Traffic Impact Assessment

Rangitikei District Council Industrial Plan Change

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Contents

List of Figures

List of Tables

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1 Introduction

WSP Opus has been engaged by Rangitikei District Council (RDC) to undertake a traffic impact assessment (TIA) for the approximately 217ha site identified in the Rangitikei District Plan Change. A proposed plan change requires a rezoning of this land from rural to industrial land use.

This TIA aims to identify any significant traffic issues on the existing road network surrounding the proposed RDC Plan Change Area *("the site")* as a result of the change in zoning. Specifically, the TIA will focus on the intersections between the local road network and the State Highway network in response to the feedback provided by NZTA. The traffic assessment has been undertaken primarily from capacity and safety viewpoints and also includes a safety assessment of the existing railway crossing on Makirikiri Road using KiwiRail's safety assessment process.

This TIA will be a component of an Assessment of Environmental Effects to support a Notice of Requirement and District Plan change process.

1.1 Project Purpose

The TIA focuses on the effects of additional traffic generation from the proposed plan change on the main arterial connections and associated intersections located within the immediate vicinity of the development. The assessment has focused on the following sites:

- Site 1: State Highway (SH) 1 intersection with Wings Line;
- Site 2: SH1 intersection with Makirikiri Road;
- Site 3: SH3 intersection with Makirikiri Road; and
- Site 4: SH3 intersection with Pukepapa Road.

The purpose of this report is to provide an overall understanding of the effects of the development potential on network performance under existing conditions to provide advice on roading network staging. It should be noted that the project scope does not include the identification and testing of potential network mitigation measures.

1.2 Project Scope

The scope of the TIA is:

- Confirm existing network conditions, including traffic volumes, travel patterns and crash history within the study area;
- Identify the trip generation potential and resulting forecast traffic growth from each stage of the proposed Industrial Zone development over the next 20 years (i.e. by 2039); and
- Use appropriate traffic modelling tools to assess the performance and lifespan of the current transportation infrastructure and identify if/when potential network deficiencies are likely to occur within the network.

1.3 Data Collected

This TIA has been developed using the following information sources:

- **Rangitikei District Council RAMM Database**

The RAMM database provides Annual Daily Traffic (ADT) and heavy vehicle figures for the local road network within the Rangitikei District (i.e. non State Highway roads). This has been used to estimate current traffic volumes and estimate historical traffic growth rates on the road network.

- **New Zealand Transport Agency's State Highway Traffic Volumes (2014-2018)**

NZTA's traffic data collection system used to establish Average Annual Daily Traffic (AADT) volumes, traffic composition and growth rates on State Highway 1 and 3. This has been used to estimate historical growth rates on the state highway network within the study area.

- **Traffic Turning Count Surveys**

Traffic turning counts at key sites of interest within the study area were undertaken on Thursday 19th September 2019. The data was used to identify peak hour traffic volumes for use in developing base models and forecasting traffic turning volumes following future development stages.

- **Trip Generation Rates**

Expected trip generation rates for industrial areas were determined with reference to industry recognised sources including the NZ Trips and Parking Database, the RTA Guide to Generating Traffic Developments, the US Institute of Transport Engineers (ITE) Trip Generation Handbook and NZTA's Research Report 453 (Trips and Parking Related to Land Use).

- **NZ Freight Demand Study**[1]

The National Freight Demand Study (2014) was reviewed to provide an indication of existing and future freight demands within the region, to provide a basis for estimating trip origins and destinations for future freight generated with the study area to inform trip distribution and assignment assumptions.

- **New Zealand Transport Agency's Crash Analysis System (CAS)**

Crash statistics at key locations of interest within the network were obtained from the Transport Agency's Crash Analysis System database (CAS).

1.4 Report Structure

This remainder of the report has been structured as follows:

- ***Section 2*** – Provides a summary of the existing road network and local transportation conditions, including traffic volumes, intersection layouts and local crash history;
- ***Section 3*** – Provides an outline of the anticipated industrial development staging and associated trip generation rates, including assumed trip distribution across the transport network;
- ***Section 4*** – Provides an outline of the findings of the traffic modelling process, including traffic modelling parameters, performance criteria, and intersection operational performance under existing and future network conditions; and
- ***Section 5*** – Provides a summary of the safety assessment of key intersections assessed within the TIA;
- ***Section 6*** – Provides a general outline of key recommendations relating to the future development of the transport network within the plan change site and surrounding areas; and
- ***Section 7*** – Provides a summary of the key study findings and general recommendations relating to future timing of infrastructure improvements on the road network.

[1] https://www.transport.govt.nz/assets/Uploads/Research/Documents/e8dbdbc206/National-Freight-Demand-Study-Mar-2014.pdf

2 Existing Conditions

This section of the report provides a description of the existing site and local transport network operations, as well as a description of the existing road network, intersection arrangements and road safety record within the sites of interest.

2.1 Site location

The site identified for the Proposed Plan Change is located to the south-east of Marton. The site includes the following lots: Pt Lot 2 DP 336499, Pt Lot 1 DP 11224, Pt Lot 2 DP 11224, Pt Lot 1 DP 10342, Lot 1 DP 82685, Pt Lot 4 Plan 25, Pt Lot 5 Plan 25, Pt Lot 6 Plan 25, Pt Lot 7 Plan 25, and Pt Lot 9 Deeds Plan 25.[2] The proposed site is located approximately 4 km southeast of the Marton town centre (refer to Figure 2-1).

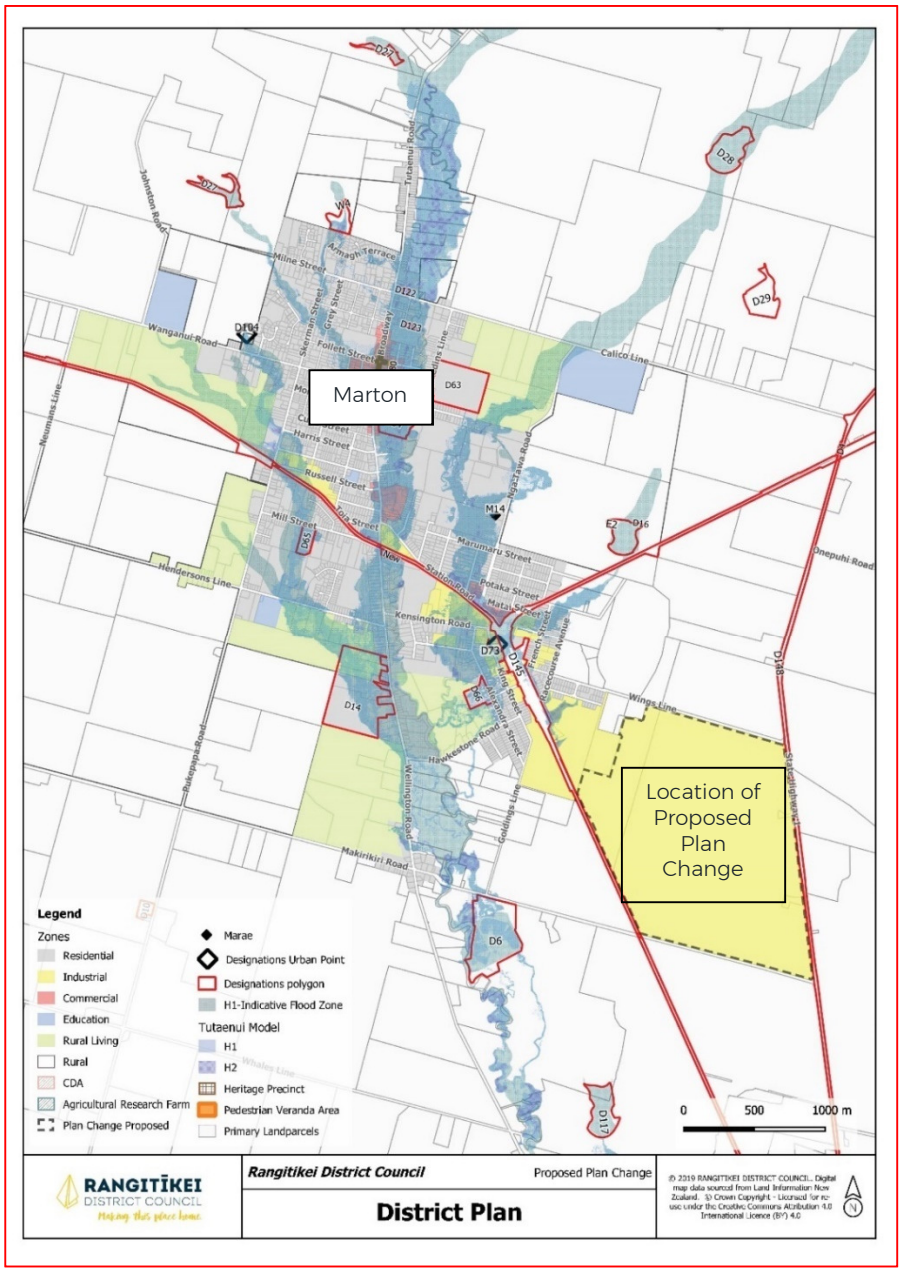

Figure 2-1 : Location of Rangitikei District plan change

[2] Draft District Plan Change Report for rezoning at 1165 State Highway 1, Marton

The site is bounded to the south by Makirikiri Road, a primary collector and key route between State Highway 1 (SH1) and Wellington Road (primary collector) which connects through the rural community of Crofton directly to the Marton town centre. The site is bounded to the west by the Marton-New Plymouth Line (MNPL), a freight only rail line and a secondary main line branching from the North Island Main Trunk Railway (NIMT). To the northwest lies industrial and rural uses.

Along the northern boundary of the site is Wings Line which provides an indirect link between State Highway 1 (SH1), industrial/residential areas and Marton town centre via French Street (secondary collector), Matai Street (secondary collector), Main Street (secondary collector), Station Road (secondary collector) and Wellington Road (primary collector).

The site is bounded to the east by SH1. Access points to SH1 within the immediate vicinity of the proposed plan change area are currently located at Wings Line and Makirikiri Road. For this TIA, it is understood that the two primary access points (aside from rail) onto SH1 will be Makirikiri Road and Wings Line.

2.2 Existing Land-Use

The land proposed for rezoning is currently zoned rural within the Rangitikei District Council's District Plan (see Figure 2-1). There are two small sites at 1091 and 1151 SH1, which are surrounded by the proposed site. These sites are zoned Rural but include residential dwellings. The zone change would involve changing 217 hectares of existing Rural Zone to Industrial Zone and amending District Plan Maps to reflect the change.

The site is surrounded by a combination of rural and industrial land use, with residential land uses also nearby. Very few community facilities are in the area as the site is located on the periphery of Marton, approximately 3.5km from the commercial town centre. A racecourse is located across Wings Line from the site.

There are 9 schools in the Marton area including Marton Junction School (2.5km) and Marton Junction Community Preschool (2.5km), Marton School (3.5km), Follett Street Kindergarten (3.9km) and Huntly School which is 5km from the site. All About Children Childcare is 3km and Bee Kids Childcare Centre 3.7km from the site. Other community amenities include the Lobby Youth Centre (3.5km), Marton Library (3.7km) Marton Skatepark (3.9km) and Marton Community Garden (4km).

2.3 Road Network

Key information about the road network surrounding the site is presented in **Table 2-2**. The road classification and Annual Average Daily Traffic (AADT) information was sourced from ONRC.

Table 2-1: Makirikiri Rd Traffic Counts and Estimates (Source: ONRC and TEAM Traffic)

	Percent %							ADT Total
Makirikiri Rd	**Cars**	**LCV**	**MCV**	**HCV1**	**HCV2**	**Bus**	**HV Vehs**	
SH1 to Goldings Line (Mar 2019)	86	2	7	3	3	0	13	1650
Goldings Line to Wellington Rd (Mar 2019)	81	2	10	4	3	0	17	1316
Wellington Rd to Pukepapa Rd – Estimate (Dec 2018)	77	4	0	10	9	0	19	638
Pukepapa Rd to Newmans Line (Mar 2019)	85	2	6	3	3	0	12	804
Newmans Line to Williamsons Line – Estimate (Apr 2019)	77	2	11	6	4	0	21	705
Williams Line to Union Line (Mar 2019)	85	2	6	3	3	0	12	532
Union Line to End of Bridge – Estimate (Dec 2018)	85	2	5	2	6	0	13	458
End of Bridge to SH3 – Estimate (Dec 2018)	61	1	26	4	8	0	38	428

Table 2-2 : Road Network Surrounding the Site

Existing Road Network	Information	Layout
Makirikiri Road	**ONRC[3] classification:** Primary Collector (SH1 to Wellington Rd **ONRC AADT:** • Between SH1 and Goldings Line: 1157 with 22% Heavy Vehicles (HV's) • Between Goldings Line and Wellington Rd: 1210 with no estimate of HV's **ONRC[4] classification:** Primary Collector (Wellington Rd to SH3) **ONRC AADT:** • Between Wellington Rd and Pukepapa Rd: 640 with 10% HV's • Between Pukepapa Rd and Williamsons Line: 500 with no estimate of HV's • Between Williamsons Line and Union Line: 540 with 10% HV's • Between union Line and End of Bridge: 324 with 23% HV's • End of Bridge to SH3: 145 with no estimate of HV's **Speed limit**: 100km/h **Cross section:** Two-way two lane with narrow shoulder *It should be noted that seal widening of Makirikiri Road was included in the 2018/19 road improvements plan.*	 *Figure 2-2: Makirikiri Rd looking east*  *Figure 2-3: Makirikiri Rd looking west*

[3] One Network Road Classification (ONRC) is a classification system, which divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available. https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/projects/onrc/

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Existing Road Network	Information	Layout
Wings Line	**ONRC classification:** Secondary Collector ONRC AADT: Between SH1 and the entrance to Malteurop: 427 with 10% HV's **Speed limit**: 100km/h **Cross section**: Two-way two lane with narrow shoulder	 *Figure 2-4: Wings Line looking east*
State Highway 1	**ONRC classification**: National (State Highway) ONRC AADT: Between Wings Line to just past Makirikiri Rd: 5780 with 18% HV's **Speed limit**: 100km/h **Cross section**: Two-way two lane with narrow shoulder	 *Figure 2-5: SH1 looking south*
Other roads in the vicinity of the site	**Goldings Line**: Secondary Collector, speed limit 70 km/h **Wellington Road**: Primary Collector, speed limit 70km/h Note: the above classification is based on the ONRC.	

Table 2-3: Existing Intersection Arrangements (source: Rangitikei District Council IntraMaps 2010 Aerial Imagery)

Wings Line / SH1	Makirikiri Road / SH1
Give Way Controlled T-junction Dedicated right-turn bay from SH1 North.	Give Way Controlled T-junction Dedicated left-turn auxiliary lane from SH1 provided. No dedicated right-turn bay from SH1 North.
	
Figure 2-6: Wings Line / SH1 Intersection	*Figure 2-7: Makirikiri Road / SH1 Intersection*

Pukepapa Road / SH3

Give Way Controlled T-junction

Dedicated right-turn bay from SH3 east.

Figure 2-8 Pukepapa Rd / SH3 Layout

Makirikiri Road / SH3

Give Way Controlled T-junction

No dedicated turning bays from SH3 onto Makirikiri Road.

Figure 2-9 Makirikiri Road / SH3 Intersection

2.4 Walking and Cycling

Since the area surrounding the site a rural in nature, there are no footpaths along Wings Line or Makirikiri Rd within the vicinity of the site. The closest footpath runs along the south side of Wings Line up to the entrance of Malteurop. Closer to the town centre there are footpaths along at least one side of the road and on many streets they are on both sides, particularly in closer proximity to the town centre.

There is currently limited dedicated cycling infrastructure within Marton or surrounding residential streets; however, at a regional level there are two segments of the Country Road Cycle Trail that connect in Marton. These cycle trails run on sealed and unsealed roads. The Mt. Curl cycle route from Hunterville to Marton (34km) and the Tangimoana cycle route which runs along the site boundary on Makirikiri Rd, from Marton to Tangimoana (55km)[5].

[5] The Country Road Cycle Routes

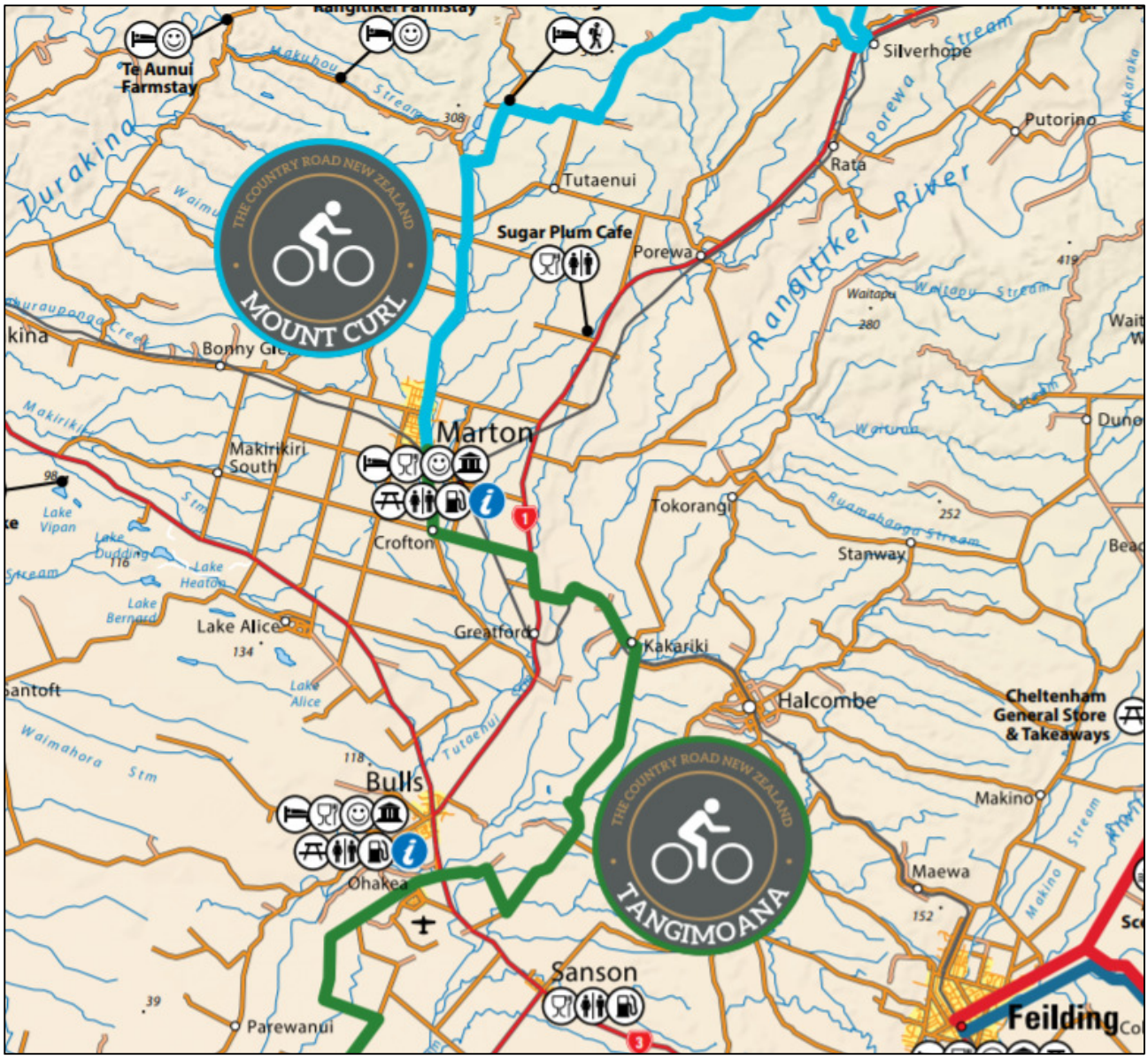

Figure 2-10: The Country Road Cycle Trail through Marton

In the *RDC Roading 2018-21 Programme Business Case & 2018-48 Activity Management Plan (AMP)*, encouraging the uptake of walking and cycling as transport modes and for recreation is listed as one of Council's strategic goals. Improvements identified in the plan include cycle lane markings radiating from schools in Hereford St and Bredins Line. Roads to be marked include; Wellington Rd High St to the Rail underpass, Broadway from Follett St to Bond St, and High St. The objective is to provide a safe lane to encourage cycling[6].

The Horizons Regional Council (HRC) Regional Land Transport Plan (RLTP) has also prioritised walking and cycling facilities.

In the AMP, 2.10.3.1 states that "council will ensure land use planning recognises potential impact on existing transport systems by ensuring new land use development includes provision for walking, cycling and public transport services consistent with relevant best practice guidance". It is also noted that encouraging walking and cycling provides positive benefits for health and efficient use of the transportation system.

[6] RDC Roading 2018-21 Programme Business Case & 2018-48 Activity Management Plan

2.5 Public Transport

Horizons Regional Council (HRC) currently operates a limited bus service to/from the Marton area to regional centres.

The public transport service to Wanganui follows SH1 to Makirikiri Road, Goldings Line, King Street, through Marton to Wanganui[7].

The Taihape/Wanganui service picks up in Marton at 10am and arrives Wanganui at 10:45am. The return trip departs Wanganui at 3:30pm and arrives in Marton at 4:15pm. This service runs the first Thursday of the month.

The Marton/Palmerston North Commuter service picks up in Marton at 7am and arrives in Palmerston North at 7:40am. The Palmerston North/Marton Commuter picks up in Palmerston North at 5:10pm and arrives in Marton at 5:50pm. Service runs Monday through Friday with no service on public holidays.

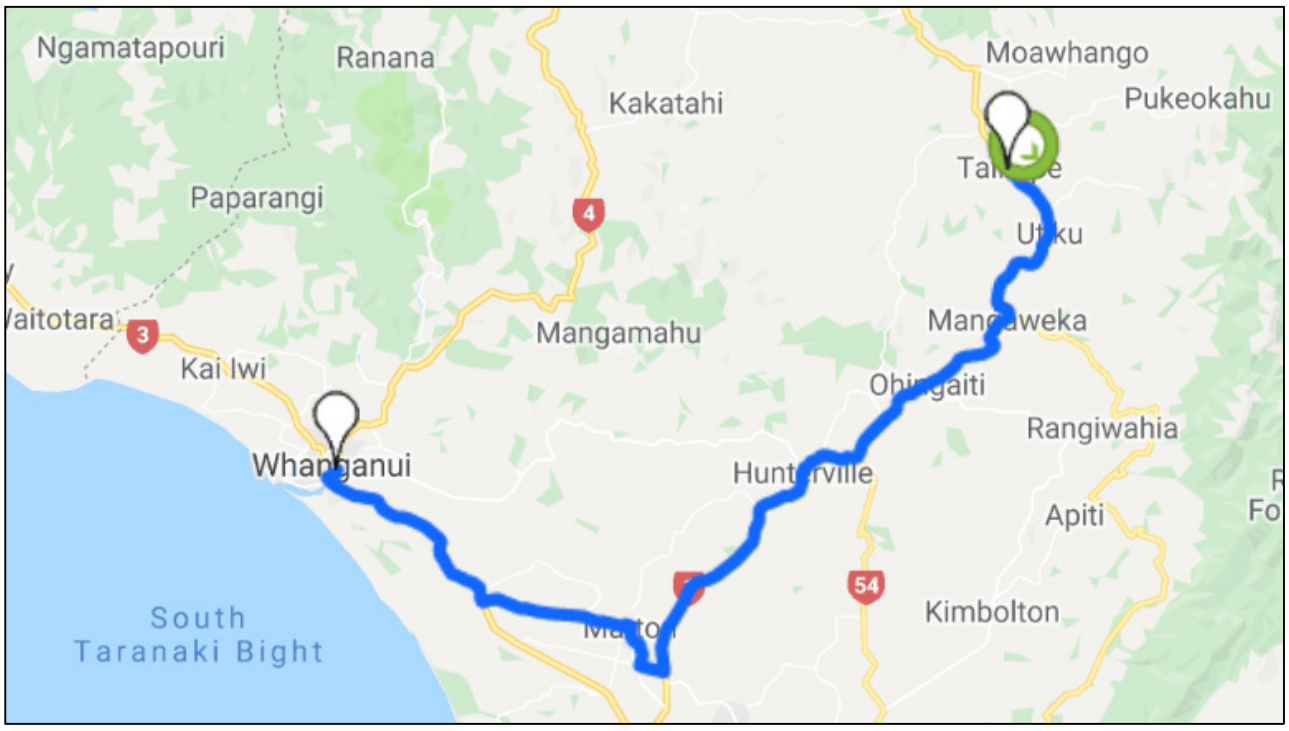

Figure 2-11 HRC bus transport past the site to Wanganui

2.6 Crash History

A review of the New Zealand Transport Agency Crash Analysis System (CAS) database has been undertaken to identify all reported crashes at key intersections within the study area within the past five full years (2014-2018). Crash records extracted from the CAS database are provided within Appendix D.

A total of 13 crashes have been recorded at these intersections over the past five years, of which 8 were injury crashes resulting 1 FSI (fatal and serious injury crashes) with 1 DSI (death and serious injury) casualty.

The location of all crashes within the study area is provided within Error! Reference source not found.. Analysis of the crash data at each intersection is discussed further within Section 5.

[7] Rangitikei Bus Service

Table 2-4 Crash History (2014-2018)

INTERSECTION	TOTAL CRASHES	TOTAL CASUALTIES			
		DEATH	SERIOUS	MINOR	TOTAL
Makirikiri Road / SH1	4	0	1	6	7
Wings Line / SH1	0	0	0	0	0
Makirikiri Road / SH3	4	0	0	5	5
Pukepapa Road / SH3	5	0	0	2	2

2.7 Existing Turning Traffic Data

A survey has been undertaken to obtain turning volumes at the following key intersections with the State Highway network surrounding the site:

- Makirikiri Rd / SH1
- Makirikiri Rd / SH3
- Pukepapa Rd / SH3
- Wings Line / SH1

The turning movement survey was completed on 19th September 2019, which was considered a fair representation of a typical day as it was during school period with fine weather.

To establish peak periods, the survey was undertaken between 6:30 – 18:15 with the peak AM and PM peak periods outlined in the tables below varying depending on the road segment. The traffic surveys included classified turning counts and recorded general traffic, heavy vehicles, buses and cyclists.

Based on the survey, it is found that generally, the AM peak hours are 7:30– 8:30 on Makirikiri Rd and Pukepapa intersections and 8:30 – 9:30 at Wings Line intersections. PM peak times on all intersections in the area was generally 16:30 – 17:30. The peak hours for the site will likely be when employees are turning up and departing. Without knowing shift patterns, the peak hours have been assummmed to coincide with typical commuter times, which aligns with the existing road peak hours.

The following tables summarise the traffic survey results in vehicles per hour for each of the key intersections during their respective AM peak hour, interpeak (IP) hour and PM peak hour. No cyclists were recorded at any of the intersections during the periods summarised in the tables below. Very few buses were recorded, they are included within the heavy commercial vehicle (HCV) columns in the summary tables below.

Table 2-5 Traffic survey results for Wings Line / SH1 intersection (vehicles per hour)

	AM		AM	IP		IP	PM		PM
	Cars	HCV	Total	Cars	HCV	Total	Cars	HCV	Total
SH 1 (North)	**90**	**31**	**121**	**152**	**27**	**179**	**144**	**28**	**172**
Thru to SH 1 (South)	89	31	120	149	27	176	143	26	169
Right into Wings Line	1	0	1	3	0	3	1	2	3
SH 1 (South)	**173**	**45**	**218**	**185**	**31**	**216**	**198**	**44**	**242**
Left into Wings Line	15	6	21	13	1	14	22	0	22
Thru to SH 1 (North)	158	39	197	172	30	202	176	44	220
Wings Line	**16**	**4**	**20**	**13**	**4**	**17**	**15**	**6**	**21**
Thru to SH 1 (South)	13	3	16	8	4	12	13	5	18
Left into SH 1 (North)	3	1	4	5	0	5	2	1	3
Grand Total	**279**	**80**	**359**	**350**	**62**	**412**	**357**	**78**	**435**

Table 2-6 Traffic survey results Makirikiri / SH1 intersection (vehicles per hour)

	AM		AM Total	IP		IP Total	PM		PM Total
	Cars	HCV		Cars	HCV		Cars	HCV	
SH 1 (North)	**94**	**38**	**132**	**155**	**29**	**184**	**152**	**33**	**185**
Thru to SH 1 (South)	92	36	128	154	28	182	152	32	184
Right into Makirikiri Rd	2	2	4	1	1	2	0	1	1
SH 1 (South)	**239**	**57**	**296**	**217**	**44**	**261**	**263**	**51**	**314**
Left into Makirikiri Rd	77	16	93	37	13	50	73	9	82
Thru to SH 1 (North)	162	41	203	180	31	211	190	42	232
Makirikiri Rd	**62**	**15**	**77**	**39**	**8**	**47**	**109**	**8**	**117**
Thru to SH 1 (South)	60	15	75	35	8	43	107	8	115
Left into SH 1 (North)	2	0	2	4	0	4	2	0	2
Grand Total	**395**	**110**	**505**	**411**	**81**	**492**	**524**	**92**	**616**

Table 2-7 traffic survey results for Makirikiri / SH3 intersection (vehicles per hour)

	AM		AM Total	IP		IP Total	PM		PM Total
	Cars	HCV		Cars	HCV		Cars	HCV	
Makirikiri Rd	**25**	**2**	**27**	**13**	**5**	**18**	**16**	**4**	**20**
Left into SH 3 (East)	1	0	1	0	0	0	0	0	0
Right into SH 3 (West)	24	2	26	13	5	18	16	4	20
SH 3 (East)	**192**	**36**	**228**	**168**	**41**	**209**	**262**	**30**	**292**
Thru to SH 3 (West)	192	36	228	168	41	209	261	30	291
Right into Makirikiri Rd	0	0	0	0	0	0	1	0	1
SH 3 (West)	**233**	**35**	**268**	**160**	**40**	**200**	**284**	**57**	**341**
Left into Makirikiri Rd	14	4	18	3	3	6	22	4	26
Right into SH 3 (East)	219	31	250	157	37	194	262	53	315
Grand Total	**450**	**73**	**523**	**341**	**86**	**427**	**562**	**91**	**653**

Table 2-8 Traffic surveys result for Pukepapa / SH3 intersection (vehicles per hour)

	AM		AM Total	IP		IP Total	PM		PM Total
	Cars	HCV		Cars	HCV		Cars	HCV	
Pukepapa Rd	**85**	**11**	**96**	**34**	**5**	**39**	**61**	**11**	**72**
Left into SH 3 (East)	83	10	93	31	4	35	59	9	68
Right into SH 3 (West)	2	1	3	3	1	4	2	2	4
SH 3 (East)	**226**	**50**	**276**	**214**	**46**	**260**	**352**	**36**	**388**
Thru to SH 3 (West)	177	40	217	174	39	213	248	29	277
Right into Pukepapa Rd	49	10	59	40	7	47	104	7	111
SH 3 (West)	**260**	**28**	**288**	**166**	**40**	**206**	**265**	**55**	**320**
Left into Pukepapa Rd	5	1	6	4	1	5	3	1	4
Right into SH 3 (East)	255	27	282	162	39	201	262	54	316
Grand Total	**571**	**89**	**660**	**414**	**91**	**505**	**678**	**102**	**780**

2.8 Background Traffic Growth

Both the future scenarios (with and without development) have assumed background traffic growth independent of the development of the site. This needs to be factored into future traffic estimates, as future traffic volumes on the State Highway network will not purely increase based on traffic generated by the proposed development.

From the most recent data extracted from the NZTA SH records, over the past five years, SH1 and SH3 have had an approximate baseline growth rate of 3-5% per annum (see Table 2-9).

Table 2-9: Historic Growth Rates – SH1 and SH3 (2014 to 2018)

SITE		HISTORIC VOLUMES					% HEAVY	ANNUAL GROWTH RATE
		2014	2015	2016	2017	2018		
State Highway 1	Mangaraupi	3,248	3,542	3,629	3,858	3,886	20.8	4.4%
	Greatford	4,638	4,769	5,027	5,339	5,381	18.7	3.8%
	Nth of Bulls	4,716	4,963	4,931	5,379	5,303	17.9	4.0%
State Highway 3	Makirikiri	5,626	6,094	6,486	6,615	6,502	12.3	3.3%
	Tutaenui Stream	6,738	7,186	7,283	7,617	7,826	9.1	3.2%

3 Future Network Conditions

This section of the report provides an outline of anticipated future network conditions following the development of the proposed industrial area.

It provides an outline of the assumptions relating to the proposed development, assumed future growth and staging scenarios used within the traffic models, assumed trip generation rates and trip distribution assumptions. Based on this, the future anticipated traffic volumes at each of the key intersections for each of the proposed stages of the development is also summarised.

3.1 Proposed Development

The site has been identified through work undertaken through the Accelerate 25 programme as a suitable location for supporting new large-scale industrial activities, such as timber processing, freight and logistics, in the Rangitikei District. No existing Industrial Zone land has been identified as suitable for this purpose therefore new Industrial Zoned land is required.

The Proposed Plan Change seeks to change the zoning from Rural to Industrial for the properties at and around 1165 State Highway 1, Marton. The purpose of the Plan Change is to enable new investment in industrial activities in Marton by providing additional land within the Industrial Zone. The area included within the Proposed Plan Change is outlined in a red line in Figure 3-1.

Figure 3-1 : Indicative Plan Change Area

A structure plan for the proposed industrial zone has not been developed; however, as a basis for this TIA assessment the following transport infrastructure is expected:

- All vehicle access into the site will be enabled through new connections to Makirikiri Road to the south and Wings Line to the north. A north-south roading connection linking Makirikiri Road and Wings Line is expected to be provided relatively early within the development;
- Connections to the railway line will be provided via rail sidings on the western extent of the site to support distribution of freight via the rail network;
- Direct vehicle access from the proposed development onto the State Highway will not be provided, rather access between the site and the State Highway within the immediate vicinity

of the proposed development will be maintained via the existing intersections at Makirikiri Road and Wings Line; and

- The area proposed for rezoning from rural to industrial includes approximately 217 hectares of land. To adhere with NZTA noise restrictions, a 100m buffer will be provided at the eastern edge of the site adjacent to State Highway 3 to adhere with the NZTA noise restrictions.

3.2 Site Traffic Generation

Trip generation associated with industrial activities within the Proposed Plan Change area have been determined using data from the following industry recognised guidelines:

- The New Zealand Trips and Parking Database (NZTPD);
- New South Wales and Traffic Authority publication – "Guide to Traffic Generating Developments" (RTA); and
- Institute of Transportation Engineers (ITE) – Trip Generation Manual (Ninth Edition).

These provide a range of trip generation rates based on the following trip generation factors:

Table 3-1: Sources of Trip Generation Rates for Industrial Areas

SOURCE	RATES
NZ Trips and Parking Data Base (2016)	GFA (m^2) Site Area (m^2)
US Institute of Transport Engineers (ITE) – Trip Generation Manual (98th Edition)	GFA (m^2) Site Area (m^2) Employees
RTA Guide to Trip Generating Developments	Employees

It is understood that the industrial area is likely to comprise a mix of warehousing and industrial, but in the absence of a structure plan or similar, there is limited certainty over split of uses are likely to be (i.e. the split between warehousing or industrial development)[8]. In the absence of a firm understanding of what this mix might be, rather than using Gross Floor Area (GFA) rates, this assessment has taken a conservative approach by using developable site area for larger industrial parks/zones.

Assessment of the peak hour trip generation rates per 100m^2 developable site area s is relatively consistent between the NZ Trips Database and the ITE[9], however, all day trips are slightly higher in the NZ Trips Database. As such, this assessment has used data from the NZ Trips Database data to be conservative.

The RTA and ITE trip generation manual provides an indication of the proportion of heavy vehicle traffic that could be generated during peak periods and all day trips from industrial based land-uses. These indicate that average freight volumes typically comprise between 8-12% of all day traffic, with the highest rates provided in the ITE being 20%. During peak periods, heavy vehicles comprise approximately 3.5% of all traffic movements in the AM peak hour and 4.1% of PM peak hour traffic movements. On this basis, it has been assumed 4% of peak period traffic is heavy vehicles, and 20% of all day traffic.

[8] Warehouse activities generally have a lower trip generation rate than general industrial activity.

[9] NZ Trip Database data was refined to focus on surveys of industrial parks exceeding 100,000m^2, extracting the average trip generation rates based on developable site area.

On the basis of the above, the trip generation rates established within the traffic impact assessment are outlined within Table 3-2.

Table 3-2 Proposed Trip Generation Rates for the Industrial Zone

TRAFFIC TYPE	VEHICLE MOVEMENTS PER 100 M² DEVELOPABLE SITE AREA		
	AM PEAK	PM PEAK	DAILY
Light vehicles	0.21	0.22	1.87
Heavy vehicles	0.01	0.01	0.39
Total Vehicles	0.22	0.23	2.26

The proposed direction splits of inbound and outbound traffic are outlined within Table 3-3. Separate directional splits have been used for light (staff) and heavy (truck) traffic. Staff working patterns predominantly involve inbound trips in the AM peak and outbound trips in the PM peak. Operational traffic associated with the proposed industrial uses at the site is less tidal with trucks arriving and departing more evenly throughout the day.

Table 3-3 Proposed Trip Generation Directional Splits

TIME PERIOD	STAFF TRIPS		OPERATIONAL TRIPS	
	In	Out	In	Out
AM Peak	85%	15%	65%	35%
PM Peak	15%	85%	35%	65%
Daily	50%	50%	50%	50%

The proposed zoning area comprises 217 hectares (or 2,170,000m^2) of land. To establish the total traffic generated by the proposed industrial zone, the total developable site area has been determined through the following assumptions:

- Approximately 17 hectares of land will be included within the 100m "exclusion zone" on the eastern boundary of the site, leaving 200 hectares (or 2,000,000m^2) of site area.
- Of land not included within the "exclusion zone", it is assumed that 30% area will be required for the development of the roading reserve and other supporting infrastructure, leaving 70% net developable site area (approx. 1,400,000m^2)[10].
- Given limited access to alternative transport options, it is assumed that all staff travelling to the site will use private cars to access the site, and none of the traffic generated by the site will use walking and cycling, or public transport.
- No reduction in freight traffic resulting from the presence of the rail siding has been accounted for in the trip generation rates[11], providing a conservative approach to assessing the potential trip generation from the industrial zone.

Using the proposed developable site area of 1,400,000m^2 (70% developable area) and the proposed inbound/outbound directional splits, the trip generation rates resulting from the full development of the proposed industrial zone is shown in Table 3-4 below.

[10] This assumption remains consistent with other transport assessments for industrial areas, including the Palmerston North NEIZ and Silverdale West Industrial Area. https://www.aucklandcouncil.govt.nz/have-your-say/topics-you-can-have-your-say-on/silverdale-west-dairy-flat-industrial-area-structure-plan/docsconsultation/integrated-transport-assessment.pdf

[11] It is appreciated that the railway line and proposed sidings will be a key asset for the development, and would likely be a key attraction for compatible industrial operations. This has the potential to reduce external vehicle trip generation from the industrial zone; however, without knowing the likely occupants of the site, it is difficult to forecast trip reduction rates with certainty.

The assessment indicates the full development has a trip generation potential of 3,000-3,200 vehicle trips during each peak hour[12] and 31,500 all day vehicle trips (during a typical weekday).

Table 3-4 Proposed Trip Generation – Full Development

TRAFFIC TYPE	AM PEAK			PM PEAK			ALL DAY
	In	Out	Total	In	Out	Total	Total
Light Vehicles	2,190	730	2,920	530	2,490	3,020	26,200
Heavy Vehicles	100	50	150	70	120	190	5,400
Total Vehicles	2,290	780	3,070	600	2,610	3,210	31,500

3.3 Development Staging

Although it is acknowledged that development within the industrial area will be based on market forces and may have periods of accelerated or slower development the future year assessments assume linear growth in development over the next 20 years (by 2039).

On this basis, the following scenarios have been tested within the future forecast traffic models:

- **Scenario 1: 2024** – 25% developed;
- **Scenario 2: 2029** – 50% developed; and
- **Scenario 3: 2039** – 100% developed.

Based on the trip generation rates established within Section 3.2, Table 3-5 to Table 3-7 summarises the forecast trip generation for each stage of the proposed Plan Change development.

Table 3-5 Trip generation Year 5 (source: Economic Impact Assessment, Visser, 2019)

25% Development – Site Area	AM PEAK			PM PEAK			ALL DAY
	In	Out	Total	In	Out	Total	Total
Light Vehicles	560	190	740	130	640	770	6,500
Heavy Vehicles	30	10	40	20	30	50	1,600
Total Vehicles	590	200	790	150	670	820	8,100

Table 3-6 Trip generation Year 10 (source: Economic Impact Assessment, Visser, 2019)

50% Development – Site Area	AM PEAK			PM PEAK			ALL DAY
	In	Out	Total	In	Out	Total	Total
Light Vehicles	1,000	330	1,330	240	1,140	1,380	11,770
Heavy Vehicles	50	20	70	30	60	90	2,630
Total Vehicles	1,050	350	1,400	270	1,200	1,470	14,400

Table 3-7 Full Development trip generation Year 20 (source: Economic Impact Assessment, Visser, 2019

100% Development – Site Area	AM PEAK			PM PEAK			ALL DAY
	In	Out	Total	In	Out	Total	Total
Light Vehicles	2,190	730	2,920	530	2,490	3,020	26,200
Heavy Vehicles	100	50	150	70	120	190	5,400
Total Vehicles	2,290	780	3,070	600	2,610	3,210	31,500

[12] RTA guidelines provide guidance on estimating employee numbers for industrial land uses of 28 employees per hectare, equating to potentially 4,000 employees within the fully developed site. Assuming 70% of staff employed within the industrial zone arrive to work by car during peak hours, this would align with the trip generation rates outlined above (approx. 3,000 peak hour trips). On this basis, the proposed trip generation rates appear reasonable for the purpose of this assessment.

3.4 Trip Distribution

In the absence of a wider strategic model for the region, to establish future traffic volumes at each intersection traffic generated during peak periods have been allocated to the network on a "first principles" basis.

The traffic distribution to and from the industrial zone has been based on routes for light and heavy vehicles to access the site. Two distributions have been identified as follows:

3.4.1 Staff trips

The Economic Impact Assessment (Visser, 2019) has been used as a basis for estimating trip distributions for employees generated by the site. This has been determined from existing working population within surrounding territorial local authorities (TLAs) adjusted to reflect more originating proportionately from Rangitikei.

A summary of the staff traffic distribution is provided in Table 3-8.

Table 3-8 Staff Traffic Distribution

STAFF ORIGIN (TLA)	ARRIVAL	DIRECTION	ROUTE CHOICE
Whanganui District	20%	North-West	Makirikiri Road
Palmerston North City	37%	South-East	SH1 and Makirikiri Road
Manawatu District	11%	South-East	SH1 and Makirikiri Road
Rangitikei District	22%	South and North	Makirikiri Road or Wings Line
Horowhenua District	10%	South	SH1 and Makirikiri Road

3.4.2 Operational Trips

Without knowing the exact nature of industry located within zone, the trip origins and destinations for operational traffic has been projected using existing and forecast regional freight demand established from the National Freight Demand Study (2014). The Study indicates changes in future freight demands compared with current distribution patterns, thus an incremental change in traffic distribution has been applied across the scenarios (see Table 3-9).

Table 3-9 Operational Traffic Distribution

YEAR	NORTH	SOUTH	WEST
2012	6%	50%	44%
2039	4%	49%	47%
Route	Wings Line -> SH 1	Makirikiri Road -> SH 1	Makirikiri Rd -> SH 3

The distribution of operational traffic has been based on the following assumptions:

- Westbound freight will favour Makirikiri Road over Wings Line to avoid travel through Marton;
- 50% of freight travelling to/from the Manawatu-Whanganui region travels to/from Whanganui.
- Northbound freight will use Wings line / SH1 and southbound will use Makirikiri Road / SH1

3.4.3 Trip Assignment

The resulting traffic flows based on the trip distribution outlined above were assigned to the network to provide future forecast turning demands at intersections for modelling purposes (see Appendix C). The timing of delivering the internal road network will heavily influence distribution patterns across the network. It should be noted that the distribution patterns developed within this assessment assume a complete north-south route is provided through the site in all scenarios.

Two westbound scenarios have been tested – one with all westbound traffic using Makirikiri / SH3 intersection and one assuming all use the Pukepapa/SH3 intersection to travel between Whanganui and the site.

3.5 Intersection Modelling Scenarios

The traffic operation assessment considers the current and future capacity of the existing and proposed intersections around the site, taking into account the traffic distribution and development growth assumptions contained in the previous sections.

The intersections considered in the assessment include:

- Makirikiri Road / SH1
- Wings Line / SH1
- Pukepapa Road / SH3
- Makirikiri Road / SH3

The performance of each of the intersections has been modelled for both the AM and PM peak periods under the following scenarios:

Table 3-10: Traffic Modelling Scenarios Tested

SCENARIOS	DESCRIPTION	YEARS
Existing Scenario ("Base Case")	Under this scenario no development has occurred and existing traffic volumes are used.	2019
Future Scenarios (No Development)	Assessment of future network performance, assuming no development has not taken place and therefore no development traffic is included. An underlying traffic growth of 4% p.a. is included based on SH1 traffic growth rates.	2024, 2029, 2039
Future Scenarios (With Development)	Assessment of future network performance, assuming development as taken place. Includes development traffic and background traffic growth of 4% p.a. based on SH1 traffic growth rates.	2024, 2029, 2039

3.5.1 Forecast Intersection Volumes

Both the future scenarios with and without development have assumed background traffic growth independent of the site. This needs to be factored into future traffic estimates, as future traffic volumes will not purely increase based on traffic generated by the proposed development.

From the most recent data extracted from the NZTA SH records, (see Table 2-9), a 4% linear traffic growth per year has been assumed for all affected roads for future scenarios.

Based on the trip generation rates for each stage of development (outlined within Section 3.2) and the proposed trip distribution and assignment (outlined within Section 3.4), the forecast peak hour traffic turning volumes for development traffic for both peak hour periods are outlined in Appendix C.

These future forecast traffic volumes have been used within the traffic modelling exercise to assess the performance of intersections under future network conditions (discussed in Section 4.2).

4 Assessment of Effects

This section of the report provides an outline of the assessment approach, the findings of the base modelling exercise and the expected performance of the network under future network conditions.

4.1 Assessment Approach

4.1.1 Modelling Tools

SIDRA v8.0 is an industry standard traffic modelling tool that is used to assess the performance of isolated intersections. Base traffic models (2019) for the AM peak, inter-peak and PM peak periods were developed using the recorded turning count data.

Future forecast traffic models were developed for each of the intersections using background traffic growth and proposed trip generation rates / distribution assumptions outlined within Section 3.24.2. Traffic models have been developed for each of the proposed stages of development to assess the incremental effects of the proposed development staging. The assumptions and observations used to develop the base model were applied within the future development scenarios to determine intersection performance under both weekday AM peak, inter-peak and PM peak conditions.

4.1.2 Modelling Assumptions

The following input assumptions have been made within the SIDRA model:

- **Peak Flow Factor**: Calibrated based on 2019 intersection turning count data;
- **Flow Scale (Constant)**: 100% on all models;
- **Lane Utilisation Factors**: Calculated by SIDRA;
- **Gap Acceptance**: As per SIDRA standard parameters for priority controlled intersections;
- **Approach Speeds**: Approach and exit speeds based on existing posted speeds; and
- **Lane Widths**: Approach lane widths have been input as per existing arrangements.

4.1.3 Performance Criteria

The purpose of the modelling exercise is to identify the performance of intersections under future conditions, and identify if/where mitigation maybe required. The following performance criteria has been used to assess if/when network deficiencies may occur within the network:

- **Level of Service (LoS)**: Average Level of Service (delay) on any approach arm is E or below, or an individual movement operates at a LoS F (see **Table 4-1**);

Table 4-1: Level of Service (LoS) Assessment Criteria – Average Delay (seconds)

Level of Service	Lower (secs)	Upper (secs)
A	0	10
B	10.1	15
C	15.1	25
D	25.1	35
E	35.1	50
F	50.1+	

- **Degree of Saturation**[13]**:** Intersection reaches practical spare capacity (i.e. v/c ratio > 85%); and

[13] The degree of saturation is a ratio of traffic volume over capacity (v/c). It is measurement of the operating capacity of a roadway or intersection where the number of vehicles passing through is divided by the number of vehicles that could theoretically pass through when at capacity. If v/c is greater than 85%, it is considered that the approach is suffering from traffic congestion with queues of vehicles starting to form.

- **Maximum Queue Lengths:** Queue lengths impede on the performance of other intersections.

A full set of modelling results is set out in Appendix C for all scenarios.

4.2 Modelling Results

4.2.1 Base Model Operations

Makirikiri Road / State Highway 1

The existing intersection layout modelled within SIDRA is shown within Figure 4-1. The model layout represents how traffic use the intersection, not necessarily lane marking. For example, Makirikiri Road at SH1 is wide and therefore traffic use it as a two-lane approach even though it is marked as a single lane approach.

The results of the intersection performance under existing 2019 network conditions for both the AM and PM peak periods is shown within Table 4-2. The assessment indicates that the intersection operates well within practical spare capacity and with minor delay during both peak periods.

Table 4-2: Makirikiri Road / SH1– Base Model Intersection Performance (2019)

APPROACH		AM PEAK (08:00-09:00)				PM PEAK (16:45-17:45)			
		V/C	Average Delay (s)	Level of Service	Max Queue (m)	V/C	Average Delay (s)	Level of Service	Max Queue (m)
NORTH SH1	Through	0.091	4.2	A	0.7	0.119	4.1	A	0.1
	Right	0.091	10.6	B	0.7	0.119	9	A	0.1
	Approach	**0.091**	**4.5**	**A**	**0.7**	**0.119**	**4.1**	**A**	**0.1**
Makirikiri Rd	Left	0.004	7.3	A	0.2	0.002	6.2	A	0.1
	Right	0.120	9.7	A	3.9	0.151	9.4	A	4.4
	Approach	**0.120**	**9.6**	**A**	**3.9**	**0.151**	**9.3**	**A**	**4.4**
SOUTH SH1	Left	0.052	5.8	A	0	0.037	5.6	A	0
	Right	0.128	4.1	A	0	0.119	4.1	A	0
	Approach	**0.128**	**4.6**	**A**	**0**	**0.119**	**4.5**	**A**	**0**

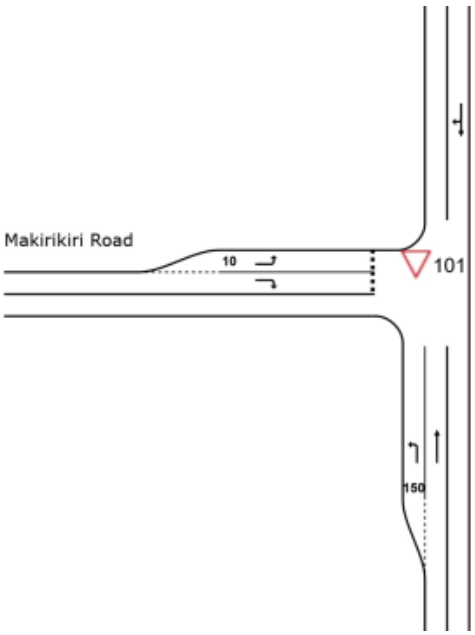

Figure 4-1: Makirikiri Road / SH1 SIDRA Intersection Layout

Wings Line / State Highway 1

The existing intersection layout modelled within SIDRA is shown within Figure 4-2. The model layout represents how traffic use the intersection, not necessarily lane marking. For example, Wings Line at SH1 is wide and therefore traffic use it as a two-lane approach even though it is marked as a single lane approach.

The results of the intersection performance under existing 2019 network conditions for both the AM and PM peak periods is shown within Table 4-3. The assessment indicates that the intersection operates well within practical spare capacity and with minor delay during both peak periods.

Table 4-3: Wings Line / SH1– Base Model Intersection Performance (2019)

APPROACH		AM PEAK (08:00-09:00)				PM PEAK (16:45-17:45)			
		V/C	Average Delay (s)	Level of Service	Max Queue (m)	V/C	Average Delay (s)	Level of Service	Max Queue (m)
NORTH SH1	Through	0.077	4.3	A	0	0.110	4.2	A	0
	Right	0.003	7.2	A	0.1	0.001	6.4	A	0
	Approach	**0.077**	**4.4**	**A**	**0.1**	**0.110**	**4.2**	**A**	**0**
WINGS LINE	Left	0.007	6.7	A	0.2	0.005	7.3	A	0.2
	Right	0.028	8.9	A	0.2	0.029	9.4	A	0.8
	Approach	**0.028**	**8.3**	**A**	**0.8**	**0.029**	**8.9**	**A**	**0.8**
SOUTH SH1	Left	0.011	5.7	A	0	0.014	5.5	A	0
	Right	0.121	4.2	A	0	0.107	4.2	A	0
	Approach	**0.121**	**4.3**	**A**	**0**	**0.107**	**4.4**	**A**	**0**

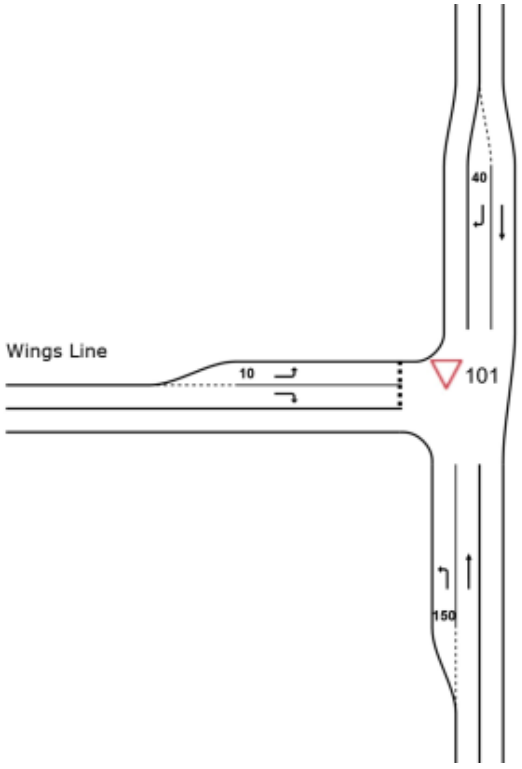

Figure 4-2: Wings Line / SH1 SIDRA Intersection Layout

Makirikiri Road / SH3

The existing intersection layout modelled within SIDRA is shown within Figure 4-3. The model layout represents how traffic use the intersection, not necessarily lane marking. For example, Makirikiri Road approach at SH3 is wide and therefore traffic use it as a two-lane approach even though it is marked as a single lane approach.

The results of the intersection performance under existing 2019 network conditions for both the AM and PM peak periods is shown within Table 4-4. The assessment indicates that the intersection operates well within practical spare capacity and with minor delay during both peak periods.

Table 4-4: Makirikiri Road / SH3– Base Model Intersection Performance (2019)

APPROACH		AM PEAK (08:00-09:00)				PM PEAK (16:45-17:45)			
		V/C	Average Delay (s)	Level of Service	Max Queue (m)	V/C	Average Delay (s)	Level of Service	Max Queue (m)
EAST SH1	Through	0.139	0	A	0.1	0.147	0	A	0.1
	Right	0.139	6.6	A	0.1	0.147	6.9	A	0.1
	Approach	**0.139**	**0**	**A**	**0.1**	**0.147**	**0**	**A**	**0.1**
MAKIRIKIRI RD	Left	0.001	6.3	A	0	0.001	6.5	A	0.1
	Right	0.036	8.7	A	0.9	0.021	8.2	A	0.5
	Approach	**0.036**	**0.5**	**A**	**0.9**	**0.021**	**8.1**	**A**	**0.5**
WEST SH1	Left	0.155	5.9	A	0	0.186	5.8	A	0
	Right	0.155	0	A	0	0.186	0	A	0
	Approach	**0.155**	**0.5**	**A**	**0**	**0.186**	**0.5**	**A**	**0**

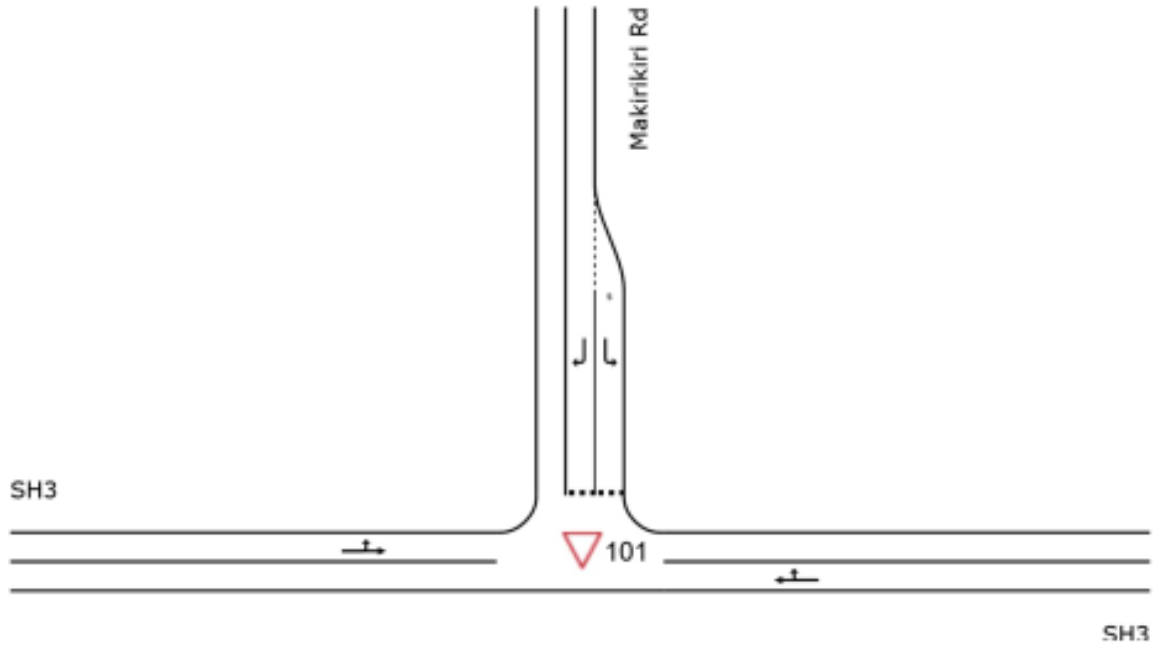

Figure 4-3: Makirikiri Road / State Highway 3 SIDRA Intersection Layout

Pukepapa Road / SH3

The existing intersection layout modelled within SIDRA is shown within Figure 4-4. The model layout represents how traffic use the intersection, not necessarily lane marking. For example, Pukepapa Road approach at SH3 is wide and therefore traffic use it as a two-lane approach even though it is marked as a single lane approach.

The results of the intersection performance under existing 2019 network conditions for both the AM and PM peak periods is shown within Table 4-5. The assessment indicates that the intersection operates well within practical spare capacity and with minor delay during both peak periods.

Table 4-5: Pukepapa Road / SH3– Base Model Intersection Performance (2019)

APPROACH		AM PEAK (08:00-09:00)				PM PEAK (16:45-17:45)			
		V/C	Average Delay (s)	Level of Service	Max Queue (m)	V/C	Average Delay (s)	Level of Service	Max Queue (m)
EAST SH3	Through	0.148	0	A	0	0.141	0	A	0
	Right	0.047	7.2	A	1.4	0.115	7.2	A	3.3
	Approach	**0.148**	**1.1**	**A**	**1.4**	**0.141**	**2.3**	**A**	**3.3**
PUKEPAPA RD	Left	0.071	7.3	A	2.0	0.073	7.2	A	1.9
	Right	0.007	15.3	C	0.2	0.016	14.4	B	0.4
	Approach	**0.071**	**7.5**	**A**	**2.0**	**0.073**	**7.8**	**A**	**1.9**
WEST SH3	Left	0.003	6.4	A	0	0.003	5.5	A	0
	Right	0.152	0	A	0	0.176	0	A	0
	Approach	**0.152**	**0.1**	**A**	**0**	**0.176**	**0.1**	**A**	**0**

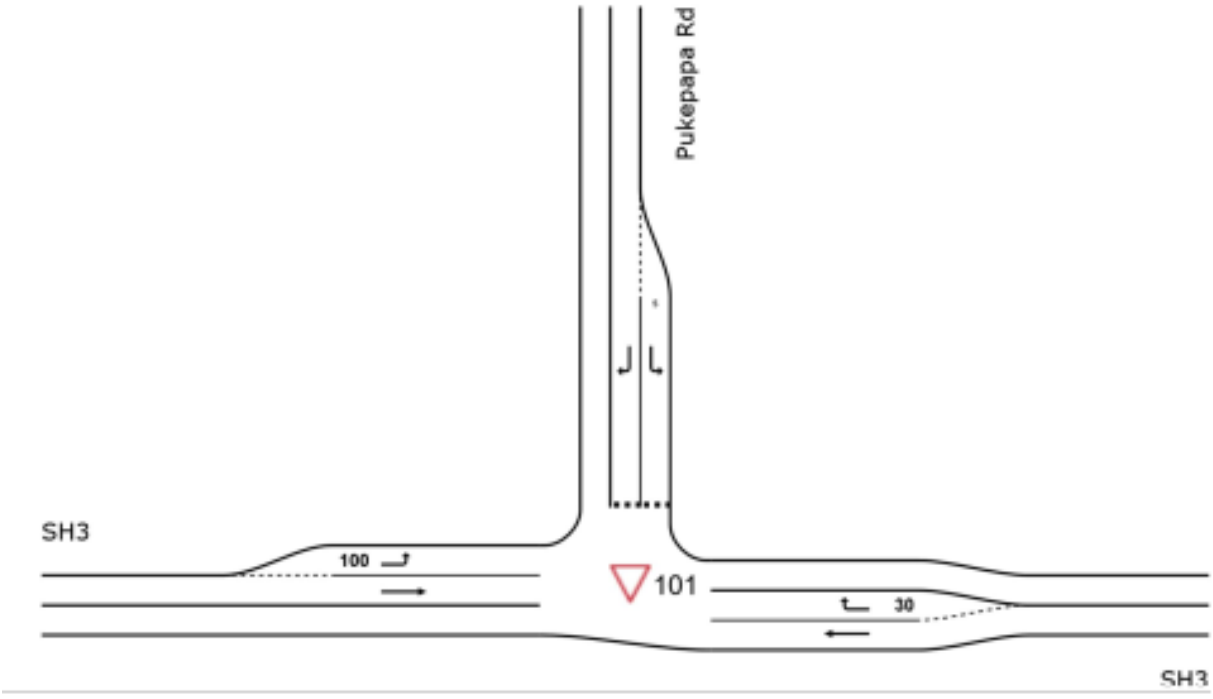

Figure 4-4: Pukepapa Road / State Highway 3 SIDRA Intersection Layout

4.2.2 Future Network Operations

The capacity and performance of the key intersections surrounding the site has been modelled for the future scenarios as discussed in the previous section. The LoS predictions for each intersection established from the outcomes of the modelling under each scenario are summarised Table 4-6. The following provides detail on the operation of each of the four intersections, under each development scenario.

Makirikiri Road / SH1

The modelling shows that the intersection operates well within acceptable operability in existing conditions and within 20 years of general traffic growth.

If the development traffic is included this causes a LoS of F on Makirikiri Road and on the SH1 southbound approach. This poor LoS is caused by:

- Right turning vehicles blocking through traffic in the southbound direction on SH1 because of the high volume of traffic left turning off SH1 that they give-way to, and
- The high volume of traffic wanting to right turn out of Makirikiri Road resulting in high delays for this movement. The average delay in the peak can reach as much as 60 minutes on the Makirikiri Road.

A right turn bay on SH1 would improve the LoS for the SH1 southbound movement to LoS A but the Makirikiri Road right turn out movement would likely need a more significant change of form to improve the LoS, such as a seagull type treatment, roundabout, or signals.

Wings Line / SH1

The Modelling shows that the intersection operates well within acceptable operability in existing conditions and within 20 years of general traffic growth.

If the Development traffic is included this causes a LoS of E in the AM peak on the Wings Line approach with an average delay of 38secs and LoS F in the PM peak. This modelling assumes right turn traffic from Wings Line give-way to some traffic left turning off SH1.

The LoS E and F may be reduced by providing more delineation between the traffic left turning off SH1 and those travelling through much like that provided at the Makirikiri Road intersection. Some peak spreading may occur that will minimise the average delays further, so its possible Wings Line will need little or no upgrade. However, delays are expected to be significant at the Makirikiri Road / SH1 intersection and therefore some rerouting to the Wings Line right turn onto SH1 is likely. Therefore, addressing delays at the Makirikiri Road / SH1 intersection will be important to ensure the Wings Line intersection operates acceptably.

Makirikiri Road / SH3

The Modelling shows that the intersection operates well within acceptable operability in existing conditions and within 20 years of general traffic growth. Makirikiri Road is the only approach that is not an A in the 20-year growth scenario, which has a LoS of B.

With development traffic the intersection will operate with LOS F on Makirikiri Road in all periods. This is because of the increase in traffic turning out of Makirikiri Road causing delays for this movement but also the lack of turning facilities on SH3 meaning it is not clear to Makirikiri Road traffic who they should give way to (i.e. cannot distinguish between traffic left turning into Makirikiri Road and traffic travelling straight.).

It should be noted, that this is a worse case traffic operation as this scenario assumes all SH3 bound traffic use Makirikiri Road. Traffic will likely use multiple routes including Pukepapa Road, therefore monitoring of the intersections will be necessary to determine which if any will require upgrade.

Pukepapa Road / SH3

The Modelling shows that the intersection operates well within acceptable operability in existing conditions (with no development) and with 20 years of general traffic growth.

If the development traffic is included the SH3 eastern approach will have a LoS of F in the PM peak, as well as the AM peak and a LoS of C on the Pukepapa Road approach. Pukepapa Road approach sees an average delay of 39.8secs in the AM peak. The SH3 western approach maintains a LoS of A across all peaks.

It should be noted, that this is a worse case traffic operation as this scenario assumes all SH3 bound traffic use Pukepapa Road. Traffic will likely use multiple routes including Makirikiri Road, therefore monitoring of the intersections will be necessary to determine which if any will require an upgrade.

Wings Line / Access Road

The access road connection with Wings Line was modelled to test the operation of a typical priority-controlled intersection. It operates at LoS A in all periods.

Table 4-6 : Summary of Modelling Results for Key Intersections.

Scenario	Base Case: 2019 - existing		Base Case + 5 Year Growth		Base Case + 5 Year Growth + Development		Base Case + 10 Year Growth		Base Case + 10 Year Growth + Development		Base Case + 20 Year Growth		Base Case + 20 Year Growth + Development	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Makirikiri Road / SH1														
SH1 (North)	A	A	A	A	A	A	A	A	A	A	A	A	F	A
Makirikiri Road	A	A	B	B	C	D	B	B	F	F	C	A	F	F
SH1 South	A	A	A	A	A	A	A	A	C	A	A	C	A	A
Makirikiri Road / SH3														
SH3 (East)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Makirikiri Road	A	A	A	A	B	B	B	B	B	C	B	B	F	F
SH3 (West)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wings Line / SH1														
SH1 (North)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wings Line	A	A	A	B	B	A	B	B	A	A	B	C	E	F
SH1 south	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Pukepapa Road / SH3														
SH3 (East)	A	A	A	A	A	A	A	A	A	A	A	A	F	C
Pukepapa Road	A	A	A	A	B	D	A	A	C	F	A	A	F	F
SH3 (West)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wings Line / Access Road														
SH3 (East)	n/a	n/a	n/a	n/a	A	A	n/a	n/a	A	A	n/a	n/a	A	A
Pukepapa Road	n/a	n/a	n/a	n/a	A	A	n/a	n/a	A	A	n/a	n/a	A	A
SH3 (West)	n/a	n/a	n/a	n/a	A	A	n/a	n/a	A	A	n/a	n/a	A	A

4.3 Wider Considerations

4.3.1 Walking and Cycling

The proposed plan change is not anticipated to significantly affect demand for walking and cycling as the majority of employees are expected to live outside a commutable walking or cycling distance; however, consideration could be given to providing local linkages between Marton and the future development as / when cycle networks are developed. The type of uses within the zone (i.e. industrial activities) will be unlikely to attract significant walking and cycling trips except within zone trips to/from cafes and other amenity sites within the industrial zone.

Street layouts have not been developed but are anticipated to be designed in accordance with Rangitikei District Council standards. The District plan has no requirement for footpaths within Industrial zones; however, consideration should be given to providing footpaths to ensure safe access to any amenity sites (e.g. cafes or supporting amenities) within the zone.

4.3.2 Public Transport

Existing public transport services into Marton for commuting purposes are limited at present. Although the proposed industrial zone is not anticipated to significantly affect demand for public transport, some demand at a regional level may be stimulated by growing local employment opportunities.

As the proposed industrial zone is developed, it is recommended that opportunities to provide transport choices for commuter travel via the public transport network are explored with Horizons Regional Council. However, based on the findings of the assessment, the intersection upgrades identified within the assessment will still be required even a significant mode shift to non-car based modes (i.e. public transport or active modes).

Any road designed within the zone will need to accommodate heavy vehicles and will, therefore, be designed to an appropriate standard for buses should a bus route be incorporated into the zone in the future.

4.3.3 Local Road Network Effects

The traffic modelling exercise has focused primarily on the impacts of the proposed development on key intersections with the State Highway network; however, the trip distribution and assignment process undertaken through this TIA indicates a large volume of traffic (both general traffic and heavy vehicles) generated by the development may to and from the west on Makirikiri Road to key destinations within Whanganui and Taranaki.

Makirikiri Road intersects with Pukepapa Road and Wellington Road to the west of the proposed industrial zone. These roads provide north-south connectivity between SH3 to the south and Marton in the north. At present, these intersections are formed of four-arm priority controlled intersections, with Makirikiri Road forming the minor approach arms.

Future traffic patterns are expected to make east-west movements along Makirikiri Road the dominant movement at both intersections during peak periods, particularly the Makirikiri Road / Wellington Road intersection. These intersections are likely to require a change in control in response to the proposed development, by either priority to make the Wellington Road and Pukepapa Road intersection give-way to traffic on Makirikiri Road, or alternatively upgrading the intersections to an alternative form of control (such as a roundabout). Monitoring of the intersections will be necessary to determine if and when any upgrades are required.

4.3.4 Construction Traffic

Additional heavy vehicle movements will be expected to access the site during the construction phase of the development which may have the potential to impact on the site and the local network surroundings. However, the effects of construction will be relatively short-term and should not be a reason for restricting the development of the site.

Construction traffic is likely to access the site via Wings Line (secondary collector) and Makirikiri Road (primary collector). Both roads are suitable to accommodate larger vehicles.

Should RDC have concerns relating to the potential impacts of construction traffic associated with specific components of the development, this could be managed and controlled through the development of a Construction Traffic Management Plan (CTMP).

Key recommendations on the scope of the CTMP are included in Section 6.3.

4.3.5 Transporting Freight by Rail

The location of the site adjacent to a rail line provides an opportunity for freight traffic to use rail rather than road. This assessment has conservatively assumed all freight will travel on road rather than rail, so if a rail siding is provided the effects of the site on the road network will be reduced compared to those reported within this TIA.

A rail siding is not expected to affect employee trips so effects during weekday peak periods will still be close to those reported as most trips during these periods are employee not freight trips; therefore, irrespective of the potential uptake of freight via rail, the findings of the modelling assessment relating to the need for intersection upgrades on the State Highway network remain valid. By reducing on road freight trips, a rail siding would reduce the maintenance requirements on the surrounding road network as road condition tends to deteriorate in proportion to heavy commercial vehicle volumes.

5 Safety Assessment

5.1 Sightlines

5.1.1 Safe sight distance requirements

The minimum sight distance for a 100km/hr posted speed limit is 282m according to the NZTA planning policy manual[14].

5.1.2 Wings Line / SH1

The sight distance from Wings Line to SH1 in both directions is greater than 300m, so exceeds NZTA standards (see Figure 5-1). Sight lines to the north could be further enhanced through the management of existing vegetation located at the north-western corner of the intersection.

Figure 5-1: View at the Wings Line / SH3 Intersection to the South (Left) and North (Right)

5.1.3 Makirikiri Road and SH1 Intersection

The sight distance from Makirikiri Road to SH1 in both directions is greater than 300m, so exceeds NZTA standards; however, the presence of vehicles on the left turn slip lane onto Makirikiri Road can impact on clear sightlines of northbound through traffic on SH1 (see Figure 5-2).

Figure 5-2: View from Makirikiri Road / SH1 Intersection to the South (Left) and North (Right)

[14] Based on the Absolute minimum Safe Intersection Sight Distances (SISD) in Austroads Guide to Traffic Engineering Part 5.

5.1.4 Pukepapa Road and SH3 Intersection

The sight distance from Pukepapa Road to SH3 in both directions is greater than 300m, so exceeds NZTA standards (see Figure 5-3).

Figure 5-3: View at the Pukepapa Road / SH3 Intersection to the East (Left) and West (Right)

5.1.5 Makirikiri and SH3 Intersection

The sight distance from Makirikiri Road to SH3 to the east (looking left from Makirikiri) is 160m because a horizontal curve restricts visibility further (see Figure 5-4). This is less than the minimum safe sight distance required by NZTA, meaning traffic turning right out of Makirikiri Road may pull into an unsafe gap on SH3.

Figure 5-4: View at the Makirikiri Road / SH3 Intersection to the East (Left) and West (Right)

Potential mitigation measures that could be considered include:

- Traffic management plans for the Site that encourage traffic to exit the Site via safer alternative routes,
- Intersection widening to provide wider shoulders ensuring there is safe avoidance space.

The sight distance from Makirikiri Road to SH3 to the west (looking right from Makirikiri) is 330m, so exceeds NZTA standards.

5.2 Crash Analysis

The NZ Transport Agency's Crash Analysis System (CAS) has been reviewed to determine the existing crash history at all four intersections assessed within this TIA.

A high-level crash risk assessment based on the NZ Transport Agency's Crash Estimation Compendium (CEC)[15] has been undertaken to compare the existing injury crash rate at the intersection, prior to the development of the site, and the predicted injury crash rate (AT) when the development is completed.

The full development traffic has been overlain onto the existing AADT to allow a direct comparison to better understand the impact of the development traffic on the safety of the intersection.

5.2.1 Wings Line / SH1 Intersection

The crash risk assessment using the NZTA's CEC methodology indicates that the predicted crash rate is 0.1 injury crash per year, which is higher than the actual crash rate. This could indicate that the intersection is operating relatively safely under its existing arrangement, or just the nature of crashes being rare and random in timing.

Addition of full development traffic results in the predicted crash rate tripling compared to with existing traffic volumes. The proposed Industrial zoning is not expected to result in significant change in crashes at the Wings Line intersection as:

- The intersection has a low crash rate and no identified crash issues that could be exacerbated by the additional traffic; and
- The intersection has a right turn bay on SH1 for traffic turning into Wings Line, providing separation for turning traffic from southbound through movements.

Table 5-1 Wings Line / SH1 Crash Analysis

CRASH RISK ASSESSMENT	SH1	WINGS LINE
Existing AADT without development traffic	6,678vpd	352vpd
Existing AADT plus full development traffic	8,853vpd	2,991vpd
AT – existing, based on CAS data	0.0 per year	
A_T – existing, based on CEC	0.115 per year	
A_T - future, with development traffic, based on CEC	0.307 per year	

5.2.2 Makirikiri Road / SH1 Intersection

The NZ Transport Agency's CAS database has recorded four crashes at the intersection in the last 5 years. Three of the crashes have resulted in injuries, with 1 serious injury and six minor injuries. Of the recorded crashes:

- Two of the crashes involved rear-end collisions with vehicles performing right-turn manoeuvres from SH1 onto Makirikiri Road. The serious crash involved a car that had pulled left off the State Highway onto the berm to wait for traffic to clear so that they could turn right into Makirikiri Road. When they have attempted to turn right they have collided with a car also turning right into Makirikiri Road that the driver failed to identify; and
- Two of the crashes were the result of vehicles turning right from Makirikiri Road failing to give way to traffic on the State Highway. In one crash, State Highway traffic was masked by a truck using the slip lane to turn into Makirikiri Road.

[15] According to crash prediction method in the Crash Estimation Compendium section 7.5 High-speed priority T-junctions ≥ 80 km/h

Error! Reference source not found. shows the results of the crash risks assessment (CEC). This indicates that the full development traffic is expected to result in a twelvefold increase in the injury crash rate at the Makirikiri Road / SH1 intersection. This is shown by the increase of AT from 0.31 per year to 3.69 per year for the existing and future scenario, respectively.

Table 5-2 Makirikiri Road / SH1 Crash Analysis

CRASH RISK ASSESSMENT	SH1	MAKIRIKIRI RD
Existing AADT, without development traffic	6,678vpd	1,650vpd
Existing AADT plus full development traffic	28,360vpd	22,081vpd
AT – existing, based on CAS data	0.60 per year	
A_T – existing, based on CEC	0.31 per year	
A_T - future, with development traffic, based on CEC	3.69 per year	

5.2.3 Pukepapa Road and SH3 Intersection

A review of the intersection crash history using the NZTA CAS database indicates five crashes have occurred at the intersection over the last five years, of which two have resulted in injury. Both injury crashes resulted in a single minor injury.

Of the recorded crashes:

- All crashes were single party crashes, four of which resulted from a loss of control and one missing the intersection/end of the road;
- Two crashes were the result of drivers travelling under the influence of alcohol; and
- The two minor injury crashes were both the result of loss of control crashes, colliding with static roadside hazards (i.e. fencing or posts).

Table 5-3 shows the results of the crash risks assessment (CEC). This indicates that the full development traffic is expected to result in a eightfold increase in the injury crash rate. This is shown by the increase of AT from 0.22 per year to 1.73 per year for the existing and full development scenario, respectively.

Table 5-3 Pukepapa Road / SH3 Crash Analysis

CRASH RISK ASSESSMENT	SH3	PUKEPAPA ROAD
Existing AADT, without development traffic	4,800vpd	1,200vpd
Existing AADT plus full development traffic	16,500vpd	11,877vpd
A_T – existing, based on CAS data	0.40 per year	
A_T – existing, based on CEC	0.22 per year	
A_T - future, with development traffic, based on CEC	1.73 per year	

5.2.4 Makirikiri Road and SH3 Intersection

Three crashes occurred at the intersection of SH3 and Makirikiri Road over the last 5 years. Two of these crashes were the result of driver inattention resulting in the vehicle SH3 veering off the State Highway to the left and colliding with a vehicle waiting to exit Makirikiri Road.

The crash risk assessment indicates that the addition of full development traffic is expected to result in a significant increase in the injury crash rate at the Makirikiri Road / SH3 intersection. This is shown

by the increase of AT from 0.09 per year to 1.48 per year for the existing and full development scenario, respectively.

Table 5-4 Makirikiri Road / SH3 Crash Analysis

CRASH RISK ASSESSMENT	SH3	MAKIRIKIRI ROAD
Existing AADT, without development traffic	6,678vpd	450vpd
Existing AADT plus full development traffic	15,750vpd	11,127vpd
AT – existing, based on CAS data	0.60 per year	
A_T – existing, based on CEC	0.09 per year	
A_T - future, with development traffic, based on CEC	1.48 per year	

5.2.5 Summary of Findings

The findings of the CEC assessment indicate that increased traffic volumes generated by the proposed development will have the most significant risk at the Makirikiri Road/SH1 intersection. As outlined within the modelling findings (in Section 4), this intersection is likely to require a change in form to support growth from the future development. Enhancing safety and reducing crash risk at the intersection would be a key design consideration within any future upgrade.

The CEC assessment has also identified an increased crash risk at Makirikiri Road/SH3 and Pukepapa/SH3 intersections. It should be noted the scenarios tested within the CEC assessment have assumed all westbound traffic would be either Makirikiri Road or Pukepapa Road to access SH3. In reality, demand is likely to be spread across both roads, therefore the CEC findings represent a "worst case scenario" in terms of crash prediction outcomes.

Monitoring of key intersections with SH3 will be necessary to determine if and when any upgrades are required to respond to potential future capacity and safety issues arising from the development on the network.

5.3 Makirikiri Road Rail Crossing

The Makirikiri Road railway crossing is located at KM178.24 of the North Island Main Trunk Line and approximately 1.3 kilometres west of the intersection of SH1 and Makirikiri Road. Traffic volumes at the railway crossing from the site are expected to increase over time as the site is developed. The crossing controls were upgraded from Flashing Lights and Bells to include Half Arm Barriers in 2015.

A Level Crossing Safety Impact Assessment (LCSIA) was undertaken to assess the suitability of the existing crossing arrangements and inform the future design process going forward, considering the potential effects of the development. A copy of the LCSIA is included within Appendix E.

As part of the LCSIA, KiwiRail and road controlling authority representatives evaluated the crossing and determined the crossing has appropriate sight distances and controls to safely manage current and future user volumes resulting from the plan change development. KiwiRail staff rated the crossing highly due to the clear sightlines between trains and vehicles due to the level approaches and lack of vegetation along adjacent property boundaries.

The LCSIA recommends additional user volume (including the proportion of user type) surveys are undertaken two years after the opening of the new intersection from the plan change area onto Makirikiri Road and review whether a change in controls is required. Subsequent surveys and reviews should be completed in three yearly cycles thereafter.

The LCSIA assessment recommends the following improvements are considered:

- The crossing signs and markings are not to the requirements of Traffic Control Devices (TCD) Manual, Part 9 (Level Crossing). Improvements could be made to install crossing approach warning signs, no passing markings and yellow hatching through the crossing.
- The pavement width at the crossing is narrow (i.e. 2 x 3.2m wide traffic lanes with no shoulders) meaning drivers tend to drive over the centre-line through the crossing due to the narrow lane widths. Localised widening of the road on the approach to the railway crossing is recommended.
- KiwiRail representatives requested that future development works should not involve planting or structures that affect the existing sightlines between road and rail.

6 Recommendations

6.1 Design Standards and Requirements

Although cross sections and designs for the internal road network have not been assessed as part of this Traffic Impact Assessment, it is expected that the internal network within the proposed Industrial zone will be designed and constructed to conform with its intended network hierarchy and adhere with the relevant requirements of the Rangitikei District Plan[16] and appropriate subdivision engineering standards[17]. This includes (but is not limited to) vehicle crossing spacings, sight distance, and parking requirements.

Two new intersections will be created to provide access to the proposed industrial zone from the existing road network, one on Wings Line and one on Makirikiri. The location of these new intersections has not been determined but should comply with Rangitikei District Council standards, specifically,

- 800m minimum spacing for intersections within a 100km/hr speed zone (Table B9.2 of Rangitikei District Plan)
- 250m minimum sight distance (Table B9.4 of Rangitikei District Plan)

6.2 General Traffic Operations

The future traffic demand around the road network, both with or without the development traffic in place, gives rises to a potential need for capacity upgrade of:

- Makirikiri Road / SH1
- Wings Line / SH1
- Makirikiri Road / SH3
- Pukepapa Road / SH3

Furthermore, there are potential visibility issues at the Makirikiri Road intersections with SH3 and Pukepapa Road that may require mitigation such as intersection widening.

Therefore, an appropriate long-term monitoring of the intersections performance and safety is recommended. In particular, the performance of the SH3 intersections will be significantly affected by route choice, therefore monitoring of westbound route choice would be particularly beneficial. It is expected that in the medium to long term, changes to intersection form for the aforementioned intersections will be required.

6.3 Construction Traffic

As noted within Section 4.3, it is expected that there would be an increase in construction traffic on the local roading network associated with the plan change, however, this is not expected to impact on the safe and efficient function of the network. It is expected that any future roading upgrades required to support development within the proposed industrial zone area would be undertaken with the appropriate level of Temporary Traffic Management (TTM).

Some specific elements of the proposed development are expected to generate higher levels of construction-related traffic, and Council may wish to consider the use of Construction Traffic Management Plan's (CTMP) to manage onsite activity; in particular, the building or upgrading of the local roading network. CTMP's outline how activities would be managed on site and should include (but not be limited to):

[16] https://www.rangitikei.govt.nz/files/general/District-Plan-Operative-Plan/Rangitikei-District-Plan-Section-B-Rules-August-2018.pdf
[17] https://www.rangitikei.govt.nz/files/general/District-Plan-Maps/RDC-Subdivision-and-Land-Development-Addendum-Revised-version-March-2017.pdf

- Details of how construction materials would arrive at the site, including the location of stockpiling areas, loading areas, and routes for heavy or over-dimension vehicles accessing the site; and
- General site operational information including details of hours of operation, location of parking for construction workers, provision for managing dust/debris migration onto the public road network, temporary traffic management requirements, maintenance of existing pedestrian and cyclist access, and access to neighbouring properties. It should also cover the requirement for communications and problem/incident reporting.

7 Conclusions

7.1 Key Findings

This Traffic Impact Assessment focuses on the effects of additional traffic generation from the proposed industrial zone on the arterial road network located within the immediate vicinity of the development, focusing on the following sites:

- Site 1 – Makirikiri Rd / Stage Highway 1
- Site 2 – Wings Line / Stage Highway 1
- Site 3 – Makirikiri Rd / Stage Highway 3
- Site 4 – Pukepapa Rd / Stage Highway 3

The proposed site for rezoning has an expected yield of approximately 1,400,000m^2 of developable site area, with a trip generation potential of **3,000-3,200** vehicle trips during each peak hour and **31,500** all day vehicle trips. Assuming linear growth in development occurs over the next 20 years, the following scenarios were tested within the future forecast traffic models:

- **Scenario 1: 2024** – 25% developed;
- **Scenario 2: 2029** – 50% developed; and
- **Scenario 3: 2039** – 100% developed.

The results of the traffic modelling exercise are summarised within **Table 7-1.**

Table 7-1: Summary of Intersection Performance

SITE	PERFORMANCE								COMMENT
	2019		2024		2029		2039		
	AM	PM	AM	PM	AM	PM	AM	PM	
SITE 1 – MAKIRIKIRI ROAD / SH1									
Without Development	✓	✓	✓	✓	✓	✓	✓	✓	• Delays on SH1 southbound because of lack of right turn bay • Delays on Makirikiri Road because of higher volumes – change of form likely needed
With Development	✓	✓	✓	–	✗	✗	✗	✗	
SITE 2 – WINGS LINE / SH1									
Without Development	✓	✓	✓	✓	✓	✓	✓	✓	• Delays on Wings Line because of higher volumes. • Operation of Makirikiri Road intersection will affect Wings Line. • Upgrade of Makirikiri may result in no need to upgrade Wings Line.
With Development	✓	✓	✓	✓	✓	✓	–	✗	
SITE 3 – MAKIRIKIRI ROAD / SH3									
Without Development	✓	✓	✓	✓	✓	✓	✓	✓	• Delays on Makirikiri Road because of higher volume of traffic. • Worse case modelled, so may not need upgrade depending on route choice
With Development	✓	✓	✓	✓	✓	✓	✗	✗	
SITE 4 – PUKEPAPA ROAD / SH3									
Without Development	✓	✓	✓	✓	✓	✓	✓	✓	• Delays on Pukekpapa because of higher volume of traffic. • Worse case modelled, so may not need upgrade depending on route choice
With Development	✓	✓	✓	–	✓	✗	✗	✗	

The results of the modelling assessment indicate that:

- **Site 1 – Makirikiri Rd / Stage Highway 1**

Will likely need an upgrade at or before 50% of the site is developed

- **Site 2 – Wings Line / Stage Highway 1**

May not need any upgrade depending on route choice and operation of the Makirikiri Road intersection with SH1.

- **Site 3 – Makirikiri Rd / Stage Highway 3**

May not need any upgrade depending on route choice

- **Site 4 – Pukepapa Rd / Stage Highway 3**

May not need any upgrade depending on route choice.

The safety assessment has also identified the potential for a notable increase in injury related crashes at the Makirikiri Rd/SH1, Makirikiri Rd/SH3 and Pukepapa Rd/SH3 intersections; however, it is noted that crash risk at the SH3 intersections will be dependent on actual future route choice and traffic distribution to the west of the development.

As these intersections are identified as potentially requiring upgrades from a capacity perspective under future development conditions, any future upgrades/improvements should be cognisent of wider opportunities to improve/resolve any emerging safety at these intersections.

7.2 Recommendations

Based on the findings of the transport assessment, it is recommended that RDC:

- Develops an annual traffic monitoring programme on the arterial road network and key interconnecting routes to establish future traffic growth generated from the development of the proposed industrial zone. This will allow RDC to determine the pace of growth against forecast traffic assumptions which have been used as a basis for traffic modelling within this assessment;
- Discuss the findings of the modelling assessment with relevant funding and investment partners within NZTA to identify and confirm preferred options for future intersection upgrades to the State Highway network.
- Undertake an option assessment for upgrades to intersections to identify preferred mitigation options and test the ability of options in resolving capacity issues on the network. This will enable solutions to be identified, appraised, costed and suitable protection measures identified (if required).

Appendix A
Background Data

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National Frieght Distribution Survey Data

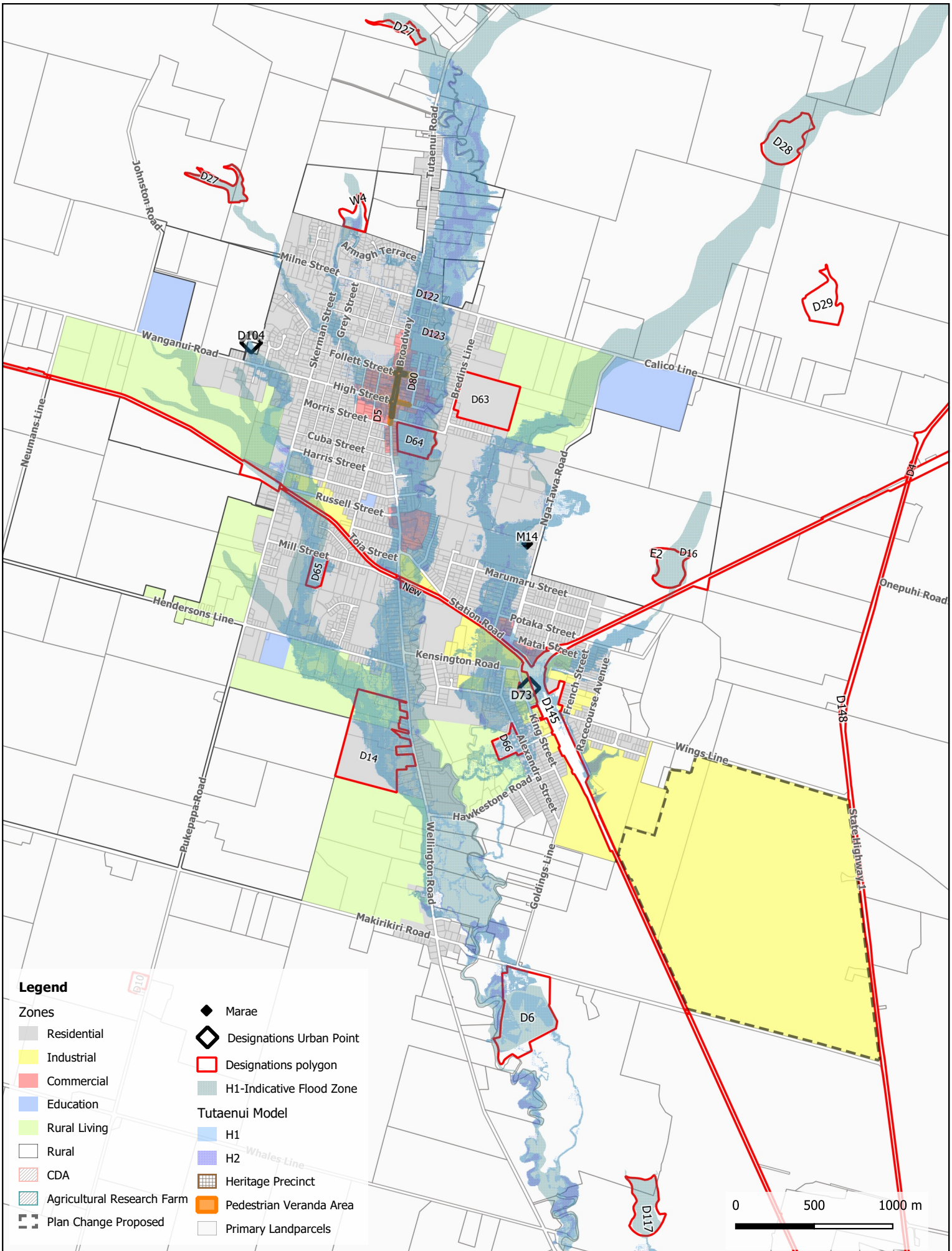
Table 3
Total Freight Movements 2012 (million tonnes)

Origin	Destination: Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	TNM	West Coast	Canterbury	Otago	Southland	Total
Northland	12.0	1.9	0.1	0.9	0.0	0.2	0.1	0.0	0.4	0.3	0.0	0.6	0.2	0.2	16.9
Auckland	0.9	38.3	2.4	2.9	0.1	0.5	0.5	1.3	1.2	0.1	0.0	1.2	0.1	0.0	49.4
Waikato	0.1	4.3	23.8	3.1	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.1	0.0	0.0	32.1
Bay of Plenty	0.2	1.9	1.8	20.2	0.1	0.2	0.1	0.3	0.1	0.0	0.0	0.1	0.0	0.0	25.0
Gisborne	0.0	0.1	0.1	0.2	3.2	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.8
Hawke's Bay	0.0	0.2	0.2	1.0	0.5	7.4	0.1	0.7	0.1	0.0	0.0	0.1	0.0	0.0	10.3
Taranaki	0.1	0.2	0.4	0.3	0.0	0.2	6.1	0.3	0.1	0.0	0.0	0.1	0.0	0.0	7.6
Manawatu	0.0	0.3	0.1	0.2	0.0	0.9	1.9	5.7	1.5	0.0	0.0	0.1	0.0	0.0	10.6
Wellington	0.0	0.7	0.1	0.0	0.0	0.1	0.1	0.9	6.4	0.0	0.0	0.1	0.0	0.0	8.4
TNM	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1	8.0	0.4	0.5	0.0	0.0	9.3
West Coast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.8	0.1	0.0	5.5
Canterbury	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.9	0.7	31.0	1.3	0.6	35.4
Otago	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	8.5	0.7	10.0
Southland	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.1	10.1	11.7
Total	13.3	48.8	29.0	28.8	4.1	9.9	9.3	9.5	9.9	9.3	3.7	37.7	11.3	11.6	236.0

Notes: TNM is the combination of the Tasman, Nelson and Marlborough regions
Where flows are non-existent they are denoted by "-". Where they are small they are denoted by 0.0.

Table 7.32
Total Freight Movements 2042 (million tonnes)

Origin	Destination: Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	Tasman/ Marlborough	West Coast	Canterbury	Otago	Southland	Total
Northland	16.34	3.30	0.16	1.11	0.00	0.27	0.10	0.01	0.47	0.31	0.00	0.66	0.24	0.24	23.23
Auckland	1.41	70.09	3.84	4.01	0.23	0.75	0.80	2.40	1.85	0.15	0.02	2.04	0.14	0.05	87.78
Waikato	0.18	7.21	36.74	3.99	0.04	0.20	0.53	0.16	0.13	0.00	0.00	0.18	0.01	0.02	49.37
Bay of Plenty	0.22	2.97	2.54	28.00	0.18	0.38	0.17	0.47	0.18	0.00	0.00	0.15	0.01	0.01	35.29
Gisborne	0.00	0.10	0.11	0.24	4.34	0.24	0.01	0.11	0.01	0.00	0.00	0.03	0.00	0.00	5.19
Hawke's Bay	0.05	0.28	0.27	1.15	0.68	11.54	0.16	1.48	0.15	0.00	0.00	0.09	0.00	0.00	15.84
Taranaki	0.11	0.22	0.55	0.33	0.01	0.20	8.10	0.40	0.06	0.01	0.00	0.08	0.02	0.00	10.11
Manawatu	0.01	0.27	0.14	0.18	0.03	1.02	2.59	8.80	1.81	0.01	0.00	0.06	0.00	0.00	14.93
Wellington	0.02	0.78	0.08	0.05	0.01	0.17	0.21	1.42	11.05	0.03	0.00	0.10	0.00	0.00	13.92
Tasman/ Marlborough	0.00	0.23	0.02	0.12	0.00	0.03	0.01	0.05	0.08	12.13	0.48	0.78	0.04	0.03	14.02
West Coast	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	4.11	3.90	0.13	0.00	8.19
Canterbury	0.00	1.11	0.06	0.03	0.00	0.05	0.16	0.19	0.27	1.30	1.24	53.78	2.19	0.84	61.22
Otago	0.00	0.13	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.03	0.01	0.95	14.00	0.90	16.06
Southland	0.00	0.05	0.02	0.01	0.00	0.02	0.00	0.00	0.00	0.02	0.01	0.60	1.70	15.34	17.79
Total	18.34	86.76	44.53	39.23	5.51	14.88	12.84	15.50	16.09	14.02	5.88	63.40	18.48	17.43	372.93



Legend

Zones
- Residential
- Industrial
- Commercial
- Education
- Rural Living
- Rural
- CDA
- Agricultural Research Farm
- Plan Change Proposed

- Marae
- Designations Urban Point
- Designations polygon
- H1-Indicative Flood Zone

Tutaenui Model
- H1
- H2
- Heritage Precinct
- Pedestrian Veranda Area
- Primary Landparcels

RANGITĪKEI DISTRICT COUNCIL
Making this place home

Rangitikei District Council

Proposed Plan Change

District Plan

N

Appendix B

Traffic Survey Data

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Wings Line-SH1 **Weather Fine** **Tue 19/09/2019**

		SH 1 (North)								SH 1 (South)								Wings Line							
		Thru to SH 1 (South)				Right into Wings Line				Left into Wings Line				Thru to SH 1 (North)				Left into SH 1 (North)				Thru to SH 1 (South)			
Period	Time	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists
AM	**6:30**	17	11	0	0	0	0	0	0	2	0	0	0	37	8	0	0	0	0	0	0	2	0	0	0
AM	**6:45**	12	6	0	0	0	0	0	0	1	1	0	0	40	7	0	0	0	0	0	0	6	0	0	0
AM	**7:00**	17	8	0	0	0	0	0	0	0	0	0	0	34	9	0	0	0	0	0	0	4	0	0	0
AM	**7:15**	12	6	0	0	0	0	0	0	4	1	0	0	34	11	0	0	0	0	0	0	8	2	0	0
AM	**7:30**	27	12	0	0	1	0	0	0	4	1	0	0	31	11	0	0	1	0	0	0	2	0	0	0
AM	**7:45**	20	8	0	0	1	0	0	0	4	2	0	0	33	8	0	0	0	1	0	0	4	1	0	0
AM	**8:00**	14	7	0	0	0	1	0	0	3	1	0	0	48	10	3	0	0	0	0	0	4	1	0	0
AM	**8:15**	18	9	0	0	1	0	0	0	1	0	0	0	32	8	0	0	2	0	0	0	3	0	0	0
AM	**8:30**	25	10	0	0	1	0	0	0	4	1	0	0	39	10	0	0	2	0	0	0	3	0	0	0
AM	**8:45**	24	11	0	0	0	0	0	0	6	1	0	0	38	8	2	0	1	1	0	0	4	1	0	0
AM	**9:00**	17	6	0	0	0	0	0	0	4	1	0	0	42	6	0	0	0	0	0	0	3	2	0	0
AM	**9:15**	23	4	0	0	0	0	0	0	1	3	0	0	39	13	0	0	0	0	0	0	3	0	0	0
IP	**11:00**	26	13	0	0	0	0	0	0	3	0	0	0	49	11	0	0	0	0	0	0	4	2	0	0
IP	**11:15**	21	4	0	0	1	0	0	0	3	0	0	0	43	14	0	0	0	0	0	0	2	1	0	0
IP	**11:30**	31	8	0	0	0	0	0	0	1	0	0	0	38	7	1	0	0	0	0	0	3	1	0	0
IP	**11:45**	45	8	0	0	1	0	0	0	3	1	0	0	44	9	0	0	0	0	0	0	3	0	0	0
IP	**12:00**	36	8	0	0	1	0	0	0	3	0	0	0	37	12	1	0	1	0	0	0	0	2	0	0
IP	**12:15**	30	5	0	0	1	0	0	0	1	0	0	0	47	4	0	0	2	0	0	0	3	1	1	0
IP	**12:30**	38	6	0	0	0	0	0	0	6	0	0	0	44	4	0	0	2	0	0	0	2	0	0	0
IP	**12:45**	27	6	0	0	0	0	0	0	4	0	0	0	26	4	0	0	0	1	0	0	3	0	0	0
PM	**15:30**	34	10	1	0	0	0	0	0	4	1	0	0	47	7	0	0	0	0	0	0	0	1	0	0
PM	**15:45**	47	10	0	0	1	0	0	0	5	0	0	0	29	2	1	0	2	0	0	0	4	2	0	0
PM	**16:00**	36	7	1	0	1	0	0	0	0	0	0	0	18	8	0	0	0	0	0	0	2	1	0	0
PM	**16:15**	29	7	0	0	0	0	0	0	3	0	0	0	39	6	0	0	2	3	0	0	4	0	0	0
PM	**16:30**	22	11	0	0	0	0	0	0	8	0	0	0	42	7	2	0	1	0	0	0	6	3	0	0
PM	**16:45**	34	4	0	0	1	1	1	0	4	0	0	0	49	9	3	0	0	0	0	0	0	1	0	0
PM	**17:00**	35	2	0	0	0	0	0	0	4	0	0	0	47	13	0	0	1	1	0	0	6	0	0	0
PM	**17:15**	52	8	1	0	0	0	0	0	6	0	0	0	38	10	0	0	0	0	0	0	1	1	0	0
PM	**17:30**	38	7	1	0	0	0	0	0	7	0	0	0	22	7	0	0	1	1	0	0	2	1	0	0
PM	**17:45**	30	9	1	0	1	0	0	0	8	0	0	0	36	4	0	0	0	0	0	0	5	0	0	0
PM	**18:00**	40	4	0	0	0	0	0	0	7	0	0	0	26	3	0	0	1	0	0	0	4	0	0	0
PM	**18:15**	45	5	2	0	0	0	0	0	3	0	0	0	26	7	0	0	0	0	0	0	4	0	0	0

Makirikiri Rd-SH1 **Weather Fine** **Tue 19/09/2019**

		SH 1 (North)								SH 1 (South)								Makirikiri Rd							
		Thru to SH 1 (South)				Right into Makirikiri Rd				Left into Makirikiri Rd				Thru to SH 1 (North)				Left into SH 1 (North)				Thru to SH 1 (South)			
Period	Time	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists
AM	**6:30**	20	10	0	0	0	0	0	0	8	4	0	0	40	9	0	0	0	0	0	0	10	4	0	0
AM	**6:45**	16	9	0	0	0	0	0	0	7	0	0	0	42	7	0	0	0	0	0	0	5	2	0	0
AM	**7:00**	17	8	0	0	2	0	0	0	16	5	0	0	34	8	0	0	0	0	0	0	15	2	0	0
AM	**7:15**	20	8	0	0	0	0	0	0	17	0	0	0	35	10	0	0	0	0	0	0	16	3	0	0
AM	**7:30**	28	10	0	0	0	0	0	0	22	3	0	0	36	13	0	0	0	0	0	0	17	3	0	0
AM	**7:45**	26	10	0	0	0	0	0	0	19	5	0	0	38	8	0	0	1	0	0	0	17	5	0	0
AM	**8:00**	16	7	0	0	0	2	0	0	19	3	0	0	50	11	3	0	1	0	0	0	14	3	0	0
AM	**8:15**	22	9	0	0	2	0	0	0	17	5	0	0	38	6	0	0	0	0	0	0	12	4	0	0
AM	**8:30**	26	10	0	0	0	0	0	0	13	4	0	0	40	12	0	0	1	1	0	0	11	4	0	0
AM	**8:45**	28	12	0	0	2	0	0	0	13	5	0	0	40	8	2	0	0	1	0	0	16	4	0	0
AM	**9:00**	19	8	0	0	0	0	0	0	16	1	0	0	46	6	0	0	1	0	0	0	9	4	0	0
AM	**9:15**	27	3	0	0	1	0	0	0	7	1	0	0	42	16	0	0	0	0	0	0	11	3	0	0
IP	**11:00**	28	11	0	0	0	0	0	0	10	2	0	0	51	8	0	0	0	0	0	0	5	1	0	0
IP	**11:15**	28	6	0	0	0	0	0	0	6	5	0	0	40	15	1	0	1	0	0	0	12	1	0	0
IP	**11:30**	35	7	0	0	0	1	0	0	6	0	0	0	42	5	1	0	0	0	0	0	12	4	0	0
IP	**11:45**	48	6	0	0	0	1	0	0	4	4	0	0	44	11	0	0	2	0	0	0	10	3	0	0
IP	**12:00**	35	9	0	0	0	0	0	0	11	3	0	0	40	11	0	0	1	0	0	0	10	2	0	0
IP	**12:15**	29	7	0	0	0	0	0	0	12	3	0	0	51	3	0	0	1	0	0	0	6	2	0	0
IP	**12:30**	42	6	0	0	1	0	0	0	10	3	0	0	45	6	0	0	0	0	0	0	9	1	0	0
IP	**12:45**	28	6	0	0	0	0	0	0	10	3	0	0	31	4	0	0	0	0	0	0	9	1	0	0
PM	**15:30**	30	10	1	0	0	0	0	0	16	3	0	0	52	7	0	0	0	0	0	0	14	6	0	0
PM	**15:45**	55	12	0	0	0	0	0	0	12	2	0	0	30	4	1	0	0	0	0	0	14	2	0	0
PM	**16:00**	34	9	1	0	1	0	0	0	4	1	0	0	19	8	0	0	1	0	0	0	37	3	0	0
PM	**16:15**	35	8	0	0	0	0	0	0	13	0	0	0	44	5	0	0	1	0	0	0	13	3	0	0
PM	**16:30**	27	12	0	0	0	1	0	0	21	5	0	0	46	6	3	0	1	0	0	0	23	3	0	0
PM	**16:45**	33	7	0	0	0	0	0	0	17	1	0	0	51	8	2	0	0	0	0	0	26	2	0	0
PM	**17:00**	39	2	0	0	0	0	0	0	15	3	0	0	57	17	0	0	1	0	0	0	33	1	0	0
PM	**17:15**	53	10	1	0	0	0	0	0	20	0	0	0	36	6	0	0	0	0	0	0	25	2	0	0
PM	**17:30**	40	7	1	0	0	0	0	0	11	1	0	0	30	7	0	0	2	0	0	0	18	3	0	0
PM	**17:45**	35	9	1	0	0	0	0	0	13	0	0	0	42	4	0	0	0	0	0	0	8	1	0	0
PM	**18:00**	41	5	0	0	0	0	0	0	13	1	0	0	31	3	0	0	0	0	0	0	16	2	0	0
PM	**18:15**	50	5	1	0	0	0	0	0	13	2	0	0	32	6	0	0	0	1	0	0	10	1	0	0

Pukepapa Rd-SH3 **Weather Fine** **Tue 19/09/2019**

		Pukepapa Rd								SH 3 (East)								SH 3 (West)							
		Left into SH 3 (East)				Right into SH 3 (West)				Thru to SH 3 (West)				Right into Pukepapa Rd				Left into Pukepapa Rd				Right into SH 3 (East)			
Period	Time	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists
AM	**6:30**	10	0	0	0	0	0	0	0	14	6	0	0	3	1	0	0	0	0	0	0	35	9	0	0
AM	**6:45**	24	1	0	0	0	1	0	0	13	4	0	0	2	2	0	0	0	0	0	0	27	7	0	0
AM	**7:00**	25	2	0	0	1	0	0	0	32	7	0	0	4	1	0	0	0	3	0	0	47	4	0	0
AM	**7:15**	24	1	1	0	2	0	0	0	37	6	0	0	10	3	0	0	0	0	0	0	69	7	1	0
AM	**7:30**	17	2	0	0	0	0	0	0	45	12	0	0	12	3	0	0	1	0	0	0	60	6	0	0
AM	**7:45**	24	2	0	0	0	0	0	0	35	8	0	0	15	3	0	0	4	0	0	0	49	4	0	0
AM	**8:00**	18	4	0	0	0	1	0	0	60	14	0	0	12	0	1	0	0	0	1	0	77	8	1	0
AM	**8:15**	10	1	0	0	0	0	0	0	56	9	0	0	7	2	0	0	1	0	0	0	45	7	0	0
AM	**8:30**	13	3	0	0	1	0	0	0	48	13	0	0	9	2	0	0	0	1	0	0	57	12	1	0
AM	**8:45**	8	3	0	0	0	0	0	0	35	8	0	0	8	2	0	0	0	1	0	0	41	8	0	0
AM	**9:00**	9	3	0	0	0	0	0	0	50	13	0	0	5	3	1	0	0	1	0	0	54	10	0	0
AM	**9:15**	11	2	0	0	0	0	0	0	35	11	0	0	10	2	0	0	0	2	0	0	52	9	0	0
IP	**11:00**	3	1	0	0	0	0	0	0	41	10	0	0	8	3	0	0	2	0	0	0	37	8	0	0
IP	**11:15**	6	3	0	0	3	0	0	0	36	14	0	0	6	3	0	0	0	0	0	0	40	11	1	0
IP	**11:30**	8	0	0	0	1	1	0	0	41	10	0	0	3	4	0	0	0	1	0	0	47	8	0	0
IP	**11:45**	5	1	0	0	0	0	0	0	46	11	0	0	11	2	0	0	0	0	0	0	32	7	0	0
IP	**12:00**	10	1	0	0	0	0	0	0	43	10	0	0	15	0	0	0	2	0	0	0	40	12	0	0
IP	**12:15**	8	2	0	0	2	0	0	0	44	8	0	0	11	1	0	0	2	0	0	0	43	12	0	0
IP	**12:30**	7	0	0	0	1	0	0	0	37	7	0	0	10	0	0	0	0	1	0	0	30	8	0	0
IP	**12:45**	10	1	0	0	0	0	0	0	43	9	1	0	8	0	0	0	1	0	0	0	31	8	0	0
PM	**15:30**	8	3	0	0	0	0	0	0	57	6	1	0	17	0	1	0	1	2	0	0	69	19	0	0
PM	**15:45**	9	2	0	0	0	0	0	0	49	3	0	0	10	0	0	0	1	0	0	0	49	7	1	0
PM	**16:00**	11	1	0	0	1	0	0	0	66	12	0	0	10	6	0	0	3	0	0	0	39	5	1	0
PM	**16:15**	12	2	0	0	0	1	0	0	61	3	0	0	17	3	1	0	2	0	0	0	52	15	0	0
PM	**16:30**	16	1	0	0	0	1	0	0	63	8	0	0	24	0	0	0	0	0	0	0	64	13	0	0
PM	**16:45**	12	3	1	0	0	0	0	0	71	5	1	0	31	2	0	0	0	1	0	0	68	9	0	0
PM	**17:00**	19	2	0	0	2	0	0	0	53	12	0	0	32	1	0	0	1	0	0	0	78	17	0	0
PM	**17:15**	22	0	0	0	0	1	0	0	46	5	0	0	24	2	0	0	1	0	0	0	50	8	0	0
PM	**17:30**	10	1	0	0	1	0	0	0	63	6	0	0	28	1	0	0	1	0	0	0	73	9	0	0
PM	**17:45**	8	0	1	0	1	0	0	0	41	10	1	0	20	0	0	0	3	0	0	0	43	16	0	0
PM	**18:00**	9	1	1	0	1	0	0	0	40	2	0	0	14	1	0	0	0	0	0	0	32	2	0	0
PM	**18:15**	4	1	0	0	0	0	0	0	23	2	0	0	11	0	0	0	2	0	0	0	33	3	0	0

Makirikiri Rd-SH3 Weather Fine Tue 19/09/2019

		Makirikiri Rd								SH 3 (East)								SH 3 (West)							
		Left into SH 3 (East)				Right into SH 3 (West)				Thru to SH 3 (West)				Right into Makirikiri Rd				Left into Makirikiri Rd				Right into SH 3 (East)			
Period	Time	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists	Cars	Trucks	Buses	Cyclists
AM	6:30	1	0	0	0	2	4	0	0	14	10	0	0	0	0	0	0	1	2	0	0	29	6	0	0
AM	6:45	0	0	0	0	2	2	0	0	12	5	0	0	0	0	0	0	3	0	0	0	44	7	0	0
AM	7:00	0	0	0	0	4	3	0	0	24	4	0	0	0	0	0	0	0	2	0	0	41	10	1	0
AM	7:15	0	0	0	0	4	2	0	0	33	5	0	0	0	0	0	0	6	1	0	0	68	3	0	0
AM	7:30	1	0	0	0	6	0	0	0	50	8	0	0	0	0	0	0	6	1	0	0	55	6	0	0
AM	7:45	0	0	0	0	8	0	0	0	32	11	0	0	0	0	0	0	2	0	0	0	61	7	1	0
AM	8:00	0	0	0	0	5	1	0	0	48	9	0	0	0	0	0	0	4	0	0	0	50	6	1	0
AM	8:15	0	0	0	0	5	1	0	0	62	8	0	0	0	0	0	0	2	3	0	0	53	10	0	0
AM	8:30	0	0	0	0	3	2	0	0	43	9	0	0	0	0	0	0	5	3	0	0	46	10	1	0
AM	8:45	0	0	0	0	4	1	0	0	44	10	0	0	0	0	0	0	4	1	0	0	50	8	0	0
AM	9:00	1	0	0	0	6	1	0	0	48	14	0	0	0	0	0	0	4	1	0	0	40	12	0	0
AM	9:15	0	0	0	0	1	0	0	0	36	7	0	0	0	0	0	0	2	0	0	0	53	8	0	0
IP	11:00	0	0	0	0	3	0	0	0	39	16	1	0	0	0	0	0	1	1	0	0	37	12	1	0
IP	11:15	0	0	0	0	8	2	0	0	37	8	0	0	0	0	0	0	0	2	0	0	35	7	0	0
IP	11:30	0	0	0	0	2	0	0	0	45	13	0	0	0	0	0	0	2	1	0	0	39	7	0	0
IP	11:45	0	0	0	0	2	1	0	0	39	11	0	0	0	0	0	0	0	0	0	0	40	12	0	0
IP	12:00	0	0	0	0	1	2	0	0	47	9	0	0	0	0	0	0	1	0	0	0	43	11	0	0
IP	12:15	0	0	0	0	3	2	0	0	37	6	0	0	0	0	0	0	0	0	0	0	32	7	0	0
IP	12:30	0	0	0	0	0	1	0	0	43	7	0	0	0	0	0	0	0	0	0	0	34	8	0	0
IP	12:45	0	0	0	0	2	0	0	0	40	11	1	0	0	0	0	0	2	0	0	0	31	8	0	0
PM	15:30	0	0	0	0	4	0	0	0	50	8	1	0	0	0	0	0	3	2	0	0	78	22	1	0
PM	15:45	0	0	0	0	2	0	0	0	51	3	0	0	0	0	0	0	2	1	0	0	27	6	1	0
PM	16:00	0	0	0	0	4	2	0	0	49	5	0	0	0	0	0	0	5	2	0	0	40	8	0	0
PM	16:15	0	0	0	0	3	2	0	0	72	12	0	0	1	0	0	0	6	2	0	0	66	13	0	0
PM	16:30	0	0	0	0	4	1	0	0	61	6	0	0	0	0	0	0	5	1	0	0	54	14	0	0
PM	16:45	0	0	0	0	6	1	0	0	66	8	0	0	0	0	0	0	5	0	0	0	67	12	0	0
PM	17:00	0	0	0	0	3	0	0	0	62	4	0	0	0	0	0	0	6	1	0	0	75	14	0	0
PM	17:15	0	0	0	0	2	0	0	0	53	11	0	0	1	0	0	0	7	0	0	0	63	10	0	0
PM	17:30	0	0	0	0	5	0	0	0	56	4	0	0	0	0	0	0	6	2	0	0	58	9	0	0
PM	17:45	0	0	0	0	4	0	0	0	46	14	0	0	0	0	0	0	4	2	0	0	41	12	0	0
PM	18:00	0	0	0	0	0	0	0	0	37	2	1	0	0	0	0	0	1	2	0	0	35	4	0	0
PM	18:15	0	0	0	0	3	0	0	0	25	1	0	0	0	0	0	0	2	0	0	0	25	3	0	0

Appendix C
Modelling Results

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TRIP DISTRIBUTION

Year 5

Trip Generation	A.M. Peak			P.M. Peak				
	In	Out	Total	In	Out	Total	Daily	%
Light vehicles	560	190	740	130	640	770	6,500	80%
Heavy vehicles	30	10	40	20	30	50	1,600	20%
Total Vehicles	590	200	790	150	670	820	8,100	100%

Trip Generation	A.M. Peak			P.M. Peak				
	In	Out	Total	In	Out	Total	Daily	%
Light vehicle	1,000	330	1,330	240	1,140	1,380	11,770	82%
Heavy vehic	50	20	70	30	60	90	2,630	18%
Total Vehicl	1,050	350	1,400	270	1,200	1,470	14,400	100%

Year 20

Trip Generation	A.M. Peak			P.M. Peak				
	In	Out	Total	In	Out	Total	Daily	%
Light vehicl	2,190	730	2,920	530	2,490	3,020	26,200	83%
Heavy vehi	100	50	150	70	120	190	5,400	17%
Total Vehic	2,290	780	3,070	600	2,610	3,210	31,500	100%

DISTRIBUTION

	Employee % distribution 5 year		
	AM	IP	PM
% in	85%	50%	15%
% out	15%	50%	85%
A	1%	4%	6%
B	1%	4%	6%
C	4%	14%	23%
D	9%	29%	49%
E	1%	4%	6%
F	0%	0%	0%
G	0%	0%	0%
H	9%	29%	49%
I	6%	4%	1%
J	6%	4%	1%
K	23%	14%	4%
L	49%	29%	9%
M	6%	4%	1%
N	0%	0%	0%
O	0%	0%	0%
P	49%	29%	9%
	100%	100%	100%
check	15%		
check	85%		

	Freight % distribution 5 year			Freight % distribution 10 year			Freight % distribution 20 year		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
% in	65%	50%	35%	65%	50%	35%	65%	50%	35%
% out	35%	50%	65%	35%	50%	65%	35%	50%	65%
A	0%	0%	0%	0%	0%	0%	0%	0%	0%
B	2%	2%	3%	2%	2%	3%	1%	2%	3%
C	16%	23%	30%	16%	23%	30%	16%	23%	30%
D	17%	25%	32%	17%	25%	32%	17%	25%	32%
E	2%	2%	3%	2%	2%	3%	1%	2%	3%
F	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	0%	0%	0%	0%	0%	0%	0%	0%	0%
H	17%	25%	32%	17%	25%	32%	17%	25%	32%
I	0%	0%	0%	0%	0%	0%	0%	0%	0%
J	3%	2%	2%	3%	2%	2%	3%	2%	1%
K	30%	23%	16%	30%	23%	16%	30%	23%	16%
L	32%	25%	17%	32%	25%	17%	32%	25%	17%
M	3%	2%	2%	3%	2%	2%	3%	2%	1%
N	0%	0%	0%	0%	0%	0%	0%	0%	0%
O	0%	0%	0%	0%	0%	0%	0%	0%	0%
P	32%	25%	17%	32%	25%	17%	32%	25%	17%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
check	35%								
check	65%								

interpeak hours 7 (0900:16:00)

% traffic in offpeak 10%

	Year 5 Development volumes		
	AM	IP	PM
Light In	560	310	130
light out	190	310	640
HCV In	30	96	20
HCV Out	10	96	30
A	8	23	48
B	9	27	50
C	37	129	194
D	72	228	396
E	9	27	50
F	0	0	0
G	0	0	0
H	72	228	396
I	47	23	8
J	48	27	9
K	186	129	40
L	383	228	76
M	48	27	9
N	0	0	0
O	0	0	0
P	383	228	76
	790	813	820
	790	813	820

	Year 10 Development volumes		
	AM	IP	PM
Light In	1,000	563	240
light out	330	563	1,140
HCV In	50	158	30
HCV Out	20	158	60
A	15	41	86
B	16	49	89
C	66	226	348
D	128	405	709
E	16	49	89
F	0	0	0
G	0	0	0
H	128	405	709
I	83	41	15
J	85	49	17
K	330	226	71
L	678	405	136
M	85	49	17
N	0	0	0
O	0	0	0
P	678	405	136
	1400	1441	1470
	1400	1441	1470

	Year 20 Development volumes		
	AM	IP	PM
Light In	2,190	1260	530
light out	730	1260	2,490
HCV In	100	323	70
HCV Out	50	323	120
A	32	92	188
B	34	106	193
C	144	495	759
D	280	890	1550
E	34	106	193
F	0	0	0
G	0	0	0
H	280	890	1550
I	182	92	33
J	186	106	36
K	724	495	155
L	1488	890	295
M	186	106	36
N	0	0	0
O	0	0	0
P	1488	890	295
	3070	3166	3210
	3070	3166	3210

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road AM + 5yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	8	0.0	0.013	5.6	LOS A	0.0	0.3	0.09	0.57	0.09	53.4
3	R2	9	0.0	0.013	5.9	LOS A	0.0	0.3	0.09	0.57	0.09	52.9
Approach		18	0.0	0.013	5.7	LOS A	0.0	0.3	0.09	0.57	0.09	53.1
East: Wings Line												
4	L2	51	0.0	0.041	5.5	LOS A	0.0	0.0	0.00	0.39	0.00	55.1
5	T1	26	0.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.39	0.00	56.6
Approach		77	0.0	0.041	3.6	NA	0.0	0.0	0.00	0.39	0.00	55.6
West: Wings Line												
11	T1	29	0.0	0.045	0.2	LOS A	0.2	1.4	0.17	0.35	0.17	56.2
12	R2	49	0.0	0.045	5.7	LOS A	0.2	1.4	0.17	0.35	0.17	54.2
Approach		79	0.0	0.045	3.6	NA	0.2	1.4	0.17	0.35	0.17	55.0
All Vehicles		174	0.0	0.045	3.9	NA	0.2	1.4	0.08	0.39	0.08	55.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road AM + 10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	16	0.0	0.025	5.6	LOS A	0.1	0.6	0.09	0.57	0.09	53.3
3	R2	17	0.0	0.025	6.1	LOS A	0.1	0.6	0.09	0.57	0.09	52.8
Approach		33	0.0	0.025	5.9	LOS A	0.1	0.6	0.09	0.57	0.09	53.1
East: Wings Line												
4	L2	89	0.0	0.064	5.5	LOS A	0.0	0.0	0.00	0.44	0.00	54.7
5	T1	31	0.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.44	0.00	56.2
Approach		120	0.0	0.064	4.1	NA	0.0	0.0	0.00	0.44	0.00	55.1
West: Wings Line												
11	T1	35	0.0	0.072	0.3	LOS A	0.3	2.4	0.23	0.41	0.23	55.6
12	R2	87	0.0	0.072	5.8	LOS A	0.3	2.4	0.23	0.41	0.23	53.7
Approach		122	0.0	0.072	4.3	NA	0.3	2.4	0.23	0.41	0.23	54.2
All Vehicles		275	0.0	0.072	4.4	NA	0.3	2.4	0.11	0.44	0.11	54.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road AM + 20yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	34	0.0	0.060	5.7	LOS A	0.2	1.5	0.11	0.58	0.11	53.0
3	R2	36	0.0	0.060	6.9	LOS A	0.2	1.5	0.11	0.58	0.11	52.5
Approach		69	0.0	0.060	6.3	LOS A	0.2	1.5	0.11	0.58	0.11	52.7
East: Wings Line												
4	L2	196	0.0	0.125	5.6	LOS A	0.0	0.0	0.00	0.49	0.00	54.3
5	T1	39	0.0	0.125	0.0	LOS A	0.0	0.0	0.00	0.49	0.00	55.7
Approach		235	0.0	0.125	4.6	NA	0.0	0.0	0.00	0.49	0.00	54.6
West: Wings Line												
11	T1	42	0.0	0.154	0.8	LOS A	0.8	5.4	0.36	0.50	0.36	54.8
12	R2	192	0.0	0.154	6.3	LOS A	0.8	5.4	0.36	0.50	0.36	52.9
Approach		234	0.0	0.154	5.3	NA	0.8	5.4	0.36	0.50	0.36	53.2
All Vehicles		538	0.0	0.154	5.1	NA	0.8	5.4	0.17	0.50	0.17	53.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road PM + 5yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	24	0.0	0.039	5.6	LOS A	0.1	1.0	0.11	0.56	0.11	53.3
3	R2	28	0.0	0.039	5.7	LOS A	0.1	1.0	0.11	0.56	0.11	52.8
Approach		53	0.0	0.039	5.7	LOS A	0.1	1.0	0.11	0.56	0.11	53.0
East: Wings Line												
4	L2	9	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.13	0.00	57.3
5	T1	35	0.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	58.8
Approach		44	0.0	0.023	1.2	NA	0.0	0.0	0.00	0.13	0.00	58.5
West: Wings Line												
11	T1	26	0.0	0.019	0.0	LOS A	0.0	0.3	0.06	0.14	0.06	58.5
12	R2	8	0.0	0.019	5.6	LOS A	0.0	0.3	0.06	0.14	0.06	56.3
Approach		35	0.0	0.019	1.4	NA	0.0	0.3	0.06	0.14	0.06	57.9
All Vehicles		132	0.0	0.039	3.0	NA	0.1	1.0	0.06	0.30	0.06	56.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road PM + 10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	91	0.0	0.136	5.7	LOS A	0.5	3.7	0.13	0.56	0.13	53.3
3	R2	94	0.0	0.136	5.8	LOS A	0.5	3.7	0.13	0.56	0.13	52.7
Approach		184	0.0	0.136	5.7	LOS A	0.5	3.7	0.13	0.56	0.13	53.0
East: Wings Line												
4	L2	18	0.0	0.030	5.5	LOS A	0.0	0.0	0.00	0.18	0.00	56.8
5	T1	40	0.0	0.030	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.3
Approach		58	0.0	0.030	1.7	NA	0.0	0.0	0.00	0.18	0.00	57.9
West: Wings Line												
11	T1	32	0.0	0.026	0.1	LOS A	0.1	0.6	0.10	0.19	0.10	57.9
12	R2	16	0.0	0.026	5.6	LOS A	0.1	0.6	0.10	0.19	0.10	55.8
Approach		47	0.0	0.026	1.9	NA	0.1	0.6	0.10	0.19	0.10	57.2
All Vehicles		289	0.0	0.136	4.3	NA	0.5	3.7	0.10	0.43	0.10	54.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / Access Road PM + 20yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

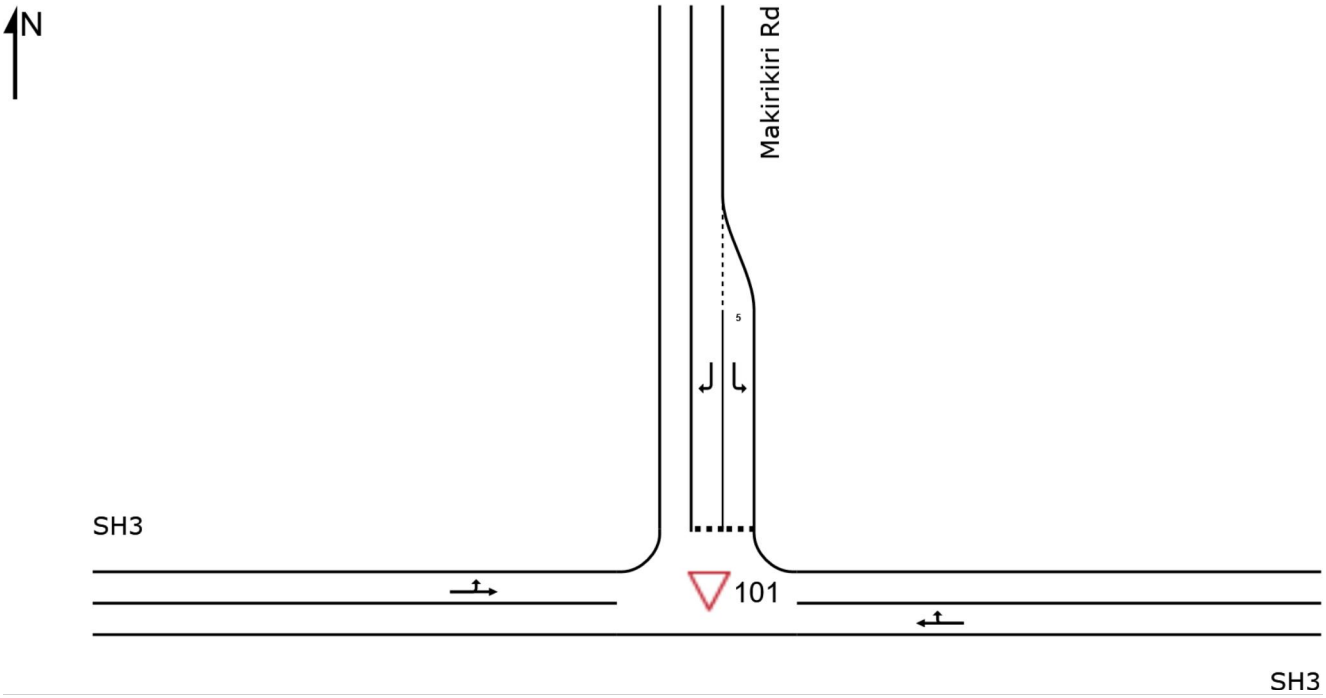
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Access Road												
1	L2	198	0.0	0.306	5.8	LOS A	1.4	9.8	0.19	0.57	0.19	53.1
3	R2	203	0.0	0.306	6.2	LOS A	1.4	9.8	0.19	0.57	0.19	52.6
Approach		401	0.0	0.306	6.0	LOS A	1.4	9.8	0.19	0.57	0.19	52.8
East: Wings Line												
4	L2	38	0.0	0.050	5.5	LOS A	0.0	0.0	0.00	0.23	0.00	56.4
5	T1	58	0.0	0.050	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	57.9
Approach		96	0.0	0.050	2.2	NA	0.0	0.0	0.00	0.23	0.00	57.3
West: Wings Line												
11	T1	40	0.0	0.042	0.2	LOS A	0.2	1.2	0.17	0.27	0.17	57.0
12	R2	35	0.0	0.042	5.7	LOS A	0.2	1.2	0.17	0.27	0.17	54.9
Approach		75	0.0	0.042	2.8	NA	0.2	1.2	0.17	0.27	0.17	56.0
All Vehicles		572	0.0	0.306	4.9	NA	1.4	9.8	0.16	0.48	0.16	53.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Makirikiri Rd / SH3 AM]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	245	15.5	0.139	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
6	R2	1	0.0	0.139	6.6	LOS A	0.0	0.1	0.00	0.00	0.00	58.0
Approach		246	15.4	0.139	0.0	NA	0.0	0.1	0.00	0.00	0.00	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.3	LOS A	0.0	0.0	0.33	0.52	0.33	52.6
9	R2	23	22.7	0.036	8.7	LOS A	0.1	0.9	0.47	0.71	0.47	50.0
Approach		24	21.7	0.036	8.6	LOS A	0.1	0.9	0.47	0.70	0.47	50.1
West: SH3												
10	L2	23	31.8	0.155	5.9	LOS A	0.0	0.0	0.00	0.05	0.00	56.4
11	T1	247	15.3	0.155	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.6
Approach		271	16.7	0.155	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
All Vehicles		541	16.3	0.155	0.7	NA	0.1	0.9	0.02	0.06	0.02	59.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM + 5yr Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	294	15.5	0.167	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
6	R2	1	0.0	0.167	7.0	LOS A	0.0	0.1	0.00	0.00	0.00	58.0
Approach		296	15.4	0.167	0.0	NA	0.0	0.1	0.00	0.00	0.00	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.5	LOS A	0.0	0.0	0.36	0.53	0.36	52.5
9	R2	28	22.7	0.049	9.7	LOS A	0.2	1.3	0.52	0.77	0.52	49.3
Approach		29	21.7	0.049	9.5	LOS A	0.2	1.3	0.51	0.76	0.51	49.5
West: SH3												
10	L2	28	31.8	0.186	5.9	LOS A	0.0	0.0	0.00	0.05	0.00	56.4
11	T1	297	15.3	0.186	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.6
Approach		325	16.7	0.186	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
All Vehicles		649	16.3	0.186	0.7	NA	0.2	1.3	0.03	0.06	0.03	59.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM 5yr Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	309	15.6	0.176	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	60.0
6	R2	1	0.0	0.176	8.4	LOS A	0.0	0.1	0.01	0.00	0.01	58.0
Approach		311	15.6	0.176	0.0	NA	0.0	0.1	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.6	LOS A	0.0	0.0	0.37	0.53	0.37	52.5
9	R2	68	9.2	0.130	10.5	LOS B	0.4	3.1	0.60	0.84	0.60	49.2
Approach		69	9.1	0.130	10.4	LOS B	0.4	3.1	0.60	0.84	0.60	49.2
West: SH3												
10	L2	225	4.2	0.301	5.6	LOS A	0.0	0.0	0.00	0.25	0.00	55.9
11	T1	313	15.2	0.301	0.0	LOS A	0.0	0.0	0.00	0.25	0.00	57.6
Approach		538	10.6	0.301	2.4	NA	0.0	0.0	0.00	0.25	0.00	56.9
All Vehicles		918	12.2	0.301	2.2	NA	0.4	3.1	0.05	0.21	0.05	57.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM +10yr Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	343	15.5	0.195	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	59.9
6	R2	1	0.0	0.195	7.4	LOS A	0.0	0.1	0.01	0.00	0.01	58.0
Approach		345	15.4	0.195	0.0	NA	0.0	0.1	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.7	LOS A	0.0	0.0	0.39	0.54	0.39	52.4
9	R2	32	22.7	0.066	10.9	LOS B	0.2	1.7	0.59	0.84	0.59	48.5
Approach		34	21.7	0.066	10.7	LOS B	0.2	1.7	0.58	0.82	0.58	48.7
West: SH3												
10	L2	32	31.8	0.217	5.9	LOS A	0.0	0.0	0.00	0.05	0.00	56.4
11	T1	346	15.3	0.217	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.6
Approach		379	16.7	0.217	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
All Vehicles		757	16.3	0.217	0.8	NA	0.2	1.7	0.03	0.06	0.03	59.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM + 10yr Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	361	15.5	0.205	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	59.9
6	R2	1	0.0	0.205	10.7	LOS B	0.0	0.2	0.01	0.00	0.01	58.0
Approach		362	15.4	0.205	0.1	NA	0.0	0.2	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.8	LOS A	0.0	0.0	0.40	0.53	0.40	52.4
9	R2	103	7.1	0.253	13.6	LOS B	0.9	6.5	0.73	0.92	0.82	47.3
Approach		104	7.1	0.253	13.6	LOS B	0.9	6.5	0.73	0.91	0.82	47.3
West: SH3												
10	L2	381	2.8	0.414	5.6	LOS A	0.0	0.0	0.00	0.30	0.00	55.5
11	T1	364	15.0	0.414	0.1	LOS A	0.0	0.0	0.00	0.30	0.00	57.1
Approach		745	8.8	0.414	2.9	NA	0.0	0.0	0.00	0.30	0.00	56.2
All Vehicles		1212	10.6	0.414	3.0	NA	0.9	6.5	0.06	0.26	0.07	56.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM + Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	441	15.5	0.251	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	59.9
6	R2	2	0.0	0.251	8.4	LOS A	0.0	0.2	0.01	0.00	0.01	58.0
Approach		443	15.4	0.251	0.1	NA	0.0	0.2	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	2	0.0	0.002	7.2	LOS A	0.0	0.0	0.45	0.56	0.45	52.2
9	R2	42	22.7	0.118	14.1	LOS B	0.4	3.0	0.72	0.89	0.72	46.5
Approach		44	21.7	0.118	13.8	LOS B	0.4	3.0	0.71	0.87	0.71	46.8
West: SH3												
10	L2	42	31.8	0.279	5.9	LOS A	0.0	0.0	0.00	0.05	0.00	56.4
11	T1	445	15.3	0.279	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.6
Approach		487	16.7	0.279	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.3
All Vehicles		974	16.3	0.279	0.9	NA	0.4	3.0	0.03	0.07	0.03	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 AM + Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	464	15.0	0.272	0.6	LOS A	0.3	2.2	0.03	0.00	0.04	59.3
6	R2	2	0.0	0.272	31.9	LOS D	0.3	2.2	0.03	0.00	0.04	57.4
Approach		466	14.9	0.272	0.8	NA	0.3	2.2	0.03	0.00	0.04	59.2
North: Makirikiri Rd												
7	L2	2	0.0	0.002	7.3	LOS A	0.0	0.1	0.46	0.57	0.46	52.2
9	R2	196	4.8	1.062	128.8	LOS F	14.7	107.4	1.00	2.16	5.86	18.8
Approach		198	4.8	1.062	127.5	LOS F	14.7	107.4	0.99	2.15	5.80	18.9
West: SH3												
10	L2	806	1.7	0.703	5.7	LOS A	0.0	0.0	0.00	0.37	0.00	54.8
11	T1	468	15.1	0.703	0.2	LOS A	0.0	0.0	0.00	0.37	0.00	56.2
Approach		1275	6.6	0.703	3.7	NA	0.0	0.0	0.00	0.37	0.00	55.3
All Vehicles		1939	8.4	1.062	15.6	NA	14.7	107.4	0.11	0.46	0.60	46.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	263	13.2	0.147	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
6	R2	1	0.0	0.147	6.9	LOS A	0.0	0.1	0.00	0.00	0.00	58.0
Approach		264	13.1	0.147	0.0	NA	0.0	0.1	0.00	0.00	0.00	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.5	LOS A	0.0	0.0	0.36	0.52	0.36	52.5
9	R2	15	0.0	0.021	8.2	LOS A	0.1	0.5	0.48	0.70	0.48	51.1
Approach		16	0.0	0.021	8.1	LOS A	0.1	0.5	0.47	0.69	0.47	51.2
West: SH3												
10	L2	29	17.9	0.186	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	57.0
11	T1	297	16.0	0.186	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
Approach		326	16.1	0.186	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		606	14.4	0.186	0.5	NA	0.1	0.5	0.01	0.05	0.01	59.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM + 5yr Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	316	13.2	0.177	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	60.0
6	R2	1	0.0	0.177	7.4	LOS A	0.0	0.1	0.01	0.00	0.01	58.0
Approach		317	13.1	0.177	0.0	NA	0.0	0.1	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	6.8	LOS A	0.0	0.0	0.40	0.54	0.40	52.4
9	R2	18	0.0	0.029	9.1	LOS A	0.1	0.6	0.53	0.75	0.53	50.4
Approach		19	0.0	0.029	9.0	LOS A	0.1	0.6	0.52	0.74	0.52	50.6
West: SH3												
10	L2	35	17.9	0.223	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	57.0
11	T1	356	16.0	0.223	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
Approach		392	16.1	0.223	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		728	14.4	0.223	0.5	NA	0.1	0.6	0.02	0.05	0.02	59.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM + 5yr Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	333	13.3	0.186	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
6	R2	1	0.0	0.186	8.1	LOS A	0.0	0.1	0.00	0.00	0.00	58.0
Approach		334	13.2	0.186	0.0	NA	0.0	0.1	0.00	0.00	0.00	60.0
North: Makirikiri Rd												
7	L2	1	0.0	0.001	7.0	LOS A	0.0	0.0	0.43	0.54	0.43	52.3
9	R2	223	0.0	0.416	12.4	LOS B	1.8	12.7	0.71	0.96	0.97	48.2
Approach		224	0.0	0.416	12.4	LOS B	1.8	12.7	0.70	0.96	0.96	48.2
West: SH3												
10	L2	79	8.0	0.277	5.7	LOS A	0.0	0.0	0.00	0.10	0.00	57.1
11	T1	413	14.5	0.277	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	59.0
Approach		492	13.5	0.277	0.9	NA	0.0	0.0	0.00	0.10	0.00	58.7
All Vehicles		1049	10.5	0.416	3.1	NA	1.8	12.7	0.15	0.25	0.21	56.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM + 10yr Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	368	13.2	0.206	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	59.9
6	R2	1	0.0	0.206	8.0	LOS A	0.0	0.1	0.01	0.00	0.01	58.0
Approach		370	13.1	0.206	0.0	NA	0.0	0.1	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	7.0	LOS A	0.0	0.0	0.44	0.55	0.44	52.3
9	R2	21	0.0	0.040	10.3	LOS B	0.1	0.9	0.60	0.82	0.60	49.7
Approach		22	0.0	0.040	10.0	LOS B	0.1	0.9	0.59	0.80	0.59	49.8
West: SH3												
10	L2	41	17.9	0.260	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	57.0
11	T1	416	16.0	0.260	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.5
Approach		457	16.1	0.260	0.6	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		849	14.4	0.260	0.6	NA	0.1	0.9	0.02	0.05	0.02	59.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM +10yr Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	387	13.3	0.217	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
6	R2	1	0.0	0.217	8.8	LOS A	0.0	0.1	0.00	0.00	0.00	58.0
Approach		388	13.3	0.217	0.0	NA	0.0	0.1	0.00	0.00	0.00	60.0
North: Makirikiri Rd												
7	L2	1	0.0	0.001	7.1	LOS A	0.0	0.0	0.45	0.55	0.45	52.2
9	R2	388	0.0	0.840	23.8	LOS C	7.0	48.9	0.92	1.44	2.61	41.9
Approach		389	0.0	0.840	23.8	LOS C	7.0	48.9	0.92	1.43	2.61	41.9
West: SH3												
10	L2	118	6.3	0.314	5.6	LOS A	0.0	0.0	0.00	0.13	0.00	56.8
11	T1	438	16.1	0.314	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	58.7
Approach		556	14.0	0.314	1.2	NA	0.0	0.0	0.00	0.13	0.00	58.3
All Vehicles		1334	9.7	0.840	7.5	NA	7.0	48.9	0.27	0.47	0.76	52.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM + Growth]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	474	13.2	0.266	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	59.9
6	R2	2	0.0	0.266	9.5	LOS A	0.0	0.2	0.01	0.00	0.01	58.0
Approach		476	13.1	0.266	0.1	NA	0.0	0.2	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.002	7.7	LOS A	0.0	0.0	0.50	0.58	0.50	52.0
9	R2	21	0.0	0.056	13.4	LOS B	0.2	1.2	0.73	0.89	0.73	47.6
Approach		22	0.0	0.056	13.0	LOS B	0.2	1.2	0.71	0.87	0.71	47.9
West: SH3												
10	L2	53	17.9	0.335	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	57.0
11	T1	534	16.0	0.335	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.4
Approach		587	16.1	0.335	0.6	NA	0.0	0.0	0.00	0.05	0.00	59.2
All Vehicles		1085	14.5	0.335	0.6	NA	0.2	1.2	0.02	0.05	0.02	59.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH3 PM + Growth + Development]

Makirikiri Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

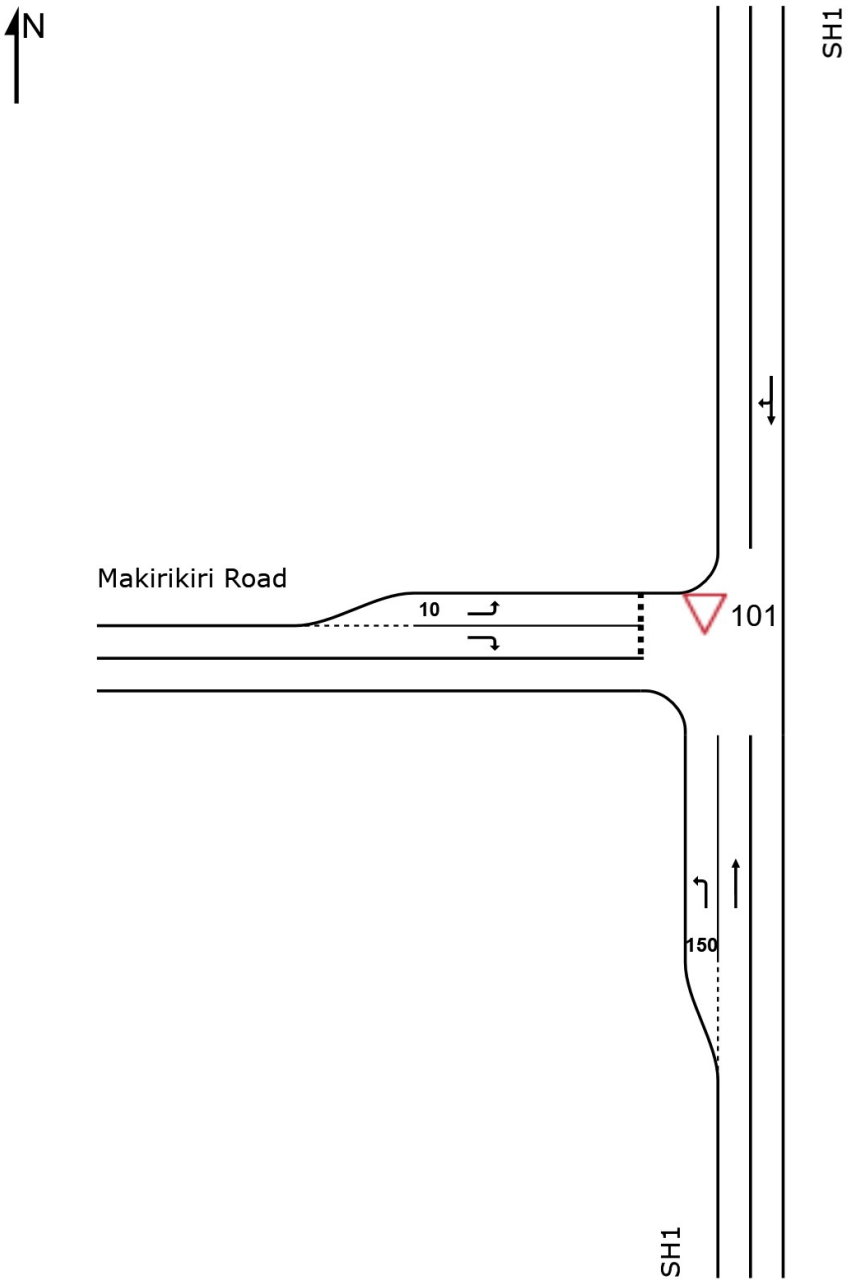
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	499	13.3	0.281	0.1	LOS A	0.1	0.4	0.01	0.00	0.01	59.9
6	R2	2	0.0	0.281	12.2	LOS B	0.1	0.4	0.01	0.00	0.01	58.0
Approach		501	13.2	0.281	0.1	NA	0.1	0.4	0.01	0.00	0.01	59.9
North: Makirikiri Rd												
7	L2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.51	0.58	0.51	51.8
9	R2	821	0.0	2.875	1701.1	LOS F	344.3	2410.2	1.00	10.45	38.86	2.1
Approach		822	0.0	2.875	1698.9	LOS F	344.3	2410.2	1.00	10.44	38.81	2.1
West: SH3												
10	L2	219	4.3	0.440	5.7	LOS A	0.0	0.0	0.00	0.17	0.00	56.5
11	T1	562	15.9	0.440	0.1	LOS A	0.0	0.0	0.00	0.17	0.00	58.2
Approach		781	12.7	0.440	1.6	NA	0.0	0.0	0.00	0.17	0.00	57.7
All Vehicles		2104	7.9	2.875	664.4	NA	344.3	2410.2	0.39	4.14	15.17	5.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Makirikiri Rd / SH1 AM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	83	21.5	0.052	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	48.8
2	T1	221	20.0	0.128	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		304	20.4	0.128	4.6	NA	0.0	0.0	0.00	0.48	0.00	70.8
North: SH1												
8	T1	137	29.2	0.091	4.4	LOS A	0.1	0.7	0.05	0.43	0.05	68.5
9	R2	6	33.3	0.091	8.1	LOS A	0.1	0.7	0.05	0.43	0.05	60.5
Approach		143	29.4	0.091	4.6	NA	0.1	0.7	0.05	0.43	0.05	68.2
West: Makirikiri Road												
10	L2	4	50.0	0.004	7.3	LOS A	0.0	0.2	0.35	0.54	0.35	48.1
12	R2	72	22.1	0.120	9.7	LOS A	0.5	3.9	0.53	0.75	0.53	47.0
Approach		76	23.6	0.120	9.6	LOS A	0.5	3.9	0.52	0.74	0.52	47.0
All Vehicles		523	23.3	0.128	5.3	NA	0.5	3.9	0.09	0.50	0.09	66.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM + 5yr Growth]

Makirikiri Rd / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	91	21.5	0.057	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	48.8
2	T1	243	20.0	0.141	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		335	20.4	0.141	4.6	NA	0.0	0.0	0.00	0.48	0.00	70.8
North: SH1												
8	T1	151	29.2	0.101	4.3	LOS A	0.1	0.8	0.06	0.42	0.06	68.8
9	R2	7	33.3	0.101	10.9	LOS B	0.1	0.8	0.06	0.42	0.06	60.8
Approach		157	29.4	0.101	4.6	NA	0.1	0.8	0.06	0.42	0.06	68.5
West: Makirikiri Road												
10	L2	5	50.0	0.005	7.4	LOS A	0.0	0.2	0.37	0.55	0.37	48.0
12	R2	79	22.1	0.142	10.3	LOS B	0.5	4.5	0.56	0.79	0.56	46.5
Approach		83	23.6	0.142	10.2	LOS B	0.5	4.5	0.55	0.77	0.55	46.6
All Vehicles		575	23.3	0.142	5.4	NA	0.5	4.5	0.10	0.51	0.10	66.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM + 5yr Growth + Development]

Makirikiri Rd / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	486	3.7	0.269	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	51.3
2	T1	221	20.0	0.128	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		707	8.8	0.269	5.2	NA	0.0	0.0	0.00	0.54	0.00	59.5
North: SH1												
8	T1	137	29.2	0.098	4.9	LOS A	0.2	1.6	0.10	0.40	0.10	67.8
9	R2	6	33.3	0.098	15.5	LOS C	0.2	1.6	0.10	0.40	0.10	59.8
Approach		143	29.4	0.098	5.3	NA	0.2	1.6	0.10	0.40	0.10	67.5
West: Makirikiri Road												
10	L2	4	50.0	0.004	7.3	LOS A	0.0	0.2	0.35	0.54	0.35	48.1
12	R2	147	10.7	0.298	12.6	LOS B	1.3	10.2	0.65	0.89	0.76	45.1
Approach		152	11.8	0.298	12.5	LOS B	1.3	10.2	0.64	0.88	0.75	45.2
All Vehicles		1002	12.2	0.298	6.3	NA	1.3	10.2	0.11	0.57	0.13	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM +10yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	116	21.5	0.072	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	48.8
2	T1	309	20.0	0.179	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		426	20.4	0.179	4.6	NA	0.0	0.0	0.00	0.48	0.00	70.8
North: SH1												
8	T1	192	29.2	0.130	4.5	LOS A	0.2	1.3	0.07	0.42	0.07	68.3
9	R2	9	33.3	0.130	9.5	LOS A	0.2	1.3	0.07	0.42	0.07	60.3
Approach		200	29.4	0.130	4.8	NA	0.2	1.3	0.07	0.42	0.07	68.0
West: Makirikiri Road												
10	L2	6	50.0	0.007	7.9	LOS A	0.0	0.3	0.42	0.58	0.42	47.8
12	R2	100	22.1	0.223	12.7	LOS B	0.9	7.3	0.64	0.86	0.67	44.7
Approach		106	23.6	0.223	12.4	LOS B	0.9	7.3	0.63	0.84	0.65	44.8
All Vehicles		732	23.3	0.223	5.8	NA	0.9	7.3	0.11	0.52	0.11	65.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM + 10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	836	3.1	0.460	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	51.3
2	T1	325	21.7	0.190	4.2	LOS A	0.0	0.0	0.00	0.45	0.00	80.9
Approach		1161	8.3	0.460	5.2	NA	0.0	0.0	0.00	0.54	0.00	58.6
North: SH1												
8	T1	202	29.2	0.215	14.4	LOS B	2.0	17.8	0.37	0.30	0.41	56.6
9	R2	13	50.0	0.215	37.2	LOS E	2.0	17.8	0.37	0.30	0.41	46.4
Approach		215	30.4	0.215	15.8	NA	2.0	17.8	0.37	0.30	0.41	56.1
West: Makirikiri Road												
10	L2	6	50.0	0.007	8.0	LOS A	0.0	0.3	0.43	0.58	0.43	47.7
12	R2	240	9.6	0.471	14.3	LOS B	2.7	20.3	0.70	0.99	1.04	43.9
Approach		246	10.7	0.471	14.1	LOS B	2.7	20.3	0.70	0.98	1.03	44.0
All Vehicles		1622	11.6	0.471	8.0	NA	2.7	20.3	0.15	0.57	0.21	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM + Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	150	21.5	0.093	5.8	LOS A	0.0	0.0	0.00	0.57	0.00	48.8
2	T1	398	20.0	0.231	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		548	20.4	0.231	4.6	NA	0.0	0.0	0.00	0.48	0.00	70.8
North: SH1												
8	T1	246	29.2	0.171	4.8	LOS A	0.3	2.3	0.09	0.41	0.09	67.9
9	R2	11	33.3	0.171	11.5	LOS B	0.3	2.3	0.09	0.41	0.09	59.9
Approach		258	29.4	0.171	5.1	NA	0.3	2.3	0.09	0.41	0.09	67.6
West: Makirikiri Road												
10	L2	8	50.0	0.010	8.6	LOS A	0.0	0.4	0.48	0.62	0.48	47.2
12	R2	129	22.1	0.388	18.9	LOS C	1.7	14.5	0.79	0.99	1.04	40.6
Approach		136	23.6	0.388	18.3	LOS C	1.7	14.5	0.77	0.97	1.01	40.9
All Vehicles		942	23.3	0.388	6.7	NA	1.7	14.5	0.14	0.53	0.17	64.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 AM + Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	1724	2.0	0.941	6.7	LOS A	0.0	0.0	0.00	0.57	0.00	50.1
2	T1	419	19.8	0.243	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.2
Approach		2143	5.5	0.941	6.2	NA	0.0	0.0	0.00	0.54	0.00	55.2
North: SH1												
8	T1	259	28.9	2.088	1352.8	LOS F	190.0	1657.9	1.00	0.06	2.29	2.2
9	R2	12	27.3	2.088	1383.9	LOS F	190.0	1657.9	1.00	0.06	2.29	1.7
Approach		271	28.8	2.088	1354.1	NA	190.0	1657.9	1.00	0.06	2.29	2.2
West: Makirikiri Road												
10	L2	8	50.0	0.011	8.8	LOS A	0.0	0.4	0.49	0.63	0.49	47.0
12	R2	431	6.8	1.082	117.6	LOS F	35.3	261.6	1.00	3.15	8.25	16.5
Approach		439	7.7	1.082	115.5	LOS F	35.3	261.6	0.99	3.10	8.10	16.7
All Vehicles		2853	8.0	2.088	150.8	NA	190.0	1657.9	0.25	0.89	1.46	13.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	66	6.3	0.037	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
2	T1	209	17.1	0.119	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		276	14.5	0.119	4.5	NA	0.0	0.0	0.00	0.48	0.00	73.2
North: SH1												
8	T1	208	15.7	0.119	4.1	LOS A	0.0	0.1	0.01	0.45	0.01	69.5
9	R2	1	0.0	0.119	6.9	LOS A	0.0	0.1	0.01	0.45	0.01	69.6
Approach		209	15.6	0.119	4.1	NA	0.0	0.1	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	3	0.0	0.002	6.2	LOS A	0.0	0.1	0.30	0.53	0.30	50.7
12	R2	96	7.7	0.151	9.4	LOS A	0.6	4.4	0.54	0.77	0.54	47.8
Approach		99	7.4	0.151	9.3	LOS A	0.6	4.4	0.53	0.76	0.53	47.8
All Vehicles		584	13.7	0.151	5.2	NA	0.6	4.4	0.09	0.52	0.09	67.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM + 5yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	80	6.3	0.045	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
2	T1	251	17.1	0.143	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		331	14.5	0.143	4.5	NA	0.0	0.0	0.00	0.48	0.00	73.2
North: SH1												
8	T1	250	15.7	0.143	4.1	LOS A	0.0	0.1	0.01	0.45	0.01	69.5
9	R2	1	0.0	0.143	7.3	LOS A	0.0	0.1	0.01	0.45	0.01	69.6
Approach		251	15.6	0.143	4.1	NA	0.0	0.1	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	4	0.0	0.003	6.3	LOS A	0.0	0.1	0.33	0.54	0.33	50.5
12	R2	115	7.7	0.208	10.7	LOS B	0.8	6.1	0.60	0.83	0.60	46.7
Approach		119	7.4	0.208	10.5	LOS B	0.8	6.1	0.59	0.82	0.59	46.8
All Vehicles		701	13.7	0.208	5.4	NA	0.8	6.1	0.10	0.53	0.10	66.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM + 5yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	164	3.2	0.090	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	51.3
2	T1	264	17.1	0.151	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		428	11.8	0.151	4.7	NA	0.0	0.0	0.00	0.50	0.00	68.7
North: SH1												
8	T1	263	15.6	0.150	4.1	LOS A	0.0	0.1	0.01	0.45	0.01	69.5
9	R2	1	0.0	0.150	8.0	LOS A	0.0	0.1	0.01	0.45	0.01	69.6
Approach		264	15.5	0.150	4.1	NA	0.0	0.1	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	4	0.0	0.003	6.4	LOS A	0.0	0.1	0.34	0.54	0.34	50.5
12	R2	538	1.6	0.922	31.7	LOS D	17.3	123.1	0.93	1.88	3.68	34.5
Approach		542	1.6	0.922	31.5	LOS D	17.3	123.1	0.92	1.87	3.65	34.6
All Vehicles		1235	8.1	0.922	16.3	NA	17.3	123.1	0.41	1.09	1.61	49.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM + 10yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	93	6.3	0.052	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
2	T1	293	17.1	0.167	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		386	14.5	0.167	4.5	NA	0.0	0.0	0.00	0.48	0.00	73.2
North: SH1												
8	T1	292	15.7	0.166	4.1	LOS A	0.0	0.1	0.01	0.45	0.01	69.5
9	R2	1	0.0	0.166	7.8	LOS A	0.0	0.1	0.01	0.45	0.01	69.6
Approach		293	15.6	0.166	4.1	NA	0.0	0.1	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	4	0.0	0.004	6.5	LOS A	0.0	0.1	0.36	0.55	0.36	50.4
12	R2	134	7.7	0.280	12.7	LOS B	1.2	8.9	0.66	0.89	0.76	45.1
Approach		139	7.4	0.280	12.5	LOS B	1.2	8.9	0.65	0.88	0.74	45.3
All Vehicles		818	13.7	0.280	5.7	NA	1.2	8.9	0.11	0.54	0.13	66.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM +10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	241	2.6	0.132	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	51.4
2	T1	308	17.1	0.176	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		549	10.7	0.176	4.8	NA	0.0	0.0	0.00	0.50	0.00	67.1
North: SH1												
8	T1	326	14.8	0.185	4.1	LOS A	0.0	0.1	0.01	0.45	0.01	69.5
9	R2	1	0.0	0.185	9.2	LOS A	0.0	0.1	0.01	0.45	0.01	69.6
Approach		327	14.8	0.185	4.1	NA	0.0	0.1	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	4	0.0	0.004	6.6	LOS A	0.0	0.1	0.37	0.55	0.37	50.4
12	R2	887	1.2	1.799	734.4	LOS F	258.6	1828.5	1.00	9.67	29.10	3.5
Approach		892	1.2	1.799	730.9	LOS F	258.6	1828.5	1.00	9.62	28.97	3.5
All Vehicles		1768	6.7	1.799	370.7	NA	258.6	1828.5	0.50	5.09	14.60	7.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM + Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	119	6.3	0.067	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
2	T1	377	17.1	0.215	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.7
Approach		496	14.5	0.215	4.5	NA	0.0	0.0	0.00	0.48	0.00	73.2
North: SH1												
8	T1	375	15.7	0.214	4.1	LOS A	0.0	0.2	0.01	0.45	0.01	69.5
9	R2	2	0.0	0.214	9.0	LOS A	0.0	0.2	0.01	0.45	0.01	69.5
Approach		377	15.6	0.214	4.1	NA	0.0	0.2	0.01	0.45	0.01	69.5
West: Makirikiri Road												
10	L2	6	0.0	0.005	6.9	LOS A	0.0	0.1	0.42	0.57	0.42	50.2
12	R2	172	7.7	0.488	19.6	LOS C	2.4	18.2	0.82	1.04	1.21	40.6
Approach		178	7.4	0.488	19.2	LOS C	2.4	18.2	0.80	1.02	1.19	40.8
All Vehicles		1052	13.7	0.488	6.8	NA	2.4	18.2	0.14	0.56	0.20	64.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Makirikiri Rd / SH1 PM + Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

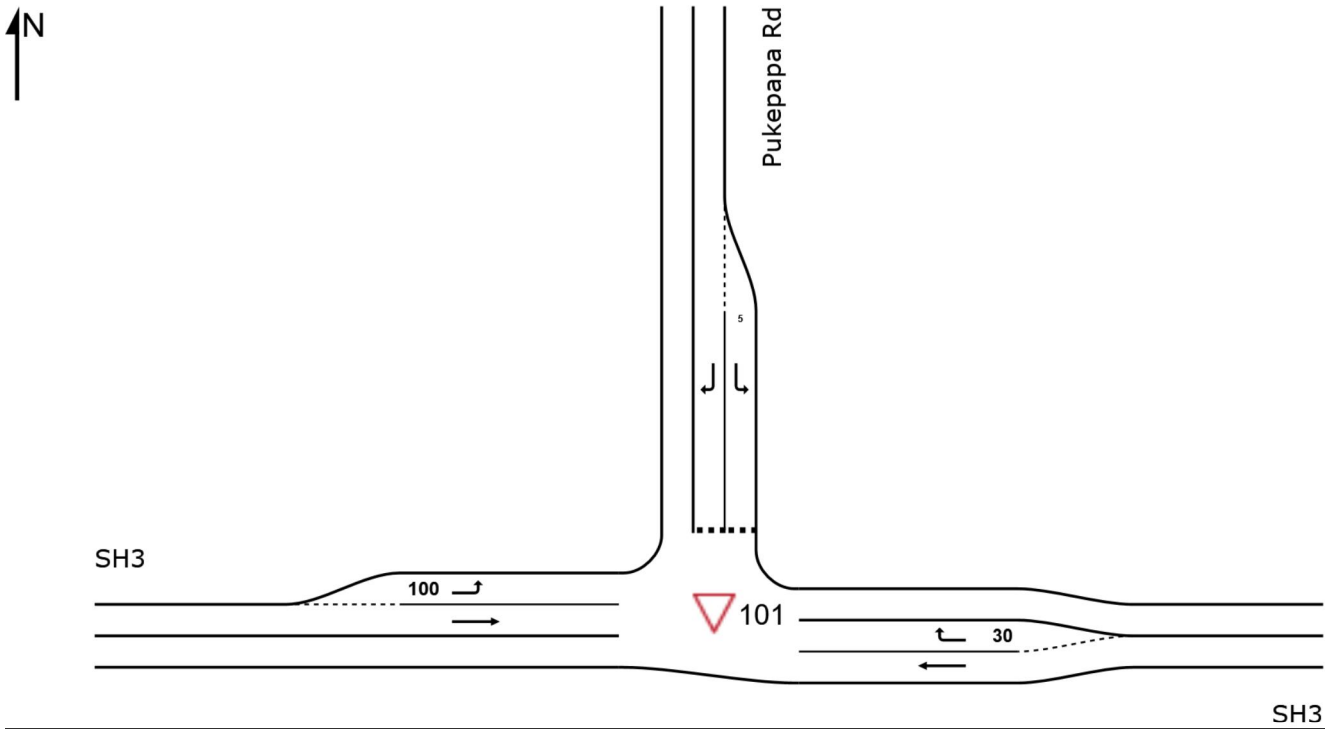
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	436	1.7	0.237	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	51.5
2	T1	397	17.0	0.226	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.8
Approach		833	9.0	0.237	4.9	NA	0.0	0.0	0.00	0.51	0.00	64.6
North: SH1												
8	T1	395	15.5	0.227	4.2	LOS A	0.1	0.5	0.01	0.44	0.02	69.3
9	R2	2	0.0	0.227	12.9	LOS B	0.1	0.5	0.01	0.44	0.02	69.4
Approach		397	15.4	0.227	4.2	NA	0.1	0.5	0.01	0.44	0.02	69.3
West: Makirikiri Road												
10	L2	6	0.0	0.006	7.0	LOS A	0.0	0.2	0.43	0.58	0.43	50.2
12	R2	1813	0.8	6.377	4848.0	LOS F	977.2	6884.3	1.00	12.12	42.58	0.6
Approach		1819	0.8	6.377	4831.1	LOS F	977.2	6884.3	1.00	12.08	42.43	0.6
All Vehicles		3048	4.9	6.377	2884.6	NA	977.2	6884.3	0.60	7.41	25.32	1.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Pukepapa Rd / SH3 PM + Growth]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	256	18.1	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	45	16.3	0.047	7.2	LOS A	0.2	1.4	0.39	0.62	0.39	51.6
Approach		301	17.8	0.148	1.1	NA	0.2	1.4	0.06	0.09	0.06	58.5
North: Pukepapa Rd												
7	L2	63	18.3	0.071	7.3	LOS A	0.3	2.0	0.38	0.63	0.38	51.7
9	R2	2	50.0	0.007	15.3	LOS C	0.0	0.2	0.65	0.72	0.65	45.4
Approach		65	19.4	0.071	7.5	LOS A	0.3	2.0	0.39	0.63	0.39	51.5
West: SH3												
10	L2	4	75.0	0.003	6.4	LOS A	0.0	0.0	0.00	0.57	0.00	50.6
11	T1	271	14.4	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		275	15.3	0.152	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		641	16.9	0.152	1.3	NA	0.3	2.0	0.07	0.11	0.07	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM 5yr scenario]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	307	18.1	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	54	16.3	0.061	7.6	LOS A	0.2	1.9	0.43	0.65	0.43	51.3
Approach		361	17.8	0.177	1.2	NA	0.2	1.9	0.07	0.10	0.07	58.5
North: Pukepapa Rd												
7	L2	76	18.3	0.091	7.7	LOS A	0.3	2.6	0.42	0.66	0.42	51.4
9	R2	3	50.0	0.011	19.0	LOS C	0.0	0.4	0.73	0.80	0.73	43.4
Approach		78	19.4	0.091	8.1	LOS A	0.3	2.6	0.43	0.67	0.43	51.1
West: SH3												
10	L2	5	75.0	0.004	6.4	LOS A	0.0	0.0	0.00	0.57	0.00	50.6
11	T1	325	14.4	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		330	15.3	0.182	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		769	16.9	0.182	1.4	NA	0.3	2.6	0.07	0.12	0.07	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM 5yr Scenario + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	323	17.9	0.187	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	57	14.8	0.081	9.1	LOS A	0.3	2.4	0.54	0.75	0.54	50.3
Approach		380	17.5	0.187	1.4	NA	0.3	2.4	0.08	0.11	0.08	58.3
North: Pukepapa Rd												
7	L2	80	17.1	0.098	7.8	LOS A	0.4	2.8	0.43	0.67	0.43	51.4
9	R2	42	2.5	0.138	16.4	LOS C	0.5	3.4	0.75	0.90	0.75	46.0
Approach		122	12.1	0.138	10.8	LOS B	0.5	3.4	0.54	0.75	0.54	49.4
West: SH3												
10	L2	201	0.5	0.109	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	342	13.8	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		543	8.9	0.191	2.1	NA	0.0	0.0	0.00	0.21	0.00	57.4
All Vehicles		1045	12.4	0.191	2.8	NA	0.5	3.4	0.09	0.24	0.09	56.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM 10yr scenario]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	358	18.1	0.206	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	63	16.3	0.077	8.0	LOS A	0.3	2.3	0.47	0.69	0.47	51.0
Approach		421	17.8	0.206	1.2	NA	0.3	2.3	0.07	0.10	0.07	58.4
North: Pukepapa Rd												
7	L2	88	18.3	0.115	8.2	LOS A	0.4	3.3	0.46	0.70	0.46	51.0
9	R2	3	50.0	0.016	23.9	LOS C	0.1	0.5	0.79	0.89	0.79	41.0
Approach		91	19.4	0.115	8.7	LOS A	0.4	3.3	0.47	0.71	0.47	50.6
West: SH3												
10	L2	6	75.0	0.005	6.4	LOS A	0.0	0.0	0.00	0.57	0.00	50.6
11	T1	379	14.4	0.212	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		385	15.3	0.212	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		897	16.9	0.212	1.5	NA	0.4	3.3	0.08	0.12	0.08	58.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM 10yr scenario + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	377	17.9	0.217	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	66	14.3	0.126	11.4	LOS B	0.5	3.7	0.64	0.85	0.64	48.7
Approach		443	17.3	0.217	1.7	NA	0.5	3.7	0.10	0.13	0.10	58.0
North: Pukepapa Rd												
7	L2	93	17.0	0.123	8.4	LOS A	0.4	3.5	0.48	0.72	0.48	51.0
9	R2	73	1.4	0.336	25.5	LOS D	1.3	9.1	0.86	0.99	1.04	41.3
Approach		165	10.2	0.336	15.9	LOS C	1.3	9.1	0.64	0.84	0.72	46.2
West: SH3												
10	L2	354	0.6	0.191	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	399	14.0	0.223	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		753	7.7	0.223	2.6	NA	0.0	0.0	0.00	0.27	0.00	56.8
All Vehicles		1361	11.1	0.336	3.9	NA	1.3	9.1	0.11	0.29	0.12	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM + Growth]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	460	18.1	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	81	16.3	0.117	9.2	LOS A	0.4	3.5	0.55	0.77	0.55	50.2
Approach		542	17.8	0.266	1.4	NA	0.4	3.5	0.08	0.12	0.08	58.2
North: Pukepapa Rd												
7	L2	114	18.3	0.175	9.5	LOS A	0.6	5.1	0.54	0.80	0.54	50.2
9	R2	4	50.0	0.037	39.8	LOS E[11]	0.1	1.1	0.89	0.95	0.89	34.8
Approach		117	19.4	0.175	10.4	LOS B	0.6	5.1	0.55	0.80	0.55	49.5
West: SH3												
10	L2	8	75.0	0.006	6.4	LOS A	0.0	0.0	0.00	0.57	0.00	50.6
11	T1	487	14.4	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		495	15.3	0.273	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1154	16.9	0.273	1.8	NA	0.6	5.1	0.09	0.14	0.09	57.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 AM + Growth + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	484	18.0	0.279	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	85	16.0	0.446	31.4	LOS D	1.7	13.4	0.92	1.04	1.20	38.4
Approach		569	17.7	0.446	4.7	NA	1.7	13.4	0.14	0.16	0.18	55.3
North: Pukepapa Rd												
7	L2	120	17.5	0.192	9.8	LOS A	0.7	5.6	0.56	0.81	0.56	50.0
9	R2	156	1.4	2.022	972.0	LOS F	55.2	390.5	1.00	3.56	11.97	3.4
Approach		276	8.4	2.022	553.3	LOS F	55.2	390.5	0.81	2.37	7.00	5.8
West: SH3												
10	L2	771	0.3	0.416	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	53.5
11	T1	513	14.4	0.287	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1283	5.9	0.416	3.4	NA	0.0	0.0	0.00	0.35	0.00	55.9
All Vehicles		2128	9.4	2.022	75.0	NA	55.2	390.5	0.14	0.56	0.96	26.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	249	14.3	0.141	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	114	3.7	0.115	7.2	LOS A	0.5	3.3	0.43	0.66	0.43	52.0
Approach		363	11.0	0.141	2.3	NA	0.5	3.3	0.13	0.21	0.13	57.2
North: Pukepapa Rd												
7	L2	66	6.3	0.073	7.2	LOS A	0.3	1.9	0.40	0.64	0.40	52.1
9	R2	5	20.0	0.016	14.4	LOS B	0.1	0.4	0.67	0.78	0.67	46.7
Approach		72	7.4	0.073	7.8	LOS A	0.3	1.9	0.42	0.65	0.42	51.7
West: SH3												
10	L2	6	0.0	0.003	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	309	17.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		316	16.7	0.176	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		751	13.0	0.176	1.9	NA	0.5	3.3	0.10	0.17	0.10	57.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + 5yr Growth]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	299	14.3	0.169	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	136	3.7	0.150	7.7	LOS A	0.6	4.4	0.48	0.70	0.48	51.6
Approach		436	11.0	0.169	2.4	NA	0.6	4.4	0.15	0.22	0.15	57.1
North: Pukepapa Rd												
7	L2	80	6.3	0.095	7.7	LOS A	0.3	2.5	0.44	0.68	0.44	51.8
9	R2	6	20.0	0.025	18.1	LOS C	0.1	0.7	0.75	0.87	0.75	44.6
Approach		86	7.4	0.095	8.5	LOS A	0.3	2.5	0.47	0.70	0.47	51.2
West: SH3												
10	L2	8	0.0	0.004	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	371	17.0	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		379	16.7	0.211	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		901	13.0	0.211	2.0	NA	0.6	4.4	0.12	0.18	0.12	57.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + 5yr Growth + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	315	14.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	143	3.7	0.170	8.2	LOS A	0.7	4.9	0.52	0.74	0.52	51.3
Approach		458	10.8	0.177	2.6	NA	0.7	4.9	0.16	0.23	0.16	56.9
North: Pukepapa Rd												
7	L2	84	6.3	0.103	7.9	LOS A	0.4	2.7	0.46	0.70	0.46	51.6
9	R2	211	0.5	0.842	41.1	LOS E	5.9	41.5	0.92	1.41	2.55	35.1
Approach		295	2.1	0.842	31.6	LOS D	5.9	41.5	0.79	1.21	1.95	38.6
West: SH3												
10	L2	51	0.0	0.027	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	391	17.0	0.222	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		441	15.0	0.222	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.1
All Vehicles		1194	10.2	0.842	9.0	NA	5.9	41.5	0.26	0.41	0.54	51.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + 10yr Growth]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	349	14.3	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	159	3.7	0.192	8.3	LOS A	0.8	5.6	0.53	0.76	0.53	51.2
Approach		508	11.0	0.197	2.6	NA	0.8	5.6	0.17	0.24	0.17	56.9
North: Pukepapa Rd												
7	L2	93	6.3	0.121	8.3	LOS A	0.4	3.2	0.49	0.73	0.49	51.4
9	R2	7	20.0	0.038	23.1	LOS C	0.1	1.0	0.81	0.92	0.81	42.0
Approach		100	7.4	0.121	9.4	LOS A	0.4	3.2	0.51	0.74	0.51	50.5
West: SH3												
10	L2	9	0.0	0.005	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	433	17.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		442	16.7	0.247	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1051	13.0	0.247	2.2	NA	0.8	5.6	0.13	0.19	0.13	57.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + 10yr Growth + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	367	14.0	0.207	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
6	R2	167	3.8	0.227	9.2	LOS A	0.9	6.6	0.58	0.82	0.58	50.6
Approach		535	10.8	0.227	2.9	NA	0.9	6.6	0.18	0.26	0.18	56.7
North: Pukepapa Rd												
7	L2	98	6.5	0.132	8.5	LOS A	0.5	3.5	0.50	0.75	0.50	51.2
9	R2	374	0.3	1.947	878.6	LOS F	121.4	852.1	1.00	6.08	20.76	3.8
Approach		472	1.6	1.947	698.0	LOS F	121.4	852.1	0.90	4.97	16.55	4.7
West: SH3												
10	L2	84	0.0	0.045	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	456	16.6	0.259	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		540	14.0	0.259	0.9	NA	0.0	0.0	0.00	0.09	0.00	58.9
All Vehicles		1546	9.1	1.947	214.2	NA	121.4	852.1	0.34	1.64	5.11	13.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + Growth]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	449	14.3	0.254	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	205	3.7	0.300	10.3	LOS B	1.4	9.8	0.62	0.87	0.72	49.8
Approach		654	11.0	0.300	3.2	NA	1.4	9.8	0.19	0.27	0.22	56.4
North: Pukepapa Rd												
7	L2	119	6.3	0.190	9.7	LOS A	0.7	5.0	0.57	0.82	0.57	50.3
9	R2	9	20.0	0.092	39.9	LOS E[11]	0.3	2.3	0.90	0.96	0.90	35.2
Approach		129	7.4	0.190	12.0	LOS B	0.7	5.0	0.59	0.83	0.59	48.8
West: SH3												
10	L2	11	0.0	0.006	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	557	17.0	0.317	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		568	16.7	0.317	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1351	13.0	0.317	2.8	NA	1.4	9.8	0.15	0.22	0.16	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: 101 [Pukepapa Rd / SH3 PM + Growth + Development]

Pukepapa Rd / SH3
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

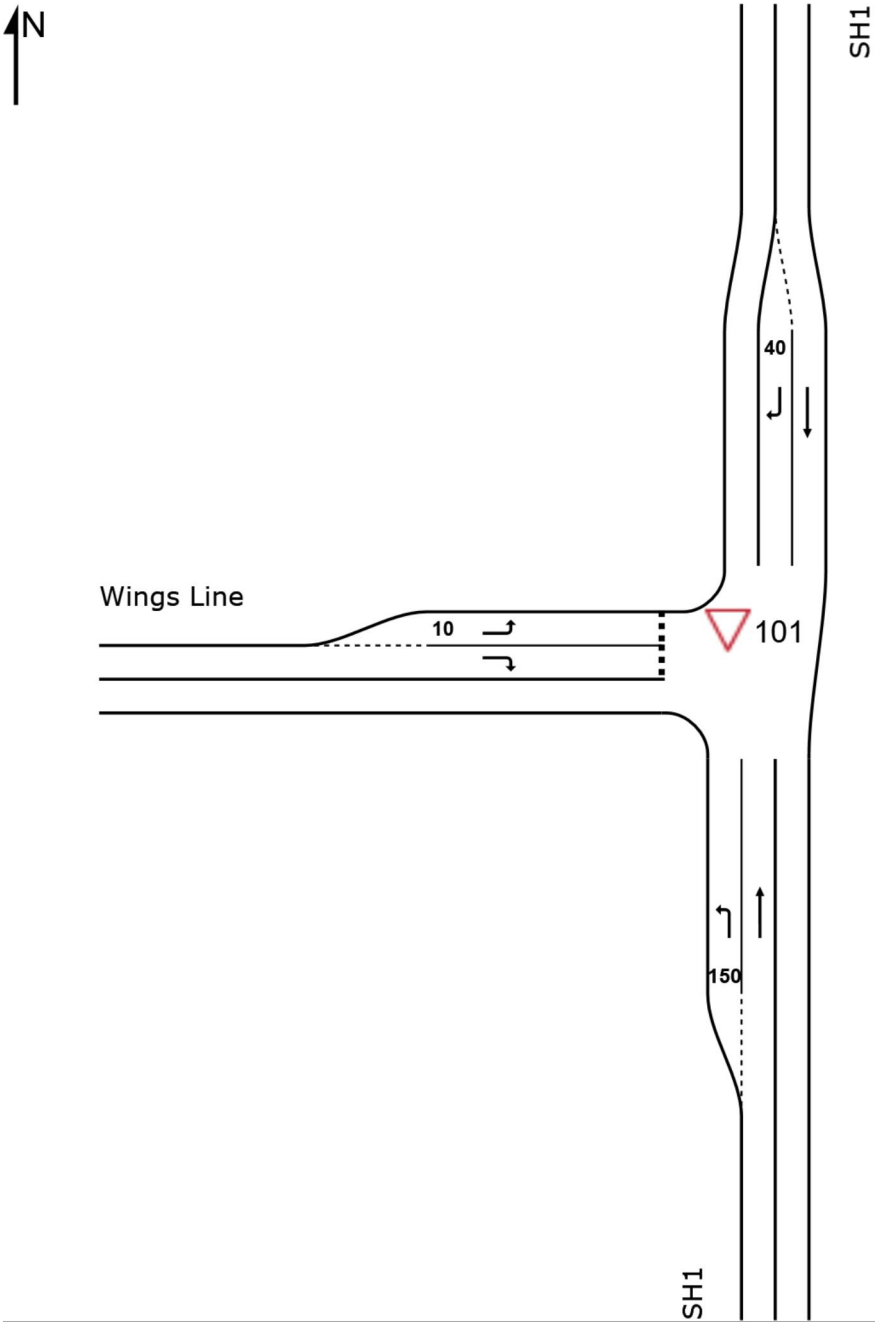
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: SH3												
5	T1	473	14.3	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	216	3.9	0.411	13.7	LOS B	2.0	14.5	0.74	0.98	1.01	47.6
Approach		688	11.0	0.411	4.3	NA	2.0	14.5	0.23	0.31	0.32	55.4
North: Pukepapa Rd												
7	L2	125	5.9	0.209	10.1	LOS B	0.7	5.5	0.59	0.83	0.60	50.1
9	R2	808	0.3	8.279	6567.7	LOS F	468.0	3283.4	1.00	5.88	21.74	0.5
Approach		934	1.0	8.279	5688.0	LOS F	468.0	3283.4	0.95	5.20	18.91	0.6
West: SH3												
10	L2	175	0.0	0.094	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
11	T1	586	17.1	0.334	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		761	13.1	0.334	1.3	NA	0.0	0.0	0.00	0.13	0.00	58.3
All Vehicles		2383	7.8	8.279	2230.1	NA	468.0	3283.4	0.44	2.17	7.50	1.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Wings Line / SH1 PM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	18	17.6	0.011	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.3
2	T1	208	20.7	0.121	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		226	20.5	0.121	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.1
North: SH1												
8	T1	124	31.4	0.077	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	3	33.3	0.003	7.2	LOS A	0.0	0.1	0.36	0.54	0.36	46.1
Approach		127	31.4	0.077	4.4	NA	0.0	0.1	0.01	0.44	0.01	78.2
West: Wings Line												
10	L2	6	16.7	0.007	6.7	LOS A	0.0	0.2	0.32	0.55	0.32	49.8
12	R2	17	12.5	0.028	8.9	LOS A	0.1	0.8	0.48	0.66	0.48	48.2
Approach		23	13.6	0.028	8.3	LOS A	0.1	0.8	0.44	0.63	0.44	48.7
All Vehicles		377	23.7	0.121	4.6	NA	0.1	0.8	0.03	0.46	0.03	76.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM + 5yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	21	17.6	0.013	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.3
2	T1	250	20.7	0.146	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		272	20.5	0.146	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.1
North: SH1												
8	T1	149	31.4	0.092	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	4	33.3	0.004	7.5	LOS A	0.0	0.1	0.40	0.56	0.40	46.0
Approach		153	31.4	0.092	4.4	NA	0.0	0.1	0.01	0.44	0.01	78.2
West: Wings Line												
10	L2	8	16.7	0.008	7.0	LOS A	0.0	0.2	0.35	0.57	0.35	49.6
12	R2	20	12.5	0.038	9.9	LOS A	0.1	1.1	0.53	0.71	0.53	47.4
Approach		28	13.6	0.038	9.1	LOS A	0.1	1.1	0.48	0.67	0.48	48.0
All Vehicles		452	23.7	0.146	4.7	NA	0.1	1.1	0.03	0.46	0.03	75.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM + 5yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	22	9.5	0.013	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	50.4
2	T1	263	20.8	0.153	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		285	19.9	0.153	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.3
North: SH1												
8	T1	157	30.9	0.097	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.4
9	R2	55	1.9	0.053	6.9	LOS A	0.2	1.5	0.39	0.61	0.39	50.0
Approach		212	23.4	0.097	5.0	NA	0.2	1.5	0.10	0.48	0.10	70.7
West: Wings Line												
10	L2	18	5.9	0.019	6.9	LOS A	0.1	0.5	0.35	0.59	0.35	50.2
12	R2	21	10.0	0.043	10.7	LOS B	0.2	1.2	0.56	0.74	0.56	46.9
Approach		39	8.1	0.043	9.0	LOS A	0.2	1.2	0.46	0.67	0.46	48.3
All Vehicles		536	20.4	0.153	4.9	NA	0.2	1.5	0.07	0.48	0.07	72.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM +10yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	25	17.6	0.015	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.3
2	T1	292	20.7	0.170	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		317	20.5	0.170	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.1
North: SH1												
8	T1	174	31.4	0.107	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	4	33.3	0.005	7.9	LOS A	0.0	0.2	0.43	0.58	0.43	45.7
Approach		178	31.4	0.107	4.4	NA	0.0	0.2	0.01	0.44	0.01	78.2
West: Wings Line												
10	L2	9	16.7	0.010	7.3	LOS A	0.0	0.3	0.38	0.59	0.38	49.5
12	R2	24	12.5	0.050	11.1	LOS B	0.2	1.4	0.56	0.75	0.56	46.5
Approach		32	13.6	0.050	10.0	LOS B	0.2	1.4	0.52	0.71	0.52	47.3
All Vehicles		528	23.7	0.170	4.7	NA	0.2	1.4	0.04	0.47	0.04	75.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM +10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	26	16.0	0.016	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.5
2	T1	307	20.5	0.179	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		334	20.2	0.179	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.2
North: SH1												
8	T1	183	31.0	0.114	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	94	1.1	0.096	7.3	LOS A	0.4	2.7	0.44	0.65	0.44	50.0
Approach		277	20.9	0.114	5.3	NA	0.4	2.7	0.15	0.51	0.15	68.2
West: Wings Line												
10	L2	26	4.0	0.029	7.1	LOS A	0.1	0.7	0.39	0.61	0.39	50.1
12	R2	25	12.5	0.064	12.9	LOS B	0.2	1.8	0.63	0.83	0.63	45.1
Approach		52	8.2	0.064	10.0	LOS A	0.2	1.8	0.51	0.72	0.51	47.5
All Vehicles		662	19.6	0.179	5.2	NA	0.4	2.7	0.10	0.50	0.10	71.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM + Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	31	17.6	0.019	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.3
2	T1	356	20.7	0.207	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		387	20.5	0.207	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.1
North: SH1												
8	T1	212	31.4	0.131	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	5	33.3	0.007	8.5	LOS A	0.0	0.2	0.48	0.61	0.48	45.2
Approach		218	31.4	0.131	4.4	NA	0.0	0.2	0.01	0.44	0.01	78.2
West: Wings Line												
10	L2	11	16.7	0.014	7.8	LOS A	0.0	0.4	0.43	0.62	0.43	49.1
12	R2	29	12.5	0.075	13.2	LOS B	0.3	2.0	0.64	0.84	0.64	44.9
Approach		40	13.6	0.075	11.8	LOS B	0.3	2.0	0.58	0.78	0.58	45.9
All Vehicles		644	23.7	0.207	4.8	NA	0.3	2.0	0.04	0.47	0.04	75.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 AM + Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	32	17.6	0.020	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	49.3
2	T1	375	20.7	0.218	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.2
Approach		407	20.5	0.218	4.3	NA	0.0	0.0	0.00	0.45	0.00	78.1
North: SH1												
8	T1	382	31.1	0.237	4.3	LOS A	0.0	0.0	0.00	0.44	0.00	79.3
9	R2	389	0.5	0.437	9.3	LOS A	2.7	19.2	0.60	0.87	0.78	48.3
Approach		770	15.7	0.437	6.9	NA	2.7	19.2	0.30	0.66	0.40	62.0
West: Wings Line												
10	L2	119	1.5	0.139	7.7	LOS A	0.5	3.6	0.46	0.70	0.46	49.7
12	R2	13	28.6	0.114	38.0	LOS E[11]	0.3	3.0	0.90	0.96	0.90	31.7
Approach		131	4.1	0.139	10.6	LOS B	0.5	3.6	0.50	0.73	0.50	47.2
All Vehicles		1309	16.0	0.437	6.5	NA	2.7	19.2	0.23	0.60	0.28	64.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	26	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	186	19.2	0.107	4.2	LOS A	0.0	0.0	0.00	0.45	0.00	81.5
Approach		213	16.8	0.107	4.4	NA	0.0	0.0	0.00	0.46	0.00	77.2
North: SH1												
8	T1	194	15.8	0.110	4.2	LOS A	0.0	0.0	0.00	0.45	0.00	82.1
9	R2	1	0.0	0.001	6.4	LOS A	0.0	0.0	0.32	0.52	0.32	50.6
Approach		195	15.7	0.110	4.2	NA	0.0	0.0	0.00	0.45	0.00	81.9
West: Wings Line												
10	L2	4	50.0	0.005	7.3	LOS A	0.0	0.2	0.32	0.55	0.32	48.2
12	R2	17	12.5	0.029	9.4	LOS A	0.1	0.8	0.50	0.68	0.50	47.9
Approach		21	20.0	0.029	8.9	LOS A	0.1	0.8	0.47	0.65	0.47	47.9
All Vehicles		428	16.5	0.110	4.5	NA	0.1	0.8	0.02	0.46	0.02	77.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + 5yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	32	0.0	0.017	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	224	19.2	0.129	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.4
Approach		255	16.8	0.129	4.3	NA	0.0	0.0	0.00	0.46	0.00	77.1
North: SH1												
8	T1	232	15.8	0.131	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	82.0
9	R2	1	0.0	0.001	6.5	LOS A	0.0	0.0	0.35	0.53	0.35	50.3
Approach		234	15.7	0.131	4.1	NA	0.0	0.0	0.00	0.45	0.00	81.8
West: Wings Line												
10	L2	5	50.0	0.006	7.6	LOS A	0.0	0.2	0.35	0.56	0.35	48.0
12	R2	20	12.5	0.040	10.5	LOS B	0.1	1.1	0.55	0.73	0.55	46.7
Approach		25	20.0	0.040	9.9	LOS A	0.1	1.1	0.51	0.70	0.51	47.0
All Vehicles		514	16.5	0.131	4.5	NA	0.1	1.1	0.03	0.47	0.03	77.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + 5yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	34	0.0	0.018	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	236	19.2	0.136	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.4
Approach		269	16.8	0.136	4.3	NA	0.0	0.0	0.00	0.46	0.00	77.1
North: SH1												
8	T1	244	15.9	0.139	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	82.0
9	R2	11	0.0	0.010	6.6	LOS A	0.0	0.3	0.36	0.57	0.36	50.2
Approach		255	15.3	0.139	4.2	NA	0.0	0.3	0.01	0.45	0.01	80.4
West: Wings Line												
10	L2	58	3.6	0.057	6.7	LOS A	0.2	1.5	0.34	0.60	0.34	50.3
12	R2	21	15.0	0.045	11.2	LOS B	0.2	1.3	0.57	0.76	0.57	46.1
Approach		79	6.7	0.057	7.9	LOS A	0.2	1.5	0.40	0.64	0.40	49.1
All Vehicles		603	14.8	0.139	4.7	NA	0.2	1.5	0.06	0.48	0.06	74.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + 10yr Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	37	0.0	0.020	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	261	19.2	0.150	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.4
Approach		298	16.8	0.150	4.3	NA	0.0	0.0	0.00	0.46	0.00	77.1
North: SH1												
8	T1	271	15.8	0.153	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	82.0
9	R2	1	0.0	0.001	6.7	LOS A	0.0	0.0	0.38	0.54	0.38	50.2
Approach		273	15.7	0.153	4.1	NA	0.0	0.0	0.00	0.45	0.00	81.8
West: Wings Line												
10	L2	6	50.0	0.008	7.9	LOS A	0.0	0.3	0.39	0.58	0.39	47.7
12	R2	24	12.5	0.054	11.8	LOS B	0.2	1.5	0.59	0.79	0.59	45.7
Approach		29	20.0	0.054	11.0	LOS B	0.2	1.5	0.55	0.74	0.55	46.1
All Vehicles		600	16.5	0.153	4.5	NA	0.2	1.5	0.03	0.47	0.03	77.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + 10yr Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	39	0.0	0.021	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	275	19.2	0.158	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	81.4
Approach		314	16.8	0.158	4.3	NA	0.0	0.0	0.00	0.46	0.00	77.1
North: SH1												
8	T1	285	15.9	0.163	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	82.0
9	R2	19	0.0	0.019	6.9	LOS A	0.1	0.5	0.40	0.60	0.40	50.1
Approach		304	14.9	0.163	4.3	NA	0.1	0.5	0.02	0.46	0.02	79.6
West: Wings Line												
10	L2	100	3.2	0.103	7.0	LOS A	0.4	2.7	0.38	0.63	0.38	50.2
12	R2	25	12.5	0.063	12.7	LOS B	0.2	1.7	0.62	0.82	0.62	45.0
Approach		125	5.0	0.103	8.1	LOS A	0.4	2.7	0.43	0.67	0.43	49.1
All Vehicles		743	14.0	0.163	4.9	NA	0.4	2.7	0.08	0.50	0.08	72.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + Growth]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	47	0.0	0.026	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	335	19.2	0.193	4.2	LOS A	0.0	0.0	0.00	0.44	0.00	81.5
Approach		383	16.8	0.193	4.4	NA	0.0	0.0	0.00	0.46	0.00	77.2
North: SH1												
8	T1	349	15.8	0.197	4.2	LOS A	0.0	0.0	0.00	0.45	0.00	82.1
9	R2	2	0.0	0.002	7.3	LOS A	0.0	0.1	0.44	0.56	0.44	50.1
Approach		351	15.7	0.197	4.2	NA	0.0	0.1	0.00	0.45	0.00	81.9
West: Wings Line												
10	L2	8	50.0	0.011	8.7	LOS A	0.0	0.4	0.44	0.62	0.44	47.1
12	R2	30	12.5	0.093	15.3	LOS C	0.3	2.5	0.70	0.87	0.70	43.4
Approach		38	20.0	0.093	14.0	LOS B	0.3	2.5	0.65	0.82	0.65	44.1
All Vehicles		771	16.5	0.197	4.8	NA	0.3	2.5	0.03	0.47	0.03	77.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Wings Line / SH1 PM + Growth + Development]

Wings Line / SH1
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: SH1												
1	L2	49	0.0	0.027	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	51.8
2	T1	353	10.1	0.193	4.1	LOS A	0.0	0.0	0.00	0.45	0.00	83.2
Approach		402	8.9	0.193	4.3	NA	0.0	0.0	0.00	0.46	0.00	78.7
North: SH1												
8	T1	367	15.8	0.209	4.2	LOS A	0.0	0.0	0.00	0.45	0.00	82.1
9	R2	40	0.0	0.043	7.4	LOS A	0.2	1.1	0.45	0.65	0.45	50.0
Approach		407	14.2	0.209	4.5	NA	0.2	1.1	0.04	0.47	0.04	78.3
West: Wings Line												
10	L2	212	2.0	0.235	7.6	LOS A	0.9	6.6	0.46	0.71	0.46	49.8
12	R2	32	13.3	0.109	17.0	LOS C	0.4	2.9	0.74	0.89	0.74	42.2
Approach		243	3.5	0.235	8.8	LOS A	0.9	6.6	0.50	0.73	0.50	48.7
All Vehicles		1053	9.7	0.235	5.4	NA	0.9	6.6	0.13	0.53	0.13	70.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D
CAS (Safety) Data

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Makirikiri Road / SH1

CODED CRASH ID	Crash road	Distance	Direction	Side road	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor
1200307	01N-0914		I	Makirikiri Road	201965340	29-08-19	Thu	7:45	Car/Wagon1 SDB on SH 1 hit rear of Car/Wagon2 SDB on SH 1 turning right from centre line	CAR/WAGON2, alcohol test above limit or test refused CAR/WAGON1, alcohol test below limit, failed to notice car slowing, stopping/stationary	Dry	Bright sun	Fine	T Junction	Nil	0	0	1
1072027	MAKIRIKIRI ROAD		I	SH 1N	201613633	08-03-16	Tue	9:55	Car/Wagon1 NDB on MAKIRIKIRI ROAD hit Car/Wagon2 turning right onto AXROAD from the left, Car/Wagon1 hit non specific ditch	CAR/WAGON2, did not check/notice another party from other dirn, failed to give way at priority traffic control	Dry	Overcast	Fine	T Junction	Give way	0	0	2
1034253	SH 1N		I	MAKIRIKIRI ROAD	201449371	13-12-14	Sat	12:55	Van1 NDB on SH 1N hit Car/Wagon2 turning right onto AXROAD from the left	CAR/WAGON2, did not check/notice another party from other dirn, failed to give way at priority traffic control	Dry	Bright sun	Fine	T Junction	Give way	0	0	0
1074549	SH 1N		I	MAKIRIKIRI ROAD	201616196	25-09-16	Sun	13:05	Car/Wagon1 and Car/Wagon2 both SDB on SH1 and turning; collided	CAR/WAGON2, did not check/notice another party from other dirn, impaired ability due to old age	Dry	Overcast	Fine	T Junction	Give way	0	1	3

Makirikiri Road / SH3

CODED CRASH ID	Crash road	Distance	Direction	Side road	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor
1171516	MAKIRIKIRI ROAD		I	SH 3	201845818	09-08-18	Thu	7:30	Car/Wagon1 EDB on SH3 lost control; went off road to left	CAR/WAGON1, attention diverted by food, cigarettes, beverages, failed to notice arrows/markings, swerved to avoid vehicle, too far left	Wet	Twilight	Light rain	T Junction	Give way	0	0	0
1108072	SH 3		I	MAKIRIKIRI ROAD	201712545	29-03-17	Wed	5:25	Car/Wagon1 EDB on SH 3 lost control; went off road to left	CAR/WAGON1, alcohol suspected, too far left	Dry	Dark	Fine	T Junction	Give way	0	0	2
1108585	SH 3		I	MAKIRIKIRI ROAD	201713064	20-03-17	Mon	5:25	Car/Wagon1 EDB on SH 3 hit Van2 turning right onto AXROAD from the left	CAR/WAGON1, alcohol suspected, too far left	Dry	Dark	Fine	T Junction	Give way	0	0	2
1109136	SH 3		I	MAKIRIKIRI ROAD	201713624	22-03-17	Wed	12:50	Truck1 WDB on State highway 3 hit turning Truck2	TRUCK2, alcohol suspected, did not check/notice another party from other dirn, failed to give way at priority traffic control	Wet	Overcast	Light rain	T Junction	Give way	0	0	1

Pukepapa Road / SH3

CODED CRASH ID	Crash road	Distance	Direction	Side road	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor
1166278	PUKEPAPA ROAD	30	N	SH 3	201840556	28-04-18	Sat	19:40	Van1 SDB on PUKEPAPA ROAD, MARTON, RANGITIKEI lost control turning right, Van1 hit non specific fence	VAN1, alcohol test above limit or test refused, lost control when turning, speed entering corner/curve	Wet	Dark	Light rain	Nil (Default)	Unknown	0	0	0
1099650	SH 3		I	PUKEPAPA ROAD	201651773	05-11-16	Sat	18:10	Car/Wagon1 NDB on Pukepapa Road missed intersection or end of road, Car/Wagon1 hit non specific fence	CAR/WAGON1, speed approaching a traffic control	Dry	Overcast	Fine	T Junction	Give way	0	0	0
1056351	SH 3	30	S	PUKEPAPA ROAD	201541971	03-04-15	Fri	4:13	Car/Wagon1 NDB on SH 3 lost control but did not leave the road, Car/Wagon1 hit non specific fence	CAR/WAGON1, alcohol test above limit or test refused, driver over-reacted, other fatigue	Dry	Dark	Fine	Nil (Default)	Unknown	0	0	0
1013002	SH 3		I	PUKEPAPA ROAD	201416775	26-10-14	Sun	15:40	Truck1 SDB on SH 3 lost control turning right, Truck1 hit non specific pole, non specific traffic sign	TRUCK1, lost control when turning, too far left	Dry	Overcast	Fine	T Junction	Stop	0	0	1
1038383	SH 3		I	PUKEPAPA ROAD	201512206	13-04-15	Mon	15:15	Car/Wagon1 NDB on SH 3 lost control; went off road to right, Car/Wagon1 hit non specific fence, non specific tree	CAR/WAGON1, alcohol test below limit, lost control avoiding another party, ENV: other slippery road	Wet	Overcast	Fine	T Junction	Give way	0	0	1

Appendix E

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Makirikiri Road Level Crossing 529, Marton

Level Crossing Safety Impact Assessment

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Contents

Document History and Status

Revision	Date	Author	Reviewed by	Approved by	Status
1	10/10/19	B. Feary	T. Burt	M. Evis	For Comment
2	11/10/19	B. Feary	T. Burt	M. Evis	Issue 1

Revision Details

Revision	Details
2	Approved by KiwiRail

Executive Summary

A District Plan Change is proposed to rezone 217 Hectares of rural land immediately northeast of the Makirikiri Road Level Crossing 529 to industrial land. The North Island Main Trunk Line is the western boundary of the land to be rezoned, the others being Makirikiri Road to the south, Wings Line to the North and State Highway 1 to the east. The main road access into the industrial area is planned to be from Makirikiri Road to the east of the existing level crossing.

Traffic volumes from the site will travel east and west and are expected to increase over time as the site is developed. In addition, it is anticipated the development will include access to the rail line, however this is yet to be confirmed.

The existing crossing carries a daily volume of 1640vpd with 13% HCV, which with the proposed industrial development is expected to increase to 5700-7900vpd with 44% HCV in 5-years and 8000-8900vpd with 50% HCV in 10 years. The road posted speed limit is 100km/h and the rail line speed 100-110km/h.

The crossing controls were upgraded from Flashing Lights and Bells to include Half Arm Barriers in 2015. The change in controls was not updated in the LXM database so is not reflected in the current crossing risk calculations. The crossing signs and markings are not to TCD 9 requirements and should be upgraded. Grade separation of the crossing is not possible or feasible with the plan change. No nearby crossings with lower volumes are proposed to be closed.

The consensus from the KiwiRail and RCA representatives who met on site to evaluate the crossing is that the crossing has appropriate sight distances and controls to safely manage current and future user volumes resulting from the plan change development. The crossing meets LCSIA Risk Criterion 2 and signs and markings upgrades to TCD 9 are recommended.

LCSS and ALCAM Evaluation

The Level Crossing Safety Score (LCSS) Procedure assesses and scores the risk of a fatality at the crossing for the upgraded existing, proposal and future traffic volume scenarios.

The tables below detail the progression of the LCSS for the level crossing through the stages of this LCSS while aiming to achieve the KiwiRail LCSIA Criteria.

An attempt was made to achieve Criterion 1 through road infrastructure changes to the crossing. Current S2 and S3 sighting meet requirements, the crossing already has flashing lights, bells and half arm barriers but the signs and road markings are not to TCD 9 requirements. The rail line speed is 110km/h. KiwiRail representatives confirmed this is not the operating speed for all trains using the line as this will depend on the train and its loading.

No additional road infrastructure tested in the LXM database could address the main crossing risk of the High Speed Rail line. No infrastructure proposal tested created any significant reduction in the ALCAM risk level which remained High for all existing and increased volume scenarios. Infrastructure changes tested included duplication of the existing Flashing Lights at the crossing and advance train activated warning signs. Upgrading of road signs and markings to TCD 9 was included in the proposals.

The Proposal and Future LCSS scores were able to meet Criterion 2, an LCSS number out of 60, equal to the Updated Existing LCSS number.

Table No. 1: Summary of change in LCSS at Crossing 529

	Updated Existing	Change in Use	Proposal	Future
LCSS	34/60	38/60	34/60	34/60
LCSS Risk Band	Medium	Medium	Medium	Medium
Criterion met	-	None	Criterion 2	

The updated existing LCSS is Medium and the Change in Use, Proposal and Future Scores all achieve a Medium Level Crossing Safety Score.

A summary of the changes to the ALCAM risk bands are presented in the following table.

Table No. 2: Summary of ALCAM change at crossing 529

	Updated Existing	Change in Use	Proposal	Future
ALCAM Risk Band	High	High	High	High
ALCAM Risk Score Change (%)	-	309%	234%	287%
Fatal Return Period	267	65	80	69

The updated existing ALCAM risk band was High, which stayed high for the future volume and upgraded crossing scenarios. The return period for predicted fatal crashes has reduced by 198 years from the Updated Existing to Future Use Scenarios.

Recommended Road Crossing Improvements

As discussed on site with KiwiRail staff, the current road markings and signs are not compliant with TCD 9. The proposed design includes providing duplicated WX1L and WX1R advance warning signs to the correct sight distance on each approach, yellow hatching in the crossing, and no passing markings on the approaches.

Also tested in the LXM database were duplicate Flashing Lights on each approach and advance Active Warning signs. These upgrades did not change the ALCAM risk score significantly enough to move it out of the LCSS High risk band of 28/30 for the change in use, proposal or future scenarios.

There has been one incident at the crossing involving a vehicle racing the barrier arms in 2016 which resulted in the barrier arm striking a towed car on a trailer. The LE identified the existing crossing as one of the better crossings on the network due to available sightlines, and with signs and markings upgrades to TCD 9 to reduce the likelihood of drivers overtaking on the approaches, for the future use scenarios as one of the best on the network. The LE cautioned that future development works should not involve planting or structures that affect the existing sightlines between road and rail.

Future User Volume Surveys

The applicant is required to conduct additional user volume (including proportion of user type) surveys two years after the opening of the new intersection from the plan change area onto

Makirikiri Road and review whether a change in controls is required. Subsequent surveys and reviews must be completed in three yearly cycles thereafter.

Recommended Updates in ALCAM

Update the crossing controls to include the existing half arm barriers which were installed in 2015.

1 Background

This Level Crossing Safety Impact Assessment is for a change in use of the existing ALCAM Level Crossing 529 Makirikiri Road, Marton. The crossing is located at KM178.24 of the North Island Main Trunk Line and 1.294 kilometres west of the intersection of SH1 and Makirikiri Road.

A District Plan Change is proposed to re-zone 217 Hectares of rural land south of Marton which is bounded by SH1, Makirikiri Road, the North Island Main Trunk Line (NIMT) and Wings Line to Industrial land. The level crossing is at the southwest corner of the proposed industrial zone. At this stage the location of the road access points from the industrial area have not been confirmed but two road access points are proposed, the major one from Makirikiri Road and a secondary access from Wings Line. Access to the rail line from the industrial area is also proposed.

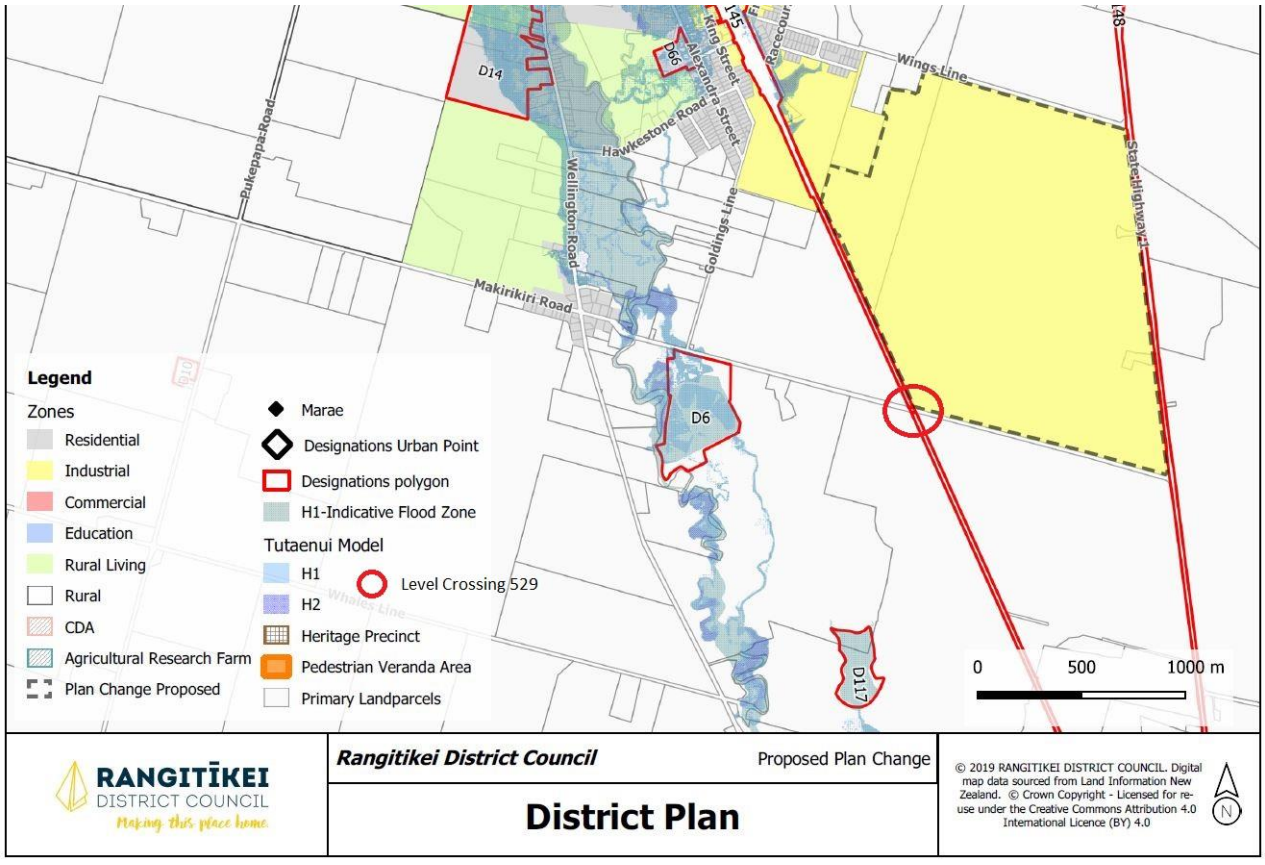

Figure 1: Extract – Rangitikei District Council District Plan Change

2 Existing Crossing

The existing crossing is controlled by Flashing Lights, Bells and Barrier Arms. KiwiRail site staff confirmed these were installed four years ago, in 2015. The LXM database has not been updated with the change in controls, so the updated existing evaluation includes a change in infrastructure and ADT.

KiwiRail Staff confirmed the current train speed at the crossing is up to 100-110km/h and there are 32 trains per day. Current road volumes are 1640vpd with 13% HCV (est, 01/04/2019).

2.1 General Safety Review

The crossing is a high speed rural crossing with a 100km/h road speed limit and a 100-110km/h rail line speed. The crossing has flashing lights, bells and half arm barriers but the signs and markings

on site are not to TCD 9 requirements. There are no Level Crossing Ahead Steam Train (WX1L and WX1R) signs in advance of the crossing, the crossing advance warning signs are white crossbucks. There are no no-overtaking markings on the approaches to the crossing and no yellow crosshatching within the crossing. There are Rail X markings on both approaches and vehicle limit lines.

KiwiRail staff rated the crossing highly due to the clear sightlines between trains and vehicles due to the level approaches and lack of vegetation along adjacent property boundaries. If planting is added to the environment in the future, they would caution the locations be reviewed to ensure they do not affect visibility for train drivers.

Their only concerns were related to driver behaviour and the road width at the crossing. The high-speed approach can lead to drivers racing around the barrier arms and the lack of shoulders to drivers driving marginally over the centreline through the crossing.

3 Change in Use Proposal

The purpose of this LCSIA is to inform the design process going forward.

The following traffic volumes are the calculated projected daily traffic volume on Makirikiri Road through the crossing due to the industrial plan change.

Table No. 3: Traffic Volume Scenarios

Daily Traffic Volume Scenario	5-years	10-years
No Development	1977	2304
With the Industrial Development (volume range)	5700 – 7900 vpd 44% HCV	8000 – 8900 vpd 50% HCV

The highest volume in the 10-year range has been used in the Change in Use and Future volume scenarios. The highest volume in the 5-year range has been used in the Proposed Design scenario as the opening volume.

The general principle for modifying an existing level crossing is the Proposed Design and Future Score LCSS achieve Criterion 1, however where the modifications required to meet Criterion 1 are not reasonably practicable for an existing level crossing upgrade the level of treatment must meet or exceed Criterion 2.

The current crossing with updated existing data has a safety flag in the LXM database for high speed rail. Road infrastructure upgrades do not significantly affect the ALCAM risk scores, which remain High for all upgrade options proposed. Therefore, to reduce the ALCAM score the crossing upgrade options are to grade separate or close the crossing to address the flag, which are not reasonably practicable for the crossing or the plan change. As such the aim of the assessment has been to achieve Criterion 2, which is achieved in the Proposed and Future evaluations.

Criterion 1: *requires the Proposed Design and Future Score of a level crossing to achieve a 'Low' or 'Medium-Low' level of risk as determined by the LCSS.*

Criterion 2*: requires the Proposed Deign and Future Score of a level crossing to achieve an LCSS number (out of 60), lower than or equal to the Updated Existing LCSS number.*

The Level Crossing Safety Score Risk Bands are defined in the following figure:

Figure 7: Level crossing safety score risk bands

Figure 2: Level Crossing Safety Score Risk Bands

4 Level Crossing Safety Score

The level crossing safety score has been calculated for the Updated Existing crossing, an improvement proposal (signs and markings to TCD 9) and a future road volume as follows.

1 Updated Existing – ALCAM and LCSS Scoring for the existing level crossing conditions found on site.
2 Change in Use – ALCAM and LCSS Scoring for the forecast 10-year user volumes over the crossing in its Updated Existing state.
3 Proposed Design – ALCAM and LCSS incorporating all the improvement recommendations for the user volumes shortly after opening, that aim to achieve Criterion 1. As improvements to meet Criterion 1 are not reasonably practicable, the aim is to achieve Criterion 2.
4 Future Score – ALCAM and LCSS ten years post opening with proposed design improvements that aim to achieve Criterion 1. As improvements to meet Criterion 1 are not reasonably practicable, the aim is to achieve Criterion 2.

4.1 ALCAM Level Crossing Safety Score

Table No. 4: ALCAM Level Crossing Score – Existing Crossing

LCSS	Score	Fatality Return	Risk % Change	Comments
Published Score	26/30	128 years	-	This is for historic crossing controls: Primary Flashing Lights only, an ADT of 1340 and rail volume of 32. The crossing was upgraded in 2015 to include barrier arms. **The ALCAM Risk Score is 78. The Risk Band Jurisdiction is High and the Likelihood Band Jurisdiction is High.** The LCSS Risk Score is 26 and the Risk Band is High.
Top Rated Characteristics				Safety Risk Flags
▪ Distance from Advance warning to crossing ▪ Slowest train speed at crossing ▪ Conformance to TCD Part 9				▪ High Speed train ▪ Sun Glare Sighting Crossing on Road
Updated Existing	25/30	267 years	-	The existing LXM data has been updated to reflect that the current crossing has half arm barriers, flashing lights and bells, an ADT of 1650vpd with 13% HCV and an asphalt panel and approach surfacing and the limit lines have been relocated to ~8m from the rail line. **The ALCAM Risk Score is 37.5 The Risk Band Jurisdiction is High and the Likelihood Band Jurisdiction is High**. The LCSS Risk Score is 25 and the Risk Band is High.
Top Rated Characteristics				Safety Risk Flags
▪ SSD – advance visibility of crossing from road ▪ Distance from advance warning to crossing ▪ Slowest train speed at crossing				▪ High Speed Train
Change in Use	28/30	65 years	309%	The updated existing crossing has had the forecast 10-year user volumes (8900 vpd, 50% HCV) added to the crossing. **The ALCAM Risk Score is 153.3. The Risk Band Jurisdiction is High and the Likelihood Band Jurisdiction is High.** The LCSS Risk Score is 28 and the Risk Band is High.
Top Rated Characteristics				Safety Risk Flags

LCSS	Score	Fatality Return	Risk % Change	Comments
▪ SSD – advance visibility of crossing from road ▪ Distance from advance warning to crossing.				▪ High Speed Train ▪ Sighting S1
Proposal	28/30	80 years	234%	The proposed design uses the 5-year volumes as the opening volumes. The improvements include – signs and markings to TCD 9, including yellow hatching and duplicated advance warning signs to SSD requirements **The ALCAM Risk Score is 125.2 The Risk Band Jurisdiction is High and the Likelihood Band Jurisdiction is High**. The LCSS Risk Score is 28 and the Risk Band is High.
Top Rated Characteristics				**Safety Risk Flags**
▪ SSD – advance visibility of crossing from road ▪ Slowest train speed at crossing (typical)				▪ High Speed Train ▪ Sighting S1
Future	28/30	69 years	287%	The future design uses the 10-year volumes and the crossing upgraded with signs and markings to TCD 9 as per the Proposal. **The ALCAM Risk Score is 145.1 The Risk Band Jurisdiction is High and the Likelihood Band Jurisdiction is High**. The LCSS Risk Score is 28 and the Risk Band is High.
Top Rated Characteristics/Mechanisms				**Safety Risk Flags**
▪ SSD – advance visibility of crossing from road ▪ Slowest train speed at crossing (typical)				▪ High Speed Train ▪ Sighting S1

4.2 Crash and Incident History Score

As per table 4 of the LCSIA Risk Guide, we have scored the one IRIS incident below as a 3 based on the vehicle driving under the barrier arm in 2016.

For the change in use we have assumed with the increase in heavy vehicle volumes and no upgrades one non-injury hit heavy vehicle incident, so a score of 4/10. For the proposed and future, with crossing upgrades including upgraded signs, markings and no passing markings on the approaches we have assumed one driving under/around near miss so a score of 3/10.

4.2.1 KiwiRail IRIS Data – one incident recorded

Incident No	164359
Incident Date	19/07/2016
Sub Code	NCLV- Near Collision Light Road Vehicle
Line	NIMT – North Island Main Trunk
Meterage	178.24
ALCAM ID	529
ALCAM NAME	Makirikiri Road
Protection	Primary Flashing Lights
Protection Type	FLB – Flashing Lights and Bells
Council	Rangitikei District Council
Region	Manawatu-Wanganui
Daily Train Traffic	32
Description	Level crossing barrier arm came down on car at the Makirikiri level crossing between Greatford and Marton. LE of 567 advised that a car towing a car trailer with a car on the trailer went through the crossing ahead of him but the barrier arm came down on the car on the trailer. No details of car given Placed a 10km/h speed restriction over the crossing until signals could attend. SIgnals advised no damage to barrier arms, all ok.

4.2.1 NZTA Crash Analysis System (CAS) Data (10-yr data)

No crashes have been recorded in the past 10 years within 50m of the crossing.

Historically there have been 3 crashes within the vicinity of the crossing. The CAS record was supplied by Manawatu District Council. The crashes have not been included in the analysis due to their age.

- A serious injury crash in 1982 involving a westbound car hitting a train – the car did not stop at a flashing red light. The crash occurred on Thursday 2/12/1982 at 6:40pm in fine weather on a dry road with bright sun.
- A minor injury crash in 2002 involved an eastbound car with a learner driver which went off the road to the left. The driver was under instruction and the road was wet, it was dark and light rain was falling. The crash occurred 1km west of SH1, approximately 300m east of the crossing on Monday 23/09/2002 at 11:50pm.
- A non-injury crash in 2006 involved an eastbound car rear ending another car at the crossing. The driver was following too closely in wet, dark conditions during heavy rain. The crash occurred on Monday 12/06/2006 at 6:50pm.

4.3 Site Specific Safety Score

The level crossing is on a Primary Collector road with a posted speed limit of 100km/h, so the Rural assessment table has been used for the site-specific safety evaluation. The updated existing score is 2/10 for the SSSS.

For the proposal and future volume scenarios, we have presumed any issues with the pavement will have been repaired reducing the Category 5 score to 1/5. This is a total SSSS for the proposal and future scenarios of 4/30, which rounds to 1/10.

There are no red flag scenarios at this crossing.

Table No. 5: Rural Road Site Specific Safety Score – Updated Existing

Score	Scenario
Category 1: Crossing Controls (5 points)	
2 – Updated Existing, change in use, proposed and future	Half Arm Barriers with Flashing Lights and Bells are currently installed. No median islands are proposed due to the 100km/h approach speeds.
Category 2: Side Road and Intersection Proximity (5 points)	
0 – Updated Existing, change in use, proposed and future	No side road or intersection on either side of the level crossing The main access to the industrial area will be to the east on the left-hand side on the departure side of the crossing and will not be in close proximity, so will not form queues back over the level crossing.
Category 3: Horizontal and Vertical Alignment of Crossing (5 points)	
1 – Updated Existing, change in use, proposed and future	The crossing is on a level profile and the road approaches are on a consistent perpendicular alignment. No changes to the horizontal and vertical alignment of the crossing are proposed.
Category 4: Short Stacking/Grounding Out (10 points)	
0 – Updated Existing, change in use, proposed and future	No intersections near the level crossing and no evidence of grounding out visible. The main access to the industrial area will be to the east on the left-hand side on the departure side of the crossing and will not be in close proximity, so will not create short stacking at the crossing.
Category 5: Road Surface Condition (5 points)	
2 – updated existing, change in use 1 – proposed and future	Minor issues with the road surface – there is a small patch on one approach. Assuming minor pavement repair will have been completed.
5/30 – Updated Existing, change in use **4/30 – Proposed and Future**	**Site Specific Safety Score of 2/10 for the Updated Existing and Change in Use Crossing** **SSSS of 1/10 for the Proposed and Future Crossing**

4.4 Site Evaluation

A site visit was undertaken on Monday 23 September 2019 and attended by the following representatives of KiwiRail, the RCA and WSP-Opus:

- Bill Edwards – KiwiRail
- Jarrod Colville – KiwiRail
- Ian Avison - KiwiRail
- John Jones – Manawatu District Council
- Bridget Feary – WSP-Opus
- Matthew Evis – WSP-Opus

The site visit notes are included in the appendices. Several items were raised in the evaluation:

- The crossing signs and markings do not comply with TCD 9. Improvements could be made to install crossing approach warning signs, no passing markings and yellow hatching through the crossing.
- The pavement width at the crossing is narrow (i.e. 2 x 3.2m wide traffic lanes with no shoulders) – drivers tend to drive over the centreline through the crossing due to the narrow lane widths.

4.5 Engineer's Risk Score

The Locomotive Engineer and the RCA Engineer both scored the existing crossing as 2/5. This gives a total score of 4/10. The detailed comments from each party are included in the appendices.

For a crossing to TCD 9 requirements and a future crossing both scored 1/5, so for the proposal and future scores the total is 2/10.

4.6 LCSS Results

The combined risk scores are tabulated below:

- Updated Existing scores the existing level crossing conditions found on site.
- Change in Use scores the existing level crossing conditions found on site for the forecast 10-year user volumes.
- Proposed Design scores all the improvement recommendations for the user volumes shortly after opening, that aim to achieve Criterion 1. As improvements to meet Criterion 1 are not reasonably practicable, the aim is to achieve Criterion 2.
- Future Score is ten years post opening with the proposed design improvements that aim to achieve Criterion 1. As improvements to meet Criterion 1 are not reasonably practicable, the aim is to achieve Criterion 2.

Criterion 2: requires the Proposed Design and Future Score of a level crossing to achieve an LCSS number (out of 60) lower than, or equal to, the Updated Existing LCSS number.

Table No. 6: Level Crossing Safety Score Results

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
ALCAM	25/30	28/30	28/30	28/30	Updated Existing includes barrier arms. Proposed Design uses 5-year volumes.
Crash & Incident History	3/10	4/10	3/10	3/10	One IRIS Near Miss Incident which involved a vehicle speeding under the barrier arm. For the change in use we have assumed with the increase in heavy vehicle volumes and no upgrades one non-injury hit heavy vehicle incident, so a score of 4/10. For the proposed and future, we with upgrades we have assumed one driving under/around near miss so a score of 3/10.

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Site Specific Safety	2/10	2/10	1/10	1/10	Site specific score reduces in the future assuming a minor pavement repair is completed.
Engineer Risk	4/10	4/10	2/10	2/10	Engineer score halves with crossing signs and markings upgraded to TCD 9.
LCSS Score	34/60	38/60	34/60	34/60	The Proposed Design and Future Score meet Criterion 2, to achieve an LCSS number equal to the Updated Existing LCSS number.
LCSS Risk Band	Medium	Medium	Medium	Medium	
Criterion Met	-	None	2	2	The proposed and future scores meet Criterion 2.

Appendix A
Site Evaluation

Appendix A Site Evaluation

Features Reviewed at the Road Crossing		Comments
1	Is there suitable lighting at the crossing point and is it of good quality?	This is a rural road with no streetlighting on the approaches or the crossing.
2	Does vegetation restrict sight lines at the crossing point or on the approach to the crossing?	No, the LE confirmed all sightlines are clear.
3	Is there any rail infrastructure in the rail corridor that restricts visibility for all users?	No.
4	Does the signage meet TCD Part 9 standards? Do any signs need to be replaced due to age or damage?	No. All existing signs are in fair condition, but do not meet TCD 9 regarding approach warning signs.
5	What is the quality of the road surfacing in the near vicinity of the level crossing?	The road surfacing is asphalt and is generally in good repair. There is a minor patch repair in the eastbound lane at the crossing.
6	What is the quality of the panel between the tracks (and on the outside) at the level crossing, is it badly deformed?	The panel is asphalt and is in good repair.
7	What is the line marking condition? Is 'Rail X' marked on the approaches (if it should be)?	The line markings are in fair condition. Rail X is marked on both approaches.
8	Are LX1 (steam train) signs present for all approaches, including nearby side roads?	No LX1 signs are present on the approaches to the crossing.
9	Is the LX1 sign pointing in the right direction (to the road centreline)?	N/A
10	Is the LX1 sign gated on approaches when the volume is greater than 2,000 AADT?	N/A
11	Are other advanced warning signs present?	Crossbucks are used as advanced warning signs.
12	Are there side roads or accessways nearby and how do they interact with the level crossing?	There are no side roads nearby. There is a farm access approximately 40m west of the crossing on the south side of the road (i.e. exit side)

Features Reviewed at the Road Crossing		Comments
13	Should flashing lights and bells be facing the side roads, if they are not already present?	N/A
14	Is there a short stacking or grounding out risk? Is there anything in place to mitigate that, i.e. signs for heavy vehicles or escape areas?	There is no short stacking or grounding out risk.

KiwiRail Evaluation – Safety Evaluation and Crossing Risk Score

This risk score reflects the level of crash risk that KiwiRail Locomotive Engineers and/or signalling staff would give to the level crossing compared with other crossings they encounter regularly within their jurisdiction.

Crossing Score		Best	compared with other crossings you encounter regularly within your jurisdiction			Worst
KiwiRail LE	Existing crossing with new volumes	1	2	3	4	5
	Proposed Design	1	2	3	4	5
	Future Crossing	1	2	3	4	5
Comments:	This is a high speed road, so the only issues with safety are drivers speeding to beat the barrier arms and driving over the centreline through the crossing. There are no sighting issues – approaching trucks are clearly visible on the approaches due to the straight alignment and the lack of vegetation. Any future development in the area should ensure it does not affect rail sightlines -in particular by carefully considering where future buildings and trees are placed so they do not affect intervisibility. Proposed improvements could include steam train signs on the approaches, additional FLB displays on the RHS of the approaches, widening the pavement through the crossing to give drivers more space (lane widths are 3.2m with no shoulders), no passing markings on the approaches and yellow hatching in the crossing.					

Questions regarding crossing history		Answer
1	Current train speed at crossing for both directions.	100-110km/h (maximum line speed is 110km/h)
2	Number of likely train movements per day.	32
3	Does shunting occur at this crossing, if so how many movements per day?	No
4	Are there whistle boards present?	Yes

Questions regarding crossing history		Answer
5	Any near miss episodes not reported in IRIS?	No
6	Any vandalism of signs or controls?	1 incident in the last 10 years
7	Any vehicle incidents which have hit KiwiRail infrastructure?	No
8	Does reverse tracking occur?	Yes, but very infrequently – once every 6 months.
9	General view on the level of safety of the crossing.	The crossing has very good sight distance of the road approaches. Sight distance along the track to the rail signals is limited by the rail alignment and overhead electrical infrastructure.

Road Controlling Authority – Safety Evaluation and Crossing Risk Score

This risk score reflects the level of crash risk that RCA staff would give to the level crossing compared with other crossings they encounter regularly within their jurisdiction.

Crossing Score		Best	compared with other crossings you encounter regularly within your jurisdiction			Worst
RCA Engineer	Existing crossing with new volumes	1	2	3	4	5
	Proposed Design	1	2	3	4	5
	Future Crossing	1	2	3	4	5
Comments:						

Questions regarding crossing history		Answer
1	Are there any known public concerns about the crossing?	No
2	Are there any incidents or crash history at the crossing you are aware of?	No additional incidents other than those recorded in CAS.
3	Are there any other changes nearby that may influence this level crossing, i.e. a new subdivision consent, a new walking or cycling facility that will change traffic patterns or volumes?	No, only the possible rezoning as industrial land of the area bounded by the railway line, Makirikiri Road, SH1 and Wings Line.

Questions regarding crossing history		Answer
4	General view on the level of safety of the crossing.	At the moment I do not have any safety concerns.

Appendix B
Crossing Characteristics

Appendix B Crossing Characteristics

ALCAM Characteristic	Existing	Updated Existing
Jurisdiction	NZ	
Street	Makirikiri Road	
Suburb	Marton	
Line Section	North Island Main Trunk - non-metro	
Rail Km	178.24	
Primary Control	Primary Flashing Lights	Half Boom Flashing Lights and Bells
Location	Non Metro	
Primary Rail Manager	KiwiRail	
Secondary Rail Manager(s)		
Primary Road Manager	NZTA - Taranaki	
Secondary Road Manager(s)		
Rail Status	Active	
Road Access	Public	
Legal Status	Public	
Crossing Class	Public road / path - Public access	
Daily Train Numbers	32	
Road Vehicle Numbers (AADT)	1340	1650
Raw Infrastructure Factor	129.4112	
Exposure Factor	0.022084158	
Infrastructure Factor	1.05183264	
Likelihood Factor	0.023228838	
Consequence Factor	0.335975723	
Risk Factor	0.007804326	
Risk Score Status	Current	
Years Between Collisions	43.0499358	
Years Between Fatalities	128.134067	
Last Calculated Date	18/10/2018 18:00	
Org Asset ID	PUB1079	
Street Directory Ref		
Route ID	NZ-NIMT_2	
Rail Traffic Type	PASSENGER	
Pass RD		
Number Of Tracks	1	
Road Status	Open	
Left Approach Pavement	CHIP-SEAL	
Left Immediate Approach Pavement	CHIP-SEAL	
Panel Pavement	CHIP-SEAL	
Right Immediate Approach Pavement	CHIP-SEAL	
Right Approach Pavement	CHIP-SEAL	
Council Region	Rangitikei District Council	

ALCAM Characteristic	Existing	Updated Existing
Main Roads Region	Manawatu-Wanganui	
Road Angle (R)	115	
Road Angle (L)	65	
Max Train Speed Up	110	
Max Train Speed Down	110	
Road Width	6.7	
Road Clearance Width	0	
Number Of Attached Peds	0	
Last ALCAM Survey Date	15/10/2008 0:00	
Last Sighting Date	15/10/2008 0:00	
Sighting Description		
High Speed Train	110kph	
Multiple Tracks	-	
Non-Compliance to Standard	-	
Queueing	-	
Short Stacking	-	
Sighting S1	-	
Sighting S2	-	
Sighting S3	-	
Road Condition	-	
Hump, Dip or Rough Surface	-	
Sun Glare Sighting Crossing on Road	Rating (5)	
Sun Glare Sighting Train	-	
Extreme S3 Required Sighting	-	
Sighting Model	AS1742_7_2007	
Number Of Left Approaches	1	
Number Of Right Approaches	1	
Left S1 - Available	251.99	
Left S1 - Required	250.44	
Right S1 - Available	242.99	
Right S1 - Required	241.38	
Left S2 Up - Measured	432	
Left S2 Up - Required	315.71	
Left S2 Down - Measured	447	
Left S2 Down - Required	315.71	
Left S2 Up - Distance	432	
Left S2 Down - Distance	447	
Right S2 Up - Measured	33	
Right S2 Up - Required	306.85	
Right S2 Down - Measured	219	
Right S2 Down - Required	306.85	
Right S2 Up - Distance	33	
Right S2 Down - Distance	219	
Left S3 - Up Required	555.38	

ALCAM Characteristic	Existing	Updated Existing
Left S3 - Down Required	555.38	
Left S3 - Up Measured	20	
Left S3 - Down Measured	524	
Right S3 - Up Required	596.04	
Right S3 - Down Required	596.04	
Right S3 - Up Measured	650	
Right S3 - Down Measured	23	
Signposted Road Speed	100	
Left - 85th Percentile Vehicle Speed	100	
Right - 85th Percentile Vehicle Speed	100	
Track Width	1.07	
Left Control Point Distance	201	
Right Control Point Distance	201	
True Bearing Up	166.79	
Left Exit True Bearing	238.21	
Right Exit True Bearing	58.21	
Left - True Bearing Road	238.21	
Right - True Bearing Road	58.21	
Left - Stop Line Clearance	5.9	8
Right - Stop Line Clearance	6.9	8
Left - Grade At S1	-1	
Right - Grade At S1	1	
Left - Grade At S3	0	
Right - Grade At S3	1	
Left Vehicle Length	26	
Right Vehicle Length	26	
Top Rated Characteristics	Slowest train speed at crossing (typical), Distance from advance warning to crossing, Conformance with AS 1742.7 and NZTA Part 9, Longest train length (typical)	
Comments (sighting)		
Left Road Vehicle Type	B-Double	
Right Road Vehicle Type	B-Double	
% Commercial Vehicles	10	13
Control Class	Primary Flashing Lights	Half Boom Flashing Lights and Bells
Jurisdiction Likelihood Band (Control Class)	High	
Jurisdiction Likelihood Band	High	
Global Likelihood Band (Control Class)	High	
Global Likelihood Band	High	
Jurisdiction Risk Band (Control Class)	High	

ALCAM Characteristic	Existing	Updated Existing
Jurisdiction Risk Band	High	
Global Risk Band (Control Class)	High	
Global Risk Band	High	

Appendix C
Signalling and Interlocking Plan

Appendix C Signalling and Interlocking Plan

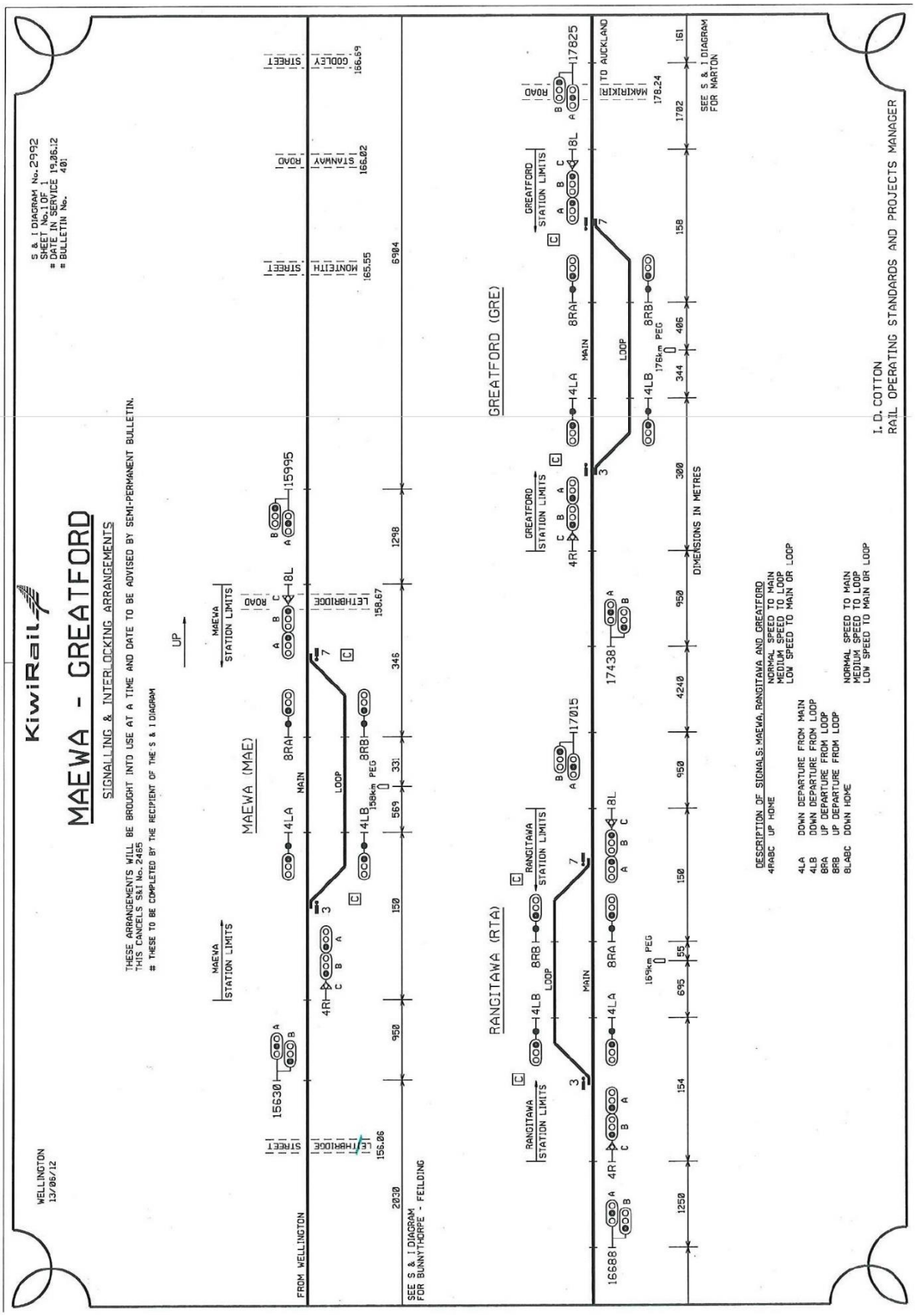

Figure 3: ALCAM Crossing 529, Makirikiri Road Marton: KM178.24

Appendix D
Site Photos

Appendix D Site Photos

Figure 4: East Approach Makirikiri Road looking west from 100m east of crossing

Figure 5: East Approach – looking south from 1.5m back from limit line

Figure 6: East Approach – looking north from 1.5m back from limit line

Figure 7: East Approach – looking west from 1.5m back from limit line

Figure 8: East Approach – Flashing Lights Bells and Half Arm Barrier

Figure 9: Panel Condition and approach surfacing

Figure 10: West Approach Makirikiri Road – looking east from 100m west of crossing

Figure 11: West Approach – looking north from 1.5m back from limit line

Figure 12: West Approach – looking south from 1.5m back from limit line

Figure 13: West Approach – looking east from 1.5m back from limit line

Figure 14: West Approach – Flashing Lights Bells and Half Arm Barrier

Appendix E
ALCAM Risk Rating

Appendix E ALCAM Risk Rating

Extracts from ALCAM Risk Rating Reports

Controls

Controls at Crossing	Primary Flashing Lights
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Human Factors	Public response phone number
Crossing Environment	Maintenance programme for vegetation etc (Road)

Crossing Volume (AADT) Road: 1340 Rail: 32

Outputs

Raw Infrastructure Factor:	**129**		
Infrastructure Factor:	**1.05183**		
Exposure Factor:	**0.02208**		
Likelihood Factor:	**0.02323**	Years Between Collisions:	**43**
Consequence Factor:	**0.33598**		
Risk Score:	**0.0078**	Years Between Fatalities:	**128**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction:	**High**

Within Primary Flashing Lights Control Class

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction :	**High**

Flags:

High Speed Train

Sun Glare Sighting Crossing on Road

Figure 15: Existing Crossing Road Rating Report Extract

Controls

Controls at Crossing	Half Boom Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	Rail-X Pavement Marking
Human Factors	Public response phone number
Crossing Environment	Maintenance programme for vegetation etc (Road)

Crossing Volume (AADT) Road: 1650 Rail: 32

Outputs

Raw Infrastructure Factor:	**123**		
Infrastructure Factor:	**1.04324**		
Exposure Factor:	**0.00999**		
Likelihood Factor:	**0.01042**	Years Between Collisions:	**96**
Consequence Factor:	**0.35963**		
Risk Score:	**0.00375**	Years Between Fatalities:	**267**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**High**	Likelihood Band All:	**Medium High**
Risk Band Jur.	**High**	Likelihood Band Jur:	**High**

Within Boom Barrier Control Class

Risk Band All:	**High**	Likelihood Band All:	**Medium**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction :	**Medium**

Flags:

High Speed Train

Figure 16: Updated Existing Crossing Road Rating Report Extract

Controls

Controls at Crossing	Half Boom Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	Rail-X Pavement Marking
Human Factors	Public response phone number
Crossing Environment	Maintenance programme for vegetation etc (Road)

Crossing Volume (AADT) Road: 8900 Rail: 32

Outputs

Raw Infrastructure Factor:	**123**		
Infrastructure Factor:	**1.0438**		
Exposure Factor:	**0.02255**		
Likelihood Factor:	**0.02354**	Years Between Collisions:	**42**
Consequence Factor:	**0.65138**		
Risk Score:	**0.01533**	Years Between Fatalities:	**65**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jur.	**High**	Likelihood Band Jur:	**High**

Within Boom Barrier Control Class

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction :	**High**

Flags:

High Speed Train
Sighting S1

Figure 17: Change in Use Road Rating Report Extract

Controls

Controls at Crossing	Half Boom Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Additional Crossing Controls	"Keep Tracks Clear" signs and yellow box marking
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	DUPLICATED Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	Rail-X Pavement Marking
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)

Crossing Volume (AADT) Road: 7900 Rail: 32

Outputs

Raw Infrastructure Factor:	**83**		
Infrastructure Factor:	**0.98764**		
Exposure Factor:	**0.02098**		
Likelihood Factor:	**0.02072**	Years Between Collisions:	**48**
Consequence Factor:	**0.60407**		
Risk Score:	**0.01252**	Years Between Fatalities:	**80**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jur.	**High**	Likelihood Band Jur:	**High**

Within Boom Barrier Control Class

Risk Band All:	**High**	Likelihood Band All:	**Medium High**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction :	**High**

Flags:

High Speed Train
Sighting S1

Figure 18: Proposed Design Road Rating Report Extract

Controls

Controls at Crossing	Half Boom Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Additional Crossing Controls	"Keep Tracks Clear" signs and yellow box marking
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	DUPLICATED Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Advance Warning	Rail-X Pavement Marking
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)

Crossing Volume (AADT) Road: 8900 Rail: 32

Outputs

Raw Infrastructure Factor:	**83**		
Infrastructure Factor:	**0.98764**		
Exposure Factor:	**0.02255**		
Likelihood Factor:	**0.02227**	Years Between Collisions:	**45**
Consequence Factor:	**0.65138**		
Risk Score:	**0.01451**	Years Between Fatalities:	**69**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**High**	Likelihood Band All:	**High**
Risk Band Jur.	**High**	Likelihood Band Jur:	**High**

Within Boom Barrier Control Class

Risk Band All:	**High**	Likelihood Band All:	**Medium High**
Risk Band Jurisdiction:	**High**	Likelihood Band Jurisdiction :	**High**

Flags:

High Speed Train
Sighting S1

Figure 19: Future Crossing Road Rating Report Extract

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