each road and intersection. The expected maximum daily construction vehicle volumes generated by each primary source in vehicles per day (vpd) are summarised in Table 5.2 below.

Table 5.2 - Summary of expected daily construction vehicle volumes generated by source

Source	Expected Maximum Daily Round Trips	Normal Hours of Operation
Firth, Lindale	20 vpd	07:00 to 19:00
Higgins Aggregates, Paraparaumu	245 vpd	07:00 to 19:00
Winstone Aggregates Quarry, Ōtaki	245 vpd	07:00 to 19:00
Various, Construction Personnel	200 vpd	07:00 to 19:00
Other deliveries	Included	

The main Project office and yard area will be established off Otaihanga Road. This yard will be the administrative centre, main access point to the alignment, pre-cast concrete yard, and main delivery point for materials among other tasks. As such, the yard is expected to generate a large number of construction vehicle movements, approximately 480 round trips at the peak of construction.

Construction vehicle movements will perform deliveries to number the discrete work sites across the Project area. The vehicles will be required to use the major roads where possible, particularly the existing SH1, to avoid residential streets. The impact of construction vehicle movements on public roads will be minimised by using the proposed Expressway Alignment as a haul route as much as possible, once it is available. A map of the routes which construction vehicles are likely to use is shown below in Figure 5.1.

An overdimension permit will be obtained from the Overdimension Permit Issuing Agency (OPIA) for any over dimensioned vehicle movements related to the Project.

The transport of bridge beam units to each bridge site is expected to require the use of over dimensioned vehicles. The transport of over dimensioned loads will be carried out in accordance

with each Road Controlling Authority's requirements. Any transport activities which require modification of the road environment or traffic management will be agreed and approved through the SSTMP process.

The normal hours of operation for construction vehicles are proposed to be between 7:00am and 7:00pm, Monday to Saturday. Some work will occur outside these hours to carry out special operations, such as bridge beam placement over local roads. Construction vehicle operation outside these hours will be restricted to discrete activities and occur rarely throughout the Project.

Works may also be programmed for holiday periods during which traffic demands are reduced and there is a higher proportion of discretionary trips on the network. Such opportunities will be investigated on a case by case basis, with an approach agreed with the relevant RCAs prior to the proposed activity. However, in accordance with general NZTA practice the start and end of holiday periods will be avoided.

The construction vehicles are expected to pass a number of "sensitive" areas along their routes. "Sensitive" areas have been defined as facilities which cater for groups of children or mobility impaired persons, such as schools, hospitals, parks, and pools.

The following areas which lie along construction vehicles routes have been identified and are shown in Figure 5.1 below.

- ABC Learning Centre, Raumati Road
- St Patrick's School, Tongariro Street
- Kāpiti English Language Academy, Tongariro Street
- Paraparaumu Playcentre, Hinemoa Street
- Kāpiti School, cnr Kāpiti Road Rimu Road
- Kāpiti Medical Centre, Kāpiti Road
- ABC Learning Centre, Arawhata Road
- Grafton Private Kindergarten, Arawhata Road
- Paraparaumu Domain, Tutanekai Street
- Waikanae Country Lodge, Te Moana Road

All site based personnel, truck drivers in particular, will be made aware of these areas around the Project. Drivers will be required to take extra care while passing these areas and be extra vigilant of children or mobility impaired persons. This requirement is included in the CTMP and will be included in safety briefings once detailed planning is underway.

The expected maximum volumes and period of impact of construction vehicles on major sections of the existing SH1 are shown in Table 5.3 and on affected KCDC roads in Table 5.4 below. It should

be emphasised that the following tables represent maximum figures. Construction vehicle volumes will only be at their maximum for a relatively short phase of the expected period of impact.

Table 5.3 – Impact of Construction Vehicle Movements on SH1

Source	Existing Two-Way Daily Traffic[1.]	Expected Max. Two-Way Trips Per Day	Increase (%)	Expected Period of Impact
South of Raumati Rd	24,000 est.	300	1.3%	2014 to 2017
South of Ihakara Rd	25,000 est.	300	1.2%	2014 to 2017
South of Kāpiti Rd	25,900	430	1.7%	2014 to 2017
South of Lindale	26,000 est.	380	1.5%	2013 to 2017
North of Lindale	23,700	420	1.8%	2013 to 2017
South of Waikanae	27,000 est.	340	1.3%	2013 to 2017
North of Waikanae	18,000 est.	370	2.1%	2013 to 2017
North of Peka Peka Rd	16,800	490	2.9%	2013 to 2017

Note: 1. Based on counts carried out in 2010 by NZTA or estimated values.

Table 5.4 - Impact of Construction Vehicle Movements on KCDC Roads

Source	Existing Two-Way Daily Traffic[1.]	Expected Max. Two-Way Trips Per Day	Increase (%)	Expected Time of Impact
Poplar Ave	3,900	150	4%	2014 to 2017
Raumati Rd	11,500	90	1%	2016
Ihakara Rd	4,800	150	3%	2015
Kāpiti Rd	20,600	150	1%	2014 to 2015
Tutanekai St	5,000	150	3%	2014 to 2015
Hinemoa St	2,800 est.	490	18%	2013 to 2017
Tongariro St	1,300 est.	490	38%	2013 to 2017
Ruahine St	1,600	490	31%	2013 to 2017
Mazengarb Rd	7,800	150	2%	2014 to 2015
Ventnor Drv	1,600 est.	40	2.5%	2013 to 2017
Otaihanga Rd	6,300	960	15%	2013 to 2017
Te Moana Rd	9,200	350	4%	2014 to 2016
Rutherford Dr	900 est.	80	9%	2015 to 2017
Ngarara Rd	900	0	0%	
Peka Peka Rd	1,100	250	23%	2014 to 2017

Note: 1. Based on counts carried out in 2010 by KCDC or estimated values.

The tables indicate that the additional construction vehicle traffic represents a minor increase in total daily volume on State Highway 1 and on the majority of the KCDC roads when compared to the daily variation in traffic volumes. To put this in perspective, the 90th percentile daily volume on the existing SH1 compared to the average daily volume is a 14% increase, after seasonal adjustment. Therefore the increase in traffic volume due to construction traffic is within normal

seasonal variation. The increase in movements on Hinemoa Street, Tongariro Street, Ruahine Street, and Peka Peka Road due to construction appears to be significant.

The significant construction vehicle traffic expected on Hinemoa Street, Tongariro Street and Ruahine Street are due to movements related to the Higgins Aggregates Quarry, situated on Ruahine Street. These streets lead directly to the quarry, and hence will experience high construction vehicle traffic volumes, particularly when the quarry is in full production for the Project. Construction vehicle drivers will be reminded to take care when driving to or from the Higgins Aggregates Quarry, particularly around the schools and playcentre in the area.

It should be noted that the Higgins Aggregates Quarry is an existing quarry and therefore the impact of construction vehicles accessing the quarry is not unique to the Project. The road network around the quarry has experienced full production traffic volumes of the quarry recently during the KiwiRail's double tracking works in Paraparaumu/ Waikanae. Mitigation measures which were implemented during the double tracking works will also be implemented during the Project's construction. The road pavements which lead to the quarry are expected to have been designed to carry the quarry movements because the Project will not change the existing use of the quarry.

The additional traffic expected on Peka Peka Road will be limited to the existing SH1/ Peka Peka intersection area. The impacts of construction vehicle movements on intersections are discussed below.

A volume analysis was completed on the intersections expected to be impacted by construction vehicle movements. Intersections which were found to have a significant increase in turning movements (above 25% and more than 10 vehicles) were analysed using a Sidra intersection model. A summary of the results for the most significantly affected intersections are shown in Table 5.5 below. Further details of the analysis and assumptions of the Sidra models are included in Appendix 33.A – Construction Traffic Assessment File Note.

Table 5.5 - Summary of Sidra intersection analysis

Intersection	Period	2016 (Existing Environment)			2016 Including Construction Traffic		
		Demand Flow [2], veh/hr	Average Delay, s	95th Percentile Queue [3], veh (m)	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
Ruahine St / Tongariro St	AM	224	2.9	0.4 (3)	333	5.3	1.1 (10)
	IP	121	2.9	0.1 (1)	230	6.2	0.7 (7)
	PM	174	2.7	0.2 (1)	283	5.6	0.8 (8)
Hinemoa St / Tongariro St	AM	243	5.0	0.3 (2)	346	7.0	0.8 (8)
	IP	240	3.8	0.3 (3)	343	6.4	0.9 (9)
	PM	204	5.0	0.2 (2)	307	7.2	0.7 (7)
Hinemoa St / Kāpiti Rd	AM	1004	7.8	0.8 (6)	1107	13.5	3.3 (30)
	IP	805	7.7	0.5 (4)	908	11.4	2.1 (20)
	PM	989	7.4	0.5 (4)	1093	13.2	2.8 (26)
Existing SH1/ Otaihanga Rd	AM	2493	4.3	2.9 (21)	2751	20.9	20.4 (218)
	IP	1975	4.1	2.1 (16)	2235	14.6	9.4 (106)
	PM	2512	17.7	21.7 (152)	2770	199.6	98.8 (796)
Te Moana Rd/ Ngarara Rd	AM						

[2] Demand Flow is the total input traffic volume (per hour) multiplied by a peak flow factor (PFF)/flow scale. This flow represents the traffic flow demand expected during a peak in the peak hour period, at an intersection.

[3] The 95th percentile queue length is the value below which 95 per cent of all observed cycle queue lengths fall, or 5 per cent of all observed queue lengths exceed.

Intersection	Period	2016 (Existing Environment)			2016 Including Construction Traffic		
		Demand Flow [2], veh/hr	Average Delay, s	95th Percentile Queue [3], veh (m)	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
	IP						
	PM						

The table above indicates that the "worst case" 95th percentile queues at the majority of these intersections are not expected to increase by more than five vehicles, with the exception of the existing SH1/ Otaihanga intersection. The 95th percentile back queue length at the existing SH1/ Otaihanga intersection is expected to increase by up to 644m or 77 vehicles, in the PM peak hour. The average delay is expected to increase by around 180s in the afternoon peak however in the morning and midday period, the increase in delays is minor. The impact and mitigation of the existing SH1/ Otaihanga Road intersection is discussed below in Section 8.2.

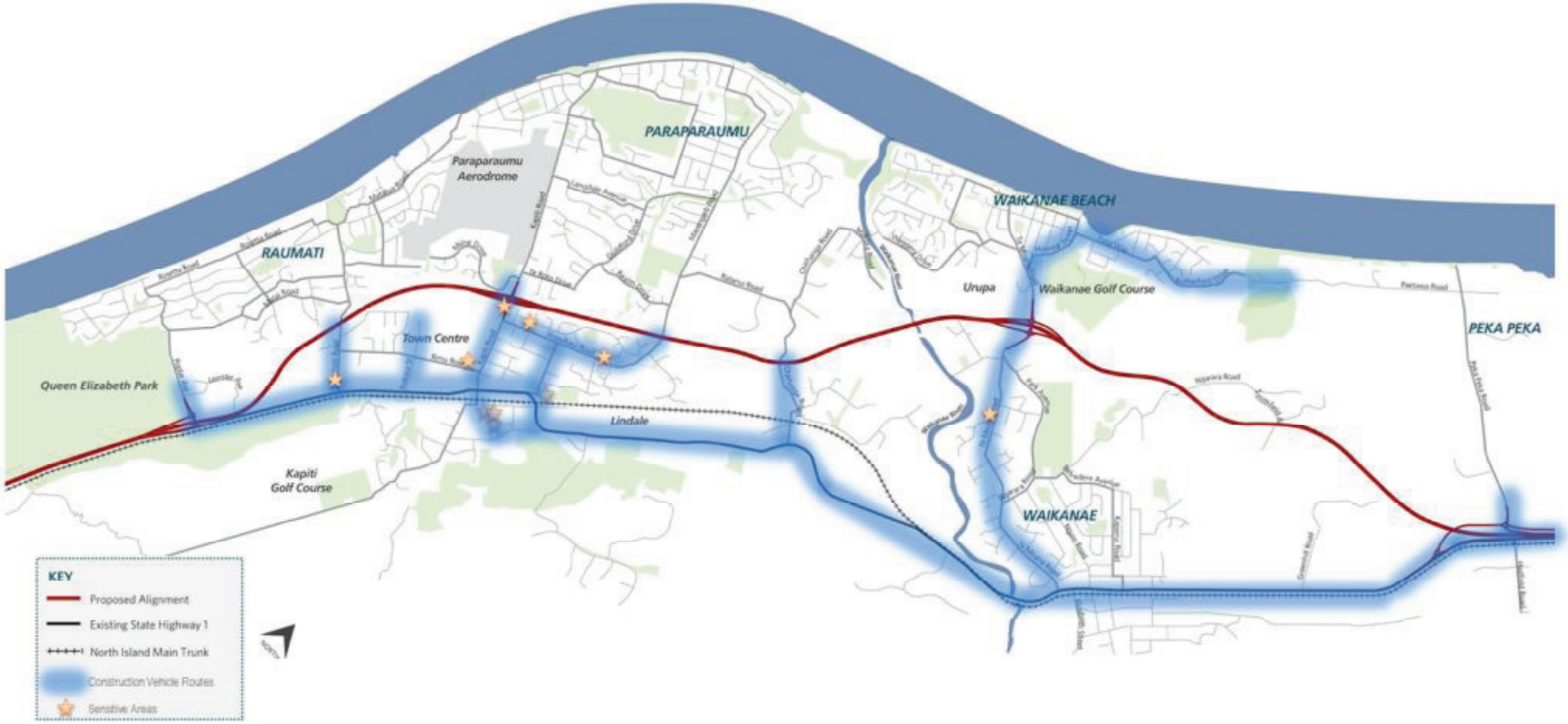


Figure 5.1 – Proposed Construction Vehicles Routes and Sensitive Areas

5.3 Site Access

Site access points will be located off the existing SH1 and in slower speed environments, where possible, to minimise impact on traffic. The acceleration and deceleration of heavy vehicles in slower speed environments will create less noise. Site access points on the local network will be designed in accordance with KCDC requirements and consider turning bays for vehicles entering the access and appropriate visibility. Where the existing pavement cross-section fronting a site access point does not allow for construction vehicles to pull off the through lane before turning into site, additional pavement will be constructed to allow this manoeuvre.

As noted in Section 5.2 above, the normal hours of operation for construction vehicles will be between 7:00am and 7:00pm. Where the road which fronts a site access point experiences high peak hour flows, movements will aim to occur outside of the peak flow period.

Further details of the site specific requirements for installation and use of site accesses are described in the CTMP.

The location of the site access points, for each work zone, for each construction phase is shown on the drawings CV-CM, Construction, Volume 5.

5.4 Pedestrians, Cyclists, and Horse Riders

The Kāpiti area has a network of existing pedestrian and cycle routes, which generally follow the local roads and some waterways in the district. The construction methodology and traffic management activities will endeavour to maintain pedestrian and cycle flow through the Project area where formal routes currently exist. The construction of the Project will affect the following pedestrian and cycle facilities;

- The existing SH1 shoulder for cyclists (particularly at the Poplar Avenue, Otaihanga Road and Peka Peka Road intersections);
- Footpath on the north side of Poplar Avenue, west of Leinster Avenue;
- Footpath on west side of the existing SH1, between Leinster Avenue to approximately 400m north of Leinster Avenue;
- Footpath on both sides of Raumati Road;
- Wharemaku Stream Trail (cycle and walkway);
- Footpath and cycle lane on north side of Kāpiti Road, shared pedestrian cycle way on the south side;
- Footpath on south side of Mazengarb Road;
- Gravel cycle and walkway on Otaihanga Road;
- Waikanae River Trail (cycle and walkway) and Bridge crossing at the Otaihanga Domain, and;

- Footpath on north side of Te Moana Road.

The pedestrian routes will be maintained by either diverting pedestrians onto the opposite footpath, onto a temporary path, or detouring pedestrians down an alternative route. Appropriate signage and delineation will be installed to provide a safe and clear temporary pedestrian route. Pedestrian facilities will be maintained on each side of a road where current facilities exist, where possible. If the facilities are required to be combined on one side of a road, justification as to why this is the case will be provided. Facilities will be provided to create a safe crossing point, such as;

- Pedestrian ramps and pedestrian refuges;
- Traffic calming;
- Assisted crossing for school children, and/or;
- Temporary controlled/zebra crossings as appropriate and agreed with KCDC.

Safety barriers will be installed to isolate pedestrians from the work site and traffic as required. Where the Project changes a major pedestrian route, the public will be advised of the impact on the route and alternative routes provided through information boards erected at appropriate locations and media advertising.

Existing cycle lanes or shoulders used by cyclists will be maintained, where possible. If cycle lanes or shoulders are required to be reduced or cyclists are detoured, justification as to why this is the case will be provided. Cycle access will be mitigated by either maintaining the existing traffic lanes through the construction area where cyclists are using the existing road or a temporary cycle route will be established where an existing cycle route cannot be maintained. Where lane widths impact on cyclists' safety, signage will be installed in advance of the area to enhance driver awareness. In addition, temporary speed limits could be installed where appropriate.

A number of informal pedestrian and cycle routes are known to run through and across the proposed Expressway Alignment. These routes will not be available during construction, and will be effectively closed by the construction works. Some of these routes will be re-established once areas of the Project are completed and commissioned.

The Kāpiti area has a number of active equestrian groups and social horse riders. The Kāpiti Pony Club, which is accessed off Gabriel Street, currently use the existing Western Link Road (WLR) designation as a bridleway. The Waikanae Pony Club makes use of Waikanae Park, which is adjacent to Ngarara Road. The Walking, Cycle, and Bridleway reference group is a community group which champions walking, cycling, and Horse Riding in the Kāpiti area. As part of community consultation work prior to construction, these groups will be made aware of the impact of the Project, including construction effects. The effects on equestrian groups will be mitigated where possible, such as providing alternative bridleway access.

5.5 Passenger Transport

Most of the Kāpiti Bus routes will pass through the Project area, particularly on Raumati Road, Kāpiti Road, Mazengarb Road, and Te Moana Road. The Project work will not stop or significantly impede traffic flow through these routes, except during night closures, where an alternative route will be used. The frequency of bus services is lower during the night and hence the impact on buses is expected to be minor. GWRC and the local bus companies will be made aware of how the Project affects these routes prior to commencement of construction works in the area. Bus routes will be maintained in the same manner as other road users in the traffic management methodologies.

Some bus stops on Kāpiti Road, Mazengarb Road and Peka Peka Road are required to be relocated during construction of the Project. The suitable alternative location, pedestrian access, required signage, marking, and advertising will be agreed with KCDC and GWRC before commencement of construction works in the area.

5.6 Utilities

At the time of developing this report, the utility works required as part of the Project were still under investigation. As such, the extent of utility construction work for the Project and associated traffic management are not well understood. Traffic management activities to facilitate the utility works are anticipated to be limited to areas surrounding the proposed Expressway interchanges and bridges. The utility works are expected to be constructed within the traffic management required for the road and bridge construction as described below. Additional traffic management may be required for some utility works; however these are expected to be similar to the traffic management activities described below and will have a similar impact.

5.7 Pavement Maintenance

The impact of the Project on pavement maintenance will arise through increased volume of heavy commercial vehicles (HCVs) movements on the road network. Pavements are deigned are generally designed to withstand an expected volume of HCVs for a typical period of 25 years.

Table 5.5 below includes the expected existing volume over 25 years and expected total construction volume on the KCDC road network. The expected increase in HCV volumes on the existing SH1 due to construction is less than 2.5%.

Table 5.5 - Impact of Construction Vehicle Movements on KCDC Road Pavements

Source	Expected Existing HCV Volume (Million vehicles)	Expected Construction HCV Volume (Million vehicles)	Increase (%)	Expected Time of Impact
Poplar Ave	1.07	0.04	7%	2014 to 2017
Raumati Rd	3.15	0.01	1%	2016
Ihakara Rd	1.31	0.02	3%	2015
Kāpiti Rd	5.64	0.02	1%	2014 to 2015
Tutanekai St	1.37	0.01	2%	2014 to 2015
Hinemoa St	0.77	0.08	21%	2013 to 2017
Tongariro St	0.36	0.08	46%	2013 to 2017
Ruahine St	0.44	0.08	37%	2013 to 2017
Mazengarb Rd	2.13	0.01	1%	2014 to 2015
Ventnor Drv	0.44	0.03	12%	2013 to 2017
Otaihanga Rd	1.72	0.44	51%	2013 to 2017
Te Moana Rd	2.52	0.04	3%	2014 to 2016
Rutherford Dr	0.25	0.03	22%	2015 to 2017
Ngarara Rd	0	0	0	
Peka Peka Rd	0.30	0.05	33%	2014 to 2017

The table indicates that construction traffic will represent a significant increase in HCV volumes over the 25 year design life of a number of KCDC road pavements. However, Hinemoa Road, Tongariro Road, and Ruahine Road lead directly to the existing quarry and hence are expected to have been designed to carry the quarry movements. Ventnor Drive leads directly to the existing Firth Concrete Plant and hence are expected to have been designed to carry the quarry movements. Peka Peka Road will only be impacted at the eastern end, which will be reconstructed as part of the Project.

The roads which are expected to experience a significantly higher pavement loading compared to their design loading resulting from the Project are Otaihanga Road and the roads from Te Moana Road leading to and including Rutherford Drive. The higher pavement loading is expected to have the effect of shortening the pavement's design life and bringing forward maintenance work. The NZTA's Project team proposes that the impact on the Otaihanga Road pavement maintenance be assessed by a joint assessment. This assessment would determine the reduction in design life on this road due to construction traffic using the current RAMM data and would determine the resulting costs to bring forward maintenance works. The NZTA's Project team would then contribute that additional cost towards the maintenance of Otaihanga Road. The responsibility for undertaking maintenance on roads outside the Project area is expected to stay with the respective RCAs.

6 Sector 1 – South End

The remainder of this assessment details the traffic management methodologies necessary to complete works in each of the four sectors of the Project. Each section provides an overview of the traffic management methodology, an appraisal of the likely traffic management impacts, and proposes a preliminary mitigation strategy where necessary.

The direct impacts to traffic during construction in Sector 1 will occur at the existing SH1 / Poplar Avenue and existing SH1 / Leinster Avenue intersections.

6.1 Poplar Avenue Interchange

Preliminary Traffic Management Methodology

The majority of the Poplar Avenue Interchange will be constructed off-line under a three stage process, which is expected to span three years. The first stage will realign Poplar Avenue by remarking traffic lanes to a reduced carriageway width using lane closures and temporary lane realignments. The temporary SH1 / Poplar Avenue intersection to the south of the existing intersection will also be constructed during the first stage. An indicative layout of the temporary intersection is shown in drawing CV-CM-303, Construction, Traffic Management, Volume 5. The existing SH1 / Leinster Avenue intersection will be closed and traffic diverted to the existing SH1 / Poplar Avenue intersection. Site access will be from Poplar Avenue and through the closed existing SH1 / Leinster Avenue intersection.

A number of properties to the north of Leinster Avenue, which currently have access off the existing SH1, will have their existing access closed during construction. Temporary access to these properties will be maintained until the proposed alternative access from Leinster Avenue is commissioned.

A temporary speed limit of 60kph is proposed for Poplar Avenue, between Leinster Avenue and the existing SH1, during the construction period to maintain safe operating speeds for the temporary environment.

Temporary TL-3 barriers will be installed to isolate the work site from passing traffic with gaps provided where necessary for site access from Poplar Avenue.

The second stage will commission the temporary Poplar Avenue / SH1 intersection, which facilitates the construction of the new Poplar Avenue /SH1 intersection.

Under the third phase, the connections between the existing SH1, the proposed Expressway and Poplar Avenue will be constructed using lane closures, alternating flow and temporary lane realignments. The proposed Expressway Alignment will be commissioned at the end of this stage.

The existing SH1 / Poplar Avenue intersection roundabout and new SH1 alignment will be constructed in the third stage, also using lane closures and temporary lane realignments.

An indicative layout of each stage is shown in drawings CV-CM-301 to 304, Construction, Traffic Management, Volume 5.

Traffic Management Impacts and Mitigation

The current two-way peak hour flow on Poplar Road is 300 vph in the morning and evening peak period. COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle) and hence Poplar Avenue is not expected to experience any significant delays.

The temporary relocation of the SH1 / Poplar Avenue intersection is expected to cause an inconvenience to road users. The intersection will be designed in accordance with the KCDC and NZTA standards, replicating the existing intersection in the new location to maintain existing capacity. All road signage and marking will be altered to direct road users to the new intersection location.

The closure of the existing SH1 / Leinster Avenue intersection is expected to re-route traffic to the SH1 / Poplar Avenue intersection, which is located 460m to the south. Sidra intersection models were used to assess the potential impact on the existing SH1 / Poplar Avenue intersection during the construction period. The models were developed for the morning and evening peak periods and a midday period using counted flows factored by 13% (to account for traffic growth and seasonal variation) on a weekday. Three model scenarios were tested; the existing situation (2016 Do-Minimum), the existing situation (2016 Do-Minimum) plus construction traffic and the existing situation (2016 Do-Minimum) plus construction traffic with the re-routed traffic from Leinster Avenue. The results of the intersection modelling are shown in Table 6.2 below. For further details and assumptions of the Sidra models, please refer to Appendix 33.A – Construction Traffic Assessment File Note.

Table 6.2 – Summary of SH1 / Poplar Avenue Sidra Intersection analysis

Model	Period	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
Existing	AM	2328	2.8	1.4 (10)
	IP	1473	1.6	0.3 (2)
	PM	2719	3.9	3.0 (21)
Existing plus Leinster Ave traffic and construction movements	AM	2421	3.6	1.7 (13)
	IP	1601	2.8	0.9 (8)
	PM	2807	29.7	29.7 (236)
Existing plus Leinster Ave traffic only	AM	2388	3.2	1.5 (11)

Model	Period	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
	IP	1526	2.1	0.5 (4)
	PM	2772	5.7	4.6 (32)

The analysis indicates that the combined effect of construction traffic and traffic re-routed from Leinster Avenue is expected to cause a significant impact on the existing SH1 / Poplar Avenue intersection, in the evening period when compared to the existing scenario. The impact on the morning and inter peak periods are considered to be minor. Removing the effect of construction traffic during the evening peak period greatly reduces the impact to an expected increase in average delay of 2 seconds. Overall, removing the effect of construction traffic during the evening peak period, the increase in delay is not considered to be significant.

Construction traffic will be required to avoid using this intersection during the evening peak period, particularly when Leinster Avenue is closed.

The effect of the Leinster Avenue traffic on the Poplar Avenue intersection is considered to be minor because the modelled scenario will be a very infrequent event and alternative routes will be available for this traffic to travel to their destinations. Hence, the scenario modelled is considered to be conservative as it represents the highest flow that may be expected in a year. Leinster Avenue residents will be encouraged, through media advertising, to use the KCDC road network to avoid delays turning from the existing SH1. It is therefore expected that some Leinster Avenue and Poplar Avenue traffic will use the KCDC road network rather than the existing SH1 intersections due to the expected increase in traffic volumes on the existing SH1. The NZTA's Project team will observe and monitor queue lengths at the intersection weekly during the construction period.

The impacts arising from the site access points and their mitigation are discussed above in Section 6.2.

The temporary speed limit of 60kph will cause some inconvenience to road users, but will result in a negligible increase in travel times (approx. 4 seconds) along Poplar Avenue.

7 Sector 2 – Paraparaumu

The impacts to traffic during construction in Sector 2 will occur on Raumati Road, Wharemauku Stream, Ihakara Road, Kāpiti Road, and Mazengarb Road.

7.1 Raumati Road Overbridge

The majority of the Raumati Road Overbridge can be constructed off-line. The bridge construction is expected to commence in 2016 and take less than one year. An indicative layout of the temporary arrangement is shown in drawing CV-CM-305, Construction, Traffic Management, Volume 5.

Safety barriers will be installed to isolate the work site from passing traffic, pedestrians and cyclists with gaps provided where necessary for site access from Raumati Road. Clear and safe site access points to access the construction areas will be established on both the northern and southern side of Raumati Road.

Overhead construction works on bridges and piers will be staged to avoid having live traffic beneath. Where this is not possible, barriers and nets will be installed to prevent objects dropping on to the traffic lanes below. The bridge beams will be lifted in place overnight under a full road closure and detour. Traffic will be directed to either Matai Road or the existing SH1 and Poplar Avenue, as shown in Figure 7.1 below.

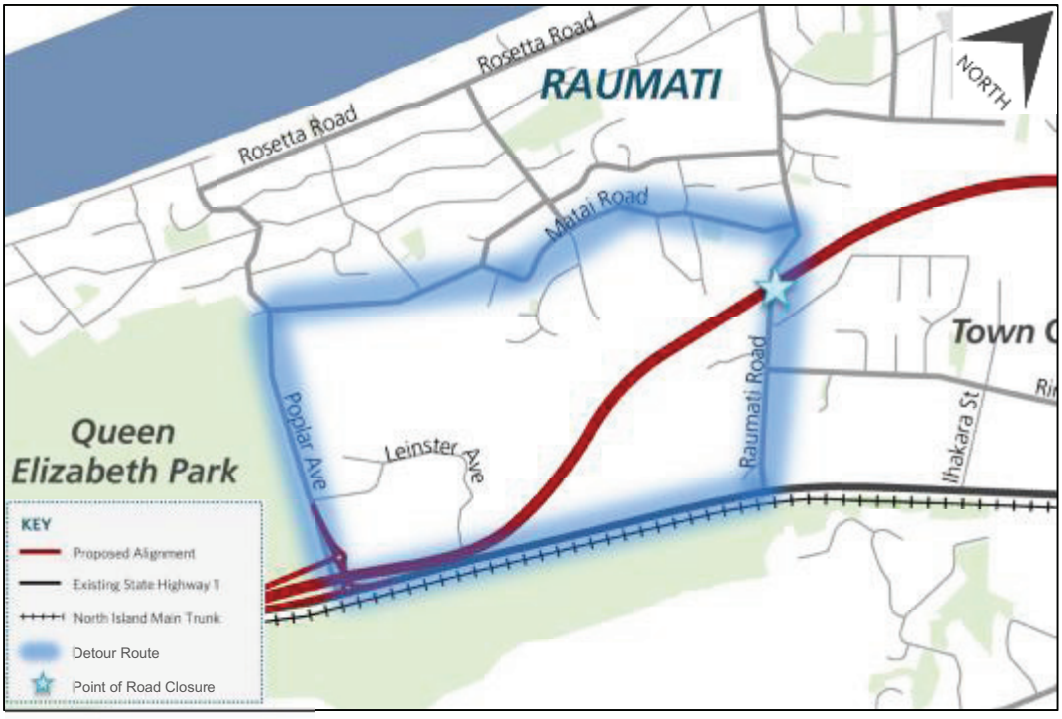


Figure 7.1 – Detour route during Raumati Road night closure

7.2 Wharemauku Stream Bridge

The construction of the proposed Expressway bridge over the Wharemauku Stream is expected to take less than one year to complete. The construction site will be operational for one and a half years, which includes placement of preload material on the proposed Expressway Alignment.

The Wharemauku Stream trail will be impacted by the bridge construction works. Pedestrians and cyclists will be diverted around the construction area during the construction of the southern abutment and bridge beam placement. The northern abutment can be constructed without affecting the existing trail.

A clear and safe site access point to access the Wharemauku Stream Bridge southern abutment construction area will be established at the end of Ihakara Street. The northern abutment and shared pedestrian and cycle bridge construction areas will be accessed from the north, off Kāpiti Road.

An indicative layout of the temporary arrangement is shown in drawing CV-CM-307, Construction, Traffic Management, Volume 5.

7.3 Kāpiti Road Interchange

Preliminary Traffic Management Methodology

The majority of the Kāpiti Interchange will be constructed off-line under a three stage process. The construction of the Kāpiti Road Interchange is expected to take one and a half years. In the first stage Kāpiti Road will be widened to the south. Temporary shoulder closures and temporary lane realignments will facilitate remarking the westbound traffic lane onto the Kāpiti Road median between Arawhata Road and Milne Drive. Temporary lane realignments of the westbound traffic lane will be installed outside of peak hour traffic periods to create a construction area for the pavement widening works opposite Arawhata Road and Te Roto Road.

Facilities for vehicles turning right into accesses on Kāpiti Rd will be provided within each realignment of Kāpiti Road to avoid right turning traffic blocking through lanes.

Temporary TL-3 barriers will be installed to isolate the work site from passing traffic with gaps provided where necessary for site access from Kāpiti Road.

The bus stops located on Kāpiti Road within the Project area will be relocated during construction works on Kāpiti Road. The impacts on bus routes and bus stops and their mitigation are discussed above in Section 5.5.

The second phase will facilitate the reconstruction of the existing Kāpiti Road carriageway. Temporary lane realignments will facilitate the remarking and realignment of both Kāpiti Road lanes on to the new pavement between Arawhata Road and Milne Drive. Temporary lane realignments of

the westbound traffic lane will be installed outside of peak hour traffic periods to allow the widening works adjacent Arawhata Road and Te Roto Road. This phase will require temporary property access closures to properties on the northern side of Kāpiti Road. The Kāpiti Road northern footpath will be diverted around the construction site adjacent the lane realignment with safety barriers installed to isolate pedestrians from the work site and passing traffic.

The third stage will facilitate the construction of the interchange ramp connections, traffic islands and commissioning of the signals. These commissioning works will be carried out under temporary lane realignments and lane closures. The commissioning of the signals will be carried out outside of the peak hour flows to minimise disruption.

Prior to works commencing on the north embankment to Kāpiti Road Bridge, the new footpath link from Greenwood Place to Kāpiti Road will be formed to enable the existing east-west connection into the Te Roto Estate. Upon completion of all works in the proposed Expressway in the area, the footbridge across the Expressway from Makarini Street will be constructed.

An indicative layout of the each stage is shown in drawings CV-CM-308-310, Construction, Traffic Management, Volume 5.

Overhead construction works on bridges and piers will be staged to avoid having live traffic beneath. Where this is not possible, barriers and nets will be installed to prevent objects dropping on to the traffic lanes below. The proposed Expressway bridge beams will be lifted in place overnight under a full road closure and detour. Traffic will be directed to Arawhata Road or Te Roto Drive, Realm Drive, Guildford Drive, and Mazengarb Road, as shown in Figure 7.2 below.

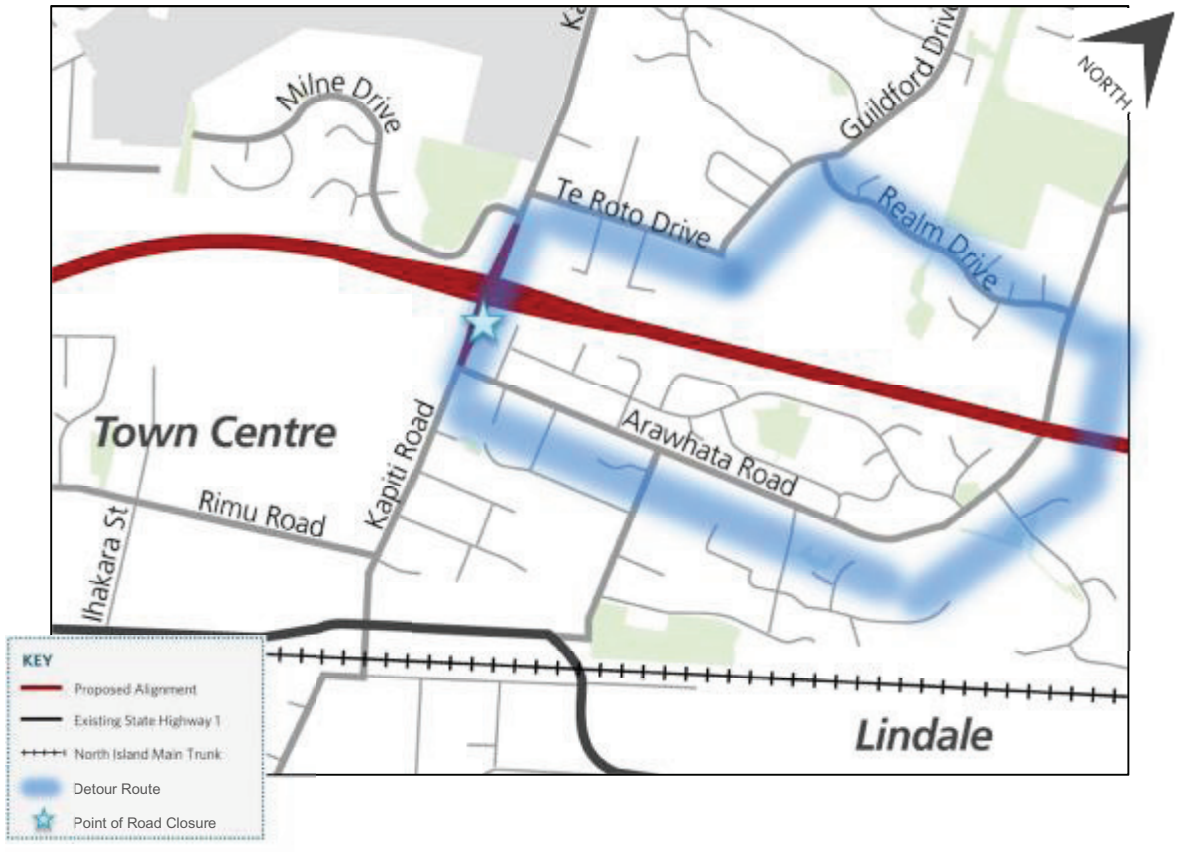


Figure 7.2 – Detour route during Kāpiti Road night closure

Traffic Management Impacts and Mitigation

The pedestrian diversion will result in a slightly longer travel time through the site; however this is considered only a minor inconvenience. Safety barriers will be installed to isolate pedestrians from the work site and traffic as required.

The temporary property access closures on Kāpiti Road will affect the time and manner properties can be accessed. These impacts will generally be mitigated where possible, by providing temporary access ways, allowing access during critical periods and/ or providing alternative access or parking. Property owners will be well informed of the closure in advance of the work, including temporary access arrangements during construction.

7.4 Mazengarb Road and Overbridge

Preliminary Traffic Management Methodology

The majority of the Mazengarb Road Overbridge and road lowering can be constructed off-line under two phases. Construction is expected to take less than one year. In the first phase the existing lanes are planned to be remarked to the west with associated lane and shoulder narrowing using lane closures. Roadside car parking will be removed over this length of Mazengarb Road during construction. The eastern footpath is planned to be closed, pedestrians will be diverted to

the western footpath. Cyclists will be required to use the traffic lane. Property accesses will be impacted during construction.

A temporary speed limit of 30kph is proposed for Mazengarb Road during the construction period to maintain safe operating speeds for the temporary environment.

Temporary TL-3 barriers will be installed to isolate the work site from passing traffic with gaps provided where necessary for site access from Mazengarb Road.

The bus stops located on Mazengarb Road affected by the Project works will be relocated to outside the construction area during construction period. The impacts on bus routes and bus stops and their mitigation are discussed above in Section 5.5.

In phase two both lanes are planned to be remarked to the east on to the lowered pavement. During this phase the northbound lane will be closed using a contra-flow operation outside of peak flow periods when required for construction activities. Pedestrians will be diverted on to a temporary footpath on the east side of Mazengarb Road. The final arrangement of Mazengarb Road works will be completed using discrete lane closures and contra-flow operation.

Overhead construction works on bridges and piers will be staged to avoid having live traffic beneath. Where this is not possible, barriers and nets will be installed to prevent objects dropping on to the traffic lanes below. The proposed Expressway bridge beams will be lifted in place overnight under a full road closure and detour. Traffic will be directed to Arawhata Road or Realm Drive, Guildford Drive, Te Roto Drive and Kāpiti Road, as shown in Figure 7.3 below.

Figure 7.3 – Detour route during Mazengarb Road night closure

An indicative layout of the each stage is shown in drawings CV-CM-311 and 313, Construction, Traffic Management, Volume 5.

Traffic Management Impacts and Mitigation

The current two-way peak hour flow on Mazengarb Road is 520 vph in the morning and 800 in the evening. Outside the evening peak period, between 7:00 am and 4:00pm, the two-way hourly flow is currently no greater than 650 vph. COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle). Lane closures with an alternating traffic flow operation on Mazengarb Road between these hours are not expected to create any significant delays.

The closure of roadside car parking on Mazengarb Road, within the Project area, is not expected to inconvenience many road users. The temporary arrangement of Mazengarb Road will indicate the closure of the roadside car parking. The remaining car parking areas on Mazengarb Road, outside the construction area will remain open.

The closure of alternative footpaths and pedestrian diversion will result in a slightly longer travel time through the site; however this is considered only a minor inconvenience. Signage will be installed at either end of the works requesting pedestrians to use the opposite footpath, where

required. Safety barriers will be installed to isolate pedestrians from the work site and traffic as required.

The property access closures on Mazengarb Road will affect the time and manner properties can be accessed. These impacts will generally be mitigated where possible, by providing temporary access ways, allowing access during critical periods and/ or providing alternative access or parking. Property owners will be well informed of the closure in advance of the work, including the temporary access arrangements during construction.

The temporary speed limit of 30kph will cause some inconvenience to road users, but will result in a negligible increase in travel times (approx. 10 seconds) along Mazengarb Road.

8 Sector 3 – Otaihanga / Waikanae

The direct impacts to traffic during construction in Sector 3 will occur in the areas of Otaihanga Road, the existing SH1/ Otaihanga Road intersection, Waikanae River, and Te Moana Road.

8.1 Otaihanga Road

Preliminary Traffic Management Methodology

The main Project office and yard area will be established off Otaihanga Road. This yard will be the administrative centre, main access point to the alignment, pre-cast concrete yard, and main delivery point for materials among other tasks. As such, the yard is expected to generate a large number of construction vehicle movements, an estimated 480 round trips at the peak of construction. The yard is expected to remain in operation between 2013 and 2017.

Clear and safe site access points will be constructed either side of Otaihanga Road. These access points will be major access points for construction traffic, and are expected to operate for the length of the Project. The pavement widening required on either side of Otaihanga Road will be constructed under a shoulder closure and lane closure and alternating traffic flow operation, when required. The pavement widening will allow construction vehicles to pull off Otaihanga Road when slowing and turning into the site access.

A number of properties which currently have access off Otaihanga Road will have their existing access closed during construction. Temporary access to these properties will be maintained until the proposed service road access from Otaihanga Road is commissioned.

The cycle and walkway on the northern side of Otaihanga Road will be maintained during construction. Pedestrians and cyclists will be diverted onto a clear and safe temporary path around the construction works when construction activities impact on the cycle and walkway.

The majority of the Otaihanga Road Overbridge can be constructed off-line. Overhead construction works on bridges and piers will be staged to avoid having live traffic beneath. Where this is not possible, barriers and nets will be installed to prevent objects dropping on to the traffic lanes below. The construction of the bridge approaches and piers will be carried out under shoulder closures or temporary lane closure and contra-flow operation where works impact the cycle and walkway. The bridge beams of the Otaihanga Road overbridge will be lifted in place overnight under a full road closure and detour. Traffic will be directed to the existing SH1 or Ratanui Road, Mazengarb Road, Arawhata Road and Kāpiti Road, as shown in Figure 8.1 below.

An indicative layout of the temporary arrangement of Otaihanga Road is shown in drawing CV-CM-314, Construction, Traffic Management, Volume 5.

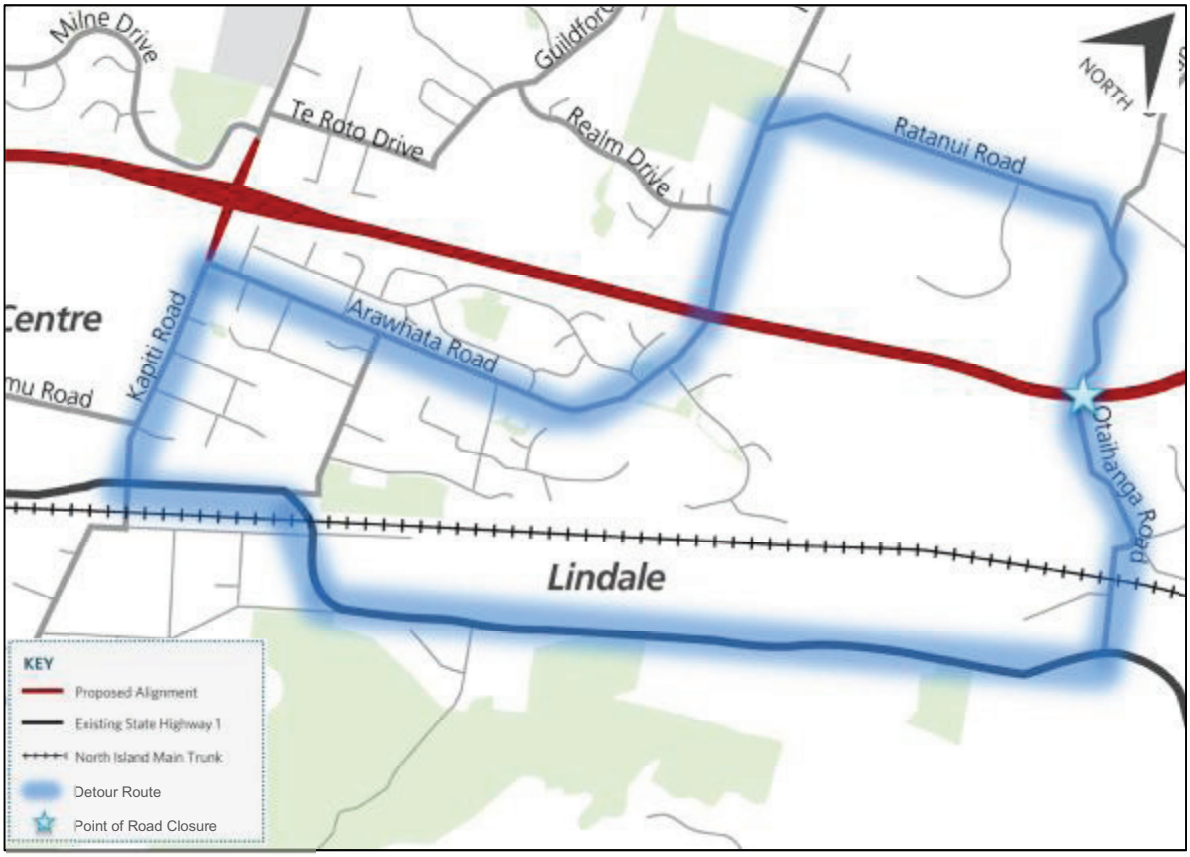


Figure 8.1 – Detour route during Otaihanga Road night closure

Traffic Management Impacts and Mitigation

The addition of an estimated 535 construction vehicle movements per day on Otaihanga Road will affect the capacity and speed of traffic on Otaihanga Road. The impact on the speed of traffic is expected to be a minor inconvenience. The impact on the capacity of Otaihanga Road is expected to be experienced mostly at the existing SH1/ Otaihanga Road intersection and at the site access

point. The impact of construction vehicles on the existing SH1/ Otaihanga Road intersection is discussed below in Section 8.2. The impact of the Otaihanga Road site access point will be mitigated by installing a clear site access point, including pavement widening and intersection marking. The arrangement for the site access points on Otaihanga Road will be designed in accordance with KCDC requirements.

The pedestrian and cycle diversion will result in a slightly longer travel time through the site; however this is considered only a minor inconvenience. Signage will be installed at either end of the works directing pedestrians and/ or cyclists to the temporary path, where required. Safety barriers will be installed to isolate pedestrians from the work site and traffic as required.

The current two-way peak hour flow on Otaihanga Road is 580 vph in the morning and 620 vph evening. COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle) and hence Otaihanga Road is not expected to experience any significant delays.

8.2 SH1/ Otaihanga Road Intersection

A significant volume of construction traffic is planned to use the Otaihanga Road / SH1 intersection during construction (the volumes are discussed in Section 5.2 above). The intersection is currently priority controlled and currently considered to experience a high volume of traffic, particularly during peak periods. The intersection is planned to be upgraded to a roundabout intersection at the commencement of the Project to maintain the current efficiency with the additional construction traffic. The roundabout is also expected to improve the safety rating of the intersection as an additional benefit. The SH1/ Otaihanga Road Roundabout is discussed further in the ATE.

Sidra intersection models were used to assess the expected impact on the SH1 / Otaihanga Road intersection during construction. Models were developed using weekday counted flows factored by 13% (to account for traffic growth and seasonal variation) taken in the morning and evening peak periods and a midday period. Three model scenarios were tested; the existing situation (2016 Do-Minimum), the existing situation (2016 Do-Minimum) plus construction traffic, and a roundabout configuration for the existing situation (2016 Do-Minimum), including the construction traffic. The summary of the results of the analysis is shown in Table 8.1 below. For further details and assumptions of the Sidra models, please refer to Appendix 33.A – Construction Traffic Assessment File Note.

Table 8.1 – Summary of SH1 / Otaihanga Road Sidra intersection analysis

Model	Period	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
Existing	AM	2493	18.0[1.]	2.9 (21)
	IP	1975	17.4[1.]	2.1 (16)

Model	Period	Demand Flow, veh/hr	Average Delay, s	95th Percentile Queue, veh (m)
	PM	2512	68.0[1.]	21.7 (152)
Existing including construction traffic	AM	2751	67.0[1.]	20.4 (218)
	IP	2235	45.1[1.]	9.4 (106)
	PM	2770	605.9[1.]	98.8 (796)
Roundabout including construction traffic	AM	2751	16.5	24.4 (179)
	IP	2235	13.1	6.7 (49)
	PM	2770	67.5	66.5 (519)

Note: 1. Weighted average delay of the turning movements only. This is used because the uncontrolled major road movements experience little or no delay at sign-controlled intersections. Therefore, the weighted average delay provides a better comparison to a roundabout intersection.

The analysis indicates that construction traffic will cause a significant impact on the SH1 / Otaihanga Road intersection in the evening period, with the average delay for turning movements increasing four times when compared to the existing situation. The impact on the morning and inter peak periods are considered to be minor.

The construction of a roundabout at the SH1 / Otaihanga Road intersection is expected to create queuing on the existing SH1; however it is also expected to reduce the average delay for all turning movements. The impact on travel times between MacKays Crossing and Peka Peka is expected to be negligible. The highest increase in travel times of approximately 20 seconds is expected in the northbound direction, in the evening peak period.

At the time of developing this report, the design and construction methodology for the SH1 / Otaihanga Road roundabout had not been developed. It is anticipated that construction will be staged, requiring traffic lanes to be remarked and realigned around the construction works. Remarking of the intersection would occur over night, under temporary lane realignments.

8.3 Waikanae River Bridge

The construction of the Waikanae River Bridge will proceed sequentially across the river and is expected to take less than one year. The construction will affect the use of the Waikanae River trail. Pedestrians and cyclists will be diverted to the opposite bank when construction activities impact on one of the trail paths. The construction methodology will endeavour to maintain one of the parallel paths at all times.

Pedestrians and cyclists will be detoured across to the opposite bank via the existing footbridges at the Otaihanga Domain and the Te Arawai footbridge, near Nimmo Avenue. The public will be advised of the planned detours through public advertising and information signs installed along the

trail. Please refer to the *Stakeholder Engagement and Communications Plan* (CEMP Appendix S, Volume 4) for a detailed description of stakeholder groups and planned consultation activities.

Safety barriers will be installed to isolate pedestrians from the work site as required.

A clear and safe site access point to access the Waikanae River Bridge northern abutment construction area will be established off Te Moana Road. The southern abutment will be accessed from the Otaihanga Road site access.

The southern property access to the Waikanae Christian Holiday Park (El Rancho) will be closed during the bridge and new access construction. Options for El Rancho to use an alternative access during construction will be discussed with El Rancho prior to construction commencing.

An indicative layout of the temporary arrangement for the Waikanae River Trail is shown in drawing CV-CM-316, Construction, Traffic Management, Volume 5.

8.4 Te Moana Road Interchange

Preliminary Traffic Management Methodology

The majority of the Te Moana Road Interchange will be constructed off-line and is expected to take less than one year. The construction of the two roundabouts will be staged, requiring traffic lanes to be remarked and realigned around the construction works. A lane closure and an alternating traffic flow operation may potentially be used while the roundabouts are under construction, however two-way flow will be restored outside of working hours to minimise disruption to road users.

A number of properties which currently have access off Te Moana Road will have their existing access closed during construction. Temporary access to these properties will be maintained until the proposed service road access from Te Moana Road is commissioned.

A clear and safe site access point to access the construction area will be established on either side of Te Moana Road.

The majority of the Te Moana Road Overbridge can be constructed off-line. Overhead construction works on bridges and piers will be staged to avoid having live traffic beneath. Where this is not possible, barriers and nets will be installed to prevent objects dropping on to the traffic lanes below. The construction of the bridge approaches and piers will be carried out under shoulder closures or temporary lane closure and contra-flow operation where works impact the footpath. The bridge beams of the overbridge will be lifted in place overnight under a full road closure and detour. Traffic will be directed down the new Te Moana Interchange ramps, as shown in Figure 8.2 below.

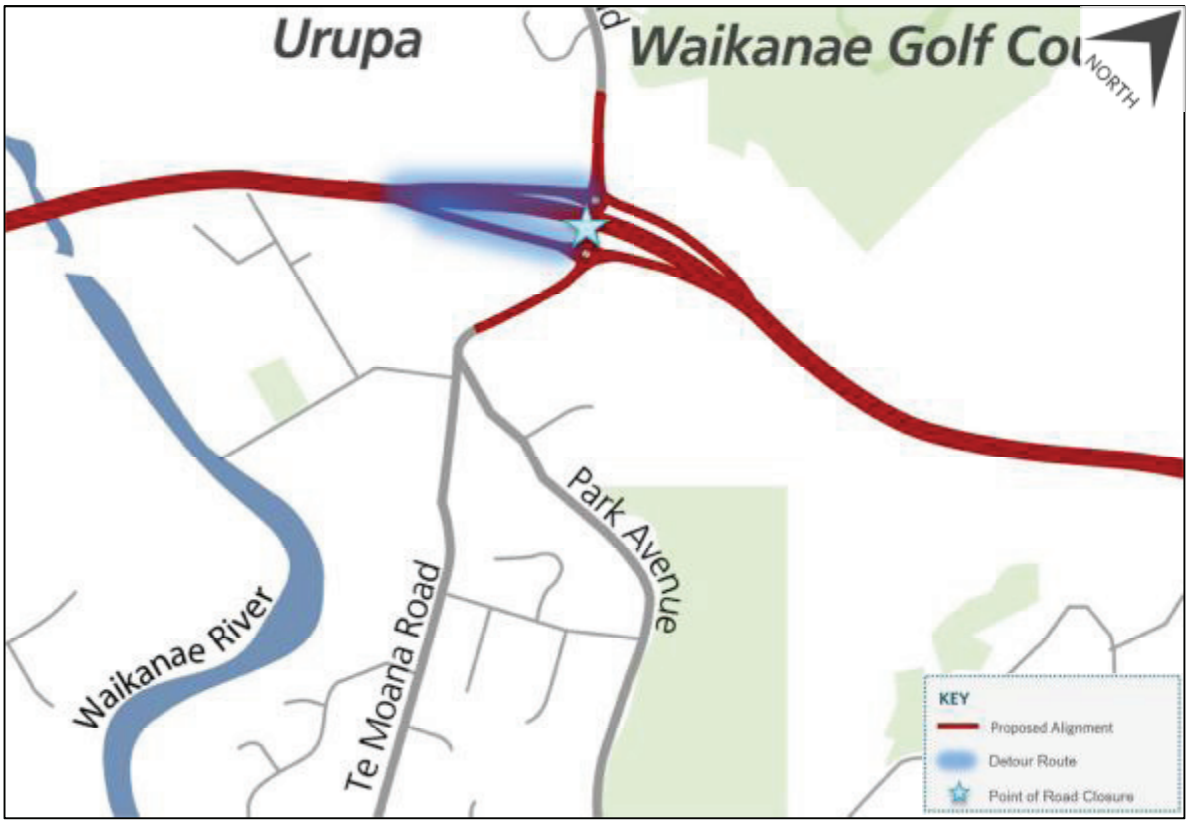


Figure 8.2 – Detour route during Te Moana Road night closure

An indicative layout of the each stage is shown in drawings CV-CM-317 to 319, Construction, Traffic Management, Volume 5.

Traffic Management Impacts and Mitigation

The current two-way peak hour flow on Te Moana Road is 630vph in the morning and 630vph in the evening. Outside the peak hours, between 9:00am and 5:00pm the flow is expected to average 510 vph. COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle) and hence Te Moana Road is not expected to experience any significant delays.

9 Sector 4 – Peka Peka

9.1 Ngarara Road Realignment and Overbridge

The majority of the Ngarara Road Realignment and Overbridge can be constructed off-line and is expected to take less than one year to construct.

A temporary signalised crossing of Ngarara Road will be established early in the construction programme to enable construction vehicle movements along the proposed Expressway Alignment. Ngarara Road traffic will be diverted along a temporary single lane controlled by temporary traffic

signals. The diversion will facilitate the construction of the permanent Ngarara Road Bridge. The connections into Ngarara Road for the temporary and permanent works will be constructed under shoulder closure and a lane closure and alternating flow operation, when required.

COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle). The traffic volumes on Ngarara Road are expected to be significantly less than 600 vph and hence are not expected to experience any significant delays.

In the urban area of Ngarara Road, the lane widths are approximately 4.0m wide. At the northern, rural end of Ngarara Road, the lane widths reduce down to approximately 2.3m wide.

An indicative layout of the each stage is shown in drawings CV-CM-321 to 324, Construction, Traffic Management, Volume 5.

9.2 Smithfield Road Extension and Overbridge

The majority of the Smithfield Road extension and Overbridge can be constructed off-line and is expected to take less than one year to construct. The connection into Ngarara Road will be constructed using a shoulder closure and lane closure and single lane flow operation, when required. Once the realignment and overbridge have been commissioned, the filling for the proposed Expressway over Smithfield Road can be completed.

COPTTM guidelines suggest signal operated single lane flow will experience delays at 600-800 vph (two-way flow, based on a 500m closure and a two to five minute signal cycle). The traffic volumes at the end of Smithfield Road are expected to be significantly less than 600 vph and hence Smithfield Road is not expected to experience any significant delays.

A number of properties accesses along Smithfield Road, including the Nga Manu Wildlife Sanctuary, will have their existing access closed during construction. Temporary access to these properties will be maintained until the proposed Smithfield Road Extension is commissioned. The property access closures will affect the time and manner properties can be accessed. These impacts will generally be mitigated where possible, by providing temporary access ways, allowing access during critical periods and/ or providing alternative access or parking. Property owners will be well informed of the closure in advance of the work, including the temporary access arrangements during construction.

9.3 Peka Peka Interchange

Preliminary Traffic Management Methodology

The majority of the Peka Peka Interchange will be constructed off-line under a three stage process and is expected to span three years. In the first stage, two site access points will be set up on Peka

Peka Road to allow access to the proposed Expressway, northern roundabout and service road construction areas. The construction of the connection between the northern roundabout and Peka Peka Road will be completed using shoulder closures and lane closures and alternating flow, when required. A temporary intersection will be constructed in the location of the southern roundabout using shoulder closures and temporary lane realignments, when required. An indicative layout of the temporary intersection is shown in drawing CV-CM-325, Construction, Traffic Management, Volume 5.

In stage two, Peka Peka Road traffic will be diverted to the temporary SH1/ Peka Peka Road intersection. This stage will allow the construction of the service road, northbound on ramp and proposed Expressway over the existing Peka Peka Road to be completed. The existing SH1/ Peka Peka Road intersection will continue to be used as a site access point. The connection between Te Kowhai Road and service road will be completed using shoulder closures and lane closures with alternating flow, when required. The existing SH1/ Te Kowhai Road intersection will be permanently closed once the service road connection to Peka Peka Road is completed and opened. The connection between the proposed Expressway Alignment and the existing SH1 will be completed using shoulder closures and temporary lane realignments, when required.

In stage three, the proposed Expressway will be commissioned allowing the works on the existing SH1 to be completed. Both the connections between the southern roundabout and the existing SH1 and re-construction work on the existing highway (including the Hadfield Road intersection) will be completed using shoulder closures and temporary lane realignments, when required.

The bus stop located near the existing SH1/ Peka Peka Road intersection will be relocated during construction works. The impacts on bus routes and bus stops and their mitigation are discussed above in Section 5.5.

Temporary TL-3 barriers will be installed along the existing SH1 for the construction of connection points to isolate the work site from passing traffic.

Property access to properties along the eastern end of Peka Peka Road and properties to the north, accessed from the existing SH1, will be affected during construction of the interchange.

An indicative layout of the each stage is shown in drawings CV-CM-324 to 326, Construction, Traffic Management, Volume 5.

Traffic Management Impacts and Mitigation

The temporary relocation of the SH1 / Peka Peka Road intersection is expected to cause an inconvenience to road users. The intersection will be designed in accordance with the KCDC and NZTA requirements, replicating the existing intersection in the new location. All road signage and marking will be altered to direct road users to the new intersection location.

The closure of the existing SH1 / Te Kowhai Road intersection is expected to re-route traffic to the SH1 / Peka Peka Road intersection, which is 650m to the south. The current traffic volume on Te Kowhai Road is approximately 200 vpd. The current traffic volume on Peka Peka Road is approximately 1250 vpd. The additional traffic on the Peka Peka Road intersection is only expected to cause a negligible impact on the intersection.

The property access closures on Peka Peka Road will affect the time and manner properties can be accessed. These impacts will generally be mitigated where possible, by providing temporary access ways, allowing access during critical periods and/ or providing alternative access or parking. Property owners will be well informed of the closure in advance of the work, including temporary access arrangements during construction.

The impacts arising from the site access points and their mitigation are discussed above in Section 5.3.

10 Conclusion

This assessment provides an appraisal of the traffic impacts that are anticipated to arise from the construction of the Project. The traffic management methodology has been developed and impacts identified on the basis of the current understanding of construction methodology.

As such, it is anticipated that the traffic management methodology and understanding of the associated impacts will undergo further refinement once detailed construction planning commences, closer to beginning construction. To this end, this assessment is largely qualitative and provides a preliminary appraisal upon which preliminary mitigation measures have been developed.

This assessment proposes measures to mitigate the identified impacts. Traffic impacts will be managed in accordance with the *Construction Traffic Management Plan* (CTMP) (CEMP Appendix O, Volume 4), which forms part of the *Construction Environmental Management Plan* (CEMP, Volume 4) suite of documents.

This assessment identifies a number of impacts to the existing SH1 and the arterial road network that require detailed mitigation strategies at the construction planning stage. It is expected that the effects and mitigation strategies identified in this assessment will be used to inform the traffic management methodologies employed for facilitating construction work on the Project.

In general the effects outlined in this assessment are expected to be able to be mitigated acceptably provided the procedures outlined by the CTMP are followed. The effects are not anticipated to be significantly greater or unusual compared with other major road construction projects completed in the Wellington region in the last five to ten years. As such, the NZTA has

considerable experience and a strong track record of successfully managing the effects of construction on traffic that will be carried through onto the MacKays to Peka Peka Project.

11 References

Wolfman, B., Whitfield, E., Solanki, R. Assessment of Transport Effects: Technical Report 32, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Ford, A. & Solanki, R. Traffic Modelling Report: Technical Report 34, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Goldie, A. Construction Methodology Report: Technical Report 4, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Minchington, J. Construction Traffic Management Plan: CEMP Appendix O, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Black, J. Stakeholder and Communication Management Plan: CEMP Appendix S, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Appendix A

Construction Traffic Assessment Technical Note

Technical Note

Construction Traffic Assessment

1.1 Construction Volume Assessment

Construction traffic volumes have been estimated by the M2PP Alliance construction team in the form of total daily round trips. To assess the impact of the construction traffic in the three main peak periods (AM, inter-peak and PM) these have been further broken down into hourly round trips, with 20% of the full daily round trips assumed to be undertaken in an hour. Given that the normal hours of operation are proposed to be between 7:00am and 7:00pm, the assumption of 20% of the daily round trips being undertaken in any one hour is considered to be representative of a 'worst case scenario'. Further discussion on the construction traffic volumes can be found in the main *Assessment of Temporary Traffic Effects* report.

Turning volumes for each of the intersections affected by construction traffic were extracted from the project assignment model (detailed in the *Traffic Modelling Report*). Figure 1 below indicates the intersections which are affected by construction traffic by their corresponding reference number. These reference numbers are used in the traffic volume tables at the end of this Appendix for easy reference. The intersection AM, PM peak and inter-peak (IP) flows from the 2016 'Do-Minimum' project assignment model and the projected construction traffic flows were retrieved and analysed to assess which intersections could be potentially significantly affected by the construction traffic. For intersections where the addition of the construction traffic is expected to lead to a significant percentage increase in traffic for any movements, an intersection model was developed. Traffic count surveys were undertaken and provided as inputs to the models to produce an accurate intersection model for intersections which were anticipated to be significantly impacted by the construction of the Project. Video footage from the surveyed intersections showing the current traffic conditions also informed the input information on gap acceptance parameters for vehicles.

The modelled and surveyed turning volumes for each intersection and time period is attached in Appendix A.

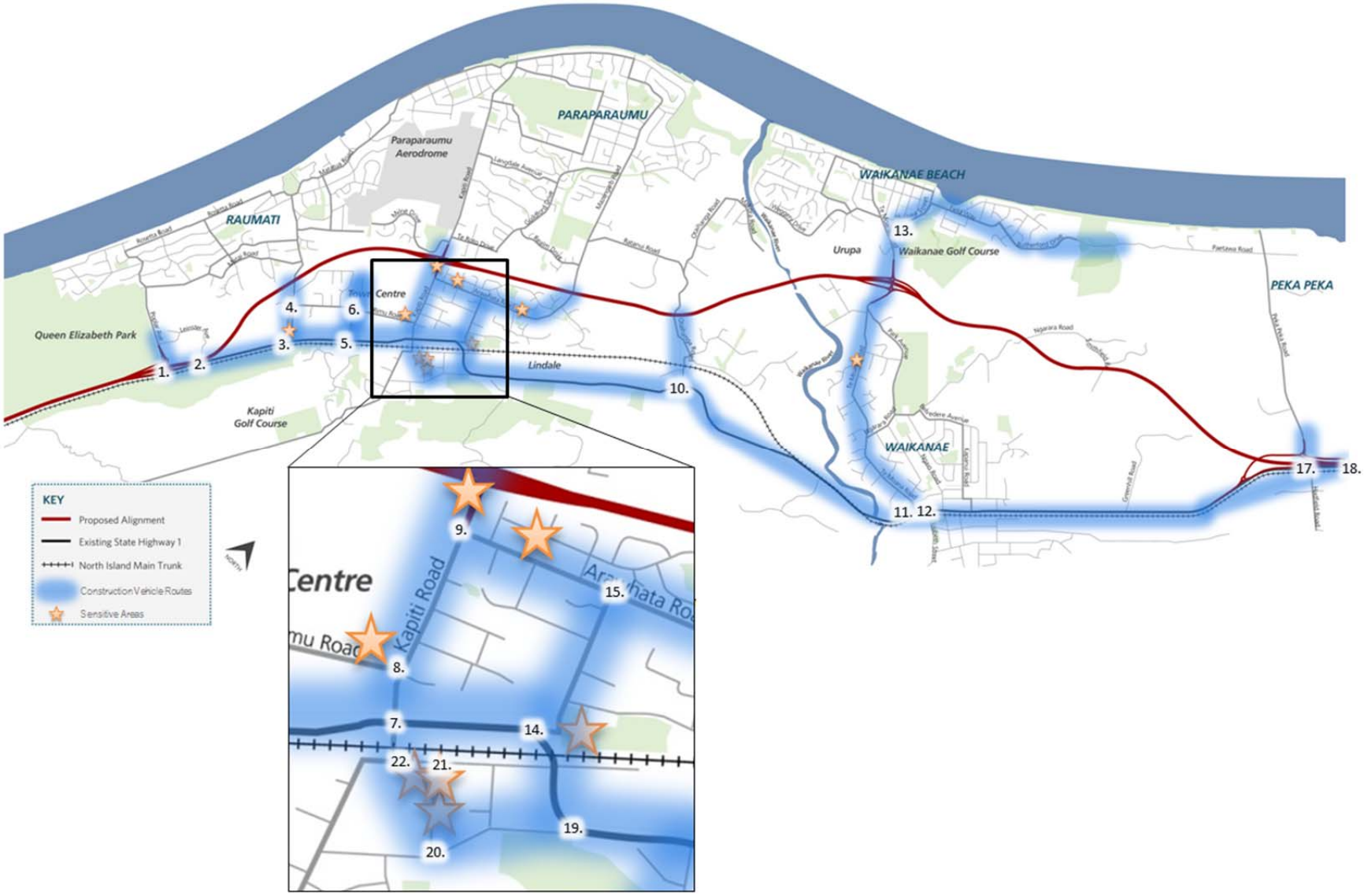


Figure 1: Intersections Affected by Construction Traffic

1.2 Intersection Assessment

Intersection models have been built using *SIDRA Intersection 5.1* for all of the intersections where construction traffic is considered to have a significant impact on the operation of the intersections during the construction phase of the M2PP Expressway project. The following intersections were modelled for the AM, IP and PM (one hour) peak periods (all intersections have been modelled in their existing layout only unless specified):

- SH1 / Poplar Avenue;
- Ihakara Street / Rimu Road;
- SH1 / Otaihanga Road – roundabout and signal layouts investigated in addition to existing layout; and
- SH1 Te Moana Road.

The scenarios modelled are:

- 2016 'Do-Minimum' (with forecast year 2016 traffic flows); and
- 2016 with construction traffic (forecast year 2016 traffic flows with estimated construction traffic flows)

To ensure that the intersection models were robust, and were producing a 'worst case scenario' a number of factors have been applied to the flows to account for seasonal variations and growth. For the intersection models using the project assignment model flows, 5% uplift was applied to all flows to account for the seasonal variations expected. The factor was calculated as the ratio of the 85th percentile to the average traffic volume of the evening peak hour for a whole year. The 2010 Paekakariki Telemetry Site data was used for this analysis. Where traffic counts have been used an uplift of 13% has been applied to the traffic count volumes. This is the combination of the 5% uplift for seasonal variation and 8% traffic growth to bring it up to the 2016 design year. The traffic growth is based on the scaled average growth rate from the project assignment model between 2011 and 2016. In addition to this, peak flow factors (PFF) of 90%-95% were applied to account for peaks within the one hour modelled period. These values were based on information from the traffic counts where applicable, with similar patterns assumed for comparable intersections where counts had not been taken (discussed further in Section 1.3 below). These assumptions are considered to be reasonably generous and therefore it is expected that the results of the models are an appropriate worst case scenario.

The following inputs have been used in the development of these intersection models:

- Traffic counts: SH1 / Poplar Ave 6th July 2011, SH1 / Leinster Ave 6th July 2011, SH1 / Otaihanga Ave 7th July 2011 (8:00am-9:00am, 12:00pm-1:00pm, 5:00pm-6:00pm);
- Project assignment model's 2016 Do-Minimum traffic flows (refer *Traffic Modelling Report*); and
- Construction Traffic Projections as supplied by M2PP Alliance.

The key assumptions / parameters used in the models are listed by site in the following sections. Where site observations were not available, the SIDRA default values were considered appropriate and used as the model inputs. Common assumptions applied to all models are the critical gap and follow up headway settings. These values were adopted from the SIDRA Intersection User Guide (March 2011) which refers to the 'recommended

values of gap acceptance parameters' (table12.2.5) which is based on AUSTROADS (2002, 2005) Guidelines.

The definitions of Critical Gap, Follow-up Headway, and Exiting Flow Effect from the SIDRA Intersection User Guide (March 2011) are presented below:

- *Critical Gap is the minimum time (headway) between successive vehicles in the opposing (major) traffic stream that is acceptable for entry by opposed (minor) stream vehicles.*
- *Follow-up Headway is the average headway between successive opposed (minor) stream vehicles entering a gap available in the opposing (major) traffic stream.*
- *The Exiting Flow Effect is a percentage of exiting flow to be added to the circulating / opposing flow. The existing flow belongs to the movement from the next approach turning into the adjacent exit side of the approach road under consideration. The next approach is determined by moving in an anticlockwise direction for driving on the left-hand side of the road.*

These settings are shown below.

Traffic Movement	Critical Gap (s)	Follow Up Headway (s)	Exiting Flow Effect
Main Road Left Turn	4.5	2.5	0%
Main Road Right Turn	4.0	2.0	0%
Side Road Left Turn	4.5	2.5	50%
Side Road Right Turn	5.5	3.5	50%
Side Road Right Turn (where it is possible to wait in the centre of the intersection)	4.0	3.0	50%

Table 1: Gap acceptance parameters used in SIDRA modelling

In addition to these gap acceptance criteria, the Sidra Intersection gap acceptance model allows for the effect of heavy vehicles on the capacity of an opposed traffic stream by using the Heavy Vehicle Equivalent (HVE) for gap acceptance. The Sidra Intersection input guide recommends a value in the range of 1.0 to 3.0 be adopted, with a value of 2.0 used in the models.

At a number of intersections on SH1 it is possible for right turn movements (Side Road Right Turn) to wait within a storage area or merge lane in the centre of the main road (without impeding the through movement), for acceptable opportunities to merge with the through traffic stream. Therefore, the gap acceptance parameters adopted for the right turn movements assume that the right turners only need to look for gaps in traffic from the right. Therefore the AUSTROADS values that apply to traffic giving way to one way traffic movements are used for these movements.

Another common principle which has been applied to all models is the give way rules, including the 2011 amendment. The amendment changes the priority for some right turns and will come into effect at 5am on 25 March 2012.

Whilst the SIDRA models have not been validated in any depth as 2011 models were not developed, video footage of a number of the intersections showing the intersection operations during peak periods were reviewed for a high level sense check of the models.

The intersection entry and exit speeds as used in the Sidra Intersection models have been assumed to be the posted speed limits. The entry and exit speeds as used in Sidra models

are the average uninterrupted travel speeds, i.e. the speed of a vehicle which is not delayed at the intersection. The entry cruise speed is the speed of vehicles before the approach to the intersection under consideration and the exit speed is the downstream speed once fully passed through the intersection. Sidra intersection recommends that the speed limit is often an appropriate value to use.

The geometrical inputs were measured approximately using Google Earth which is considered to show the latest intersection layouts and sufficient for this level of intersection analysis.

1.3 SH1 / Poplar Avenue

Intersection models were produced for this intersection for the AM, inter-peak and PM peak periods using the project assignment model's 2016 Do-Minimum traffic flows. The modelled results indicated that this intersection may be heavily impacted by the construction flows and modelling was also undertaken using traffic counts to provide further refinement of these results. The traffic counts were undertaken on Wednesday 6th July 8am – 9am, 12am – 1pm and 5pm – 6pm. These peak periods were chosen to match the periods from the project assignment model. As discussed in **Section 1.2,** a combined traffic growth and seasonal variation factor of 13% was applied to the current traffic counts to forecast the 2016 design year.

Additionally, an intersection model was created to determine the impact of the anticipated rerouting from Leinster Avenue onto Poplar Avenue, for all three peak periods. The assumptions for this model are identical to the original SH1 / Poplar Avenue model, with the anticipated rerouted traffic flows taken from the project assignment model (2016) and the traffic counts (with growth applied to forecast year 2016 traffic flows). The following sections set out the model inputs, assumptions and the modelled results.

1.3.1 Geometry

- The practical length of the left turn lane on SH1 Northbound has been modelled as 140m;
- The practical length of the right turn lane on, SH1 Southbound has been modelled as a 45m turn bay;
- The left turn lane on Poplar Avenue has been modelled as a 45m length left turn slip lane;
- Lane width is assumed as 3.3m for each lane at the intersection; and
- A basic saturation flow of 1950 through car units per hour (tcu/h) is assumed for each lane.

1.3.2 Traffic Flow and Speeds

- A peak flow factor of 90% has been assumed for all side road and turning movements;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial routes; and
- The entry and exit speeds of each movement are assumed as the posted speed limits of 100kph on SH1 and 80kph on Poplar Avenue.

1.3.3 Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- Right turning traffic from Poplar Avenue are assumed not to give way to southbound through traffic as there is spaced provided for stacking before they are able to merge

with the inside lane on the highway. It is assumed that in reality they accept gaps based on the northbound through and southbound right turn movements, and then merge with the southbound through traffic. However, it is noted that given the limitations of the software with regarding to coding this type of intersection, this could not be accurately modelled in SIDRA. It is considered that the gap acceptance assumptions applied for this model is appropriate for this level of analysis.

- Gap acceptance parameters (critical gap/follow up headway) have been used as follows:
  - Poplar Avenue left turn = 4.5/2.5 with exiting flow effect of 50%;
  - Poplar Avenue right turn = 4.0/3.0 with exiting flow effect of 50%;
  - SH1 Southbound right turn= 4.0/2.0; and
  - SH1 Northbound left turn = 4.5/2.5.

1.3.4 Traffic Volumes

The construction traffic volumes were added to the forecast 2016 traffic flows. An additional 30 heavy vehicles are expected during the peak hours (AM, IP and PM), on the southbound right turn movement and the eastbound left turn movement (i.e. an additional 60 heavy vehicles accessing the intersection). The additional 30 vehicles create an increase in flows of around 40% in all peaks.

1.3.5 Results

Without rerouted traffic from Leinster Avenue

The full SIDRA results are attached in **Appendix A**. The addition of the construction traffic at the intersection is likely to lead to slightly longer delays and queuing on some approaches. The only approach on which the Level of Service (LOS)[1] is affected is the right turn from SH1 North, which reduces from LOS E to F. The LOS for all other movements' remains the same for the models which include construction traffic (AM, IP and PM models) when compared to the existing models. In the AM and IP models, each movement at the intersection operates at LOS C or above for the 2016 Do Minimum or with the construction traffic. In the PM peak there are significant increases in queue lengths and delays expected on the SH1 North right turn and Poplar Avenue left turn. For the Poplar Avenue left turn, the degree of saturation increases from under 0.8 in the Do Min to over 1 with the addition of construction traffic.

[1] Please refer to the *Assessment of Transport Effects* Appendices for a full definition of Level of Service (LOS).

Approach		PM 2016 Do Min				PM With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	B	12.3	0.123	0	B	12.3	0.123	0
	Through	A	0	0.831	0	A	0	0.831	0
SH1 North	Through	A	0	0.193	0	A	0	0.193	0
	Right	F	42	0.285	8.3	F	202.2	0.935	50.3
Poplar Av. (West)	Left	F	65.9	0.651	21.3	F	450.5	1.356	181
	Right	D	27.4	0.213	5.3	D	27.9	0.219	5.4

Table 2: SH1 / Poplar Avenue Do Min and Construction Results Summary

With Rerouted Traffic Flows from Leinster Avenue

The models including rerouted flows from Leinster Avenue (to Poplar Avenue) is expected to cause an overall increase in queue lengths and delays on the SH1 North right turn and Poplar Avenue left turn, compared to the SH1 / Poplar Ave 2016 Do Minimum scenario. This is most significant for the SH1 North right turn, where the degree of saturation is more than one and the ninety fifth percentile queue is longer than the available stacking room. With the construction traffic added the average delay and ninety fifth percentile queues are expected to increase significantly. The effect of the Leinster Avenue traffic on Poplar Avenue intersection is considered to be minor because the modelled scenario will be a very infrequent event and alternative routes will be available for this traffic to travel to their destinations. Hence, the scenario modelled is considered to be conservative as it represents the highest flow that may be expected during the construction period. Leinster Avenue residents will be encouraged, through media advertising, to use the KCDC road network to avoid delays turning from SH1. It is therefore expected that some Leinster Avenue and Poplar Avenue traffic will use the KCDC road network rather than the SH1 intersections due to the expected increase in traffic volumes on SH1. Construction traffic will also avoid using the intersection during the evening peak period to minimise their impact.

Approach		PM 2016 Do Min + Leinster				PM With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	B	12.3	0.127	0	B	12.3	0.127	0
	Through	A	0	0.831	0	A	0	0.831	0
SH1 North	Through	A	0	0.193	0	A	0	0.193	0
	Right	E	49.2	0.467	14.8	F	229.7	1.056	86.6
Poplar Av. (West)	Left	F	89	0.821	32.3	F	530.9	1.477	235.9
	Right	D	28.2	0.223	5.5	D	28.8	0.228	5.7

Table 3: SH1 / Poplar Avenue Do Min and Construction (inc. Leinster Avenue) Results Summary

1.4 Ihakara Street / Rimu Road

The intersection of Ihakara Street and Rimu Road has been modelled using the 2016 Do-Minimum traffic flows from the project assignment model, with the AM, IP and PM peaks all coded with the existing roundabout layout. Again models have been developed both 'with' and 'without' the anticipated construction traffic for comparison purposes.

The following assumptions and parameters have been used in the SIDRA models for this intersection.

1.4.1 Geometry

- The diameter of the island has been modelled as 10m;
- The circulation width has been modelled as 5.5m;
- Single lane width entry only on each approach;
- Assumed entry radius of 30m;
- Assumed entry angle of 30°;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

1.4.2 Traffic Flow

- A peak flow factor of 90% has been assumed for all movements; and
- The entry and exit speeds of each movement are assumed to match the posted speed limit of 50kph.

1.4.3 Priority and Gap Acceptance

- The SIDRA default roundabout settings have been used for the critical gap and follow-up headway parameters. The programme estimates gap-acceptance parameters as a function of geometry and flow conditions for each roundabout.

1.4.4 Traffic Volumes

The construction volumes are projected to add 15 heavy vehicles to the eastbound and westbound movements at the roundabout. Whilst these additional flows are not high, this accounts for between approx. 50% increase on the westbound through movement in the PM and a 200% increase in traffic on the eastbound through movement in the PM, which is considered to be significant.

Results

The comparative SIDRA modelling results shows that there would be a slight reduction in LOS in the AM and PM peaks with the additional construction traffic flows. The reduction in LOS is expected on the Ihakara east and through and left movements, the Rimu Road left and through movements, and all Ihakara west movements, with reductions in LOS in the PM peak from LOS B to LOS C. The IP model indicates that same LOS would be achieved in both the 'with' and 'without' construction traffic flow scenarios. The PM peak is the busiest with higher traffic flows accessing the intersection. The results of the evening peak period are summarised in **Table 4**.

Approach		PM 2016 Do Min				PM With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
Rimu Rd South	Left	B	18.2	0.764	90.6	C	20.8	0.789	100.7
	Through	B	17.4	0.761	90.6	C	27.4	0.795	100.7
	Right	C	21.5	0.761	90.6	C	26.1	0.791	100.7
Ihakara St East	Left	B	17.6	0.774	96	C	23	0.825	120.1
	Through	B	16.8	0.778	96	C	23.2	0.824	120.1
	Right	C	20.8	0.774	96	C	26.4	0.827	120.1
Rimu Rd North	Left	A	6.9	0.42	31.1	A	9.1	0.439	31.8
	Through	A	6.1	0.42	31.1	B	13.8	0.439	31.8
	Right	B	10.1	0.417	31.1	B	16.3	0.435	31.8
Ihakara St West	Left	B	15.3	0.214	12.7	C	21.8	0.332	20.5
	Through	B	14.4	0.216	12.7	C	21.3	0.330	20.5
	Right	B	18.5	0.214	12.7	C	23.6	0.331	20.5

Table 4: Ihakara Street / Rimu Road Do min and Construction Results Summary

The detailed SIDRA results are attached in **Appendix A**.

1.5 SH1 / Otaihanga Road

Intersection models were produced for the intersection of SH1 and Otaihanga Road using the 2016 Do-Minimum traffic flows from the project assignment model. An initial intersection modelling using the flows from the project assignment model indicated that this intersection may be significantly impacted by the projected construction traffic flows hence; SIDRA modelling was also undertaken using the traffic count flows to further confirm the initial modelled results.

Furthermore, this intersection has being modelled as a roundabout as well as a signalised intersection (currently it is a priority controlled intersection) as possible solutions to mitigate the potential negative effects of the construction traffic at the intersection.

1.5.1 Existing Layout

The following assumptions and parameters have been used in the SIDRA models for the intersection operating with the existing priority controlled layout:

Geometry

- The practical length of the left turn lane on SH1 Northbound has been modelled as 140m;
- The practical length of the right turn lane on, SH1 Southbound has been modelled as 60m;
- The left turn lane on Otaihanga has been modelled as 45m left slip;
- Lane width is assumed as 3.3m for each lane; and

- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all side road and for the turning movements on the highway;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial routes; and
- The entry and exit speeds of each movement are assumed to be as the posted speed limit of 80kph.

Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- The gap acceptance parameters used are as follows (critical gap/follow up headway):
  - Otaihanga left turn = 4.5/2.5 with exiting flow effect of 50%;
  - Otaihanga right turn = 4.0/3.0 with exiting flow effect of 50%;
  - SH1 Southbound right turn= 4.0/2.0; and
  - SH1 Northbound left turn = 4.5/2.5.

1.5.2 Roundabout Layout – Option 1

The following assumptions and parameters have been used in the SIDRA models for the scenario with the intersection operating as a roundabout:

Geometry

- The diameter of the island is assumed to be 40m;
- The circulation width has been modelled as 5m;
- Two lane width at entry on each approach and
- Assumed entry radius of 30m;
- Assumed entry angle of 30°;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all side road and the turning movements on the highway;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial routes; and
- The entry and exit speeds of each movement are assumed to match the posted speed limit of 80kph.

Priority and Gap Acceptance

- The default SIDRA settings for priority and gap acceptance for a roundabout have been used in the models.

1.5.3 Signalised Intersection – Option 2

The following assumptions and parameters have been used in the SIDRA models for the scenario with the intersection operating as a signalised intersection:

File Note

Geometry

- The practical length of the left turn lane on SH1 Northbound has been modelled as 140m;
- The practical length of the right turn lane on, SH1 Southbound has been modelled as 60m;
- The left turn lane on Otaihanga has been modelled as 45m;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all side road and the turning movements on the highway;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial route; and
- The entry and exit speeds of each movement are assumed to match the posted speed limit of 80kph.

Signal Phasing

- A 3 phase sequence has been assumed, with no right turn filtering allowed;
- The inter-green period has been assumed to be 4 seconds for amber period and 2 seconds for 'all red', for all phases;
- The signals settings have been optimised to provide realistic delays that are expected at the intersection; and
- The practical cycle times were selected by SIDRA which ranged from 50 – 70 seconds.

Traffic Volumes

12-77 additional construction heavy vehicles are expected at the four movements at this intersection turning into and out of Otaihanga Road. Where an additional 77 heavy vehicles are expected, this is an increase of over 91% on the modelled flows in all periods for the eastbound right turn and northbound left turn movements. Due to this high increase in flows, traffic counts were also taken to ensure the robustness of the models.

Results

The models with traffic survey flows and the models with project assignment model flows indicate different delays, queue lengths, etc., for the different modelled scenarios. However, the conclusions in terms of intersection performance, between these models (in all periods) are the same and they achieve the same LOS for the different scenarios modelled (with the exception of the PM model with roundabout layout).

In the PM peak Otaihanga Road operates at an LOS F in the 2016 Do Min with the existing priority layout. With the addition of construction traffic Otaihanga Road is expected to operate at LOS F in both the AM and PM peaks. With construction traffic, the delays on both the Otaihanaga movements and the right turn from SH1 are expected to be over 500s, with long ninety fifth percentile queue lengths. The results from the worst peak period are summarised in **Table 5**.

Approach		PM 2016 Do Min				PM With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	B	11	0.027	0	B	14	0.099	0
	Through	A	0	0.613	0	A	0	0.613	0
SH1 North	Through	A	0	0.366	0	A	0	0.366	0
	Right	E	44	0.843	54	F	834.2	1.867	796.4
Otaihanga Rd West	Left	F	97.5	1.028	151.7	F	597.8	1.615	771.2
	Right	C	20.3	0.056	1.3	F	685.5	1.574	341.8

Table 5: SH 1/ Otaihanga Do minimum and Construction Results Summary

The models indicate that alternative options such as a signalised intersection or roundabout should be further investigated as they may provide significant benefits over the existing priority layout.

Approach		PM 2016 Roundabout				PM Signals			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	B	18.2	0.332	22.5	D	39.3	0.83	179.7
	Through	D	36.1	0.988	317.9	C	24.9	0.831	179.7
SH1 North	Through	A	9.4	0.514	41.5	A	3.9	0.492	82.1
	Right	B	17.6	0.346	23.5	D	46.7	0.83	109
Otaihanga Rd West	Left	F	295.5	1.254	519.1	C	29.4	0.562	92.7
	Right	F	186.3	1.005	142.8	D	54.6	0.727	47.8

Table 6: SH1/ Otaihanga Signals and Roundabout Construction Results Summary

With the additional construction traffic, both the roundabout (Option 1) and the signalised intersection (Option 2) provide a better intersection performance when compared to the existing priority intersection. Option 2 achieves a LOS D or better for each movement (delays less than 50 seconds). Option 1 achieves a better LOS in the AM peak, however in the PM peak Otaihanga Road is still shown to have an LOS F.

Detailed SIDRA results can be found at the back of the Appendix.

1.6 SH1 / Peka Peka Road

The intersection of SH1 and Peka Peka Road has been modelled using the 2016 Do-Minimum traffic flows from the project assignment model. The AM, IP and PM peaks all include with the existing intersection layout.

The following assumptions and parameters have been used in the SIDRA models for this intersection:

File Note

Geometry

- The practical length of the left turn lane on SH1 Northbound has been modelled as 65m;
- The practical length of the right turn lane on, SH1 Southbound has been modelled as a 40m turn bay;
- The left turn lane on Peka Peka Road has been modelled as a 20m left slip;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all side road and turning movements;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial routes; and
- The entry and exit speeds of each movement are assumed to match the posted speed limits of 100kph on SH1 and 80kph on Peka Peka Road.

Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- Gap acceptance parameters have been used as follows (critical gap/follow up headway):
  - Peka Peka Road left turn = 4.5/2.5 with exiting flow effect of 50%;
  - Peka Peka Road right turn = 4.0/3.0 with exiting flow effect of 50%;
  - SH1 Southbound right turn= 4.0/2.0; and
  - SH1 Northbound left turn = 4.5/2.5.

Traffic Volumes

An additional 10 to 20 construction traffic vehicles are expected at all movements at the intersection, which equates to an additional 80 heavy vehicles passing through the intersection. The percentage increase of traffic due to the addition of construction vehicles is less than 50% for each movement.

File Note

Results

The results show that in the 2016 do min situation all of the approaches would achieve LOS C, in all periods; however with the construction traffic flows added to the intersection, at least one movement in each peak achieves a lower LOS of D.

Approach		PM 2016 Do Min				PM With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	B	12.5	0.054	0	B	12.8	0.058	0
	Through	A	0	0.444	0	A	0	0.444	0
SH1 North	Through	A	0	0.359	0	A	0	0.359	0
	Right	C	17	0.045	1.6	D	26.3	0.16	7.3
Peka Peka Rd (West)	Left	C	17.1	0.072	2.4	D	27.3	0.223	9.6
	Right	C	15.5	0.172	4.5	C	16.6	0.199	5.6

Table 8: SH1/ Peka Peka Road Do min and Construction Results Summary

Detailed SIDRA results can be found at the back of this Appendix.

1.7 SH1 / Te Moana Road

The intersection of Te Moana Road and SH1 has been modelled using the project assignment model's 2016 Do-Minimum traffic flows, with the morning, inter and evening peaks all modelled with the existing layout. Models have been produced both with and without the anticipated construction traffic to allow for the impacts to be assessed against a 'base situation'.

The following assumptions and parameters have been used in the SIDRA models for this intersection:

Geometry

- Te Moana Road modelled with two right turning lanes and a 21m left turn slip lane;
- SH1 Northbound modelled with two through lanes and a 20m left turn slip lane;
- SH1 Southbound modelled with two through lanes and 53m right turn bay;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all side road and turning movements;
- A peak flow factor of 95% has been assumed on the SH1 through movements, to reflect the more even peak typically experienced on main arterial routes; and
- The entry and exit speeds of each movement are assumed to match the posted speed limits of 50kph.

File Note

Signal Phasing

- A 3 phase sequence has been assumed, with no right turn filtering;
- A 90 second cycle time has been assumed with the phase timings taken from the project assignment model; and
- The inter-green period has been assumed to be 4 second yellow and 2 second all red for all phases.

Traffic Volumes

The construction volumes provided effect all of the movements at the intersection, with additional 8 – 40 heavy vehicles making these movements. This addition of heavy vehicles leads to a percentage increase of over 86% for the southbound right turn movement, though the increase on other movements is only up to around 20%.

Results

The full SIDRA results can be found at the back of this Appendix. The results indicate that the intersection performance remains broadly similar between the 'with' and 'without' construction traffic scenario models. The LOS at the SH1 southbound right turn approach changes from LOS D to LOS E with the construction traffic flows in the PM peak, however the increase in delay is expected to be less than 15 seconds which is not considered to be significant.

		AM 2016 Do Min				AM With Construction Traffic			
Approach		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
SH1 South	Left	A	6.7	0.428	16.7	A	7.2	0.437	21.7
	Through	B	15.3	0.427	95.1	B	15.3	0.427	95.1
SH1 North	Through	A	8.6	0.459	101.3	A	8.6	0.459	101.3
	Right	D	51.6	0.367	24	E	55.4	0.67	45.9
Te Moana Rd West	Left	B	13.7	0.709	38.1	B	14.8	0.858	45.9
	Right	D	40.4	0.529	72.7	D	40.7	0.556	77

Table 9: SH1/ Te Moana Road Do min and Construction Results Summary

The intersection is considered to operate satisfactorily with the construction traffic flows, in all periods, in 2016.

1.8 Ruahine Street / Tongariro Street

The intersection of Ruahine Street and Tongariro Street has been modelled using the project assignment model's 2016 Do-Minimum traffic flows, with the morning, inter and evening peaks all modelled with the existing layout. Models have been produced both with and without the anticipated construction traffic to allow for the impacts to be assessed against a 'base situation'.

The following assumptions and parameters have been used in the SIDRA models for this intersection:

Geometry

- Ruahine Street Northbound modelled with one through lanes and an 8m left turn bay;
- Ruahine Street Southbound modelled with one combine through and right turn lane;
- Tongariro Street modelled with one right turn lane and an 8m left turn bay;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all movements; and
- The entry and exit speeds of each movement are assumed to match the posted speed limits of 50kph.

Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- Gap acceptance parameters have been used as follows (critical gap/follow up headway):
  - Ruahine Street left turn = 4.5/2.5;
  - Ruahine Street right turn = 4.0/2.0;
  - Tongariro Street right turn= 5.5/3.5 with exiting flow effect of 50%; and
  - Tongariro Street left turn = 4.5/2.5 with exiting flow effect of 50%.

Traffic Volumes

The eastbound left turn movement and the southbound right turn movement are expected to have additional 70 and 90 heavy vehicles respectively during the construction period. Due to the low do-minimum flows expected for these movements this results in an over 700% increase in traffic volume on the southbound right turn in IP period.

Results

The full SIDRA results can be found at the back of this Appendix. Generally, the modelling results indicate that the intersection achieves high LOS in each period both the 2016 do-minimum (without construction traffic) and 2016 with construction traffic scenarios. The only approach which is affected enough for the LOS to change is the Tongariro approach in the AM peak which drops from an LOS A to an LOS B with the addition of construction traffic; however the highest average delay on this approach is expected to be only 10seconds.

Approach		IP 2016 Do Min				IP With Construction Traffic			
		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
Ruahine St South	Left	A	6.4	0.007	0	A	6.4	0.007	0
	Through	A	0	0.017	0	A	0	0.017	0
Ruahine St North	Through	A	0.1	0.028	1.3	A	0.4	0.092	7
	Right	A	6.9	0.028	1.3	A	8.8	0.092	7
Tongariro St West	Left	A	6.8	0.039	0.6	A	9.2	0.3	5.8
	Right	A	7	0.005	0.1	A	7.6	0.005	0.2

Table 10: Ruahine Street / Tongariro Street Do min and Construction Results Summary

The results indicate that the intersection is expected to have a good level of operations with the additional construction traffic flows.

1.9 Tongariro Street / Hinemoa Street

The intersection of Tongariro Street and Hinemoa Street has been modelled using the project assignment model's 2016 Do-Minimum traffic flows, with the morning, inter and evening peaks all modelled with the existing layout. Models have been produced both with and without the anticipated construction traffic to allow for the impacts to be assessed against a 'base situation'.

The following assumptions and parameters have been used in the SIDRA models for this intersection:

Geometry

- Hinemoa Street Northbound modelled with one combined through and right turn lane;
- Hinemoa Street Southbound modelled with one combined through and left turn lane;
- Tongariro Street modelled with one combined left and right turn lane;
- Lane width is assumed as 3.3m for each lane; and
- A basic saturation flow of 1950 tcu/h is assumed for each lane.

Traffic Flow

- A peak flow factor of 90% has been assumed for all movements; and
- The entry and exit speeds of each movement are assumed to match the posted speed limits of 50kph.

Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- Gap acceptance parameters have been used as follows (critical gap/follow up headway):
  - Hinemoa Street left turn = 4.5/2.5;
  - Hinemoa Street right turn = 4.0/2.0;
  - Tongariro Street right turn= 5.5/3.5 with exiting flow effect of 50%; and
  - Tongariro Street left turn = 4.5/2.5 with exiting flow effect of 50%.

File Note

Traffic Volumes

The westbound left turn movement and the northbound right turn movement are expected to have additional 90 and 70 heavy vehicles respectively during the construction period. This equates to an increase of up to 177% on traffic volume at the intersection, in the PM period.

Results

The full SIDRA results in attached in **Appendix A**. Whilst the modelling shows a slight increase in delay on some movements, the intersection is expected operate at a LOS A (including at each approach), in each period, in both the 2016 do-minimum (without construction traffic) and with the construction traffic scenarios.

		PM 2016 Do Min				PM With Construction Traffic			
Approach		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
Hinemoa St South	Left	A	0.2	0.05	2.2	A	0.3	0.128	8.6
	Through	A	7	0.05	2.2	A	8.2	0.128	8.6
Tongariro St East	Through	A	6.8	0.054	1.9	A	8	0.13	6.9
	Right	A	7.3	0.054	1.9	A	7.5	0.129	6.9
Hinemoa St North	Left	A	6.6	0.028	0	A	6.6	0.032	6.8
	Right	A	0	0.028	0	A	0	0.032	6.8

Table 11: Tongariro Street / Hinemoa Street Do min and Construction Results Summary

1.10 Hinemoa Street / Kapiti Road

The intersection of Hinemoa Street and Kapiti Road has been modelled using the project assignment model's 2016 Do-Minimum traffic flows, with the morning, inter and evening peaks all modelled with the existing layout. Models have been produced both with and without the anticipated construction traffic to allow for the impacts to be assessed against a 'base situation'.

The following assumptions and parameters have been used in the SIDRA models for this intersection:

Geometry

- Hinemoa Street Northbound modelled with one left lane and a 22m through bay;
- Hinemoa Street Southbound modelled with one combined through and right turn lane;
- Kapiti Road modelled as the main road with one right turn lane and a 16m left turn bay;
- Lane width is assumed as 3.3m for each lane;
- A basic saturation flow of 1950 tcu/h is assumed for each lane;

File Note

Traffic Flow

- A peak flow factor of 90% has been assumed for all movements; and
- The entry and exit speeds of each movement are assumed to match the posted speed limits of 50kph.

Priority and Gap Acceptance

- The NZ give way rules, including the 2011 amendment have been used in the model;
- Gap acceptance parameters have been used as follows (critical gap/follow up headway):
  - Hinemoa Street Northbound straight ahead (crossing Kapiti Road) = 4.5/2.5;
  - Hinemoa Street Southbound right turn = 4.5/2.5; and
  - Hinemoa Street Southbound ahead = 4.5/2.5.

Note – The Zebra Crossing across the north arm of Hinemoa Street has not been included in the model.

Traffic Volumes

The eastbound left turn movement and the southbound right turn movement are expected to have an increase in flows by 45 heavy vehicles respectively.

Results

The full SIDRA results are attached in **Appendix A**. The results on the modelling shows that the LOS on Hinemoa Street for the southbound right turn movement reduces from LOS B to LOS C, due to the additional 45 heavy vehicles, in both the AM and IP. The LOS for this movement reduced from LOS B to LOS D in the PM peak with the construction traffic scenario, however the maximum average delay is only 26.4 seconds, which is the very top of LOS D and is judged to be acceptable as the modelling is a worst case scenario and for temporary works.

		PM 2016 Do Min				PM With Construction Traffic			
Approach		LOS	Av Delay (s)	DoS	95% Queue (m)	LOS	Av Delay (s)	DoS	95% Queue (m)
Hinemoa St South	Left	A	6.5	0.243	0	A	6.5	0.243	0
	Through	A	8.8	0.019	0.4	A	9.4	0.019	0.6
Hinemoa St North	Through	B	14.4	0.130	3.7	C	25.7	0.445	25.8
	Right	B	13.1	0.130	3.7	D	26.4	0.445	25.8
Kapiti Rd	Left	A	8.4	0.041	0	A	9.5	0.088	0
	Right	A	6.5	0.202	0	A	6.5	0.202	0

Table 12: Hinemoa Street / Kapiti Road Do min and Construction Results Summary

The results indicate that the intersection is generally expected to have a good level of operations with the additional construction traffic flows.

Project Assignment Model Intersection Volumes

(Peak hour volumes - vehicles per hour)

Assumed Construction Vehicle Volumes

07:00 to 19:00 Maximum Hourly Flow

Intersection			EBD			SBD			NBD			WBD		
No	Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
1	Old SH1	Poplar Ave	15	0	0	0	0	15	0	0	0	0	0	0
2	Old SH1	Leinster Ave	0	0	0	0	15	0	0	15	0	0	0	0
3	Old SH1	Raumati Rd	9	0	0	0	15	9	0	15	0	0	0	0
4	Raumati Rd	Rimu Rd	0	9	0	0	0	0	0	0	0	0	9	0
5	Old SH1	Ihakara Rd	15	0	0	0	0	15	0	0	0	0	0	0
6	Ihakara Rd	Rimu Rd	0	15	0	0	0	0	0	0	0	0	15	0
7	Old SH1	Kapiti Rd	8	14	0	0	0	8	0	0	25	25	14	10
8	Kapiti Rd	Rimu Rd	0	28	0	0	0	0	0	0	0	0	28	0
9	Kapiti Rd	Arawhata Rd	0	15	0	11	0	0	0	0	0	0	15	11
10	Old SH1	Otaihanga Rd	46	0	70	0	0	46	70	0	0	0	0	0
11	Old SH1	Te Moana Rd	23	0	12	0	0	23	12	0	0	0	0	0
12	Old SH1	Elizabeth St	0	0	0	0	35	0	0	35	0	0	0	0
13	Ruaparaha Rd	Huiawa Rd	0	0	0	8	0	0	0	0	0	0	0	8
14	Old SH1	Tutanekai Rd	0	0	0	8	0	0	0	0	0	0	0	8
15	Arawhata Rd	Tutanekai Rd	0	0	0	8	0	0	0	0	0	0	0	8
16	Te Moana Rd	Ngarara Rd	0	0	0	0	0	0	0	0	0	0	0	0
17	Old SH1	Peka Peka Rd	15	0	4	0	0	15	4	0	0	0	0	0
18	Old SH1	Te Kowhai Rd												
19	Old SH1	Ruahine St	0	0	0	0	10	0	0	0	0	0	0	0
20	Ruahine St	Tongariro St	49	0	0	0	0	49	0	0	0	0	0	0
21	Hinemoa St	Tongariro St	0	0	0	0	0	0	0	0	49	49	0	0
22	Hinemoa St	Kapiti Rd	49	0	0	0	0	49	0	0	0	0	0	0

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	133		81		1095	67	45	864				
Old SH1	Leinster Ave	52		48		1113	37	6	991				
Above two int. combined		185		129		1095	104	50	864				
Old SH1	Raumati Rd	156		194		956	196	123	920				
Raumati Rd	Rimu Rd	490	357		47		256					303	29
Old SH1	Ihakara Rd	108		67		1085	112	208	869				
Ihakara Rd	Rimu Rd	0	8	13	108	253	0	23	376	150	51	8	175
Old SH1	Kapiti Rd				0	917			719	175	146		57
Kapiti Rd	Rimu Rd	15	629	457	14	19	25	466	5	45	207	311	21
Kapiti Rd	Arawhata Rd	53	852		306		130					625	116
Old SH1	Otaihanga Rd	259		72		1048	344	41	730				
Old SH1	Te Moana Rd	200		368		990	44	266	704				
Old SH1	Elizabeth St					828			707				
Ruaparaha Rd	Huiawa Rd	0	68	2	120	31	0	4	41	0	0	58	47
Old SH1	Tutanekai Rd				9	56			92	856	1035		140
Arawhata Rd	Tutanekai Rd				61	193			67	5	75		103
Te Moana Rd	Ngarara Rd	18	474		5		25					204	4
Old SH1	Peka Peka Rd	40		60		750	45	80	649				
Old SH1	Te Kowhai Rd	2		11		184	1	5	146				
Old SH1	Ruahine St	810				91	1113	0	24				
Ruahine St	Tongariro St	15		4		75	48	15	37				
Hinemoa St	Tongariro St				3	34			31	63	84		5
Hinemoa St	Kapiti Rd	72		315		40	78	381	22				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	65		44		667	70	37	627				
Old SH1	Leinster Ave	21		4		732	50	13	678				
Above two int. combined		86		48		667	120	50	627				
Old SH1	Raumait Rd	90		84		698	142	63	636				
Raumati Rd	Rimu Rd	352	167		16		278					186	41
Old SH1	Ihakara Rd	126		121		719	203	187	539				
Ihakara Rd	Rimu Rd	0	13	23	40	196	0	23	323	91	104	14	266
Old SH1	Kapiti Rd				1	681			612	96	100		7
Kapiti Rd	Rimu Rd	27	620	375	15	10	27	739	7	141	155	338	15
Kapiti Rd	Arawhata Rd	56	888		147		143					936	178
Old SH1	Otaihanga Rd	197		32		706	180	36	700				
Old SH1	Te Moana Rd	134		247		649	37	285	614				
Old SH1	Elizabeth St					576			592				
Ruaparaha Rd	Huiawa Rd	0	53	3	62	25	0	3	28	0	0	52	60
Old SH1	Tutanekai Rd				43	103			68	758	690		141
Arawhata Rd	Tutanekai Rd				80	90			120	31	117		105
Te Moana Rd	Ngarara Rd	22	304		5		22					250	4
Old SH1	Peka Peka Rd	28		84		493	20	64	523				
Old SH1	Te Kowhai Rd	1		5		103	1	5	128				
Old SH1	Ruahine St	735				38	745	0	43				
Ruahine St	Tongariro St	18		4		32	12	12	26				
Hinemoa St	Tongariro St				6	45			56	51	52		7
Hinemoa St	Kapiti Rd	58		260		47	51	262	49				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	68		43		776	64	169	1380				
Old SH1	Leinster Ave	65		7		833	69	20	1429				
Above two int. combined		134		50		776	133	188	1380				
Old SH1	Raumait Rd	107		85		817	126	226	1268				
Raumati Rd	Rimu Rd	386	158		53		404					335	38
Old SH1	Ihakara Rd	211		123		820	118	366	1009				
Ihakara Rd	Rimu Rd	38	7	34	84	325	17	21	376	70	140	27	371
Old SH1	Kapiti Rd				1	663			1091	181	194		78
Kapiti Rd	Rimu Rd	20	441	352	15	10	24	794	9	178	83	360	22
Kapiti Rd	Arawhata Rd	85	695		173		119					926	314
Old SH1	Otaihanga Rd	319		43		732	245	81	1039				
Old SH1	Te Moana Rd	161		237		798	18	341	943				
Old SH1	Elizabeth St					695			879				
Ruaparaha Rd	Huiawa Rd	0	52	7	56	44	0	3	33	0	0	49	78
Old SH1	Tutanekai Rd				47	39			181	1187	685		124
Arawhata Rd	Tutanekai Rd				62	105			217	15	125		210
Te Moana Rd	Ngarara Rd	25	287		4		22					323	4
Old SH1	Peka Peka Rd	32		82		609	26	82	757				
Old SH1	Te Kowhai Rd	1		6		138	1	12	182				
Old SH1	Ruahine St	1158				43	754	0	38				
Ruahine St	Tongariro St	27		5		37	13	13	54				
Hinemoa St	Tongariro St				9	37			15	65	48		11
Hinemoa St	Kapiti Rd	65		329		47	39	401	15				

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	140		85		1149	70	47	907				
Old SH1	Leinster Ave	55		51		1169	39	6	1041				
Above two int. combined		194		136		1149	109	53	907				
Old SH1	Raumati Rd	164		204		1004	205	129	966				
Raumati Rd	Rimu Rd	515	375		50		268					318	31
Old SH1	Ihakara Rd	113		70		1139	118	218	912				
Ihakara Rd	Rimu Rd	0	8	14	114	266	0	24	395	158	53	9	183
Old SH1	Kapiti Rd				0	963			755	184	153		60
Kapiti Rd	Rimu Rd	16	660	480	15	20	26	490	5	47	217	327	22
Kapiti Rd	Arawhata Rd	56	895		322		136					656	122
Old SH1	Otaihanga Rd	272		76		1100	361	43	767				
Old SH1	Te Moana Rd	210		387		1040	46	279	739				
Old SH1	Elizabeth St					869			742				
Ruaparaha Rd	Huiawa Rd	0	71	2	126	33	0	5	43	0	0	60	50
Old SH1	Tutanekai Rd				9	59			97	899	1086		147
Arawhata Rd	Tutanekai Rd				64	202			70	6	78		108
Te Moana Rd	Ngarara Rd	19	498		6		27					214	4
Old SH1	Peka Peka Rd	42		63		788	47	84	681				
Old SH1	Te Kowhai Rd	2		12		193	1	5	153				
Old SH1	Ruahine St	850				96	1169	0	25				
Ruahine St	Tongariro St	16		4		78	50	16	39				
Hinemoa St	Tongariro St				3	35			32	66	89		6
Hinemoa St	Kapiti Rd	75		331		42	82	400	23				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	68		46		700	73	39	658				
Old SH1	Leinster Ave	22		5		769	52	14	712				
Above two int. combined		90		51		700	126	52	658				
Old SH1	Raumait Rd	95		88		733	149	66	668				
Raumati Rd	Rimu Rd	370	176		17		291					196	43
Old SH1	Ihakara Rd	133		127		755	214	196	566				
Ihakara Rd	Rimu Rd	0	14	24	42	205	0	24	339	95	110	14	279
Old SH1	Kapiti Rd				1	715			643	100	105		8
Kapiti Rd	Rimu Rd	28	651	394	16	11	28	775	7	148	163	355	16
Kapiti Rd	Arawhata Rd	59	933		154		151					983	187
Old SH1	Otaihanga Rd	207		34		742	189	38	735				
Old SH1	Te Moana Rd	141		259		681	39	300	644				
Old SH1	Elizabeth St					605			622				
Ruaparaha Rd	Huiawa Rd	0	56	3	65	26	0	3	29	0	0	55	63
Old SH1	Tutanekai Rd				45	108			72	796	725		148
Arawhata Rd	Tutanekai Rd				84	95			126	32	122		110
Te Moana Rd	Ngarara Rd	23	319		5		23					262	5
Old SH1	Peka Peka Rd	29		89		517	21	67	549				
Old SH1	Te Kowhai Rd	1		5		108	1	5	135				
Old SH1	Ruahine St	772				40	782	0	45				
Ruahine St	Tongariro St	19		5		34	12	12	28				
Hinemoa St	Tongariro St				6	47			59	54	55		7
Hinemoa St	Kapiti Rd	61		273		49	53	275	52				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	72		45		815	67	177	1449				
Old SH1	Leinster Ave	69		7		875	72	21	1500				
Above two int. combined		140		52		815	139	198	1449				
Old SH1	Raumait Rd	112		90		858	133	238	1331				
Raumati Rd	Rimu Rd	405	166		55		424					352	40
Old SH1	Ihakara Rd	221		129		861	124	384	1059				
Ihakara Rd	Rimu Rd	40	8	36	88	342	18	22	394	74	147	28	390
Old SH1	Kapiti Rd				1	696			1145	190	204		82
Kapiti Rd	Rimu Rd	21	463	369	16	10	25	834	9	187	87	378	23
Kapiti Rd	Arawhata Rd	89	730		181		125					973	330
Old SH1	Otaihanga Rd	335		45		769	257	85	1091				
Old SH1	Te Moana Rd	169		249		838	19	358	991				
Old SH1	Elizabeth St					730			923				
Ruaparaha Rd	Huiawa Rd	0	54	7	58	46	0	4	34	0	0	51	82
Old SH1	Tutanekai Rd				49	41			190	1247	719		131
Arawhata Rd	Tutanekai Rd				65	110			228	15	131		221
Te Moana Rd	Ngarara Rd	27	301		4		23					339	4
Old SH1	Peka Peka Rd	33		86		640	27	87	794				
Old SH1	Te Kowhai Rd	1		6		145	1	13	191				
Old SH1	Ruahine St	1216				46	792	0	40				
Ruahine St	Tongariro St	28		6		39	14	14	57				
Hinemoa St	Tongariro St				9	39			16	68	51		11
Hinemoa St	Kapiti Rd	68		346		49	41	421	15				

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	155		85		1149	85	47	907				
Old SH1	Leinster Ave	55		51		1184	39	6	1056				
Above two int. combined		209		136		1149	124	53	907				
Old SH1	Raumati Rd	173		204		1019	214	129	981				
Raumati Rd	Rimu Rd	515	384		50		268					327	31
Old SH1	Ihakara Rd	128		70		1139	133	218	912				
Ihakara Rd	Rimu Rd	0	23	14	114	266	0	24	395	158	53	24	183
Old SH1	Kapiti Rd				0	963			755	209	178		70
Kapiti Rd	Rimu Rd	16	688	480	15	20	26	490	5	47	217	355	22
Kapiti Rd	Arawhata Rd	56	910		333		136					671	133
Old SH1	Otaihanga Rd	318		146		1100	407	113	767				
Old SH1	Te Moana Rd	233		399		1040	69	291	739				
Old SH1	Elizabeth St					904			777				
Ruaparaha Rd	Huiawa Rd	0	71	2	134	33	0	5	43	0	0	60	58
Old SH1	Tutanekai Rd				17	59			97	899	1086		155
Arawhata Rd	Tutanekai Rd				72	202			70	6	78		116
Te Moana Rd	Ngarara Rd	19	498		6		27					214	4
Old SH1	Peka Peka Rd	57		67		788	62	88	681				
Old SH1	Te Kowhai Rd	2		12		193	1	5	153				
Old SH1	Ruahine St	850				106	1169	0	25				
Ruahine St	Tongariro St	65		4		78	99	16	39				
Hinemoa St	Tongariro St				3	35			32	115	138		6
Hinemoa St	Kapiti Rd	124		331		42	131	400	23				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	83		46		700	88	39	658				
Old SH1	Leinster Ave	22		5		784	52	14	727				
Above two int. combined		105		51		700	141	52	658				
Old SH1	Raumait Rd	104		88		748	158	66	683				
Raumati Rd	Rimu Rd	370	185		17		291					205	43
Old SH1	Ihakara Rd	148		127		755	229	196	566				
Ihakara Rd	Rimu Rd	0	29	24	42	205	0	24	339	95	110	29	279
Old SH1	Kapiti Rd				1	715			643	125	130		18
Kapiti Rd	Rimu Rd	28	679	394	16	11	28	775	7	148	163	383	16
Kapiti Rd	Arawhata Rd	59	948		165		151					998	198
Old SH1	Otaihanga Rd	253		104		742	235	108	735				
Old SH1	Te Moana Rd	164		271		681	62	312	644				
Old SH1	Elizabeth St					640			657				
Ruaparaha Rd	Huiawa Rd	0	56	3	73	26	0	3	29	0	0	55	71
Old SH1	Tutanekai Rd				53	108			72	796	725		156
Arawhata Rd	Tutanekai Rd				92	95			126	32	122		118
Te Moana Rd	Ngarara Rd	23	319		5		23					262	5
Old SH1	Peka Peka Rd	44		93		517	36	71	549				
Old SH1	Te Kowhai Rd	1		5		108	1	5	135				
Old SH1	Ruahine St	772				50	782	0	45				
Ruahine St	Tongariro St	68		5		34	61	12	28				
Hinemoa St	Tongariro St				6	47			59	103	104		7
Hinemoa St	Kapiti Rd	110		273		49	102	275	52				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	87		45		815	82	177	1449				
Old SH1	Leinster Ave	69		7		890	72	21	1515				
Above two int. combined		155		52		815	154	198	1449				
Old SH1	Raumait Rd	121		90		873	142	238	1346				
Raumati Rd	Rimu Rd	405	175		55		424					361	40
Old SH1	Ihakara Rd	236		129		861	139	384	1059				
Ihakara Rd	Rimu Rd	40	23	36	88	342	18	22	394	74	147	43	390
Old SH1	Kapiti Rd				1	696			1145	215	229		92
Kapiti Rd	Rimu Rd	21	491	369	16	10	25	834	9	187	87	406	23
Kapiti Rd	Arawhata Rd	89	745		192		125					988	341
Old SH1	Otaihanga Rd	381		115		769	303	155	1091				
Old SH1	Te Moana Rd	192		261		838	42	370	991				
Old SH1	Elizabeth St					765			958				
Ruaparaha Rd	Huiawa Rd	0	54	7	66	46	0	4	34	0	0	51	90
Old SH1	Tutanekai Rd				57	41			190	1247	719		139
Arawhata Rd	Tutanekai Rd				73	110			228	15	131		229
Te Moana Rd	Ngarara Rd	27	301		4		23					339	4
Old SH1	Peka Peka Rd	48		90		640	42	91	794				
Old SH1	Te Kowhai Rd	1		6		145	1	13	191				
Old SH1	Ruahine St	1216				56	792	0	40				
Ruahine St	Tongariro St	77		6		39	63	14	57				
Hinemoa St	Tongariro St				9	39			16	117	100		11
Hinemoa St	Kapiti Rd	117		346		49	90	421	15				

Increase in Factored Volumes (%)

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	11		0		0	21	0	0				
Old SH1	Leinster Ave	0		0		1	0	0	1				
Above two int. combined		8		0		0	14	0	0				
Old SH1	Raumati Rd	5		0		1	4	0	2				
Raumati Rd	Rimu Rd	0	2		0		0					3	0
Old SH1	Ihakara Rd	13		0		0	13	0	0				
Ihakara Rd	Rimu Rd		188	0	0	0		0	0	0	0	170	0
Old SH1	Kapiti Rd				0	0			0	14	16		17
Kapiti Rd	Rimu Rd	0	4	0	0	0	0	0	0	0	0	9	0
Kapiti Rd	Arawhata Rd	0	2		3		0					2	9
Old SH1	Otaihanga Rd	17		93		0	13	162	0				
Old SH1	Te Moana Rd	11		3		0	50	4	0				
Old SH1	Elizabeth St					4			5				
Ruaparaha Rd	Huiawa Rd		0	0	6	0		0	0	0		0	16
Old SH1	Tutanekai Rd				87	0			0	0	0		5
Arawhata Rd	Tutanekai Rd				12	0			0	0	0		7
Te Moana Rd	Ngarara Rd	0	0		0		0					0	0
Old SH1	Peka Peka Rd	35		6		0	32	5	0				
Old SH1	Te Kowhai Rd	0		0		0	0	0	0				
Old SH1	Ruahine St	0				10	0		0				
Ruahine St	Tongariro St	308		0		0	98	0	0				
Hinemoa St	Tongariro St				0	0			0	74	55		0
Hinemoa St	Kapiti Rd	65		0		0	60	0	0				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	22		0		0	20	0	0				
Old SH1	Leinster Ave	0		0		2	0	0	2				
Above two int. combined		17		0		0	12	0	0				
Old SH1	Raumait Rd	9		0		2	6	0	2				
Raumati Rd	Rimu Rd	0	5		0		0					5	0
Old SH1	Ihakara Rd	11		0		0	7	0	0				
Ihakara Rd	Rimu Rd		108	0	0	0		0	0	0	0	105	0
Old SH1	Kapiti Rd				0	0			0	25	24		128
Kapiti Rd	Rimu Rd	0	4	0	0	0	0	0	0	0	0	8	0
Kapiti Rd	Arawhata Rd	0	2		7		0					2	6
Old SH1	Otaihanga Rd	22		206		0	24	185	0				
Old SH1	Te Moana Rd	16		5		0	59	4	0				
Old SH1	Elizabeth St					6			6				
Ruaparaha Rd	Huiawa Rd		0	0	12	0		0	0	0		0	13
Old SH1	Tutanekai Rd				18	0			0	0	0		5
Arawhata Rd	Tutanekai Rd				10	0			0	0	0		7
Te Moana Rd	Ngarara Rd	0	0		0		0					0	0
Old SH1	Peka Peka Rd	52		5		0	73	6	0				
Old SH1	Te Kowhai Rd	0		0		0	0	0	0				
Old SH1	Ruahine St	0				25	0		0				
Ruahine St	Tongariro St	254		0		0	400	0	0				
Hinemoa St	Tongariro St				0	0			0	91	89		0
Hinemoa St	Kapiti Rd	80		0		0	92	0	0				

Increase in Factored Volumes (%)

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	21		0		0	22	0	0				
Old SH1	Leinster Ave	0		0		2	0	0	1				
Above two int. combined		11		0		0	11	0	0				
Old SH1	Raumait Rd	8		0		2	7	0	1				
Raumati Rd	Rimu Rd	0	5		0		0					3	0
Old SH1	Ihakara Rd	7		0		0	12	0	0				
Ihakara Rd	Rimu Rd	0	198	0	0	0	0	0	0	0	0	53	0
Old SH1	Kapiti Rd				0	0			0	13	12		12
Kapiti Rd	Rimu Rd	0	6	0	0	0	0	0	0	0	0	7	0
Kapiti Rd	Arawhata Rd	0	2		6		0					2	3
Old SH1	Otaihanga Rd	14		155		0	18	83	0				
Old SH1	Te Moana Rd	14		5		0	121	3	0				
Old SH1	Elizabeth St					5			4				
Ruaparaha Rd	Huiawa Rd		0	0	14	0		0	0	0		0	10
Old SH1	Tutanekai Rd				16	0			0	0	0		6
Arawhata Rd	Tutanekai Rd				12	0			0	0	0		4
Te Moana Rd	Ngarara Rd	0	0		0		0					0	0
Old SH1	Peka Peka Rd	45		5		0	55	5	0				
Old SH1	Te Kowhai Rd	0		0		0	0	0	0				
Old SH1	Ruahine St	0				22	0		0				
Ruahine St	Tongariro St	175		0		0	362	0	0				
Hinemoa St	Tongariro St				0	0			0	72	96		0
Hinemoa St	Kapiti Rd	72		0		0	120	0	0				

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	131		81		1056	62	42	775				
Old SH1	Leinster Ave	53		50		1069	35	5	901				
Above two int. combined		184		131		1056	97	47	775				
Old SH1	Raumati Rd	160		186		917	199	111	842				
Raumati Rd	Rimu Rd	506	354		48		257					291	30
Old SH1	Ihakara Rd	111		59		1057	110	189	813				
Ihakara Rd	Rimu Rd	0	8	14	110	260	0	24	389	153	49	9	164
Old SH1	Kapiti Rd				0	900			656	178	139		49
Kapiti Rd	Rimu Rd	14	608	464	14	20	24	460	5	44	214	305	21
Kapiti Rd	Arawhata Rd	54	848		311		132					614	116
Old SH1	Otaihanga Rd	253		69		1026	339	40	676				
Old SH1	Te Moana Rd	208		379		955	46	269	658				
Old SH1	Elizabeth St					792			668				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				6	56			79	783	1022		135
Arawhata Rd	Tutanekai Rd				59	197			67	5	71		89
Te Moana Rd	Ngarara Rd	18	486		5		25					200	4
Old SH1	Peka Peka Rd	38		57		712	45	81	603				
Old SH1	Te Kowhai Rd	2		11		177	1	5	141				
Old SH1	Ruahine St	739				88	1091	0	21				
Ruahine St	Tongariro St	15		4		74	48	15	37				
Hinemoa St	Tongariro St				2	26			28	62	83		5
Hinemoa St	Kapiti Rd	68		316		36	73	368	22				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	63		44		608	69	36	562				
Old SH1	Leinster Ave	21		4		673	50	12	613				
Above two int. combined		84		48		608	119	48	562				
Old SH1	Raumait Rd	90		79		643	142	58	577				
Raumati Rd	Rimu Rd	362	160		17		285					181	43
Old SH1	Ihakara Rd	126		120		664	201	181	485				
Ihakara Rd	Rimu Rd	0	14	24	36	202	0	24	333	93	105	14	259
Old SH1	Kapiti Rd				0	630			559	95	95		2
Kapiti Rd	Rimu Rd	21	615	381	13	10	22	745	6	141	158	339	14
Kapiti Rd	Arawhata Rd	57	887		149		147					938	182
Old SH1	Otaihanga Rd	192		30		653	176	33	648				
Old SH1	Te Moana Rd	133		247		596	38	290	560				
Old SH1	Elizabeth St					528			541				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				38	101			61	701	639		138
Arawhata Rd	Tutanekai Rd				77	92			123	30	117		96
Te Moana Rd	Ngarara Rd	22	300		5		21					246	5
Old SH1	Peka Peka Rd	26		82		445	19	62	471				
Old SH1	Te Kowhai Rd	1		5		97	1	5	118				
Old SH1	Ruahine St	675				35	687	0	41				
Ruahine St	Tongariro St	17		4		31	11	12	26				
Hinemoa St	Tongariro St				5	40			56	50	52		6
Hinemoa St	Kapiti Rd	57		259		45	47	252	50				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	69		40		759	65	170	1388				
Old SH1	Leinster Ave	67		4		821	72	20	1437				
Above two int. combined		136		44		759	138	190	1388				
Old SH1	Raumait Rd	108		76		817	131	228	1276				
Raumati Rd	Rimu Rd	397	152		51		415					339	37
Old SH1	Ihakara Rd	216		127		821	118	375	1008				
Ihakara Rd	Rimu Rd	40	7	35	84	331	18	22	383	71	144	27	383
Old SH1	Kapiti Rd				1	654			1095	184	199		79
Kapiti Rd	Rimu Rd	19	441	361	13	9	22	823	8	179	83	360	21
Kapiti Rd	Arawhata Rd	88	704		174		122					951	328
Old SH1	Otaihanga Rd	321		41		721	248	81	1043				
Old SH1	Te Moana Rd	166		241		791	19	354	940				
Old SH1	Elizabeth St					687			873				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				44	39			182	1189	671		122
Arawhata Rd	Tutanekai Rd				60	106			227	14	127		208
Te Moana Rd	Ngarara Rd	26	289		4		22					330	4
Old SH1	Peka Peka Rd	31		82		599	26	82	750				
Old SH1	Te Kowhai Rd	1		6		137	1	13	179				
Old SH1	Ruahine St	1158				44	737	0	37				
Ruahine St	Tongariro St	27		6		38	13	13	55				
Hinemoa St	Tongariro St				8	35			14	64	49		11
Hinemoa St	Kapiti Rd	63		332		47	37	409	15				

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	8		4		93	8	5	132				
Old SH1	Leinster Ave	2		1		100	4	1	140				
Above two int. combined		10		4		93	12	6	132				
Old SH1	Raumati Rd	4		18		87	6	18	124				
Raumati Rd	Rimu Rd	9	21		2		11					27	1
Old SH1	Ihakara Rd	3		11		82	8	29	99				
Ihakara Rd	Rimu Rd	0	0	0	4	6	0	0	6	5	5	0	19
Old SH1	Kapiti Rd				0	63			99	6	14		11
Kapiti Rd	Rimu Rd	2	53	16	1	0	2	30	0	4	3	21	1
Kapiti Rd	Arawhata Rd	2	47		10		4					42	6
Old SH1	Otaihanga Rd	19		7		74	22	4	91				
Old SH1	Te Moana Rd	3		8		85	1	10	81				
Old SH1	Elizabeth St					77			74				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				3	3			18	116	64		12
Arawhata Rd	Tutanekai Rd				5	5			3	1	7		19
Te Moana Rd	Ngarara Rd	1	12		0		1					15	0
Old SH1	Peka Peka Rd	4		6		76	2	3	78				
Old SH1	Te Kowhai Rd	0		0		16	0	0	12				
Old SH1	Ruahine St	112				7	78	0	3				
Ruahine St	Tongariro St	1		0		4	2	0	2				
Hinemoa St	Tongariro St				1	10			4	4	5		1
Hinemoa St	Kapiti Rd	7		16		6	9	32	1				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	5		2		92	4	2	96				
Old SH1	Leinster Ave	1		0		96	3	2	99				
Above two int. combined		5		2		92	7	4	96				
Old SH1	Raumait Rd	5		9		90	7	8	91				
Raumati Rd	Rimu Rd	7	15		0		7					14	0
Old SH1	Ihakara Rd	7		7		91	13	15	81				
Ihakara Rd	Rimu Rd	0	0	0	6	3	0	0	6	3	4	0	21
Old SH1	Kapiti Rd				0	85			84	5	10		6
Kapiti Rd	Rimu Rd	7	35	13	3	1	6	30	1	7	5	16	3
Kapiti Rd	Arawhata Rd	2	46		5		4					44	4
Old SH1	Otaihanga Rd	15		4		89	13	5	87				
Old SH1	Te Moana Rd	7		13		85	2	10	84				
Old SH1	Elizabeth St					77			81				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				7	7			11	95	86		10
Arawhata Rd	Tutanekai Rd				7	3			3	3	6		14
Te Moana Rd	Ngarara Rd	1	19		0		1					16	0
Old SH1	Peka Peka Rd	3		6		72	1	5	78				
Old SH1	Te Kowhai Rd	0		0		11	0	0	17				
Old SH1	Ruahine St	97				5	95	0	4				
Ruahine St	Tongariro St	2		0		3	1	0	2				
Hinemoa St	Tongariro St				1	7			3	4	3		1
Hinemoa St	Kapiti Rd	4		15		5	6	23	2				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	3		5		56	1	7	61				
Old SH1	Leinster Ave	2		3		54	0	1	63				
Above two int. combined		4		8		56	2	8	61				
Old SH1	Raumait Rd	4		13		41	2	9	55				
Raumati Rd	Rimu Rd	8	14		4		9					12	2
Old SH1	Ihakara Rd	5		2		40	6	9	51				
Ihakara Rd	Rimu Rd	0	0	1	3	11	0	0	11	3	3	1	7
Old SH1	Kapiti Rd				0	42			51	7	5		3
Kapiti Rd	Rimu Rd	3	22	9	3	1	3	11	1	8	4	19	3
Kapiti Rd	Arawhata Rd	1	26		7		3					22	2
Old SH1	Otaihanga Rd	14		4		49	9	4	48				
Old SH1	Te Moana Rd	3		8		48	0	4	50				
Old SH1	Elizabeth St					43			49				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				5	2			7	58	48		9
Arawhata Rd	Tutanekai Rd				5	4			1	2	4		13
Te Moana Rd	Ngarara Rd	1	12		0		1					9	0
Old SH1	Peka Peka Rd	2		3		40	1	5	44				
Old SH1	Te Kowhai Rd	0		0		8	0	0	12				
Old SH1	Ruahine St	58				2	56	0	3				
Ruahine St	Tongariro St	1		0		1	1	0	2				
Hinemoa St	Tongariro St				1	4			2	3	2		1
Hinemoa St	Kapiti Rd	5		14		2	4	12	0				

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	23		4		93	23	5	132				
Old SH1	Leinster Ave	2		1		115	4	1	155				
Above two int. combined		25		4		93	27	6	132				
Old SH1	Raumati Rd	13		18		102	15	18	139				
Raumati Rd	Rimu Rd	9	30		2		11					36	1
Old SH1	Ihakara Rd	18		11		82	23	29	99				
Ihakara Rd	Rimu Rd	0	15	0	4	6	0	0	6	5	5	15	19
Old SH1	Kapiti Rd				0	63			99	31	39		21
Kapiti Rd	Rimu Rd	2	81	16	1	0	2	30	0	4	3	49	1
Kapiti Rd	Arawhata Rd	2	62		21		4					57	17
Old SH1	Otaihanga Rd	65		77		74	68	74	91				
Old SH1	Te Moana Rd	26		20		85	24	22	81				
Old SH1	Elizabeth St					112			109				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				11	3			18	116	64		20
Arawhata Rd	Tutanekai Rd				13	5			3	1	7		27
Te Moana Rd	Ngarara Rd	1	12		0		1					15	0
Old SH1	Peka Peka Rd	19		10		76	17	7	78				
Old SH1	Te Kowhai Rd	0		0		16	0	0	12				
Old SH1	Ruahine St	112				17	78	0	3				
Ruahine St	Tongariro St	50		0		4	51	0	2				
Hinemoa St	Tongariro St				1	10			4	53	54		1
Hinemoa St	Kapiti Rd	56		16		6	58	32	1				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	20		2		92	19	2	96				
Old SH1	Leinster Ave	1		0		111	3	2	114				
Above two int. combined		20		2		92	22	4	96				
Old SH1	Raumait Rd	14		9		105	16	8	106				
Raumati Rd	Rimu Rd	7	24		0		7					23	0
Old SH1	Ihakara Rd	22		7		91	28	15	81				
Ihakara Rd	Rimu Rd	0	15	0	6	3	0	0	6	3	4	15	21
Old SH1	Kapiti Rd				0	85			84	30	35		16
Kapiti Rd	Rimu Rd	7	63	13	3	1	6	30	1	7	5	44	3
Kapiti Rd	Arawhata Rd	2	61		16		4					59	15
Old SH1	Otaihanga Rd	61		74		89	59	75	87				
Old SH1	Te Moana Rd	30		25		85	25	22	84				
Old SH1	Elizabeth St					112			116				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				15	7			11	95	86		18
Arawhata Rd	Tutanekai Rd				15	3			3	3	6		22
Te Moana Rd	Ngarara Rd	1	19		0		1					16	0
Old SH1	Peka Peka Rd	18		10		72	16	9	78				
Old SH1	Te Kowhai Rd	0		0		11	0	0	17				
Old SH1	Ruahine St	97				15	95	0	4				
Ruahine St	Tongariro St	51		0		3	50	0	2				
Hinemoa St	Tongariro St				1	7			3	53	52		1
Hinemoa St	Kapiti Rd	53		15		5	55	23	2				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	18		5		56	16	7	61				
Old SH1	Leinster Ave	2		3		69	0	1	78				
Above two int. combined		19		8		56	17	8	61				
Old SH1	Raumait Rd	13		13		56	11	9	70				
Raumati Rd	Rimu Rd	8	23		4		9					21	2
Old SH1	Ihakara Rd	20		2		40	21	9	51				
Ihakara Rd	Rimu Rd	0	15	1	3	11	0	0	11	3	3	16	7
Old SH1	Kapiti Rd				0	42			51	32	30		13
Kapiti Rd	Rimu Rd	3	50	9	3	1	3	11	1	8	4	47	3
Kapiti Rd	Arawhata Rd	1	41		18		3					37	13
Old SH1	Otaihanga Rd	60		74		49	55	74	48				
Old SH1	Te Moana Rd	26		20		48	23	16	50				
Old SH1	Elizabeth St					78			84				
Ruaparaha Rd	Huiawa Rd												
Old SH1	Tutanekai Rd				13	2			7	58	48		17
Arawhata Rd	Tutanekai Rd				13	4			1	2	4		21
Te Moana Rd	Ngarara Rd	1	12		0		1					9	0
Old SH1	Peka Peka Rd	17		7		40	16	9	44				
Old SH1	Te Kowhai Rd	0		0		8	0	0	12				
Old SH1	Ruahine St	58				12	56	0	3				
Ruahine St	Tongariro St	50		0		1	50	0	2				
Hinemoa St	Tongariro St				1	4			2	52	51		1
Hinemoa St	Kapiti Rd	54		14		2	53	12	0				

Counted Intersection Volumes (7-Jun-2011)

(Peak hour volumes - vehicles per hour)

Assumed Construction Vehicle Volumes

07:00 to 19:00 Maximum Hourly Flow

Intersection			EBD			SBD			NBD			WBD		
No	Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
1	Old SH1	Poplar Ave	15	0	0	0	0	15	0	0	0	0	0	0
2	Old SH1	Leinster Ave	0	0	0	0	15	0	0	15	0	0	0	0
3	Old SH1	Raumati Rd	9	0	0	0	15	9	0	15	0	0	0	0
4	Raumati Rd	Rimu Rd	0	9	0	0	0	0	0	0	0	0	9	0
5	Old SH1	Ihakara Rd	15	0	0	0	0	15	0	0	0	0	0	0
6	Ihakara Rd	Rimu Rd	0	15	0	0	0	0	0	0	0	0	15	0
7	Old SH1	Kapiti Rd	8	14	0	0	0	8	0	0	25	25	14	10
8	Kapiti Rd	Rimu Rd	0	28	0	0	0	0	0	0	0	0	28	0
9	Kapiti Rd	Arawhata Rd	0	15	0	11	0	0	0	0	0	0	15	11
10	Old SH1	Otaihanga Rd	46	0	70	0	0	46	70	0	0	0	0	0
11	Old SH1	Te Moana Rd	23	0	12	0	0	23	12	0	0	0	0	0
12	Old SH1	Elizabeth St	0	0	0	0	35	0	0	35	0	0	0	0
13	Ruaparaha Rd	Huiawa Rd	0	0	0	8	0	0	0	0	0	0	0	8
14	Old SH1	Tutanekai Rd	0	0	0	8	0	0	0	0	0	0	0	8
15	Arawhata Rd	Tutanekai Rd	0	0	0	8	0	0	0	0	0	0	0	8
16	Te Moana Rd	Ngarara Rd	0	0	0	0	0	0	0	0	0	0	0	0
17	Old SH1	Peka Peka Rd	15	0	4	0	0	15	4	0	0	0	0	0
18	Old SH1	Te Kowhai Rd												
19	Old SH1	Ruahine St	0	0	0	0	10	0	0	0	0	0	0	0
20	Ruahine St	Tongariro St	49	0	0	0	0	49	0	0	0	0	0	0
21	Hinemoa St	Tongariro St	0	0	0	0	0	0	0	0	49	49	0	0
22	Hinemoa St	Kapiti Rd	49	0	0	0	0	49	0	0	0	0	0	0

Light Vehicle Count (vph)

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	84		143		920	64	33	567				
Old SH1	Leinster Ave	33		7		950	7	0	632				
Above two int. combined		117		150		920	71	33	567				
Old SH1	Otaihanga Rd	186		45		931	201	25	531				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	34		34		517	33	32	510				
Old SH1	Leinster Ave	16		1		547	17	3	551				
Above two int. combined		50		35		517	50	35	510				
Old SH1	Otaihanga Rd	145		29		624	141	31	603				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	59		34		590	34	179	1317				
Old SH1	Leinster Ave	16		0		620	20	6	1238				
Above two int. combined		75		34		590	54	185	1317				
Old SH1	Otaihanga Rd	263		13		531	200	38	965				

HCV Count (vph)

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	1		3	0	61	0	3	60	0	0	0	0
Old SH1	Leinster Ave	0		0	0	71	1	0	78	0	0	0	0
Above two int. combined		1		3		61	1	3	60				
Old SH1	Otaihanga Rd	5		10	0	55	8	1	72	0	0	0	0

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	2		1	0	44	1	2	56	0	0	0	0
Old SH1	Leinster Ave	3		0	0	45	0	1	55	0	0	0	0
Above two int. combined		5		1		44	1	3	56				
Old SH1	Otaihanga Rd	15		8	0	40	5	6	38	0	0	0	0

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	1		1	0	26	0	2	27	0	0	0	0
Old SH1	Leinster Ave	0		0	0	26	1	0	31	0	0	0	0
Above two int. combined		1		1		26	1	2	27				
Old SH1	Otaihanga Rd	0		0	0	42	6	1	25	0	0	0	0

Difference in Total Count and Model Volume

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	-48		65		-114	-3	-9	-237				
Old SH1	Leinster Ave	-19		-41		-92	-29	-6	-281				
Above two int. combined		-67		24		-114	-32	-14	-237				
Old SH1	Otaihanga Rd	-68		-17		-62	-135	-15	-127				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	-29		-9		-106	-36	-3	-61				
Old SH1	Leinster Ave	-2		-3		-140	-33	-9	-72				
Above two int. combined		-31		-12		-106	-69	-12	-61				
Old SH1	Otaihanga Rd	-37		5		-42	-34	1	-59				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	-8		-8		-160	-30	12	-36				
Old SH1	Leinster Ave	-42		-260		599	-30	-256	1220				
Above two int. combined		-51		-268		-160	-59	-243	-36				
Old SH1	Otaihanga Rd	-56		-30		-159	-39	-42	-49				

Light Counted Volumes, Plus Peak Factor 13% HCV Counted Volumes, Plus Peak Factor 13%

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD			EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	95		162		1040	72	37	641					1		3	0	69	0	3	68	0	0	0	0
Old SH1	Leinster Ave	37		8		1074	8	0	714					0		0	0	80	1	0	88	0	0	0	0
Above two int. combined		132		170		1040	80	37	641					1		3		69	1	3	68				
Old SH1	Otaihanga Rd	210		51		1052	227	28	600					6		11	0	62	9	1	81	0	0	0	0

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD			EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	38		38		584	37	36	576					2		1	0	50	1	2	63	0	0	0	0
Old SH1	Leinster Ave	18		1		618	19	3	623					3		0	0	51	0	1	62	0	0	0	0
Above two int. combined		57		40		584	57	40	576					6		1		50	1	3	63				
Old SH1	Otaihanga Rd	164		33		705	159	35	681					17		9	0	45	6	7	43	0	0	0	0

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD			EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	67		38		667	38	202	1488					1		1	0	29	0	2	31	0	0	0	0
Old SH1	Leinster Ave	18		0		701	23	7	1399					0		0	0	29	1	0	35	0	0	0	0
Above two int. combined		85		38		667	61	209	1488					1		1		29	1	2	31				
Old SH1	Otaihanga Rd	297		15		600	226	43	1090					0		0	0	47	7	1	28	0	0	0	0

HCV Facted Volumes, Plus Construction Vehicles

AM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	16		3		69	15	3	68				
Old SH1	Leinster Ave	0		0		95	1	0	103				
Above two int. combined		16		3		69	16	3	68				
Old SH1	Otaihanga Rd	52		81		62	55	71	81				

Inter Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	17		1		50	16	2	63				
Old SH1	Leinster Ave	3		0		66	0	1	77				
Above two int. combined		21		1		50	16	3	63				
Old SH1	Otaihanga Rd	63		79		45	52	77	43				

PM Peak Hour

Total Volumes		EBD			SBD			NBD			WBD		
Major Rd	Minor Rd	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
Old SH1	Poplar Ave	16		1		29	15	2	31				
Old SH1	Leinster Ave	0		0		44	1	0	50				
Above two int. combined		16		1		29	16	2	31				
Old SH1	Otaihanga Rd	46		70		47	53	71	28				

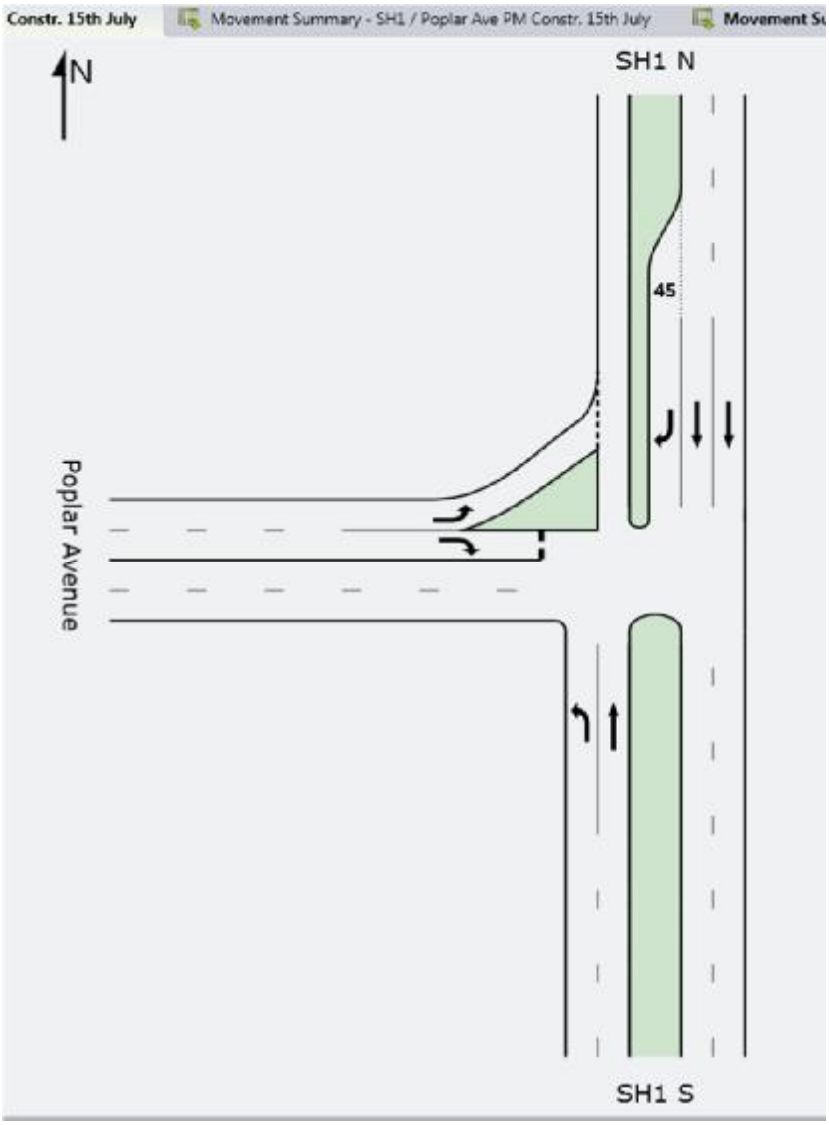
SIDRA - Overall Intersection Operational Statistics

SIDRA Model	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
						Vehicles	Distance			
	veh/h	%	v/c	sec		veh	m		per veh	km/h
SH1_Poplar Ave (Count)										
SH1 / Poplar Ave Existing - AM (Count)	2328	6.5	0.407	2.8	NA	1.4	10.0	0.1	0.16	88.6
SH1 / Poplar Ave Existing - IP (Count)	1473	8.3	0.358	1.6	NA	0.3	2.2	0.05	0.09	93.3
SH1 / Poplar Ave Existing - PM (Count)	2719	2.5	0.831	3.9	NA	3	21.3	0.06	0.12	86.7
SH1 / Poplar Ave (Constr.) - AM (Count)	2361	7.8	0.407	3.2	NA	1.5	10.4	0.11	0.17	87.4
SH1 / Poplar Ave (Constr.) - IP (Count)	1510	10.5	0.359	2.3	NA	0.7	5.8	0.06	0.11	91.5
SH1 / Poplar Ave (Constr.) - PM (Count)	2753	3.7	1.357	20.9	NA	22.2	181.0	0.07	0.17	57
SH1 / Poplar Ave (Incl Leinster existing) - AM (Count)	2388	6.4	0.407	3.2	NA	1.5	10.9	0.11	0.18	87.2
SH1 / Poplar Ave (Incl Leinster) - IP (Count)	1526	8.4	0.358	2.1	NA	0.5	4.0	0.06	0.12	91.5
SH1 / Poplar Ave (Incl Leinster) - PM (Count)	2772	2.5	0.831	5.7	NA	4.6	32.3	0.07	0.14	82.1
SH1 / Poplar Ave (w. Construction Incl Leinster) - AM (Count)	2421	7.7	0.407	3.6	NA	1.7	13.2	0.13	0.19	86.1
SH1 / Poplar Ave (w. Construction Incl Leinster) - IP (Count)	1601	10.3	0.367	2.8	NA	0.9	7.9	0.08	0.14	89.7
SH1 / Poplar Ave (w. Construction Incl Leinster) - PM (Count)	2807	3.6	1.469	29.7	NA	29.7	235.9	0.08	0.21	48.2
SH1_Poplar Ave (Model)										
SH1 / Poplar Ave Existing - AM (Model)	2663	10.4	1.574	24.6	NA	28	203.7	0.11	0.18	53.3
SH1 / Poplar Ave Existing - IP (Model)	1759	12.7	0.41	2.6	NA	0.9	6.4	0.08	0.13	90.2
SH1 / Poplar Ave Existing - PM (Model)	2916	5.1	1	8.8	NA	6	45.8	0.07	0.13	75.6
SH1 / Poplar Ave (Constr.) - AM (Model)	2697	11.5	1.574	25.4	NA	28	203.7	0.12	0.2	52
SH1 / Poplar Ave (Constr.) - IP (Model)	1792	14.3	0.41	3.2	NA	1.1	9.5	0.10	0.14	88.4
SH1 / Poplar Ave (Constr.) - PM (Model)	2949	6.1	1.489	30	NA	27	222.9	0.08	0.18	48.1
SH1 / Poplar Ave (Incl Leinster) - AM (Model)	2830	10.1	2.5	80.2	NA	63.5	455.8	0.16	0.29	26
SH1 / Poplar Ave (Incl Leinster) - IP (Model)	1861	12.3	0.41	3.5	NA	1.1	7.8	0.11	0.17	87.4
SH1 / Poplar Ave (Incl Leinster) - PM (Model)	3104	5	1.373	37.3	NA	33.8	242.7	0.12	0.29	42.5
SH1 / Poplar Ave (w. Construction Incl Leinster) - AM (Model)	2863	11.1	2.5	81	NA	63.5	455.6	0.17	0.32	25.8
SH1 / Poplar Ave (w. Construction Incl Leinster) - IP (Model)	1894	13.8	0.41	4.1	NA	1.4	11.4	0.13	0.19	85.7
SH1 / Poplar Ave (w. Construction Incl Leinster) - PM (Model)	3138	6	2.001	70.5	NA	61.4	474.6	0.11	0.32	28.3
Ruahine St / Tongariro St										
Tongariro St / Ruahine St Existing - AM (2016)	224	4.5	0.078	2.9	NA	0.5	3.6	0.11	0.28	46
Tongariro St / Ruahine St Existing - IP (2016)	121	7.3	0.039	2.9	NA	0.2	1.3	0.08	0.27	46.2
Tongariro St / Ruahine St Existing - PM (2016)	174	3.2	0.054	2.7	NA	0.2	1.5	0.10	0.24	46.4
Tongariro St / Ruahine St (Incl Constr.) - AM (2016)	333	35.7	0.296	5.3	NA	1.1	9.8	0.23	0.38	44.4
Tongariro St / Ruahine St (Incl Constr.) - IP (2016)	230	51.2	0.299	6.2	NA	0.7	7.0	0.26	0.4	43.9
Tongariro St / Ruahine St (Incl Constr.) - PM (2016)	283	40.4	0.316	5.6	NA	0.8	7.5	0.24	0.37	44.4

SIDRA Model	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
						Vehicles	Distance			
	veh/h	%	v/c	sec		veh	m		per veh	km/h
Hinemoa St / Tongariro St										
Tongariro St / Hinemoa St Existing - AM (2016)	243	10.8	0.076	4.9	NA	0.4	2.9	0.11	0.44	44.4
Tongariro St / Hinemoa St Existing - IP (2016)	240	8.3	0.067	3.8	NA	0.4	3.1	0.12	0.35	45.3
Tongariro St / Hinemoa St Existing - PM (2016)	204	6.7	0.054	5	NA	0.3	2.2	0.10	0.45	44.4
Tongariro St / Hinemoa St (Incl Constr.) - AM (2016)	346	37.4	0.152	6.3	NA	0.8	7.8	0.15	0.49	43.7
Tongariro St / Hinemoa St (Incl Constr.) - IP (2016)	343	35.9	0.130	5.6	NA	0.9	8.6	0.17	0.43	44.3
Tongariro St / Hinemoa St (Incl Constr.) - PM (2016)	307	38	0.131	6.5	NA	0.7	6.8	0.15	0.5	43.7
Hinemoa St / Kapiti Rd										
Hinemoa Street / Kapiti Road - AM (2016)	1004	7.4	0.24	7.8	NA	0.8	6.2	0.09	0.66	43.3
Hinemoa Street / Kapiti Road - IP (2016)	805	7.2	0.165	7.7	NA	0.5	4.1	0.09	0.66	43.8
Hinemoa Street / Kapiti Road - PM (2016)	989	3.9	0.243	7.4	NA	0.5	3.7	0.06	0.65	43.6
Hinemoa Street / Kapiti Road (Incl Constr.) - AM (2016)	1107	16.1	0.488	9.9	NA	3.3	30.2	0.13	0.7	42.1
Hinemoa Street / Kapiti Road (Incl Constr.) - IP (2016)	908	17.7	0.350	9.4	NA	2.1	20.0	0.14	0.69	43.0
Hinemoa Street / Kapiti Road (Incl Constr.) - PM (2016)	1093	13	0.444	9.5	NA	2.8	25.8	0.11	0.68	42.3
SH1 / Otaihanga Rd (Count)										
SH1 / Otaihanga Rd Existing - AM (2016)	2493	7.2	0.623	4.3	NA	2.9	21.2	0.16	0.23	70.3
SH1 / Otaihanga Rd Existing - IP (2016)	1975	6.8	0.41	4.1	NA	2.1	15.7	0.14	0.22	70.9
SH1 / Otaihanga Rd Existing - PM (2016)	2512	3.5	1.028	17.7	NA	21.7	151.7	0.24	0.44	51.0
SH1 / Otaihanga Rd (Constr.) - AM (2016)	2751	15.9	1.157	20.9	NA	20.4	218.3	0.26	0.45	48.2
SH1 / Otaihanga Rd (Constr.) - IP (2016)	2235	17.6	0.989	14.6	NA	9.4	106.3	0.25	0.39	55.2
SH1 / Otaihanga Rd (Constr.) - PM (2016)	2770	12.5	1.87	199.6	NA	98.8	796.4	0.28	1.29	10.8
SH1 / Otaihanga Rd Signals - AM (2016)	2751	15.9	0.89	26.1	LOS C	42	308.2	0.88	0.89	41.6
SH1 / Otaihanga Rd Signals - IP (2016)	2235	17.6	0.811	19.7	LOS B	13.8	102.0	0.85	0.81	46.9
SH1 / Otaihanga Rd Signals - PM (2016)	2750	11.8	0.831	24.2	LOS C	24.5	179.7	0.81	0.79	43.2
SH1 / Otaihanga Rd Roundabout - AM (2016)	2751	15.9	0.906	16.5	LOS B	24.4	178.8	0.89	0.85	52.5
SH1 / Otaihanga Rd Roundabout - IP (2016)	2235	17.6	0.602	13.1	LOS B	6.7	49.4	0.67	0.71	54.7
SH1 / Otaihanga Rd Roundabout - PM (2016)	2770	12.5	1.255	67.5	LOS E	66.5	519.1	0.82	1.31	25.2

SIDRA Model	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
						Vehicles	Distance			
	veh/h	%	v/c	sec		veh	m		per veh	km/h
SH1 / Otaihanga Rd (Modelled)										
SH1 / Otaihanga Rd Existing - AM (2016)	2802	8.3	0.62	6.2	NA	5.1	37.9	0.23	0.32	66
SH1 / Otaihanga Rd Existing - IP (2016)	2075	10.9	0.436	4.4	NA	2.8	20.5	0.16	0.24	69.7
SH1 / Otaihanga Rd Existing - PM (2016)	2761	4.9	1.155	28.9	NA	42.5	308.0	0.24	0.57	40.3
SH1 / Otaihanga Rd (Constr.) - AM (2016)	3060	16	1.731	65.7	NA	49.8	506.1	0.32	0.84	24.4
SH1 / Otaihanga Rd (Constr.) - IP (2016)	2333	20.8	1.148	20.7	NA	16.8	189.2	0.26	0.44	47.4
SH1 / Otaihanga Rd (Constr.) - PM (2016)	3019	13.1	2.13	222.8	NA	138.6	1101.4	0.29	1.39	9.3
SH1 / Otaihanga Rd Signals - AM (2016)	3060	16	0.91	34.9	LOS C	44.8	331.8	0.92	1.01	33.4
SH1 / Otaihanga Rd Signals - IP (2016)	2333	20.8	0.829	20.2	LOS C	14.3	114.0	0.85	0.84	43.1
SH1 / Otaihanga Rd Signals - PM (2016)	3019	13.1	0.885	29.6	LOS C	31.3	231.3	0.84	0.85	36.7
SH1 / Otaihanga Rd Roundabout - AM (2016)	3060	16	0.652	14.7	LOS B	9	69.2	0.85	0.8	51.8
SH1 / Otaihanga Rd Roundabout - IP (2016)	2333	20.8	0.44	12.5	LOS B	4.7	39.5	0.68	0.69	54.6
SH1 / Otaihanga Rd Roundabout - PM (2016)	3019	13.1	0.99	28.2	LOS C	33.2	263.7	0.77	0.89	40.0
Ihakara St / Rimu Rd										
Ihakara St / Rimu Rd Existing - AM (2016)	1363	3.7	0.614	8.7	LOS A	7.3	51.7	0.67	0.68	40.9
Ihakara St / Rimu Rd Existing - IP (2016)	1277	3.7	0.574	9.6	LOS A	6.6	46.9	0.67	0.72	40.5
Ihakara St / Rimu Rd Existing - PM (2016)	1761	2.5	0.774	15.3	LOS B	13.5	96.0	0.85	0.96	36.4
Ihakara St / Rimu Rd (Incl Constr.) - AM (2016)	1397	6	0.642	9.7	LOS A	8.4	59.6	0.72	0.72	40.4
Ihakara St / Rimu Rd (Incl Constr.) - IP (2016)	1310	6.2	0.599	10.3	LOS B	7.3	51.8	0.71	0.76	40.0
Ihakara St / Rimu Rd (Incl Constr.) - PM (2016)	1794	4.3	0.827	22.2	LOS C	16.5	120.1	0.87	1.01	45.0
SH1 / Peka Peka Rd										
SH1 / Peka Peka Rd Existing - AM (2016)	1809	9.9	0.452	2.2	NA	0.5	3.5	0.06	0.12	91.6
SH1 / Peka Peka Rd Existing - IP (2016)	1349	12.9	0.324	2.4	NA	0.5	4.0	0.06	0.14	90.5
SH1 / Peka Peka Rd Existing - PM (2016)	1766	5.7	0.444	2.2	NA	0.6	4.5	0.06	0.12	91.4
SH1 / Peka Peka Rd (Incl Constr.) - AM (2016)	1860	12.4	0.452	3.1	NA	1	9.2	0.08	0.15	89.0
SH1 / Peka Peka Rd (Incl Constr.) - IP (2016)	1400	16.1	0.324	3.4	NA	0.7	6.6	0.08	0.17	87.8
SH1 / Peka Peka Rd (Incl Constr.) - PM (2016)	1817	8.4	0.444	3.2	NA	1	9.6	0.08	0.15	88.5
SH1 / Te Moana Rd										
SH1 / Te Moana Road - AM (2016)	2899	6.9	0.709	16.1	LOS B	13.5	101.3	0.60	0.6	35.3
SH1 / Te Moana Road - IP (2016)	2217	9.6	0.452	14.7	LOS B	10.8	84.1	0.56	0.56	36.2
SH1 / Te Moana Road - PM (2016)	2809	4.3	0.705	14.9	LOS B	17	123.9	0.60	0.6	35.9
SH1 / Te Moana Road (Incl Constr.) - AM (2016)	2977	9.3	0.859	16.8	LOS B	13.5	101.3	0.62	0.61	35.0
SH1 / Te Moana Road (Incl Constr.) - IP (2016)	2266	12.6	0.589	15.1	LOS B	10.8	84.1	0.57	0.57	36.0
SH1 / Te Moana Road (Incl Constr.) - PM (2016)	2886	6.8	0.899	15.5	LOS B	17	123.9	0.62	0.61	35.7

SH1 / Poplar Avenue - SIDRA Modelling results (using traffic counts)



SH1 / Poplar Ave Existing - AM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	44	7.5	0.025	12.6	LOS B	0	0	0	0.75	64.8
2	T	746	9.6	0.406	0	LOS A	0	0	0	0	100
Approach		791	9.5	0.407	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1167	6.2	0.311	0	LOS A	0	0	0	0	100
9	R	80	0	0.103	16	LOS C	0.5	3.7	0.62	0.87	58.8
Approach		1247	5.8	0.311	1	LOS C	0.5	3.7	0.04	0.06	96.3
West: Poplar Ave											
10	L	107	1	0.181	16.2	LOS C	0.9	6.1	0.64	0.89	52.4
12	R	183	1.8	0.321	16.1	LOS C	1.4	10	0.62	0.93	52.5
Approach		290	1.5	0.321	16.1	LOS C	1.4	10	0.63	0.91	52.5
All Vehicles		2328	6.5	0.407	2.8	NA	1.4	10	0.1	0.16	88.6
Turning Movements Only				#	15.7						

SH1 / Poplar Ave Existing - IP (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	41	5.4	0.023	12.5	LOS B	0	0	0	0.75	64.8
2	T	656	10	0.358	0	LOS A	0	0	0	0	100
Approach		697	9.7	0.358	0.7	LOS B	0	0	0	0.04	97.3
North: SH1 North											
8	T	649	7.8	0.175	0	LOS A	0	0	0	0	100
9	R	41	2.7	0.047	15.4	LOS C	0.2	1.7	0.58	0.8	60
Approach		691	7.5	0.175	0.9	LOS C	0.2	1.7	0.03	0.05	96.7
West: Poplar Ave											
10	L	43	5.1	0.065	15.2	LOS C	0.3	2.2	0.57	0.81	53.8
12	R	42	2.6	0.065	14.1	LOS B	0.2	1.6	0.48	0.84	54.9
Approach		86	3.9	0.065	14.6	LOS C	0.3	2.2	0.52	0.83	54.3
All Vehicles		1473	8.3	0.358	1.6	NA	0.3	2.2	0.05	0.09	93.3
Turning Movements Only				#	14.3						

SH1 / Poplar Ave Existing - PM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	227	1	0.123	12.3	LOS B	0	0	0	0.75	64.8
2	T	1599	2	0.831	0	LOS A	0	0	0	0	100
Approach		1826	1.9	0.831	1.5	LOS B	0	0	0	0.09	94.5
North: SH1 North											
8	T	733	4.2	0.193	0	LOS A	0	0	0	0	100
9	R	42	0	0.285	42	LOS E	1.2	8.3	0.94	1	36.1
Approach		775	3.9	0.286	2.3	LOS E	1.2	8.3	0.05	0.05	92.4
West: Poplar Ave											
10	L	76	1.5	0.651	65.9	LOS F	3	21.3	0.97	1.08	25.5
12	R	43	2.6	0.213	27.4	LOS D	0.7	5.3	0.86	0.97	42.2
Approach		119	1.9	0.652	51.9	LOS F	3	21.3	0.93	1.04	29.8
All Vehicles		2719	2.5	0.831	3.9	NA	3	21.3	0.06	0.12	86.7
Turning Movements Only				#	27.7						

SH1 / Poplar Ave (Constr.) - AM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	44	7.5	0.025	12.6	LOS B	0	0	0	0.75	64.8
2	T	746	9.6	0.406	0	LOS A	0	0	0	0	100
Approach		791	9.5	0.407	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1167	6.2	0.311	0	LOS A	0	0	0	0	100
9	R	97	17.2	0.156	18.5	LOS C	0.8	6.4	0.65	0.92	56.9
Approach		1264	7.1	0.311	1.4	LOS C	0.8	6.4	0.05	0.07	95.3
West: Poplar Ave											
10	L	123	14.4	0.251	18.6	LOS C	1.3	10	0.69	0.92	50.4
12	R	183	1.8	0.332	16.4	LOS C	1.5	10.4	0.64	0.93	52.1
Approach		307	6.9	0.332	17.3	LOS C	1.5	10.4	0.66	0.93	51.4
All Vehicles		2361	7.8	0.407	3.2	NA	1.5	10.4	0.11	0.17	87.4
Turning Movements Only				#	17.1						

SH1 / Poplar Ave (Constr.) - IP (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	41	5.4	0.023	12.5	LOS B	0	0	0	0.75	64.8
2	T	657	10.1	0.359	0	LOS A	0	0	0	0	100
Approach		698	9.8	0.359	0.7	LOS B	0	0	0	0.04	97.3
North: SH1 North											
8	T	652	8.1	0.176	0	LOS A	0	0	0	0	100
9	R	58	30.8	0.102	19.5	LOS C	0.5	4.6	0.64	0.89	56.5
Approach		709	9.9	0.176	1.6	LOS C	0.5	4.6	0.05	0.07	94.9
West: Poplar Ave											
10	L	60	31.5	0.142	19.4	LOS C	0.7	5.8	0.66	0.89	50.1
12	R	42	2.6	0.067	14.3	LOS B	0.2	1.7	0.49	0.85	54.6
Approach		102	19.6	0.142	17.3	LOS C	0.7	5.8	0.59	0.87	51.9
All Vehicles		1510	10.5	0.359	2.3	NA	0.7	5.8	0.06	0.11	91.5
Turning Movements Only				#	17.0						

SH1 / Poplar Ave (Constr.) - PM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	227	1	0.123	12.3	LOS B	0	0	0	0.75	64.8
2	T	1599	2	0.831	0	LOS A	0	0	0	0	100
Approach		1826	1.9	0.831	1.5	LOS B	0	0	0	0.09	94.5
North: SH1 North											
8	T	733	4.2	0.193	0	LOS A	0	0	0	0	100
9	R	59	28.3	0.935	202.2	LOS F	5.8	50.3	1	1.21	10.8
Approach		792	6	0.938	15	LOS F	5.8	50.3	0.07	0.09	65.5
West: Poplar Ave											
10	L	92	19.3	1.356	450.5	LOS F	22.2	181	1	1.98	5.1
12	R	43	2.6	0.219	27.9	LOS D	0.8	5.4	0.87	0.98	41.9
Approach		136	13.9	1.357	315.4	LOS F	22.2	181	0.96	1.66	7.1
All Vehicles		2753	3.7	1.357	20.9	NA	22.2	181	0.07	0.17	57
Turning Movements Only				#	136.3						

SH1 / Poplar Ave (Incl Leinster existing) - AM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	44	7.5	0.025	12.6	LOS B	0	0	0	0.75	64.8
2	T	746	9.6	0.406	0	LOS A	0	0	0	0	100
Approach		791	9.5	0.407	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1167	6.2	0.311	0	LOS A	0	0	0	0	100
9	R	90	1.2	0.116	16.1	LOS C	0.6	4.2	0.62	0.88	58.8
Approach		1257	5.9	0.311	1.2	LOS C	0.6	4.2	0.04	0.06	95.9
West: Poplar Ave											
10	L	148	0.8	0.251	16.7	LOS C	1.3	9.1	0.66	0.91	51.9
12	R	192	1.7	0.34	16.3	LOS C	1.5	10.9	0.63	0.93	52.2
Approach		340	1.3	0.34	16.5	LOS C	1.5	10.9	0.64	0.92	52.1
All Vehicles		2388	6.4	0.407	3.2	NA	1.5	10.9	0.11	0.18	87.2
Turning Movements Only				#	16.0						

SH1 / Poplar Ave (Incl Leinster) - IP (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	47	7.1	0.026	12.6	LOS B	0	0	0	0.75	64.8
2	T	656	10	0.358	0	LOS A	0	0	0	0	100
Approach		702	9.8	0.358	0.8	LOS B	0	0	0	0.05	97
North: SH1 North											
8	T	649	7.8	0.175	0	LOS A	0	0	0	0	100
9	R	62	1.8	0.072	15.4	LOS C	0.4	2.6	0.59	0.82	59.8
Approach		712	7.3	0.175	1.3	LOS C	0.4	2.6	0.05	0.07	95.2
West: Poplar Ave											
10	L	68	9.8	0.111	15.9	LOS C	0.5	4	0.59	0.86	53.1
12	R	44	2.5	0.07	14.2	LOS B	0.2	1.8	0.49	0.85	54.7
Approach		112	6.9	0.111	15.3	LOS C	0.5	4	0.55	0.85	53.7
All Vehicles		1526	8.4	0.358	2.1	NA	0.5	4	0.06	0.12	91.5
Turning Movements Only				#	14.7						

SH1 / Poplar Ave (Incl Leinster) - PM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	234	0.9	0.127	12.3	LOS B	0	0	0	0.75	64.8
2	T	1599	2	0.831	0	LOS A	0	0	0	0	100
Approach		1833	1.9	0.831	1.6	LOS B	0	0	0	0.1	94.3
North: SH1 North											
8	T	733	4.2	0.193	0	LOS A	0	0	0	0	100
9	R	68	1.6	0.467	49.2	LOS E	2.1	14.8	0.96	1.03	32.7
Approach		800	4	0.467	4.2	LOS E	2.1	14.8	0.08	0.09	87
West: Poplar Ave											
10	L	94	1.2	0.821	89	LOS F	4.6	32.3	0.98	1.18	20.6
12	R	43	2.6	0.223	28.2	LOS D	0.8	5.5	0.87	0.98	41.6
Approach		138	1.6	0.822	69.9	LOS F	4.6	32.3	0.95	1.11	24.4
All Vehicles		2772	2.5	0.831	5.7	NA	4.6	32.3	0.07	0.14	82.1
Turning Movements Only				#	36.0						

SH1 / Poplar Ave (w. Construction Incl Leinster) - AM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	44	7.5	0.025	12.6	LOS B	0	0	0	0.75	64.8
2	T	746	9.6	0.406	0	LOS A	0	0	0	0	100
Approach		791	9.5	0.407	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1167	6.2	0.311	0	LOS A	0	0	0	0	100
9	R	107	16.7	0.17	18.4	LOS C	0.9	7	0.66	0.92	56.9
Approach		1274	7.1	0.311	1.5	LOS C	0.9	7	0.05	0.08	94.8
West: Poplar Ave											
10	L	164	10.8	0.313	18.5	LOS C	1.7	13.2	0.7	0.94	50.3
12	R	192	1.7	0.351	16.6	LOS C	1.6	11.3	0.65	0.94	51.8
Approach		357	5.9	0.351	17.5	LOS C	1.7	13.2	0.67	0.94	51.1
All Vehicles		2421	7.7	0.407	3.6	NA	1.7	13.2	0.13	0.19	86.1
Turning Movements Only				#	17.2						

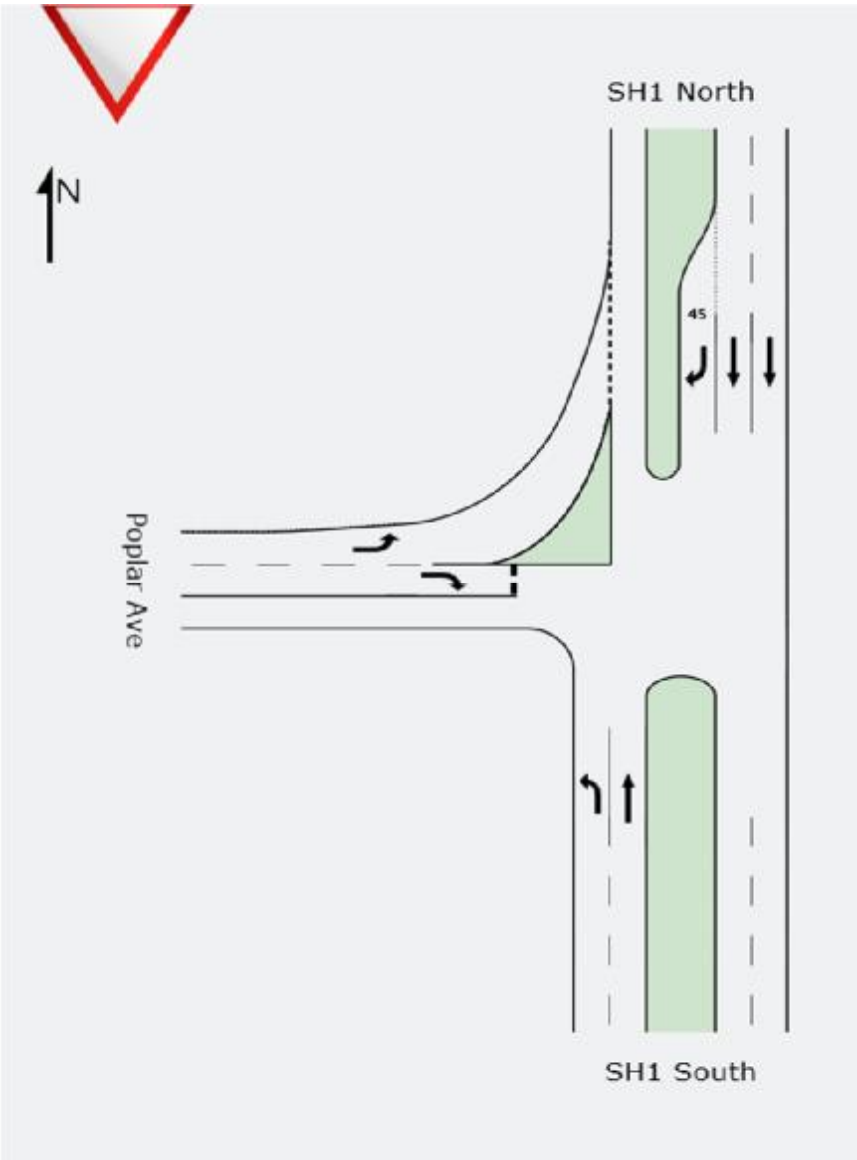
SH1 / Poplar Ave (w. Construction Incl Leinster) - IP (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	48	7	0.027	12.6	LOS B	0	0	0	0.75	64.8
2	T	673	9.9	0.367	0	LOS A	0	0	0	0	100
Approach		720	9.7	0.367	0.8	LOS B	0	0	0	0.05	97
North: SH1 North											
8	T	667	7.9	0.18	0	LOS A	0	0	0	0	100
9	R	81	21.9	0.128	18.4	LOS C	0.7	5.5	0.64	0.89	57.3
Approach		748	9.4	0.18	2	LOS C	0.7	5.5	0.07	0.1	93.5
West: Poplar Ave											
10	L	87	26.9	0.196	19.1	LOS C	0.9	7.9	0.67	0.9	50.2
12	R	46	2.4	0.076	14.5	LOS B	0.3	1.9	0.52	0.87	54.3
Approach		132	18.5	0.196	17.6	LOS C	0.9	7.9	0.62	0.89	51.5
All Vehicles		1601	10.3	0.367	2.8	NA	0.9	7.9	0.08	0.14	89.7
Turning Movements Only				#	16.9						

SH1 / Poplar Ave (w. Construction Incl Leinster) - PM (Count)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	234	0.9	0.127	12.3	LOS B	0	0	0	0.75	64.8
2	T	1599	2	0.831	0	LOS A	0	0	0	0	100
Approach		1833	1.9	0.831	1.6	LOS B	0	0	0	0.1	94.3
North: SH1 North											
8	T	733	4.2	0.193	0	LOS A	0	0	0	0	100
9	R	86	20.8	1.056	229.7	LOS F	10.5	86.6	1	1.42	9.6
Approach		818	5.9	1.059	24	LOS F	10.5	86.6	0.1	0.15	54.1
West: Poplar Ave											
10	L	112	15.8	1.477	530.9	LOS F	29.7	235.9	1	2.26	4.4
12	R	43	2.6	0.228	28.8	LOS D	0.8	5.7	0.87	0.98	41.2
Approach		156	12.1	1.469	391	LOS F	29.7	235.9	0.96	1.91	5.8
All Vehicles		2807	3.6	1.469	29.7	NA	29.7	235.9	0.08	0.21	48.2
Turning Movements Only				#	175.4						

SH1 / Poplar Avenue - SIDRA Modelling results (using SATURN Flows)



SH1 / Poplar Ave Existing - AM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	52	10.6	0.03	12.8	LOS B	0	0	0	0.75	64.8
2	T	1008	14.6	0.566	0	LOS A	0	0	0	0	100
Approach		1060	14.4	0.566	0.6	LOS B	0	0	0	0.04	97.8
North: SH1 North											
8	T	1277	8.1	0.345	0	LOS A	0	0	0	0	100
9	R	78	11.4	0.183	21.6	LOS C	0.9	6.6	0.79	0.95	52.6
Approach		1354	8.3	0.345	1.2	LOS C	0.9	6.6	0.05	0.05	95.8
West: Poplar Ave											
10	L	154	5.8	0.439	25.7	LOS D	2.4	17.6	0.84	1.02	48.1
12	R	94	4.7	1.574	625.8	LOS F	28	203.7	1	2.18	4.3
Approach		249	5.4	1.574	253.4	LOS F	28	203.7	0.9	1.46	9.8
All Vehicles		2663	10.4	1.574	24.6	NA	28	203.7	0.11	0.18	53.3
Turning Movements Only				#	172.3						

SH1 / Poplar Ave Existing - IP (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	42	5.3	0.024	12.5	LOS B	0	0	0	0.75	64.8
2	T	731	14.6	0.411	0	LOS A	0	0	0	0	100
Approach		773	14.1	0.41	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	778	13.1	0.216	0	LOS A	0	0	0	0	100
9	R	81	5.5	0.108	16.6	LOS C	0.6	4.1	0.63	0.88	58.5
Approach		859	12.4	0.216	1.6	LOS C	0.6	4.1	0.06	0.08	94.6
West: Poplar Ave											
10	L	76	7.4	0.138	16.8	LOS C	0.6	4.8	0.65	0.89	52
12	R	51	4.3	0.249	27.8	LOS D	0.9	6.4	0.87	0.98	42
Approach		127	6.1	0.25	21.3	LOS D	0.9	6.4	0.73	0.93	47.5
All Vehicles		1759	12.7	0.41	2.6	NA	0.9	6.4	0.08	0.13	90.2
Turning Movements Only				#	18.3						

SH1 / Poplar Ave Existing - PM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	197	4	0.109	12.4	LOS B	0	0	0	0.75	64.8
2	T	1610	4.2	0.848	0	LOS A	0	0	0	0	100
Approach		1807	4.2	0.848	1.4	LOS B	0	0	0	0.08	95.1
North: SH1 North											
8	T	906	6.9	0.243	0	LOS A	0	0	0	0	100
9	R	73	1.5	0.476	47.8	LOS E	2.2	15.4	0.95	1.03	33.3
Approach		979	6.5	0.478	3.6	LOS E	2.2	15.4	0.07	0.08	88.6
West: Poplar Ave											
10	L	80	4.2	0.69	69.4	LOS F	3.3	23.7	0.97	1.09	24.6
12	R	50	11.1	1	281.4	LOS F	6	45.8	1	1.32	7.8
Approach		130	6.8	1	151	LOS F	6	45.8	0.98	1.18	13.5
All Vehicles		2916	5.1	1	8.8	NA	6	45.8	0.07	0.13	75.6
Turning Movements Only				#	63.9						

SH1 / Poplar Ave (Constr.) - AM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	52	10.6	0.03	12.8	LOS B	0	0	0	0.75	64.8
2	T	1008	14.6	0.566	0	LOS A	0	0	0	0	100
Approach		1060	14.4	0.566	0.6	LOS B	0	0	0	0.04	97.8
North: SH1 North											
8	T	1277	8.1	0.345	0	LOS A	0	0	0	0	100
9	R	94	27.1	0.317	29.1	LOS D	1.6	14.1	0.85	1	46
Approach		1371	9.4	0.345	2	LOS D	1.6	14.1	0.06	0.07	93.5
West: Poplar Ave											
10	L	171	14.9	0.607	32.8	LOS D	3.7	29.2	0.9	1.1	39
12	R	94	4.7	1.574	630.7	LOS F	28	203.7	1	2.19	3.7
Approach		266	11.3	1.574	245.5	LOS F	28	203.7	0.94	1.49	8.9
All Vehicles		2697	11.5	1.574	25.4	NA	28	203.7	0.12	0.2	52
Turning Movements Only				#	166.2						

SH1 / Poplar Ave (Constr.) - IP (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	42	5.3	0.024	12.5	LOS B	0	0	0	0.75	64.8
2	T	731	14.6	0.411	0	LOS A	0	0	0	0	100
Approach		773	14.1	0.41	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	778	13.1	0.216	0	LOS A	0	0	0	0	100
9	R	98	21.6	0.175	19.5	LOS C	0.9	7.4	0.68	0.92	55.8
Approach		876	14.1	0.216	2.2	LOS C	0.9	7.4	0.08	0.1	92.9
West: Poplar Ave											
10	L	92	24.1	0.231	20.7	LOS C	1.1	9.5	0.73	0.93	48.6
12	R	51	4.3	0.261	28.8	LOS D	0.9	6.7	0.87	0.98	41.3
Approach		143	17.1	0.261	23.6	LOS D	1.1	9.5	0.78	0.95	45.7
All Vehicles		1792	14.3	0.41	3.2	NA	1.1	9.5	0.1	0.14	88.4
Turning Movements Only				#	20.5						

SH1 / Poplar Ave (Constr.) - PM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	197	4	0.109	12.4	LOS B	0	0	0	0.75	64.8
2	T	1610	4.2	0.848	0	LOS A	0	0	0	0	100
Approach		1807	4.2	0.848	1.4	LOS B	0	0	0	0.08	95.1
North: SH1 North											
8	T	906	6.9	0.243	0	LOS A	0	0	0	0	100
9	R	90	19.8	1.011	188.6	LOS F	8.8	72	1	1.36	11.4
Approach		996	8	1.006	17.1	LOS F	8.8	72	0.09	0.12	62.5
West: Poplar Ave											
10	L	97	20.7	1.487	563.8	LOS F	27	222.9	1	2.14	4.1
12	R	50	11.1	1	291.7	LOS F	6	46.3	1	1.33	7.6
Approach		147	17.4	1.489	471.1	LOS F	27	222.9	1	1.86	4.9
All Vehicles		2949	6.1	1.489	30	NA	27	222.9	0.08	0.18	48.1
Turning Movements Only				#	204.4						

SH1 / Poplar Ave (Incl Leinster) - AM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	59	11.3	0.034	12.9	LOS B	0	0	0	0.75	64.8
2	T	1008	14.6	0.566	0	LOS A	0	0	0	0	100
Approach		1067	14.4	0.566	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1277	8.1	0.345	0	LOS A	0	0	0	0	100
9	R	121	11	0.286	22.9	LOS C	1.5	11.5	0.81	0.98	51.1
Approach		1398	8.3	0.345	2	LOS C	1.5	11.5	0.07	0.08	93.4
West: Poplar Ave											
10	L	216	5.2	0.609	29	LOS D	3.9	28.6	0.89	1.1	45.5
12	R	150	3	2.5	1447.5	LOS F	63.5	455.8	1	2.87	1.9
Approach		366	4.3	2.5	611.1	LOS F	63.5	455.8	0.93	1.83	4.4
All Vehicles		2830	10.1	2.5	80.2	NA	63.5	455.8	0.16	0.29	26
Turning Movements Only				#	415.6						

SH1 / Poplar Ave (Incl Leinster) - IP (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	58	7.7	0.033	12.6	LOS B	0	0	0	0.75	64.8
2	T	731	14.6	0.411	0	LOS A	0	0	0	0	100
Approach		789	14.1	0.41	0.9	LOS B	0	0	0	0.05	96.7
North: SH1 North											
8	T	778	13.1	0.216	0	LOS A	0	0	0	0	100
9	R	140	5.6	0.191	16.9	LOS C	1	7.3	0.65	0.91	58
Approach		918	12	0.216	2.6	LOS C	1	7.3	0.1	0.14	91.2
West: Poplar Ave											
10	L	99	5.6	0.177	16.8	LOS C	0.8	6.1	0.65	0.89	52
12	R	56	4	0.299	30.3	LOS D	1.1	7.8	0.89	0.99	40.2
Approach		154	5	0.298	21.6	LOS D	1.1	7.8	0.74	0.93	47.1
All Vehicles		1861	12.3	0.41	3.5	NA	1.1	7.8	0.11	0.17	87.4
Turning Movements Only				#	18.3						

SH1 / Poplar Ave (Incl Leinster) - PM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	220	4	0.122	12.4	LOS B	0	0	0	0.75	64.8
2	T	1610	4.2	0.848	0	LOS A	0	0	0	0	100
Approach		1830	4.2	0.848	1.5	LOS B	0	0	0	0.09	94.7
North: SH1 North											
8	T	906	6.9	0.243	0	LOS A	0	0	0	0	100
9	R	156	1.4	1.065	174.7	LOS F	15.4	108.8	1	1.64	12.2
Approach		1061	6.1	1.067	25.6	LOS F	15.4	108.8	0.15	0.24	52.2
West: Poplar Ave											
10	L	156	2.9	1.377	418.1	LOS F	33.8	242.7	1	2.5	5.5
12	R	58	15.4	0.996	358.7	LOS F	7.2	56.8	1	1.49	6.3
Approach		213	6.3	1.373	402	LOS F	33.8	242.7	1	2.23	5.7
All Vehicles		3104	5	1.373	37.3	NA	33.8	242.7	0.12	0.29	42.5
Turning Movements Only				#	196.6						

SH1 / Poplar Ave (w. Construction Incl Leinster) - AM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	59	11.3	0.034	12.9	LOS B	0	0	0	0.75	64.8
2	T	1008	14.6	0.566	0	LOS A	0	0	0	0	100
Approach		1067	14.4	0.566	0.7	LOS B	0	0	0	0.04	97.5
North: SH1 North											
8	T	1277	8.1	0.345	0	LOS A	0	0	0	0	100
9	R	138	21.8	0.416	28.9	LOS D	2.4	19.6	0.86	1.02	45.9
Approach		1414	9.4	0.417	2.8	LOS D	2.4	19.6	0.08	0.1	91
West: Poplar Ave											
10	L	232	12	0.772	39.7	LOS E	6	46.4	0.94	1.24	39
12	R	150	3	2.5	1452.6	LOS F	63.5	455.6	1	2.88	1.9
Approach		382	8.4	2.5	594.2	LOS F	63.5	455.6	0.96	1.88	4.5
All Vehicles		2863	11.1	2.5	81	NA	63.5	455.6	0.17	0.32	25.8
Turning Movements Only				#	400.4						

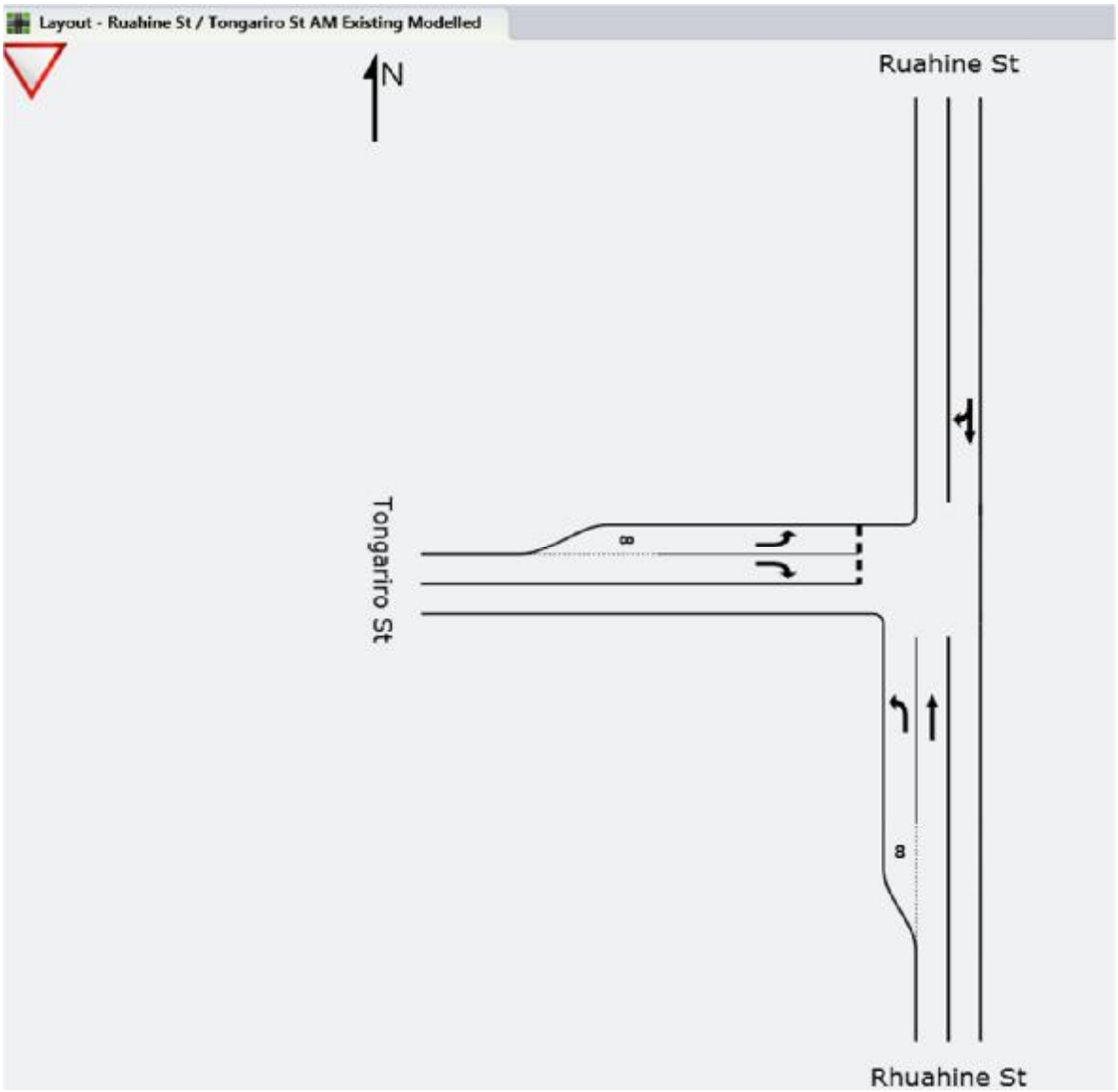
SH1 / Poplar Ave (w. Construction Incl Leinster) - IP (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	58	7.7	0.033	12.6	LOS B	0	0	0	0.75	64.8
2	T	731	14.6	0.411	0	LOS A	0	0	0	0	100
Approach		789	14.1	0.41	0.9	LOS B	0	0	0	0.05	96.7
North: SH1 North											
8	T	778	13.1	0.216	0	LOS A	0	0	0	0	100
9	R	157	15.6	0.257	19.2	LOS C	1.4	11.4	0.69	0.94	55.7
Approach		934	13.6	0.257	3.2	LOS C	1.4	11.4	0.12	0.16	89.6
West: Poplar Ave											
10	L	116	19.2	0.269	20.2	LOS C	1.4	11.2	0.72	0.94	48.9
12	R	56	4	0.312	31.5	LOS D	1.1	8.1	0.89	1	39.5
Approach		171	14.3	0.312	23.9	LOS D	1.4	11.2	0.78	0.96	45.4
All Vehicles		1894	13.8	0.41	4.1	NA	1.4	11.4	0.13	0.19	85.7
Turning Movements Only				#	20.3						

SH1 / Poplar Ave (w. Construction Incl Leinster) - PM (Model)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	220	4	0.122	12.4	LOS B	0	0	0	0.75	64.8
2	T	1610	4.2	0.848	0	LOS A	0	0	0	0	100
Approach		1830	4.2	0.848	1.5	LOS B	0	0	0	0.09	94.7
North: SH1 North											
8	T	948	6.9	0.255	0	LOS A	0	0	0	0	100
9	R	130	11	1.118	224.3	LOS F	16.4	125.8	1	1.68	9.8
Approach		1078	7.5	1.113	27	LOS F	16.4	125.8	0.12	0.2	51.1
West: Poplar Ave											
10	L	172	12.3	2.003	983	LOS F	61.4	474.6	1	3.08	2.4
12	R	58	15.4	0.996	349.6	LOS F	7.1	56.3	1	1.48	6.4
Approach		230	13	2.001	823.9	LOS F	61.4	474.6	1	2.68	2.9
All Vehicles		3138	6	2.001	70.5	NA	61.4	474.6	0.11	0.32	28.3
Turning Movements Only				#	381.4						

Tongariro St / Ruahine St - SIDRA Modelling results (using SATURN flows)



Tongariro St / Ruahine St Existing - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	17	0	0.009	6.4	LOS A	0	0	0	0.61	43.3
2	T	43	5.1	0.023	0	LOS A	0	0	0	0	50
Approach		60	3.7	0.023	1.8	LOS A	0	0	0	0.17	47.9
North: Ruahine											
8	T	87	5.1	0.078	0.2	LOS A	0.5	3.6	0.16	0	47.8
9	R	56	4	0.078	6.8	LOS A	0.5	3.6	0.16	0.73	42.9
Approach		142	4.7	0.078	2.8	LOS A	0.5	3.6	0.16	0.28	45.8
West: Tongariro											
10	L	18	6.3	0.031	6.7	LOS A	0.1	0.5	0.13	0.57	42.8
12	R	4	0	0.005	7.6	LOS A	0	0.2	0.29	0.59	42.2
Approach		22	5	0.031	6.9	LOS A	0.1	0.5	0.16	0.57	42.7
All Vehicles		224	4.5	0.078	2.9	NA	0.5	3.6	0.11	0.28	46
Turning Movements Only				#	6.7						

Tongariro St / Ruahine St Existing - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	13	0	0.007	6.4	LOS A	0	0	0	0.61	43.3
2	T	31	7.1	0.017	0	LOS A	0	0	0	0	50
Approach		44	5	0.017	1.9	LOS A	0	0	0	0.18	47.8
North: Ruahine											
8	T	38	8.8	0.028	0.1	LOS A	0.2	1.3	0.13	0	48.3
9	R	13	8.3	0.028	6.9	LOS A	0.2	1.3	0.13	0.78	43
Approach		51	8.7	0.028	1.9	LOS A	0.2	1.3	0.13	0.2	46.8
West: Tongariro											
10	L	21	10.5	0.039	6.8	LOS A	0.1	0.6	0.11	0.57	42.9
12	R	4	0	0.005	7	LOS A	0	0.1	0.19	0.58	42.5
Approach		26	8.7	0.039	6.8	LOS A	0.1	0.6	0.13	0.57	42.8
All Vehicles		121	7.3	0.039	2.9	NA	0.2	1.3	0.08	0.27	46.2
Turning Movements Only				#	6.7						

Tongariro St / Ruahine St Existing - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	14	0	0.008	6.4	LOS A	0	0	0	0.61	43.3
2	T	63	3.5	0.033	0	LOS A	0	0	0	0	50
Approach		78	2.9	0.033	1.2	LOS A	0	0	0	0.11	48.6
North: Ruahine											
8	T	43	2.6	0.032	0.2	LOS A	0.2	1.5	0.18	0	47.6
9	R	16	7.1	0.032	7	LOS A	0.2	1.5	0.18	0.76	43
Approach		59	3.8	0.032	2	LOS A	0.2	1.5	0.18	0.2	46.3
West: Tongariro											
10	L	31	3.6	0.054	6.7	LOS A	0.1	0.8	0.16	0.57	42.7
12	R	7	0	0.007	7.2	LOS A	0	0.2	0.23	0.58	42.4
Approach		38	2.9	0.054	6.8	LOS A	0.1	0.8	0.17	0.57	42.7
All Vehicles		174	3.2	0.054	2.7	NA	0.2	1.5	0.1	0.24	46.4
Turning Movements Only				#	6.8						

Tongariro St / Ruahine St (Incl Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	17	0	0.009	6.4	LOS A	0	0	0	0.61	43.3
2	T	43	5.1	0.023	0	LOS A	0	0	0	0	50
Approach		60	3.7	0.023	1.8	LOS A	0	0	0	0.17	47.9
North: Ruahine											
8	T	87	5.1	0.142	0.4	LOS A	1.1	9.8	0.21	0	46.9
9	R	110	51.5	0.142	8.2	LOS A	1.1	9.8	0.21	0.68	42.7
Approach		197	31.1	0.142	4.7	LOS A	1.1	9.8	0.21	0.38	44.5
West: Tongariro											
10	L	72	76.9	0.296	9.3	LOS A	0.5	5.7	0.44	0.52	41.7
12	R	4	0	0.006	8.3	LOS A	0	0.2	0.36	0.61	41.7
Approach		77	72.5	0.296	9.3	LOS A	0.5	5.7	0.44	0.53	41.7
All Vehicles		333	35.7	0.296	5.3	NA	1.1	9.8	0.23	0.38	44.4
Turning Movements Only				#	8.4						

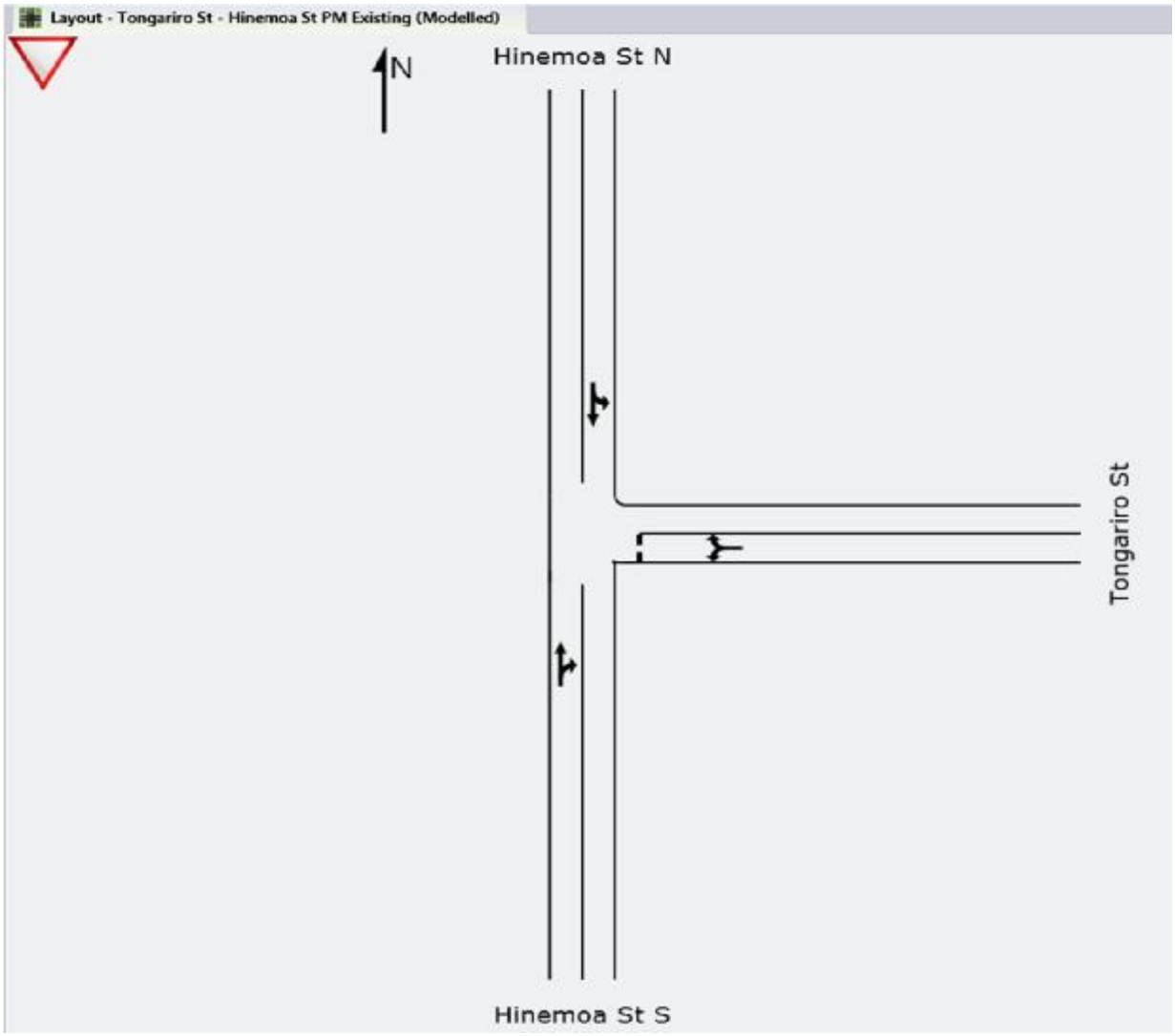
Tongariro St / Ruahine St (Incl Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	13	0	0.007	6.4	LOS A	0	0	0	0.61	43.3
2	T	31	7.1	0.017	0	LOS A	0	0	0	0	50
Approach		44	5	0.017	1.9	LOS A	0	0	0	0.18	47.8
North: Ruahine											
8	T	38	8.8	0.092	0.4	LOS A	0.7	7	0.19	0	47.2
9	R	68	82	0.092	8.8	LOS A	0.7	7	0.19	0.66	42.7
Approach		106	55.8	0.092	5.8	LOS A	0.7	7	0.19	0.42	44.2
West: Tongariro											
10	L	76	75	0.3	9.2	LOS A	0.5	5.8	0.5	0.49	41.5
12	R	4	0	0.005	7.6	LOS A	0	0.2	0.29	0.59	42.2
Approach		80	70.8	0.299	9.2	LOS A	0.5	5.8	0.49	0.49	41.6
All Vehicles		230	51.2	0.299	6.2	NA	0.7	7	0.26	0.4	43.9
Turning Movements Only				#	8.8						

Tongariro St / Ruahine St (Incl Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruahine											
1	L	14	0	0.008	6.4	LOS A	0	0	0	0.61	43.3
2	T	63	3.5	0.033	0	LOS A	0	0	0	0	50
Approach		78	2.9	0.033	1.2	LOS A	0	0	0	0.11	48.6
North: Ruahine											
8	T	43	2.6	0.099	0.7	LOS A	0.8	7.5	0.26	0	46.2
9	R	70	79.4	0.099	9.1	LOS A	0.8	7.5	0.26	0.66	42.6
Approach		113	50	0.099	5.9	LOS A	0.8	7.5	0.26	0.41	43.9
West: Tongariro											
10	L	86	64.9	0.316	9.1	LOS A	0.6	6.1	0.43	0.54	41.8
12	R	7	0	0.008	7.8	LOS A	0	0.2	0.32	0.6	42
Approach		92	60.2	0.316	9	LOS A	0.6	6.1	0.42	0.55	41.8
All Vehicles		283	40.4	0.316	5.6	NA	0.8	7.5	0.24	0.37	44.4
Turning Movements Only				#	8.8						

Tongariro St / Hinemoa St - SIDRA Modelling results (using SATURN flows)



Tongariro St / Hinemoa St Existing - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	34	12.5	0.06	0.1	LOS A	0.4	2.7	0.14	0	47.9
2	T	69	6.1	0.059	7.1	LOS A	0.4	2.7	0.14	0.68	42.7
Approach		103	8.2	0.059	4.8	LOS A	0.4	2.7	0.14	0.46	44.2
East: Tongariro St											
8	T	93	5.7	0.076	6.8	LOS A	0.4	2.9	0.13	0.57	42.8
9	R	6	16.7	0.076	7.4	LOS A	0.4	2.9	0.13	0.68	42.6
Approach		99	6.4	0.076	6.8	LOS A	0.4	2.9	0.13	0.58	42.8
North: Hinemoa St N											
10	L	3	33.3	0.025	7.1	LOS A	0	0	0	0.92	43.3
12	R	38	27.8	0.025	0	LOS A	0	0	0	0	50
Approach		41	28.2	0.025	0.5	LOS A	0	0	0	0.07	49.4
All Vehicles		243	10.8	0.076	4.9	NA	0.4	2.9	0.11	0.44	44.4
Turning Movements Only				#	0.9						

Tongariro St / Hinemoa St Existing - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	62	5.1	0.067	0.2	LOS A	0.4	3.1	0.16	0	47.7
2	T	57	7.4	0.067	7.1	LOS A	0.4	3.1	0.16	0.73	42.7
Approach		119	6.2	0.067	3.5	LOS A	0.4	3.1	0.16	0.35	45.2
East: Tongariro St											
8	T	58	5.5	0.052	6.9	LOS A	0.3	1.9	0.15	0.57	42.8
9	R	7	14.3	0.052	7.4	LOS A	0.3	1.9	0.15	0.68	42.6
Approach		65	6.5	0.052	6.9	LOS A	0.3	1.9	0.15	0.58	42.7
North: Hinemoa St N											
10	L	6	16.7	0.032	6.8	LOS A	0	0	0	0.88	43.3
12	R	49	14.9	0.032	0	LOS A	0	0	0	0	50
Approach		56	15.1	0.032	0.8	LOS A	0	0	0	0.1	49.1
All Vehicles		240	8.3	0.067	3.8	NA	0.4	3.1	0.12	0.35	45.3
Turning Movements Only				#	0.8						

Tongariro St / Hinemoa St Existing - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	17	12.5	0.05	0.2	LOS A	0.3	2.2	0.14	0	47.8
2	T	71	4.5	0.05	7	LOS A	0.3	2.2	0.14	0.64	42.6
Approach		87	6	0.05	5.7	LOS A	0.3	2.2	0.14	0.52	43.5
East: Tongariro St											
8	T	54	3.9	0.054	6.8	LOS A	0.3	1.9	0.13	0.57	42.8
9	R	13	8.3	0.054	7.3	LOS A	0.3	1.9	0.13	0.66	42.6
Approach		66	4.8	0.054	6.9	LOS A	0.3	1.9	0.13	0.58	42.8
North: Hinemoa St N											
10	L	9	11.1	0.028	6.6	LOS A	0	0	0	0.85	43.3
12	R	41	10.3	0.028	0	LOS A	0	0	0	0	50
Approach		51	10.4	0.028	1.2	LOS A	0	0	0	0.16	48.6
All Vehicles		204	6.7	0.054	5	NA	0.3	2.2	0.1	0.45	44.4
Turning Movements Only				#	2.0						

Tongariro St / Hinemoa St (Incl Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	34	12.5	0.119	0.3	LOS A	0.8	7.5	0.18	0	47.2
2	T	121	46.1	0.119	8.2	LOS A	0.8	7.5	0.18	0.65	42.5
Approach		155	38.8	0.12	6.5	LOS A	0.8	7.5	0.18	0.51	43.5
East: Tongariro St											
8	T	144	39.4	0.152	7.7	LOS A	0.8	7.8	0.17	0.57	42.7
9	R	6	16.7	0.154	7.6	LOS A	0.8	7.8	0.17	0.71	42.5
Approach		151	38.5	0.152	7.7	LOS A	0.8	7.8	0.17	0.57	42.7
North: Hinemoa St N											
10	L	3	33.3	0.025	7.1	LOS A	0	0	0	0.92	43.3
12	R	38	27.8	0.025	0	LOS A	0	0	0	0	50
Approach		41	28.2	0.025	0.5	LOS A	0	0	0	0.07	49.4
All Vehicles		346	37.4	0.152	6.3	NA	0.8	7.8	0.15	0.49	43.7
Turning Movements Only				#	1.0						

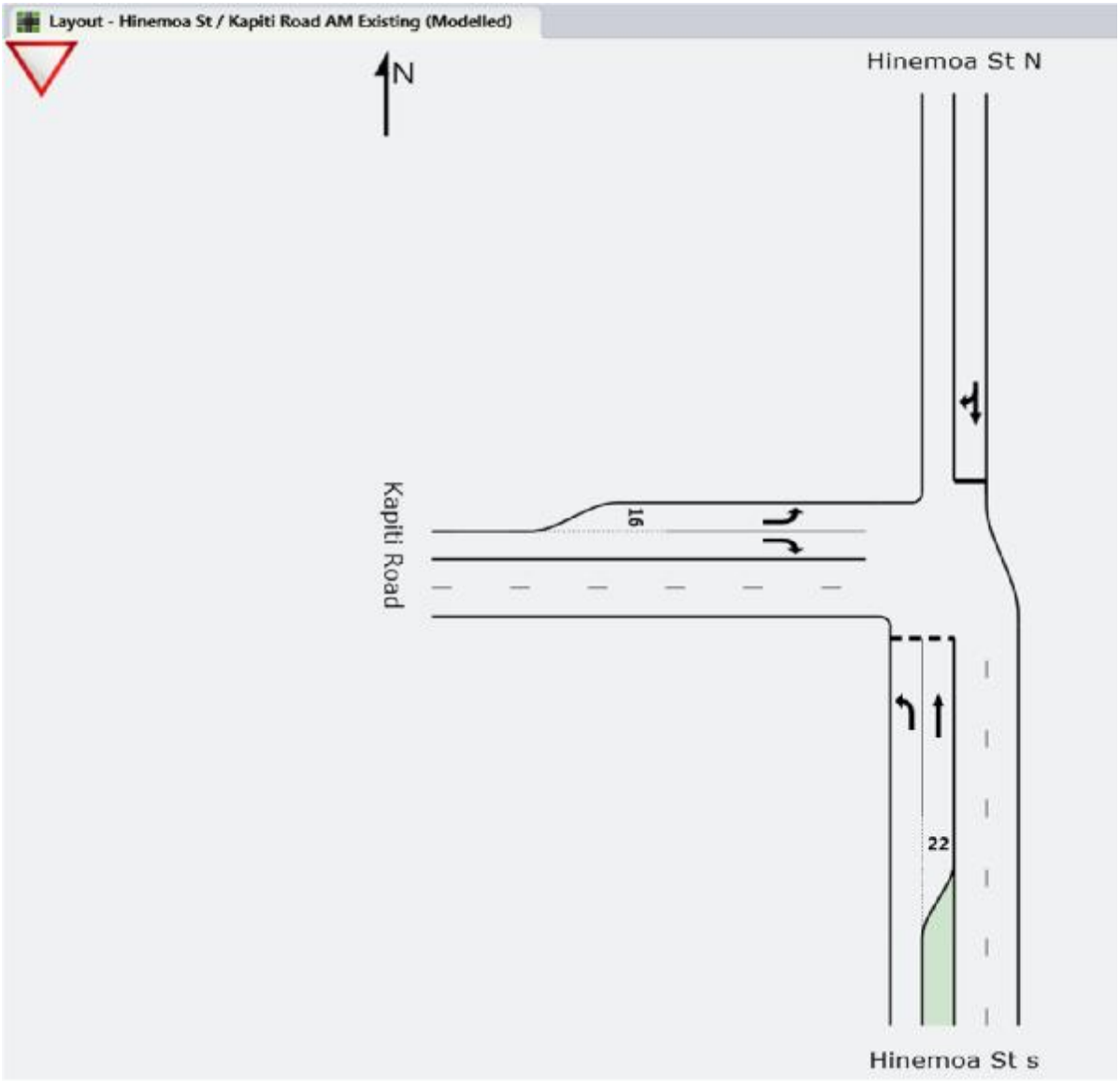
Tongariro St / Hinemoa St (Incl Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	62	5.1	0.128	0.4	LOS A	0.9	8.6	0.21	0	46.8
2	T	108	51.5	0.128	8.5	LOS A	0.9	8.6	0.21	0.69	42.5
Approach		171	34.6	0.128	5.5	LOS A	0.9	8.6	0.21	0.44	44
East: Tongariro St											
8	T	109	50	0.13	8.1	LOS A	0.7	6.9	0.19	0.57	42.6
9	R	7	14.3	0.129	7.7	LOS A	0.7	6.9	0.19	0.71	42.4
Approach		117	47.7	0.13	8	LOS A	0.7	6.9	0.19	0.58	42.6
North: Hinemoa St N											
10	L	6	16.7	0.032	6.8	LOS A	0	0	0	0.88	43.3
12	R	49	14.9	0.032	0	LOS A	0	0	0	0	50
Approach		56	15.1	0.032	0.8	LOS A	0	0	0	0.1	49.1
All Vehicles		343	35.9	0.13	5.6	NA	0.9	8.6	0.17	0.43	44.3
Turning Movements Only				#	1.0						

Tongariro St / Hinemoa St (Incl Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	17	12.5	0.11	0.3	LOS A	0.7	6.7	0.18	0	47.1
2	T	122	44.8	0.11	8.2	LOS A	0.7	6.7	0.18	0.63	42.5
Approach		139	40.9	0.11	7.2	LOS A	0.7	6.7	0.18	0.55	43
East: Tongariro St											
8	T	105	51	0.131	8	LOS A	0.7	6.8	0.17	0.56	42.7
9	R	13	8.3	0.13	7.5	LOS A	0.7	6.8	0.17	0.69	42.5
Approach		118	46.4	0.131	8	LOS A	0.7	6.8	0.17	0.58	42.7
North: Hinemoa St N											
10	L	9	11.1	0.028	6.6	LOS A	0	0	0	0.85	43.3
12	R	41	10.3	0.028	0	LOS A	0	0	0	0	50
Approach		51	10.4	0.028	1.2	LOS A	0	0	0	0.16	48.6
All Vehicles		307	38	0.131	6.5	NA	0.7	6.8	0.15	0.5	43.7
Turning Movements Only				#	2.0						

Hinemoa St / Kapiti Road - SIDRA Modelling results (using SATURN flows)



Hinemoa Street / Kapiti Road - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	421	8	0.24	6.6	LOS A	0	0	0	0.61	43.3
2	T	24	4.3	0.03	8.9	LOS A	0.1	0.7	0.45	0.63	48
Approach		445	7.8	0.24	6.7	LOS A	0.1	0.7	0.02	0.61	43.5
North: Hinemoa St N											
8	T	44	14.3	0.205	16	LOS C	0.8	6.2	0.57	0.9	43.2
9	R	86	11	0.205	14.2	LOS B	0.8	6.2	0.57	1	38.4
Approach		131	12.1	0.205	14.8	LOS B	0.8	6.2	0.57	0.97	39.9
West: Kapiti Road											
10	L	79	9.3	0.045	8.5	LOS A	0	0	0	0.67	49
12	R	349	4.8	0.195	6.5	LOS A	0	0	0	0.61	43.3
Approach		428	5.7	0.195	6.9	NA	0	0	0	0.62	44.3
All Vehicles		1004	7.4	0.24	7.8	NA	0.8	6.2	0.09	0.66	43.3
Turning Movements Only											

Hinemoa Street / Kapiti Road - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	289	8.4	0.165	6.6	LOS A	0	0	0	0.61	43.3
2	T	55	3.8	0.065	8.6	LOS A	0.2	1.5	0.41	0.63	48.2
Approach		344	7.6	0.165	6.9	LOS A	0.2	1.5	0.07	0.61	44
North: Hinemoa St N											
8	T	53	10	0.135	14	LOS B	0.5	4.1	0.48	0.87	44.6
9	R	56	11.3	0.135	12.4	LOS B	0.5	4.1	0.48	0.98	39.5
Approach		108	10.7	0.135	13.2	LOS B	0.5	4.1	0.48	0.92	41.9
West: Kapiti Road											
10	L	64	6.6	0.036	8.4	LOS A	0	0	0	0.67	49
12	R	288	5.5	0.161	6.5	LOS A	0	0	0	0.61	43.3
Approach		353	5.7	0.161	6.9	NA	0	0	0	0.62	44.3
All Vehicles		805	7.2	0.165	7.7	NA	0.5	4.1	0.09	0.66	43.8

Turning Movements Only

Hinemoa Street / Kapiti Road - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	443	2.9	0.243	6.5	LOS A	0	0	0	0.61	43.3
2	T	16	0	0.019	8.8	LOS A	0.1	0.4	0.45	0.62	48
Approach		459	2.8	0.243	6.6	LOS A	0.1	0.4	0.02	0.61	43.5
North: Hinemoa St N											
8	T	52	4.1	0.13	14.4	LOS B	0.5	3.7	0.52	0.88	44
9	R	43	9.8	0.13	13.1	LOS B	0.5	3.7	0.52	1.01	39.1
Approach		95	6.7	0.13	13.8	LOS B	0.5	3.7	0.52	0.94	41.7
West: Kapiti Road											
10	L	72	7.4	0.041	8.4	LOS A	0	0	0	0.67	49
12	R	364	4	0.202	6.5	LOS A	0	0	0	0.61	43.3
Approach		436	4.6	0.202	6.8	NA	0	0	0	0.62	44.2
All Vehicles		989	3.9	0.243	7.4	NA	0.5	3.7	0.06	0.65	43.6

Turning Movements Only

Hinemoa Street / Kapiti Road (Incl Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	421	8	0.24	6.6	LOS A	0	0	0	0.61	43.3
2	T	24	4.3	0.029	9.5	LOS A	0.1	1	0.49	0.67	47.6
Approach		445	7.8	0.24	6.7	LOS A	0.1	1	0.03	0.61	43.5
North: Hinemoa St N											
8	T	44	14.3	0.486	24.9	LOS C	3.3	30.2	0.75	1.08	36.9
9	R	138	44.3	0.489	24.6	LOS C	3.3	30.2	0.75	1.15	33.1
Approach		182	37	0.488	24.6	LOS C	3.3	30.2	0.75	1.13	34
West: Kapiti Road											
10	L	131	45.2	0.093	9.5	LOS A	0	0	0	0.66	49
12	R	349	4.8	0.195	6.5	LOS A	0	0	0	0.61	43.3
Approach		480	15.8	0.195	7.3	LOS A	0	0	0	0.62	44.8
All Vehicles		1107	16.1	0.488	9.9	NA	3.3	30.2	0.13	0.7	42.1

Turning Movements Only

Hinemoa Street / Kapiti Road (Incl Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	289	8.4	0.165	6.6	LOS A	0	0	0	0.61	43.3
2	T	55	3.8	0.068	9.1	LOS A	0.3	2.1	0.47	0.67	47.9
Approach		344	7.6	0.165	7	LOS A	0.3	2.1	0.07	0.62	44
North: Hinemoa St N											
8	T	53	10	0.351	19.6	LOS C	2.1	20	0.63	0.93	40.2
9	R	107	53.9	0.35	19.9	LOS C	2.1	20	0.63	1.07	35.9
Approach		160	39.5	0.35	19.8	LOS C	2.1	20	0.63	1.02	37.2
West: Kapiti Road											
10	L	116	48.2	0.084	9.6	LOS A	0	0	0	0.66	49
12	R	288	5.5	0.161	6.5	LOS A	0	0	0	0.61	43.3
Approach		404	17.7	0.161	7.4	LOS A	0	0	0	0.63	44.8
All Vehicles		908	17.7	0.35	9.4	NA	2.1	20	0.14	0.69	43

Turning Movements Only

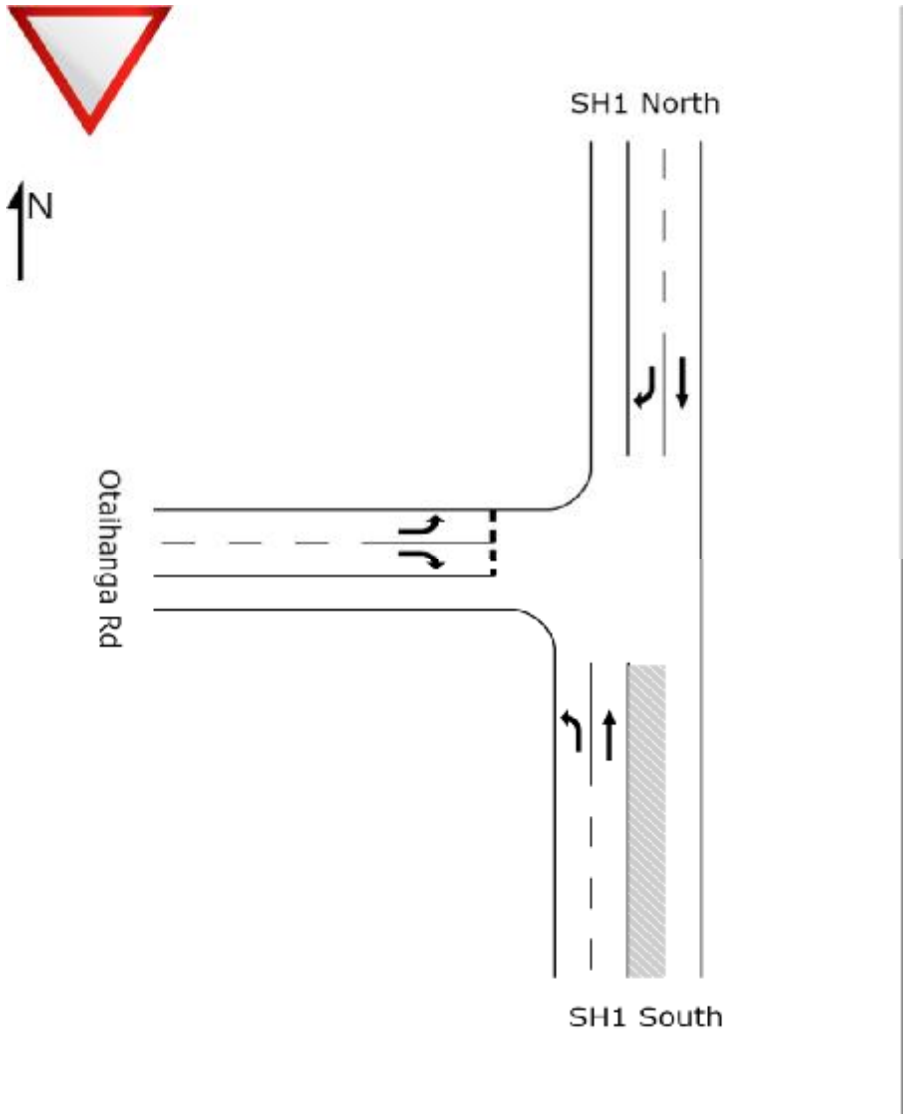
Hinemoa Street / Kapiti Road (Incl Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Hinemoa St S											
1	L	443	2.9	0.243	6.5	LOS A	0	0	0	0.61	43.3
2	T	16	0	0.019	9.4	LOS A	0.1	0.6	0.49	0.66	47.7
Approach		459	2.8	0.243	6.6	LOS A	0.1	0.6	0.02	0.61	43.4
North: Hinemoa St N											
8	T	52	4.1	0.445	25.7	LOS D	2.8	25.8	0.73	1.04	36.1
9	R	95	58.9	0.445	26.4	LOS D	2.8	25.8	0.73	1.12	32.4
Approach		146	39.6	0.444	26.1	LOS D	2.8	25.8	0.73	1.1	33.7
West: Kapiti Road											
10	L	123	46.2	0.088	9.5	LOS A	0	0	0	0.66	49
12	R	364	4	0.202	6.5	LOS A	0	0	0	0.61	43.3
Approach		487	14.7	0.202	7.3	LOS A	0	0	0	0.62	44.6
All Vehicles		1093	13	0.444	9.5	NA	2.8	25.8	0.11	0.68	42.3

Turning Movements Only

SH1 / Otaihanga Road - SIDRA Modelling results (using traffic counts)

Existing



SH1 / Otaihanga Rd Existing - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	32	3.4	0.018	11.1	LOS B	0	0	0	0.73	58.9
2	T	717	11.9	0.396	0	LOS A	0	0	0	0	80
Approach		749	11.5	0.396	0.5	LOS B	0	0	0	0.03	78.8
North: SH1 North											
8	T	1173	5.6	0.623	0	LOS A	0	0	0	0	80
9	R	262	3.8	0.443	18.5	LOS C	2.9	21.2	0.72	1	49.9
Approach		1435	5.2	0.623	3.4	LOS C	2.9	21.2	0.13	0.18	72.2
West: Otaihanga Rd											
10	L	240	2.8	0.397	17.9	LOS C	2.5	17.9	0.7	0.97	50.7
12	R	69	17.7	0.182	19.1	LOS C	0.7	5.3	0.69	0.92	50
Approach		309	6.1	0.396	18.2	LOS C	2.5	17.9	0.69	0.96	50.6
All Vehicles		2493	7.2	0.623	4.3	NA	2.9	21.2	0.16	0.23	70.3
					17.9						

SH1 / Otaihanga Rd Existing - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	46	17.1	0.028	11.7	LOS B	0	0	0	0.73	58.9
2	T	742	6	0.395	0	LOS A	0	0	0	0	80
Approach		788	6.6	0.395	0.7	LOS B	0	0	0	0.04	78.4
North: SH1 North											
8	T	768	6	0.41	0	LOS A	0	0	0	0	80
9	R	179	3.7	0.303	17.2	LOS C	1.7	12.1	0.67	0.94	51.3
Approach		947	5.6	0.41	3.2	LOS C	1.7	12.1	0.13	0.18	72.5
West: Otaihanga Rd											
10	L	197	9.6	0.351	18.3	LOS C	2.1	15.7	0.69	0.95	50.5
12	R	43	23.1	0.113	18.8	LOS C	0.4	3.3	0.65	0.91	50.6
Approach		240	12	0.351	18.4	LOS C	2.1	15.7	0.68	0.94	50.5
All Vehicles		1975	6.8	0.41	4.1	NA	2.1	15.7	0.14	0.22	70.9
					17.3						

SH1 / Otaihanga Rd Existing - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	49	2.3	0.027	11	LOS B	0	0	0	0.73	58.9
2	T	1177	2.5	0.613	0	LOS A	0	0	0	0	80
Approach		1226	2.5	0.613	0.4	LOS B	0	0	0	0.03	78.9
North: SH1 North											
8	T	681	7.3	0.366	0	LOS A	0	0	0	0	80
9	R	259	3	0.843	44	LOS E	7.5	54	0.96	1.34	32.8
Approach		940	6.1	0.842	12.1	LOS E	7.5	54	0.26	0.37	57.6
West: Otaihanga Rd											
10	L	330	0	1.028	97.5	LOS F	21.7	151.7	1	2.11	19.2
12	R	17	0	0.056	20.3	LOS C	0.2	1.3	0.76	0.94	48
Approach		347	0	1.028	93.8	LOS F	21.7	151.7	0.99	2.06	19.8
All Vehicles		2512	3.5	1.028	17.7	NA	21.7	151.7	0.24	0.44	51
					67.9						

SH1 / Otaihanga Rd (Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	110	71.7	0.09	14.4	LOS B	0	0	0	0.73	58.9
2	T	717	11.9	0.396	0	LOS A	0	0	0	0	80
Approach		827	19.9	0.396	1.9	LOS B	0	0	0	0.1	76.4
North: SH1 North											
8	T	1173	5.6	0.623	0	LOS A	0	0	0	0	80
9	R	313	19.5	0.89	47.5	LOS E	11	89.8	0.96	1.54	31.6
Approach		1486	8.5	0.891	10	LOS E	11	89.8	0.2	0.33	60.8
West: Otaihanga Rd											
10	L	291	19.8	0.715	29.5	LOS D	6.2	50.6	0.88	1.2	41.3
12	R	147	61.4	1.155	222	LOS F	20.4	218.3	1	2.24	9.8
Approach		438	33.8	1.157	94	LOS F	20.4	218.3	0.92	1.55	19.9
All Vehicles		2751	15.9	1.157	20.9	NA	20.4	218.3	0.26	0.45	48.2
					67.0						

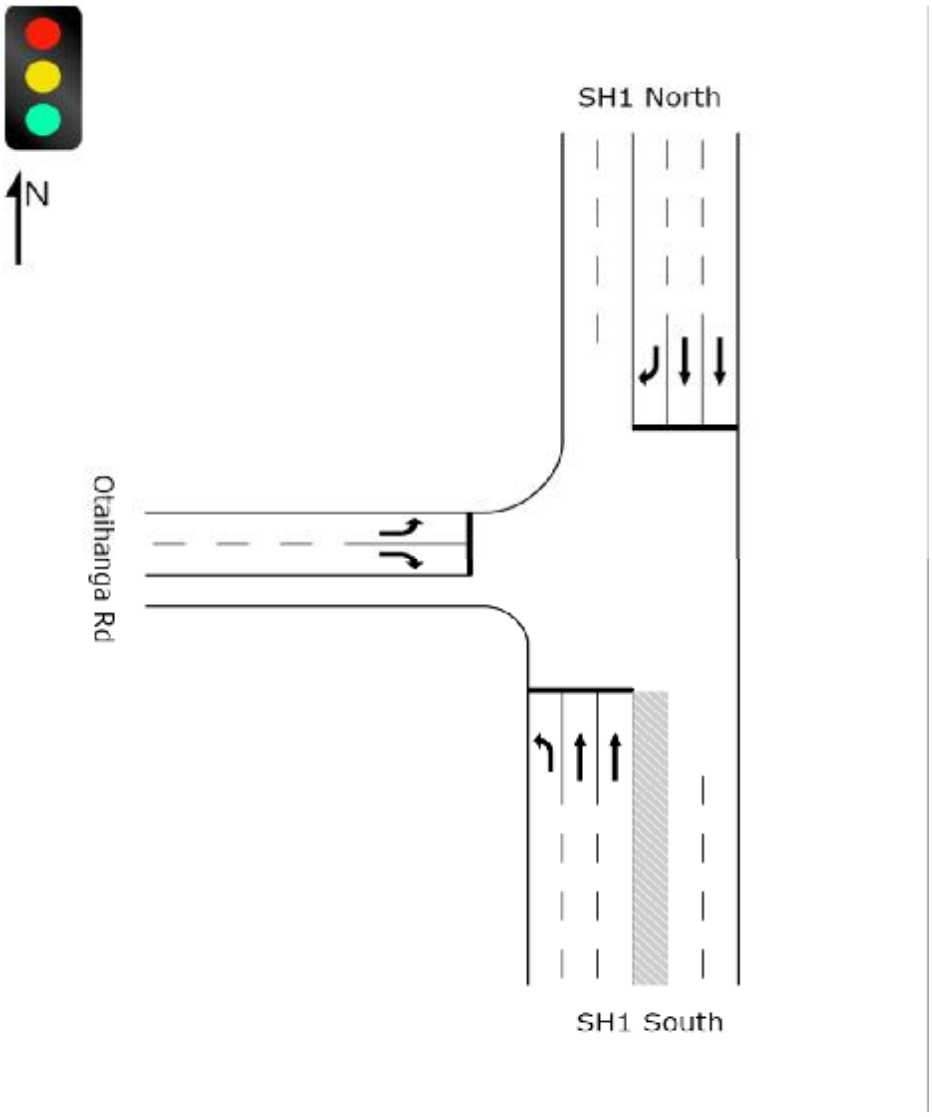
SH1 / Otaihanga Rd (Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	123	69.4	0.099	14.3	LOS B	0	0	0	0.73	58.9
2	T	743	6.1	0.396	0	LOS A	0	0	0	0	80
Approach		866	15.1	0.396	2	LOS B	0	0	0	0.1	76.2
North: SH1 North											
8	T	769	6.2	0.41	0	LOS A	0	0	0	0	80
9	R	230	25.1	0.74	36.8	LOS E	5.9	50.3	0.92	1.23	36.9
Approach		999	10.5	0.739	8.5	LOS E	5.9	50.3	0.21	0.28	63.3
West: Otaihanga Rd											
10	L	248	28.3	0.706	32.3	LOS D	5.8	50.2	0.89	1.2	39.6
12	R	121	72.5	0.993	118.2	LOS F	9.4	106.3	1	1.62	16.8
Approach		369	42.8	0.989	60.5	LOS F	9.4	106.3	0.92	1.34	27.5
All Vehicles		2235	17.6	0.989	14.6	NA	9.4	106.3	0.25	0.39	55.2
					45.1						

SH1 / Otaihanga Rd (Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	62.3	0.099	14	LOS B	0	0	0	0.73	58.9
2	T	1177	2.5	0.613	0	LOS A	0	0	0	0	80
Approach		1304	8.3	0.613	1.4	LOS B	0	0	0	0.07	77.4
North: SH1 North											
8	T	681	7.3	0.366	0	LOS A	0	0	0	0	80
9	R	310	19	1.867	834.2	LOS F	97.8	796.4	1	4.49	2.8
Approach		991	10.9	1.87	260.9	LOS F	97.8	796.4	0.31	1.41	8.5
West: Otaihanga Rd											
10	L	381	13.4	1.615	597.8	LOS F	98.8	771.2	1	4.84	3.9
12	R	94	82.4	1.574	685.5	LOS F	28.6	341.8	1	2.54	3.4
Approach		476	27.1	1.618	615.2	LOS F	98.8	771.2	1	4.38	3.8
All Vehicles		2770	12.5	1.87	199.6	NA	98.8	796.4	0.28	1.29	10.8
					605.9						

Signalised Intersection



SH1 / Otaihanga Rd Signals - AM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	110	71.7	0.708	37.7	LOS D	13.7	119.8	0.93	0.92	40.2
2	T	717	11.9	0.708	23	LOS C	15.1	119.8	0.93	0.83	42.1
Approach		827	19.9	0.708	24.9	LOS C	15.1	119.8	0.93	0.84	41.8
North: SH1 North											
8	T	1173	5.6	0.89	19.9	LOS B	42	308.2	0.87	0.93	45.2
9	R	313	19.5	0.708	38.9	LOS D	12	98.1	0.96	0.87	35.6
Approach		1486	8.5	0.89	23.9	LOS C	42	308.2	0.89	0.92	42.8
West: Otaihanga Rd											
10	L	291	19.8	0.368	24.1	LOS C	8	65.2	0.67	0.81	45.5
12	R	147	61.4	0.884	59	LOS E	7.9	84.7	1	1.02	28.2
Approach		438	33.8	0.883	35.8	LOS D	8	84.7	0.78	0.88	37.7
All Vehicles		2751	15.9	0.89	26.1	LOS C	42	308.2	0.88	0.89	41.6

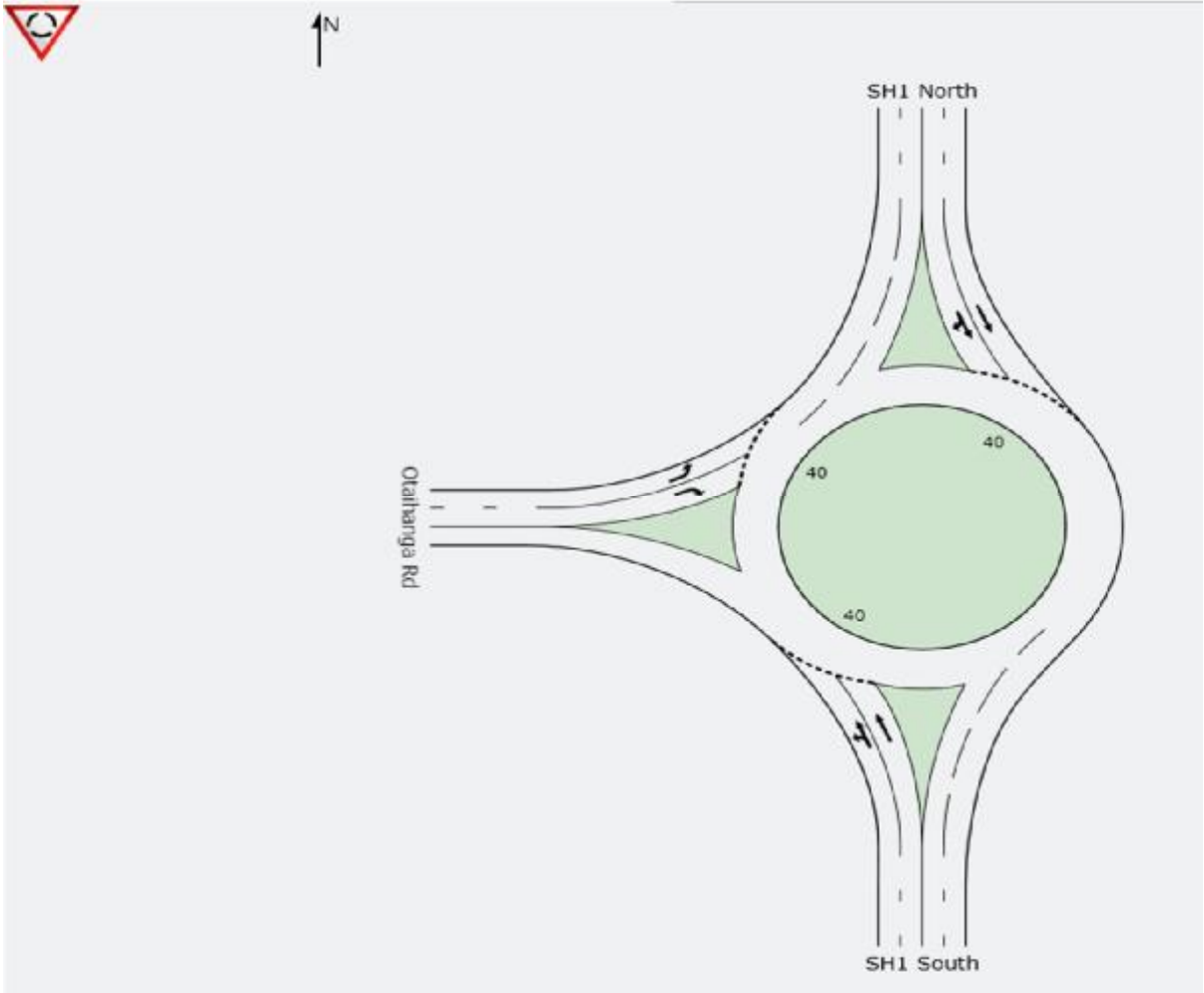
SH1 / Otaihanga Rd Signals - IP (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	123	69.4	0.774	34.9	LOS C	12	102	0.96	0.97	42.1
2	T	743	6.1	0.774	20.3	LOS C	13.3	102	0.96	0.92	43.9
Approach		866	15.1	0.774	22.4	LOS C	13.3	102	0.96	0.92	43.6
North: SH1 North											
8	T	769	6.2	0.662	6.7	LOS A	13.8	101.4	0.69	0.63	60.4
9	R	230	25.1	0.811	39.3	LOS D	8.2	69.6	1	0.95	35.6
Approach		999	10.5	0.811	14.2	LOS B	13.8	101.4	0.76	0.7	52.2
West: Otaihanga Rd											
10	L	248	28.3	0.364	22.6	LOS C	5.6	48.8	0.71	0.81	47.1
12	R	121	72.5	0.707	40.9	LOS D	4.6	52.3	1	0.89	35.9
Approach		369	42.8	0.707	28.6	LOS C	5.6	52.3	0.8	0.84	42.7
All Vehicles		2235	17.6	0.811	19.7	LOS B	13.8	102	0.85	0.81	46.9

SH1 / Otaihanga Rd Signals - PM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	62.3	0.83	39.3	LOS D	22.8	179.7	0.95	1.01	39.3
2	T	1177	2.5	0.831	24.9	LOS C	24.5	179.7	0.95	0.94	40.8
Approach		1304	8.3	0.831	26.3	LOS C	24.5	179.7	0.95	0.95	40.6
North: SH1 North											
8	T	681	7.3	0.492	3.9	LOS A	11	82.1	0.44	0.4	66.4
9	R	310	19	0.83	46.7	LOS D	13.4	109	1	0.94	32
Approach		991	10.9	0.829	17.3	LOS B	13.4	109	0.61	0.57	49.9
West: Otaihanga Rd											
10	L	381	13.4	0.562	29.4	LOS C	11.9	92.7	0.83	0.84	41.2
12	R	74	77.6	0.727	54.6	LOS D	4.1	47.8	1	0.87	30
Approach		456	23.9	0.727	33.5	LOS C	11.9	92.7	0.85	0.85	38.8
All Vehicles		2750	11.8	0.831	24.2	LOS C	24.5	179.7	0.81	0.79	43.2

Roundabout Intersection



SH1 / Otaihanga Rd Roundabout - AM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	110	71.7	0.295	18.4	LOS B	1.8	20.8	0.68	0.85	52.7
2	T	717	11.9	0.676	12.3	LOS B	9	69.1	0.82	0.81	56.1
Approach		827	19.9	0.676	13.1	LOS B	9	69.1	0.8	0.82	55.6
North: SH1 North											
8	T	1173	5.6	0.906	15.8	LOS B	24.4	178.8	1	0.84	53.1
9	R	313	19.5	0.458	19.2	LOS B	3.8	31.4	0.65	0.79	51.1
Approach		1486	8.5	0.906	16.5	LOS B	24.4	178.8	0.93	0.83	52.6
West: Otaihanga Rd											
10	L	291	19.8	0.487	16.6	LOS B	4.9	40.3	0.93	0.99	52.7
12	R	147	61.4	0.541	35.3	LOS D	4.4	46.5	0.89	1.06	39.7
Approach		438	33.8	0.54	22.9	LOS D	4.9	46.5	0.92	1.01	47.3
All Vehicles		2751	15.9	0.906	16.5	LOS B	24.4	178.8	0.89	0.85	52.5

SH1 / Otaihanga Rd Roundabout - IP (2016)
AS ROUNDABOUT

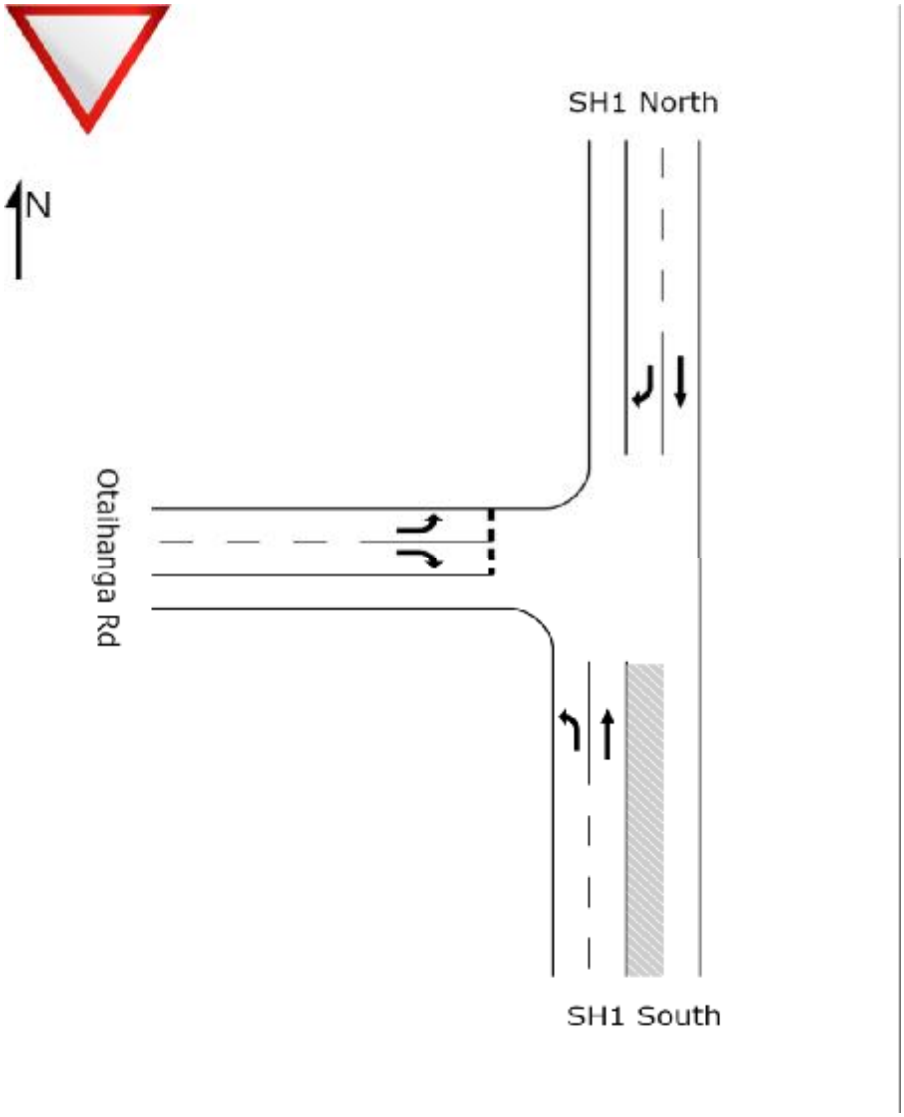
Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	123	69.4	0.286	16.6	LOS B	1.8	20.4	0.62	0.78	54.7
2	T	743	6.1	0.602	9.7	LOS A	6.4	47.1	0.68	0.66	57.4
Approach		866	15.1	0.602	10.7	LOS B	6.4	47.1	0.67	0.67	57
North: SH1 North											
8	T	769	6.2	0.59	9.7	LOS A	6.7	49.4	0.62	0.62	57.3
9	R	230	25.1	0.332	18.7	LOS B	2.5	21.4	0.55	0.75	51.5
Approach		999	10.5	0.59	11.8	LOS B	6.7	49.4	0.61	0.65	55.8
West: Otaihanga Rd											
10	L	248	28.3	0.431	16.5	LOS B	3.9	33.5	0.87	0.96	53.2
12	R	121	72.5	0.475	35.4	LOS D	3.5	39.3	0.86	1.03	39.8
Approach		369	42.8	0.475	22.7	LOS D	3.9	39.3	0.87	0.98	47.7
All Vehicles		2235	17.6	0.602	13.1	LOS B	6.7	49.4	0.67	0.71	54.7

SH1 / Otaihanga Rd Roundabout - PM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	62.3	0.332	18.2	LOS B	2.1	22.5	0.68	0.85	52.6
2	T	1177	2.5	0.988	36.1	LOS D	44.5	317.9	1	1.43	36.9
Approach		1304	8.3	0.988	34.4	LOS D	44.5	317.9	0.97	1.37	38
North: SH1 North											
8	T	681	7.3	0.514	9.4	LOS A	5.6	41.5	0.54	0.58	58
9	R	310	19	0.346	17.6	LOS B	2.9	23.5	0.5	0.71	51.8
Approach		991	10.9	0.514	11.9	LOS B	5.6	41.5	0.53	0.62	55.8
West: Otaihanga Rd											
10	L	381	13.4	1.254	295.5	LOS F	66.5	519.1	1	2.8	7.5
12	R	94	82.4	1.005	186.3	LOS F	12	142.8	1	1.52	12.1
Approach		476	27.1	1.255	273.8	LOS F	66.5	519.1	1	2.55	8.2
All Vehicles		2770	12.5	1.255	67.5	LOS E	66.5	519.1	0.82	1.31	25.2

SH1 / Otaihanga Road - SIDRA Modelling results (using SATURN flows)

Existing



SH1 / Otaihanga Rd Existing - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	49	9.1	0.028	11.4	LOS B	0	0	0	0.73	58.9
2	T	807	11.9	0.446	0	LOS A	0	0	0	0	80
Approach		856	11.7	0.446	0.6	LOS B	0	0	0	0.04	78.4
North: SH1 North											
8	T	1158	6.7	0.62	0	LOS A	0	0	0	0	80
9	R	401	6.1	0.592	20.3	LOS C	5.1	37.9	0.8	1.1	33.9
Approach		1559	6.6	0.62	5.2	LOS C	5.1	37.9	0.21	0.28	67.2
West: Otaihanga Rd											
10	L	302	7	0.603	22.9	LOS C	4.6	34	0.82	1.09	46.1
12	R	84	9.2	0.255	21	LOS C	1	7.4	0.77	0.96	47.8
Approach		387	7.5	0.603	22.5	LOS C	4.6	34	0.81	1.07	46.5
All Vehicles		2802	8.3	0.62	6.2	NA	5.1	37.9	0.23	0.32	66
					20.8						

SH1 / Otaihanga Rd Existing - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	42	13.2	0.025	11.6	LOS B	0	0	0	0.73	58.9
2	T	774	11.8	0.427	0	LOS A	0	0	0	0	80
Approach		816	11.9	0.427	0.6	LOS B	0	0	0	0.04	78.6
North: SH1 North											
8	T	781	12	0.432	0	LOS A	0	0	0	0	80
9	R	210	6.9	0.298	16.7	LOS C	1.8	13.3	0.68	0.95	37.9
Approach		991	10.9	0.432	3.5	LOS C	1.8	13.3	0.14	0.2	71.1
West: Otaihanga Rd											
10	L	230	7.2	0.436	19.8	LOS C	2.8	20.5	0.75	1	48.9
12	R	38	11.8	0.092	17.7	LOS C	0.3	2.5	0.65	0.91	51.3
Approach		268	7.9	0.436	19.5	LOS C	2.8	20.5	0.73	0.98	49.2
All Vehicles		2075	10.9	0.436	4.4	NA	2.8	20.5	0.16	0.24	69.7
					17.7						

SH1 / Otaihanga Rd Existing - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	94	4.7	0.053	11.1	LOS B	0	0	0	0.73	58.9
2	T	1148	4.4	0.606	0	LOS A	0	0	0	0	80
Approach		1243	4.4	0.606	0.8	LOS B	0	0	0	0.06	77.9
North: SH1 North											
8	T	811	6.4	0.433	0	LOS A	0	0	0	0	80
9	R	286	3.5	0.658	27.5	LOS D	4.9	35.7	0.9	1.15	27.9
Approach		1096	5.6	0.658	7.2	LOS D	4.9	35.7	0.23	0.3	63.2
West: Otaihanga Rd											
10	L	372	4.2	1.156	187.6	LOS F	42.5	308	1	3.06	11.3
12	R	50	8.9	0.191	23.2	LOS C	0.7	5.1	0.81	0.96	45.8
Approach		422	4.7	1.155	168.1	LOS F	42.5	308	0.98	2.81	12.4
All Vehicles		2761	4.9	1.155	28.9	NA	42.5	308	0.24	0.57	40.3
					99.6						

SH1 / Otaihanga Rd (Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	64.9	0.1	14.1	LOS B	0	0	0	0.73	58.9
2	T	807	11.9	0.446	0	LOS A	0	0	0	0	80
Approach		934	19.1	0.446	1.9	LOS B	0	0	0	0.1	76.4
North: SH1 North											
8	T	1158	6.7	0.62	0	LOS A	0	0	0	0	80
9	R	452	16.7	1.032	93.3	LOS F	29.2	233.5	1	2.47	11
Approach		1610	9.5	1.032	26.2	LOS F	29.2	233.5	0.28	0.69	40.4
West: Otaihanga Rd											
10	L	353	20.4	1.052	110.1	LOS F	27	221.9	1	2.4	17.6
12	R	162	52.7	1.726	729.3	LOS F	49.8	506.1	1	3.25	3.2
Approach		516	30.6	1.731	304.9	LOS F	49.8	506.1	1	2.67	7.3
All Vehicles		3060	16	1.731	65.7	NA	49.8	506.1	0.32	0.84	24.4
					183.7						

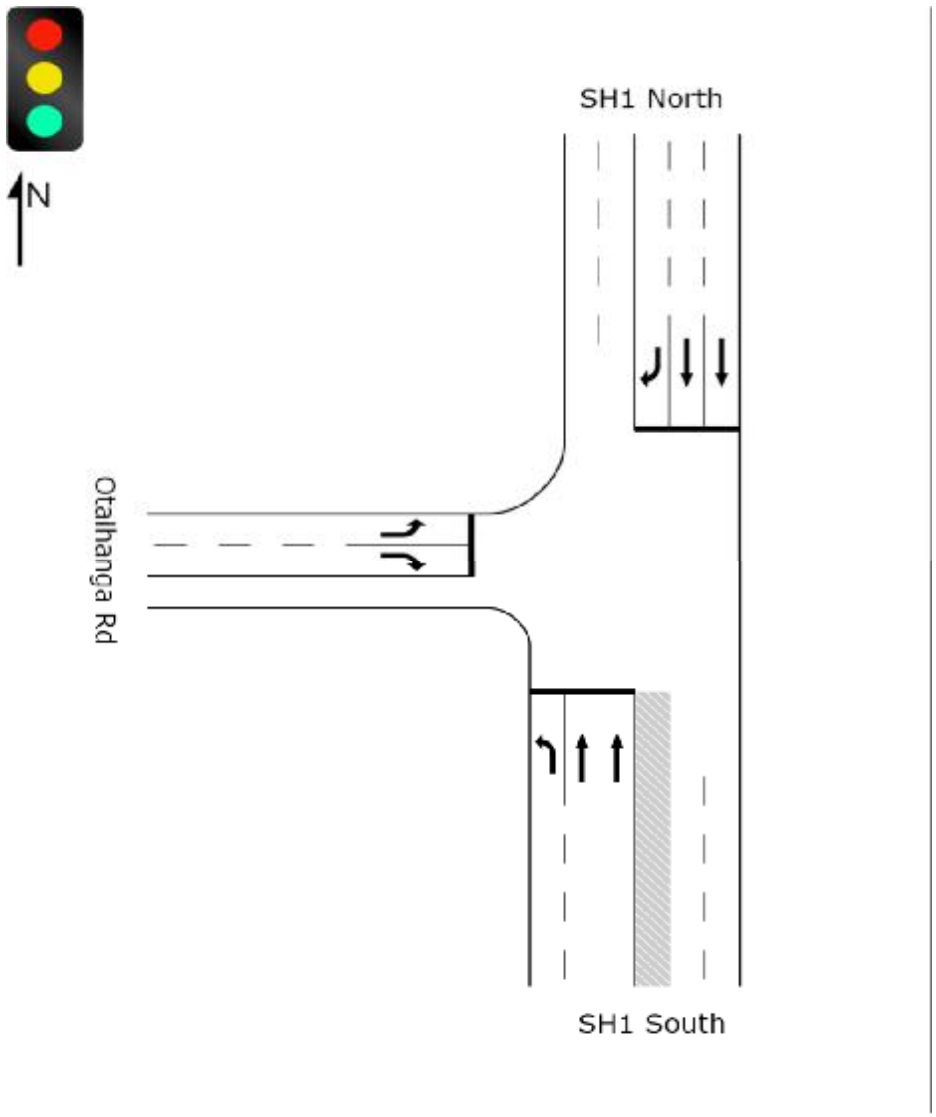
SH1 / Otaihanga Rd (Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	120	69.4	0.097	14.3	LOS B	0	0	0	0.73	58.9
2	T	774	11.8	0.427	0	LOS A	0	0	0	0	80
Approach		894	19.6	0.427	1.9	LOS B	0	0	0	0.1	76.4
North: SH1 North											
8	T	781	12	0.432	0	LOS A	0	0	0	0	80
9	R	261	25.1	0.663	30.6	LOS D	5.3	45	0.89	1.17	26.7
Approach		1042	15.3	0.663	7.7	LOS D	5.3	45	0.22	0.29	62.9
West: Otaihanga Rd											
10	L	281	24.1	0.842	42.4	LOS E	8.7	73.9	0.94	1.4	34
12	R	116	71.2	1.144	231.4	LOS F	16.8	189.2	1	2.03	9.4
Approach		397	37.8	1.148	97.5	LOS F	16.8	189.2	0.96	1.58	19.4
All Vehicles		2333	20.8	1.148	20.7	NA	16.8	189.2	0.26	0.44	47.4
					62.3						

SH1 / Otaihanga Rd (Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	172	47.7	0.124	13.2	LOS B	0	0	0	0.73	58.9
2	T	1148	4.4	0.606	0	LOS A	0	0	0	0	80
Approach		1321	10.1	0.606	1.7	LOS B	0	0	0	0.1	76.5
North: SH1 North											
8	T	811	6.4	0.433	0	LOS A	0	0	0	0	80
9	R	337	18.2	1.403	409.9	LOS F	68.6	555.3	1	4.03	2.8
Approach		1147	9.8	1.401	120.3	LOS F	68.6	555.3	0.29	1.18	14.4
West: Otaihanga Rd											
10	L	423	15.7	1.969	916.4	LOS F	138.6	1101.4	1	5.54	2.6
12	R	128	64.3	2.13	1129.6	LOS F	49.8	540.3	1	2.96	2.1
Approach		551	27	2.13	965.8	LOS F	138.6	1101.4	1	4.94	2.5
All Vehicles		3019	13.1	2.13	222.8	NA	138.6	1101.4	0.29	1.39	9.3
					634.6						

Signalised Intersection



SH1 / Otaihanga Rd Signals - AM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	64.9	0.91	56.1	LOS E	20.5	176.9	1	1.12	30.8
2	T	807	11.9	0.91	41.3	LOS D	22.4	176.9	1	1.11	32
Approach		934	19.1	0.91	43.3	LOS D	22.4	176.9	1	1.11	31.8
North: SH1 North											
8	T	1158	6.7	0.904	23.5	LOS C	44.8	331.8	0.9	0.99	42.3
9	R	452	16.7	0.909	53.3	LOS D	20.9	167	1	1.02	17.5
Approach		1610	9.5	0.909	31.8	LOS C	44.8	331.8	0.93	1	34.7
West: Otaihanga Rd											
10	L	353	20.4	0.412	19.2	LOS B	9	74.3	0.64	0.79	38.3
12	R	162	52.7	0.842	50.3	LOS D	8.2	83.6	1	1.02	26.1
Approach		516	30.6	0.842	29	LOS C	9	83.6	0.76	0.87	33.3
All Vehicles		3060	16	0.91	34.9	LOS C	44.8	331.8	0.92	1.01	33.4

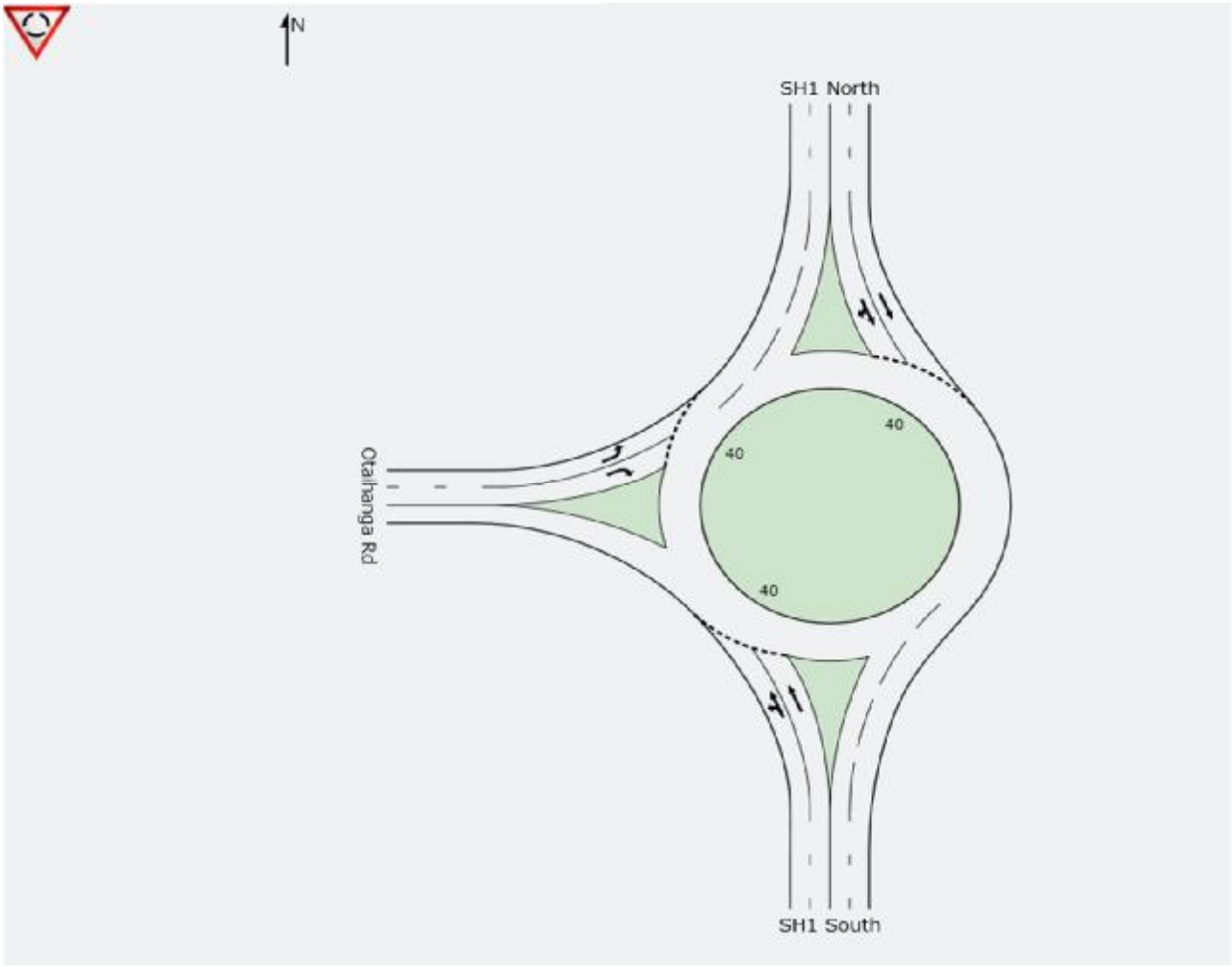
SH1 / Otaihanga Rd Signals - IP (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	120	69.4	0.819	37.4	LOS D	13.1	114	0.98	1.01	40.5
2	T	774	11.8	0.819	22.7	LOS C	14.3	114	0.98	0.98	42
Approach		894	19.6	0.819	24.7	LOS C	14.3	114	0.98	0.98	41.8
North: SH1 North											
8	T	781	12	0.675	6.2	LOS A	13.7	106.1	0.68	0.62	60.7
9	R	261	25.1	0.829	39.6	LOS D	9.2	78.3	1	0.97	22.1
Approach		1042	15.3	0.829	14.6	LOS B	13.7	106.1	0.76	0.71	49
West: Otaihanga Rd											
10	L	281	24.1	0.403	19.1	LOS B	6.4	53.7	0.72	0.8	38.4
12	R	116	71.2	0.782	39.7	LOS D	4.6	52.3	1	1	29.7
Approach		397	37.8	0.782	25.1	LOS C	6.4	53.7	0.8	0.86	35.4
All Vehicles		2333	20.8	0.829	20.2	LOS C	14.3	114	0.85	0.84	43.1

SH1 / Otaihanga Rd Signals - PM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	172	47.7	0.885	48.9	LOS D	29	231.3	1	1.06	33.6
2	T	1148	4.4	0.885	35	LOS D	31.3	231.3	1	1.04	34.8
Approach		1321	10.1	0.885	36.8	LOS D	31.3	231.3	1	1.04	34.6
North: SH1 North											
8	T	811	6.4	0.597	5.7	LOS A	16.5	121.6	0.53	0.48	63.4
9	R	337	18.2	0.862	53.2	LOS D	16.4	132.9	1	0.96	17.5
Approach		1147	9.8	0.862	19.6	LOS B	16.5	132.9	0.66	0.62	44.4
West: Otaihanga Rd											
10	L	423	15.7	0.58	26.7	LOS C	14	111.6	0.81	0.83	34.2
12	R	128	64.3	0.804	54.6	LOS D	7.3	79.4	1	0.97	25
Approach		551	27	0.803	33.2	LOS C	14	111.6	0.85	0.86	31.5
All Vehicles		3019	13.1	0.885	29.6	LOS C	31.3	231.3	0.84	0.85	36.7

Roundabout Intersection



SH1 / Otaihanga Rd Roundabout - AM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	127	64.9	0.551	16	LOS B	6.5	55.3	0.89	0.95	56.1
2	T	807	11.9	0.552	12.7	LOS B	6.5	55.3	0.89	0.86	55.8
Approach		934	19.1	0.552	13.1	LOS B	6.5	55.3	0.89	0.87	55.8
North: SH1 North											
8	T	1158	6.7	0.652	9.1	LOS A	9	69.2	0.77	0.62	56.6
9	R	452	16.7	0.653	19.2	LOS B	8.9	69.2	0.82	0.78	39.5
Approach		1610	9.5	0.652	12	LOS B	9	69.2	0.79	0.67	52.5
West: Otaihanga Rd											
10	L	353	20.4	0.585	20.5	LOS C	7.7	63.7	1	1.04	48.7
12	R	162	52.7	0.575	38.5	LOS D	5.5	56.2	0.98	1.11	37.9
Approach		516	30.6	0.585	26.2	LOS D	7.7	63.7	0.99	1.06	44.5
All Vehicles		3060	16	0.652	14.7	LOS B	9	69.2	0.85	0.8	51.8

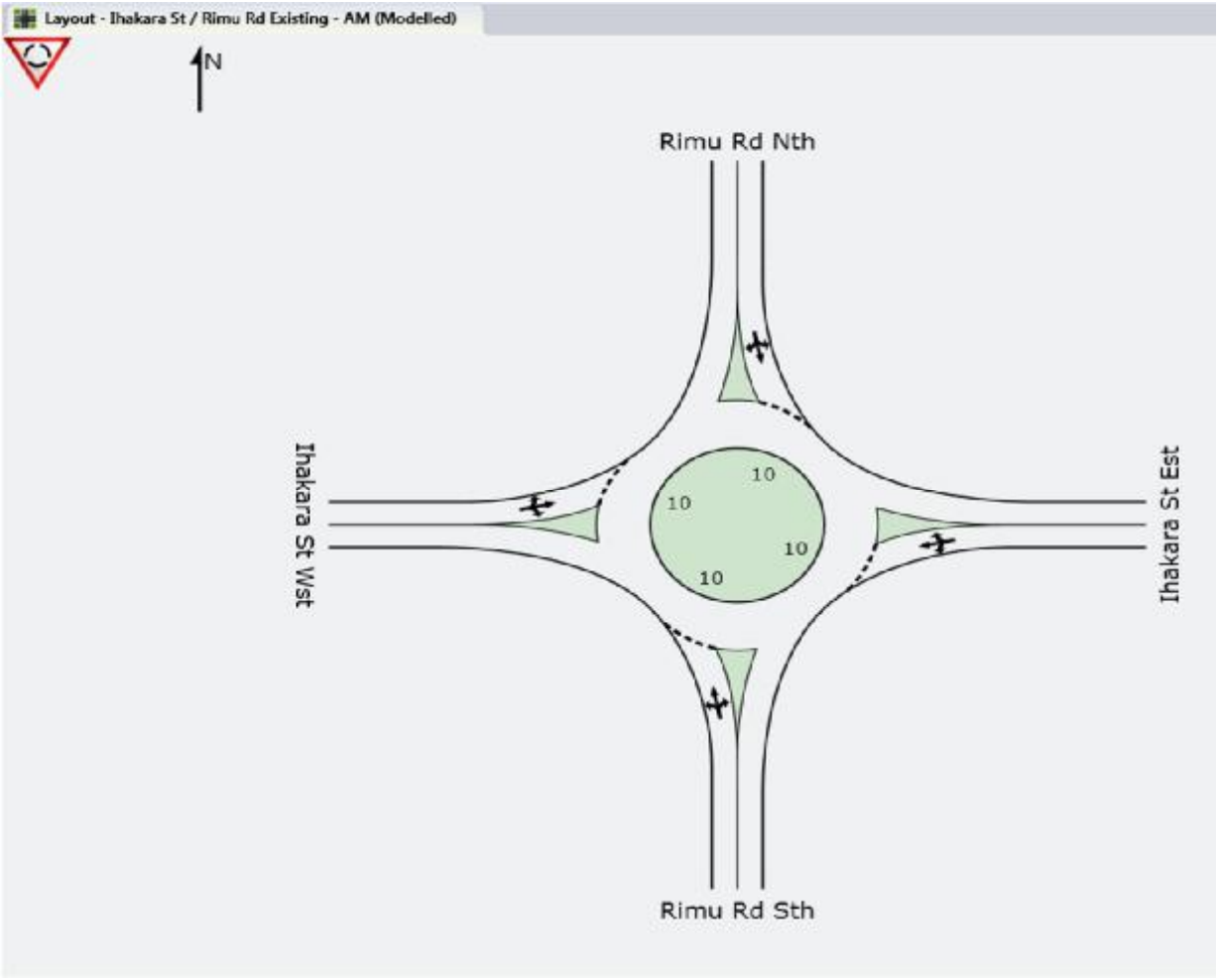
SH1 / Otaihanga Rd Roundabout - IP (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	120	69.4	0.427	13.4	LOS B	4.1	35.5	0.67	0.74	57.5
2	T	774	11.8	0.427	9.7	LOS A	4.1	35.5	0.67	0.65	57.8
Approach		894	19.6	0.427	10.2	LOS B	4.1	35.5	0.67	0.66	57.8
North: SH1 North											
8	T	781	12	0.427	8.5	LOS A	4.7	36.3	0.57	0.56	58.7
9	R	261	25.1	0.427	18.1	LOS B	4.4	35.9	0.6	0.75	40.8
Approach		1042	15.3	0.427	10.9	LOS B	4.7	36.3	0.58	0.61	54.9
West: Otaihanga Rd											
10	L	281	24.1	0.427	16.2	LOS B	4.4	37.4	0.96	0.92	53.3
12	R	116	71.2	0.439	36.3	LOS D	3.5	39.5	0.91	1.04	39.5
Approach		397	37.8	0.44	22.1	LOS D	4.4	39.5	0.95	0.96	48.1
All Vehicles		2333	20.8	0.44	12.5	LOS B	4.7	39.5	0.68	0.69	54.6

SH1 / Otaihanga Rd Roundabout - PM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	172	47.7	0.606	13.9	LOS B	7.6	60.1	0.82	0.84	56.6
2	T	1148	4.4	0.606	10.9	LOS B	7.6	60.1	0.83	0.76	56.3
Approach		1321	10.1	0.606	11.3	LOS B	7.6	60.1	0.82	0.77	56.4
North: SH1 North											
8	T	811	6.4	0.451	8.3	LOS A	5.2	38.4	0.59	0.56	58.5
9	R	337	18.2	0.451	17.9	LOS B	4.8	37.9	0.63	0.74	40.2
Approach		1147	9.8	0.451	11.1	LOS B	5.2	38.4	0.6	0.61	53.8
West: Otaihanga Rd											
10	L	423	15.7	0.991	111.3	LOS F	33.2	263.7	1	1.92	17.4
12	R	128	64.3	0.765	81.2	LOS F	8.1	88.5	1	1.26	23.6
Approach		551	27	0.99	104.3	LOS F	33.2	263.7	1	1.76	18.6
All Vehicles		3019	13.1	0.99	28.2	LOS C	33.2	263.7	0.77	0.89	40

Ihakara Street / Rimu Road - SIDRA Modelling results (using SATURN Flows)



Ihakara St / Rimu Rd Existing - AM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	27	0	0.62	8.3	LOS A	7.3	51.7	0.75	0.69	41.3
2	T	439	1.5	0.614	7.5	LOS A	7.3	51.7	0.75	0.66	41.1
3	R	176	3.2	0.614	11.6	LOS B	7.3	51.7	0.75	0.76	39.9
Approach		641	1.9	0.614	8.6	LOS B	7.3	51.7	0.75	0.69	40.8
East: Ihakara St Est											
4	L	60	9.3	0.323	8.8	LOS A	2.7	20.7	0.64	0.69	41.1
5	T	10	0	0.323	7.7	LOS A	2.7	20.7	0.64	0.65	41.2
6	R	203	10.4	0.323	12	LOS B	2.7	20.7	0.64	0.76	39.2
Approach		273	9.8	0.323	11.1	LOS B	2.7	20.7	0.64	0.74	39.7
North: Rimu Rd Nth											
7	L	127	3.5	0.402	7.6	LOS A	3.9	27.9	0.58	0.64	42
8	T	296	2.3	0.403	6.7	LOS A	3.9	27.9	0.58	0.59	42
9	R	1	0	0.37	10.7	LOS B	3.9	27.9	0.58	0.76	40.5
Approach		423	2.6	0.403	7	LOS B	3.9	27.9	0.58	0.61	42
West: Ihakara St Wst											
10	L	1	0	0.051	12.5	LOS B	0.4	2.8	0.82	0.76	38.3
11	T	9	0	0.05	11.7	LOS B	0.4	2.8	0.82	0.74	38.4
12	R	16	0	0.05	15.7	LOS B	0.4	2.8	0.82	0.8	36.8
Approach		26	0	0.05	14.2	LOS B	0.4	2.8	0.82	0.77	37.4
All Vehicles		1363	3.7	0.614	8.7	LOS A	7.3	51.7	0.67	0.68	40.9

Ihakara St / Rimu Rd Existing - IP (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	27	0	0.58	10.1	LOS B	6.6	46.9	0.8	0.81	40.5
2	T	377	1.8	0.574	9.2	LOS A	6.6	46.9	0.8	0.79	40.7
3	R	107	3.1	0.573	13.3	LOS B	6.6	46.9	0.8	0.87	38.7
Approach		510	2	0.574	10.1	LOS B	6.6	46.9	0.8	0.81	40.2
East: Ihakara St Est											
4	L	121	3.7	0.46	8.3	LOS A	4.4	32.4	0.65	0.67	41.2
5	T	16	0	0.458	7.4	LOS A	4.4	32.4	0.65	0.63	41.1
6	R	311	7.5	0.462	11.6	LOS B	4.4	32.4	0.65	0.74	39.5
Approach		448	6.2	0.461	10.6	LOS B	4.4	32.4	0.65	0.72	40
North: Rimu Rd Nth											
7	L	47	14.3	0.254	7.2	LOS A	2.2	15.7	0.44	0.61	42.5
8	T	228	1.5	0.254	6.1	LOS A	2.2	15.7	0.44	0.53	42.7
9	R	1	0	0.278	10.1	LOS B	2.2	15.7	0.44	0.75	40.9
Approach		276	3.6	0.254	6.3	LOS B	2.2	15.7	0.44	0.54	42.6
West: Ihakara St Wst											
10	L	1	0	0.079	12.3	LOS B	0.6	4.4	0.81	0.78	38.4
11	T	16	0	0.081	11.5	LOS B	0.6	4.4	0.81	0.76	38.6
12	R	27	0	0.081	15.5	LOS B	0.6	4.4	0.81	0.82	36.9
Approach		43	0	0.081	14	LOS B	0.6	4.4	0.81	0.8	37.5
All Vehicles		1277	3.7	0.574	9.6	LOS A	6.6	46.9	0.67	0.72	40.5

Ihakara St / Rimu Rd Existing - PM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	24	0	0.764	18.2	LOS B	12.6	90.6	1	1.16	35
2	T	438	2.8	0.761	17.4	LOS B	12.6	90.6	1	1.16	35.1
3	R	82	4.1	0.761	21.5	LOS C	12.6	90.6	1	1.16	33.9
Approach		544	2.9	0.762	18	LOS C	12.6	90.6	1	1.16	34.9
East: Ihakara St Est											
4	L	163	2	0.774	17.6	LOS B	13.5	96	0.99	1.12	34.8
5	T	31	3.6	0.778	16.8	LOS B	13.5	96	0.99	1.12	34.9
6	R	433	1.8	0.774	20.8	LOS C	13.5	96	0.99	1.12	33.7
Approach		628	1.9	0.774	19.8	LOS C	13.5	96	0.99	1.12	34
North: Rimu Rd Nth											
7	L	97	3.4	0.42	6.9	LOS A	4.3	31.1	0.48	0.59	42.3
8	T	380	3.2	0.42	6.1	LOS A	4.3	31.1	0.48	0.53	42.4
9	R	20	0	0.417	10.1	LOS B	4.3	31.1	0.48	0.73	40.8
Approach		497	3.1	0.42	6.4	LOS B	4.3	31.1	0.48	0.55	42.3
West: Ihakara St Wst											
10	L	44	0	0.214	15.3	LOS B	1.8	12.7	0.91	0.91	36.4
11	T	8	0	0.216	14.4	LOS B	1.8	12.7	0.91	0.9	36.5
12	R	40	2.8	0.214	18.5	LOS B	1.8	12.7	0.91	0.93	35.1
Approach		92	1.2	0.214	16.6	LOS B	1.8	12.7	0.91	0.92	35.8
All Vehicles		1761	2.5	0.774	15.3	LOS B	13.5	96	0.85	0.96	36.4

Ihakara St / Rimu Rd (Incl Constr.) - AM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	27	0	0.635	9.5	LOS A	8.4	59.6	0.8	0.76	40.9
2	T	439	1.5	0.642	8.6	LOS A	8.4	59.6	0.8	0.73	40.9
3	R	176	3.2	0.641	12.7	LOS B	8.4	59.6	0.8	0.81	39.1
Approach		641	1.9	0.642	9.8	LOS B	8.4	59.6	0.8	0.76	40.4
East: Ihakara St Est											
4	L	60	9.3	0.368	9.2	LOS A	3.2	25	0.68	0.71	40.8
5	T	27	62.5	0.37	9.4	LOS A	3.2	25	0.68	0.75	41
6	R	203	10.4	0.369	12.4	LOS B	3.2	25	0.68	0.77	39
Approach		290	14.9	0.369	11.5	LOS B	3.2	25	0.68	0.76	39.5
North: Rimu Rd Nth											
7	L	127	3.5	0.421	7.9	LOS A	4	28.9	0.62	0.67	41.8
8	T	296	2.3	0.42	7	LOS A	4	28.9	0.62	0.62	41.8
9	R	1	0	0.37	11	LOS B	4	28.9	0.62	0.77	40.3
Approach		423	2.6	0.42	7.3	LOS B	4	28.9	0.62	0.64	41.8
West: Ihakara St Wst											
10	L	1	0	0.159	18.3	LOS B	1	9.5	0.85	0.84	34.8
11	T	26	65.2	0.149	18.6	LOS B	1	9.5	0.85	0.92	34.9
12	R	16	0	0.148	21.5	LOS C	1	9.5	0.85	0.88	33.6
Approach		42	39.5	0.149	19.7	LOS C	1	9.5	0.85	0.9	34.4
All Vehicles		1397	6	0.642	9.7	LOS A	8.4	59.6	0.72	0.72	40.4

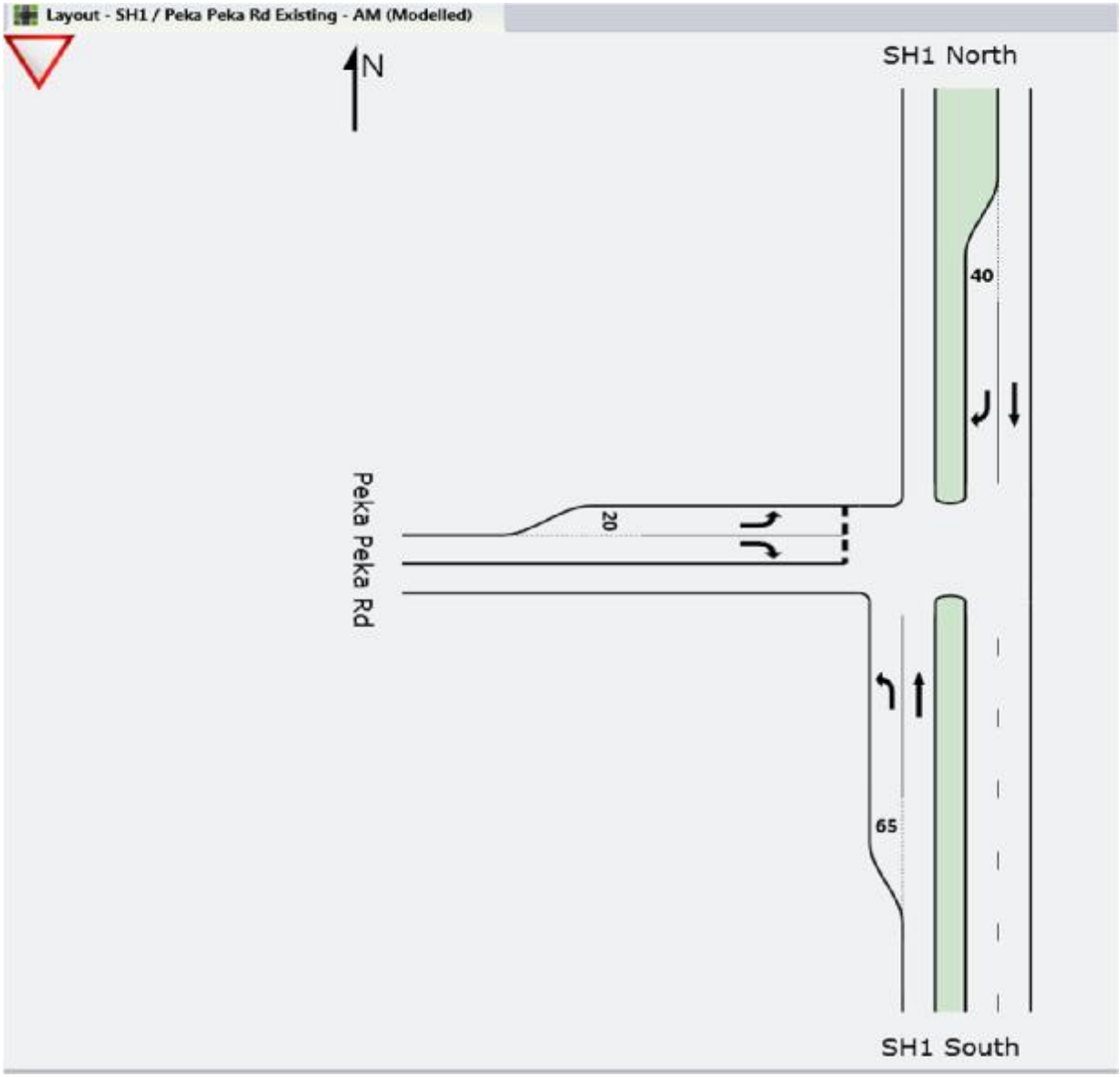
Ihakara St / Rimu Rd (Incl Constr.) - IP (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	27	0	0.593	11.1	LOS B	7.3	51.8	0.84	0.87	39.7
2	T	377	1.8	0.599	10.2	LOS B	7.3	51.8	0.84	0.85	39.9
3	R	107	3.1	0.599	14.3	LOS B	7.3	51.8	0.84	0.91	38.1
Approach		510	2	0.599	11.1	LOS B	7.3	51.8	0.84	0.86	39.5
East: Ihakara St Est											
4	L	121	3.7	0.498	8.6	LOS A	4.9	37	0.68	0.68	41.1
5	T	32	51.7	0.496	8.6	LOS A	4.9	37	0.68	0.72	41
6	R	311	7.5	0.499	11.9	LOS B	4.9	37	0.68	0.75	39.3
Approach		464	9.6	0.499	10.8	LOS B	4.9	37	0.68	0.73	39.9
North: Rimu Rd Nth											
7	L	47	14.3	0.265	7.5	LOS A	2.2	16.1	0.48	0.63	42.3
8	T	228	1.5	0.266	6.4	LOS A	2.2	16.1	0.48	0.55	42.5
9	R	1	0	0.278	10.4	LOS B	2.2	16.1	0.48	0.76	40.7
Approach		276	3.6	0.266	6.6	LOS B	2.2	16.1	0.48	0.57	42.4
West: Ihakara St Wst											
10	L	1	0	0.159	16	LOS B	1.2	10.3	0.83	0.84	36.1
11	T	32	51.7	0.168	16.1	LOS B	1.2	10.3	0.83	0.91	36.2
12	R	27	0	0.168	19.2	LOS B	1.2	10.3	0.83	0.88	34.8
Approach		60	27.8	0.167	17.5	LOS B	1.2	10.3	0.83	0.89	35.6
All Vehicles		1310	6.2	0.599	10.3	LOS B	7.3	51.8	0.71	0.76	40

Ihakara St / Rimu Rd (Incl Constr.) - PM (2016)
AS ROUNDABOUT

Mov ID	Turn	Demand	HV	Deg. Satn	Average	Level of	95% Back of Queue		Prop.	Effective	Average
Flow	HV	Deg.			Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Rimu Rd Sth											
1	L	24	0	0.789	20.8	LOS C	14	100.7	1	1.24	33.5
2	T	438	2.8	0.795	27.4	LOS C	14	100.7	1	1.12	50.4
3	R	82	4.1	0.791	26.1	LOS C	14	100.7	1	1.2	36
Approach		544	2.9	0.794	26.9	LOS C	14	100.7	1	1.14	47.1
East: Ihakara St Est											
4	L	163	2	0.825	23	LOS C	16.5	120.1	1	1.17	36.4
5	T	48	37.2	0.824	23.2	LOS C	16.5	120.1	1	1.25	36.5
6	R	433	1.8	0.827	26.4	LOS C	16.5	120.1	1	1.17	35.3
Approach		644	4.5	0.827	25.3	LOS C	16.5	120.1	1	1.18	35.6
North: Rimu Rd Nth											
7	L	97	3.4	0.439	9.1	LOS A	4.4	31.8	0.53	0.64	47.5
8	T	380	3.2	0.439	13.8	LOS B	4.4	31.8	0.53	0.66	65.2
9	R	20	0	0.435	16.3	LOS B	4.4	31.8	0.53	0.76	58.3
Approach		497	3.1	0.439	12.9	LOS B	4.4	31.8	0.53	0.66	61.3
West: Ihakara St Wst											
10	L	44	0	0.332	21.8	LOS C	2.6	20.5	0.93	0.97	41.9
11	T	24	68.2	0.33	21.3	LOS C	2.6	20.5	0.93	0.97	38.6
12	R	40	2.8	0.331	23.6	LOS C	2.6	20.5	0.93	0.98	37
Approach		109	16.3	0.331	22.4	LOS C	2.6	20.5	0.93	0.97	39.3
All Vehicles		1794	4.3	0.827	22.2	LOS C	16.5	120.1	0.87	1.01	45

SH1 / Peka Peka Road - SIDRA Modelling results (using SATURN flows)



SH1 / Peka Peka Rd Existing - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	93	3.6	0.052	12.4	LOS B	0	0	0	0.75	64.8
2	T	717	11.5	0.395	0	LOS A	0	0	0	0	100
Approach		810	10.5	0.395	1.4	LOS B	0	0	0	0.09	94.9
North: SH1 North											
8	T	829	9.6	0.452	0	LOS A	0	0	0	0	100
9	R	52	4.3	0.07	16.4	LOS C	0.4	2.6	0.62	0.85	58.6
Approach		882	9.3	0.452	1	LOS C	0.4	2.6	0.04	0.05	96.5
West: Peka Peka Rd											
10	L	47	9.5	0.087	16.9	LOS C	0.4	3	0.63	0.9	52
12	R	70	9.5	0.13	15.7	LOS C	0.5	3.5	0.57	0.88	53.3
Approach		117	9.5	0.13	16.2	LOS C	0.5	3.5	0.59	0.89	52.8
All Vehicles		1809	9.9	0.452	2.2	NA	0.5	3.5	0.06	0.12	91.6

SH1 / Peka Peka Rd Existing - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	74	7.5	0.042	12.6	LOS B	0	0	0	0.75	64.8
2	T	578	14.2	0.324	0	LOS A	0	0	0	0	100
Approach		652	13.4	0.324	1.4	LOS B	0	0	0	0.09	94.9
North: SH1 North											
8	T	544	13.9	0.304	0	LOS A	0	0	0	0	100
9	R	22	5	0.025	15.3	LOS C	0.1	0.9	0.57	0.76	60.2
Approach		566	13.6	0.304	0.6	LOS C	0.1	0.9	0.02	0.03	97.8
West: Peka Peka Rd											
10	L	32	10.3	0.05	15.4	LOS C	0.2	1.8	0.57	0.82	53.7
12	R	98	6.8	0.147	14.3	LOS B	0.5	4	0.47	0.86	54.9
Approach		130	7.7	0.147	14.5	LOS C	0.5	4	0.5	0.85	54.6
All Vehicles		1349	12.9	0.324	2.4	NA	0.5	4	0.06	0.14	90.5

SH1 / Peka Peka Rd Existing - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	97	5.7	0.054	12.5	LOS B	0	0	0	0.75	64.8
2	T	836	5.5	0.444	0	LOS A	0	0	0	0	100
Approach		932	5.6	0.444	1.3	LOS B	0	0	0	0.08	95.4
North: SH1 North											
8	T	673	6.3	0.359	0	LOS A	0	0	0	0	100
9	R	30	3.7	0.045	17	LOS C	0.2	1.6	0.64	0.85	57.8
Approach		703	6.2	0.359	0.7	LOS C	0.2	1.6	0.03	0.04	97.4
West: Peka Peka Rd											
10	L	37	6.1	0.072	17.1	LOS C	0.3	2.4	0.66	0.91	51.6
12	R	94	3.5	0.172	15.5	LOS C	0.6	4.5	0.59	0.89	53.2
Approach		131	4.2	0.172	16	LOS C	0.6	4.5	0.61	0.89	52.7
All Vehicles		1766	5.7	0.444	2.2	NA	0.6	4.5	0.06	0.12	91.4

SH1 / Peka Peka Rd (Incl Constr.) - AM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	98	8	0.056	12.7	LOS B	0	0	0	0.75	64.8
2	T	717	11.5	0.395	0	LOS A	0	0	0	0	100
Approach		815	11	0.395	1.5	LOS B	0	0	0	0.09	94.7
North: SH1 North											
8	T	829	9.6	0.452	0	LOS A	0	0	0	0	100
9	R	73	31.8	0.162	21.8	LOS C	0.8	7.1	0.72	0.93	53.7
Approach		903	11.4	0.452	1.8	LOS C	0.8	7.1	0.06	0.08	94.3
West: Peka Peka Rd											
10	L	68	37.7	0.213	23.9	LOS C	1	9.2	0.75	0.94	46.4
12	R	74	14.9	0.16	17	LOS C	0.6	4.6	0.62	0.9	52.1
Approach		142	25.8	0.213	20.3	LOS C	1	9.2	0.68	0.92	49.2
All Vehicles		1860	12.4	0.452	3.1	NA	1	9.2	0.08	0.15	89

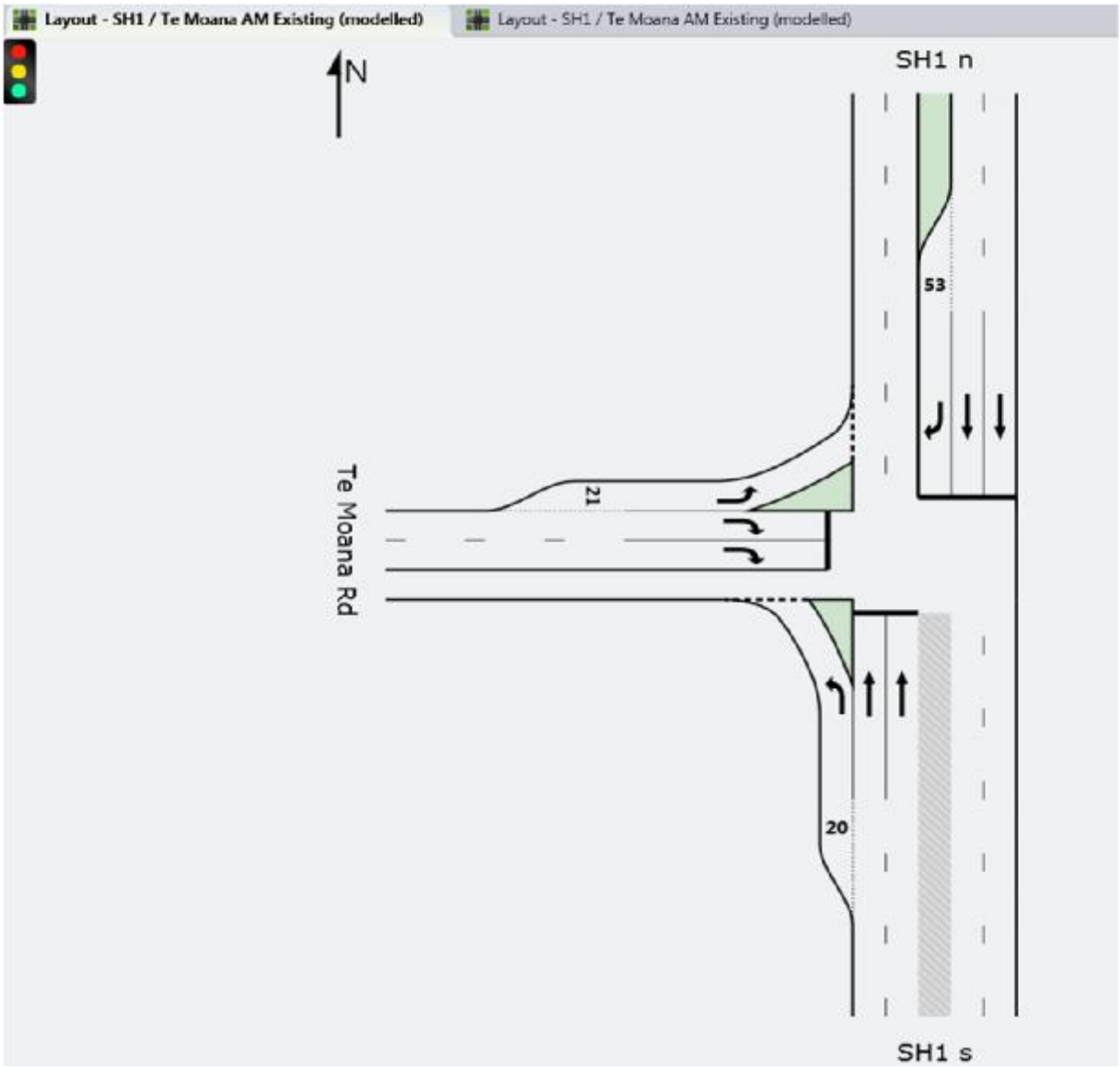
SH1 / Peka Peka Rd (Incl Constr.) - IP (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	79	12.7	0.046	12.9	LOS B	0	0	0	0.75	64.8
2	T	578	14.2	0.324	0	LOS A	0	0	0	0	100
Approach		657	14	0.324	1.6	LOS B	0	0	0	0.09	94.7
North: SH1 North											
8	T	544	13.9	0.304	0	LOS A	0	0	0	0	100
9	R	43	51.3	0.101	22.9	LOS C	0.5	5.1	0.68	0.92	53.8
Approach		588	16.7	0.304	1.7	LOS C	0.5	5.1	0.05	0.07	94.8
West: Peka Peka Rd											
10	L	53	45.8	0.147	21.9	LOS C	0.7	6.6	0.68	0.91	48.6
12	R	102	10.9	0.171	15.1	LOS C	0.6	4.8	0.52	0.87	54.1
Approach		156	22.9	0.171	17.4	LOS C	0.7	6.6	0.58	0.88	52.1
All Vehicles		1400	16.1	0.324	3.4	NA	0.7	6.6	0.08	0.17	87.8

SH1 / Peka Peka Rd (Incl Constr.) - PM (2016)
AS PRIORITY

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 South											
1	L	101	9.9	0.058	12.8	LOS B	0	0	0	0.75	64.8
2	T	836	5.5	0.444	0	LOS A	0	0	0	0	100
Approach		937	6	0.444	1.4	LOS B	0	0	0	0.08	95.2
North: SH1 North											
8	T	673	6.3	0.359	0	LOS A	0	0	0	0	100
9	R	51	43.5	0.16	26.3	LOS D	0.8	7.3	0.79	0.95	49.5
Approach		724	8.9	0.359	1.9	LOS D	0.8	7.3	0.06	0.07	94.2
West: Peka Peka Rd											
10	L	58	40.4	0.223	27.3	LOS D	1	9.6	0.8	0.96	43.7
12	R	99	7.9	0.199	16.6	LOS C	0.7	5.6	0.63	0.9	52.2
Approach		157	19.9	0.223	20.5	LOS D	1	9.6	0.69	0.92	48.7
All Vehicles		1817	8.4	0.444	3.2	NA	1	9.6	0.08	0.15	88.5

SH1 / Te Moana Road - SIDRA Modelling results (using SATURN flows)



SH1 / Te Moana Road - AM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	310	3.6	0.428	6.7	LOS A	2.3	16.7	0.27	0.6	42.9
2	T	778	11	0.427	15.3	LOS B	12.4	95.1	0.68	0.59	35.2
Approach		1088	8.9	0.428	12.9	LOS B	12.4	95.1	0.56	0.6	37.1
North: SH1 N											
8	T	1095	8.2	0.459	8.6	LOS A	13.5	101.3	0.54	0.49	40.1
9	R	52	2.1	0.367	51.6	LOS D	3.4	24	0.99	0.74	22.3
Approach		1147	7.9	0.459	10.6	LOS B	13.5	101.3	0.56	0.5	38.7
West: Te Moana Rd											
10	L	234	1.4	0.709	13.7	LOS B	5.4	38.1	0.37	0.7	37.8
12	R	430	2.1	0.529	40.4	LOS D	10.2	72.7	0.93	0.81	25.4
Approach		664	1.8	0.709	31	LOS C	10.2	72.7	0.73	0.77	28.7
All Vehicles		2899	6.9	0.709	16.1	LOS B	13.5	101.3	0.6	0.6	35.3

SH1 / Te Moana Road - IP (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	333	3.3	0.452	6.8	LOS A	2.5	17.8	0.29	0.61	42.8
2	T	678	13	0.377	14.9	LOS B	10.8	84.1	0.66	0.57	35.5
Approach		1011	9.8	0.452	12.2	LOS B	10.8	84.1	0.54	0.58	37.7
North: SH1 N											
8	T	717	12.5	0.308	7.5	LOS A	8.6	66.6	0.48	0.42	41.1
9	R	44	5	0.319	51.4	LOS D	2.9	21.1	0.98	0.74	22.4
Approach		761	12	0.319	10.1	LOS B	8.6	66.6	0.5	0.43	39.2
West: Te Moana Rd											
10	L	156	5	0.434	7.8	LOS A	2.3	16.5	0.3	0.62	42.1
12	R	289	5	0.363	39	LOS D	7.1	51.8	0.89	0.79	25.8
Approach		444	5	0.434	28.1	LOS C	7.1	51.8	0.69	0.73	29.9
All Vehicles		2217	9.6	0.452	14.7	LOS B	10.8	84.1	0.56	0.56	36.2

SH1 / Te Moana Road - PM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	398	1.1	0.477	6.6	LOS A	2.4	16.9	0.32	0.62	42.7
2	T	1042	5.1	0.552	16.7	LOS B	17	123.9	0.74	0.66	34.3
Approach		1440	4	0.552	13.9	LOS B	17	123.9	0.62	0.65	36.3
North: SH1 N											
8	T	883	5.7	0.364	7.9	LOS A	10.6	77.7	0.5	0.44	40.7
9	R	21	0	0.146	50.2	LOS D	1.4	9.8	0.96	0.7	22.7
Approach		904	5.6	0.364	8.9	LOS A	10.6	77.7	0.51	0.45	40
West: Te Moana Rd											
10	L	188	1.8	0.705	16.1	LOS B	5.3	37.7	0.44	0.73	36.2
12	R	277	3.2	0.343	38.8	LOS D	6.8	49	0.89	0.78	25.9
Approach		464	2.6	0.705	29.6	LOS C	6.8	49	0.7	0.76	29.3
All Vehicles		2809	4.3	0.705	14.9	LOS B	17	123.9	0.6	0.6	35.9

SH1 / Te Moana Road (Incl Constr.) - AM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	323	7.6	0.437	7.2	LOS A	2.9	21.7	0.33	0.62	42.5
2	T	778	11	0.427	15.3	LOS B	12.4	95.1	0.68	0.59	35.2
Approach		1101	10	0.437	13	LOS B	12.4	95.1	0.58	0.6	37.1
North: SH1 N											
8	T	1095	8.2	0.459	8.6	LOS A	13.5	101.3	0.54	0.49	40.1
9	R	78	34.3	0.67	55.4	LOS E	5.1	45.9	1	0.85	21.6
Approach		1173	9.9	0.67	11.7	LOS B	13.5	101.3	0.57	0.51	37.9
West: Te Moana Rd											
10	L	260	11.1	0.858	14.8	LOS B	6	45.9	0.47	0.72	37.1
12	R	443	5	0.556	40.7	LOS D	10.5	77	0.94	0.82	25.3
Approach		703	7.3	0.859	31.1	LOS C	10.5	77	0.77	0.78	28.7
All Vehicles		2977	9.3	0.859	16.8	LOS B	13.5	101.3	0.62	0.61	35

SH1 / Te Moana Road (Incl Constr.) - IP (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	347	7.1	0.466	7.2	LOS A	3	22.1	0.34	0.62	42.6
2	T	678	13	0.377	14.9	LOS B	10.8	84.1	0.66	0.57	35.5
Approach		1025	11	0.466	12.2	LOS B	10.8	84.1	0.55	0.59	37.7
North: SH1 N											
8	T	717	12.5	0.308	7.5	LOS A	8.6	66.6	0.48	0.42	41.1
9	R	66	39.7	0.589	54.6	LOS D	4.3	40.8	1	0.8	21.8
Approach		783	14.8	0.589	11.5	LOS B	8.6	66.6	0.52	0.45	38.2
West: Te Moana Rd											
10	L	172	18.4	0.554	8.1	LOS A	2.7	21.6	0.32	0.62	42
12	R	286	9.2	0.37	39.2	LOS D	7.1	53.4	0.89	0.79	25.8
Approach		458	12.6	0.555	27.5	LOS C	7.1	53.4	0.68	0.73	30.2
All Vehicles		2266	12.6	0.589	15.1	LOS B	10.8	84.1	0.57	0.57	36

SH1 / Te Moana Road (Incl Constr.) - PM (2016)
AS SIGNALS

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: SH1 S											
1	L	411	4.3	0.594	7.4	LOS A	3.4	25	0.41	0.64	42.3
2	T	1042	5.1	0.552	16.7	LOS B	17	123.9	0.74	0.66	34.3
Approach		1453	4.8	0.595	14	LOS B	17	123.9	0.65	0.65	36.3
North: SH1 N											
8	T	883	5.7	0.364	7.9	LOS A	10.6	77.7	0.5	0.44	40.7
9	R	47	54.8	0.449	54	LOS D	3.1	32.1	0.99	0.75	22
Approach		930	8.2	0.449	10.2	LOS B	10.6	77.7	0.52	0.46	39.1
West: Te Moana Rd											
10	L	213	13.5	0.9	15.7	LOS B	5.9	46	0.48	0.71	36.5
12	R	290	7.7	0.371	39.1	LOS D	7.1	53.3	0.89	0.79	25.8
Approach		503	10.2	0.899	29.2	LOS C	7.1	53.3	0.72	0.76	29.5
All Vehicles		2886	6.8	0.899	15.5	LOS B	17	123.9	0.62	0.61	35.7