

J/N 19121
26th August 2021

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Dear Adrian

***NGAWHA INNOVATION & ENTERPRISE PARK SH12, KAIKOHE
THRESHOLDS FOR WALLIS RD INTERSECTION UPGRADE AND SH12 INTERSECTION CAPACITIES***

As requested, we have investigated the thresholds for the level of development of the Ngawha Innovation & Enterprise Park (NIEP) that would trigger the need for upgrading the State Highway 12 / Wallis Road intersection, and the level of NIEP development that could be accommodated by the new NIEP intersection on SH12 both on its own, and with an upgrading of the SH12/ Wallis Road intersection.

1. Background

NIEP comprises three fingers of land on the northern side of SH12 east of Wallis Road –

- Finger 1, the Horticulture Precinct, adjacent to Wallis Road,
- Finger 2, the Innovation & Enterprise Precinct, opposite Ngawha Springs Road, and
- Finger 3, east of Finger 2 and opposite the Ngawha Corrections Facility access road.

There are to be two access points to NIEP when fully developed –

1. a new intersection off SH12 west of Ngawha Springs Road, with a right turn bay and left turn auxiliary lane. This intersection design has been approved by Waka Kotahi – the NZ Transport Agency.

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2. An access off Wallis Road, with upgrading of the section of Wallis Road between the access and SH12, and an upgrading of the SH12/Wallis Road intersection by providing a right turn bay and left turn auxiliary lane.

It is proposed that initially all peak period vehicle access to NIEP will be by way of the new intersection off SH12 west of Ngawha Springs Road, and that traffic accessing Finger 1 from Wallis Road will be limited to off-peak only truck traffic, with light passenger vehicles using the new intersection off SH12. In practice this will be achieved by providing an unmanned boom gate at the Finger 1 access driveway on Wallis Road controlled by an elevated sensor with height set so that it is not activated by approaching passenger vehicles.

The Wallis Road upgrading is proposed to occur when the level of development in NIEP can no longer be adequately served by the new SH12 intersection alone.

2. Maximum Total NIEP Traffic with Single Peak Hour Access from New SH12 Intersection

The peak hour turning movement volumes at the new NIEP intersection on SH12 and at the SH 12/Wallis Road intersection have been based on the following:

- Manual surveys of existing peak hour volumes on SH12 at the Wallis Road intersection and at the location of the proposed intersection.
- Adding 10 years of traffic growth to SH12, consistent with the requirements of the NZTA Planning Policy Manual.
- Including the extra traffic that would be generated by the development of Finger 1 and Finger 2.
- Adding traffic from additional levels of employment in Finger 3 of the NIEP until intersection capacities are reached.

2.1 Existing Peak Hour Traffic and Expected Traffic Growth on SH12

The existing peak hour traffic volumes on SH12 at the Wallis Road intersection and at the location of the proposed intersection, and the level of traffic growth anticipated in the next 10 years, are described in Section 2.3 of the Ngawha Innovation & Enterprise Park Integrated Transport Assessment report dated September 2019 (the NIEP ITA report).

2.2 Finger 1 and Finger 2 Development Traffic

The level of traffic predicted to be generated by NIEP development has been estimated by applying peak hour trip generation rates sourced from the Road and Traffic Authority of New South Wales

“Guide to Traffic Generating Developments” and Waka Kotahi - NZ Transport Agency Research Report 453 “Trips and Parking related to Land Use” to the activity GFAs and levels of employment proposed in each Finger of the NIEP. The generation trip rates used are discussed in Section 3.3 of the NIEP ITA report.

As per Section 3.1 of the NIEP ITA report, Finger 1 development would comprise a Horticulture Hub with some 110 F.T.E. (full time equivalent) positions to man the operation.

The level of development of Finger 2 is based on that set out in Section 2.5 of the “Ngawha Innovation & Enterprise Park Ultimate Development - Site and Infrastructure Suitability Report” produced by Cook Costello for Far North Holdings Ltd dated 14 September 2019. The level of development and resulting peak hour trip generation of Finger 1 and Finger 2 is tabulated below.

NGAWHA INNOVATION & ENTERPRISE PARK PEAK HOUR TRIP GENERATION							
	GFA (m2)	Activity category	Staff	Students	AM Peak Hour Vehicle Movements	PM Peak Hour Vehicle Movements	Based on
FINGER 1							
Horticulture Hub		Manufacturing	110		35	40	employees
FINGER 2							
Berries and Culinary Oil		Manufacturing	200		64	73	employees
Business Innovation & Incubator Hub	1,458	Office	36	45	23	23	GFA
Incubator Hub	1,733	Manufacturing	28		9	10	employees
WH1 Carbonscape	9,633	Manufacturing	28		9	10	employees
WH2 Spindle & Expansion	5,717	Manufacturing	30	54	10	11	employees
WH3	2,300	Manufacturing	8		3	3	employees
WH4	2,300	Manufacturing	8		3	3	employees
WH5	2,300	Manufacturing	8		3	3	employees
Kiln	600	Manufacturing	2		1	1	employees
Business Office Hub	1,500	Office	40		13	15	employees
Small Glasshouse	5,694	Manufacturing	55		17	20	employees
Manuka Honey Hub	4,759	Manufacturing	41		13	15	employees
Retail/Café	585	Retail/Café	9		29	29	GFA
Accommodation	2,400	Accommodation			-	-	for NIEP
Maintenance/Security Staff	-	Manufacturing	6		2	2	employees
TOTAL			609	99	232	258	

Table 1: Peak Hour Traffic Generation of Finger 1 and Finger 2

These vehicle movements would be expected to comprise light vehicles, as heavy vehicle deliveries and pick-ups would generally occur outside of peak periods.

Information from the New Zealand Trips and Parking Database suggests that for industrial activities some 75% of vehicle movements in the morning peak hour are into the site, and the balance of 25% are out from the site. These proportions have been applied for all NIEP traffic movements in the morning peak hour, with the proportions reversed (75% out and 25% in) in the afternoon peak hour.

The majority of peak hour traffic activity to and from the NIEP in the morning and afternoon peak hours will be associated with employee commuter trips, and the majority of employees would come from the nearest population centre, Kaikohe. For the purposes of this assessment, it is assumed

that 80% of peak hour turning movement volumes are trips to or from Kaikohe (or other places to the west), with the balance of 20% of peak hour turning movement volumes being trips to or from places to the east (e.g., Kerikeri, Paihia, Opuia, Kawakawa, Moerewa, Ohaeawai).

2.3 Additional Finger 3 employment to reach new SH12 intersection capacity.

The peak hour traffic generation of employment in Finger 3, and resulting turning movements, has been based on the same assumptions as for Finger 1 and Finger 2 development.

As discussed in Section 1 above, it is assumed that initially all NIEP peak hour traffic generated by Finger 1 and Finger 2 and the partial development of Finger 3 will use the new intersection on SH12 west of Ngawha Springs Road.

The level of additional Finger 3 traffic that this new intersection could accommodate has been determined using the SIDRA intersection analysis software.

This assessment has been based on capacity being reached when the most delayed movement at the intersection does not have a worse Level of Service (LOS) than D, i.e., an average peak hour delay not exceeding 35 seconds. This has been chosen on the basis that should delay be higher than this, motorists attempting to turn on or off SH12 at the intersection may become frustrated and accept inadequate gaps in SH12 traffic.

The most critical turning movement at a priority-controlled T intersection is the right turn out from the side road, as this traffic must give way to both directions of traffic on the main road. The critical peak period for the new NIEP access intersection on SH12 will be the PM peak hour, when traffic leaving the side road will peak, and the majority of traffic departing the site will be turning right to travel to Kaikohe.

By trial and error, it has been determined that the new NIEP access intersection on SH12 will be at its maximum capacity (i.e., that the right turn movement out from the site in the PM peak hour will have an average peak hour delay close to but not exceeding 35 seconds) when there are 770 FTE employees in Finger 3, in addition to the 110 employees in Finger 1 and the 499 FTE employees in Finger 2 as per Table 1, i.e., a total of 1379 FTE employees.

With this level of development, and taking into account current traffic counts and the 20% traffic growth (2% per annum) expected in the next 10 years, the forecast PM peak hour turning movements at the new NIEP intersection, assuming all NIEP peak hour traffic uses this intersection, are shown in Figure 1.

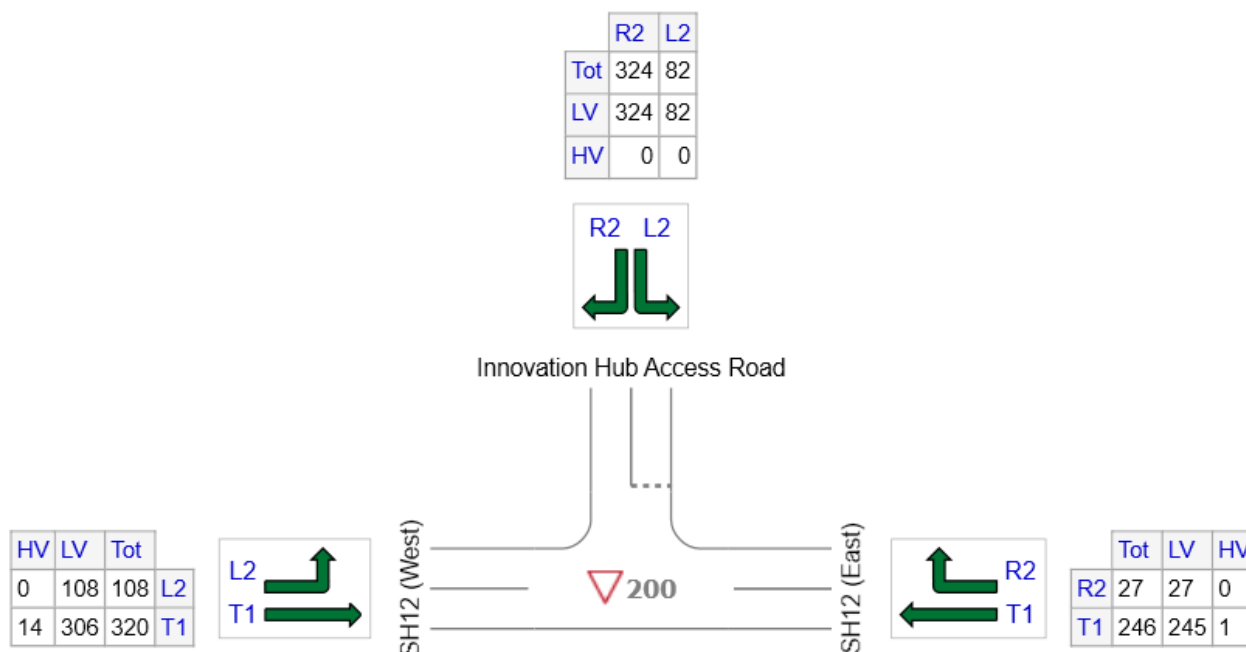


Figure 1: PM Peak Hour Turning Movement Volumes at SH12/NIEP Intersection at Capacity

The performance of the new NIEP intersection on SH12 in the PM peak hour with the traffic volumes in Figure 1 is shown in Figure 2 below:

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
East: SH12 (East)												
5	T1	259	0.4	0.134	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
6	R2	28	0.0	0.032	6.6	LOS A	0.1	0.8	0.46	0.64	0.46	45.0
Approach		287	0.4	0.134	0.7	NA	0.1	0.8	0.05	0.06	0.05	89.2
North: Innovation Hub Access Road												
7	L2	86	0.0	0.897	25.4	LOS D	13.3	93.1	0.89	1.83	3.30	34.3
9	R2	341	0.0	0.897	34.3	LOS D	13.3	93.1	0.89	1.83	3.30	34.2
Approach		427	0.0	0.897	32.5	LOS D	13.3	93.1	0.89	1.83	3.30	34.3
West: SH12 (West)												
10	L2	114	0.0	0.061	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
11	T1	337	4.4	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		451	3.3	0.178	1.2	NA	0.0	0.0	0.00	0.13	0.00	77.5
All Vehicles		1165	1.4	0.897	12.5	NA	13.3	93.1	0.34	0.74	1.22	54.1

Figure 2: PM Peak Hour SH12/ NIEP Intersection Performance at Capacity

The SIDRA modelling shows that at this level of development the proposed new NIEP intersection will be able to accommodate the projected PM peak hour turning movement volumes with LOS A to through traffic on the State Highway, and for traffic turning left and right off SH12 into the site, with a negligible 95th percentile back of queue. Left turning traffic out of the site would have an average delay of 25.4s (LOS D) and a 95th percentile back of queue of 13.3 vehicles. Right turning

traffic out of the site would have an average delay of 34.3 seconds (LOS D) and a 95th percentile back of queue of 13.3 vehicles.

With the same level of development, and taking into account current traffic counts and the 20% traffic growth (2% per annum) expected in the next 10 years, the forecast AM peak hour turning movements at the new NIEP intersection on SH12 are shown in Figure 3 and the modelled performance of the intersection is shown in Figure 4.

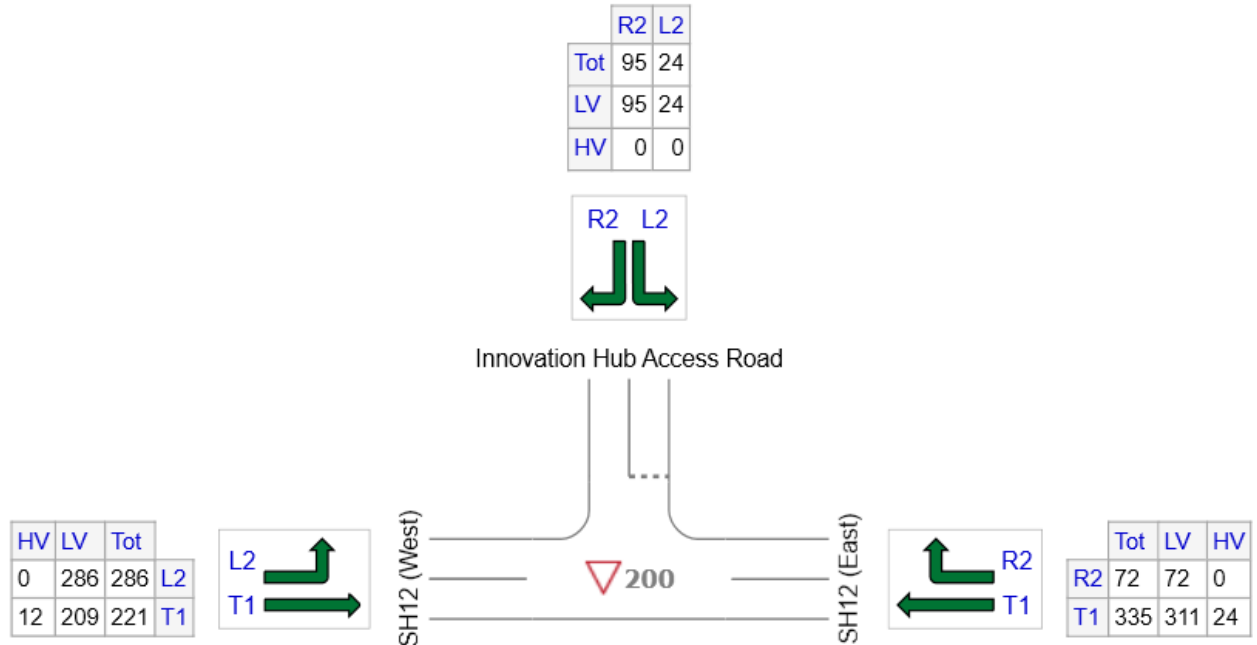


Figure 3: AM Peak Hour Turning Movement Volumes at SH12/NIEP Intersection at Capacity

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
East: SH12 (East)												
5	T1	353	7.2	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
6	R2	76	0.0	0.093	7.3	LOS A	0.4	2.5	0.52	0.71	0.52	44.6
Approach		428	5.9	0.191	1.3	NA	0.4	2.5	0.09	0.13	0.09	81.9
North: Innovation Hub Access Road												
7	L2	25	0.0	0.318	6.8	LOS A	1.4	9.5	0.66	0.86	0.80	41.5
9	R2	100	0.0	0.318	16.2	LOS C	1.4	9.5	0.66	0.86	0.80	41.3
Approach		125	0.0	0.318	14.3	LOS B	1.4	9.5	0.66	0.86	0.80	41.3
West: SH12 (West)												
10	L2	301	0.0	0.162	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
11	T1	233	5.4	0.124	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		534	2.4	0.162	2.6	NA	0.0	0.0	0.00	0.30	0.00	60.7
All Vehicles		1087	3.5	0.318	3.4	NA	1.4	9.5	0.11	0.29	0.13	63.7

Figure 4: AM Peak Hour SH12/ NIEP Intersection Performance at Capacity

2.4 Adequacy of SH12/Wallis Road intersection

Traffic accessing this level of development from the new NIEP intersection on SH12 will increase the amount of traffic passing the SH12 / Wallis Road intersection. Assuming no increase in turning movement volumes in or out of Wallis Road in peak hours, the forecast PM and AM peak hour turning movements at the SH12 / Wallis Road intersection are shown in Figures 5 and 6 respectively.

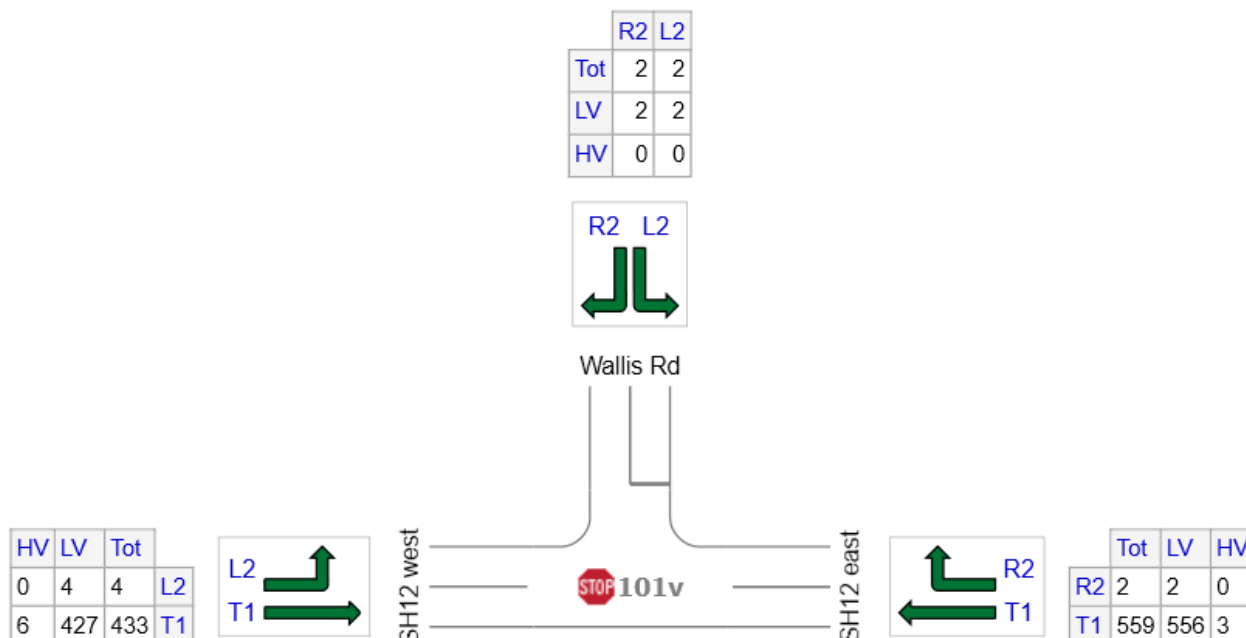


Figure 5: PM Peak Hour SH12/ Wallis Rd Turning Movement Volumes - NIEP Intersection at Capacity

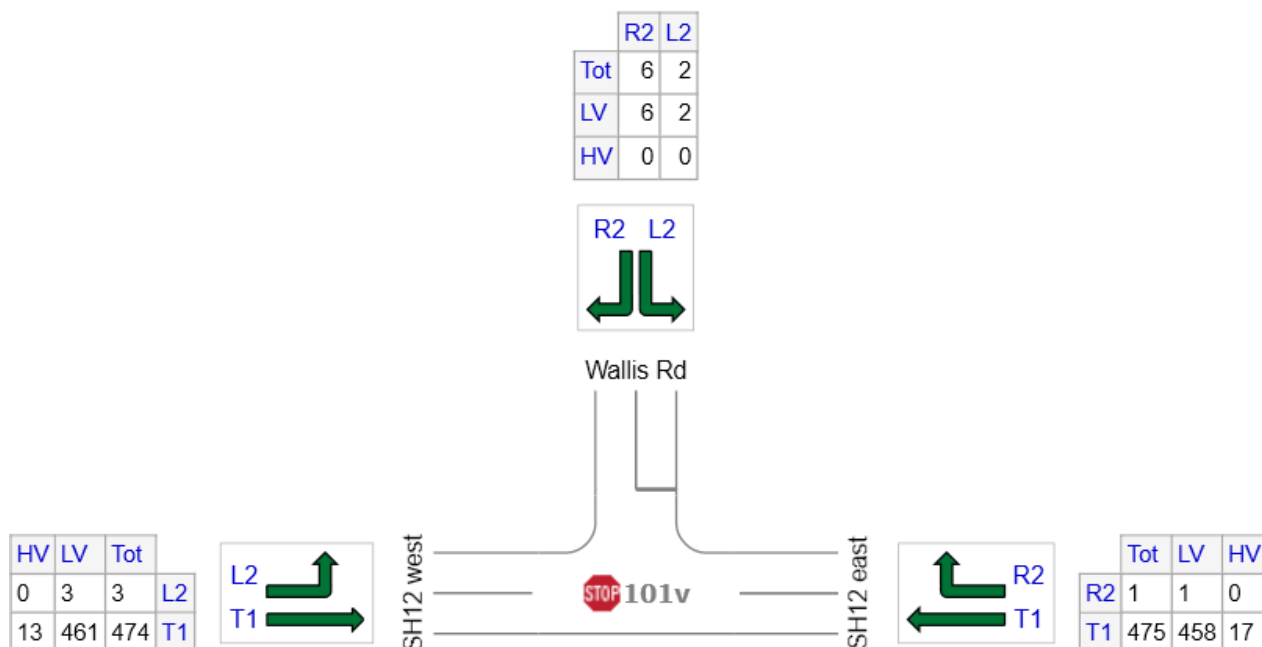


Figure 6: AM Peak Hour SH12/ Wallis Rd Turning Movement Volumes - NIEP Intersection at Capacity

The adequacy of the existing configuration of the SH12/ Wallis Road intersection to accommodate traffic from NIEP when the new NIEP access road on SH12 is at capacity needs to be assessed in two ways –

- a) In terms of intersection Level of Service
- b) In terms of safety warrants for auxiliary lanes.

The performance of the existing configuration of the SH12 / Wallis Road intersection to accommodate the level of traffic predicted in the PM and AM peak hours when the new NIEP intersection on SH12 is at capacity are shown in Figures 7 and 8 below:

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows 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: SH12 east												
5	T1	588	0.5	0.305	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	94.9
6	R2	2	0.0	0.305	9.8	LOS A	0.0	0.2	0.01	0.00	0.01	75.4
Approach		591	0.5	0.305	0.1	NA	0.0	0.2	0.01	0.00	0.01	94.8
North: Wallis Rd												
7	L2	2	0.0	0.009	10.6	LOS B	0.0	0.2	0.59	0.88	0.59	58.0
9	R2	2	0.0	0.009	17.1	LOS C	0.0	0.2	0.59	0.88	0.59	58.5
Approach		4	0.0	0.009	13.8	LOS B	0.0	0.2	0.59	0.88	0.59	58.3
West: SH12 west												
10	L2	4	0.0	0.238	7.5	LOS A	0.0	0.0	0.00	0.01	0.00	82.1
11	T1	456	1.4	0.238	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	89.7
Approach		460	1.4	0.238	0.1	NA	0.0	0.0	0.00	0.01	0.00	89.7
All Vehicles		1055	0.9	0.305	0.1	NA	0.0	0.2	0.01	0.01	0.01	92.2

Figure 7: PM Peak Hour SH12/ Wallis Rd Intersection Performance - NIEP Intersection at Capacity

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows 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: SH12 east												
5	T1	500	3.6	0.263	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	94.9
6	R2	1	0.0	0.263	10.0	LOS B	0.0	0.1	0.00	0.00	0.00	75.4
Approach		501	3.6	0.263	0.0	NA	0.0	0.1	0.00	0.00	0.00	94.9
North: Wallis Rd												
7	L2	2	0.0	0.021	10.9	LOS B	0.1	0.5	0.66	0.95	0.66	57.1
9	R2	6	0.0	0.021	16.3	LOS C	0.1	0.5	0.66	0.95	0.66	57.6
Approach		8	0.0	0.021	14.9	LOS B	0.1	0.5	0.66	0.95	0.66	57.4
West: SH12 west												
10	L2	3	0.0	0.262	7.5	LOS A	0.0	0.0	0.00	0.00	0.00	82.2
11	T1	499	2.7	0.262	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.8
Approach		502	2.7	0.262	0.1	NA	0.0	0.0	0.00	0.00	0.00	89.7
All Vehicles		1012	3.1	0.263	0.2	NA	0.1	0.5	0.01	0.01	0.01	91.7

Figure 8: AM Peak Hour SH12/ Wallis Rd Intersection Performance - NIEP Intersection at Capacity

Once again, the critical period is the PM peak hour and the critical movement is the right turn out from the side road.

The SIDRA analysis shown in Figures 7 and 8 indicates that when the new NIEP intersection on SH12 is at capacity, and with no extra peak hour traffic turning in or out of Wallis Road, the existing configuration of the SH12 / Wallis Road intersection will accommodate the anticipated levels of traffic on SH12, with a Level of Service of C or better for all movements, and a maximum average delay of 17.1 seconds experienced by traffic turning right out from Wallis Road onto SH12 in the PM peak hour.

Figure 2.25 of Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings provides warrants based on safety performance for auxiliary lanes on major roads at unsignalised intersections as a function of the peak hour traffic volume on the major road and the side road turning volume, separately for a design speed less than 70 km/h, a design speed between 70 km/h and 100km/h, and a design speed for 100km/h or more.

Speed surveys of unrestricted vehicles undertaken between 4pm and 5:15pm on Friday 22nd March 2019 indicated that the 85th percentile speed on SH12 in the vicinity of Wallis Road is 87km/h for eastbound traffic travelling from Kaikohe and 93 km/h westbound to Kaikohe, and thus a design between 70 km/h and 100 km/h applies to the SH12 / Wallis Road intersection.

In Figure 9 the appropriate forecast AM and PM peak hour turning movement and through volumes for the SH12 / Wallis Road intersection have been applied to the Austroads warrant.

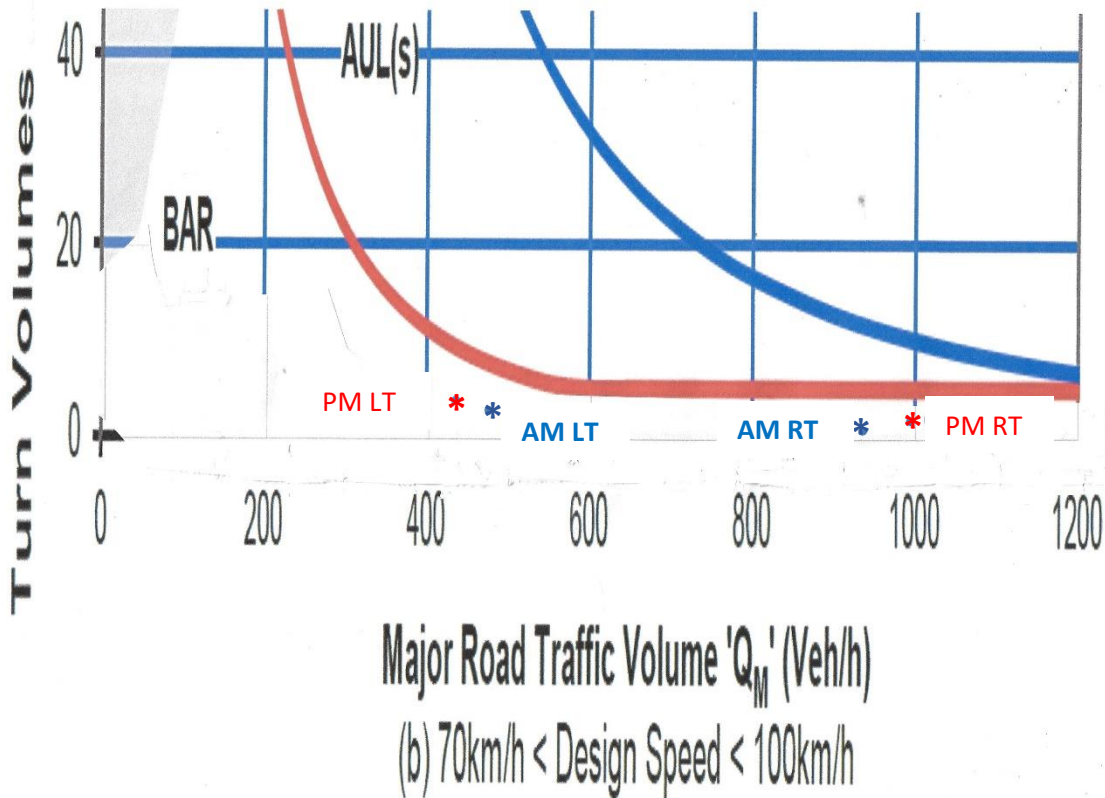


Figure 9: Warrants for Auxiliary Lanes at SH12/Wallis Rd Intersection

It is evident from Figure 9 that by maintaining current traffic volumes on Wallis Road in peak periods, no auxiliary lane treatment is warranted at the SH12 / Wallis Road intersection when the new NIEP access intersection on SH12 west of Ngawha Springs road is at capacity.

3. Maximum Total NIEP Traffic with Upgraded SH12 / Wallis Road Intersection

As is evident from Figure 9, once the new NIEP intersection on SH12 is operating at capacity, any appreciable increase of traffic on Wallis Road will trigger the safety warrants for auxiliary lanes at the SH12 / Wallis Road intersection. The proposed upgrade of the SH12 / Wallis Road intersection includes the provision of a 20-metre-long right turn lane and a 30 metres long left turn auxiliary lane on SH12.

Adding NIEP site traffic to Wallis Road will increase the volume of through traffic past the new NIEP intersection on SH12 (from NIEP traffic turning right into Wallis Road and left out from Wallis Road) and this will have the effect of decreasing the capacity of the new NIEP intersection on SH12 to accommodate NIEP traffic.

By trial and error, it has been determined that both the new NIEP access intersection on SH12 and the upgraded SH12 / Wallis Road intersection will be at their maximum capacity (i.e., that the right turn movement out from both intersections in the PM peak hour will have an average peak hour delay close to but not exceeding 35 seconds) when there are 260 FTE employees accessing NIEP via Wallis Road in addition to the 110 employees in Finger 1 and the 499 FTE employees in Finger 2 as per Table 1, and 730 FTE employees in Finger 3, using the new NIEP intersection on SH12. i.e., a total of 1599 FTE employees.

The predicted turning movements in the PM peak hour at the two intersections when both the upgraded SH12 / Wallis Road intersection and the new NIEP intersection on SH12 would be at capacity are shown in Figures 10 and 11 below:

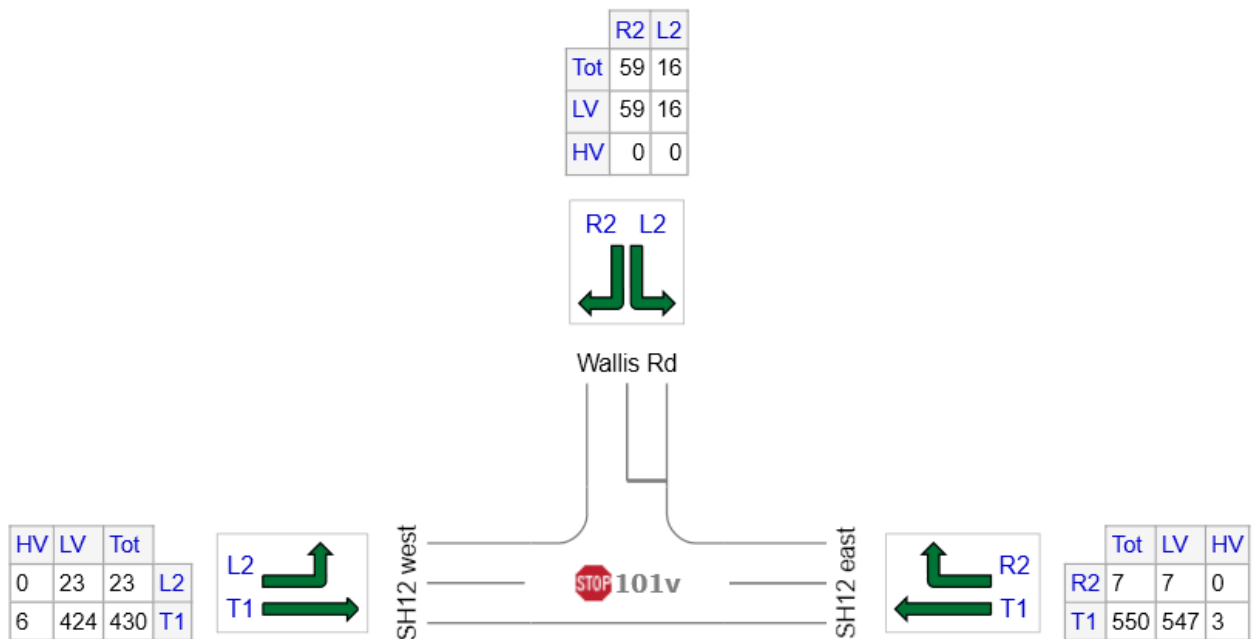


Figure 10: PM Peak Hour SH12/ Wallis Rd Turning Movement Volumes - NIEP at Capacity

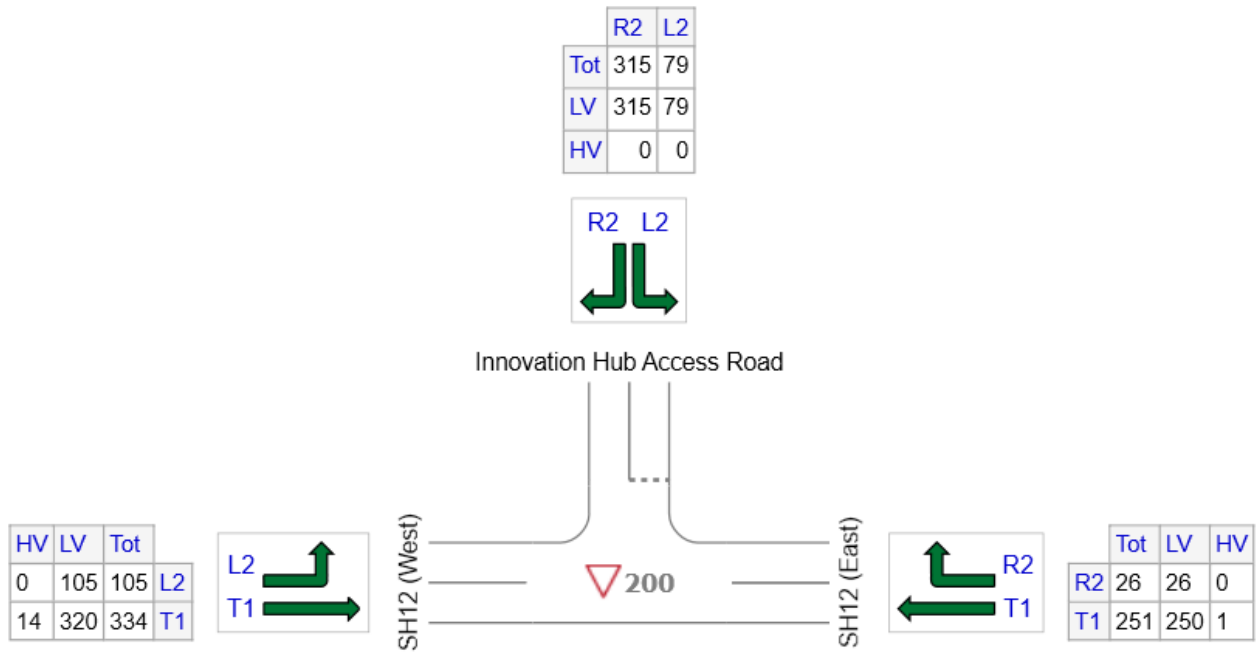


Figure 11: PM Peak Hour SH12/ NIEP Intersection Turning Movement Volumes - NIEP at Capacity

The performance of the upgraded SH12 / Wallis Road intersection and the new NIEP intersection on SH12 in the PM peak hour when carrying these volumes of traffic are shown in Figures 12 and 13 below:

STOP Site: 101v [SH12/Wallis Rd upgraded int PM - trippen with F1=260 +F3=730]

PM Peak
 Site Category: (None)
 Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
East: SH12 east												
5	T1	579	0.5	0.299	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	94.8
6	R2	7	0.0	0.009	9.4	LOSA	0.0	0.2	0.47	0.66	0.47	63.1
Approach		586	0.5	0.299	0.2	NA	0.0	0.2	0.01	0.01	0.01	94.2
North: Wallis Rd												
7	L2	17	0.0	0.391	15.6	LOSC	1.5	10.7	0.84	1.06	1.09	46.0
9	R2	62	0.0	0.391	34.9	LOSD	1.5	10.7	0.84	1.06	1.09	46.4
Approach		79	0.0	0.391	30.8	LOSD	1.5	10.7	0.84	1.06	1.09	46.3
West: SH12 west												
10	L2	24	0.0	0.013	7.4	LOSA	0.0	0.0	0.00	0.65	0.00	70.6
11	T1	453	1.4	0.234	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	89.9
Approach		477	1.3	0.234	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.6
All Vehicles		1142	0.8	0.391	2.4	NA	1.5	10.7	0.06	0.09	0.08	85.8

Figure 12: PM Peak Hour SH12/ Wallis Rd Intersection Performance - NIEP at Capacity

Site: 200 [SH12/I&E Hub - PM - tripgen with F1=260 + F3=730]

PM Peak
 Site Category: (None)
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
East: SH12 (East)												
5	T1	264	0.4	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
6	R2	27	0.0	0.031	6.7	LOS A	0.1	0.8	0.47	0.64	0.47	45.0
Approach		292	0.4	0.137	0.6	NA	0.1	0.8	0.04	0.06	0.04	89.6
North: Innovation Hub Access Road												
7	L2	83	0.0	0.897	25.9	LOS D	12.9	90.4	0.89	1.83	3.32	34.1
9	R2	332	0.0	0.897	35.0	LOS E	12.9	90.4	0.89	1.83	3.32	34.0
Approach		415	0.0	0.897	33.2	LOS D	12.9	90.4	0.89	1.83	3.32	34.1
West: SH12 (West)												
10	L2	111	0.0	0.060	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
11	T1	352	4.2	0.185	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		462	3.2	0.185	1.1	NA	0.0	0.0	0.00	0.13	0.00	78.4
All Vehicles		1168	1.4	0.897	12.4	NA	12.9	90.4	0.33	0.72	1.19	54.8

Figure 13: PM Peak Hour SH12/ NIEP Intersection Performance - NIEP at Capacity

It should be noted that at capacity the upgraded SH12 / Wallis Road intersection can accommodate a much lower level of NIEP traffic than the new NIEP intersection on SH12. This because, owing to most NIEP traffic using the new NIEP intersection on SH12 travelling to and from Kaikohe, the volume of through traffic on SH12 at Wallis Road is much higher than the volume of through traffic on SH12 at the new NIEP intersection (Refer Figures 10 and 11 – PM peak through traffic volumes eastbound and westbound on SH12 at the new NIEP intersection are 334 and 251 vehicles per hour respectively, while the corresponding SH12 volumes at Wallis Road are 430 and 550 vehicles per hour).

4. Conclusions

The same assumptions as to traffic generation and trip distribution as used in the Ngawha Innovation & Enterprise Park Integrated Transport Assessment report dated September 2019 have been used to determine the degree of NIEP development that can be accommodated if solely accessed in peak periods via the new NIEP intersection on SH12, and if accessed from both the new NIEP intersection on SH12 and the proposed upgrading of the SH12 / Wallis Road intersection.

This assessment has been based on intersection capacity being reached when the most delayed movement at the intersection does not have a Level of Service worse than D, i.e., an average peak hour delay not exceeding 35 seconds. This has been chosen on the basis that should delay be higher

than this, motorists attempting to turn on or off SH12 at the intersection may become frustrated and accept inadequate gaps in SH12 traffic.

The most critical turning movement at a priority-controlled T intersection is the right turn out from the side road, as this traffic must give way to both directions of traffic on the main road. The critical peak period for the new NIEP access intersection on SH12 will be the PM peak hour, when traffic leaving the side road will peak, and the majority of traffic departing the site will be turning right to travel to Kaikohe.

Using SIDRA intersection analysis software, it has been determined that the new NIEP access intersection on SH12 will be at its maximum capacity (i.e., that the right turn movement out from the site in the PM peak hour will have an average peak hour delay close to but not exceeding 35 seconds when there are 770 FTE employees in Finger 3, in addition to the 110 employees in Finger 1 and the 499 FTE employees in Finger 2 as per Table 1, i.e., a total of 1379 FTE employees, all with sole access in peak periods from the new NIEP intersection on SH12 west of Ngawha Springs Road.

Under this scenario, provided there is no increase in traffic on Wallis Road in peak periods, there will be no capacity or safety reason to change the SH12 / Wallis Road intersection form its current configuration.

However, any increase in traffic using Wallis Road in peak periods is likely to trigger the safety warrant for auxiliary lanes at the SH12 / Wallis Road intersection.

Once the SH12/ Wallis Road intersection is upgraded and used as a second access to NIEP, a higher degree of NIEP development can be accommodated.

SIDRA intersection analysis indicates that both the new NIEP access intersection on SH12 and the upgraded SH12 / Wallis Road intersection will be at their maximum capacity (i.e., that the right turn movement out from both intersections in the PM peak hour will have an average peak hour delay close to but not exceeding 35 seconds) when there are 260 FTE employees accessing NIEP via Wallis Road in addition to the 110 employees in Finger 1 and the 499 FTE employees in Finger 2 as per Table 1, and 730 FTE employees in Finger 3, accessing NIEP via the new NIEP intersection on SH12, i.e. a total of 1599 FTE employees with access to the NIEP divided between Wallis Road and the new NIEP intersection on SH12.

We would be pleased to provide the spreadsheets calculating the trip generation and resulting vehicle movements and the SIDRA intersection analysis files used in this assessment if that would be helpful.

Yours sincerely

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