Planning | Surveying | Engineering | Environmental

# Kahikatea Drive, Kinloch

# Integrated Transportation Assessment

Seven Oaks Kinloch Ltd

Kahikatea Drive, Kinloch

# DOCUMENT CONTROL

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# 1 Introduction

1.1.1 This Broad Integrated Transportation Assessment (ITA) considers the traffic and transportation effects of a proposed 87 lot residential development within the northern extents of Lot 501 DP 569523, Kinloch which will be referred to as 'the site'.

1.1.2 The site is located within the northwest area of Kinloch township, within Taupo District Council (TDC) jurisdiction, approximately 16km northwest of central Taupo.

1.1.3 In summary, it has been concluded that the traffic effects of the proposed development are considered to be less than minor. As such, it is considered that there are no transportation reasons why the development cannot be consented.

# 2 Site Location

2.1.1 The site is located within appellation Lot 501 DP 569523 which is highlighted in yellow in Figure 1.

Figure 1: Site location

2.1.2 The overall site lies across two zones as shown in the District Plan (DP); Kinloch Residential (highlighted dark pink) and Kinloch Low Density Residential (highlighted light pink) as shown in light blue in Figure 2 below.

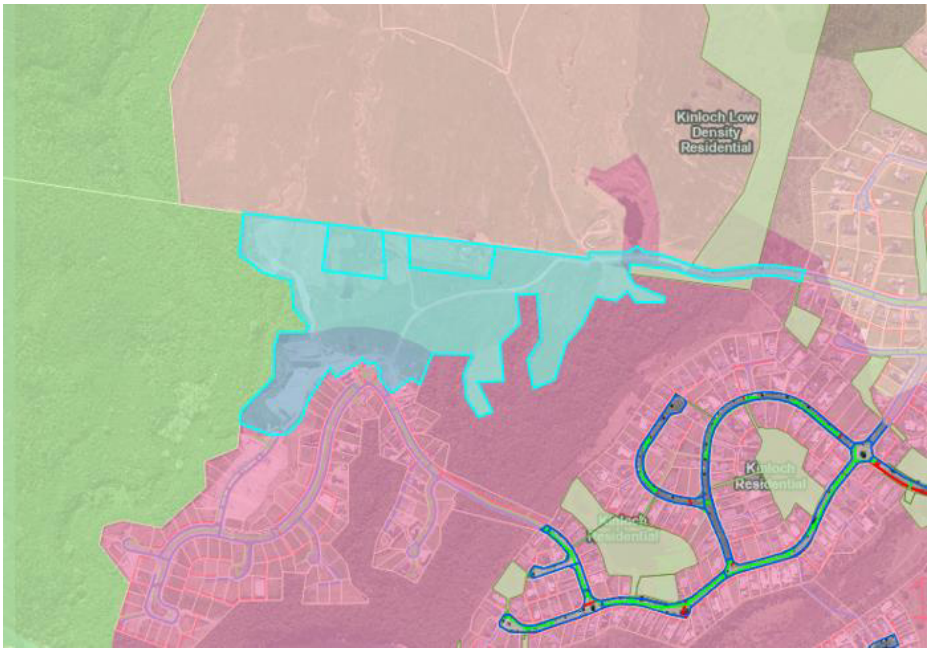



Figure 2: Existing zoning (Source: Taupo District Council)

2.1.3 The lower two thirds of the site zoned Kinloch Residential, is already consented for the development of 160 residential lots as part of the Seven Oaks development project. This area is shown outlined in black in Figure 3 below and is already under development. This area is also accessed from Okaia Drive as also shown in Figure 3. The subject area of this assessment is the remaining land located in the north of the lot, zoned Kinloch Low Density Residential and shown as light blue in Figure 3. This area has frontage to both Okaia Drive and Kahikatea Drive.

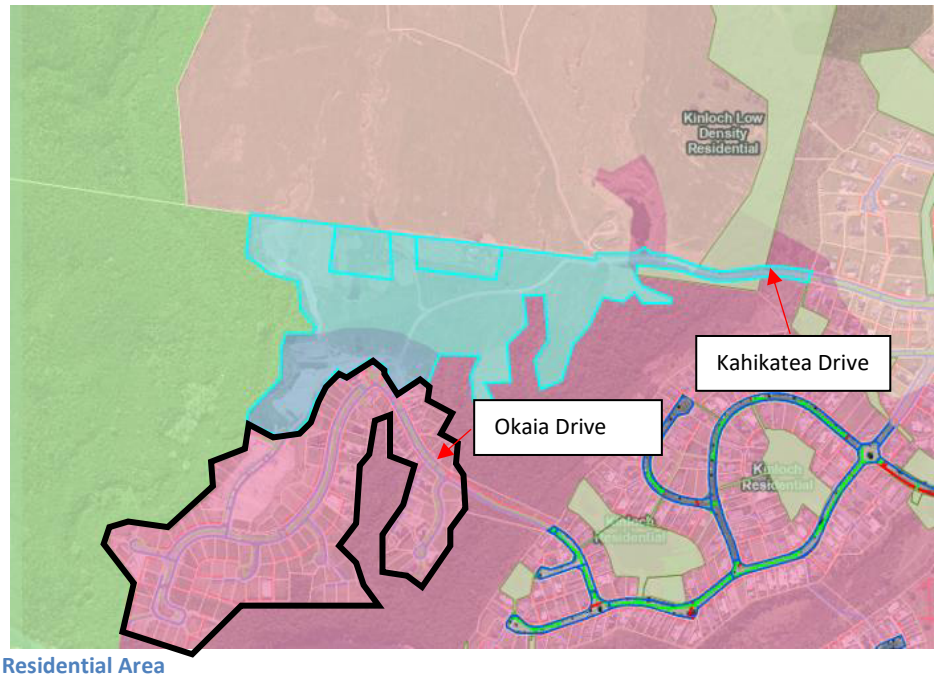



Figure 3 Adjacent Residential Area

# 3 Existing Road Network

## 3.1 Primary Road Network

### Corridors

3.1.1 For the purposes of this assessment, the 'primary road network' is identified as the series of roads within and around the immediate vicinity of Kinloch, that the proposed development connects to. These roads are shown in Figure 4 and consist of a series of six local and collector roads. These six roads are:

- Okaia Drive (shown in green);
- Kahikatea Drive (shown in blue);
- Lisland Drive (shown in purple);
- Oakdale Drive (shown in orange);
- Kinloch Road (shown in yellow); and
- Whangamata Road (shown in red).

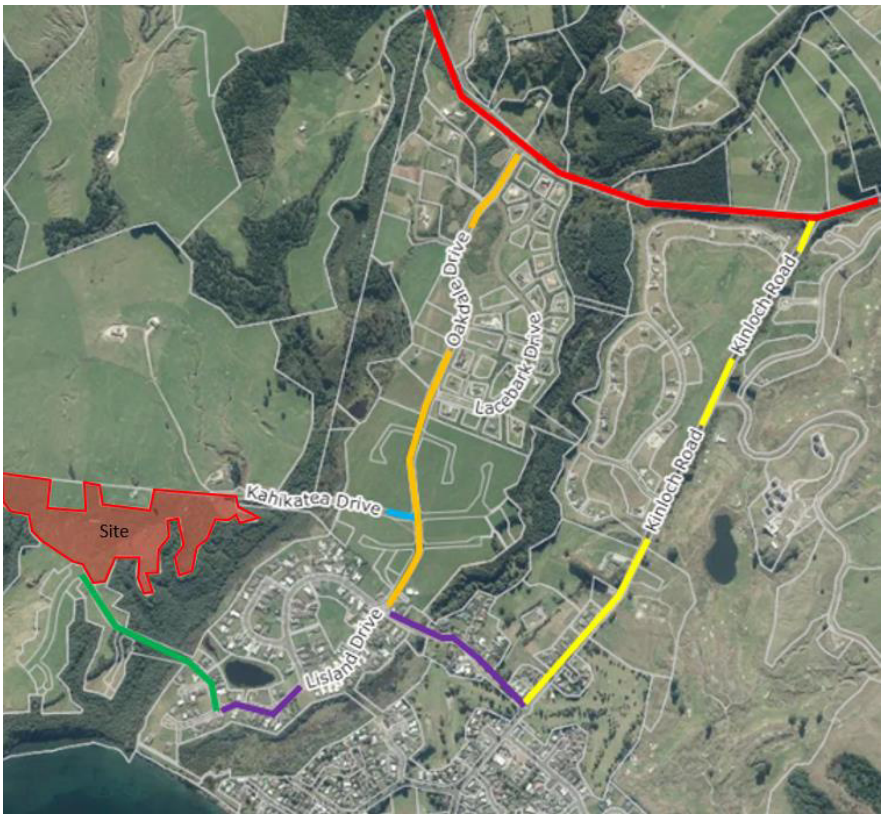



Figure 4 Surrounding Road Network

3.1.2 It is noted that due to a fundamental revision to the way speed limit changes are processed, the posted speed environments of the roads described in this section have been obtained via the NZTA National Speed Limit Register[1] (NSLR) as directed by TDC and are current as of 27th August 2024.

3.1.3 The primary network road corridor cross-sections and environments are described in detail below.

### *Okaia Drive*

3.1.4 Okaia Drive is classified as a local road within the DP and is a 50km/h speed environment. Okaia Drive forms one of the primary access points to both the existing 160 lot residential development of Seven Oaks as well as the primary southern access to the proposed development site.

3.1.5 Okaia Drive has a carriageway width of 11m and contains two 5.5m wide movement lanes as shown in Figure 5. The carriageway is delineated with centrelines only and contains footpaths on both sides of the road as shown in Figure 5.

Figure 5: Okaia Drive carriageway

### *Kahikatea Drive*

3.1.6 Kahikatea Drive is classified as a local road within the DP and is a 50km/h speed environment. The carriageway is approximately 9m in width containing a single movement lane in each of the eastbound and westbound directions and is delineated with centrelines only with no designated on-street parking or cycle lanes.

[1] NSLR (nzta.govt.nz)

3.1.7 A typical cross-section of Kahikatea Drive is shown in Figure 6 below.

Figure 6 Cross Section of Kahikatea Drive east of its intersections with Oakdale Drive

3.1.8 Kahikatea Drive has recently been extended beyond the publicly available 200m as shown in Figure 7 below, as part of the Terraces Residential Development. This new section of Kahikatea Drive is expected to open to the public in January 2025 and will also permit a future 500m extension and complete connection to the Okaia Drive / Seven Oaks Drive intersection.

Figure 7: Kahikatea Drive carriageway extension

### *Oakdale Drive*

3.1.9 Oakdale Drive is classified as a local road within the DP and is a 50km/h speed environment. Oakdale Drive primarily provides property connection between Lisland Drive and Whangamata Road and is one of two main routes in and out of Kinloch.

3.1.10 Oakdale Drive has a typical carriageway width of 11m with a single 5.5m wide movement lane in both the northbound and southbound directions. The carriageway is typically delineated with centreline markings only. Footpaths are present on both sides of the carriageway between the intersections of Lisland Drive and Kahikatea Drive. The footpath then terminates on the western side and continues north on the eastern side only.

3.1.11 Typical cross-sections are shown in Figure 8 and Figure 9.

Figure 8: Oakdale Drive southern end


Figure 9: Oakdale Drive northern end - at the intersection with Whangamata Road

### *Lisland Drive*

3.1.12 Lisland Drive is classified as a local road within the DP and is a 50km/h speed environment providing direct residential access. Lisland Drive has a typical carriageway width of 11m with a single 5.5m wide movement lane in both directions. The carriageway is typically delineated with centreline markings only.

3.1.13 Footpaths are present on both sides of the carriageway. Typical cross-sections of Lisland Drive are shown in Figure 10 and Figure 11.

Figure 10 Lisland Drive south of Okaia Drive

Figure 11: Lisland Drive north of Okaia Drive

### *Kinloch Road*

3.1.14 Kinloch Road south of Whangamata Road is classified as a district arterial within the DP for the initial 1.7km to the roundabout intersection with Lisland Drive and provides inter-regional connectivity. South of Lisland Drive, Kinloch Road is classified as a collector road connecting the wider Kinloch local road network to the arterial roads.

3.1.15 Kinloch Road is signposted as a 60km/h speed zone for the initial 530m south of Whangamata Road before reducing to 50km/h. Kinloch Road also provides the primary access point into the township itself for both westbound and eastbound vehicles along Whangamata Road as well as providing residential access as a secondary function.

3.1.16 Kinloch Road is approximately 2.7km in total length and has a typical carriageway width of 6m with a single 3m wide lane in each direction and is typically delineated with both edgeline and centreline markings. It is also noted that there is a shared footpath along the entire length of Kinloch Road. Typical cross-sections of Kinloch Road are shown in Figure 12 and Figure 13 below.

Figure 12 Typical cross-section of Kinloch Road (60 km/h section)

Figure 13: Typical cross-section of Kinloch Road (50km/h section)

### *Whangamata Road*

3.1.17 Whangamata Road is approximately 27.5km in length and connects Pohipi Road in the east to State Highway 32 (SH32) in the west as shown below in Figure 14.


Figure 14: Whangamata Road

3.1.18 Whangamata Road east of Kinloch Road is classified as a district arterial while west of Kinloch Road it is a collector road within the DP.

3.1.19 Whangamata Road has a posted speed limit of 100km/h along much of its length with the exception of a 1.2km length of corridor starting approximately 100m east of Kinloch Road and extending approximately 120m beyond Oakdale Drive which is a 60km/h speed limit.

3.1.20 Whangamata Road consists of a 6m wide carriageway with a single 3m wide movement lane in each direction. It is typically delineated with edgeline and centreline markings with minimal sealed shoulders as shown in Figure 15 below.

3.1.21 Although also acting as a major cycle route, there is no dedicated provision for cyclists along its length.

Figure 15: Whangamata Road cross-section approximately 200m east of Kinloch Road intersection

## Intersections

### *Okaia Drive / Kahikatea Drive*

3.1.22 Okaia Drive intersects with Seven Oaks Drive to the south and the future extension of Kahikatea Drive to the north via a newly constructed, four arm roundabout. The roundabout operates with a standard give-way priority and has an 8m diameter, with a7m wide single circulatory lane as shown in Figure 16 and Figure 17 below.

**Figure 16: Okaia Drive / Kahikatea Drive roundabout intersection (Okaia Drive left to right, Kahikatea Drive straight through)**


**Figure 17: Aerial View of Okaia Drive / Kahikatea Drive Roundabout Intersection**

3.1.23 Pedestrian crossing points are present on all approach arms with pedestrian refuges located within the raised central splitter island.

### *Okaia Drive / Lisland Drive*

3.1.24 The Okaia Drive / Lisland Drive intersection is a three-arm roundabout, approximately 6m in diameter. The roundabout operates with a standard give-way priority and has a 7m wide single circulatory lane as shown in Figure 18 and Figure 19 below.

Figure 18: Okaia Drive / Lisland Drive intersection (view from Oakaia Drive)

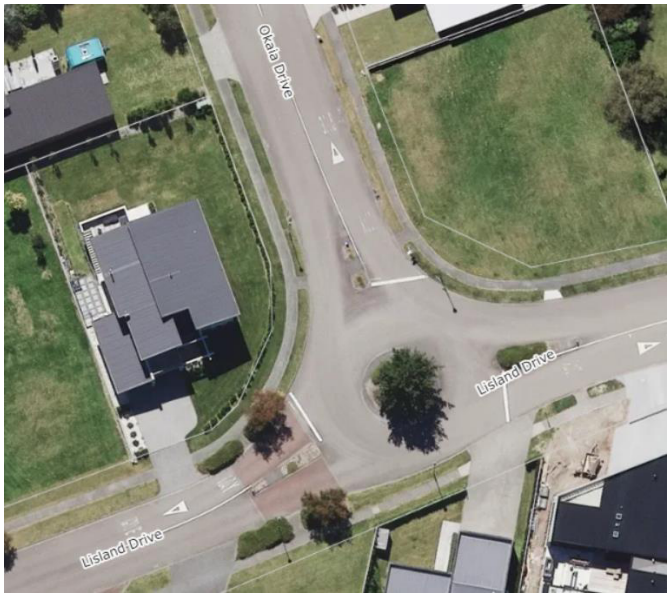



Figure 19: Aerial view of Okaia Drive / Lisland Drive Roundabout Intersection

3.1.25 Pedestrian crossing points are present on all approach arms with pedestrian refuges located within the raised central splitter island.

### *Kahikatea Drive / Oakdale Drive*

3.1.26 Kahikatea Drive connects at its eastern end with Oakdale Drive via a give way priority crossroad intersection with priority afforded to through traffic on Oakdale Drive. The intersection is shown in Figure 20 and Figure 21 below.


Figure 20: Kahikatea Drive / Oakdale Drive intersection (view from Kahikatea Drive)

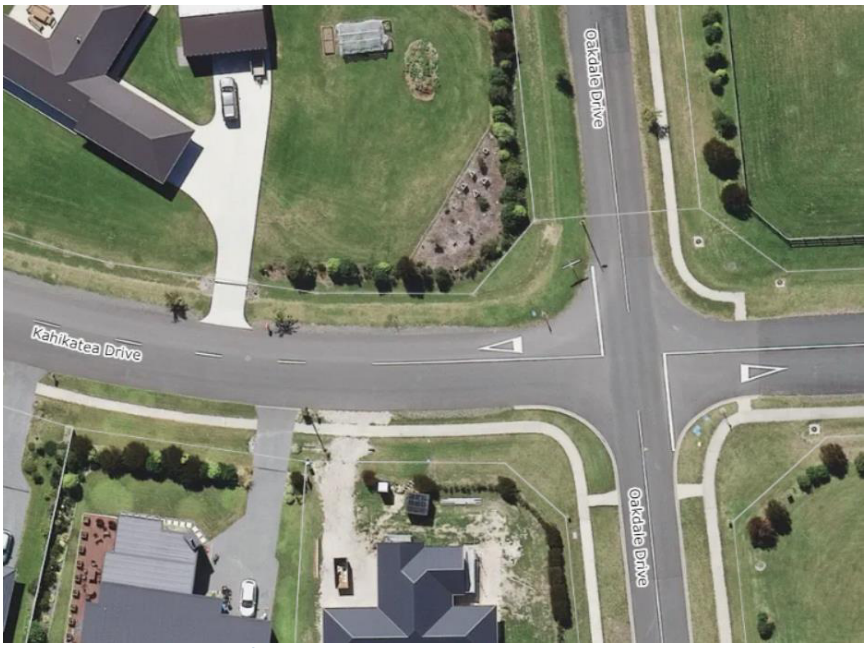



Figure 21: Aerial View of Kahikatea Drive / Oakdale Drive Intersection

3.1.27 The minimum Safe Intersection Sight Distance (SISD) is specified within Austroads Guide to Road Design (AGRD) Part 4A – Unsignalised and Signalised Intersections Table 3.2. The minimum required SISD for a 50km/h speed environment is 97m. The intersection has unobstructed sightlines in both directions and is able to achieve SISD compliance.

### *Oakdale Drive / Whangamata Road*

3.1.28 At its northern end, Oakdale Drive intersects with Whangamata Road via a give way T-intersection with priority afforded to through vehicles on Whangamata Road as shown in Figure 22 below.


Figure 22: Aerial View of Oakdale Drive / Whangamata Road Intersection

3.1.29 Measured sight distance is approximately 250m to the west which is limited by a crest in the road. Visibility to the east is 160m which is limited by a horizontal curve.

3.1.30 The posted speed limit is 60km/h. This increases to 100km/h approximately 100m west of the intersection. Minimum SISD requirements to the east are therefore 123m due to the 60km/h speed environment. SISD requirements to the west have been assessed at a 100km/h posted speed given that vehicles are likely to still be decelerating. At this higher speed, at least 248m visibility is required. Therefore, the intersection is assessed as being able to provide compliant sight distances in both directions.

### *Oakdale Drive / Lisland Drive / Montgomery Crescent*

3.1.31 Oakdale Drive intersects with Lisland Drive at its southern end via a four-arm roundabout approximately 6m in diameter as shown in Figure 23 below. The roundabout has a single circulatory lane measuring approximately 7m in width.


Figure 23: Aerial View of Oakdale Drive / Lisland Drive Roundabout Intersection

3.1.32 Pedestrian crossing points are present on all approach arms with pedestrian refuges located within the raised central splitter island.

### *Lisland Drive / Kinloch Road*

3.1.33 Lisland Drive intersects with Kinloch Road at its eastern end via a three-arm roundabout approximately 7m in diameter as shown in Figure 23 below. The roundabout has a single circulatory lane measuring approximately 7.5m in width.


Figure 24: Aerial View of Lisland Drive / Kinloch Road Roundabout Intersection

3.1.34 Pedestrian crossing points are present on all approach arms with pedestrian refuges located within the raised central splitter island.

### *Kinloch Road / Whangamata Road*

Kinloch Road intersects with Whangamata Road in the north via a Give Way t-intersection which contains a 3m wide right turn bay on Whangamata Road as shown below in Figure 25.

Figure 25: Kinloch Road / Whangamata Road intersection (view: looking east from Whangamata Road)

3.1.35 As described earlier, the speed limit to the west is 60km/h and there is a 60 / 100km/h speed transition approximately 100m to the east. Minimum SISD requirements to the west are therefore 123m due to the 60km/h speed environment while minimum SISD requirements to the east are assessed at 248m to account for the close nature of the 100 / 60km/h speed transition. Therefore, the intersection is assessed as being able to provide compliant sight distances in both directions as shown in Figure 26below.


Figure 26: Aerial View of Kinloch Road / Whangamata Road Intersection

## 3.2 Wider Road Network

### Corridors

#### *Pohipi Road*

3.2.1 Pohipi Road is classified as a regional arterial within the DP. Located between Wairakei Drive in the east and Whangamata Road in the northwest are two speed transitions. From the east, Pohipi Road has a posted speed limit of 50km/h for the initial 880m before transitioning to a posted speed limit of 80km/h approximately 200m south of Scoria Road as shown in Figure 27 below.


Figure 27: Pohipi Road speed transition location 50km/h to 80km/h

3.2.2 The 80km/h speed limit operates for 3.3km before becoming a 100km/h posted speed limit approximately 150m north of Tukairangi Road and 5.6km southeast of Whangamata Road as shown in Figure 28 below.


Figure 28: Pohipi Road speed transition location 80km/h to 100km/h

3.2.3 Pohipi Road has a total carriageway width of 6m with a single, 3m wide movement lane in each direction and is delineated with centreline and edgeline markings. There are no pedestrian or cycle facilities along its length which is typical of a rural road environment.

3.2.4 A typical cross-section of Pohipi Road is shown in Figure 29.

Figure 29 Typical Cross-Section of Pohipi Road between Wairakei Drive and Whangamata Road

### *Wairakei Drive*

3.2.5 Wairakei Drive was formally part of State Highway 1, however has not been under Waka Kotahi jurisdiction since the construction and opening of the East Taupo Arterial (ETA) bypass in October 2010. Wairakei Drive is classified as a regional arterial road within the DP. Wairakei Drive (at the Pohipi Road intersection) has a speed limit of 50 km/h.

3.2.6 North and south of the intersection of Pohipi Road, Wairakei Drive provides a single 3.2m wide movement lane in both the north and southbound directions with sealed shoulders of between 1.8m and 2.2m in width. The carriageway is typically delineated with edgelines and centreline or flush median markings.

### *Tongariro Street*

3.2.7 Tongariro Street is a continuation of Wairakei Drive south of the Wairakei Drive / Norman Smith Street intersection. As with Wairakei Drive, it is classified as a regional arterial road within the DP with a speed environment of 50km/h.

3.2.8 It has a single 3.7m wide through lane in each direction, delineated with edgelines and separated by a 3m wide flush median. The movement lanes narrow to the south to consist of single 3.2m wide movement lanes in each direction across the 60m long Control Gates Bridge (CGB). The movement lanes across the bridge are separated by a 2.8m wide raised central median which extends 70m south.

3.2.9 The movement lanes south of the CGB widen to 4m in each direction with sealed shoulders of between 0.9m and 1.3m in each direction. Delineation on this section of road is via edgelines and double yellow no-overtaking centrelines.

### *Norman Smith Street*

3.2.10 Norman Smith Street is classified as a District Arterial Road in the DP and is two-lane, two-way, providing a 3.4m wide westbound movement lane and 3m wide eastbound movement lane. The carriageway is delineated with standard centreline markings and edgeline markings for westbound traffic and No Stopping At All Times (NSAAT) markings in the eastbound direction.

### *Spa Road*

3.2.11 Spa Road is classified as a District Arterial Road in the DP and is two-lane, two-way and provides an east / connection across the northern extent of the Taupo business district. Spa Road also provides local road access north and south to service the central business district.

## Intersections

### *Whangamata Road / Pohipi Road*

3.2.12 Approximately 10km northwest of the Pohipi Road / Wairakei Drive intersection, Pohipi Road intersects with Whangamata Road at its eastern end via a Give Way T-intersection. The intersection contains a 3m wide right turn bay and left slip lane from Pohipi Road as shown below in Figure 30.


Figure 30: Whangamata Road / Pohipi Road intersection

3.2.13 The intersection meets the minimum SISD visibility requirements within a 100km/h speed environment of 248m in both the eastbound and westbound directions demonstrating compliance with AGRD Part 4A.

### *Pohipi Road / Wairakei Drive Intersection*

3.2.14 The Wairakei Drive/Pohipi Road Intersection is designed as a seagull priority intersection with a right-turn bay for vehicles turning into Pohipi Road, a right-turn merge lane for vehicles turning right out of Pohipi Road, and a left-turn filter for vehicles turning into Pohipi Road as shown in Figure 31.

3.2.15 There are no pedestrian footpaths or formalised crossing facilities on the western side of Wairakei Drive in the immediate vicinity of the Pohipi Road intersection. On the eastern side of Wairakei Drive however, there is a shared path.

Figure 31: Wairakei Road / Pohipi Road Intersection (Source: Google Streetview looking south)

3.2.16 The intersection meets the minimum visibility requirements of 97m in both the northbound and southbound directions demonstrating compliance with AGRD Part 4A for an 50km/h speed zone.

### *Wairakei Drive / Norman Smith Street / Tongariro Street Intersection*

3.2.17 The Wairakei Drive / Norman Smith Street / Tongariro Street intersection was upgraded in 2019 to include traffic signals on all three approaches. It is noted that this upgrade was conducted in order to relieve congestion currently experienced both at the intersection itself and further south, at the CGB and at the Tongariro Road / Spa Road intersection.

3.2.18 Norman Smith Street forms the western arm of the intersection and has two right turn lanes south onto Tongariro Street, with the outside lane acting as a dedicated right turn lane and the inside lane acting as a shared left turn lane onto Wairakei Drive.

3.2.19 Wairakei Drive has a single northbound lane and two southbound through lanes onto Tongariro Street. No right turns are permitted from Wairakei Drive onto Norman Smith Street at the intersection, and this is signposted using an RG-9 on an extended raised central median.

3.2.20 The single northbound movement lane of Tongariro Street, on the approach to the intersection, diverges into a left slip lane onto Norman Smith Street and a northbound through lane onto Wairakei Drive.

3.2.21 The Norman Smith Street / Wairakei Drive / Tongariro Street intersection is shown in Figure 32 below.


Figure 32: Norman Smith Street / Wairakei Drive / Tongariro Road Intersection

### *Tongariro Street / Spa Road Intersection*

3.2.22 The Tongariro Street / Spa Road intersection is a three-arm roundabout with a raised central island of approximately 8m in diameter with approaches from the north, south and east. The roundabout has a single circulation lane on both the northern and southern Tongariro Street approaches and two circulatory lanes from the Spa Road approach.

3.2.23 The Tongariro Street / Spa Road intersection is shown in Figure 33 below.


Figure 33: Tongariro Street / Spa Road Intersection

## 3.3 Traffic Volumes

### Video Survey

3.3.1 In 2022, CKL engaged Matrix Traffic and Transport Data to undertake an independent peak hour survey of existing traffic volumes at the following intersections:

- Oakdale Drive / Whangamata Road;
- Kinloch Road / Whangamata Road;
- Whangamata Road / Pohipi Road; and
- Pohipi Road / Wairakei Drive.

3.3.2 The survey established the existing peak hours, 7:15am to 8:15am and 4:15pm to 5:15pm, as well as total peak hour traffic and traffic distribution patterns. A summary table of the total peak hour traffic volumes is shown in Table 1 below. The detailed results of the survey are attached as Appendix A.

**Table 1: Peak hour traffic volumes summary (surveyed)**

| Road | AM vph | PM vph |
|---|---|---|
| Oakdale Drive | 91 | 92 |
| Kinloch Road | 170 | 148 |
| Whangamata Road | 275 | 259 |
| Pohipi Road | 412 | 458 |
| Wairakei Drive | 850 | 1,028 |

3.3.3 Heavy vehicle volumes were also obtained through the traffic survey. The results of the traffic surveyed heavy vehicle volumes are summarised in Table 2 below.

**Table 2: Peak Hour Heavy Vehicle Volumes For Key Intersections**

| Intersection | 7:45am - 8:45am | 4:15pm - 5:15pm |
|---|---|---|
| Whangamata Rd / Oakdale Dr | 8 | 11 |
| Whangamata Rd / Kinloch Rd | 25 | 16 |
| Whangamata Rd / Poihipi Rd | 16 | 18 |
| Poihipi Rd / Wairakei Drive | 38 | 19 |

## TDC Count Data

3.3.4 In addition to the above peak hour data, the TDC count data from November 2023, previously used for daily traffic volume analysis, also provided peak hour volumes for the intersections of:

- Norman Smith Street / Wairakei Drive / Tongariro Street
- Tongariro Street / Spa Road

3.3.5 Summary peak hour intersection flow diagrams from the video survey and the TDC count data are attached in Appendix B.

## Seasonal Variance

3.3.6 Taupo and the surrounding districts, including Kinloch, are tourist destinations, particularly during the winter months due to proximity to New Zealand landmarks such as thermal springs, Mount Ruapehu for snow related activities and other geographic features. As such, investigation was conducted to establish if there was any seasonal variation in traffic volumes within the surrounding road network.

3.3.7 Due to the lack of consistent available count data closer to the site, the state highway network was chosen for assessment as regular count data is available through the Waka Kotahi Traffic Management System (TMS). A first principles analysis of traffic volumes from the closest count locations along State Highways 1 and 5 (SH1 and SH5) has been undertaken.

3.3.8 The count sites are shown in Figure 34 below.

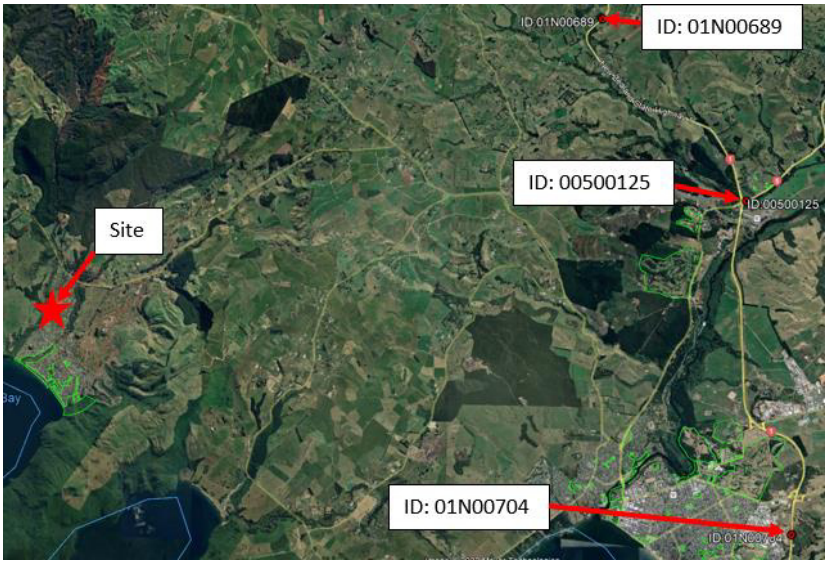



Figure 34: State Highway traffic volume count locations

3.3.9 Traffic count data collected at these sites has been obtained between 1 March 2021 to 13 August 2024. The latest available traffic volumes are summarised in the tables below.

**Table 3: State Highway 1 Traffic Counts North of Wairakei Drive Intersection**

| Site ID: 01N00689 | | |
|---|---|---|
| Date Range | | Weekly Average AADT (vpd) |
| 5th to 11th May | 2021 | 6283 |
| 11th to 17th July | 2021 | 7805 |
| 20th to 26 Jan | 2022 | 7257 |
| 3rd to 9th Nov | 2022 | 6577 |
| 18th to 24th Feb | 2023 | 6029 |
| 23rd to 29th Aug | 2023 | 6653 |
| 11th to 17th April | 2024 | 6539 |
| 4th to 10th July | 2024 | 6288 |

**Table 4: State Highway 1 Traffic Counts South of Wairakei Drive Intersection**

| Site ID: 01N00704 | | |
|---|---|---|
| Date Range | | Weekly Average AADT (vpd) |
| 5th May to 11th May | 2021 | 7104 |
| 2nd to 8th Nov | 2021 | 5771 |
| 3rd to 9 Dec | 2021 | 6361 |
| 20th to 26th Jan | 2022 | 7864 |
| 15th to 21st Mar | 2022 | 6194 |
| 14th to 20th July | 2022 | 8016 |
| 4th to 10th Nov | 2022 | 7880 |
| 24th Feb to 2nd Mar | 2023 | 6105 |
| 22nd to 28th July | 2023 | 7569 |
| 30th Aug to 5th Sep | 2023 | 8191 |
| 9th to 15th July | 2024 | 8495 |

**Table 5: State Highway 5 at Wairakei Drive Intersection**

| Site ID: 00500125 | | |
|---|---|---|
| Date Range | | Weekly Average AADT (vpd) |
| 23rd to 29th Mar | 2021 | 4524 |
| 5th to 11th May | 2021 | 4098 |
| 11th to 17th July | 2021 | 4770 |
| 1st to 7th Oct | 2021 | 4634 |
| 20th to 26th Jan | 2022 | 5055 |
| 7th to 13th July | 2022 | 4399 |
| 3rd to 9th Nov | 2022 | 4882 |

3.3.10 The traffic volume data used for assessing effects of the proposed development were taken from the months of September and November which are towards the higher end of traffic volumes throughout the year. This ensures that a robust assessment has been undertaken

## Lane Capacity Assessment

3.3.11 Due to existing, known capacity / congestion issues experienced south of the Pohipi Road / Wairakei Drive intersection, a lane capacity assessment has been undertaken to determine approximately how the network south of this intersection is performing. Specific modelling analysis is undertaken later within this report.

3.3.12 Under free flow conditions, typical single lane capacity is estimated to be between 1,400vph to 1,800vph depending on vehicle following distance. For analysis purposes, the single lane capacity is averaged to be 1,600vph and the demand data used was supplied by TDC.

Table 6: Existing Lane Capacity Assessment

| | | Traffic Volumes (vph) | | Average Lane Capacity (%) | |
|---|---|---|---|---|---|
| Intersection | Approach | AM Average | PM Average | AM | PM |
| Wairakei Drive / Norman Smith Street / Tongariro Street | North | 684 | 567 | 43 | 35 |
| | South | 665 | 1521 | 42 | 95 |
| | West | 944 | 446 | 59 | 28 |
| Tongariro Street / Spa Road | North | 1592 | 1013 | 100 | 63 |
| | East | 575 | 1157 | 36 | 72 |
| | South | 223 | 429 | 14 | 27 |

3.3.13 As shown in Table 6 above, the majority of the existing road network is shown to be operating well within typical lane capacities during peak hour with the exception of Tongariro Street between Norman Smith Road to the north and Spa Road to the south. Both travel directions, highlighted yellow, across the surveyed days were observed to be operating near capacity which explains the existing congestion problems experienced by traffic across the CGB.

3.3.14 Travel options into the Taupo CBD for vehicles originating from the northwest side of the Waikato River are limited to either the CGB or a twenty-minute detour north to the SH1 / SH5 / Wairakei Drive roundabout before heading south along SH1 East Taupo Arterial. The primary exit locations for drivers would then be at either the Centennial Drive off-ramp, Broadlands Road off-ramp or the Napier Road roundabout.

## 3.4 Road Safety

3.4.1 A search was made of the Waka Kotahi NZTA's Crash Analysis System for all crashes that had been reported between 2019 - 2024 (to date) at the following intersections:

- Wairakei Drive/Pohipi Road;
- Whangamata Road/Pohipi Road;

- Whangamata Road/Kinloch Road; and
- Whangamata Road/Oakdale Drive

3.4.2 A total of eighteen crashes have been reported at these intersections, which resulted in three serious, seven minor injury and eight non-injury crashes. No crashes were reported at the Whangamata Road/Oakdale Drive intersection during this 2019-2024 period.

3.4.3 Seven crashes occurred at the Wairakei Drive/Pohipi Road intersection, which resulted in one serious injury, three minor injury and three non-injury crashes. The serious injury resulted from a crash between a vehicle turning right out of Pohipi Road onto Wairakei Drive, travelling towards Taupo Town Centre. The first minor injury crash occurred when a driver turning right from Pohipi Road failed to give way to a cyclist turning right from Wairakei Drive into Pohipi Road. The second minor injury crash occurred when a northbound vehicle on Wairakei Drive used the left slip lane onto Pohipi Road and deliberately drove into a queued vehicle on Pohipi Road in a suicide attempt. The third minor injury crash occurred when a vehicle utilising the Wairakei Drive / Pohipi Road left slip lane failed to negotiate the turn and crashed into queued traffic on Pohipi Road.

3.4.4 Nine crashes were recorded within 100m of the Whangamata Road/Pohipi Road intersection, which resulted in two serious and five minor injuries. Five of the reported crashes occurred at the intersection including two minor injury and three non-injury crashes. Both minor injury crashes occurred as a result of shadowing / masking. Both crash reports indicate sightline obstruction for a right turning driver from Whangamata Road onto Pohipi Road by an oncoming vehicle turning left from Pohipi Road onto Whangamata Road. Neither right turning driver observed an oncoming northbound through vehicle on Pohipi Road.

3.4.5 Four midblock crashes occurred approximately 80m southwest of the Whangamata Road/Pohipi Road intersection and include one serious injury, two minor injury and one non-injury crashes. The serious injury crash involved a motorcycle approaching a bend preceding the intersection from the south failing to make the turn. The first minor injury crash occurred where a tourist failed to negotiate the bend preceding the intersection crossing the centreline and leaving the road. The second minor injury crash occurred where a northbound vehicle approaching the bend preceding the intersection slowed to undertake the turn and a vehicle travelling behind rear-ended the lead vehicle pushing it from the road across the centreline.

3.4.6 Two crashes have been reported at the Whangamata Road / Kinloch Road intersection, which resulted in one serious injury. The serious injury crash occurred where a vehicle failed to give way. The crash report cited alcohol as being suspected.

3.4.7 No crashes have been reported at the Whangamata Road / Oakdale Drive intersection during the analysis period. It is noted that this intersection, as described in section 3.2 above, experiences non-compliant sight distance to the east however is also the subject of a proposed speed reduction by TDC. This would suggest that the non-compliant sight distance safety concern is being addressed as a proactive remedial action rather than a reaction to a reported crash.

3.4.8 Overall, the crash history indicates that there are some existing safety issues along the main road corridors of Pohipi Road and Whangamata Road. It is reasonably considered following analysis of the crash reports and due to the investigation of proposed speed limit reductions outlined by TDC on these roads, the reported crashes along these corridors may have a significant component relating to excessive or inappropriate speed. It is reasonably considered that any implemented speed reduction will likely have the desired effect of crash likelihood and severity of injury reduction.

3.4.9 An additional crash history search was also made during the same five-year time period, 2019 to 2024, of the three likely highest traffic volume intersections within Kinloch township. These intersections were:

- Okaia Drive / Lisland Drive;
- Lisland Drive / Oakdale Drive; and
- Lisland Drive / Kinloch Road.

3.4.10 A radius of 50m was analysed at each intersection and returned no reported crashes at any of these intersections during the analysis time period.

3.4.11 A full, updated and combined crash report for the intersections that returned reported crashes is available in Appendix C.

## 3.5 MegaMaps Analysis

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

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

3.5.2 It is noted that MegaMaps is a retrospective analysis tool based on crash data from 2017 to 2021. Therefore, the risk profile classifications are indicative of a slightly historic environment and may not be entirely reflective of the existing environment, noting some recent changes to speed limits and also intersection upgrades.

3.5.3 The overall risk profile classification is typically based on the collective risk profile rating. Table 7 below shows both the independent collective and personal risk ratings and the overall classification summary of the MegaMaps Risk Ratings for the surrounding roads.

3.5.4 Where more than one overall risk rating classification was identified across a road corridor, multiple rows have been shown in order to correctly identify which section of road corridor the classification pertains to.

**Table 7: NZTA MegaMaps Analysis**

| Road Corridors | Location Description | Collective Risk | Personal Risk | Overall Classification |
|---|---|---|---|---|
| All Internal Kinloch Roads | | Low | Low | Low |
| Whangamata Road | | Low Medium | Medium | Low Medium |
| Pohipi Road | west of Tukairangi Road | Low Medium | Medium | Low Medium |
| | between Tukairangi Road and Watene Lane | Medium | Low Medium | Medium |
| | east of Watene Lane | Medium High | High | Medium High |
| Wairakei Drive | immediately north of Pohipi Road intersection | Medium High | Medium High | Medium High |
| | southbound right turn slip lane from Pohipi Road | Low | Low | Low |
| | to Norman Smith Street intersection | Low Medium | Low Medium | Low Medium |
| Norman Smith Street | | Low | Low | Low |
| Tongariro Street | south of Norman Smith Street to CGB | Low Medium | Low Medium | Low Medium |
| | CGB to Spa Road roundabout | Medium | Medium High | Medium |
| | south of Spa Road roundabout SBD | Medium High | High | Medium High |

| | | | | |
|---|---|---|---|---|
| | south of Spa Road roundabout NBD | Low | Low | Low |
| Spa Road | immediately east of roundabout | High | High | High |
| | between Gascoigne Street and Taniwha Street | Low Medium | Low Medium | Low Medium |

3.5.5 As shown in Table 7, all of the roads within Kinloch township were shown to have low risk ratings for both collective and personal analysis and have been subsequently grouped together as 'All Internal Kinloch Roads' for easy reference.

3.5.6 Treatment methodologies for those roads classified as either low, low medium or medium, involve relatively low to medium cost initiatives from regular maintenance to additional / upgraded signage as prescribed in Figure 4-5 of the High-Risk Intersection Guide (HRIG).

3.5.7 TDC has taken a proactive approach to crash mitigation through the consultation and proposed implementation of the speed management bylaw which is also partly reflected in the National Speed Limit Register. There are a series of speed reductions proposed under this bylaw, some of which have been enacted and others yet to be. It is considered that the implementation of these reduced speed zones proposed by this bylaw, such as the reduced speed limits along Pohipi Road and Whangamata Road, will likely address the majority of safety concerns demonstrated by the above classifications.

3.5.8 It is also considered that the risk classifications of Tongariro Street and Spa Road are likely due to the significant traffic volumes experienced along these corridors and the restricted travel options to cross the Waikato River. The congestion problems across the CGB are known and TDC is currently investigating the feasibility of a second bridge crossing as described in the long-term plan. It is considered that until such time that a feasible solution to the congestion is implemented, this congestion and risk classification will likely remain. Further analysis of the congestion across the CGB is also included in section 7 of this report.

# 4 Sustainable Travel Modes

## 4.1 Walking and Cycling

4.1.1 As shown in Figure 35, a local network of walking and cycling trails is available in Kinloch, and a short distance away from the area of proposed development.

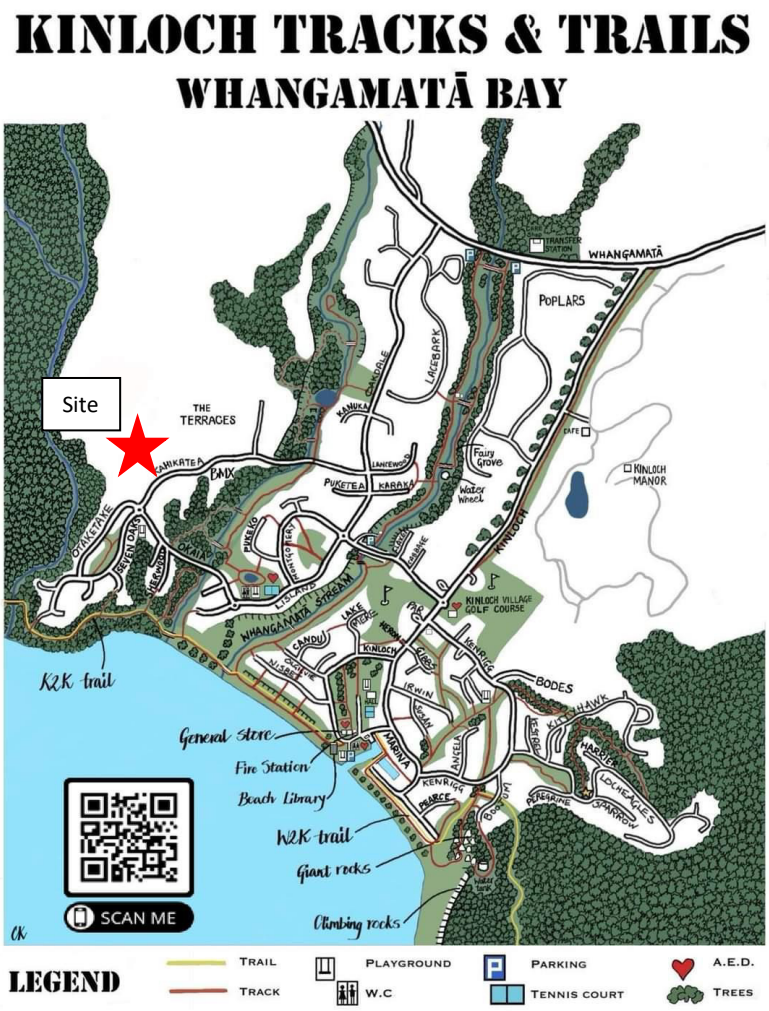



Figure 35 Kinloch network of walk/cycle trails.

4.1.2 This network is complemented by a network of paths running alongside many of the local roads, including Lisland Drive and Oakdale Drive. There are also some separated walk/cycleways along stormwater reserves and between properties that connect neighbourhoods with each other. The roads themselves are also quiet, low speed and therefore appropriate for suitably capable cyclists to use. This includes Lisland Drive, Oakdale Drive and Kinloch Road.

## 4.2 Public Transport

4.2.1 With the exception of school bus(es) operating between Kinloch and Taupo, there is one public transport service operating within Kinloch. Route 35 Kinloch to Taupo is part of the Connect2Taupo service that operates two return runs, one in the morning and one in the afternoon, every Wednesday. The bus route is also noted to operate as a hail to ride service

meaning that users can hail the bus anywhere along the route where it is safe for the bus to pull over and stop.

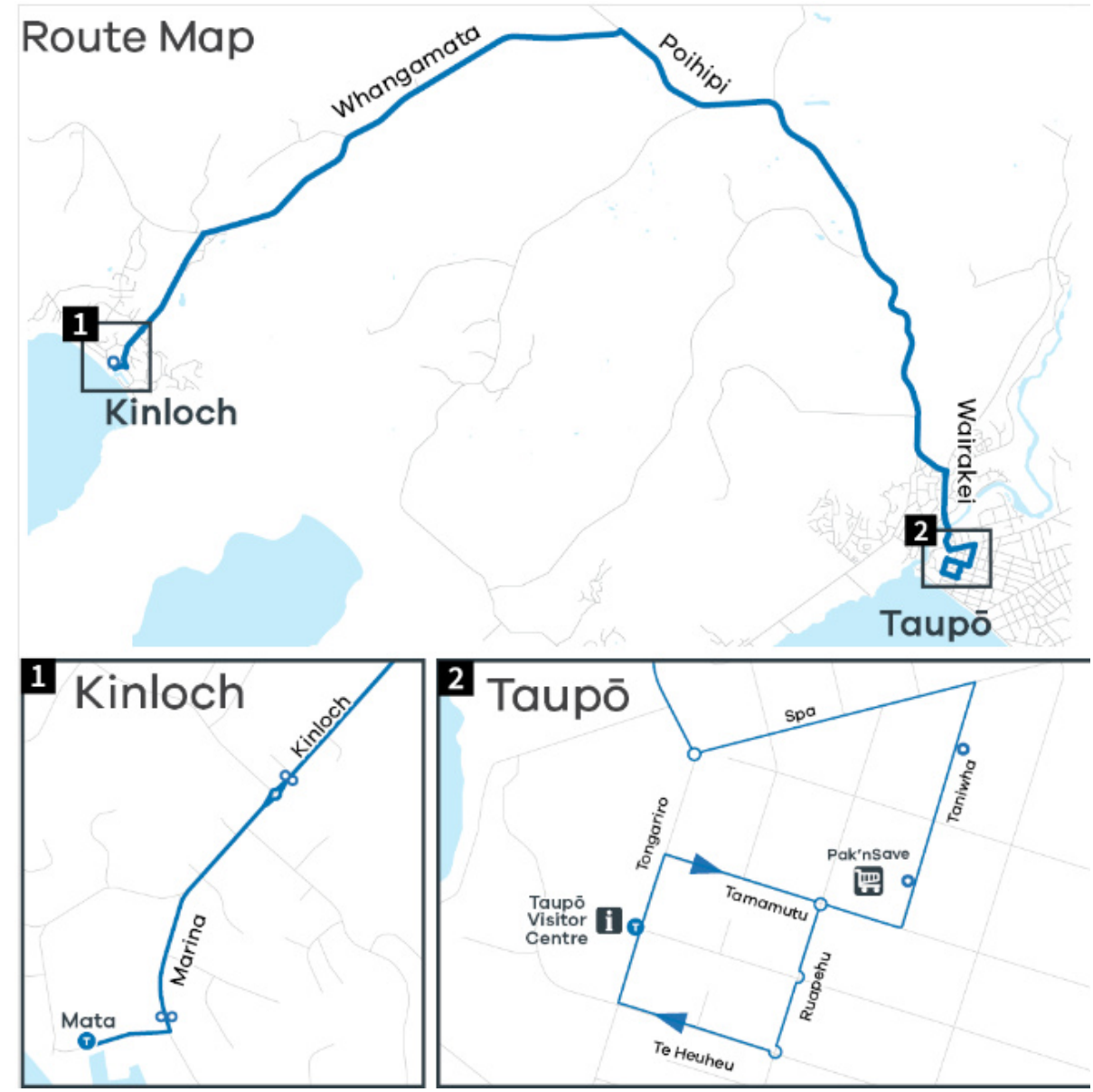



Figure 36: Bus Map - Route 35

# 5 Committed Environmental Changes

## 5.1 Kinloch Developments

5.1.1 It is understood that Kinloch is set to expand by some 480 residential dwellings across 11 different developments by 2050. Future development mapping obtained from TDC is attached in Appendix D.

5.1.2 These developments, respective lots and expected delivery timeframes are summarised in Table 8 below. It is noted that included within these future lots is the existing Seven Oaks development located south of the proposed site which consists of 160 lots, highlighted yellow.

Table 8: Kinloch Future Developments

| Future Development | Lots | Construction Timing |
|---|---|---|
| Hunt Club Inc | 30 | 2030-2035 |
| The Terraces | 55 | 2025-2035 |
| Seven Oaks | 160 | 2020-2026 |
| Oakdale Drive | 12 | 2025-2030 |
| Workshop Site | 6 | 2025 |
| The Poplars | 12 | 2020-2025 |
| The Fairways | 54 | 2020-2040 |
| Kinloch Golf Course | 108 | 2035-2050 |
| The Kinloch Manor | 12 | 2025-2030 |
| Edmund Hillary Outdoor Education | 1 | 2025 |
| Locheagle Developments | 30 | 2020-2035 |
| Total | **480** | |

5.1.3 The trip generation effects of these developments are explored further in section 7.

## 5.2 Nukuhau Development (Plan Change 37)

5.2.1 Plan Change 37, also referred to as the Nukuhau Plan Change, was approved in 2022 and re-zoned some 77.8 hectares of Rural Environment land to a mix of General Residential and Medium Density Residential. The rezoned land is located between Norman Smith Street in the south and Pohipi Road in the north and will enable the development of 780 residential dwellings. Also incorporated within this area will be a neighbourhood shopping centre, stormwater and recreational reserve overlays.

5.2.2 In addition to re-zoning, the plan change would also see the introduction of a realignment of Pohipi Road to relocate the intersection with Wairakei Drive north, to become a signalised intersection with Huka Falls Road. A map of the proposed Nukuhau Plan Change area is shown in Figure 37 below.

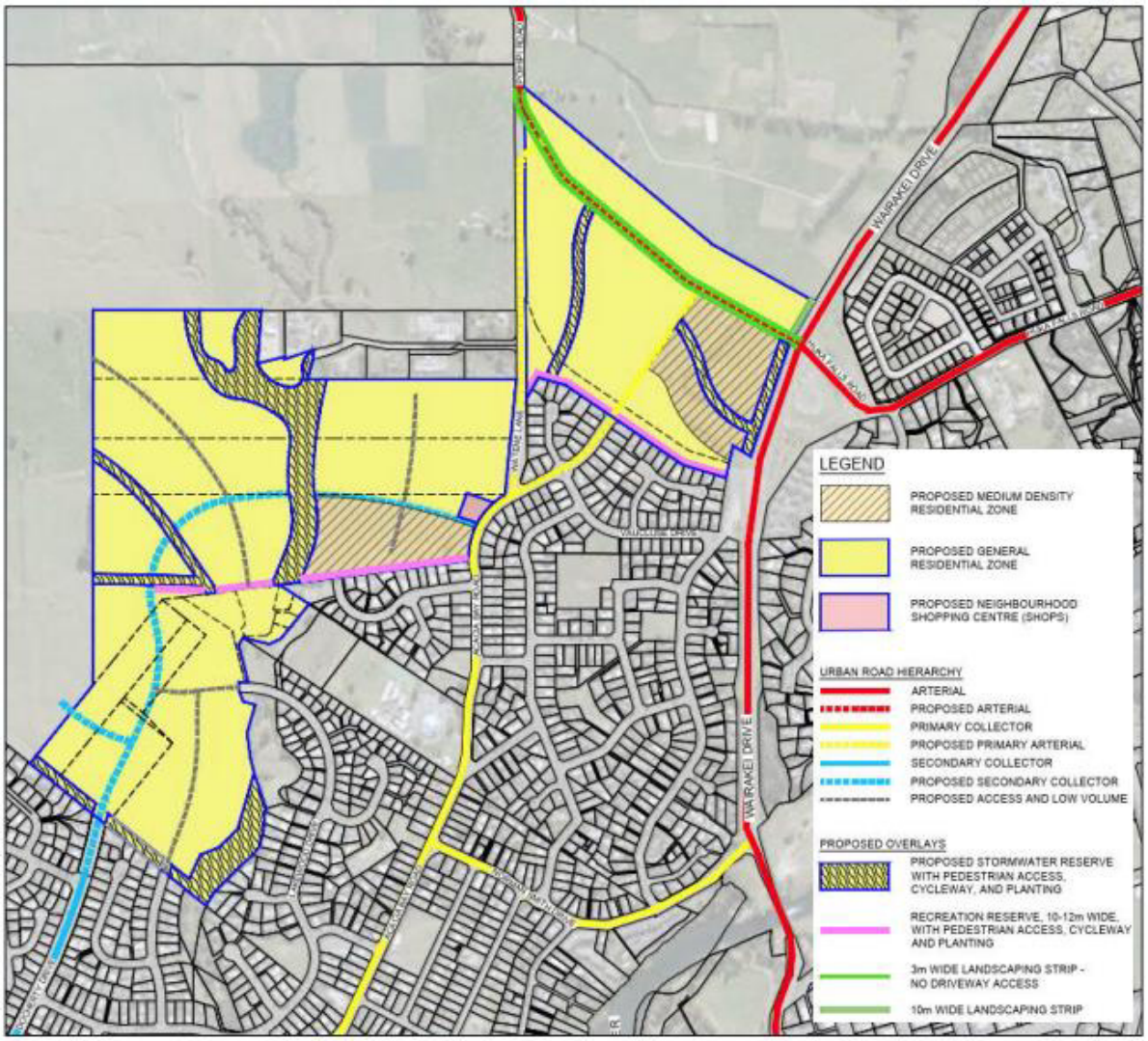



Figure 5-1 Nukuhau Development Road Hierarchy Map with Proposed Zoning
Source: WSP, 2020
**Figure 37: Nukuhau Plan Change**

## 5.3 Lochviews Estate

5.3.1 Located to the west of Taupo within Acacia Bay is a residential development referred to as the Lochviews Estate Subdivision. It is understood this subdivision enables the development of 570 rural residential dwellings total across two stages of development as shown in Figure 38 and Figure 39 below.

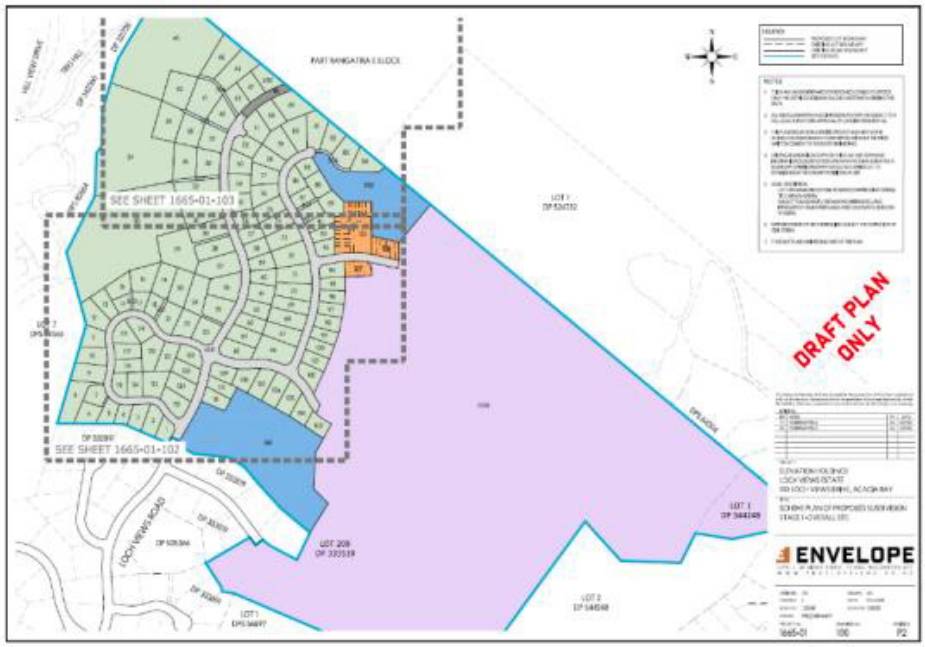



Figure 38: Lochviews Estate Subdivision Stage 1 - 125 lots

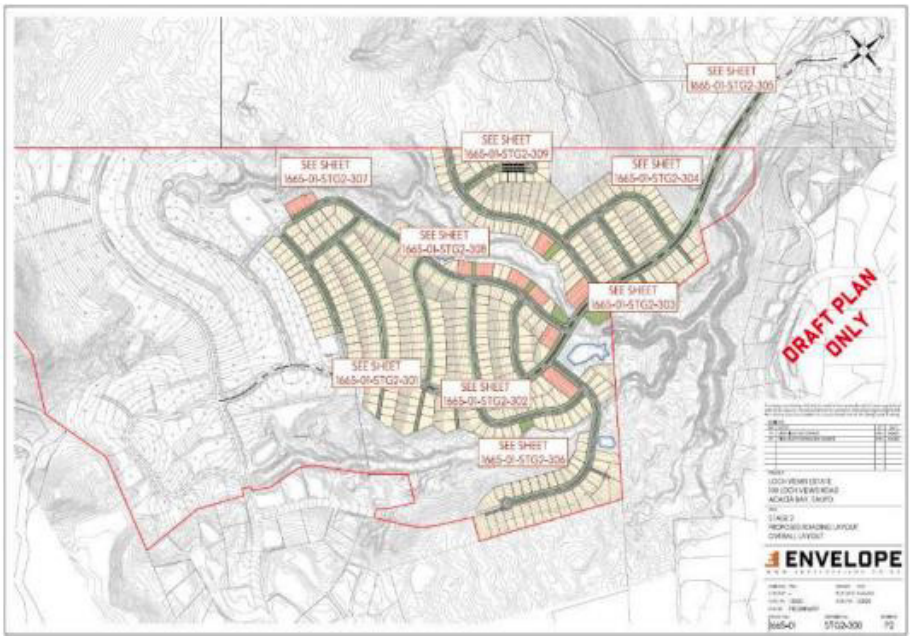



Figure 39: Lochviews Estate Subdivision Stage 2 - 406 lots

# 6 Development Proposal

6.1.1 It is proposed to develop the existing site at Lot 501 DP 569523, Kinloch into an 87-lot residential development within the existing lot boundary as shown in Figure 40.

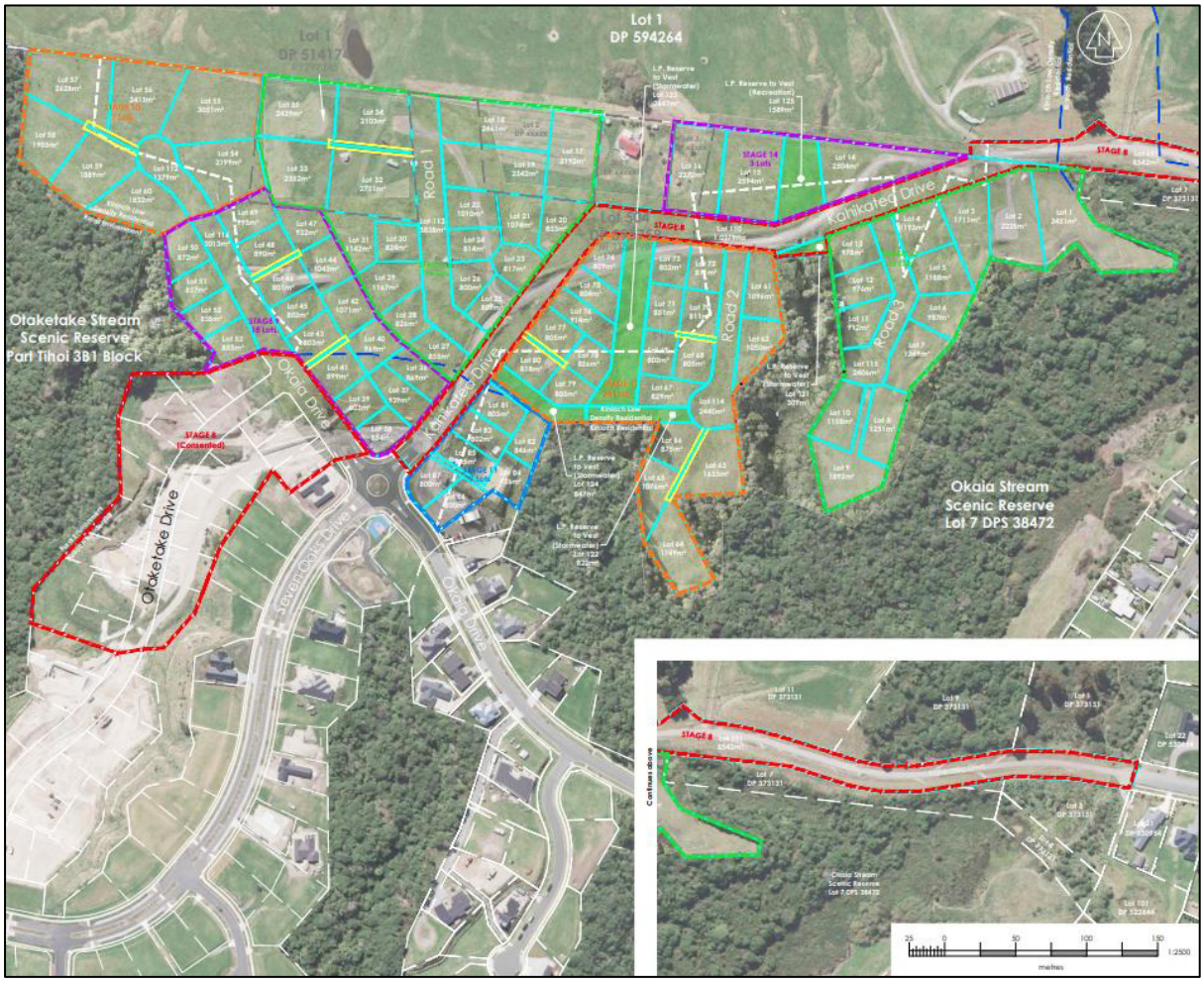



Figure 40: Concept Scheme Plan

6.1.2 The development of the site will also incorporate an internal road network to connect to Okaia Drive in the south and Kahikatea Drive in the east.

6.1.3 The proposed site is largely un-developed and lies to the northwest of Kinloch township. The proposed development is located immediately north of the existing and consented Seven Oaks developments which contains 160 residential lots.

6.1.4 Okaia Drive is already constructed as far as the roundabout intersection with Seven Oaks Drive within the development. This intersection is currently providing access for the 160 residential lot Seven Oaks development to the south.

6.1.5 Kahikatea Drive has is also partly constructed and recently was extended to accommodate the Terraces residential development. It is expected that the current formation of Kahikatea Drive, as shown in Figure 41 below, will be extended a further 500m into the Seven Oaks development to meet the Okaia Drive / Seven Oaks Drive roundabout shown in Figure 17 and provide the required through connection within the development.

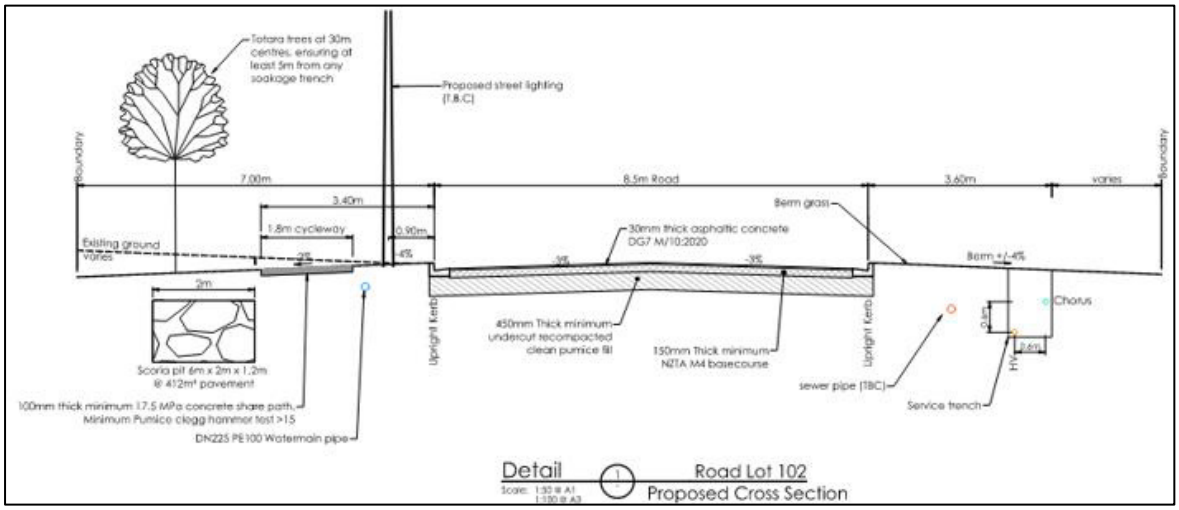



Figure 41: Expected Kahikatea Drive extension cross-section

# 7 Traffic Generation and Distribution

## 7.1 Trip Generation

7.1.1 Trip generation has been estimated using applicable rates from the Waka Kotahi Research Report 453 (RR453) *Trips and Parking Related to Land Use* Table C1. Each of the dwellings has been assessed as land use Residential: Dwelling (Outer Suburban) rates of 0.9 trips per dwelling in the peak hour and 6.9 over the course of the day. With 87 lots proposed, this equates to 78 trips in the peak hour and 600 over the course of the day.

## 7.2 Surrounding Developments

7.2.1 Consideration has been given to the variety of other developments nearby that have also been consented.

### Kinloch

7.2.2 As described in section 5 above, there are 11 other residential developments within Kinloch, including the pre-cursor Seven Oaks stage. These developments will ultimately provide a total of some 480 residential lots.

7.2.3 It is expected that the proposed development is likely to be developed within five years (i.e. 2025 to 2029). Therefore, 2029 has been taken as the future year for assessing traffic effects of the proposed development. Based on the timings of the committed developments and expected completion rates of the other developments outlined previously in Table 8, it is estimated that some 228 (48%) lots may also be delivered by the time the proposed development is completed.

7.2.4 The traffic demands associated with these subdivisions have been derived using the same rates from RR453 as adopted for the subject site. With 228 lots anticipated by 2029, this equates to 205 peak hour trips and 1,573 over the course of the day. All trips are expected to access the wider network at the Wairakei Drive / Pohipi Street intersection.

### Nukuhau Plan Change

7.2.5 The traffic demand associated with the NPC have been derived from the WSP report 'Nukuhau Private Plan Change' dated October 2020. This report relied on the Taupo Traffic Model to estimate both the number of trips from Nukuhau as well as how such trips are distributed to the network. From this reporting, it was identified that this development is likely to generate up to 712 trips in the peak hour (663 for residential plus 49 new external trips for the neighbourhood centre).

### Lochviews Estate Subdivision

7.2.6 The traffic demands associated with the Lochviews Estate Subdivision were derived from the Integrated Transportation Assessment report prepared by Stantec dated July 2021. This development is expected to generate 513vph. All trips are expected to access the wider network at the Wairakei Drive / Norman Smith Street intersection.

7.2.7 Table 9 below summarises the trips rates for the site and the neighbouring developments during the peak hour.

**Table 9: Calculated Trip Generation**

| Development | Number of Lots | Peak hour trip rate (vph/dwelling) | Peak Hour Trips (vph) |
|---|---|---|---|
| **Proposed** | 87 | 0.9 | 78 |
| **Kinloch (other)** | 228 | 0.9 | 205 |
| **Nukuhau** | 780 + 1,000sqm Retail | - | 712 |
| **Lochviews** | 570 | 0.9 | 513 |
| **Total** | **1,665 + 1,000sqm Retail** | **-** | **1,508** |

7.2.8 Overall, it is assessed that the combination of the proposal and the other consented developments would likely add 1,508 trips to the surrounding road network during the peak hour. The proposed development represents approximately 5% of the total number of trips.

## 7.3 Development Trip Distribution

7.3.1 As described in section 6, the overall development is proposed to connect to the wider surrounding road network of Kinloch township in two locations; Kahikatea Drive to the north and Okaia Drive in the south.

7.3.2 It is noted that the Kinloch Community Structure Plan (KCSP) requires an additional intersection located to the west of the Oakdale Drive / Whangamata Road intersection for additional future development. However, due to its location relative to the development, this future intersection is not assessed further within this report.

7.3.3 Figure 42 shown below details the two likely routes for development traffic entering and exiting Kinloch township. Route 1 connects the northern end of the development to Whangamata Road via Kahikatea Drive and Oakdale Drive and is shown in red. Route 2 connects the southern end of the development to Whangamata Road via Okaia Drive, Lisland Drive and Kinloch Road, by-passing Kinloch township to the south and is shown in yellow.

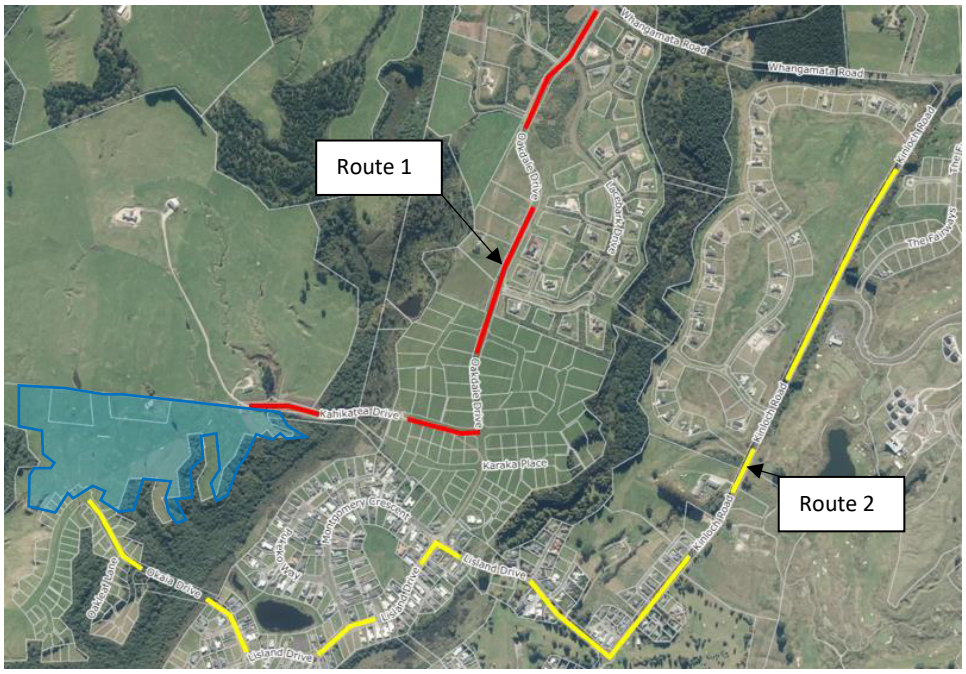



Figure 42: Access routes into and out of development

7.3.4 It is reasonable to expect that the majority of development traffic would utilise Oakdale Drive (shown in red) and its subsequent intersection with Whangamata Road for journey to work or school based trips rather than the longer Kinloch Road route (shown in yellow). As such, it

has been assumed that 80% of development traffic will use Oakdale Drive and 20% will use Kinloch Road to access Whangamata Road. No traffic has been assumed to fully enter Kinloch township and all traffic has been assumed to travel to Taupo CBD via Pohipi Road and Wairakei Drive.

7.3.5 The Institute of Transportation Engineers (ITE) Manual, 10th Edition was used to establish likely peak hour inbound and outbound trip percentages for the proposed 87 lots of the Seven Oaks development extension.

7.3.6 The ITE Manual (Land Use Code 210 – Single Family Detached Housing) was used to demonstrate the traffic patterns into and out of the development within the AM and PM peaks. Peak hour distribution rates and indicated in the AM peak hour 75% of trips would be outbound (likely to be for work or school) while the remaining 25% would be inbound (likely to be returning from work or school). In the PM peak hour, the outbound percentage was 37% and inbound was 63%.

# 8 Traffic Modelling

## 8.1 Overview

8.1.1 Modelling of the road network has been based on two different areas. The immediate area represents the three intersections on Whangamata Road that are close to the development site. The three key intersections on Wairakei Drive at Pohipi Road, Norman Smith Street and Spa Road represent part of the network that traffic site as well neighbouring developments will use to access the town centre.

## 8.2 Immediate Network Modelling

8.2.1 As described in section 3.1 and section 3.2, three main intersections are considered to form the likely 'key route' between Kinloch and Taupo, where the majority of the development traffic generated within Kinloch would likely navigate on a regular basis. These intersections are:

- Oakdale Drive / Whangamata Road;
- Kinloch Road / Whangamata Road;
- Whangamata Road / Pohipi Road;

8.2.2 The scenario assessed includes the existing network volumes that were surveyed in 2022 along with the anticipated new trip from the subject and the other subdivisions in the Kinloch area. Developments at Nukuhau and Lochview are not included as these developments are unlikely to add traffic volumes on the roads in Kinloch. An additional sensitivity scenario was also modelled which added a further 10% to the background traffic volumes from the scenario that included traffic from the site and neighbouring sites.

8.2.3 Summaries of the SIDRA outputs for these scenarios are shown in Table 10 to Table 15 below with full results (including baseline traffic modelling) shown in Appendix E.

### *Oakdale Drive / Whangamata Road*

8.2.4 Table 10 and Table 11 below represent the summary of movements across the Oakdale Drive / Whangamata Road intersection.

**Table 10: Oakdale Drive / Whangamata Road Intersection (AM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Oakdale (south) | Left | 4.6 | A | 0.4 | 4.6 | A | 0.4 |
| | Right | 4.8 | A | 2.5 | 4.9 | A | 2.7 |
| Whangamata (east) | Left | 4.6 | A | 0 | 4.6 | A | 0 |
| | Through | 0 | A | 0 | 0 | A | 0 |
| Whangamata (west) | Through | 0.1 | A | 0.6 | 0.1 | A | 0.6 |
| | Right | 4.7 | A | 0.6 | 4.7 | A | 0.6 |
| **All Vehicles** | | **3.8** | **NA** | **2.5** | **3.8** | **NA** | **2.7** |

**Table 11: Oakdale Drive / Whangamata Road Intersection (PM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Oakdale (south) | Left | 4.7 | A | 0.4 | 4.7 | A | 0.4 |
| | Right | 5.1 | A | 0.8 | 5.1 | A | 0.9 |
| Whangamata (east) | Left | 4.6 | A | 0 | 4.6 | A | 0 |
| | Through | 0 | A | 0 | 0 | A | 0 |
| Whangamata (west) | Through | 0.3 | A | 1.3 | 0.3 | A | 1.4 |
| | Right | 4.9 | A | 1.3 | 5 | A | 1.4 |
| **All Vehicles** | | **3.6** | **NA** | **1.3** | **3.5** | **NA** | **1.4** |

8.2.5 The above results indicate that the Oakdale Drive / Whangamata Road intersection still performs at high levels when considering both scenarios. The movement with the highest delay is the right turn out of Oakdale Drive during the evening peak hour across both scenarios. In the evening peak this has just over 5 seconds average delay and maintains Level of Service (LOS) rating of A. This represents a high level of service is able to be maintained with minimal impact to the intersection operation across both scenarios.

### *Kinloch Road / Whangamata Road*

8.2.6 Table 12 and Table 13 below represent the summary of movements across the Kinloch Road / Whangamata Road intersection.

**Table 12: Kinloch Road / Whangamata Road Intersection (AM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Kinloch (south) | Left | 4.7 | A | 0.2 | 4.7 | A | 0.2 |
| | Right | 5.6 | A | 3 | 5.6 | A | 3.4 |
| Whangamata (east) | Left | 4.6 | A | 0 | 4.6 | A | 0 |
| | Through | 0 | A | 0 | 0 | A | 0 |
| Whangamata (west) | Through | 0 | A | 0.4 | 0 | A | 0.4 |
| | Right | 5 | A | 0.4 | 5 | A | 0.4 |
| **All Vehicles** | | **2.7** | **NA** | **3.0** | **2.8** | **NA** | **3.4** |

**Table 13: Kinloch Road / Whangamata Road Intersection (PM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Kinloch (south) | Left | 4.9 | A | 0.1 | 4.9 | A | 0.1 |
| | Right | 5.6 | A | 1.8 | 5.7 | A | 2 |
| Whangamata (east) | Left | 4.6 | A | 0 | 4.6 | A | 0 |
| | Through | 0 | A | 0 | 0 | A | 0 |
| Whangamata (west) | Through | 0.2 | A | 0.8 | 0.2 | A | 0.8 |
| | Right | 5.3 | A | 0.8 | 5.4 | A | 0.8 |
| **All Vehicles** | | **2.6** | **NA** | **1.8** | **2.6** | **NA** | **0.8** |

8.2.7 The above results indicate that the Kinloch Road / Whangamata Road intersection still performs at high levels in both scenarios. The movement with the highest delay is the right turn out of Kinloch Road during peak season in the evening. In the evening peak this has just over 5 seconds average delay and a LOS rating of A. This represents a high level of service is able to be maintained with minimal impact to the intersection operation across both scenarios.

### *Whangamata Road / Pohipi Road*

8.2.8 Table 14 and Table 15 below represent the summary of movements across the Pohipi Road / Whangamata Road intersection.

**Table 14: Whangamata Road / Pohipi Road intersection (AM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Pohipi Rd (south) | Left | 4.5 | A | 0.8 | 4.5 | A | 0.9 |
| | Through | 0.0 | A | 0.0 | 0.0 | A | 0.0 |
| Pohipi Rd (north) | Right | 4.8 | A | 0.1 | 4.8 | A | 0.1 |
| | Through | 0.0 | A | 0.0 | 0.0 | A | 0.0 |
| Whangamata (west) | Left | 7.7 | A | 0.2 | 7.8 | A | 0.2 |
| | Right | 10.3 | B | 3.7 | 10.6 | B | 4.2 |
| **All Vehicles** | | **4.3** | **NA** | - | **4.3** | **NA** | - |

**Table 15: Whangamata Road / Pohipi Road intersection (PM)**

| Approach | Movement | Development Scenario | | | Sensitivity Scenario | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Pohipi Rd (south) | Left | 4.6 | A | 2.2 | 4.6 | A | 2.4 |
| | Through | 0.0 | A | 0.0 | 0.0 | A | 0.0 |
| Pohipi Rd (north) | Right | 4.9 | A | 0.1 | 4.9 | A | 0.1 |
| | Through | 0.0 | A | 0.0 | 0.0 | A | 0.0 |
| Whangamata (west) | Left | 7.8 | A | 0.2 | 7.9 | A | 0.2 |
| | Right | 10.9 | B | 1.8 | 11.1 | B | 2.0 |
| **All Vehicles** | | **3.8** | **NA** | - | **3.8** | **NA** | - |

8.2.9 The above results indicate that the Whangamata Road / Pohipi Road intersection still performs at high levels when accommodating both the development traffic and anticipated growth. The movement with the highest delay is the right turn out of Whangamata Road during peak season in the evening. In the evening peak this has an 11 second average delay and a LOS rating of B. This represents a high level of service is able to be maintained with minimal impact to the intersection operation across both scenarios.

### *Summary*

8.2.10 The above results show that all intersections on the immediate network continue to operate at relatively free-flow conditions with no significant increases in delay. It is therefore assessed that existing road users are unlikely to have their travel patterns significantly affected by the proposed subdivision. It is also noted that the increase in queue lengths does not exceed one typical additional car length in the worst cases.

## 8.3 Wairakei Network Modelling

### *Pohipi Road / Wairakei Drive*

8.3.1 The Pohipi Road / Wairakei Drive intersection has been modelled in the same manner as previously outlined for the Immediate Road Network described above using the same parameters and existing layout. Results are summarised in Table 16 and Table 17 below.

**Table 16: Pohipi Road / Wairakei Drive intersection (AM)**

| Approach | Movement | Development AM | | | Development + Growth AM | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Wairakei (south) | Left | 4.7 | A | 1.5 | 4.7 | A | 1.7 |
| | Through | 0.0 | A | 0.0 | 0.0 | A | 0.0 |
| Wairakei (north) | Right | 5.3 | A | 0.5 | 5.4 | A | 0.6 |
| | Through | 0.0 | A | 0.0 | 0.1 | A | 0.0 |
| Pohipi Rd (west) | Left | 7.8 | A | 1.0 | 7.9 | A | 1.2 |
| | Right | 18.5 | C | 15.2 | 21.2 | C | 20.3 |
| **All Vehicles** | | **5.7** | **NA** | **-** | **6.3** | **NA** | **-** |

**Table 17: Pohipi Road / Wairakei Drive intersection (PM)**

| Approach | Movement | Development PM | | | Development + Growth PM | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Wairakei (south) | Left | 4.9 | A | 3.4 | 5.0 | A | 3.9 |
| | Through | 0.1 | A | 0.0 | 0.1 | A | 0.0 |
| Wairakei (north) | Right | 6.1 | A | 1.3 | 6.3 | A | 1.5 |
| | Through | 0.1 | A | 0.0 | 0.1 | A | 0.0 |
| Pohipi Rd (west) | Left | 8.1 | A | 0.4 | 8.2 | A | 0.4 |
| | Right | 24.9 | C | 12.7 | 31.1 | D | 18.4 |
| **All Vehicles** | | **5.6** | **NA** | **-** | **6.6** | **NA** | **-** |

8.3.2 The above results indicate that the Pohipi Road / Wairakei Drive intersection still performs at adequate levels when accommodating both the development traffic and anticipated growth. The movement with the highest delay is the right turn out of Pohipi Road during peak season in the evening. In the evening peak this has just over 31 seconds average delay and a LOS rating of D. This is considered to be an appropriate level for a priority-controlled intersection under future year growth scenarios.

8.3.3 Calibration of this intersection was undertaken based on the traffic overlay from Google maps as detailed queuing data was not captured during surveys of this intersection. This overlay suggests peak hour queuing at this intersection is in the order of 20m as shown in the red line on Figure 43 below. The yellow line suggests that there may be some vehicles that are slowing down in anticipation of the queuing but that fully stopped queues are unlikely to exceed 20m. These values broadly align with the modelled results which indicate 95%ile queuing to be in the order of 10-15m.


Figure 43: Google Maps Traffic Overlay

8.3.4 A further test of this intersection was undertaken for the scenario where the Nukuhau Plan Change in implemented. Along with additional dwellings, the Plan Change includes the realignment of Pohipi Road to form a signalised crossroad intersection with Huka Falls Road. For this scenario, the future modelled volumes from the WSP report were adopted as a base

scenario with the expected traffic from the subject proposal added to these base volumes to assess the effects of the proposal.

Table 18: Pohipi Road / Wairakei Drive intersection (AM) – With Nukuhau Plan Change

| Approach | Movement | Baseline | | | With Development | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Wairakei Dr (south) | Left | 37.0 | D | 30.2 | 37.5 | D | 36.0 |
| | Through | 31.5 | C | 20.5 | 31.5 | C | 20.5 |
| | Right | 47.4 | D | 27.0 | 47.4 | D | 27.0 |
| Huka Falls Rd (east) | Left | 41.9 | D | 85.3 | 45.7 | D | 90.2 |
| | Through | 37.3 | D | 85.3 | 41.1 | D | 90.2 |
| | Right | 44.1 | D | 4.6 | 44.1 | D | 4.6 |
| Wairakei Dr (North) | Left | 36.8 | D | 29.4 | 36.8 | D | 29.4 |
| | Through | 32.2 | C | 29.4 | 32.2 | C | 29.4 |
| | Right | 45.1 | D | 11.6 | 45.1 | D | 11.6 |
| Pohipi Rd (west) | Left | 22.7 | C | 25.2 | 24.1 | C | 25.2 |
| | Through | 18.1 | B | 25.2 | 19.5 | B | 25.2 |
| | Right | 38.3 | D | 100.1 | 47.5 | D | 135.5 |
| **All Vehicles** | | **36.9** | **D** | - | **40.8** | **D** | - |

Table 19: Pohipi Road / Wairakei Drive intersection (AM) – With Nukuhau Plan Change

| Approach | Movement | Baseline | | | With Development | | |
|---|---|---|---|---|---|---|---|
| | | Ave Delay (s) | LOS | 95% Q (m) | Ave Delay (s) | LOS | 95% Q (m) |
| Wairakei Dr (south) | Left | 36.6 | D | 115.9 | 37.9 | D | 142.9 |
| | Through | 22.3 | C | 7.9 | 22.6 | C | 8.4 |
| | Right | 35.0 | C | 43.8 | 35.7 | D | 46.7 |
| Huka Falls Rd (east) | Left | 39.8 | D | 59.9 | 45.2 | D | 68.2 |
| | Through | 35.2 | D | 59.9 | 40.7 | D | 68.2 |
| | Right | 43.8 | D | 3.5 | 49.6 | D | 3.9 |
| Wairakei Dr (North) | Left | 38.3 | D | 21.3 | 42.9 | D | 24.0 |
| | Through | 33.7 | C | 21.3 | 38.3 | D | 24.0 |
| | Right | 45.7 | D | 17.2 | 51.7 | D | 19.6 |
| Pohipi Rd (west) | Left | 29.7 | C | 22.4 | 31.5 | C | 24.5 |
| | Through | 25.1 | C | 22.4 | 26.9 | C | 24.5 |
| | Right | 42.5 | D | 63.8 | 46.7 | D | 81.7 |
| **All Vehicles** | | **36.9** | **D** | - | **39.8** | **D** | - |

8.3.5 The above results indicate that adding the proposal to the expected Nukuhau Plan Change scenario would likely only increase delays by less than four seconds and there are no changes to level of service rating for any movement. Hence it is considered that the proposal would not have a material effect on the future performance of the Pohipi Road / Wairakei Road intersection.

### *Control Gates Bridge*

8.3.6 The Wairakei Drive / Norman Smith Street and Tongariro Street / Spa Road intersections represent the two intersections at either end of the Control Gates Bridge which is a known constraint on the network. The upgrade of the Wairakei Drive / Norman Smith Street intersection in 2019 has assisted in 'metering' traffic across the bridge in the morning peak while the Tongariro Street / Spa Road intersection is a constraint on vehicles leaving the town centre in the evening. Hence the volumes across the bridge are governed by these two intersections.

8.3.7 As also identified in the 2018-2028 LTP, investigations into the feasibility of a second bridge crossing are underway. The recent 2024-2034 Draft LTP indicates a projected total bridge cost of some $65.5 million with funding for this expected to be comprised of some 85% from Development Contributions and 15% by revenue from other sources. Although costs were not discussed in the latest published LTP 2021-2031, the feasibility study is confirmed and it is expected that a decision will be made on the feasibility of a second bridge crossing before the 2032 / 2033 financial year. It is also noted that the development contributions from the proposed subdivision toward the provision of the second bridge are necessary in order to offset longer term traffic effects from the wider area.

8.3.8 TDC provided detailed count and queuing data for the Wairakei Drive / Norman Smith Street and Tongariro Street / Spa Street intersections. This data was captured in 2023. The SIDRA models for these two intersections have been based on the volumes from the provided counts.

### *Wairakei Drive / Norman Smith Street*

8.3.9 Four scenarios have been modelled in each peak period for these intersections which are described as follows:

- Existing No Dev – Baseline volumes as provided by TDC.
- Existing with Dev – Added subject development traffic to existing volumes.

- Future No Dev – Baseline volumes with traffic added from neighbouring development.
- Future with Dev - Added subject development traffic to future volumes.

8.3.10 The queuing data that was captured as part of the TDC data was used to calibrate the models. A comparison of the 95th percentile observed queues and the modelled 95th percentile queues for the existing scenario is summarised in Table 20 and Table 21 below where queuing has been measured and reported as number of vehicles. This confirmed that no changes were required to the give-way parameters for this intersection.

8.3.11 The GEH statistic was then used to determine if the modelled queuing reasonably reflected the observed queue lengths. All queuing was found to have a GEH less than 5 which was considered to be appropriate and is summarised in Table 20 and Table 21 below. As such the SIDRA models are considered to be appropriately calibrated to the latest data from TDC.

Table 20: Wairakei Dr / Norman Smith St / Tongariro St Intersection GEH AM Peak

| Scenario | AM | | | | | |
|---|---|---|---|---|---|---|
| | Wairakei Drive | | Tongariro Street | | Norman Smith Street | |
| | Thru - Lane 1 | Thru - Lane 2 | Left Turn - Lane 1 | Thru - Lane 2 | Left + Right - Lane 1 | Right - Lane 2 |
| Observed | 7.35 | 4.25 | 0.0 | 10.5 | 4.35 | 13 |
| Modelled | 3.3 | 20 | 0.0 | 8.5 | 4 | 25.6 |
| GEH | **1.8** | **4.5** | **0.0** | **0.6** | **0.2** | **2.9** |

Table 21: Wairakei Dr / Norman Smith St / Tongariro St Intersection GEH PM Peak

| Scenario | PM | | | | | |
|---|---|---|---|---|---|---|
| | Wairakei Drive | | Tongariro Street | | Norman Smith Street | |
| | Thru - Lane 1 | Thru - Lane 2 | Left Turn - Lane 1 | Thru - Lane 2 | Left + Right - Lane 1 | Right - Lane 2 |
| Observed | 5 | 1 | 0.0 | 6 | 4 | 9 |
| Modelled | 1.6 | 6 | 0.0 | 11.3 | 1.8 | 6.9 |
| GEH | **1.9** | **2.7** | **0.0** | **1.8** | **1.3** | **0.7** |

8.3.12 It is noted that the lane demands from the northern approach show more vehicles in lane 2 than lane 1. This is due to how SIDRA assigns vehicles where vehicles pick their lane based on downstream conditions. In the model, lane 2 is modelled as the through lane hence SIDRA assigns more people to this lane. A test was made to change lane to be the full lane which resolved the assignment of vehicle from the north but resulted in the demands for right turning vehicles from the west to more favour lane 1 despite lane 2 being more popular based on recorded volumes. This also affected left turning vehicles from the west hence lane 2

heading south was selected to be the full lane. In practice, both downstream lanes heading south are equally balanced. Hence the demands and associated queueing from the north can be considered as having their results swapped to give a more likely outcome of queuing and demands.

8.3.13 Lane summary outputs from the modelling for these intersections are provided in Appendix F. Table 22 summarises the average delay for each intersection along with the level of service rating in brackets.

**Table 22: Wairakei Drive / Norman Smith Street Modelling Summary**

| Scenario | AM Peak | PM Peak |
|---|---|---|
| Existing No Dev | 30.0 (C) | 9.6 (A) |
| Existing with Dev | 36.3 (D) | 9.7 (A) |
| Future No Dev | 51.2 (D) | 9.9 (A) |
| Future With Dev | 61.2 (E) | 10.1 (B) |

8.3.14 The results show that morning peak is the critical time period. This is due to traffic turning right from Norman Smith Street, which is a busy movement in the morning as vehicles head towards the town centre, having to wait for a green signal. In contrast, the left turn into Norman Smith Street which is the popular movement in the evening is a free left turn and is not required to stop for other movements.

8.3.15 The scenarios with development traffic are not significantly different from the without development scenario with an overall increase in delay of no more than 10 seconds in the morning peak. In the evening peak, there is negligible effect due to the free left turn and low demands turning out of Norman Smith Street that would impede traffic leaving the town centre. It is therefore considered that the proposed development is unlikely to have a significant effect on the performance of the road network.

### *Tongariro Street / Spa Road Intersection*

8.3.16 The same scenarios for the Wairakei Dr / Norman Smith St Intersection have been applied for this intersection.

8.3.17 As part of the calibration for the Tongariro Street / Spa Road intersection, the gap acceptance values for the southern and eastern approaches were set to be 4s critical gap and 2s headway rather than just the program default values. With these adjustments, all queuing had GEH

values less than 5 as summarised in Table 23 and Table 24 below. This calibration is good modelling practice.

Table 23: Tongariro St / Spa Rd Intersection GEH Table 1

| Scenario | AM | | | | |
|---|---|---|---|---|---|
| | Tongariro St (North) | | Spa Rd | | Tongariro St (South) |
| | Left - Lane 1 | Thru - Lane 2 | Left + Right - Lane 1 | Right - Lane 2 | Lane 1 |
| Observed | 1.45 | 2 | 5.45 | 6 | 3.45 |
| Modelled | 7.3 | 4.1 | 1.1 | 5 | 1.9 |
| GEH | **2.8** | **1.2** | **2.4** | **0.4** | **0.9** |

Table 24: Tongariro St / Spa Rd Intersection GEH Table 2

| Scenario | PM | | | | |
|---|---|---|---|---|---|
| | Tongariro St (North) | | Spa Rd | | Tongariro St (South) |
| | Left - Lane 1 | Thru - Lane 2 | Left + Right - Lane 1 | Right - Lane 2 | Lane 1 |
| Observed | 0.45 | 2.45 | 10.9 | 10 | 10 |
| Modelled | 4.3 | 2.1 | 1.5 | 10.7 | 20.7 |
| GEH | **2.5** | **0.2** | **3.8** | **0.2** | **2.7** |

8.3.18 The lane summaries for the intersections from this modelling are attached in Appendix F. A summary of overall intersection performance for the scenarios tested are presented in Table 25 below with the average vehicles delay in seconds and Level of Service rating in brackets:

Table 25: Tongariro St / Spa Rd Intersection Performance

| Scenario | AM Peak | PM Peak |
|---|---|---|
| Existing No Dev | 6.9 (A) | 17.9 (B) |
| Existing with Dev | 7.0 (A) | 28.4 (C) |
| Future No Dev | 7.3 (A) | 54.4 (E) |
| Future with Dev | 7.5 (A) | 77.1 (F) |

8.3.19 There is negligible delay in the morning peak and the future developments do not materially change intersection performance. The evening peak shows notable congestion which is attributable to a large demand turning right from Spa which has a blocking effect on traffic from the southern approach. Such blocking movements do not occur in the morning peak.

8.3.20 In the future evening peak scenarios, the intersection is already close to level of service F with additional demands from the proposed development tipping delay over this threshold. The results continue to show that other development has a greater effect on this intersection than

the proposed development. This is demonstrated by comparing the 'Existing with Dev' (which adds traffic from the subject proposal to the existing volumes) to the 'Future No Dev' scenario (which adds traffic from neighbouring developments without traffic from the subject proposal). Subject site development only results in level of service C whereas other development results in level of Service E. This indicates that if the proposed development is constructed first, the effects on the network are unlikely to be significant. By the time most other developments are likely to be completed, which is unlikely to occur before 2031, it is expected the design and funding for a new bridge across the Waikato River would be well progressed based on current funding and forecasts from the LTP which would then alleviate congestion at this intersection. Hence the future performance is likely to be an overestimate of actual future performance.

8.3.21 Based on the modelling assessments undertaken, it is considered that the existing surrounding road network is unlikely to experience any significant additional adverse effects associated with the additional traffic generated by the 87-lot extension of the Seven Oaks residential subdivision. It is also reiterated that a variety of conservative approaches have been undertaken when assessing effects of the proposal such as no traffic heading towards Kinloch, all traffic using Pohipi Road intersection, no traffic heading north on Wairakei Drive and no scaling back of trip rates given that some dwellings may be holiday homes rather than traditional dwellings.

# 9 Road Safety Effects

9.1.1 As reported within section 3.4, none of the local intersections within Kinloch township have reported any crashes within the last five years. The subject development is unlikely to materially change the traffic environment in the town and therefore is not expected to change the existing road safety record.

9.1.2 As stated in Section 3.5, the identified 'high-risk' road corridors are considered to have achieved this classification due to existing traffic volumes and existing road network constraints pertaining to crossing the Waikato River on the Control Gates Bridge. TDC are in the process of attempting to improve the existing constraint. As also shown in Section 8 of this report, the proposed subdivision is not anticipated to materially alter the receiving traffic environment and hence is unlikely to have a material effect on the existing road safety record.

9.1.3 The posted speed on Whangamata Road past Oakdale Drive is 60km/h. Over 100m west there is an increase in posted speed limit to 100km/h. It is therefore possible that eastbound vehicles may still in the process of decelerating and hence operating speeds are likely to be between 70km/h and 100km/h.

9.1.4 Figure 3.25 from Austroads Guide to Traffic Management (AGTM) Part 6 *Intersections, Interchanges and Crossings Management* Figure 3.25: indicates whether right turn bays would be applicable at priority intersections. This figure is provided below with the black showing the expected traffic volumes through the intersection.

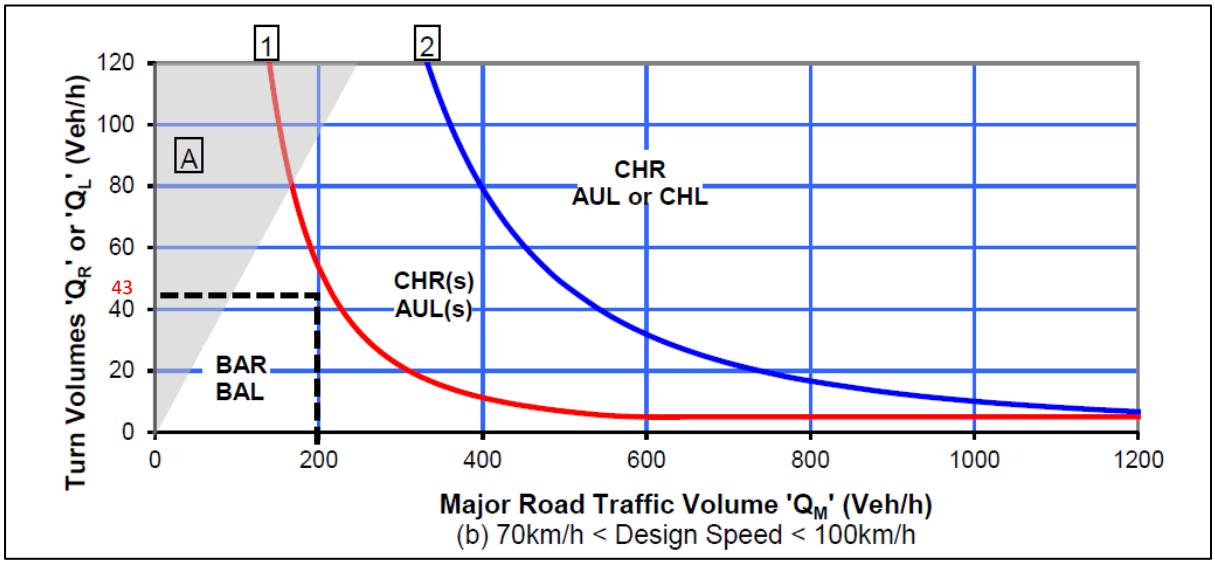



Figure 44: Oakdale Drive / Whangamata Road right turn bay requirement

9.1.5 Based on the above, a right turn bay is not warranted at this intersection. The existing intersection already features shoulder widening opposite the 'T' which provides an opportunity for a following vehicle to bypass a vehicle waiting to turn right.

9.1.6 There is unlikely to be any significant safety impact on the Kinloch Road / Whangamata Road intersection as traffic entering the proposed subdivision from the west will likely utilise the Oakdale Road / Whangamata Road intersection. Eastbound traffic would therefore not reach the Kinloch Road intersection. A right turn bay is already present and no safety upgrades pertinent to turning manoeuvres are considered necessary.

# 10 Access

## 10.1 Vehicle Access

10.1.1 As demonstrated through the modelling, neither the Oakdale Drive / Whangamata Road nor the Kinloch Road / Whangamata Road intersections are significantly affected by the development.

10.1.2 It is expected that the construction of the Kahikatea Drive extension through the proposed development will be in keeping with the current formation as shown in Figure 41. It is noted however that the current extent of Kahikatea Drive only contains pedestrian footpaths on its southern side. With the number of proposed dwellings on its northern side, it is recommended that a pedestrian footpath be constructed along the northern side of Kahikatea Drive within the development and a suitable pedestrian crossing be established.

10.1.3 Kahikatea Drive has a road reserve width of approximately 20m and is shown to have a carriageway of approximately 8.5m to 9m in total width containing both eastbound and westbound movement lanes. The carriageway is delineated with centrelines only and has no designated carparking spaces.

10.1.4 The remainder of Kahikatea Drive will be constructed to a similar cross section as shown in Figure 45 below. It is considered that this will adequately service the development as it is general accordance with NZS 4404 – 2010 Figure E23 – Urban Live and Play and can accommodate approximately 8,000vpd.

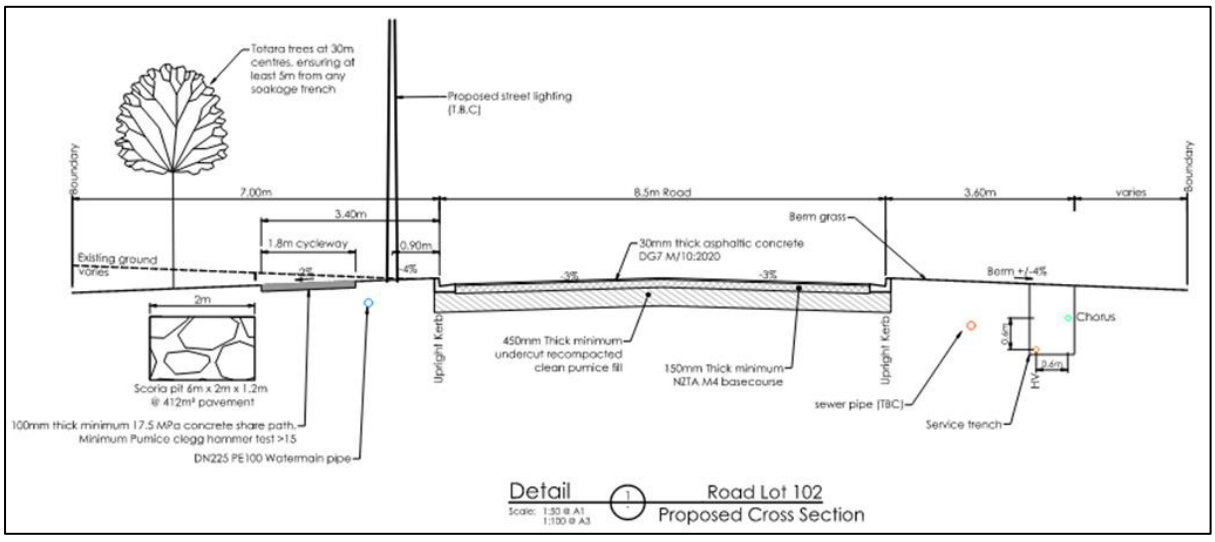



Figure 45: Kahikatea Drive Cross Section

10.1.5 It is noted that while vehicle crossing and separation distances within the subdivision are likely to be largely compliant with the requirements of TDC DP, two lots, those located at the roundabout intersection of Kahikatea Drive and Okaia Drive may need careful consideration regarding access location to achieve compliant separation distance from the intersection. It is also expected that this will be able to be confirmed during detailed design.

10.1.6 Providing that the existing and proposed intersections associated with the proposed development remain free from obstruction by vegetation or structures, it is assessed that compliant visibility and separation distances can be achieved.

## 10.2 Cycling and Pedestrian Access

10.2.1 The majority of roads within Kinloch township contain pedestrian footpaths on both sides of the road with minor cul-de-sacs only having a footpath on one side. There are also some wider footpaths that will act as shared paths both within the site and throughout the surrounding area.

10.2.2 No dedicated cycle lanes were observed throughout Kinloch during the site visit. Cyclists will therefore either share the movement lane of the carriageway or utilise off-road paths. It is also reasonable to expect that this will continue through into the proposed development.

10.2.3 The Waka Kotahi Pedestrian Planning and Design Guide states that the average person will spend approximately 11-12 minutes walking per trip and that the average travel speed of a fit and healthy adult is approximately 1.5m/s. Given Kinloch is a lifestyle destination it can reasonably be expected that pedestrians would expect a slightly longer duration walk, in the order of 10 to 15 minutes. Based on the increased duration and reduced travel speed, a fit and healthy adult will typically walk between 0.9km and 1.35km.

10.2.4 Assuming travel from the centre of the proposed development using footpaths or roadway, the general store located on Mata Street is approximately 3km to the southeast with an expected travel time of approximately 33 minutes. Should a pedestrian or cyclist utilise the Kawakawa Bay Tracks located to the south of the proposed development, this distance reduces to 1.75km and the overall travel time reduces to 19.5 minutes.

## 10.3 Public Transport Access

10.3.1 With the exception of school bus(es) operating between Kinloch and Taupo, there is no existing public transport facility that operates within Kinloch township, however, the subdivision does not preclude the provision of public transport services in future.

# 11 Planning Framework

11.1.1 Table 26 below summarises the compliance of the proposed development with the relevant transportation criteria from the ODP.

Table 26: TDC Objectives and Policies

| Rule | Requirement | Proposed | Compliance |
|---|---|---|---|
| **Objectives and Policies** | | | |
| **Objective 3f.2.1**<br>**The safe and efficient operation of the roading network, and movement of traffic, including cyclists and pedestrians within the District.** | | | |
| | i. Ensure activities avoid, remedy or mitigate any adverse effects on the operation and function of the roading network, including the movement of traffic cyclists and pedestrians, as accordance with the Roading Hierarchy.<br>ii. Encourage activities, including the design and location of new vehicle crossings, to provide for the safe and efficient movement of traffic, including cyclists and pedestrians.<br>**iii.** Encourage the use of alternative modes of transport such as cycling and public transport. | As stated within section 8 of the report, it is expected that the development will provide pedestrian footpaths in keeping with the local road networks within Kinloch. Cyclists would likely share the carriageway, also in keeping with local road networks.<br>With the exception of school bus(es) operating between Kinloch and Taupo, there is no existing or proposed public transport service within Kinloch<br>The proposed development is approximately 3km from the general store (by conventional routes) as described in section 8. Given topography and distance, it is unlikely non-motorised transport would be used to access goods and services. | |

11.1.2 The proposed development area is located within the Taupo District and is required to address the relevant rules of the District Plan.

11.1.3 Table 27 lists the relevant rules and whether the proposed development can comply with the District Plan requirements for the Taupo Low Density Residential zone or where specific assessment criteria governing this site are proposed.

Table 27: Operative District Plan Compliance

| Rule | Requirement | Proposed | Compliance |
|---|---|---|---|
| **General Requirements** | | | |
| **6.5 Access** | | | |
| 6.5.2 Sight Distances<br><br>i. Minimum Sight Distances from Vehicle Crossing Points shall be designed in accordance | Both Okaia Drive and Kahikatea Road are currently classified as Collector Roads which require a minimum sight distance of 50m. However, as TDC moves towards ONF classification both are also proposed to be reclassified to Local Streets | Expected to comply – vehicle crossing points have not been identified on the plan however there is sufficient space for all lots to comply. Two lots, those on the | Can comply |

| | | | |
|---|---|---|---|
| with 6.5.3 and Figure 6 (refer number 1). | which require a minimum of 40m | intersection of Kahikatea Drive and Okaia Drive may result in a potential non-compliance in separation distance to the intersection however this is expected to be confirmed during detailed design. | |
| 6.5.4 Distance – Road Intersection to Vehicle<br><br>i. Minimum Distance from Road Intersection to Vehicle Crossing shall be designed in accordance with 6.5.5 and Figure 7 (refer to number 2 in figure 7). | 15m required. | Compliance achievable | Can Comply |
| 6.5.6 Vehicle Crossings<br>Vehicle Crossings shall be provided in accordance with 6.5.7 | Maximum number of crossings: 1 per allotment<br>Maximum width of crossing at boundary: 6m | Compliance achievable | Can Comply |
| 6.5.8 Minimum Standards for Driveways and Accessways<br><br>i. Minimum Standards for Driveways and Accessways shall be designed in accordance with 6.5.9 to 6.5.11.<br>ii. In accordance with Rules 4a.3.5, 4b.3.12, and 4d.3.5 any single common driveway or accessway serving more than nine allotments in the Residential and Industrial Environments, and more than twelve allotments in the Rural Environment, is to be vested as legal road.<br>iii. Except for the Rural Environment, and except in the case of a single dwelling and/or allotment, all driveways and accessways shall be formed and sealed with an all-weather surface. (Please note that as required by the stormwater provisions for urban properties, all stormwater must be collected and retained within the site to meet the 10% event, except where there is a community stormwater reticulation system).<br>iv. In the case of a single dwelling and /or allotment in the Residential Environment, all driveways or accessways shall have a stable surface that does not discharge any material off-site. Where the | i. Can comply<br>ii. N/A<br>iii. Can comply<br>iv. Can comply<br>v. N/A | The development can comply with all relevant requirements and will be confirmed during detailed design | Can comply |

| | | | |
|---|---|---|---|
| driveway or accessway is steeper than 6% and slopes towards the road, an all-weather surface and stormwater control shall be provided in accordance with iii. above.<br>v. In the Rural Environment accessways shall be sealed where they serve more than 3 allotments or where they are steeper than 6% and service more than 1 allotment. Where the access is onto a sealed public roadway the vehicle crossing shall be sealed.<br><br>For the purposes of these performance standards, all weather shall mean a durable permanent surfacing such as concrete, seal or pavers. | | | |

11.1.4 The development site is generally considered likely to comply with the relevant transportation related standards of the ODP. Some non-compliances may arise in relation to the vehicle crossing separation distance and locations however these non-compliances are unlikely to result in any practical adverse effects and would likely be able to be resolved during detailed design.

11.1.5 In summary, it has been concluded that the traffic effects of the proposed development are less than minor and are in keeping with the overall expected development of Kinloch Township. As such, it is considered that there are no transportation reasons why the development cannot be adopted.

# 12 Conclusions and Recommendations

12.1.1 The proposed residential development is located within the northern third of Lot 501 DP 569523, Kinloch within the Taupo District Council jurisdiction. The development is to consist of 87 residential dwellings. The site will be directly accessible via Okaia Drive in the south and Kahikatea Drive in the north.

12.1.2 Based on the assessment of potential traffic and transportation effects associated with the proposed residential development, it is concluded that:

- The site may generate some 78 vehicle movements during peak hour and potentially up to 600 vehicles per day. The surrounding road network is able to accommodate these traffic volumes.

- Intersection modelling has shown that the identified Immediate Network intersections identified in section 8.2 are able to facilitate both the proposed development and other nearby committed developments without any significant adverse effect. These intersections are shown to still maintain a LOS A or LOS B which is considered acceptable.

- Analysis of the congestion modelling shows a network south of the Wairakei Drive / Pohipi Road which already exceeds capacity resulting in significant congestion issues. These issues are both existing and have been identified for remedial works including investigation for a second bridge crossing within the Long-Term Plan.

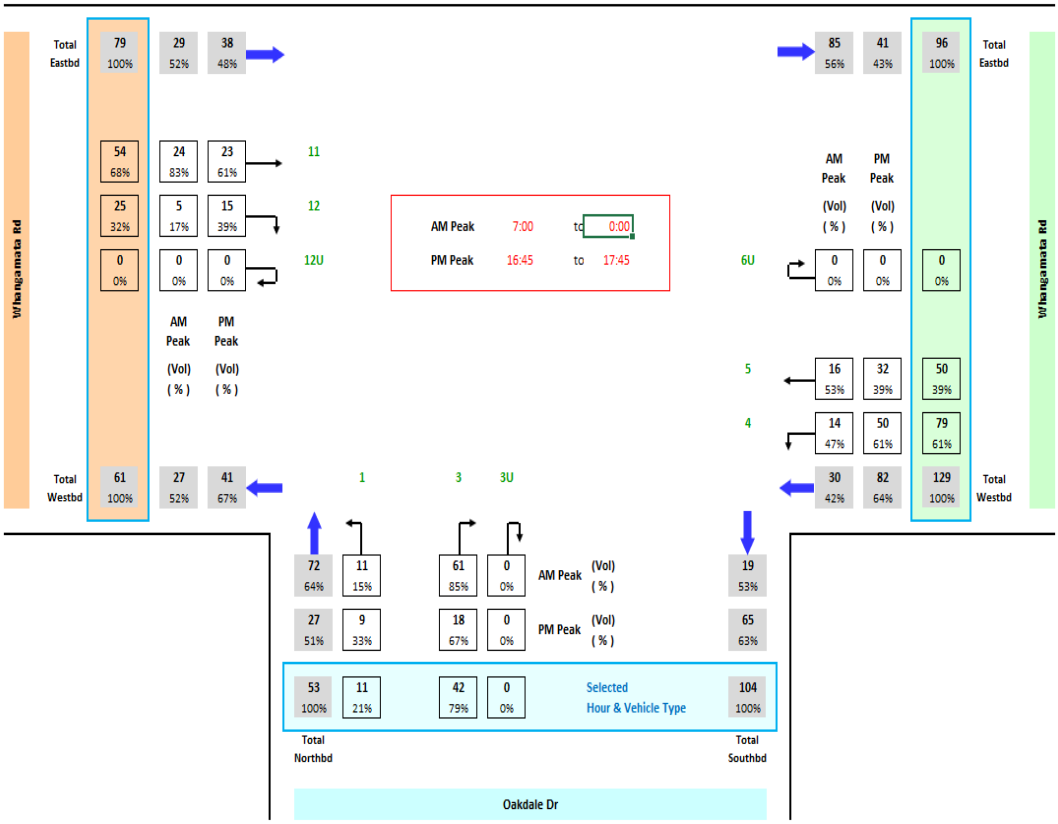
- Despite the congestion issues experienced at the bridge, multiple developments requiring use of the Control Gates Bridge to access Taupo township have been consented and are under construction. This assessment has included additional analysis to incorporate the effects of the site related traffic at the intersections at either end of the bridge and concluded that the effects will be negligible.

- Development contributions from the proposed development will contribute toward the respective funding requirement for provision of a second Taupo bridge crossing as outlined in the Draft 2024-2034 LTP Proposed Developments Contribution Policy. This will offset the longer term traffic impacts of the development and its surrounds.

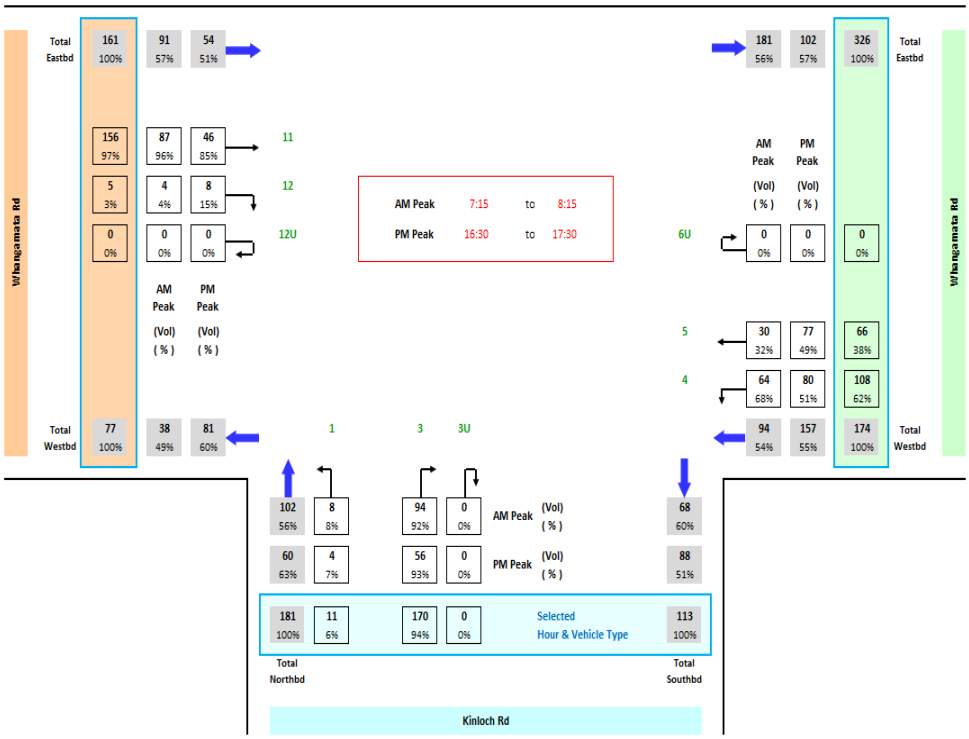
12.1.3 It is concluded that the transportation effects of the proposed residential development will be less than minor on the surrounding local road network and that there is no traffic or transportation reason why resource consent cannot be granted.

CKL

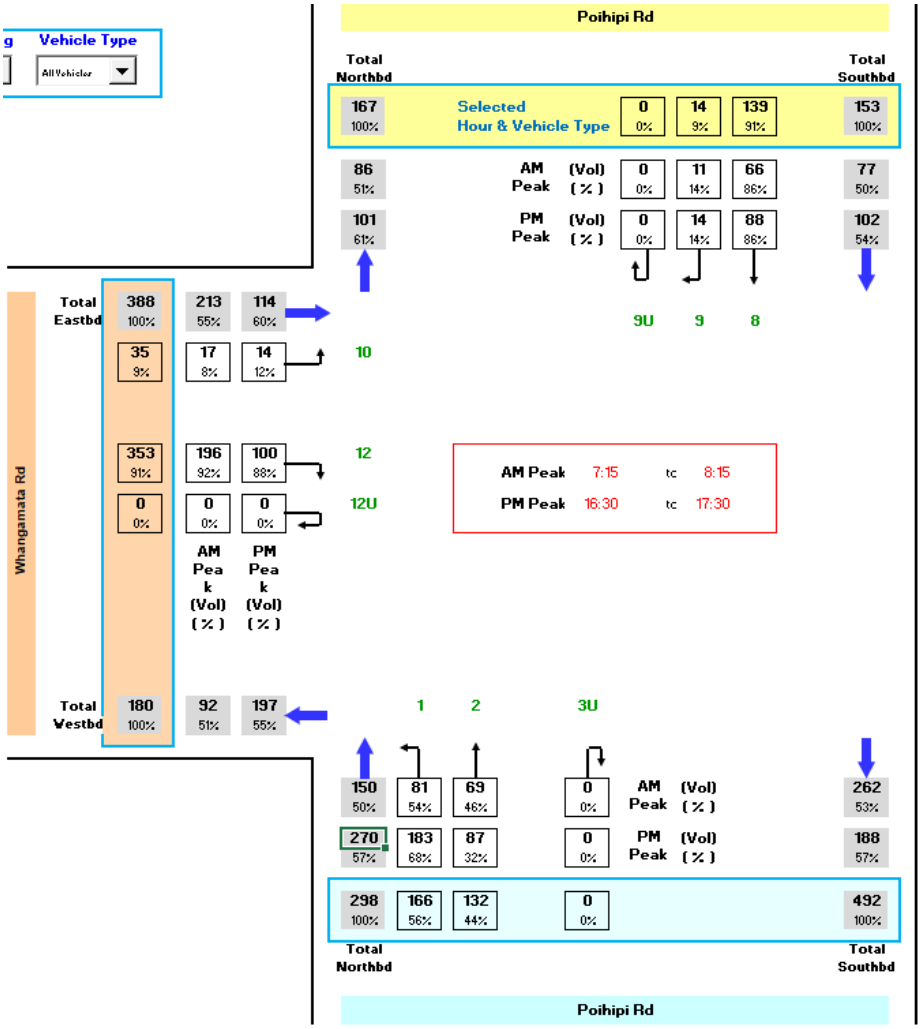
# Appendix A – Survey Traffic Volumes – November 2023



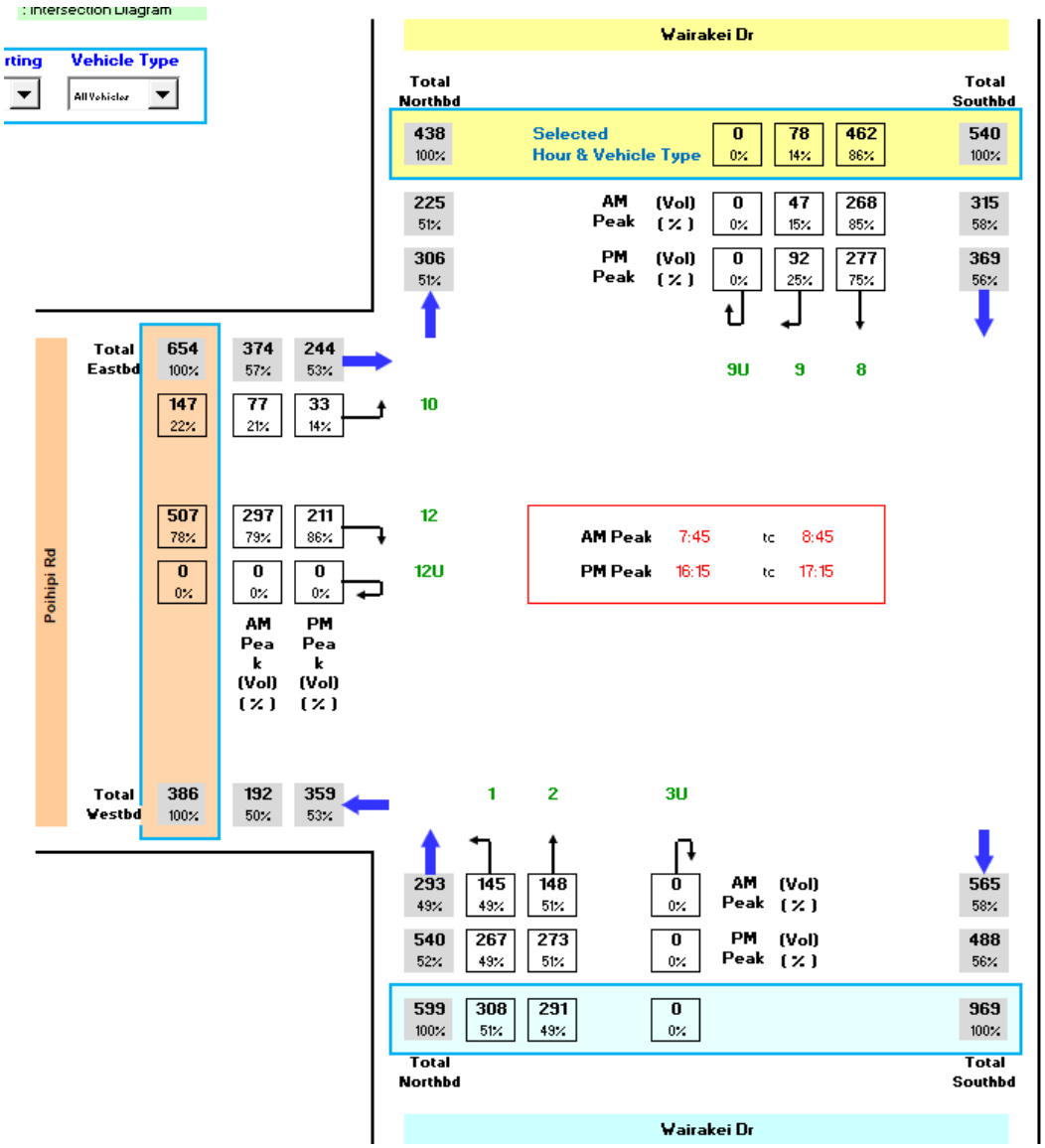

Oakdale Drive / Whangamata Road




Kinloch Road / Whangamata Road

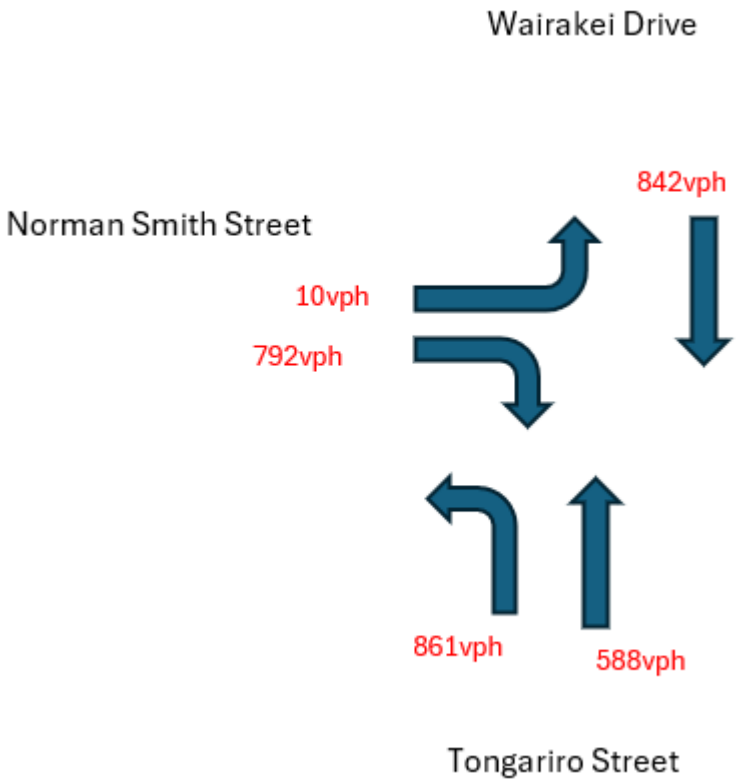



Whangamata Road / Pohipi Road

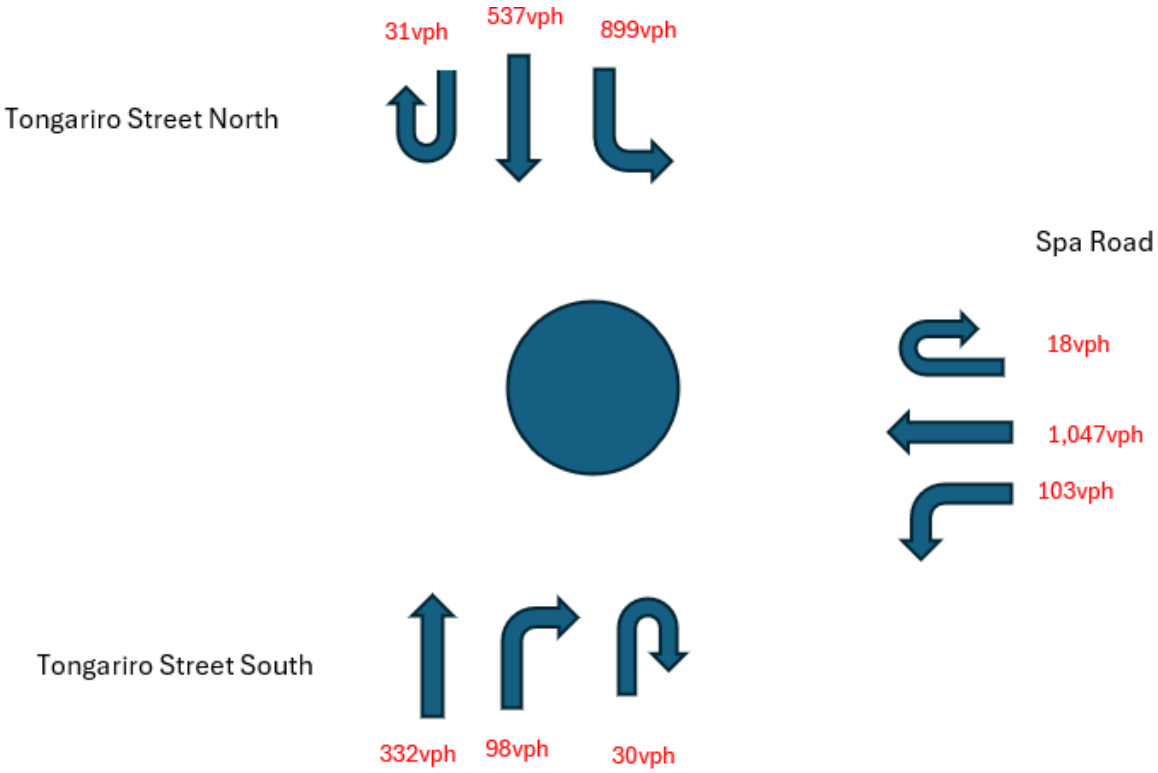



Pohipi Road / Wairakei Drive

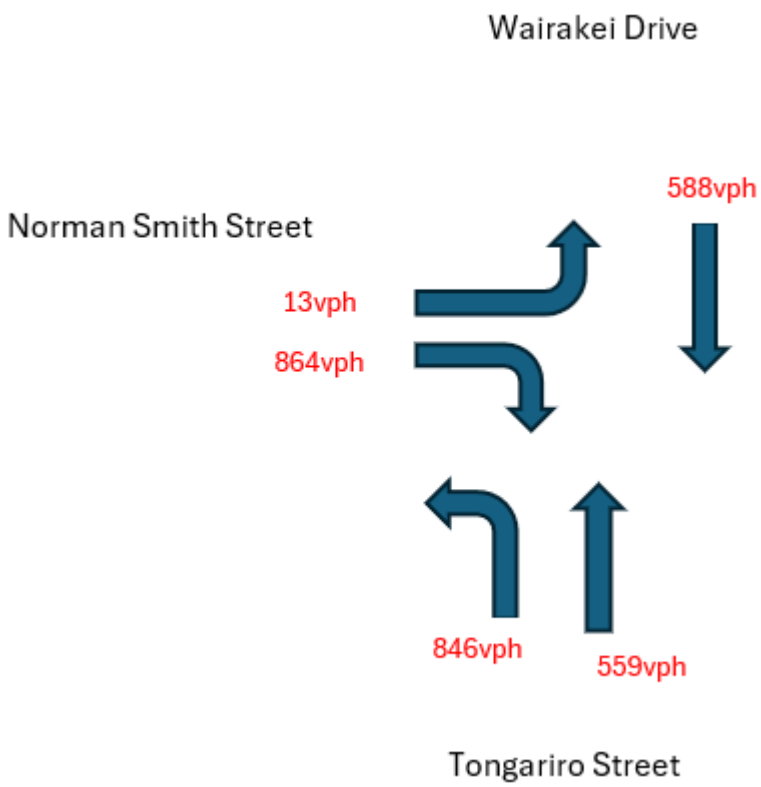
# Appendix B – Taupo District Council Traffic Counts



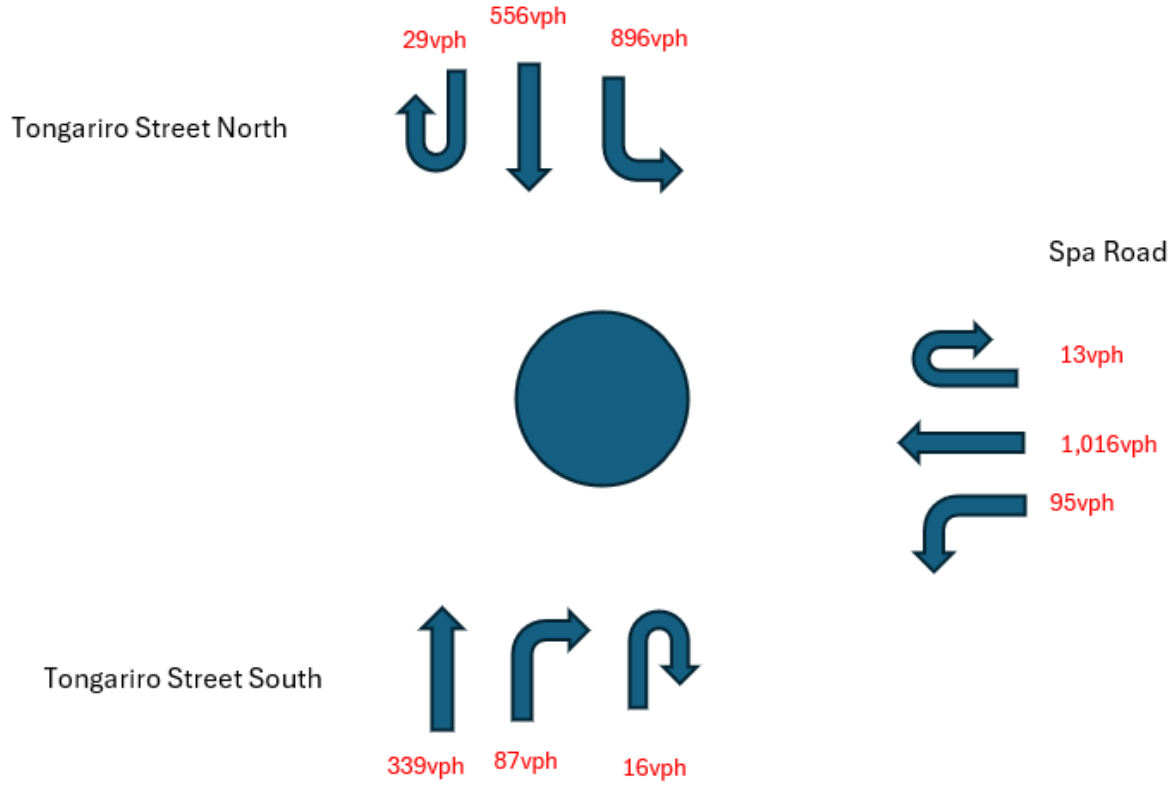

Wairakei Dr / Norman Smith St / Tongariro St Intersection Peak Hour Data - Tuesday 28/11/23 (Source: TDC)




Tongariro St / Spa Rd Intersection Peak Hour Data - Tuesday 28/11/23 (Source: TDC)




Wairakei Dr / Norman Smith St / Tongariro St Intersection Peak Hour Data - Wednesday 29/11/23 (Source: TDC)




Tongariro St / Spa Rd Intersection Peak Hour Data - Wednesday 29/11/23 (Source: TDC)

# Appendix C – Waka Kotahi Crash Analysis (2019 - 2024)

## Pohipi/Wairakei 2017/2022

**Saved sites**

Pohipi/Wairakei Int

**Crash severity**

Fatal Crash, Serious Crash, Minor Crash, Non-Injury Crash

**Crash year**

2017 — 2022

## Plain English report

**12 results from your query.**

1-12 of 12

| Crash road | Side road | Feature | Distance from side road/feature | Direction | Reference station | Route position | Easting | Northing | Longitude | Latitude | ID | Date | Day of week | Time | Description of events | Crash factors | Surface condition | Natural light | Weather | Junction | Control | Casualty count fatal | Casualty count serious | Casualty count minor | Social cost $(m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POIHIPI ROAD** | WAIRAKEI DRIVE | | | I | | | 1867028 | 5715003 | 176.069377 | -38.673310 | 2020152472 | 20/05/2020 | Wed | 16:45 | Van1 EDB on POIHIPI ROAD turning right hit Cyclist2 (Age 19) turning right into AXROAD | VAN1, alcohol suspected, 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 | 1 | 0.11 |
| **POIHIPI ROAD** | WAIRAKEI DRIVE | | | I | | | 1866999 | 5715013 | 176.069041 | -38.673231 | 2021199518 | 04/09/2021 | Sat | 13:35 | Car/Wagon1 NDB on WAIRAKEI DRIVE lost control turning right but did not leave the road | SUV2, alcohol test below limit CAR/WAGON1, alcohol suspected, attempted suicide, intentional collision | Dry | Bright sun | Fine | T Junction | Give way | 0 | 0 | 2 | 0.11 |
| **POIHIPI ROAD** | WAIRAKEI DRIVE | | | I | | | 1867015 | 5715009 | 176.069226 | -38.673265 | 2021204982 | 05/03/2021 | Fri | 15:50 | Left scene1 EDB on POIHIPI ROAD hit rear end of Car/Wagon2 stop/slow for cross traffic | LEFT SCENE1, following too closely | Dry | Bright sun | Fine | T Junction | Give way | 0 | 0 | 0 | 0.05 |
| **POIHIPI ROAD** | WAIRAKEI DRIVE | | | I | | | 1866985 | 5715016 | 176.068878 | -38.673203 | 201984744 | 07/11/2019 | Thu | 17:53 | Car/Wagon2 turning right hit by oncoming Motorcycle1 DIRN on POIHIPI ROAD | CAR/WAGON2, failed to give way turning to non-turning traffic, overseas/migrant driver fail to adjust to nz roads | Dry | Bright sun | Fine | Driveway | Nil | 0 | 0 | 0 | 0.04 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867032 | 5715003 | 176.069412 | -38.673313 | 201951008 | 12/02/2019 | Tue | 09:00 | Car/Wagon1 NDB on Wairakei Drive 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, other inattentive | Dry | Bright sun | Fine | T Junction | Give way | 0 | 1 | 0 | 0.71 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867032 | 5714997 | 176.069416 | -38.673365 | 2020177689 | 08/08/2020 | Sat | 00:53 | Car/Wagon1 SDB on WAIRAKEI DRIVE hit Left scene2 merging from the right | LEFT SCENE2, failed to give way at priority traffic control | Wet | Dark | Light rain | T Junction | Give way | 0 | 0 | 0 | 0.05 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867032 | 5715010 | 176.069412 | -38.673252 | 201750948 | 08/10/2017 | Sun | 13:30 | Other1 NDB on Wairakei Drive 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 | Wet | Overcast | Light rain | T Junction | Give way | 0 | 0 | 0 | 0.04 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867032 | 5715010 | 176.069412 | -38.673252 | 201755946 | 10/12/2017 | Sun | 14:40 | Car/Wagon1 NDB on Wairakei drive hit SUV2 turning right onto AXROAD from the left | CAR/WAGON1, alcohol test below limit SUV2, alcohol test below limit, 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 | 0 | 0.04 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867032 | 5715010 | 176.069412 | -38.673252 | 201718944 | 09/11/2017 | Thu | 09:45 | Car/Wagon1 NDB on Wairakei drive hit turning Car/Wagon2 | CAR/WAGON2, failed to give way at priority traffic control | Dry | Bright sun | Fine | T Junction | Give way | 0 | 0 | 1 | 0.11 |
| **WAIRAKEI DRIVE** | POIHIPI ROAD | | | I | | | 1867003 | 5715005 | 176.069090 | -38.673302 | 2022215011 | 07/02/2022 | Mon | 09:45 | Car/Wagon1 NDB on WAIRAKEI DRIVE lost control on curve and hit Ute2 head on | UTE2, alcohol test below limit CAR/WAGON1, alcohol test below limit, inappropriate speed for road conditions, lost control when turning, new driver/under instruction, ENV: heavy rain, slippery road due to rain | Wet | Overcast | Heavy rain | T Junction | Give way | 0 | 0 | 1 | 0.11 |
| **WAIRAKEI ROAD** | POIHIPI ROAD | | | I | | | 1867032 | 5715010 | 176.069412 | -38.673252 | 201845347 | 23/07/2018 | Mon | 12:00 | Car/Wagon1 NDB on Wairakei drive hit Car/Wagon2 merging from the left | CAR/WAGON2, failed to give way at priority traffic control | Dry | Overcast | Fine | T Junction | Give way | 0 | 0 | 0 | 0.04 |
| **WAIRAKEI ROAD** | POIHIPI ROAD | | | I | | | 1867032 | 5715010 | 176.069412 | -38.673252 | 201848484 | 07/09/2018 | Fri | 11:40 | Truck2 turning right hit by oncoming Car/Wagon1 NDB on Wairakei Drive | TRUCK2, alcohol test below limit, failed to give way at priority traffic control | Dry | Overcast | Fine | T Junction | Give way | 0 | 0 | 0 | 0.04 |

1-12 of 12

## kinloch / whangamata 2017-2022

**Saved sites**

kinloch / whangamata int

**Crash severity**

Fatal Crash, Serious Crash, Minor Crash, Non-Injury Crash

**Crash year**

2017 — 2022

## Plain English report

**2 results from your query.**

1-2 of 2

| Crash road | Side road | Feature | Distance from side road/feature | Direction | Reference station | Route position | Easting | Northing | Longitude | Latitude | ID | Date | Day of week | Time | Description of events | Crash factors | Surface condition | Natural light | Weather | Junction | Control | Casualty count fatal | Casualty count serious | Casualty count minor | Social cost $(m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WHANGAMATA ROAD** | KINLOCH ROAD | | | I | | | 1855505 | 5718688 | 175.935732 | -38.643546 | 2021184260 | 04/04/2021 | Sun | 17:39 | Car/Wagon1 WDB on WHANGAMATA ROAD hit Car/Wagon2 turning right onto AXROAD from the left | CAR/WAGON2, alcohol test below limit, failed to give way at priority traffic control CAR/WAGON1, alcohol suspected | Dry | Bright sun | Fine | T Junction | Give way | 0 | 1 | 0 | 0.71 |
| **WHANGAMATA ROAD** | KINLOCH ROAD | | | I | | | 1855502 | 5718688 | 175.935692 | -38.643545 | 201986144 | 25/11/2019 | Mon | 17:19 | Car/Wagon1 WDB on WHANGAMATA ROAD hit Ute2 turning right onto AXROAD from the left | UTE2, alcohol test below limit, did not check/notice another party from other dirn, failed to give way at priority traffic control CAR/WAGON1, alcohol test below limit | Dry | Bright sun | Fine | T Junction | Give way | 0 | 0 | 0 | 0.04 |

1-2 of 2

## Whangamata Pohipi int

**Saved sites**

Whangamata Pohipi int

**Crash severity**

Fatal Crash, Serious Crash, Minor Crash, Non-Injury Crash

**Crash year**

2017 — 2022

## Plain English report

**8 results from your query.**

1-8 of 8

| Crash road | Side road | Feature | Distance from side road/feature | Direction | Reference station | Route position | Easting | Northing | Longitude | Latitude | ID | Date | Day of week | Time | Description of events | Crash factors | Surface condition | Natural light | Weather | Junction | Control | Casualty count fatal | Casualty count serious | Casualty count minor | Social cost $(m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861969 | 5721841 | 176.008713 | -38.613289 | 201810677 | 05/02/2018 | Mon | 16:01 | Car/Wagon1 SDB on Poihipi rd lost control turning right, Car/Wagon1 hit non specific cliff, non specific guard rail | CAR/WAGON1, alcohol suspected, inappropriate speed for road conditions, other inexperience, too far left | Wet | Overcast | Light rain | T Junction | Nil | 0 | 2 | 0 | 0.71 |
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861981 | 5721835 | 176.008857 | -38.613338 | 2021206681 | 02/12/2021 | Thu | 08:15 | Car/Wagon1 NDB on Poihipi Road hit Car/Wagon2 turning right onto AXROAD from the left | CAR/WAGON1, alcohol test below limit CAR/WAGON2, alcohol test below limit, didnt look/notice other party - visibility obstruc, failed to give way at priority traffic control | Dry | Bright sun | Fine | T Junction | Stop | 0 | 0 | 1 | 0.11 |
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861980 | 5721836 | 176.008851 | -38.613330 | 2021183099 | 30/03/2021 | Tue | 09:59 | Car/Wagon1 NDB on POIHIPI ROAD hit Car/Wagon2 turning right onto AXROAD from the left, Car/Wagon1 hit drainage | CAR/WAGON2, alcohol test below limit, failed to give way at priority traffic control CAR/WAGON1, alcohol test below limit | Wet | Overcast | Light rain | T Junction | Stop | 0 | 0 | 2 | 0.11 |
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861969 | 5721841 | 176.008713 | -38.613289 | 201750035 | 29/09/2017 | Fri | 21:00 | SUV1 EDB on Whangamata Road missed intersection or end of road, SUV1 hit non specific guard rail | SUV1, alcohol test above limit or test refused, speed approaching a traffic control | Dry | Dark | Fine | T Junction | Stop | 0 | 0 | 0 | 0.04 |
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861969 | 5721841 | 176.008713 | -38.613289 | 201715482 | 03/07/2017 | Mon | 12:30 | Car/Wagon1 EDB on Whangamata turning right hit Cyclist2 (Age 37) turning right into AXROAD | CAR/WAGON1, did not check/notice another party from other dirn, failed to give way at priority traffic control | Dry | Overcast | Fine | T Junction | Stop | 0 | 0 | 1 | 0.11 |
| **POIHIPI ROAD** | WHANGAMATA ROAD | | | I | | | 1861969 | 5721841 | 176.008713 | -38.613289 | 201839704 | 25/05/2018 | Fri | 07:12 | Car/Wagon1 EDB on WHANGAMATA ROAD, KINLOCH, TAUPO lost control turning right, Car/Wagon1 hit non specific cliff, non specific fence, non specific pole, | CAR/WAGON1, alcohol test below limit, inappropriate speed for weather conditions, lost control under acceleration | Wet | Overcast | Light rain | T Junction | Stop | 0 | 0 | 0 | 0.04 |
| **WHANGAMATA ROAD** | POIHIPI ROAD | 84m | | S | | | 1861907 | 5721788 | 176.008030 | -38.613776 | 201984021 | 28/10/2019 | Mon | 12:25 | Ute1 EDB on WHANGAMATA ROAD lost control turning left; went off road to right | UTE1, alcohol test below limit, other inexperience, speed entering corner/curve, swung wide on bend | Wet | Overcast | Light rain | Nil (Default) | Nil | 0 | 0 | 0 | 0.04 |
| **WHANGAMATA ROAD** | POIHIPI ROAD | 73m | | S | | | 1861921 | 5721793 | 176.008179 | -38.613731 | 201972341 | 01/11/2019 | Fri | 15:00 | Car/Wagon1 EDB on Whangamata Road lost control turning left; went off road to right, Car/Wagon1 hit bank, ditch | CAR/WAGON1, overseas/migrant driver fail to adjust to nz roads, speed entering corner/curve, swung wide on bend | Dry | Overcast | Fine | Nil (Default) | Nil | 0 | 0 | 1 | 0.11 |

1-8 of 8

# Appendix D – Kinloch Future Development Maps

**Te Tuhi**
44 Lots Restricted Flow Residential Demand
Timing: Developed now, but connection likely all by 2035 (after The Terraces)
*WSP to import scheme plan provided and prepare concept to supply lots above Kinloch High Zone.*

Top end of Kinloch High Pressure Zone (480m Elevation contour)

**Hunt Club Inc.**
30 Lots Full Residential Demand
Timing: 2030-2035
*No Scheme plan provided, connection assumed*

**The Terraces**
55 Lots Full Residential Demand, connected to High Zone
Timing: 2025-2035
*Scheme plan provided, recommendations for pipe size will be provided.*

**Oakdale Downs**
Total 82 Lots Full Residential Demand,
Timing: Development completed 2019,
All lots connected by 2025
*Refer to latest GIS for customer points*

**Seven Oaks,**
Stage 1-9,
160 Lots Full Residential Demand,
Balance Lot (Stage 10) 30 Lots Full Residential Demand
Stage 1 to 7 connected to Low Zone
Stage 8,9 and Balance Lot to High Zone
Timing: 2020-2026
*Scheme plan provided, recommendations for pipe size already provided in development enquiry.*

**Oakdale Drive,**
12 Lots Full Residential Demand,
Timing: 2025-2030

**Kinloch Fill In lots** (including the Poplars, Locheagles and Fairways) Township
96 Lots Full Residential Demand,
Timing: 2020-2035

**Workshop Site**
6 Lots Full Residential Demand
Timing: 2025

WHANGAMATA ROAD
OAKDALE DRIVE
LANCEWOOD DRIVE
LISLAND DRIVE
KINLOCH ROAD
Okaia Wildlife Reserve
Kinloch Golf Course

GREAT LAKE TAUPŌ
Taupō District Council



# Kinloch Future Development Maps, Western Site, 'The Terraces', 'Seven Oaks', 'To Tuhi', 'Hunt Club'

419.100 Meters

Scale = 1: 8,000 (A3)

Date Created: 27 February 2020 4:30 p.m.

Map Produced From Mapi

N

**Poplars Stage 2**
12 Lots Full Residential Demand
Timing: 2020-2025

**Whangamata Private supply scheme**
Potential to connect private scheme to the Kinloch Water Supply Network in the future.
Currently approx. 70 Lots Farm Demand
*WSP will check the impact of the connection on the 2050 model. Separate assessment required to determine operational impact (additional PS, reservoir etc?)*

**The Fairways**
54 Lots Full Residential Demand
Timing: 2020-2040
*Currently already some lots connected, balance to be connected by 2040*

**Kinloch Golf Course / Low Density Zone**
108 Lots Full Residential Demand
Timing: 2035-2050

**The Kinloch Manor**
12 Lots Full Residential Demand
Timing 2025-2030

New Water Treatment Plant Site

**Edmund Hillary Outdoor Education**
1 Lot Restricted Residential Demand
Timing: 2025

Locheagle Developments as per Sheet 1 Kinloch Fill in Lots.

Nu further development in the Whakarao DMA

GREAT LAKE TAUPŌ
Taupō District Council



# Kinloch Future Development Maps, Eastern Site, 'Popplers', 'Golf course', 'Locheagles'

419.100 Meters

Scale = 1: 8,000 (A3)

Date Created: 27 February 2020 4:33 p.m.

Map Produced From Mapi

N

# Appendix E – Immediate Network SIDRA Analysis

# MOVEMENT SUMMARY

## Site: 103 [Future AM - Peak (Site Folder: Oakdale Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Oakdale | | | | | | | | | | | | | | |
| 1 | L2 | 21 | 0.0 | 22 | 0.0 | 0.014 | 4.6 | LOS A | 0.1 | 0.4 | 0.07 | 0.50 | 0.07 | 46.5 |
| 3 | R2 | 119 | 0.0 | 125 | 0.0 | 0.104 | 4.8 | LOS A | 0.4 | 2.5 | 0.16 | 0.54 | 0.16 | 45.8 |
| Approach | | 140 | 0.0 | 147 | 0.0 | 0.104 | 4.8 | LOS A | 0.4 | 2.5 | 0.15 | 0.53 | 0.15 | 45.9 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 26 | 0.0 | 27 | 0.0 | 0.026 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 47.8 |
| 5 | T1 | 20 | 0.0 | 21 | 0.0 | 0.026 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 48.3 |
| Approach | | 46 | 0.0 | 48 | 0.0 | 0.026 | 2.6 | NA | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 48.0 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 29 | 0.0 | 31 | 0.0 | 0.025 | 0.1 | LOS A | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.7 |
| 12 | R2 | 15 | 0.0 | 16 | 0.0 | 0.025 | 4.7 | LOS A | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.0 |
| Approach | | 44 | 0.0 | 46 | 0.0 | 0.025 | 1.6 | NA | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.5 |
| All Vehicles | | 230 | 0.0 | 242 | 0.0 | 0.104 | 3.8 | NA | 0.4 | 2.5 | 0.11 | 0.42 | 0.11 | 46.8 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Future PM - Peak (Site Folder: Oakdale Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Oakdale | | | | | | | | | | | | | | |
| 1 | L2 | 20 | 0.0 | 21 | 0.0 | 0.013 | 4.7 | LOS A | 0.1 | 0.4 | 0.11 | 0.50 | 0.11 | 46.4 |
| 3 | R2 | 39 | 0.0 | 41 | 0.0 | 0.036 | 5.1 | LOS A | 0.1 | 0.8 | 0.22 | 0.55 | 0.22 | 45.7 |
| Approach | | 59 | 0.0 | 62 | 0.0 | 0.036 | 4.9 | LOS A | 0.1 | 0.8 | 0.18 | 0.53 | 0.18 | 45.9 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 82 | 0.0 | 86 | 0.0 | 0.067 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.37 | 0.00 | 47.5 |
| 5 | T1 | 38 | 0.0 | 40 | 0.0 | 0.067 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.37 | 0.00 | 47.9 |
| Approach | | 120 | 0.0 | 126 | 0.0 | 0.067 | 3.1 | NA | 0.0 | 0.0 | 0.00 | 0.37 | 0.00 | 47.6 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 27 | 0.0 | 28 | 0.0 | 0.042 | 0.3 | LOS A | 0.2 | 1.3 | 0.22 | 0.31 | 0.22 | 47.6 |
| 12 | R2 | 41 | 0.0 | 43 | 0.0 | 0.042 | 4.9 | LOS A | 0.2 | 1.3 | 0.22 | 0.31 | 0.22 | 47.0 |
| Approach | | 68 | 0.0 | 72 | 0.0 | 0.042 | 3.1 | NA | 0.2 | 1.3 | 0.22 | 0.31 | 0.22 | 47.2 |
| All Vehicles | | 247 | 0.0 | 260 | 0.0 | 0.067 | 3.6 | NA | 0.2 | 1.3 | 0.10 | 0.39 | 0.10 | 47.1 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Growth AM - Peak (Site Folder: Oakdale Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Oakdale | | | | | | | | | | | | | | |
| 1 | L2 | 23 | 0.0 | 24 | 0.0 | 0.015 | 4.6 | LOS A | 0.1 | 0.4 | 0.08 | 0.50 | 0.08 | 46.4 |
| 3 | R2 | 126 | 0.0 | 133 | 0.0 | 0.111 | 4.9 | LOS A | 0.4 | 2.7 | 0.17 | 0.54 | 0.17 | 45.8 |
| Approach | | 149 | 0.0 | 157 | 0.0 | 0.111 | 4.8 | LOS A | 0.4 | 2.7 | 0.15 | 0.53 | 0.15 | 45.9 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 27 | 0.0 | 28 | 0.0 | 0.027 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 47.9 |
| 5 | T1 | 22 | 0.0 | 23 | 0.0 | 0.027 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 48.3 |
| Approach | | 49 | 0.0 | 52 | 0.0 | 0.027 | 2.5 | NA | 0.0 | 0.0 | 0.00 | 0.30 | 0.00 | 48.1 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 31 | 0.0 | 33 | 0.0 | 0.027 | 0.1 | LOS A | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.7 |
| 12 | R2 | 16 | 0.0 | 17 | 0.0 | 0.027 | 4.7 | LOS A | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.0 |
| Approach | | 47 | 0.0 | 49 | 0.0 | 0.027 | 1.6 | NA | 0.1 | 0.6 | 0.09 | 0.18 | 0.09 | 48.5 |
| All Vehicles | | 245 | 0.0 | 258 | 0.0 | 0.111 | 3.8 | NA | 0.4 | 2.7 | 0.11 | 0.42 | 0.11 | 46.8 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Growth PM - Peak (Site Folder: Oakdale Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Oakdale | | | | | | | | | | | | | | |
| 1 | L2 | 21 | 0.0 | 22 | 0.0 | 0.014 | 4.7 | LOS A | 0.1 | 0.4 | 0.11 | 0.50 | 0.11 | 46.4 |
| 3 | R2 | 42 | 0.0 | 44 | 0.0 | 0.040 | 5.1 | LOS A | 0.1 | 0.9 | 0.23 | 0.55 | 0.23 | 45.7 |
| Approach | | 63 | 0.0 | 66 | 0.0 | 0.040 | 5.0 | LOS A | 0.1 | 0.9 | 0.19 | 0.53 | 0.19 | 45.9 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 88 | 0.0 | 93 | 0.0 | 0.073 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.36 | 0.00 | 47.5 |
| 5 | T1 | 42 | 0.0 | 44 | 0.0 | 0.073 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.36 | 0.00 | 47.9 |
| Approach | | 130 | 0.0 | 137 | 0.0 | 0.073 | 3.1 | NA | 0.0 | 0.0 | 0.00 | 0.36 | 0.00 | 47.6 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 30 | 0.0 | 32 | 0.0 | 0.045 | 0.3 | LOS A | 0.2 | 1.4 | 0.23 | 0.31 | 0.23 | 47.6 |
| 12 | R2 | 43 | 0.0 | 45 | 0.0 | 0.045 | 5.0 | LOS A | 0.2 | 1.4 | 0.23 | 0.31 | 0.23 | 47.0 |
| Approach | | 73 | 0.0 | 77 | 0.0 | 0.045 | 3.1 | NA | 0.2 | 1.4 | 0.23 | 0.31 | 0.23 | 47.3 |
| All Vehicles | | 266 | 0.0 | 280 | 0.0 | 0.073 | 3.5 | NA | 0.2 | 1.4 | 0.11 | 0.39 | 0.11 | 47.1 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Future AM - Peak (Site Folder: Kinloch Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinloch | | | | | | | | | | | | | | |
| 1 | L2 | 11 | 0.0 | 12 | 0.0 | 0.007 | 4.7 | LOS A | 0.0 | 0.2 | 0.12 | 0.49 | 0.12 | 46.3 |
| 3 | R2 | 124 | 0.0 | 131 | 0.0 | 0.127 | 5.6 | LOS A | 0.4 | 3.0 | 0.32 | 0.60 | 0.32 | 45.5 |
| Approach | | 135 | 0.0 | 142 | 0.0 | 0.127 | 5.5 | LOS A | 0.4 | 3.0 | 0.30 | 0.59 | 0.30 | 45.6 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 78 | 0.0 | 82 | 0.0 | 0.069 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 47.6 |
| 5 | T1 | 45 | 0.0 | 47 | 0.0 | 0.069 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 48.1 |
| Approach | | 123 | 0.0 | 129 | 0.0 | 0.069 | 2.9 | NA | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 47.8 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 150 | 0.0 | 158 | 0.0 | 0.086 | 0.0 | LOS A | 0.1 | 0.4 | 0.03 | 0.02 | 0.03 | 49.8 |
| 12 | R2 | 7 | 0.0 | 7 | 0.0 | 0.086 | 5.0 | LOS A | 0.1 | 0.4 | 0.03 | 0.02 | 0.03 | 49.1 |
| Approach | | 157 | 0.0 | 165 | 0.0 | 0.086 | 0.2 | NA | 0.1 | 0.4 | 0.03 | 0.02 | 0.03 | 49.8 |
| All Vehicles | | 415 | 0.0 | 437 | 0.0 | 0.127 | 2.7 | NA | 0.4 | 3.0 | 0.11 | 0.30 | 0.11 | 47.8 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Future PM - Peak (Site Folder: Kinloch Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinloch | | | | | | | | | | | | | | |
| 1 | L2 | 5 | 0.0 | 5 | 0.0 | 0.004 | 4.9 | LOS A | 0.0 | 0.1 | 0.22 | 0.49 | 0.22 | 46.1 |
| 3 | R2 | 73 | 0.0 | 77 | 0.0 | 0.076 | 5.6 | LOS A | 0.3 | 1.8 | 0.32 | 0.60 | 0.32 | 45.5 |
| Approach | | 78 | 0.0 | 82 | 0.0 | 0.076 | 5.6 | LOS A | 0.3 | 1.8 | 0.31 | 0.59 | 0.31 | 45.6 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 101 | 0.0 | 106 | 0.0 | 0.124 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.1 |
| 5 | T1 | 124 | 0.0 | 131 | 0.0 | 0.124 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.6 |
| Approach | | 225 | 0.0 | 237 | 0.0 | 0.124 | 2.1 | NA | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.4 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 73 | 0.0 | 77 | 0.0 | 0.051 | 0.2 | LOS A | 0.1 | 0.8 | 0.13 | 0.09 | 0.13 | 49.1 |
| 12 | R2 | 15 | 0.0 | 16 | 0.0 | 0.051 | 5.3 | LOS A | 0.1 | 0.8 | 0.13 | 0.09 | 0.13 | 48.4 |
| Approach | | 88 | 0.0 | 93 | 0.0 | 0.051 | 1.1 | NA | 0.1 | 0.8 | 0.13 | 0.09 | 0.13 | 49.0 |
| All Vehicles | | 391 | 0.0 | 412 | 0.0 | 0.124 | 2.6 | NA | 0.3 | 1.8 | 0.09 | 0.28 | 0.09 | 47.9 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Growth AM - Peak (Site Folder: Kinloch Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinloch | | | | | | | | | | | | | | |
| 1 | L2 | 12 | 0.0 | 13 | 0.0 | 0.008 | 4.7 | LOS A | 0.0 | 0.2 | 0.12 | 0.49 | 0.12 | 46.3 |
| 3 | R2 | 136 | 0.0 | 143 | 0.0 | 0.141 | 5.7 | LOS A | 0.5 | 3.4 | 0.33 | 0.61 | 0.33 | 45.5 |
| Approach | | 148 | 0.0 | 156 | 0.0 | 0.141 | 5.6 | LOS A | 0.5 | 3.4 | 0.32 | 0.60 | 0.32 | 45.6 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 86 | 0.0 | 91 | 0.0 | 0.075 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 47.6 |
| 5 | T1 | 48 | 0.0 | 51 | 0.0 | 0.075 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 48.0 |
| Approach | | 134 | 0.0 | 141 | 0.0 | 0.075 | 2.9 | NA | 0.0 | 0.0 | 0.00 | 0.34 | 0.00 | 47.8 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 160 | 0.0 | 168 | 0.0 | 0.092 | 0.0 | LOS A | 0.1 | 0.4 | 0.03 | 0.03 | 0.03 | 49.8 |
| 12 | R2 | 8 | 0.0 | 8 | 0.0 | 0.092 | 5.0 | LOS A | 0.1 | 0.4 | 0.03 | 0.03 | 0.03 | 49.1 |
| Approach | | 168 | 0.0 | 177 | 0.0 | 0.092 | 0.3 | NA | 0.1 | 0.4 | 0.03 | 0.03 | 0.03 | 49.7 |
| All Vehicles | | 450 | 0.0 | 474 | 0.0 | 0.141 | 2.8 | NA | 0.5 | 3.4 | 0.11 | 0.31 | 0.11 | 47.7 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 103 [Growth PM - Peak (Site Folder: Kinloch Whangamata)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinloch | | | | | | | | | | | | | | |
| 1 | L2 | 6 | 0.0 | 6 | 0.0 | 0.004 | 4.9 | LOS A | 0.0 | 0.1 | 0.22 | 0.49 | 0.22 | 46.1 |
| 3 | R2 | 80 | 0.0 | 84 | 0.0 | 0.085 | 5.7 | LOS A | 0.3 | 2.0 | 0.34 | 0.61 | 0.34 | 45.5 |
| Approach | | 86 | 0.0 | 91 | 0.0 | 0.085 | 5.7 | LOS A | 0.3 | 2.0 | 0.33 | 0.60 | 0.33 | 45.5 |
| East: Whangamata | | | | | | | | | | | | | | |
| 4 | L2 | 110 | 0.0 | 116 | 0.0 | 0.134 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.1 |
| 5 | T1 | 133 | 0.0 | 140 | 0.0 | 0.134 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.6 |
| Approach | | 243 | 0.0 | 256 | 0.0 | 0.134 | 2.1 | NA | 0.0 | 0.0 | 0.00 | 0.24 | 0.00 | 48.4 |
| West: Whangamata | | | | | | | | | | | | | | |
| 11 | T1 | 78 | 0.0 | 82 | 0.0 | 0.054 | 0.2 | LOS A | 0.1 | 0.8 | 0.14 | 0.10 | 0.14 | 49.1 |
| 12 | R2 | 16 | 0.0 | 17 | 0.0 | 0.054 | 5.4 | LOS A | 0.1 | 0.8 | 0.14 | 0.10 | 0.14 | 48.4 |
| Approach | | 94 | 0.0 | 99 | 0.0 | 0.054 | 1.1 | NA | 0.1 | 0.8 | 0.14 | 0.10 | 0.14 | 49.0 |
| All Vehicles | | 423 | 0.0 | 445 | 0.0 | 0.134 | 2.6 | NA | 0.3 | 2.0 | 0.10 | 0.28 | 0.10 | 47.9 |

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Future AM - Peak Stage 1 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Future AM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Stop (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pohipi | | | | | | | | | | | | | | |
| 1 | L2 | 113 | 0.0 | 113 | 0.0 | 0.070 | 4.5 | LOS A | 0.1 | 0.8 | 0.06 | 0.48 | 0.06 | 47.1 |
| 2 | T1 | 86 | 0.0 | 86 | 0.0 | 0.044 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 199 | 0.0 | 199 | 0.0 | 0.070 | 2.6 | LOS A | 0.1 | 0.8 | 0.03 | 0.27 | 0.03 | 48.3 |
| North: Pohipi | | | | | | | | | | | | | | |
| 9 | R2 | 14 | 0.0 | 14 | 0.0 | 0.008 | 4.8 | LOS A | 0.0 | 0.1 | 0.18 | 0.50 | 0.18 | 46.0 |
| Approach | | 14 | 0.0 | 14 | 0.0 | 0.008 | 4.8 | NA | 0.0 | 0.1 | 0.18 | 0.50 | 0.18 | 46.0 |
| West: Whangamata | | | | | | | | | | | | | | |
| 10 | L2 | 26 | 0.0 | 26 | 0.0 | 0.020 | 7.7 | LOS A | 0.0 | 0.2 | 0.18 | 0.88 | 0.18 | 45.0 |
| 11 | T1 | 302 | 0.0 | 302 | 0.0 | 0.295 | 8.1 | LOS A | 0.5 | 3.7 | 0.32 | 0.95 | 0.32 | 41.6 |
| Approach | | 328 | 0.0 | 328 | 0.0 | 0.295 | 8.1 | LOS A | 0.5 | 3.7 | 0.31 | 0.94 | 0.31 | 42.1 |
| All Vehicles | | 541 | 0.0 | 541 | 0.0 | 0.295 | 6.0 | NA | 0.5 | 3.7 | 0.21 | 0.68 | 0.21 | 45.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 102 [Future AM - Peak Stage 2 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Future AM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North: Pohipi | | | | | | | | | | | | | | |
| 8 | T1 | 83 | 0.0 | 83 | 0.0 | 0.043 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 83 | 0.0 | 83 | 0.0 | 0.043 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| West: Acceleration Lane | | | | | | | | | | | | | | |
| 12 | R2 | 302 | 0.0 | 302 | 0.0 | 0.223 | 2.2 | LOS A | 0.3 | 2.3 | 0.17 | 0.51 | 0.17 | 45.2 |
| Approach | | 302 | 0.0 | 302 | 0.0 | 0.223 | 2.2 | LOS A | 0.3 | 2.3 | 0.17 | 0.51 | 0.17 | 45.2 |
| All Vehicles | | 385 | 0.0 | 385 | 0.0 | 0.223 | 1.8 | NA | 0.3 | 2.3 | 0.13 | 0.40 | 0.13 | 46.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
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 [Future PM - Peak Stage 1 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Future PM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Stop (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pohipi | | | | | | | | | | | | | | |
| 1 | L2 | 269 | 0.0 | 269 | 0.0 | 0.167 | 4.6 | LOS A | 0.3 | 2.2 | 0.08 | 0.47 | 0.08 | 47.0 |
| 2 | T1 | 109 | 0.0 | 109 | 0.0 | 0.056 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 379 | 0.0 | 379 | 0.0 | 0.167 | 3.2 | LOS A | 0.3 | 2.2 | 0.05 | 0.34 | 0.05 | 47.8 |
| North: Pohipi | | | | | | | | | | | | | | |
| 9 | R2 | 18 | 0.0 | 18 | 0.0 | 0.011 | 4.9 | LOS A | 0.0 | 0.1 | 0.21 | 0.50 | 0.21 | 46.0 |
| Approach | | 18 | 0.0 | 18 | 0.0 | 0.011 | 4.9 | NA | 0.0 | 0.1 | 0.21 | 0.50 | 0.21 | 46.0 |
| West: Whangamata | | | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 21 | 0.0 | 0.016 | 7.8 | LOS A | 0.0 | 0.2 | 0.21 | 0.87 | 0.21 | 45.0 |
| 11 | T1 | 147 | 0.0 | 147 | 0.0 | 0.161 | 8.6 | LOS A | 0.3 | 1.8 | 0.38 | 0.96 | 0.38 | 41.3 |
| Approach | | 168 | 0.0 | 168 | 0.0 | 0.161 | 8.5 | LOS A | 0.3 | 1.8 | 0.36 | 0.95 | 0.36 | 42.1 |
| All Vehicles | | 565 | 0.0 | 565 | 0.0 | 0.167 | 4.9 | NA | 0.3 | 2.2 | 0.15 | 0.52 | 0.15 | 46.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 102 [Future PM - Peak Stage 2 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Future PM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North: Pohipi | | | | | | | | | | | | | | |
| 8 | T1 | 111 | 0.0 | 111 | 0.0 | 0.057 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 111 | 0.0 | 111 | 0.0 | 0.057 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| West: Acceleration Lane | | | | | | | | | | | | | | |
| 12 | R2 | 147 | 0.0 | 147 | 0.0 | 0.111 | 2.3 | LOS A | 0.1 | 1.0 | 0.18 | 0.51 | 0.18 | 45.2 |
| Approach | | 147 | 0.0 | 147 | 0.0 | 0.111 | 2.3 | LOS A | 0.1 | 1.0 | 0.18 | 0.51 | 0.18 | 45.2 |
| All Vehicles | | 258 | 0.0 | 258 | 0.0 | 0.111 | 1.3 | NA | 0.1 | 1.0 | 0.10 | 0.29 | 0.10 | 47.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
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 [Growth AM - Peak Stage 1 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Growth AM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Stop (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pohipi | | | | | | | | | | | | | | |
| 1 | L2 | 123 | 0.0 | 123 | 0.0 | 0.076 | 4.5 | LOS A | 0.1 | 0.9 | 0.06 | 0.48 | 0.06 | 47.1 |
| 2 | T1 | 95 | 0.0 | 95 | 0.0 | 0.049 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 218 | 0.0 | 218 | 0.0 | 0.076 | 2.6 | LOS A | 0.1 | 0.9 | 0.04 | 0.27 | 0.04 | 48.3 |
| North: Pohipi | | | | | | | | | | | | | | |
| 9 | R2 | 15 | 0.0 | 15 | 0.0 | 0.009 | 4.8 | LOS A | 0.0 | 0.1 | 0.19 | 0.50 | 0.19 | 46.0 |
| Approach | | 15 | 0.0 | 15 | 0.0 | 0.009 | 4.8 | NA | 0.0 | 0.1 | 0.19 | 0.50 | 0.19 | 46.0 |
| West: Whangamata | | | | | | | | | | | | | | |
| 10 | L2 | 28 | 0.0 | 28 | 0.0 | 0.022 | 7.8 | LOS A | 0.0 | 0.2 | 0.19 | 0.88 | 0.19 | 45.0 |
| 11 | T1 | 327 | 0.0 | 327 | 0.0 | 0.334 | 8.3 | LOS A | 0.6 | 4.2 | 0.35 | 0.95 | 0.35 | 41.6 |
| Approach | | 356 | 0.0 | 356 | 0.0 | 0.334 | 8.2 | LOS A | 0.6 | 4.2 | 0.34 | 0.94 | 0.34 | 42.0 |
| All Vehicles | | 588 | 0.0 | 588 | 0.0 | 0.334 | 6.1 | NA | 0.6 | 4.2 | 0.22 | 0.68 | 0.22 | 45.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 102 [Growth AM - Peak Stage 2 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Growth AM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North: Pohipi | | | | | | | | | | | | | | |
| 8 | T1 | 91 | 0.0 | 91 | 0.0 | 0.046 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 91 | 0.0 | 91 | 0.0 | 0.046 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| West: Acceleration Lane | | | | | | | | | | | | | | |
| 12 | R2 | 327 | 0.0 | 327 | 0.0 | 0.243 | 2.3 | LOS A | 0.4 | 2.6 | 0.18 | 0.51 | 0.18 | 45.2 |
| Approach | | 327 | 0.0 | 327 | 0.0 | 0.243 | 2.3 | LOS A | 0.4 | 2.6 | 0.18 | 0.51 | 0.18 | 45.2 |
| All Vehicles | | 418 | 0.0 | 418 | 0.0 | 0.243 | 1.8 | NA | 0.4 | 2.6 | 0.14 | 0.40 | 0.14 | 46.7 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
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 [Growth PM - Peak Stage 1 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Growth PM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Stop (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pohipi | | | | | | | | | | | | | | |
| 1 | L2 | 293 | 0.0 | 293 | 0.0 | 0.182 | 4.6 | LOS A | 0.3 | 2.4 | 0.08 | 0.47 | 0.08 | 47.0 |
| 2 | T1 | 120 | 0.0 | 120 | 0.0 | 0.062 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 413 | 0.0 | 413 | 0.0 | 0.182 | 3.2 | LOS A | 0.3 | 2.4 | 0.06 | 0.34 | 0.06 | 47.8 |
| North: Pohipi | | | | | | | | | | | | | | |
| 9 | R2 | 19 | 0.0 | 19 | 0.0 | 0.012 | 4.9 | LOS A | 0.0 | 0.1 | 0.22 | 0.50 | 0.22 | 45.9 |
| Approach | | 19 | 0.0 | 19 | 0.0 | 0.012 | 4.9 | NA | 0.0 | 0.1 | 0.22 | 0.50 | 0.22 | 45.9 |
| West: Whangamata | | | | | | | | | | | | | | |
| 10 | L2 | 22 | 0.0 | 22 | 0.0 | 0.017 | 7.9 | LOS A | 0.0 | 0.2 | 0.22 | 0.87 | 0.22 | 45.0 |
| 11 | T1 | 160 | 0.0 | 160 | 0.0 | 0.180 | 8.8 | LOS A | 0.3 | 2.0 | 0.40 | 0.96 | 0.40 | 41.2 |
| Approach | | 182 | 0.0 | 182 | 0.0 | 0.180 | 8.7 | LOS A | 0.3 | 2.0 | 0.38 | 0.95 | 0.38 | 42.0 |
| All Vehicles | | 614 | 0.0 | 614 | 0.0 | 0.182 | 4.9 | NA | 0.3 | 2.4 | 0.16 | 0.52 | 0.16 | 46.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 102 [Growth PM - Peak Stage 2 (Site Folder: Whangamata Pohipi Int)]

## Network: N103 [Growth PM - Peak (Network Folder: Whangamata Pohipi)]

New Site
Site Category: (None)
Give-Way (Two-Way)

**Vehicle Movement Performance**

| Mov ID | Turn | DEMAND FLOWS [ Total veh/h | HV ] % | ARRIVAL FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North: Pohipi | | | | | | | | | | | | | | |
| 8 | T1 | 121 | 0.0 | 121 | 0.0 | 0.062 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| Approach | | 121 | 0.0 | 121 | 0.0 | 0.062 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 50.0 |
| West: Acceleration Lane | | | | | | | | | | | | | | |
| 12 | R2 | 160 | 0.0 | 160 | 0.0 | 0.122 | 2.3 | LOS A | 0.2 | 1.2 | 0.19 | 0.51 | 0.19 | 45.1 |
| Approach | | 160 | 0.0 | 160 | 0.0 | 0.122 | 2.3 | LOS A | 0.2 | 1.2 | 0.19 | 0.51 | 0.19 | 45.1 |
| All Vehicles | | 281 | 0.0 | 281 | 0.0 | 0.122 | 1.3 | NA | 0.2 | 1.2 | 0.11 | 0.29 | 0.11 | 47.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

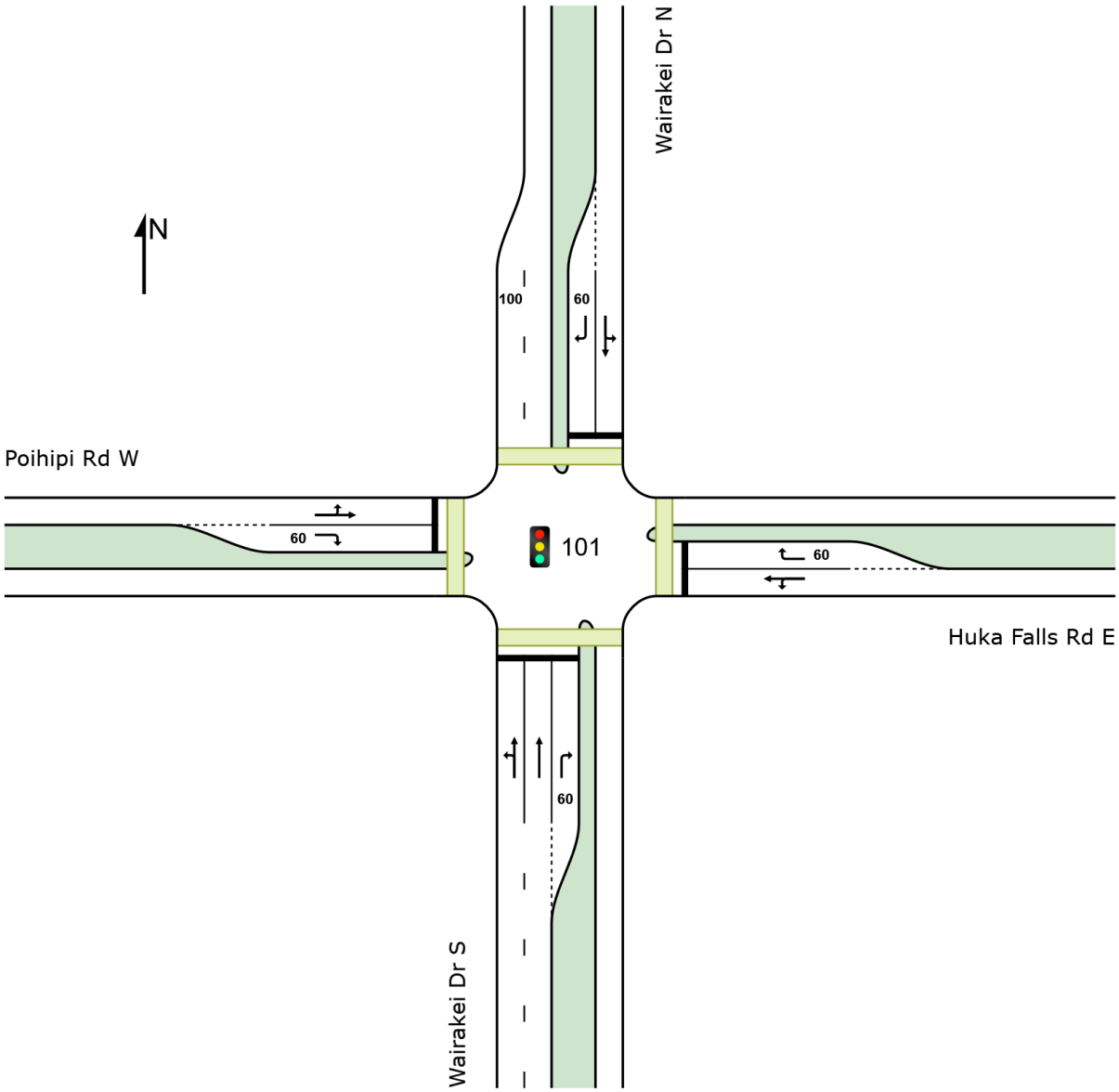
# Appendix F – Wairakei Network SIDRA Analysis

# SITE LAYOUT

## Site: 101 [WSP 2041 AM No dev (Site Folder: Pohipi - Wairakei)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# MOVEMENT SUMMARY

## Site: 101 [WSP 2041 AM No dev (Site Folder: Pohipi - Wairakei)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 119 | 2.0 | 119 | 2.0 | *0.371 | 37.0 | LOS D | 4.2 | 30.2 | 0.93 | 0.77 | 0.93 | 32.6 |
| 2 | T1 | All MCs | 83 | 2.0 | 83 | 2.0 | 0.247 | 31.5 | LOS C | 2.9 | 20.5 | 0.90 | 0.70 | 0.90 | 34.9 |
| 3 | R2 | All MCs | 91 | 2.0 | 91 | 2.0 | *0.659 | 47.4 | LOS D | 3.8 | 27.0 | 1.00 | 0.84 | 1.14 | 29.9 |
| Approach | | | 293 | 2.0 | 293 | 2.0 | 0.659 | 38.7 | LOS D | 4.2 | 30.2 | 0.94 | 0.77 | 0.98 | 32.3 |
| East: Huka Falls Rd E | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 245 | 2.0 | 245 | 2.0 | 0.790 | 41.9 | LOS D | 12.0 | 85.3 | 1.00 | 0.94 | 1.17 | 31.5 |
| 5 | T1 | All MCs | 46 | 2.0 | 46 | 2.0 | *0.790 | 37.3 | LOS D | 12.0 | 85.3 | 1.00 | 0.94 | 1.17 | 32.0 |
| 6 | R2 | All MCs | 17 | 2.0 | 17 | 2.0 | 0.123 | 44.1 | LOS D | 0.7 | 4.6 | 0.96 | 0.69 | 0.96 | 30.7 |
| Approach | | | 308 | 2.0 | 308 | 2.0 | 0.790 | 41.3 | LOS D | 12.0 | 85.3 | 1.00 | 0.92 | 1.16 | 31.5 |
| North: Wairakei Dr N | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 11 | 2.0 | 11 | 2.0 | 0.348 | 36.8 | LOS D | 4.1 | 29.4 | 0.92 | 0.73 | 0.92 | 34.0 |
| 8 | T1 | All MCs | 106 | 2.0 | 106 | 2.0 | 0.348 | 32.2 | LOS C | 4.1 | 29.4 | 0.92 | 0.73 | 0.92 | 34.6 |
| 9 | R2 | All MCs | 41 | 2.0 | 41 | 2.0 | 0.299 | 45.1 | LOS D | 1.6 | 11.6 | 0.98 | 0.73 | 0.98 | 30.5 |
| Approach | | | 158 | 2.0 | 158 | 2.0 | 0.348 | 35.9 | LOS D | 4.1 | 29.4 | 0.94 | 0.73 | 0.94 | 33.4 |
| West: Poihipi Rd W | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 64 | 2.0 | 64 | 2.0 | 0.191 | 22.7 | LOS C | 3.5 | 25.2 | 0.71 | 0.65 | 0.71 | 38.4 |
| 11 | T1 | All MCs | 71 | 2.0 | 71 | 2.0 | 0.191 | 18.1 | LOS B | 3.5 | 25.2 | 0.71 | 0.65 | 0.71 | 39.1 |
| 12 | R2 | All MCs | 355 | 2.0 | 355 | 2.0 | *0.775 | 38.3 | LOS D | 14.1 | 100.1 | 0.99 | 0.91 | 1.11 | 32.4 |
| Approach | | | 489 | 2.0 | 489 | 2.0 | 0.775 | 33.3 | LOS C | 14.1 | 100.1 | 0.91 | 0.84 | 1.00 | 33.9 |
| All Vehicles | | | 1248 | 2.0 | 1248 | 2.0 | 0.790 | 36.9 | LOS D | 14.1 | 100.1 | 0.94 | 0.83 | 1.03 | 32.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Eff. Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Huka Falls Rd E | | | | | | | | | | | | |
| P2 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| North: Wairakei Dr N | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| West: Poihipi Rd W | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| All Pedestrians | | 200 | 211 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 101 [WSP 2041 PM No dev (Site Folder: Pohipi - Wairakei)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 414 | 2.0 | 414 | 2.0 | *0.786 | 36.6 | LOS D | 16.3 | 115.9 | 0.98 | 0.91 | 1.10 | 32.8 |
| 2 | T1 | All MCs | 39 | 2.0 | 39 | 2.0 | 0.070 | 22.3 | LOS C | 1.1 | 7.9 | 0.76 | 0.57 | 0.76 | 38.3 |
| 3 | R2 | All MCs | 176 | 2.0 | 176 | 2.0 | 0.452 | 35.0 | LOS C | 6.2 | 43.8 | 0.92 | 0.79 | 0.92 | 33.3 |
| Approach | | | 628 | 2.0 | 628 | 2.0 | 0.786 | 35.3 | LOS D | 16.3 | 115.9 | 0.95 | 0.86 | 1.03 | 33.2 |
| East: Huka Falls Rd E | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 148 | 2.0 | 148 | 2.0 | 0.669 | 39.8 | LOS D | 8.4 | 59.9 | 0.99 | 0.85 | 1.04 | 32.3 |
| 5 | T1 | All MCs | 69 | 2.0 | 69 | 2.0 | *0.669 | 35.2 | LOS D | 8.4 | 59.9 | 0.99 | 0.85 | 1.04 | 32.8 |
| 6 | R2 | All MCs | 13 | 2.0 | 13 | 2.0 | 0.092 | 43.8 | LOS D | 0.5 | 3.5 | 0.96 | 0.68 | 0.96 | 30.8 |
| Approach | | | 231 | 2.0 | 231 | 2.0 | 0.669 | 38.7 | LOS D | 8.4 | 59.9 | 0.98 | 0.84 | 1.04 | 32.3 |
| North: Wairakei Dr N | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 15 | 2.0 | 15 | 2.0 | 0.291 | 38.3 | LOS D | 3.0 | 21.3 | 0.93 | 0.73 | 0.93 | 33.4 |
| 8 | T1 | All MCs | 68 | 2.0 | 68 | 2.0 | 0.291 | 33.7 | LOS C | 3.0 | 21.3 | 0.93 | 0.73 | 0.93 | 34.0 |
| 9 | R2 | All MCs | 60 | 2.0 | 60 | 2.0 | *0.437 | 45.7 | LOS D | 2.4 | 17.2 | 0.99 | 0.75 | 0.99 | 30.4 |
| Approach | | | 143 | 2.0 | 143 | 2.0 | 0.437 | 39.2 | LOS D | 3.0 | 21.3 | 0.96 | 0.74 | 0.96 | 32.3 |
| West: Poihipi Rd W | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 43 | 2.0 | 43 | 2.0 | 0.206 | 29.7 | LOS C | 3.1 | 22.4 | 0.82 | 0.69 | 0.82 | 35.9 |
| 11 | T1 | All MCs | 59 | 2.0 | 59 | 2.0 | 0.206 | 25.1 | LOS C | 3.1 | 22.4 | 0.82 | 0.69 | 0.82 | 36.5 |
| 12 | R2 | All MCs | 221 | 2.0 | 221 | 2.0 | *0.743 | 42.5 | LOS D | 9.0 | 63.8 | 1.00 | 0.90 | 1.14 | 31.2 |
| Approach | | | 323 | 2.0 | 323 | 2.0 | 0.743 | 37.6 | LOS D | 9.0 | 63.8 | 0.94 | 0.83 | 1.04 | 32.6 |
| All Vehicles | | | 1325 | 2.0 | 1325 | 2.0 | 0.786 | 36.9 | LOS D | 16.3 | 115.9 | 0.95 | 0.84 | 1.02 | 32.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Eff. Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Huka Falls Rd E | | | | | | | | | | | | |
| P2 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| North: Wairakei Dr N | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| West: Poihipi Rd W | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| All Pedestrians | | 200 | 211 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 101 [WSP 2041 AM Dev (Site Folder: Pohipi - Wairakei)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 140 | 2.0 | 140 | 2.0 | *0.437 | 37.5 | LOS D | 5.1 | 36.0 | 0.94 | 0.79 | 0.94 | 32.5 |
| 2 | T1 | All MCs | 83 | 2.0 | 83 | 2.0 | 0.247 | 31.5 | LOS C | 2.9 | 20.5 | 0.90 | 0.70 | 0.90 | 34.9 |
| 3 | R2 | All MCs | 91 | 2.0 | 91 | 2.0 | *0.659 | 47.4 | LOS D | 3.8 | 27.0 | 1.00 | 0.84 | 1.14 | 29.9 |
| Approach | | | 314 | 2.0 | 314 | 2.0 | 0.659 | 38.8 | LOS D | 5.1 | 36.0 | 0.95 | 0.78 | 0.99 | 32.3 |
| East: Huka Falls Rd E | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 245 | 2.0 | 245 | 2.0 | 0.843 | 45.7 | LOS D | 12.7 | 90.2 | 1.00 | 1.00 | 1.27 | 30.5 |
| 5 | T1 | All MCs | 46 | 2.0 | 46 | 2.0 | *0.843 | 41.1 | LOS D | 12.7 | 90.2 | 1.00 | 1.00 | 1.27 | 31.0 |
| 6 | R2 | All MCs | 17 | 2.0 | 17 | 2.0 | 0.123 | 44.1 | LOS D | 0.7 | 4.6 | 0.96 | 0.69 | 0.96 | 30.7 |
| Approach | | | 308 | 2.0 | 308 | 2.0 | 0.843 | 44.9 | LOS D | 12.7 | 90.2 | 1.00 | 0.98 | 1.25 | 30.6 |
| North: Wairakei Dr N | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 11 | 2.0 | 11 | 2.0 | 0.348 | 36.8 | LOS D | 4.1 | 29.4 | 0.92 | 0.73 | 0.92 | 34.0 |
| 8 | T1 | All MCs | 106 | 2.0 | 106 | 2.0 | 0.348 | 32.2 | LOS C | 4.1 | 29.4 | 0.92 | 0.73 | 0.92 | 34.6 |
| 9 | R2 | All MCs | 41 | 2.0 | 41 | 2.0 | 0.299 | 45.1 | LOS D | 1.6 | 11.6 | 0.98 | 0.73 | 0.98 | 30.5 |
| Approach | | | 158 | 2.0 | 158 | 2.0 | 0.348 | 35.9 | LOS D | 4.1 | 29.4 | 0.94 | 0.73 | 0.94 | 33.4 |
| West: Poihipi Rd W | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 64 | 2.0 | 64 | 2.0 | 0.191 | 24.1 | LOS C | 3.5 | 25.2 | 0.71 | 0.65 | 0.71 | 38.4 |
| 11 | T1 | All MCs | 71 | 2.0 | 71 | 2.0 | 0.191 | 19.5 | LOS B | 3.5 | 25.2 | 0.71 | 0.65 | 0.71 | 39.1 |
| 12 | R2 | All MCs | 417 | 2.0 | 417 | 2.0 | *0.884 | 47.5 | LOS D | 19.0 | 135.5 | 1.00 | 1.04 | 1.31 | 30.3 |
| Approach | | | 552 | 2.0 | 552 | 2.0 | 0.884 | 41.2 | LOS D | 19.0 | 135.5 | 0.93 | 0.94 | 1.16 | 32.0 |
| All Vehicles | | | 1332 | 2.0 | 1332 | 2.0 | 0.884 | 40.8 | LOS D | 19.0 | 135.5 | 0.95 | 0.89 | 1.12 | 31.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Eff. Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| East: Huka Falls Rd E | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P2 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| North: Wairakei Dr N | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| West: Poihipi Rd W | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |
| All Pedestrians | | 200 | 211 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 188.1 | 200.0 | 1.06 |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

## Site: 101 [WSP 2041 PM Dev (Site Folder: Pohipi - Wairakei)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**Vehicle Movement Performance**

| Mov ID | Turn | Mov Class | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh. veh | Dist ] m | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | | | | |
| 1 | L2 | All MCs | 466 | 2.0 | 466 | 2.0 | *0.790 | 37.9 | LOS D | 20.1 | 142.9 | 0.97 | 0.91 | 1.06 | 32.4 |
| 2 | T1 | All MCs | 39 | 2.0 | 39 | 2.0 | 0.063 | 22.6 | LOS C | 1.2 | 8.4 | 0.72 | 0.54 | 0.72 | 38.2 |
| 3 | R2 | All MCs | 176 | 2.0 | 176 | 2.0 | 0.393 | 35.7 | LOS D | 6.6 | 46.7 | 0.88 | 0.79 | 0.88 | 33.0 |
| Approach | | | 681 | 2.0 | 681 | 2.0 | 0.790 | 36.5 | LOS D | 20.1 | 142.9 | 0.94 | 0.86 | 1.00 | 32.8 |
| East: Huka Falls Rd E | | | | | | | | | | | | | | | |
| 4 | L2 | All MCs | 148 | 2.0 | 148 | 2.0 | 0.703 | 45.2 | LOS D | 9.6 | 68.2 | 1.00 | 0.87 | 1.07 | 30.8 |
| 5 | T1 | All MCs | 69 | 2.0 | 69 | 2.0 | *0.703 | 40.7 | LOS D | 9.6 | 68.2 | 1.00 | 0.87 | 1.07 | 31.3 |
| 6 | R2 | All MCs | 13 | 2.0 | 13 | 2.0 | 0.103 | 49.6 | LOS D | 0.6 | 3.9 | 0.97 | 0.68 | 0.97 | 29.4 |
| Approach | | | 231 | 2.0 | 231 | 2.0 | 0.703 | 44.1 | LOS D | 9.6 | 68.2 | 1.00 | 0.86 | 1.07 | 30.9 |
| North: Wairakei Dr N | | | | | | | | | | | | | | | |
| 7 | L2 | All MCs | 15 | 2.0 | 15 | 2.0 | 0.302 | 42.9 | LOS D | 3.4 | 24.0 | 0.94 | 0.73 | 0.94 | 32.0 |
| 8 | T1 | All MCs | 68 | 2.0 | 68 | 2.0 | 0.302 | 38.3 | LOS D | 3.4 | 24.0 | 0.94 | 0.73 | 0.94 | 32.6 |
| 9 | R2 | All MCs | 60 | 2.0 | 60 | 2.0 | *0.492 | 51.7 | LOS D | 2.7 | 19.6 | 1.00 | 0.75 | 1.00 | 28.9 |
| Approach | | | 143 | 2.0 | 143 | 2.0 | 0.492 | 44.4 | LOS D | 3.4 | 24.0 | 0.96 | 0.74 | 0.96 | 30.9 |
| West: Poihipi Rd W | | | | | | | | | | | | | | | |
| 10 | L2 | All MCs | 43 | 2.0 | 43 | 2.0 | 0.195 | 31.5 | LOS C | 3.4 | 24.5 | 0.80 | 0.68 | 0.80 | 35.2 |
| 11 | T1 | All MCs | 59 | 2.0 | 59 | 2.0 | 0.195 | 26.9 | LOS C | 3.4 | 24.5 | 0.80 | 0.68 | 0.80 | 35.9 |
| 12 | R2 | All MCs | 252 | 2.0 | 252 | 2.0 | *0.773 | 46.7 | LOS D | 11.5 | 81.7 | 1.00 | 0.91 | 1.15 | 30.1 |
| Approach | | | 354 | 2.0 | 354 | 2.0 | 0.773 | 41.5 | LOS D | 11.5 | 81.7 | 0.94 | 0.85 | 1.05 | 31.5 |
| All Vehicles | | | 1408 | 2.0 | 1408 | 2.0 | 0.790 | 39.8 | LOS D | 20.1 | 142.9 | 0.95 | 0.84 | 1.02 | 32.0 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Eff. Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Wairakei Dr S | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 193.1 | 200.0 | 1.04 |
| East: Huka Falls Rd E | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P2 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 193.1 | 200.0 | 1.04 |
| North: Wairakei Dr N | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 193.1 | 200.0 | 1.04 |
| West: Poihipi Rd W | | | | | | | | | | | | |
| P4 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 193.1 | 200.0 | 1.04 |
| All Pedestrians | | 200 | 211 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 193.1 | 200.0 | 1.04 |

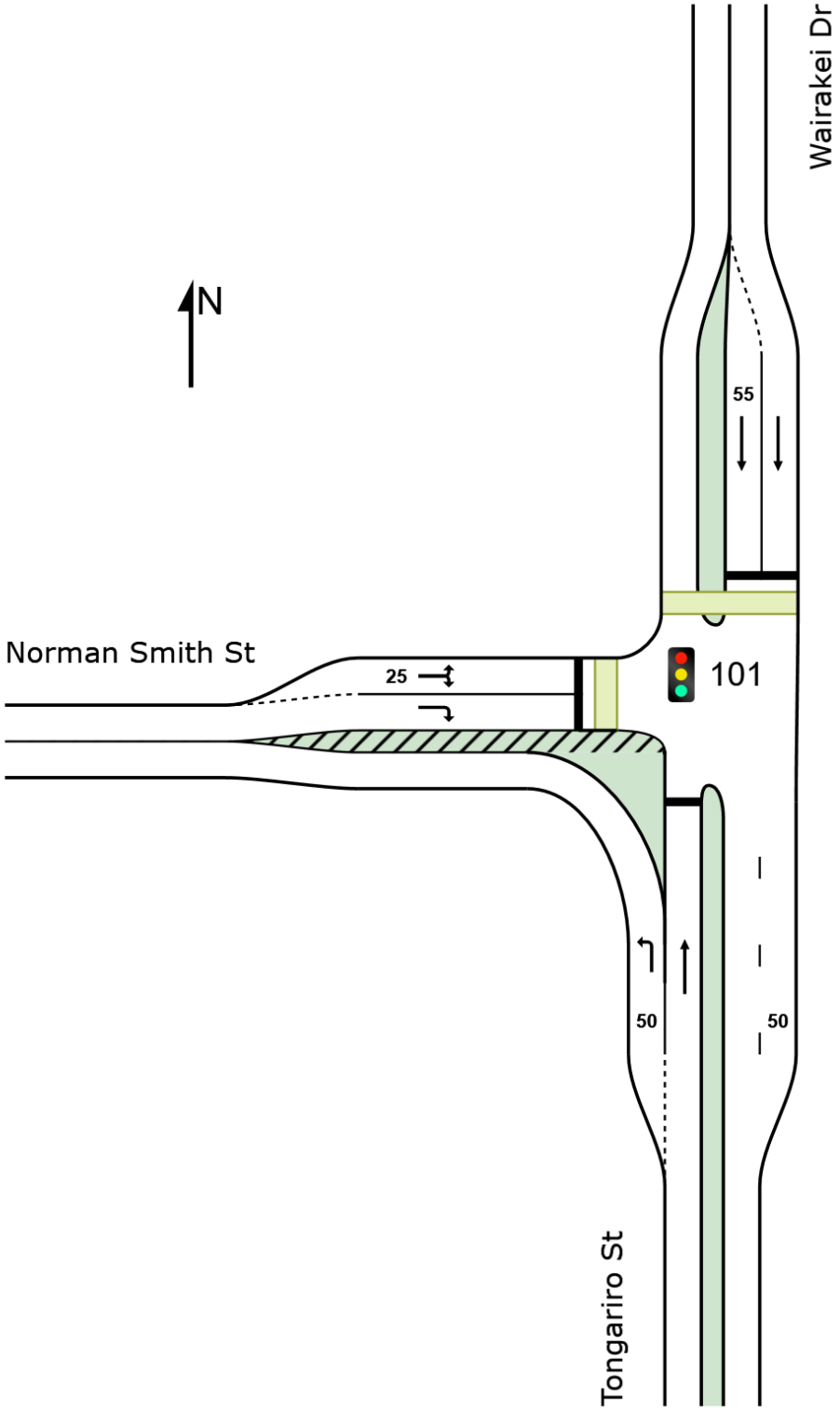
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# SITE LAYOUT

## Site: 101 [Existing AM (Site Folder: Council Wairakei-Norman)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# LANE SUMMARY

## Site: 101 [Existing AM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 342 | 7.0 | 342 | 7.0 | 1768 | 0.193 | 100 | 4.5 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 357 | 8.2 | 357 | 8.2 | 518 | 0.689 | 100 | 19.1 | LOS B | 8.5 | 63.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 699 | 7.6 | 699 | 7.6 | | 0.689 | | 11.9 | LOS B | 8.5 | 63.3 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 164 | 4.8 | 164 | 4.8 | 529 | 0.309 | 32[6] | 18.3 | LOS B | 3.3 | 23.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 510 | 4.8 | 510 | 4.8 | 529 | 0.964 | 100 | 44.6 | LOS D | 20.0 | 145.4 | Short | 55 | 0.0 | NA |
| Approach | 674 | 4.8 | 674 | 4.8 | | 0.964 | | 38.2 | LOS D | 20.0 | 145.4 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 287 | 2.5 | 287 | 2.5 | 949 | 0.302 | 33[6] | 20.5 | LOS C | 4.0 | 28.9 | Short | 25 | 0.0 | NA |
| Lane 2 | 708 | 1.8 | 708 | 1.8 | 763[1] | 0.928 | 100 | 43.8 | LOS D | 25.6 | 181.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 995 | 2.0 | 995 | 2.0 | | 0.928 | | 37.0 | LOS D | 25.6 | 181.9 | | | | |
| All Vehicles | 2368 | 4.5 | 2368 | 4.5 | | 0.964 | | 30.0 | LOS C | 25.6 | 181.9 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 342 | - | 342 | 7.0 | 1768 | 0.193 | 100 | 0.0 | 2 |
| Lane 2 | - | 357 | 357 | 8.2 | 518 | 0.689 | 100 | NA | NA |
| Approach | 342 | 357 | 699 | 7.6 | | 0.689 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 164 | 164 | 4.8 | 529 | 0.309 | 32[6] | NA | NA |
| Lane 2 | 510 | 510 | 4.8 | 529 | 0.964 | 100 | 96.8 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 674 | 674 | 4.8 | | | 0.964 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 11 | 275 | 287 | 2.5 | 949 | 0.302 | 33[6] | 18.1 | 2 |
| Lane 2 | - | 708 | 708 | 1.8 | 763[1] | 0.928 | 100 | NA | NA |
| Approach | 11 | 983 | 995 | 2.0 | | 0.928 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2368 | 4.5 | 0.964 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 609 | 618 | 2.54 | 2.03 | 439 | 884 | 0.497 | 1.3 | 2.5 |
| Merge Lane | 2 | - | 50.0 | 219 | 223 | 2.54 | 2.03 | 1218 | 1504 | 0.810 | 0.0 | 0.3 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev AM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 342 | 7.0 | 342 | 7.0 | 1768 | 0.193 | 100 | 4.5 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 357 | 8.2 | 357 | 8.2 | 555 | 0.643 | 100 | 20.4 | LOS C | 9.4 | 70.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 699 | 7.6 | 699 | 7.6 | | 0.643 | | 12.6 | LOS B | 9.4 | 70.7 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 174 | 4.7 | 174 | 4.7 | 568 | 0.306 | 32[6] | 22.7 | LOS C | 4.0 | 29.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 522 | 4.7 | 522 | 4.7 | 547[1] | 0.954 | 100 | 48.7 | LOS D | 22.7 | 165.5 | Short | 55 | 0.0 | NA |
| Approach | 696 | 4.7 | 696 | 4.7 | | 0.954 | | 42.2 | LOS D | 22.7 | 165.5 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 303 | 2.5 | 303 | 2.5 | 973 | 0.312 | 33[6] | 24.1 | LOS C | 5.0 | 35.8 | Short | 25 | 0.0 | NA |
| Lane 2 | 725 | 1.8 | 725 | 1.8 | 756[1] | 0.958 | 100 | 58.5 | LOS E | 33.8 | 240.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 1028 | 2.0 | 1028 | 2.0 | | 0.958 | | 48.3 | LOS D | 33.8 | 240.1 | | | | |
| All Vehicles | 2423 | 4.4 | 2423 | 4.4 | | 0.958 | | 36.3 | LOS D | 33.8 | 240.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 342 | - | 342 | 7.0 | 1768 | 0.193 | 100 | 0.0 | 2 |
| Lane 2 | - | 357 | 357 | 8.2 | 555 | 0.643 | 100 | NA | NA |
| Approach | 342 | 357 | 699 | 7.6 | | 0.643 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 174 | 174 | 4.7 | 568 | 0.306 | 32[6] | NA | NA |
| Lane 2 | 522 | 522 | 4.7 | 547[1] | 0.954 | 100 | 100.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 696 | 696 | 4.7 | | | 0.954 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 11 | 292 | 303 | 2.5 | 973 | 0.312 | 33[6] | 37.7 | 2 |
| Lane 2 | - | 725 | 725 | 1.8 | 756[1] | 0.958 | 100 | NA | NA |
| Approach | 11 | 1017 | 1028 | 2.0 | | 0.958 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2423 | 4.4 | 0.958 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 623 | 633 | 2.54 | 2.03 | 466 | 857 | 0.543 | 1.4 | 2.8 |
| Merge Lane | 2 | - | 50.0 | 233 | 236 | 2.54 | 2.03 | 1247 | 1486 | 0.839 | 0.0 | 0.4 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Future AM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 342 | 7.0 | 342 | 7.0 | 1768 | 0.193 | 100 | 4.5 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 357 | 8.2 | 357 | 8.2 | 555 | 0.643 | 100 | 20.4 | LOS C | 9.4 | 70.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 699 | 7.6 | 699 | 7.6 | | 0.643 | | 12.6 | LOS B | 9.4 | 70.7 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 185 | 4.6 | 185 | 4.6 | 568 | 0.325 | 32[6] | 24.5 | LOS C | 4.3 | 31.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 546 | 4.6 | 546 | 4.6 | 539[1] | 1.012 | 100 | 75.1 | LOS E | 29.8 | 216.4 | Short | 55 | 0.0 | NA |
| Approach | 730 | 4.6 | 730 | 4.6 | | 1.012 | | 62.3 | LOS E | 29.8 | 216.4 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 322 | 2.4 | 322 | 2.4 | 974 | 0.331 | 33[6] | 25.4 | LOS C | 5.4 | 38.4 | Short | 25 | 0.0 | NA |
| Lane 2 | 761 | 1.9 | 761 | 1.9 | 749[1] | 1.016 | 100 | 86.8 | LOS F | 44.8 | 318.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 1083 | 2.0 | 1083 | 2.0 | | 1.016 | | 68.5 | LOS E | 44.8 | 318.5 | | | | |
| All Vehicles | 2512 | 4.3 | 2512 | 4.3 | | 1.016 | | 51.2 | LOS D | 44.8 | 318.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 342 | - | 342 | 7.0 | 1768 | 0.193 | 100 | 0.0 | 2 |
| Lane 2 | - | 357 | 357 | 8.2 | 555 | 0.643 | 100 | NA | NA |
| Approach | 342 | 357 | 699 | 7.6 | | 0.643 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 185 | 185 | 4.6 | 568 | 0.325 | 32[6] | NA | NA |
| Lane 2 | 546 | 546 | 4.6 | 539[1] | 1.012 | 100 | 100.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 730 | 730 | 4.6 | | | 1.012 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 11 | 310 | 322 | 2.4 | 974 | 0.331 | 33[6] | 44.3 | 2 |
| Lane 2 | - | 761 | 761 | 1.9 | 749[1] | 1.016 | 100 | NA | NA |
| Approach | 11 | 1071 | 1083 | 2.0 | | 1.016 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2512 | 4.3 | 1.016 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 644 | 654 | 2.54 | 2.03 | 495 | 818 | 0.605 | 1.6 | 3.2 |
| Merge Lane | 2 | - | 50.0 | 247 | 251 | 2.54 | 2.03 | 1288 | 1467 | 0.878 | 0.0 | 0.5 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 3.3 | 22.3 | NA |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 5.8 | 28.1 | NA |

# LANE SUMMARY

## Site: 101 [Existing + Dev + Future AM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 342 | 7.0 | 342 | 7.0 | 1768 | 0.193 | 100 | 4.5 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 357 | 8.2 | 357 | 8.2 | 625 | 0.572 | 100 | 23.7 | LOS C | 11.6 | 87.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 699 | 7.6 | 699 | 7.6 | | 0.572 | | 14.3 | LOS B | 11.6 | 87.0 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 202 | 4.6 | 202 | 4.6 | 639 | 0.316 | 32[6] | 34.0 | LOS C | 5.9 | 42.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 553 | 4.6 | 553 | 4.6 | 561[1] | 0.984 | 100 | 76.2 | LOS E | 33.5 | 243.4 | Short | 55 | 0.0 | NA |
| Approach | 754 | 4.6 | 754 | 4.6 | | 0.984 | | 64.9 | LOS E | 33.5 | 243.4 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 316 | 2.4 | 316 | 2.4 | 937 | 0.337 | 33[6] | 33.5 | LOS C | 6.9 | 49.0 | Short | 25 | 0.0 | NA |
| Lane 2 | 798 | 1.8 | 798 | 1.8 | 771[1] | 1.035 | 100 | 109.8 | LOS F | 58.5 | 415.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 1114 | 2.0 | 1114 | 2.0 | | 1.035 | | 88.2 | LOS F | 58.5 | 415.6 | | | | |
| All Vehicles | 2567 | 4.3 | 2567 | 4.3 | | 1.035 | | 61.2 | LOS E | 58.5 | 415.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 342 | - | 342 | 7.0 | 1768 | 0.193 | 100 | 0.0 | 2 |
| Lane 2 | - | 357 | 357 | 8.2 | 625 | 0.572 | 100 | NA | NA |
| Approach | 342 | 357 | 699 | 7.6 | | 0.572 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 202 | 202 | 4.6 | 639 | 0.316 | 32[6] | NA | NA |
| Lane 2 | 553 | 553 | 4.6 | 561[1] | 0.984 | 100 | 100.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 754 | 754 | 4.6 | | | 0.984 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 11 | 304 | 316 | 2.4 | 937 | 0.337 | 33[6] | 67.4 | 2 |
| Lane 2 | - | 798 | 798 | 1.8 | 771[1] | 1.035 | 100 | NA | NA |
| Approach | 11 | 1102 | 1114 | 2.0 | | 1.035 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2567 | 4.3 | 1.035 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 662 | 672 | 2.54 | 2.03 | 506 | 782 | 0.647 | 1.7 | 3.7 |
| Merge Lane | 2 | - | 50.0 | 253 | 257 | 2.54 | 2.03 | 1324 | 1460 | 0.907 | 0.0 | 0.7 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 13.6 | 63.3 | NA |

# LANE SUMMARY

## Site: 101 [Existing PM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 944 | 3.0 | 944 | 3.0 | 1818 | 0.519 | 100 | 4.6 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 648 | 5.5 | 648 | 5.5 | 894 | 0.724 | 100 | 10.7 | LOS B | 11.3 | 82.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 1591 | 4.0 | 1591 | 4.0 | | 0.724 | | 7.1 | LOS A | 11.3 | 82.5 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 5.6 | 140 | 5.6 | 894 | 0.157 | 32[6] | 7.1 | LOS A | 1.6 | 11.6 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 437 | 5.6 | 437 | 5.6 | 894 | 0.489 | 100 | 8.1 | LOS A | 6.0 | 44.1 | Short | 55 | 0.0 | NA |
| Approach | 577 | 5.6 | 577 | 5.6 | | 0.489 | | 7.8 | LOS A | 6.0 | 44.1 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 113 | 4.9 | 113 | 4.9 | 493 | 0.230 | 33[6] | 18.0 | LOS B | 1.8 | 13.1 | Short | 25 | 0.0 | NA |
| Lane 2 | 346 | 5.0 | 346 | 5.0 | 491[1] | 0.705 | 100 | 21.1 | LOS C | 6.9 | 50.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 460 | 5.0 | 460 | 5.0 | | 0.705 | | 20.3 | LOS C | 6.9 | 50.0 | | | | |
| All Vehicles | 2628 | 4.5 | 2628 | 4.5 | | 0.724 | | 9.6 | LOS A | 11.3 | 82.5 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 944 | - | 944 | 3.0 | 1818 | 0.519 | 100 | 0.0 | 2 |
| Lane 2 | - | 648 | 648 | 5.5 | 894 | 0.724 | 100 | NA | NA |
| Approach | 944 | 648 | 1591 | 4.0 | | 0.724 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 140 | 140 | 5.6 | 894 | 0.157 | 32[6] | NA | NA |
| Lane 2 | 437 | 437 | 5.6 | 894 | 0.489 | 100 | 0.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 577 | 577 | 5.6 | | | 0.489 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 3 | 110 | 113 | 4.9 | 493 | 0.230 | 33[6] | 0.0 | 2 |
| Lane 2 | - | 346 | 346 | 5.0 | 491[1] | 0.705 | 100 | NA | NA |
| Approach | 3 | 457 | 460 | 5.0 | | 0.705 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2628 | 4.5 | 0.724 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 392 | 402 | 2.57 | 2.05 | 250 | 1226 | 0.204 | 0.4 | 0.6 |
| Merge Lane | 2 | - | 50.0 | 125 | 128 | 2.57 | 2.05 | 783 | 1602 | 0.489 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev PM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 976 | 3.0 | 976 | 3.0 | 1818 | 0.537 | 100 | 4.7 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 671 | 5.3 | 671 | 5.3 | 895 | 0.749 | 100 | 11.5 | LOS B | 12.2 | 89.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 1647 | 3.9 | 1647 | 3.9 | | 0.749 | | 7.5 | LOS A | 12.2 | 89.1 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 5.6 | 140 | 5.6 | 894 | 0.157 | 32[6] | 7.1 | LOS A | 1.6 | 11.6 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 437 | 5.6 | 437 | 5.6 | 894 | 0.489 | 100 | 8.1 | LOS A | 6.0 | 44.1 | Short | 55 | 0.0 | NA |
| Approach | 577 | 5.6 | 577 | 5.6 | | 0.489 | | 7.8 | LOS A | 6.0 | 44.1 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 113 | 4.9 | 113 | 4.9 | 493 | 0.230 | 33[6] | 18.0 | LOS B | 1.8 | 13.1 | Short | 25 | 0.0 | NA |
| Lane 2 | 346 | 5.0 | 346 | 5.0 | 491[1] | 0.705 | 100 | 21.1 | LOS C | 6.9 | 50.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 460 | 5.0 | 460 | 5.0 | | 0.705 | | 20.3 | LOS C | 6.9 | 50.0 | | | | |
| All Vehicles | 2683 | 4.5 | 2683 | 4.5 | | 0.749 | | 9.7 | LOS A | 12.2 | 89.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 976 | - | 976 | 3.0 | 1818 | 0.537 | 100 | 0.0 | 2 |
| Lane 2 | - | 671 | 671 | 5.3 | 895 | 0.749 | 100 | NA | NA |
| Approach | 976 | 671 | 1647 | 3.9 | | 0.749 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 140 | 140 | 5.6 | 894 | 0.157 | 32[6] | NA | NA |
| Lane 2 | 437 | 437 | 5.6 | 894 | 0.489 | 100 | 0.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 577 | 577 | 5.6 | | | 0.489 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 3 | 110 | 113 | 4.9 | 493 | 0.230 | 33[6] | 0.0 | 2 |
| Lane 2 | - | 346 | 346 | 5.0 | 491[1] | 0.705 | 100 | NA | NA |
| Approach | 3 | 457 | 460 | 5.0 | | 0.705 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2683 | 4.5 | 0.749 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 392 | 402 | 2.57 | 2.05 | 250 | 1226 | 0.204 | 0.4 | 0.6 |
| Merge Lane | 2 | - | 50.0 | 125 | 128 | 2.57 | 2.05 | 783 | 1602 | 0.489 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Future PM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 1025 | 3.0 | 1025 | 3.0 | 1819 | 0.564 | 100 | 4.7 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 711 | 5.1 | 711 | 5.1 | 943 | 0.753 | 100 | 11.0 | LOS B | 12.7 | 93.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 1736 | 3.9 | 1736 | 3.9 | | 0.753 | | 7.3 | LOS A | 12.7 | 93.0 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 5.6 | 140 | 5.6 | 941 | 0.149 | 32[6] | 6.5 | LOS A | 1.5 | 11.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 437 | 5.6 | 437 | 5.6 | 941 | 0.464 | 100 | 7.3 | LOS A | 5.7 | 41.9 | Short | 55 | 0.0 | NA |
| Approach | 577 | 5.6 | 577 | 5.6 | | 0.464 | | 7.1 | LOS A | 5.7 | 41.9 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 114 | 4.9 | 114 | 4.9 | 449 | 0.255 | 33[6] | 19.4 | LOS B | 1.9 | 13.7 | Short | 25 | 0.0 | NA |
| Lane 2 | 346 | 5.0 | 346 | 5.0 | 442[1] | 0.782 | 100 | 24.4 | LOS C | 7.5 | 54.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 460 | 5.0 | 460 | 5.0 | | 0.782 | | 23.1 | LOS C | 7.5 | 54.7 | | | | |
| All Vehicles | 2772 | 4.4 | 2772 | 4.4 | | 0.782 | | 9.9 | LOS A | 12.7 | 93.0 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1025 | - | 1025 | 3.0 | 1819 | 0.564 | 100 | 0.0 | 2 |
| Lane 2 | - | 711 | 711 | 5.1 | 943 | 0.753 | 100 | NA | NA |
| Approach | 1025 | 711 | 1736 | 3.9 | | 0.753 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 140 | 140 | 5.6 | 941 | 0.149 | 32[6] | NA | NA |
| Lane 2 | 437 | 437 | 5.6 | 941 | 0.464 | 100 | 0.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 577 | 577 | 5.6 | | | 0.464 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 3 | 111 | 114 | 4.9 | 449 | 0.255 | 33[6] | 0.0 | 2 |
| Lane 2 | - | 346 | 346 | 5.0 | 442[1] | 0.782 | 100 | NA | NA |
| Approach | 3 | 457 | 460 | 5.0 | | 0.782 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2772 | 4.4 | 0.782 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 391 | 402 | 2.57 | 2.05 | 251 | 1226 | 0.205 | 0.4 | 0.6 |
| Merge Lane | 2 | - | 50.0 | 126 | 129 | 2.57 | 2.05 | 782 | 1601 | 0.488 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing +Dev + Future PM (Site Folder: Council Wairakei-Norman)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 40 seconds (Site Optimum Cycle Time - Minimum Delay)

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St | | | | | | | | | | | | | | | |
| Lane 1 | 1056 | 2.9 | 1056 | 2.9 | 1820 | 0.580 | 100 | 4.7 | LOS A | 0.0 | 0.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 735 | 5.1 | 735 | 5.1 | 944 | 0.779 | 100 | 12.0 | LOS B | 13.8 | 101.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 1791 | 3.8 | 1791 | 3.8 | | 0.779 | | 7.7 | LOS A | 13.8 | 101.2 | | | | |
| North: Wairakei Dr | | | | | | | | | | | | | | | |
| Lane 1 | 140 | 5.6 | 140 | 5.6 | 941 | 0.149 | 32[6] | 6.5 | LOS A | 1.5 | 11.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 437 | 5.6 | 437 | 5.6 | 941 | 0.464 | 100 | 7.3 | LOS A | 5.7 | 41.9 | Short | 55 | 0.0 | NA |
| Approach | 577 | 5.6 | 577 | 5.6 | | 0.464 | | 7.1 | LOS A | 5.7 | 41.9 | | | | |
| West: Norman Smith St | | | | | | | | | | | | | | | |
| Lane 1 | 114 | 4.9 | 114 | 4.9 | 449 | 0.255 | 33[6] | 19.4 | LOS B | 1.9 | 13.7 | Short | 25 | 0.0 | NA |
| Lane 2 | 346 | 5.0 | 346 | 5.0 | 442[1] | 0.782 | 100 | 24.4 | LOS C | 7.5 | 54.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 460 | 5.0 | 460 | 5.0 | | 0.782 | | 23.1 | LOS C | 7.5 | 54.7 | | | | |
| All Vehicles | 2828 | 4.4 | 2828 | 4.4 | | 0.782 | | 10.1 | LOS B | 13.8 | 101.2 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.
6 Lane under-utilisation due to downstream effects

### Approach Lane Flows (veh/h)

South: Tongariro St

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1056 | - | 1056 | 2.9 | 1820 | 0.580 | 100 | 0.0 | 2 |
| Lane 2 | - | 735 | 735 | 5.1 | 944 | 0.779 | 100 | NA | NA |
| Approach | 1056 | 735 | 1791 | 3.8 | | 0.779 | | | |

North: Wairakei Dr

| Mov. From N To Exit: | T1 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|
| Lane 1 | 140 | 140 | 5.6 | 941 | 0.149 | 32[6] | NA | NA |
| Lane 2 | 437 | 437 | 5.6 | 941 | 0.464 | 100 | 0.0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Approach | 577 | 577 | 5.6 | | | 0.464 | | | |
| West: Norman Smith St | | | | | | | | | |
| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 3 | 111 | 114 | 4.9 | 449 | 0.255 | 33[6] | 0.0 | 2 |
| Lane 2 | - | 346 | 346 | 5.0 | 442[1] | 0.782 | 100 | NA | NA |
| Approach | 3 | 457 | 460 | 5.0 | | 0.782 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| All Vehicles | 2828 | 4.4 | 0.782 | | | | | | |

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Delay and stops experienced by drivers upstream of short lane entry have been accounted for.

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South Exit: Tongariro St Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 50 | 50.0 | 391 | 402 | 2.57 | 2.05 | 251 | 1226 | 0.205 | 0.4 | 0.6 |
| Merge Lane | 2 | - | 50.0 | 126 | 129 | 2.57 | 2.05 | 782 | 1601 | 0.488 | 0.0 | 0.1 |

**Variable Demand Analysis**

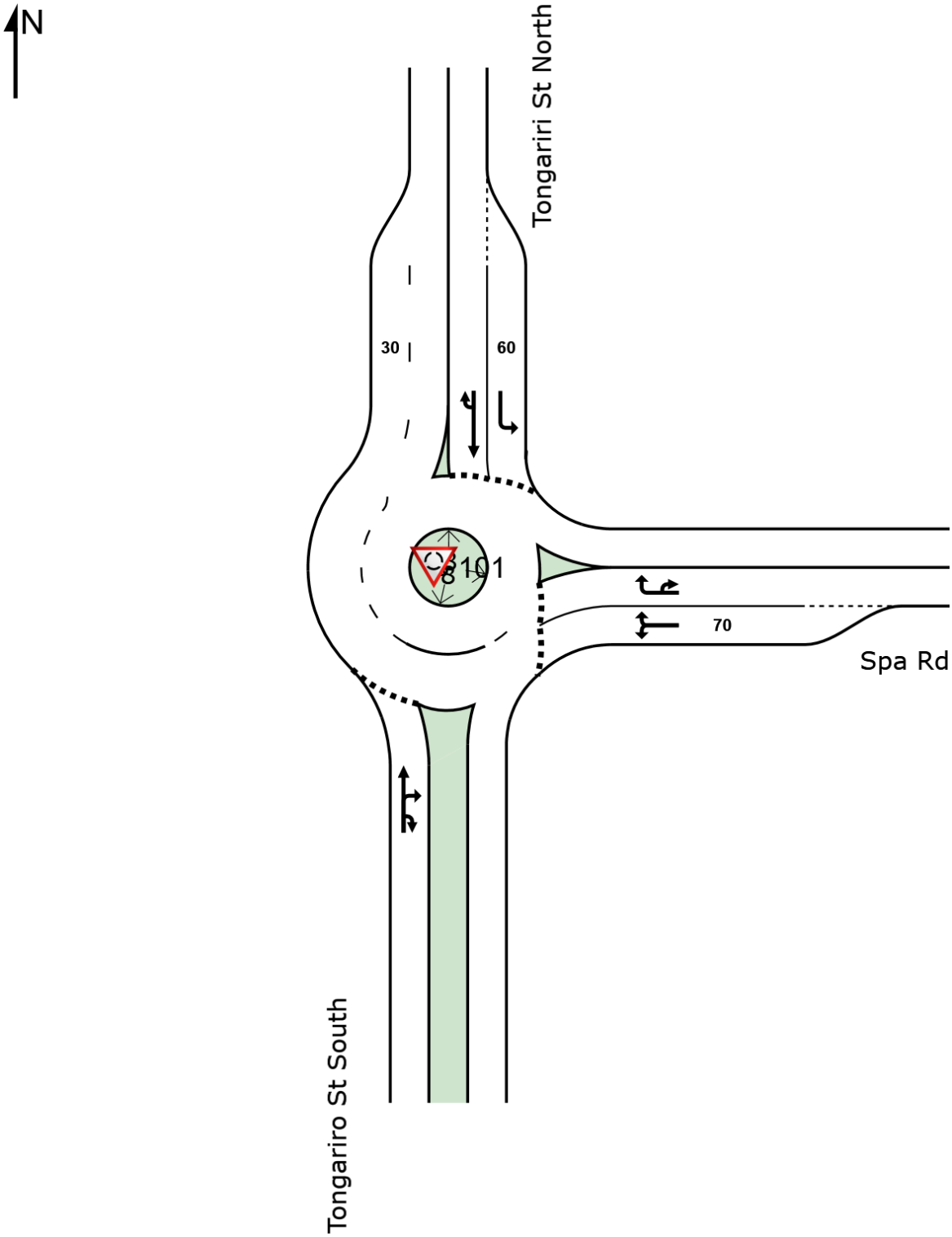
| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Wairakei Dr | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| West: Norman Smith St | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# SITE LAYOUT

## Site: 101 [Existing AM (Site Folder: Council Tongariro-Spa)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



# LANE SUMMARY

## Site: 101 [Existing AM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 262 | 2.8 | 262 | 2.8 | 949 | 0.276 | 100 | 7.3 | LOS A | 1.9 | 13.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 262 | 2.8 | 262 | 2.8 | | 0.276 | | 7.3 | LOS A | 1.9 | 13.6 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 150 | 6.2 | 150 | 6.2 | 917 | 0.163 | 31[6] | 9.6 | LOS A | 1.1 | 8.1 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 481 | 8.8 | 481 | 8.8 | 899 | 0.535 | 100 | 13.4 | LOS B | 5.0 | 38.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 631 | 8.2 | 631 | 8.2 | | 0.535 | | 12.5 | LOS B | 5.0 | 38.0 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 994 | 5.1 | 994 | 5.1 | 1581 | 0.628 | 100 | 4.9 | LOS A | 7.3 | 53.4 | Short | 60 | 0.0 | NA |
| Lane 2 | 622 | 1.0 | 622 | 1.0 | 1338 | 0.465 | 100 | 4.3 | LOS A | 4.1 | 28.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 1616 | 3.5 | 1616 | 3.5 | | 0.628 | | 4.6 | LOS A | 7.3 | 53.4 | | | | |
| All Vehicles | 2508 | 4.6 | 2508 | 4.6 | | 0.628 | | 6.9 | LOS A | 7.3 | 53.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 211 | 42 | 9 | 262 | 2.8 | 949 | 0.276 | 100 | NA | NA |
| Approach | 211 | 42 | 9 | 262 | 2.8 | | 0.276 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | 81 | - | 150 | 6.2 | 917 | 0.163 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 474 | 6 | 481 | 8.8 | 899 | 0.535 | 100 | NA | NA |
| Approach | 68 | 556 | 6 | 631 | 8.2 | | 0.535 | | | |

North: Tongariri St North

| Mov. | L2 | T1 | U | Total | %HV | | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|---|---|---|

| From N To Exit: | E | S | N | | | Cap. veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 994 | - | - | 994 | 5.1 | 1581 | 0.628 | 100 | 1.7 | 2 |
| Lane 2 | - | 592 | 31 | 622 | 1.0 | 1338 | 0.465 | 100 | NA | NA |
| Approach | 994 | 592 | 31 | 1616 | 3.5 | | 0.628 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | | |
| All Vehicles | 2508 | 4.6 | | 0.628 | | | | | | |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 252 | 263 | 2.55 | 2.04 | 292 | 1442 | 0.202 | 0.1 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 146 | 149 | 2.60 | 2.08 | 505 | 1550 | 0.326 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev AM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 262 | 2.8 | 262 | 2.8 | 946 | 0.277 | 100 | 7.3 | LOS A | 1.9 | 13.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 262 | 2.8 | 262 | 2.8 | | 0.277 | | 7.3 | LOS A | 1.9 | 13.7 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 150 | 6.2 | 150 | 6.2 | 885 | 0.169 | 31[6] | 9.9 | LOS A | 1.1 | 8.5 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 481 | 8.8 | 481 | 8.8 | 868 | 0.554 | 100 | 14.3 | LOS B | 5.5 | 41.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 631 | 8.2 | 631 | 8.2 | | 0.554 | | 13.2 | LOS B | 5.5 | 41.1 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 1023 | 5.0 | 1023 | 5.0 | 1583 | 0.646 | 100 | 4.9 | LOS A | 7.8 | 56.8 | Short | 60 | 0.0 | NA |
| Lane 2 | 649 | 1.1 | 649 | 1.1 | 1342 | 0.484 | 100 | 4.3 | LOS A | 4.4 | 30.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 1673 | 3.5 | 1673 | 3.5 | | 0.646 | | 4.7 | LOS A | 7.8 | 56.8 | | | | |
| All Vehicles | 2565 | 4.6 | 2565 | 4.6 | | 0.646 | | 7.0 | LOS A | 7.8 | 56.8 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 211 | 42 | 9 | 262 | 2.8 | 946 | 0.277 | 100 | NA | NA |
| Approach | 211 | 42 | 9 | 262 | 2.8 | | 0.277 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | 81 | - | 150 | 6.2 | 885 | 0.169 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 474 | 6 | 481 | 8.8 | 868 | 0.554 | 100 | NA | NA |
| Approach | 68 | 556 | 6 | 631 | 8.2 | | 0.554 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1023 | - | - | 1023 | 5.0 | 1583 | 0.646 | 100 | 3.4 | 2 |
| Lane 2 | - | 619 | 31 | 649 | 1.1 | 1342 | 0.484 | 100 | NA | NA |
| Approach | 1023 | 619 | 31 | 1673 | 3.5 | | 0.646 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2565 | 4.6 | 0.646 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 252 | 263 | 2.55 | 2.04 | 292 | 1442 | 0.202 | 0.1 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 146 | 149 | 2.60 | 2.08 | 505 | 1550 | 0.326 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Future AM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 262 | 2.8 | 262 | 2.8 | 941 | 0.278 | 100 | 7.3 | LOS A | 1.9 | 13.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 262 | 2.8 | 262 | 2.8 | | 0.278 | | 7.3 | LOS A | 1.9 | 13.9 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 150 | 6.2 | 150 | 6.2 | 838 | 0.179 | 31[6] | 10.3 | LOS B | 1.2 | 9.1 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 481 | 8.8 | 481 | 8.8 | 821 | 0.585 | 100 | 15.8 | LOS B | 6.2 | 46.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 631 | 8.2 | 631 | 8.2 | | 0.585 | | 14.5 | LOS B | 6.2 | 46.5 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 1068 | 4.8 | 1068 | 4.8 | 1587 | 0.673 | 100 | 4.9 | LOS A | 8.6 | 62.4 | Short | 60 | 0.0 | NA |
| Lane 2 | 692 | 1.1 | 692 | 1.1 | 1348 | 0.513 | 100 | 4.3 | LOS A | 4.8 | 34.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 1760 | 3.3 | 1760 | 3.3 | | 0.673 | | 4.7 | LOS A | 8.6 | 62.4 | | | | |
| All Vehicles | 2653 | 4.4 | 2653 | 4.4 | | 0.673 | | 7.3 | LOS A | 8.6 | 62.4 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 211 | 42 | 9 | 262 | 2.8 | 941 | 0.278 | 100 | NA | NA |
| Approach | 211 | 42 | 9 | 262 | 2.8 | | 0.278 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | 81 | - | 150 | 6.2 | 838 | 0.179 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 474 | 6 | 481 | 8.8 | 821 | 0.585 | 100 | NA | NA |
| Approach | 68 | 556 | 6 | 631 | 8.2 | | 0.585 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1068 | - | - | 1068 | 4.8 | 1587 | 0.673 | 100 | 6.2 | 2 |
| Lane 2 | - | 661 | 31 | 692 | 1.1 | 1348 | 0.513 | 100 | NA | NA |
| Approach | 1068 | 661 | 31 | 1760 | 3.3 | | 0.673 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2653 | 4.4 | 0.673 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 252 | 263 | 2.55 | 2.04 | 292 | 1442 | 0.203 | 0.1 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 146 | 149 | 2.60 | 2.08 | 505 | 1550 | 0.326 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev + Future AM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 262 | 2.8 | 262 | 2.8 | 933 | 0.281 | 100 | 7.3 | LOS A | 2.0 | 14.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 262 | 2.8 | 262 | 2.8 | | 0.281 | | 7.3 | LOS A | 2.0 | 14.0 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 150 | 6.2 | 150 | 6.2 | 804 | 0.186 | 31[6] | 10.7 | LOS B | 1.3 | 9.6 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 481 | 8.8 | 481 | 8.8 | 788 | 0.610 | 100 | 17.1 | LOS B | 6.8 | 50.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 631 | 8.2 | 631 | 8.2 | | 0.610 | | 15.6 | LOS B | 6.8 | 50.9 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 1098 | 4.8 | 1098 | 4.8 | 1588 | 0.691 | 100 | 4.9 | LOS A | 9.2 | 66.7 | Short | 60 | 0.0 | NA |
| Lane 2 | 719 | 1.2 | 719 | 1.2 | 1350 | 0.533 | 100 | 4.3 | LOS A | 5.2 | 36.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 1817 | 3.4 | 1817 | 3.4 | | 0.691 | | 4.7 | LOS A | 9.2 | 66.7 | | | | |
| All Vehicles | 2709 | 4.4 | 2709 | 4.4 | | 0.691 | | 7.5 | LOS A | 9.2 | 66.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 211 | 42 | 9 | 262 | 2.8 | 933 | 0.281 | 100 | NA | NA |
| Approach | 211 | 42 | 9 | 262 | 2.8 | | 0.281 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | 81 | - | 150 | 6.2 | 804 | 0.186 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 474 | 6 | 481 | 8.8 | 788 | 0.610 | 100 | NA | NA |
| Approach | 68 | 556 | 6 | 631 | 8.2 | | 0.610 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 1098 | - | - | 1098 | 4.8 | 1588 | 0.691 | 100 | 8.2 | 2 |
| Lane 2 | - | 688 | 31 | 719 | 1.2 | 1350 | 0.533 | 100 | NA | NA |
| Approach | 1098 | 688 | 31 | 1817 | 3.4 | | 0.691 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2709 | 4.4 | 0.691 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 252 | 263 | 2.55 | 2.04 | 292 | 1442 | 0.203 | 0.1 | 0.2 |
| Merge Lane | 2 | - | 50.0 | 146 | 149 | 2.60 | 2.08 | 505 | 1550 | 0.326 | 0.0 | 0.1 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing PM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 451 | 4.9 | 451 | 4.9 | 467 | 0.965 | 100 | 63.7 | LOS E | 20.7 | 151.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 451 | 4.9 | 451 | 4.9 | | 0.965 | | 63.7 | LOS E | 20.7 | 151.1 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 283 | 4.1 | 283 | 4.1 | 1239 | 0.228 | 31[6] | 9.3 | LOS A | 1.5 | 10.9 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 922 | 4.8 | 922 | 4.8 | 1233 | 0.748 | 100 | 13.1 | LOS B | 10.7 | 78.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 1205 | 4.6 | 1205 | 4.6 | | 0.748 | | 12.2 | LOS B | 10.7 | 78.3 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 698 | 4.7 | 698 | 4.7 | 1496 | 0.467 | 100 | 4.9 | LOS A | 4.3 | 31.6 | Short | 60 | 0.0 | NA |
| Lane 2 | 351 | 5.4 | 351 | 5.4 | 1182 | 0.297 | 100 | 4.6 | LOS A | 2.1 | 15.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 1048 | 4.9 | 1048 | 4.9 | | 0.467 | | 4.8 | LOS A | 4.3 | 31.6 | | | | |
| All Vehicles | 2704 | 4.8 | 2704 | 4.8 | | 0.965 | | 17.9 | LOS B | 20.7 | 151.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 377 | 66 | 7 | 451 | 4.9 | 467 | 0.965 | 100 | NA | NA |
| Approach | 377 | 66 | 7 | 451 | 4.9 | | 0.965 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 64 | 219 | - | 283 | 4.1 | 1239 | 0.228 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 914 | 8 | 922 | 4.8 | 1233 | 0.748 | 100 | NA | NA |
| Approach | 64 | 1133 | 8 | 1205 | 4.6 | | 0.748 | | | |

North: Tongariri St North

| Mov. | L2 | T1 | U | Total | %HV | | Deg. | Lane | Prob. | Ov. |
|---|---|---|---|---|---|---|---|---|---|---|

| From N To Exit: | E | S | N | | | Cap. veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 698 | - | - | 698 | 4.7 | 1496 | 0.467 | 100 | 0.0 | 2 |
| Lane 2 | - | 325 | 25 | 351 | 5.4 | 1182 | 0.297 | 100 | NA | NA |
| Approach | 698 | 325 | 25 | 1048 | 4.9 | | 0.467 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | | |
| All Vehicles | 2704 | 4.8 | 0.965 | | | | | | | |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 470 | 481 | 2.56 | 2.04 | 596 | 1110 | 0.537 | 0.7 | 1.5 |
| Merge Lane | 2 | - | 50.0 | 298 | 304 | 2.56 | 2.05 | 939 | 1377 | 0.682 | 0.2 | 0.6 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev PM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 480 | 4.8 | 480 | 4.8 | 448 | 1.072 | 100 | 120.6 | LOS F | 38.4 | 279.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 480 | 4.8 | 480 | 4.8 | | 1.072 | | 120.6 | LOS F | 38.4 | 279.6 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 289 | 4.1 | 289 | 4.1 | 1240 | 0.233 | 31[6] | 9.4 | LOS A | 1.5 | 11.2 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 943 | 4.8 | 943 | 4.8 | 1234 | 0.764 | 100 | 13.6 | LOS B | 11.5 | 83.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 1233 | 4.6 | 1233 | 4.6 | | 0.764 | | 12.6 | LOS B | 11.5 | 83.8 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 698 | 4.7 | 698 | 4.7 | 1504 | 0.464 | 100 | 4.9 | LOS A | 4.3 | 31.4 | Short | 60 | 0.0 | NA |
| Lane 2 | 351 | 5.4 | 351 | 5.4 | 1188 | 0.295 | 100 | 4.6 | LOS A | 2.1 | 15.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 1048 | 4.9 | 1048 | 4.9 | | 0.464 | | 4.8 | LOS A | 4.3 | 31.4 | | | | |
| All Vehicles | 2761 | 4.8 | 2761 | 4.8 | | 1.072 | | 28.4 | LOS C | 38.4 | 279.6 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 406 | 66 | 7 | 480 | 4.8 | 448 | 1.072 | 100 | NA | NA |
| Approach | 406 | 66 | 7 | 480 | 4.8 | | 1.072 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 64 | 225 | - | 289 | 4.1 | 1240 | 0.233 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 935 | 8 | 943 | 4.8 | 1234 | 0.764 | 100 | NA | NA |
| Approach | 64 | 1160 | 8 | 1233 | 4.6 | | 0.764 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 698 | - | - | 698 | 4.7 | 1504 | 0.464 | 100 | 0.0 | 2 |
| Lane 2 | - | 325 | 25 | 351 | 5.4 | 1188 | 0.295 | 100 | NA | NA |
| Approach | 698 | 325 | 25 | 1048 | 4.9 | | 0.464 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2761 | 4.8 | 1.072 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 480 | 491 | 2.55 | 2.04 | 604 | 1093 | 0.553 | 0.7 | 1.6 |
| Merge Lane | 2 | - | 50.0 | 302 | 309 | 2.56 | 2.05 | 960 | 1371 | 0.700 | 0.2 | 0.6 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 16.1 | 129.8 | NA |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Future PM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 521 | 4.4 | 521 | 4.4 | 418 | 1.245 | 100 | 255.5 | LOS F | 76.1 | 552.7 | Full | 500 | 0.0 | 8.0 |
| Approach | 521 | 4.4 | 521 | 4.4 | | 1.245 | | 255.5 | LOS F | 76.1 | 552.7 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 300 | 4.0 | 300 | 4.0 | 1245 | 0.241 | 31[6] | 9.5 | LOS A | 1.6 | 11.6 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 979 | 4.6 | 979 | 4.6 | 1240 | 0.790 | 100 | 14.2 | LOS B | 12.8 | 93.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 1279 | 4.4 | 1279 | 4.4 | | 0.790 | | 13.1 | LOS B | 12.8 | 93.4 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 698 | 4.7 | 698 | 4.7 | 1525 | 0.458 | 100 | 4.8 | LOS A | 4.2 | 30.9 | Short | 60 | 0.0 | NA |
| Lane 2 | 351 | 5.4 | 351 | 5.4 | 1207 | 0.290 | 100 | 4.5 | LOS A | 2.1 | 15.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 1048 | 4.9 | 1048 | 4.9 | | 0.458 | | 4.7 | LOS A | 4.2 | 30.9 | | | | |
| All Vehicles | 2848 | 4.6 | 2848 | 4.6 | | 1.245 | | 54.4 | LOS E | 76.1 | 552.7 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 447 | 66 | 7 | 521 | 4.4 | 418 | 1.245 | 100 | NA | NA |
| Approach | 447 | 66 | 7 | 521 | 4.4 | | 1.245 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 64 | 236 | - | 300 | 4.0 | 1245 | 0.241 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 970 | 8 | 979 | 4.6 | 1240 | 0.790 | 100 | NA | NA |
| Approach | 64 | 1206 | 8 | 1279 | 4.4 | | 0.790 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 698 | - | - | 698 | 4.7 | 1525 | 0.458 | 100 | 0.0 | 2 |
| Lane 2 | - | 325 | 25 | 351 | 5.4 | 1207 | 0.290 | 100 | NA | NA |
| Approach | 698 | 325 | 25 | 1048 | 4.9 | | 0.458 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2848 | 4.6 | 1.245 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 498 | 509 | 2.55 | 2.04 | 595 | 1066 | 0.558 | 0.8 | 1.8 |
| Merge Lane | 2 | - | 50.0 | 298 | 304 | 2.56 | 2.05 | 996 | 1380 | 0.722 | 0.2 | 0.6 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 51.3 | 441.3 | NA |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |

# LANE SUMMARY

## Site: 101 [Existing + Dev + Future PM (Site Folder: Council Tongariro-Spa)]

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site
Site Category: (None)
Roundabout

### Lane Use and Performance

| | Demand Flows [ Total veh/h | HV ] % | Arrival Flows [ Total veh/h | HV ] % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Aver. Delay sec | Level of Service | 95% Back Of Queue [ Veh | Dist ] m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tongariro St South | | | | | | | | | | | | | | | |
| Lane 1[d] | 549 | 4.4 | 549 | 4.4 | 400 | 1.374 | 100 | 366.5 | LOS F | 103.8 | 754.1 | Full | 500 | 0.0 | 18.9 |
| Approach | 549 | 4.4 | 549 | 4.4 | | 1.374 | | 366.5 | LOS F | 103.8 | 754.1 | | | | |
| East: Spa Rd | | | | | | | | | | | | | | | |
| Lane 1 | 307 | 4.0 | 307 | 4.0 | 1247 | 0.246 | 31[6] | 9.6 | LOS A | 1.6 | 11.8 | Short | 70 | 0.0 | NA |
| Lane 2[d] | 1001 | 4.6 | 1001 | 4.6 | 1242 | 0.806 | 100 | 14.7 | LOS B | 13.8 | 100.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 1307 | 4.4 | 1307 | 4.4 | | 0.806 | | 13.5 | LOS B | 13.8 | 100.3 | | | | |
| North: Tongariri St North | | | | | | | | | | | | | | | |
| Lane 1[d] | 698 | 4.7 | 698 | 4.7 | 1539 | 0.453 | 100 | 4.8 | LOS A | 4.2 | 30.5 | Short | 60 | 0.0 | NA |
| Lane 2 | 351 | 5.4 | 351 | 5.4 | 1219 | 0.288 | 100 | 4.4 | LOS A | 2.1 | 15.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 1048 | 4.9 | 1048 | 4.9 | | 0.453 | | 4.7 | LOS A | 4.2 | 30.5 | | | | |
| All Vehicles | 2905 | 4.6 | 2905 | 4.6 | | 1.374 | | 77.1 | LOS F | 103.8 | 754.1 | | | | |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

### Approach Lane Flows (veh/h)

South: Tongariro St South

| Mov. From S To Exit: | T1 N | R2 E | U S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 476 | 66 | 7 | 549 | 4.4 | 400 | 1.374 | 100 | NA | NA |
| Approach | 476 | 66 | 7 | 549 | 4.4 | | 1.374 | | | |

East: Spa Rd

| Mov. From E To Exit: | L2 S | R2 N | U E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 64 | 243 | - | 307 | 4.0 | 1247 | 0.246 | 31[6] | 0.0 | 2 |
| Lane 2 | - | 992 | 8 | 1001 | 4.6 | 1242 | 0.806 | 100 | NA | NA |
| Approach | 64 | 1235 | 8 | 1307 | 4.4 | | 0.806 | | | |

North: Tongariri St North

| Mov. From N To Exit: | L2 E | T1 S | U N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 698 | - | - | 698 | 4.7 | 1539 | 0.453 | 100 | 0.0 | 2 |
| Lane 2 | - | 325 | 25 | 351 | 5.4 | 1219 | 0.288 | 100 | NA | NA |
| Approach | 698 | 325 | 25 | 1048 | 4.9 | | 0.453 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| All Vehicles | 2905 | 4.6 | 1.374 |

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

6 Lane under-utilisation due to downstream effects

**Merge Analysis**

| | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % | Opposing Flow Rate veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Exit: Tongariri St North Merge Type: **Zipper** | | | | | | | | | | | | |
| Exit Short Lane | 1 | 30 | 50.0 | 509 | 520 | 2.55 | 2.04 | 589 | 1047 | 0.562 | 0.8 | 1.9 |
| Merge Lane | 2 | - | 50.0 | 294 | 300 | 2.56 | 2.04 | 1017 | 1384 | 0.735 | 0.1 | 0.6 |

**Variable Demand Analysis**

| | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
|---|---|---|---|---|
| South: Tongariro St South | | | | |
| Lane 1 | 0.0 | 74.8 | 673.7 | NA |
| East: Spa Rd | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| North: Tongariri St North | | | | |
| Lane 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane 2 | 0.0 | 0.0 | 0.0 | 0.0 |