Before an Independent Hearings Panel

The Proposed Waikato District Plan (Stage 1)

IN THE MATTER OF the Resource Management Act 1991 (**RMA**)

IN THE MATTER OF hearing submissions and further submissions on the Proposed Waikato District Plan (Stage 1):
Topic 25 – Zone Extents

PRIMARY EVIDENCE OF LEO DONALD HILLS
ON BEHALF OF TATA VALLEY LIMITED

17 February 2021

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1. SUMMARY OF EVIDENCE

1.1 My full name is Leo Donald Hills. I am a Chartered Member of Engineering New Zealand.

1.2 I am providing transport evidence in relation to proposed rezoning sought TaTa Valley Limited (**TVL**)[1] of land at 242 Bluff Road and 35 Trig Road, Pokeno (**Site**).

1.3 My evidence assesses the transport and traffic effects of the proposed rezoning sought by TVL, along with its integration from a transport perspective with Pokeno.

1.4 The 242 Bluff Road property currently connects to Potter Road to the northwest. The 35 Trig Road property currently connects to Trig Road to the west and Potter Road to the north. These existing connections are not intended to be modified as part of the proposal (i.e. still to be used as farming access).

1.5 It is proposed to provide a new main accessway to the Site through land owned by associated companies to TVL which connects to Yashili Drive in Pokeno.

1.6 Based on the modelling assessment detailed within my evidence:

(a) The proposed principal access can operate safely and efficiently (including two one-lane sections).

(b) No additional mitigation is required within the local network to accommodate the traffic generated by the proposed rezoning.

(c) No discernible changes to the operation of the key local intersections is experienced as a result of the proposal and the adjoining Havelock proposal (addressed in a separate brief of evidence for Havelock Village Limited).

(d) The local transport network can operate safely and efficiently.

1.7 The construction of the new proposed principal access is important to ensure safe and efficient access to the Site and support rules in the TaTa Valley Resort Zone (TVRZ) to achieve this outcome.

1.8 There are likely upgrades required for intersections / roads in the wider Pokeno area to serve the increased traffic from all submissions seeking rezoning within Pokeno. In my opinion these upgrades should be constructed by the Council as part of its management and upgrade of the transport network. I consider this to be consistent with

[1] Submitter 574 and further submitter 1340.

the fact that upgrades are the result of cumulative effects from multiple sites (and so hard to attribute to any one rezoning). On that basis I consider there does not need to be any specific staging or triggers in the TaTa Valley Resort Zone related to those wider cumulative impacts or upgrades.

1.9 The Resort Zone enables events (amongst other things) and I consider any events on-site over 500 person capacity should require detailed assessment of peak traffic movements and how these will be managed on-site.

2. INTRODUCTION

2.1 My full name is Leo Donald Hills. I am a Chartered Member of Engineering New Zealand.

2.2 I hold a Bachelor of Engineering with Honours (1996) and a Masters of Civil Engineering (2000), both from the University of Auckland.

2.3 I have over 23 years' experience as a specialist traffic and transportation engineer. During that time, I have been engaged by local authorities and private companies/individuals to advise on traffic and transportation development issues covering safety, management and planning matters of many kinds.

2.4 I have been involved in the rezoning proposal by TVL since 2019 and have managed and reviewed the production of an updated ITA for the site. I have visited the site and Pokeno on a number of occasions with the last occasion being on the 11 September 2020.

Scope of evidence

2.5 My evidence assesses the transport and traffic effects of the proposed rezoning sought by TVL, along with its integration from a transport perspective with Pokeno. In general, my evidence covers:

(a) Site context and characteristics;

(b) Relevant parts of the rezoning proposal;

(c) Potential transportation effects of the proposed rezoning;

(d) Management of effects;

(e) Comments on Council Section 42A framework report; and

(f) Conclusions.

2.6 My evidence relies on and should be read in conjunction with the Traffic Generation section of the Transport Assessment prepared for the resort and eco-tourism resource consent application, prepared by Arrive ("Arrive TA") in May 2019. This is attached as **Appendix A** to this evidence.

2.7 I have also prepared separate evidence for a related company for the rezoning of the site adjacent to TaTa Valley (Havelock Village).

3. CODE OF CONDUCT

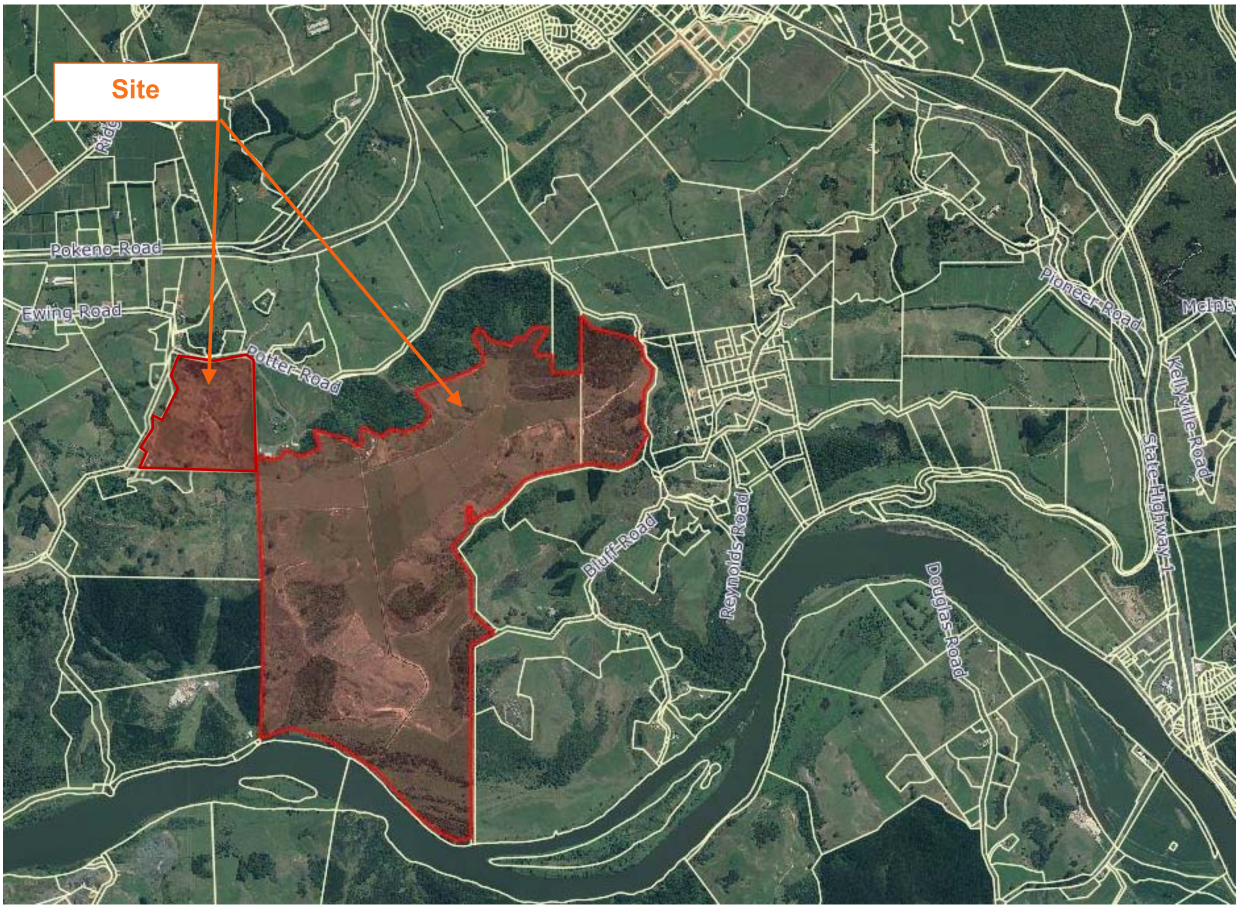
3.1 I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

4. SITE CONTEXT AND CHARACTERISTICS

4.1 The site is located approximately 53 km south of Auckland, and 72 km north of Hamilton, therefore is still in a commutable distance from both these cities.

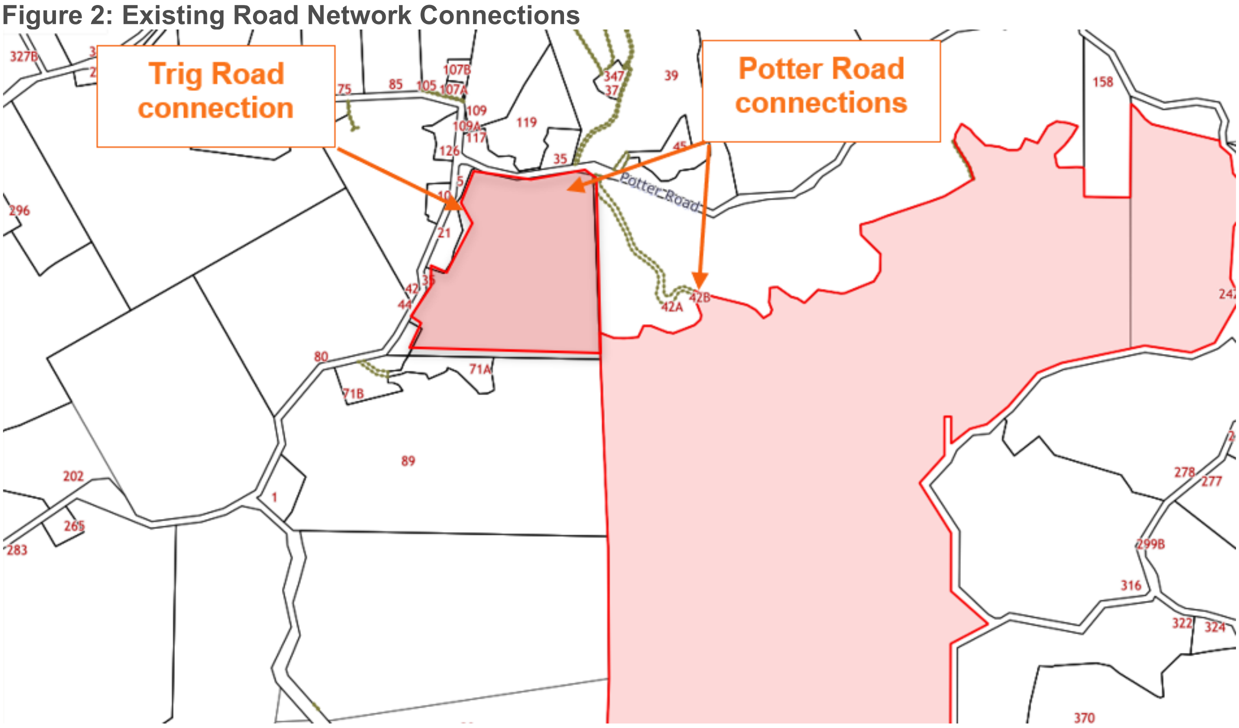
4.2 The site is zoned 'Rural' under the PWDP. **Figure 1** below shows the location of the site.

Figure 1: Site Location



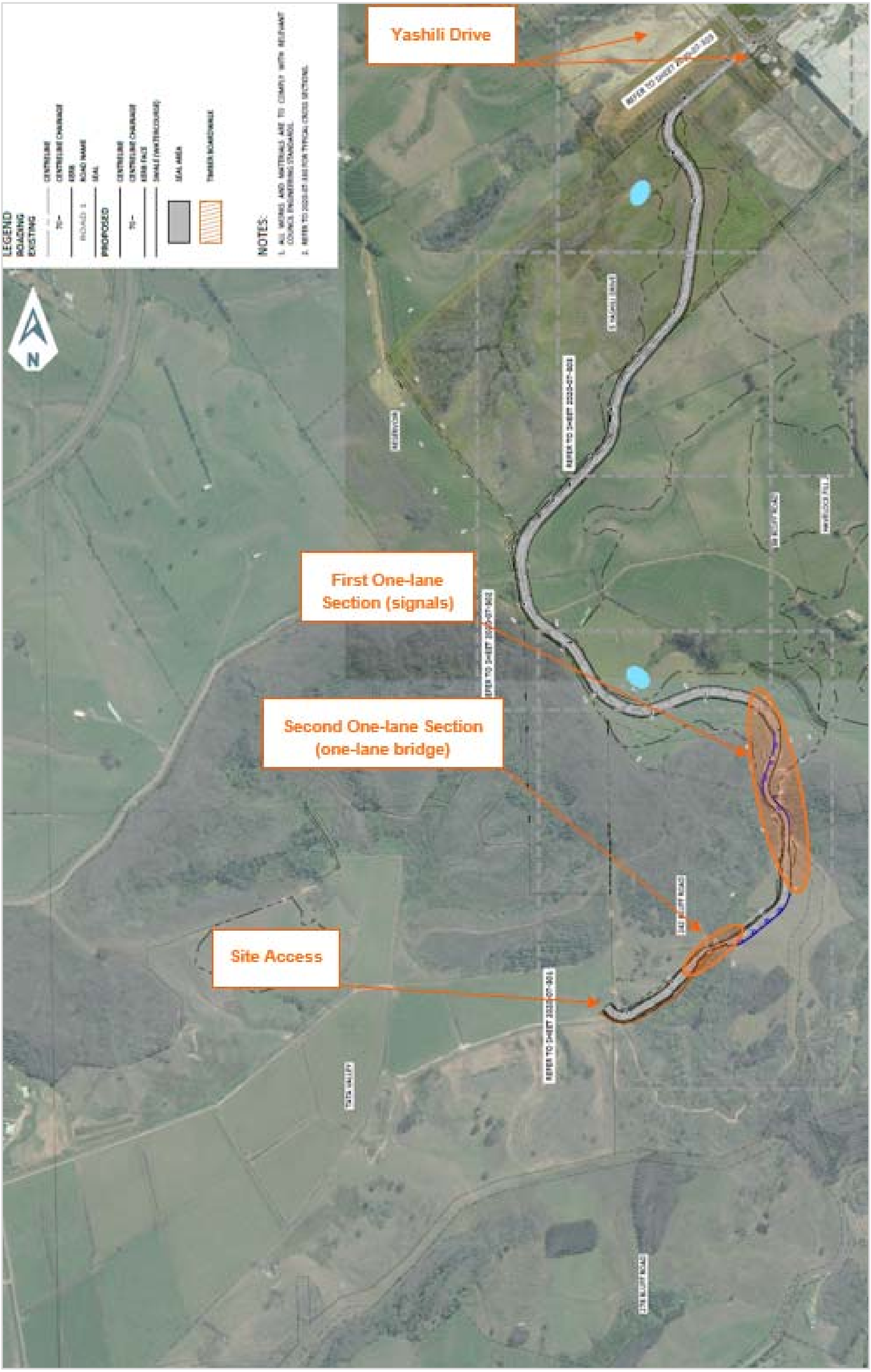
4.3 The property at 242 Potter Road currently connects to Potter Road to the northwest. The 35 Trig Road property currently connects to Trig Road to the west and Potter Road to the north. These existing connections are not intended to be modified as part of the proposal (i.e. still to be used as farming access). The Site and its existing connections are detailed in **Figure 2** below.

Figure 2: Existing Road Network Connections



4.4 It is proposed to provide a new main accessway to the Site through land owned by related companies to TVL which connects to Yashili Drive in Pokeno. This proposed principal access alignment is detailed in **Figure 3** below.

Figure 3: Proposed Principal Access



4.5 The key roads in the local road network (beyond the Site) are summarised below:

(a) Yashili Drive has been recently upgraded featuring a 12.0m wide two-way carriageway and sealed for the full length.

(b) Hitchen Road has been recently upgraded featuring a 10.5m wide two-way carriageway and sealed for the full length.

(c) McDonald Road features a 12.0m wide two-way carriageway and sealed for the full length. It terminates in a dead end at its southern extent.

(d) Pokeno Road features a 9.5m wide two-way carriageway and sealed for the full length.

(e) Gateway Park Drive has been recently upgraded featuring a 12.0m wide two-way carriageway and sealed for the full length.

(f) Great South Road features a 15.0m wide two-way carriageway with shoulders and a flush median and sealed for the full length.

4.6 Traffic volumes have been sourced from traffic counts / data undertaken by WDC and are detailed in Table 1 below.

Table 1: WDC Traffic Volumes

Road	**Date**	**ADT (vehicles / day)**
Yashili Drive (between Gateway Park Road and Flannery Road)	2020 estimate	60
Hitchen Road (between Pokeno Road and Gateway Park Road)	2020 estimate	210
McDonald Road (near Great South Road)	2020 estimate	420
Pokeno Road (between Helenslee Road and Bridge)	2017 count	3,377
Gateway Park Drive (between McDonald Road and Yashili Drive)	2020 estimate	210
Great South Road (near Walter Rodgers Road)	2019 count	3,933

5. RELEVANT PARTS OF REZONING PROPOSAL

5.1 The full details of TVL's rezoning proposal are outlined in TVL's submission and the primary evidence of Chris Scrafton for TVL for this Topic. The relevant parts of the proposal for the purposes of my evidence are the development of a proposed new resort and eco-tourist destination on the Site.

5.2 The principal access point to the Site will be via a new vehicle access at the eastern boundary of the Site (a privately owned vehicle access where outside the existing paper roads with the sites) from Yashili Drive through 5 Hitchen Road (also known as 5 Yashilli Drive), and 88 & 242 Bluff Road. I understand that resource consent applications for this vehicle access will be lodged shortly with Waikato Regional and Waikato District Councils.

Proposed Principal Access to the Site

5.3 I provide further information about the proposed principal access in this section of my evidence. The site is proposed to gain access principally from an extension to Yashili Drive and will connect to the subject site at its north-eastern extent adjoining 242 Bluff Road.

5.4 The access winds through existing rural farmland and forest and crosses a dirt road (Potter Road) at approximately its halfway point.

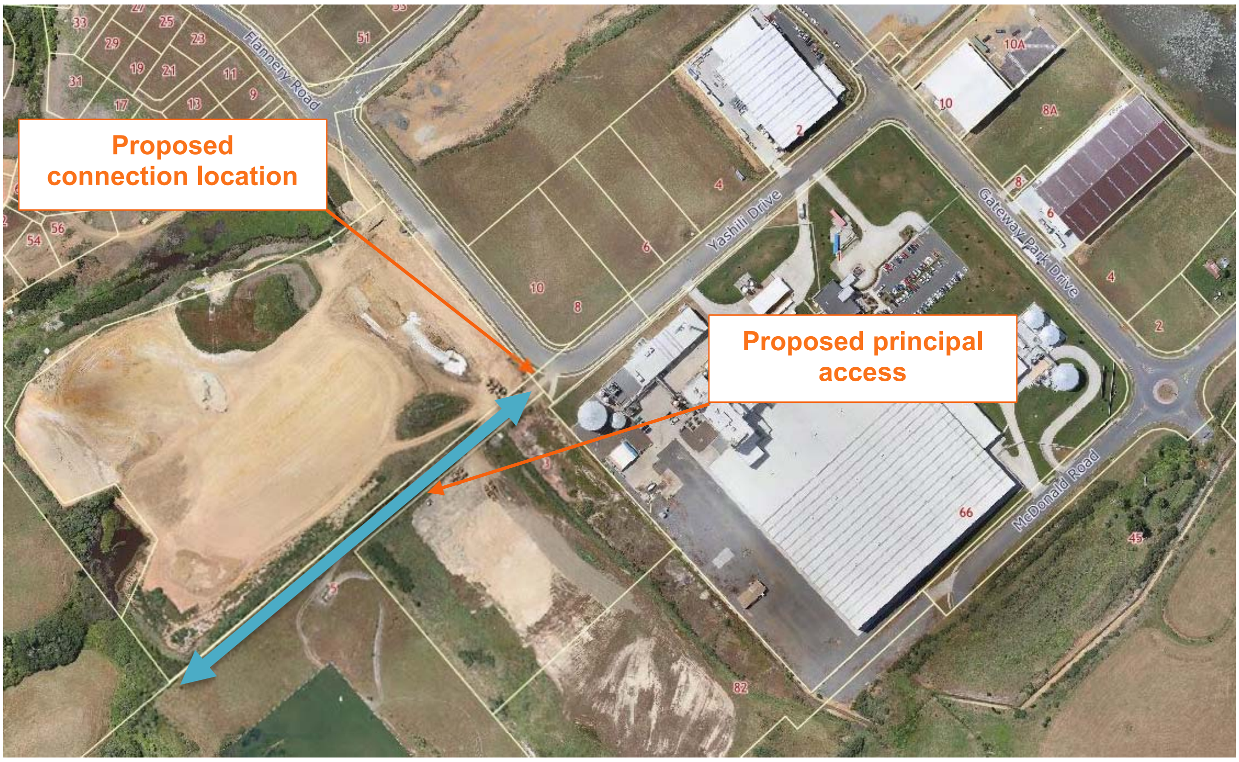
5.5 The access includes a 7.0m wide carriageway and single 2.5m wide shared pedestrian path. This carriageway width enables two-way movement of vehicles and trucks.

5.6 The access features separate northern and southern one-lane sections along its length as detailed previously in Figure 3. The northern one-lane section features a carriageway width of 3.5m. The southern one-lane section features a carriageway width of 4.0m. These one-lane sections are further detailed below. The access features a maximum gradient of 10%. Table 3.2 of AS 2890.2—2002 (Off-street commercial vehicle facilities) details a maximum gradient of 15.4% for roadways used by heavy vehicles. The proposed access gradients are less steep than this maximum and I therefore consider they are acceptable.

Yashili Drive Connection

5.7 The proposed principal access will connect to the public road network via an extension to Yashili Drive. A commercial vehicle crossing is proposed at this intersection from the access to the public road. The location of this connection is detailed in **Figure 4** below. I consider that the proposed principal access connection can be accommodated safely on Yashili Drive, with minor amendments to the existing access connections in this location.

Figure 4: Indicative Yashili Drive Connection



Unsignalised One-Lane Section

5.8 The southern one-lane section of the access is proposed to operate via a “one-lane bridge” on the existing route of a track bounded by two wetlands. I understand that the one-lane section is designed to reduce the extent of works through wetlands, and therefore its design as a one-way section relates to a Site constraint rather than a transportation reason. The unsignalised one lane section is shown on **Figure 3** above.

Signalised One-Lane Section

5.9 The northern one-lane section of the access is proposed to operate via traffic signals at either end, due to the length of the one-lane section and the limited visibility. I understand that the one-lane section is designed to reduce the extent of works through the Significant Natural Area (SNA), and therefore its design as a one-way section relates to the Site constraint rather than a transportation reason. The signalised one lane section is shown on Figure 3 above.

6. POTENTIAL TRANSPORT EFFECTS OF PROPOSED REZONING

6.1 In my opinion, the key transport impacts of the rezoning of the Site in the local area relates to the operation of the new Yashili Drive / Access connection, the unsignalised one-lane section, the signalised one-lane section, and the local network effects. There are also positive effects arising from the new Access connection.

6.2 In summary, the traffic effects of the proposed rezoning will be addressed through the establishment of the proposed principal access road.

Trip generation

6.3 The anticipated trips generated by the development have been thoroughly detailed in the Arrive TA. Based on the assumptions detailed in the Arrive TA, I consider the detailed trip rates and resulting traffic movements to be generally appropriate and if anything, in my opinion, overly conservative (ie they potentially overestimate typical traffic generation of the site), The trip generation section of the Arrive TA is attached in **Appendix A**, while the calculated vehicle movements are repeated in Table 2 below, from the Arrive TA.

Table 2: Estimated Vehicle Movements, All Activities, Peak Week (Arrive TA)

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	Unconstrained Total
Weekday	1051	52	343	7	33	1486
Weekend	1061	52	343	7	4	1467
AM Peak	186	10	30	0	6	232
PM Peak	269	14	73	0	6	362
Weekend Peak	220	11	231	0	1	244

Trip distribution

6.4 A typical inbound / outbound split of 80% / 20% in the AM peak hour and 20% / 80% in the peak hour respectively has been used for analysis.

Yashili Drive connection

6.5 The access will connect to the public road network via an extension to Yashili Drive. A commercial vehicle crossing is proposed at this intersection from the access to the public road.

6.6 Austroads safe intersection sight distance (SISD) requires visibility of 76m (50km/h, 2.0s reaction time, 1.5s observation time. RTS 6 requires a sight distance of 40m for a local road (50km/h, more than 200 vehicles per day).

6.7 The photographs below detail the sight distance to the northeast and northwest respectively.

Photograph 1: Sight distance to the northeast

Photograph 2: Sight distance to the northwest

6.8 As detailed in the photos above, sight distance is in excess of 200m in both directions. Sight distance is therefore considered to be more than sufficient from the subject access and therefore I consider an access in this location to be viable.

6.9 The proposed layout of the Yashili Drive connection is shown previously in Figure 4 above.

6.10 Further details of the access (e.g. detailed design) will be required at resource consent stage.

Unsignalised one-way section

6.11 The southern one-lane section of the access is proposed to operate via a "one-lane bridge" on the existing route of a track bounded by two wetlands. I undertook a visibility assessment of this one lane section to ensure vehicles at each end of the one-lane section have suitable visibility to each other.

6.12 I subsequently recommended that minor visibility obstructions are removed, to ensure visibility between vehicles is available at all times.

Signalised one-way section

6.13 The second one-lane section of the access is proposed to operate via traffic signals at either end due to the length of the one-lane section and the limited visibility. I understand that the one-lane section is designed to reduce the extent of works through the Significant Natural Area (SNA), and therefore its design as a one-way section relates to the site constraint rather than a transportation reason.

6.14 The traffic effects of the site trip generation have been assessed using the traffic modelling software Sidra The results presented below include the Degree of Saturation, which is a measure of available capacity and the Level of Service ("LOS"), which is a generalised function of delay. LOS A and B are very good and indicative of free-flow conditions; C is good; D is acceptable; and E and F are indicative of congestion and unstable conditions.

6.15 To assess the workability and operation of the one-lane section, I have undertaken Sidra intersection modelling. The peak unconstrained traffic generated by the development has been used for the analysis of the one-lane section (summarised in **Appendix A** and Table 2 above). The additional key assumptions for the Sidra model inputs are detailed below:

(i) A one-lane section length of 300m;

(ii) An average vehicle speed of 30km/h; and

(iii) An all-red time of 40s.

6.16 The proposed one-lane section performance is summarised in Tables 3 and 4 below.

Table 3: Access One-Lane Section – Morning Peak Hour

MOVEMENT SUMMARY

Site: 101 [AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated   Cycle Time = 110 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
South: South								
2	T1	48	10.0	0.485	58.5	LOS E	2.7	20.7
Approach		48	10.0	0.485	58.5	LOS E	2.7	20.7
North: North								
8	T1	196	10.0	0.735	51.8	LOS D	10.7	81.2
Approach		196	10.0	0.735	51.8	LOS D	10.7	81.2
All Vehicles		244	10.0	0.735	53.2	LOS D	10.7	81.2

Table 4: Access One-Lane Section – Evening Peak Hour

MOVEMENT SUMMARY

Site: 101 [PM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles								
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
South: South								
2	T1	305	10.0	0.800	53.2	LOS D	18.2	138.5
Approach		305	10.0	0.800	53.2	LOS D	18.2	138.5
North: North								
8	T1	76	10.0	0.710	65.4	LOS E	4.8	36.1
Approach		76	10.0	0.710	65.4	LOS E	4.8	36.1
All Vehicles		381	10.0	0.800	55.6	LOS E	18.2	138.5

6.17 As shown above, the one-lane section operates satisfactorily, with reasonable queues on the approaches. The largest queue is 139m on the southern leg in the PM peak hour, and therefore does not extend into the one-lane section to the south (separation of approximately 180m). Overall, the access section operates with an LOS of D and LOS E in the AM and PM peak hours respectively, which I consider acceptable given the red-time required for all phases to enable vehicles to clear the one-way section.

6.18 I note that the analysis has been undertaken for a vehicle speed of 30km/h along the one-lane section and for the traffic generated in the peak week of project operation (as detailed in the Arrive TA). In reality, I anticipate that vehicle speeds will in fact be more than this, and traffic volumes will be lower than those modelled for the majority of the year. In any case, the signals operation is considered satisfactory and suitable to serve the development.

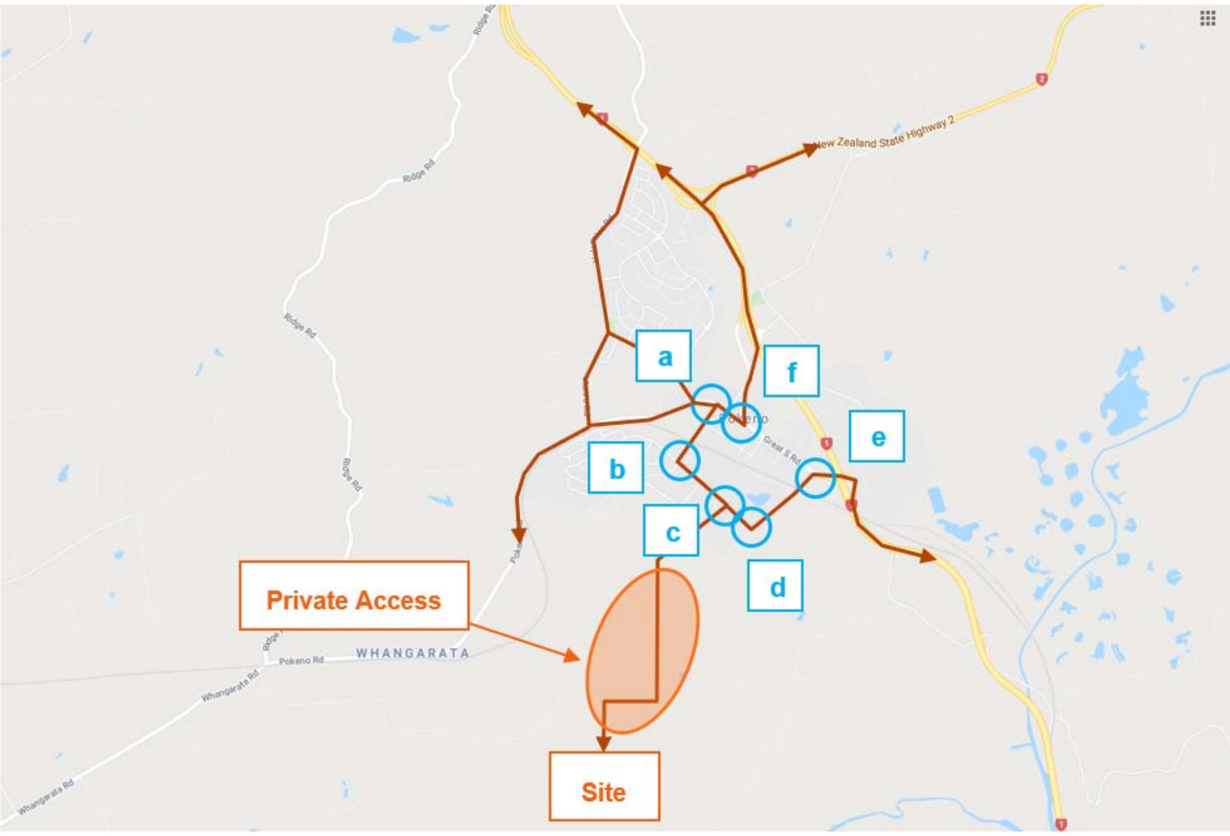
6.19 I have also reviewed the level of traffic which would lead to the one-way sections reaching unacceptable delay / LOS. From my analysis this occurs at approximately 400 vehicles per hour (noting from Table 2 the estimated peak is some 362 vehicles per hour).

Local Network Effects

6.20 Given the proposed principal access to the subject site, the local network will experience additional traffic effects. I note that the original submission contemplated access via Potter Road, however an alternative proposal has been developed with the proposed principal access now to Yashili Drive.

6.21 The traffic routes to and from the subject site for the proposed principal access arrangement are detailed in Figure 5 below.

Figure 5: Traffic Routes (Proposed principal access Arrangements)



6.22 In general, the proposed principal access will result in traffic travelling a lesser distance to / from the arterial road network, especially SH1 (as compared with access via Ewing and Potter Roads). The affected intersections are shown in blue and detailed further below:

6.23 Pokeno Road / Hitchen Road – features a T-intersection with good sight distance in both directions and two-exit lanes on the Hitchen Road approach. Given that the new routes will increase turning movements at this intersection, Sidra intersection modelling has been undertaken and is further detailed below.

6.24 Hitchen Road / Gateway Park Drive – features a recently constructed single lane roundabout. The roundabout is considered to have sufficient capacity for additional traffic volumes and is able to readily accommodate the minor additional trips likely to be generated from the rezoning.

6.25 Yashili Drive / Gateway Park Drive – features a recently constructed T-intersection with good sight distance in both directions and a wide carriageway. The intersection is considered to have sufficient capacity for additional traffic volumes and is able to readily accommodate the minor additional trips generated by the development.

6.26 McDonald Road / Gateway Park Drive – features a recently constructed single lane roundabout. The roundabout is considered to have sufficient capacity for additional traffic volumes and is able to readily accommodate the minor additional trips generated by the development.

6.27 McDonald Road / Great South Road – features a recently constructed T-intersection with good sight distance in both directions and a wide carriageway. Given that the new routes are likely to increase movements at this intersection, further analysis has been undertaken and is detailed below.

6.28 Pokeno Road / Great South Road – features a priority-controlled intersection with good sight distance in both directions and separate right turn and left turn exit lanes on the Pokeno Road approach. The intersection was assessed for its ability to accommodate the additional traffic movements. No additional intersection mitigation was necessary as a result of the increased traffic volumes generated by the development. As such, the existing intersection arrangement is considered suitable.

Pokeno Road / Hitchen Road intersection analysis

6.29 The Pokeno Road / Hitchen Road intersection has been modelled using the Sidra traffic modelling software. The additional traffic generated by the proposed rezoning has been added to the existing traffic volumes at the intersection. The traffic volumes at the intersection and the proposed signalised intersection layout has also been sourced from the Arrive TA have been sourced from earlier transport assessments related to resource consent applications at TaTa Valley.

6.30 The proposed Pokeno Road / Hitchen Road intersection performance (as at 2027) is summarised in Tables 5 and 6 below.

Table 5: Pokeno Road / Hitchen Road Intersection Performance – Morning Peak Hour

MOVEMENT SUMMARY

Site: 101 [Pokeno / Hitchen AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles									
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Hitchen								
1	L2	292	5.0	0.244	10.9	LOS B	5.0	36.7
3	R2	261	5.0	0.689	41.7	LOS D	11.1	80.9
Approach		553	5.0	0.689	25.5	LOS C	11.1	80.9
East: Pokeno								
4	L2	300	5.0	0.342	19.7	LOS B	8.0	58.8
5	T1	298	5.0	0.710	36.7	LOS D	12.7	92.4
Approach		598	5.0	0.710	28.2	LOS C	12.7	92.4
West: Pokeno								
11	T1	371	5.0	0.290	6.2	LOS A	6.4	47.0
12	R2	521	5.0	0.726	29.7	LOS C	19.7	143.5
Approach		892	5.0	0.726	19.9	LOS B	19.7	143.5
All Vehicles		2043	5.0	0.726	23.8	LOS C	19.7	143.5

Table 6: Pokeno Road / Hitchen Road Intersection Performance – Evening Peak Hour

MOVEMENT SUMMARY

Site: 101 [Pokeno / Hitchen PM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles								
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Hitchen								
1	L2	547	5.0	0.549	18.3	LOS B	15.3	111.6
3	R2	400	5.0	0.717	35.4	LOS D	16.1	117.5
Approach		947	5.0	0.717	25.5	LOS C	16.1	117.5
East: Pokeno								
4	L2	253	5.0	0.202	9.6	LOS A	3.8	27.9
5	T1	445	5.0	0.707	28.7	LOS C	17.3	126.5
Approach		698	5.0	0.707	21.8	LOS C	17.3	126.5
West: Pokeno								
11	T1	351	5.0	0.322	10.5	LOS B	7.9	57.7
12	R2	247	5.0	0.729	44.5	LOS D	10.9	79.6
Approach		598	5.0	0.729	24.5	LOS C	10.9	79.6
All Vehicles		2243	5.0	0.729	24.1	LOS C	17.3	126.5

6.31 As shown above, the proposed intersection operates satisfactorily, with reasonable queues on the major approaches. Overall, the intersections operate with an LOS of C, which is considered to be good operation for a major intersection. The largest delay experienced is 44.5s for the right turn movement into Hitchen Road in the PM peak hour. This delay is still well within the acceptable range for delay at an intersection. The intersection operation is therefore considered satisfactory, with no noticeable change to the operational efficiency and no further mitigation works are required.

6.32 This intersection is designed to accommodate the trip generation associated with the residential development of the Hitchens and Graham Blocks (Residential 2 Zone), along with traffic from the Pokeno Light Industrial Zone.

McDonald Road / Great South Road intersection analysis

6.33 The existing traffic volumes at the McDonald Road / Great South Road intersection have been sourced from Waikato Council traffic counts and were detailed in Table 1 previously.

6.34 The subject section of Great South Road features an ADT of approximately 4,000vpd. McDonald Road features an ADT of 420vpd. The proposed rezoning is anticipated to add an additional 208 trips through this intersection.

6.35 Given the relatively low volumes that currently exist on McDonald Road and the existing intersection arrangement, including separate exit lanes and a right turn bay, this level of additional trips is not anticipated to detrimentally effect the operation of this intersection. The intersection has been recently constructed and designed to accommodate additional traffic as the Pokeno local area is developed. As such, the intersection operation is considered satisfactory, with no further mitigation works required. The design of the intersection is appropriate to accommodate the vehicle trip generation and characteristics from the Pokeno Light and Heavy Industry Zones.

Positive effects: Additional Connectivity

6.36 The proposal will provide improved connectivity between the site and Pokeno, linking Pokeno Town Centre to the Waikato River without the use of SH1 as is currently required. I consider the additional vehicle and pedestrian connections to the Waikato River a positive effect for Pokeno, allowing the movement to and from places of recreation without accessing the arterial road network.

Other Access

6.37 The existing access points Trig Road and Potter Road (as per paragraph 4.3 of my evidence) can remain in my opinion proving their use does not significantly change in nature. In this regard these existing access points should be limited to activities relating to typical farm operation.

Wider network effects / cumulative effects

6.38 It is important to note that my evidence only assesses the traffic effects at the key local intersections, considered relevant to the rezoning proposal. The traffic generated by this rezoning proposal has been taken into account. However, I understand that there are several other submissions seeking rezoning within Pokeno (including to residential). It is difficult to ascertain the number or size of these submissions, the traffic expected to be generated, the traffic patterns and therefore the traffic effects to the surrounding road network. As a result, I have made a assumptions about the appropriate future environment for assessment purposes.

6.39 In this regard I consider that, at this point in time, Council's 42A Framework report provides the best basis for determining the appropriate future environment. In the report the Council appears to be supporting rezoning of the various growth cells for Pokeno identified in Waikato 2070 and listed in Appendix 8 to the section 42A report.

6.40 There are likely upgrades required for intersections / roads in wider Pokeno to serve the increased traffic from rezoning within Pokeno. In my opinion these upgrades should be constructed by the Council as part of its management and upgrade of the transport network with any contribution from TaTa Valley Limited being paid through the development charges or targeted rates. I consider this to be consistent with the fact that upgrades are the result of cumulative effects from multiple sites (and so hard to attribute to any one rezoning).

6.41 On that basis I consider there does not need to be any specific staging or triggers in the TaTa Valley Zone related to those wider cumulative impacts or upgrades.

7. MANAGEMENT OF EFFECTS

Special Events

7.1 I understand that the site has the potential to hold events, such as concerts and weddings and the TaTa Valley Resort Zone will enable those activities, subject to certain standards.

7.2 As detailed previously, the proposed principal access, specifically the one-way sections, have an hourly capacity of 400 vehicles per hour.

7.3 The following assumptions have been made with relation to the proposed development and the potential events held on-site and their trip generating characteristics:

a) 50% of the Site traffic will continue to be generated, independently of the event traffic. This equates to a peak of 181 vehicles per hour.

b) 80% of the event traffic will arrive or depart within a peak hour.

c) The event traffic will feature an average occupancy of 2 people per vehicle.

7.4 Using these assumptions above, results in a total event capacity of 548 people, to remain under the 400 vehicle per hour capacity detailed previously.

7.5 I therefore consider that any events on-site over 500 person capacity should require detailed assessment of peak traffic movements and how these will be managed on-site.

Special Events

7.6 I understand provision relating to special events capacity has been included in the draft TaTa Valley Resort Zone Provisions as well as provisions relating to access for all uses (other than farming) via the Yushili Drive connection. I consider these to be appropriate.

8. CONCLUSION

8.1 Based on the modelling and assessment outlined in my evidence, I consider that the full extent of development enabled by the rezoning proposal can be appropriately supported by the proposed primary access arrangements (as I have detailed above) and will maintain appropriate levels of safety and efficiency on the local surrounding road network.

8.2 There are likely upgrades required for intersections / roads in wider Pokeno to serve the increased traffic resulting from rezoning within Pokeno. In my opinion these upgrades should be constructed by the Council as part of its management and upgrade of the transport network with any contribution from TaTa Valley Limited being paid through the development charges or targeted rates.

8.3 Accordingly, I conclude that there is no traffic engineering or transportation planning reason to preclude acceptance of the rezoning proposal.

Leo Hills
17 February 2021

APPENDIX A: Traffic Generation section of the 2019 ARRIVE TA

6 Traffic Impact Assessment

This section of the report sets out the number of vehicle movements expected to be generated by the activities on the site, and where and when those vehicle movements will occur. The impact of those trips on road safety and road efficiency are then assessed. The impact of traffic movements on other aspects of the environment such as noise or amenity is not within the scope of this transport assessment.

6.1 Trip Generation Rates

The Operative Plan does not determine activity status based on traffic movements.

The Proposed District Plan uses the number of traffic movements per day to determine activity status. In the Rural zone an activity that produces more than 200 vehicle movements per day or with more than 15% heavy vehicle movements requires resource consent. The PWDP provides a table of indicative traffic generation rates; however, no rate is provided for the Event Space or Farm Show Ground activities.

The trip generation rates, modal splits, and other assumptions used in this assessment are set out below. Data from published studies referenced when determining appropriate trip generation rates is contained in an appendix.

6.1.1 Hotel Accommodation

The NZ TDB database contains data from two hotels, and the ITE presents data from up to 28 Hotels. As both sources include hotels with restaurants and conference facilities it is likely that the higher trip generation rates are associated with conferences being held at the hotel. This is supported by the ITE Resort Hotel classification, which contains hotels that are less likely to contain conference facilities, having significantly lower trip generation rates. The adopted rates are more influenced by the ITE Resort Hotel data as the trip generation from events is calculated separately.

Table 13: Trip Generation Rates for Hotel, Movements per Occupied Room

Period	Guests	Staff
Weekday	2.5	2.0
Weekend	2.5	2.0
AM Peak	0.3	0.0
PM Peak	0.4	0.3
Weekend Peak	0.4	0.0

Other assumptions include:

- 85% of hotel rooms are occupied
- 50% of hotel guests travelling by car and 50% by coach.
- Average car occupancy is estimated to be 1 hotel room (generally 2 people) per car, 1.1 staff members per car, and 20 hotel rooms (around 40 people) per coach.

- Proportion of vehicle movements entering is 5% of guests and 90% of staff in the AM Peak, 50% of guests and 70% of staff in the PM peak and 50% each in the weekend midday peak hour.

The resulting worst-case vehicle trips from the hotel accommodation are summarised in the following table.

Table 14: Estimated Vehicle Movements – Hotel Accommodation – Peak Week

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	All Vehicles
Weekday	210	11	90	2	4	**317**
Weekend	210	11	90	2	0	**313**
AM Peak	25	1	0	0	1	**27**
PM Peak	34	2	14	0	1	**50**
Weekend Peak	34	2	0	0	0	**36**

The number of vehicle movements is expected to have a seasonal variation, averaging around 189 vehicle movements per day in winter through to 252 vehicle movements per day in summer, with an annual average daily traffic (AADT) volume of 220 vehicle movements per day.

6.1.2 Hotel Restaurant

There is no relevant published data from New Zealand restaurants, and the ITE 931 Quality Restaurant data is summarised in the appendix. The adopted rates are based on the number of seats, and it is assumed that the restaurant would not make significant contributions to the weekday peak hour vehicle movements. The number of external guests visiting the restaurant for breakfast is expected to be negligible, and it is expected that most external restaurant guests arriving for dinner would do so after the weekday evening traffic peak period has concluded.

Table 15: Trip Generation Rates for Hotel Restaurant, Movements per Seat

Period	Guests	Staff
Weekday	3.5	2.0
Weekend	4.0	2.0
AM Peak	0.0	0.0
PM Peak	0.0	0.3
Weekend Peak	0.5	0.3

Other assumptions include:

- The proportion of external restaurant guests (not staying at the hotel) is 40% on weekdays and 60% on weekends.
- 50% of external restaurant guests travel by car and 50% by coach.
- Average car occupancy is estimated to be 2 people per car, 1.1 staff members per car, and 40 people per coach.
- 90% of staff vehicle movements in the PM peak are entering and 10% are leaving.
- In the weekend midday peak hour 50% of the vehicle movements are entering the site and 50% are leaving the site.

The resulting vehicle trips from the restaurant are summarised in the following table.

Table 16: Estimated Vehicle Movements – Hotel Restaurant – Peak Week

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	All Vehicles
Weekday	73	4	90	2	5	174
Weekend	83	4	90	2	0	179
AM Peak	0	0	0	0	1	1
PM Peak	0	0	11	0	1	12
Weekend Peak	10	1	11	0	0	21

The number of vehicle movements is expected to have a seasonal variation, averaging around 105 vehicle movements per day in winter through to 140 vehicle movements per day in summer, with an annual average daily traffic (AADT) volume of 122 vehicle movements per day.

6.1.3 Hotel Event and Conference Space

To our knowledge there are no published surveys of event or conference centre trip generation, so the demand is estimated from first-principles, based on a worst-case scenario of no conference attendees staying at the hotel, and assuming that half will travel by car with an average occupancy of 2 people per car, with the remainder travelling by coach.

As noted earlier with respect to parking, this is considered to be a worst-case scenario for short-duration conferences or events. It is expected that longer multi-day events would have a significant proportion of guests staying at the hotel, which would reduce the daily trip generation and could reduce the peak-hour trip generation.

In addition, the proposed cap on trip generation would mean that the trip generation estimates presented in this section are unlikely to occur except in low tourism season when the number of visitors to other activities on the site such as the Farm Show is reduced.

Table 17: Trip Generation Rates for Hotel Event and Conference Space, Movements per Seat – Worst Case

Period	Guests	Staff
Weekday	2.0	2.0
Weekend	2.0	2.0
AM Peak	0.7	0.3
PM Peak	0.7	0.3
Weekend Peak	0.7	0.0

Other assumptions include:

- 50% of event or conference guests travel by car and 50% by coach.
- Average car occupancy is estimated to be 2 people per car, 1.2 staff members per car, and 40 people per coach.
- Proportion of vehicle movements entering is 90% of both guests and staff entering in the AM peak, 10% in the PM Peak, and 50% in the weekend midday peak hour.

The resulting vehicle trips from the Hotel event and conference space are summarised in the following table.

Table 18: Estimated Vehicle Movements – Hotel Event and Conference Space– Worst Case

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	All Vehicles
Weekday	396	20	48	0	4	468
Weekend	396	20	48	0	4	468
AM Peak	139	7	6	0	1	153
PM Peak	198	10	24	0	1	233
Weekend Peak	139	7	0	0	1	147

6.1.4 Hotel Health Spa

With no published data available, this trip generation is estimated from first principles, based on the information supplied by the applicant.

The applicant expects that only 10% of the 250-guest capacity will be from external customers, and we have assumed that all would travel for those guests would be by car. It is assumed that directional flow would be 90% entering in the AM peak and 10% in the PM peak, with 50% entering in the weekend midday peak. Those assumptions result in the number of vehicle movements summarised in the table below.

Table 19: Estimated Vehicle Movements – Hotel Health Spa – Peak Week

Period	Guest Cars	Staff Cars	Staff Vans	All Vehicles
Weekday	83	33	1	**117**
Weekend	83	33	1	**117**
AM Peak	8	4	0	**12**
PM Peak	8	4	0	**12**
Weekend Peak	8	0	0	**8**

The number of vehicle movements is expected to have a seasonal variation, averaging around 76 vehicle movements per day in winter through to 93 vehicle movements per day in summer, with an annual average daily traffic (AADT) volume of 80 vehicle movements per day.

6.1.5 Farm Show Ground

We are not aware of any published surveys of similar activities. We have estimated the trip generation from first principles based on guest numbers supplied by the applicant, with 1000 guests per day expected, together with staff numbers, and daily truck movement numbers provided by the applicant.

It is expected, based on information supplied by the applicant, that 30% of Farm Show Ground visitors would be guests from the hotel, restaurant, and other activities who do not contribute to the external trip generation rates over and above the generation already calculated for the hotel.

Table 20: Trip Generation Rates for Farm Show Ground, Movements per person

Period	Guests	Staff
Weekday	2.0	2.0
Weekend	2.0	2.0
AM Peak	0.1	0.5
PM Peak	0.2	0.5
Weekend Peak	0.2	0.0

Other assumptions include:

- 30% of farm show ground visitors are hotel guests
- 50% of external guests travel by car and 50% by coach
- Average car occupancy is estimated to be 2 people per car, 1.1 staff members per car, and 40 people per coach.
- Proportion of vehicle movements entering is 90% of both guests and staff entering in the AM peak, 10% in the PM Peak, and 50% in the weekend midday peak hour.

The resulting vehicle trips from the Farm Show Ground are summarised in the following table.

Table 21: Estimated Vehicle Movements – Farm Show Ground – Peak Week

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	All Vehicles
Weekday	292	18	82	2	20	**414**
Weekend	292	18	82	2	0	**394**
AM Peak	14	1	20	0	3	**38**
PM Peak	29	2	20	0	3	**54**
Weekend Peak	29	2	0	0	1	**32**

The number of vehicle movements is expected to have a seasonal variation, averaging around 182 vehicle movements per day in winter through to 323 vehicle movements per day in summer, with an annual average daily traffic (AADT) volume of 247 vehicle movements per day.

6.1.6 Total Trip Generation

The total trip generation of all activities is summarised in the following tables.

It is proposed that the site be subject to a cap on daily traffic volumes of 1100 vehicle movements per day in order to address the effects of traffic noise. That will require the applicant to manage the number, size, and types of events during the busier weeks so that the cap is not exceeded. It is expected that larger events could be held when Farm Show visitor numbers are lower, or the Farm Park operation may be reduced or closed to allow for an event.

The following table calculates the total unconstrained trip generation, and then estimates that trip generation as a result of the proposed trip generation cap based on the reduction in daily trip generation.

Table 22: Estimated Vehicle Movements – All Activities – Peak Week

Period	Guest Cars	Guest Coaches	Staff Cars	Staff Vans	Trucks	Unconstrained Total	Constrained Total
Weekday	1051	52	343	7	33	1486	**1,100**
Weekend	1061	52	343	7	4	1467	**1,100**
AM Peak	186	10	30	0	6	232	**172**
PM Peak	269	14	73	0	6	362	**268**
Weekend Peak	220	11	231	0	1	244	**183**

The following table calculates the unconstrained seasonal average trip generation. All unconstrained seasonal averages are below the proposed daily trip generation cap.

Table 23: Estimated Vehicle Movements – All Activities – Seasonal and Annual Averages

Activity	Summer	Spring	Winter	Autumn	Annual
Hotel	252	221	189	221	220
Hotel Restaurant	140	122	105	122	122
Hotel Health Spa	93	76	76	76	80
Hotel Event and Conference Space	96	96	96	96	96
Farm Show Ground	323	242	182	242	247
Total	**905**	**758**	**648**	**758**	**765**

The following table summarises the annual average daily vehicle movements for each activity.

Table 24: Estimated Vehicle Movements – All Activities – Annual Average Daily Traffic

Activity	Type of Vehicle			
	Cars	Coaches	Trucks	Total
Hotel	210	7	2	**220**
Restaurant	117	3	2	**122**
Health Spa	80			**80**
Event and Conference Space	91	4	1	**96**
RC1 Total	**498**	**14**	**5**	**518**
Farm Show Ground	228	11	9	**247**
Site Total	**726**	**25**	**14**	**765**

6.1.7 Trip Distribution

The proposal would be relatively unique in this area so there is no useful source of information that could be surveyed to determine the distribution of traffic. As a result, the distribution has been estimated for each group of users as summarised in the following table. It is assumed that the spatial distribution would be similar across the various time periods.

Table 25: Assumed Trip Distribution

Group	SH1 North	SH2 East	SH1 South	West	Pokeno	Total
Guests by Car	50%	17%	30%	2%	1%	100%
Guests by Coach	52%	18%	30%			100%
Staff by Car	36%	6%	8%	25%	25%	100%
Staff by Van				50%	50%	100%
Trucks	35%	10%	30%	25%		100%

This distribution, together with the trip generation rates and assumptions, determines the volume of vehicular traffic added to the road network during the various timeframes and determines the proportion of traffic turning left or right at the Whangarata Rd/ Ewing Rd intersection.

The increases in turning volumes at that intersection are summarised in the following figures. In these figures the bold number is the total number of vehicles and the smaller number is the number of heavy vehicles (trucks and tour coaches)

Figure 31: Generated turning movements – Weekday – Peak Week, Capped to 1100 veh/day.

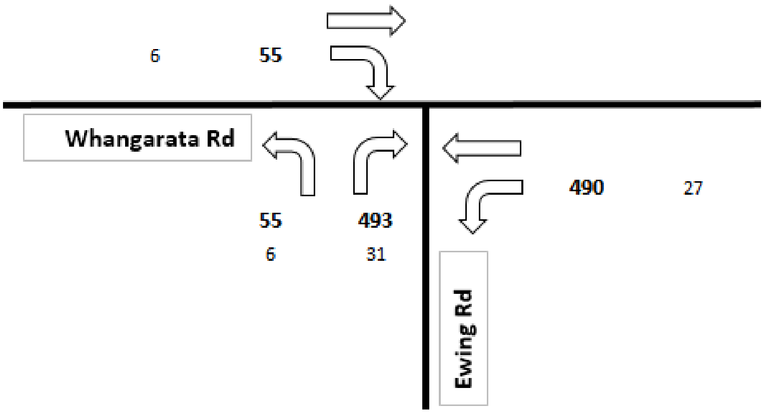
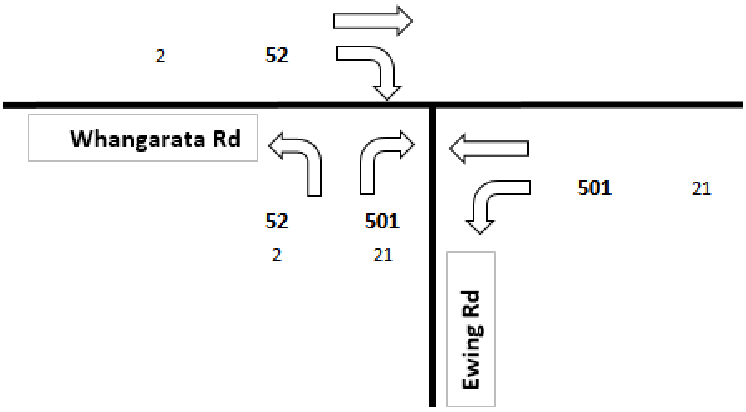


Figure 32: Generated turning movements – Weekend – Peak Week, Capped to 1100 veh/day.



The effects of the proposal on intersection efficiency are assessed during the peak hours on the road network. In order to provide a robust assessment, the unconstrained peak hour trip generation estimates are used, although the actual trip generation is likely to be significantly lower.

Figure 33: Generated turning movements – Weekday AM Peak Hour – Peak Week (Unconstrained)

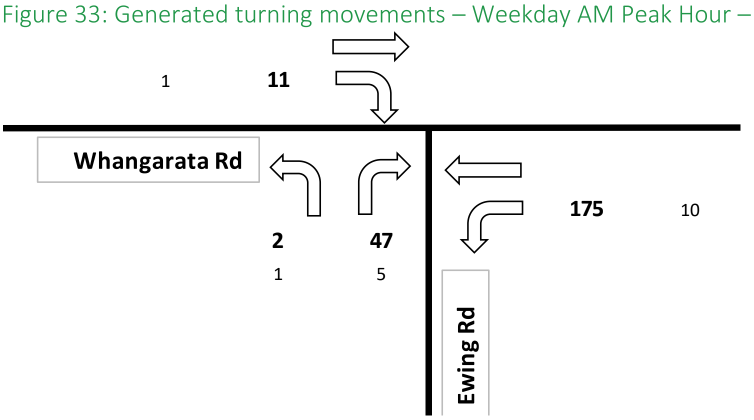


Figure 34: Generated turning movements – Weekday PM Peak Hour– Peak Week (Unconstrained)

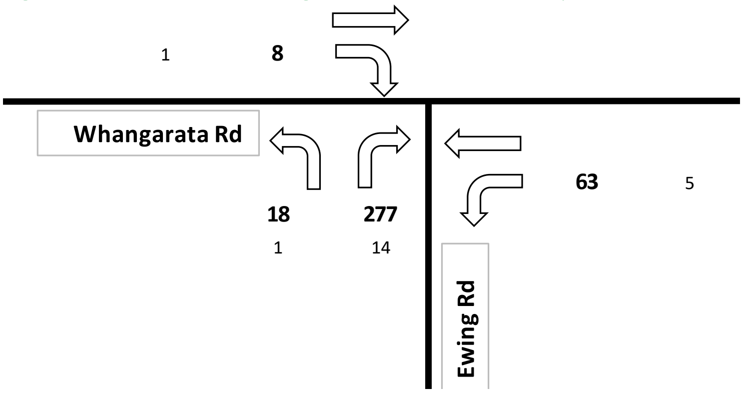
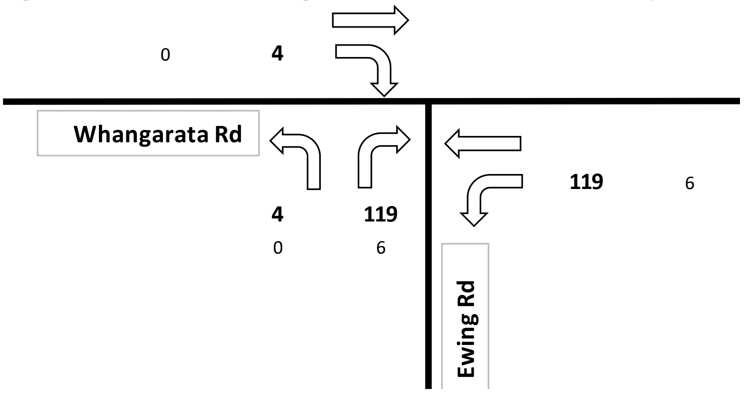


Figure 35: Generated turning movements – Weekend Midday Peak Hour – Peak Week (Unconstrained)



6.2 Effects on Safety

6.2.1 Potter Road and Ewing Road

The proposal will result in substantial increases in traffic volume on Potter Road and Ewing Road compared with the volume of traffic they are currently carrying.

Potter Road currently carries an estimated 30-40 vehicles per day. The activities on the site will be managed to produce no more than 1100 vehicles per day, and around 765 vehicle per day as an annual average. As a result, the traffic volume on Potter Road is expected to increase to around 1140 vehicles per day during the peak week, and around 800 vehicles per day as an annual average.

The traffic volume on Ewing Road is expected to increase from around 190 vehicles per day at present to around 1290 vehicles per day during the peak week, or to around 955 vehicles per day as an annual average.

As noted earlier, the seal width on these roads is around 6.0m, which meets the Council standard for roads of this type carrying the existing traffic volumes.

The significant increase in traffic would result in an increased probability of passing a vehicle travelling in the opposite direction, with around 6% of those vehicles being a tour coach or truck. There is also an increased likelihood that two larger vehicles (a coach or truck) would need to pass each other.

On the current carriageway, two large vehicles could only comfortably pass each other if travelling slowly and likely placing the left-side wheels onto the unsealed shoulder. There are two significant crests and a number of bends along the route that mean that forward visibility at some points is limited. It is expected that local residents are familiar with these locations and slow down on the approaches to these locations.

The majority of visitors to the TaTa Valley site would not be familiar with these roads, and a proportion of drivers may be foreign drivers with little experience of rural New Zealand roads.

The proposal is expected to result in occasional semi-trailer vehicles transporting shipping containers. These long vehicles require more road width on bends, and although long vehicles such as livestock transport trucks are expected to use the road now, the probability of a long vehicles passing a car, coach or truck will increase significantly.

All of these issues are likely to result in an adverse effect on road safety if the proposal were to operate on the existing road formations. As a result, it is recommended that Potter Road and Ewing Road be widened to permit two vehicles to pass each other more comfortably. This work is discussed further under heading 9.2 below.

Figure 14.12.5.15 of the PWDP-N specifies access road conditions. Roads with average daily traffic volumes between 100 and 1000 vehicles per day (annual average) are to have two 3.5m wide traffic lanes plus two sealed shoulders 0.75m wide each, to give a total seal width of 8.5m. The width on bends is to allow a semi-trailer to track around the bend without needing to cross the centreline. It is recommended that the route be upgraded to this width.

It is recommended that the route have line marking added, including a centreline and edge lines along the full length between Whangarata Road and the site.

It is also recommended that warning signs be added at the right-angle bend on Ewing Road, including warning signs in advance of the bend and chevron signs at the bend, both with appropriate advisory speeds.

It is recommended that the Potter/ Ewing intersection have a Stop control added on Potter Road, and that chevron sight boards be installed opposite the intersection to make it more conspicuous to approaching drivers.

As the proposal may attract a proportion of foreign drivers, signs and markings reminding drivers to drive on the left are also recommended. All of these works are discussed further under heading 9.2 below.

With the roads widened to the recommended standard, and with the other recommended improvements in place, the adverse effects on safety as a result of the increased number of vehicles, including the increase in coaches and trucks, is considered to be appropriately mitigated. The wider carriageway, and the sealed shoulders in particular, are also expected to result in some improvement to the safety of unmotorised road users (pedestrians, cyclists, and equestrians), although those improvements may be offset to some degree by a likely small increase in average vehicle speed.

6.2.2 Whangarata Road / Ewing Road Intersection

As noted earlier, the sightline to the north-west of the intersection along Whangarata Road is deficient. This represents a significant hazard, but due to the relatively low volume of traffic turning right in and out of Ewing Road, this has apparently resulted in few crashes, as no crashes have been reported here.

The increase in traffic movements as a result of the proposal would significantly increase the exposure to that risk, resulting in an increased risk of collision between vehicles travelling eastbound along Whangarata Road and vehicles turning right out of Ewing Road.

In addition, the increase in traffic turning into Ewing Road would likely lead to an increase in rear-end collisions between traffic travelling through the intersection along Whangarata Road and vehicles slowing to turn into Ewing Road. This would be exacerbated by the acute left turn into Ewing Road causing large vehicles to travel slowly, with the right turn crash risk exacerbated by the poor visibility to the west.

With the increased traffic volumes as a result of the proposal, the intersection would meet the Austroads warrants for the provision of an auxiliary right turn lane (right turn bay) and an auxiliary left turn lane.

It is therefore recommended that the road be widened to incorporate both turn bays, and that Whangarata Road west of the intersection be realigned and lowered over the crest so that the full Austroads Safe Intersection Sight Distance Standard would be met. The widening would require some private land on the south-eastern corner of the intersection to be acquired to facilitate the auxiliary left-turn lane, and other land may also be required. The works would require the regrading of several private access driveways and lowering of underground services as a result of lowering Whangarata Road over the crest. The implementation of this work is discussed under heading 9.2 below.

Council has recently undertaken work on Whangarata Road in this area to provide a reconstructed pavement and wider sealed shoulders. That work would reduce some risks associated with vehicles turning into Ewing Road by providing more road width to avoid turning vehicles; however, the reduction in risk would not be as great as that provided by formal turning bays.

The lowering of the speed limit to 80km/hr would reduce the length of the minimum required sight distance, but the intersection would not comply with industry standard guidelines for minimum safe sight distances unless the speed limit was reduced to 60km/hr or less, which is likely to be inappropriate for this sparsely populated rural environment. As a result, lowering of the road surface west of Ewing Road is recommended to sufficiently mitigate the adverse effects associated with the traffic generated by the proposal. These works are discussed in further detail under heading 9.2 below.

6.3 Effects on Efficiency

6.3.1 Baselines for Comparison

The impact of the proposal on the transport environment needs to be considered, and the transport environment could be seen to include the existing environment and a small range of possible future environments. It is not possible, nor practical, to assess the proposal against a comprehensive range of potential future environments.

This assessment assesses the change in likely performance of the transport network under a small number of scenarios. The first is a “2018” or “Existing” scenario based on traffic volumes counted at the Whangarata Rd / Ewing Rd intersection in June 2018. This scenario has Weekday AM Peak, Weekday PM Peak and Weekend Midday Peak hours.

The second “2027” scenario for assessment is the fully-developed Pokeno Structure Plan as per the PC21 projected traffic volumes for 2027, which were based on the original PC24 PSP modelling, supplemented by an estimated set of traffic volumes for the Whangarata/ Ewing intersection in 2027 based on historic growth rates. The PC21 volumes account for development in Pokeno in accordance with the Operative Plan zoning, plus an allowance for some development in Tuakau, plus allowance for growth in other traffic volumes. This scenario is considered to be a reasonable future "Operative" environment. Information is available for weekday AM peak and PM peak.

The third scenario assesses the proposal against the provisions of the Proposed Waikato District Plan as notified. The most significant change is the addition of a large residential area to the northwest of Pokeno known as "Pokeno West" [PW]. Our assessment of this scenario is based on the Integrated Transport Assessment prepared for Pokeno West by Commute Consultants, which in turn was based on a 2016 study undertaken for Council by Beca Consultants which provided estimated traffic volumes for 2021 and 2040 time periods. The 2016 Beca assessment has significantly higher traffic volumes than the PC21 scenario due to a number of different (erroneous) assumptions. For the purposes of this assessment the Pokeno West ITA volumes for 2021 and proposed intersection forms are used as-is, despite a number of shortcomings. The 2040 traffic volumes are not used as they are considered to be unreliable, in addition to representing an overly onerous time period for assessment of this proposal. The use of the Pokeno West data is not an endorsement of that data or the methodology used to derive it. Information is available for weekday AM peak and PM peak.

6.3.2 Intersections Assessed

A number of intersections have been assessed as part of this report.

The intersection of Potter Road and Ewing Road has not been assessed as the turning volumes expected at that intersection are relatively small and well within the capacity of a simple T-intersection.

Some intersections have not been assessed in all scenarios. It is considered that there is little point in evaluating the impact of the proposal for the existing scenario within Pokeno due to the significant growth expected to occur in the area over the next few years. The assessed intersections and scenarios are summarised below.

All intersections are assessed using the estimated peak-hour trip generation unconstrained by the cap on daily trip generation. The cap would reduce the overall peak daily traffic volume to around 75% of the unconstrained daily traffic volume with all activities operating, so the intersection assessments using unconstrained volumes are considered to be conservative, allowing a buffer for hourly trip generation to be peakier than allowed for in the estimates.

6.3.3 Ewing Road / Whangarata Road

For all the "With Proposal" scenarios, it is assumed that this intersection would be changed as recommended above to address adverse effects on road safety. With those changes in place there is more than sufficient capacity for this intersection to accommodate the expected turning movements while operating at good levels of service.

Table 26: Whangarata/ Ewing. Average Delay and Level of Service - AM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2018	2027	2018	2027
Ewing	L	5.1	5.3	5.5	5.8
	R	6.1	6.7	9.9	11.5
Whangarata E	L	7.4	7.4	7.6	7.6
	T	0.0	0.0	0.0	0.0
Whangarata W	T	0.0	0.0	0.0	0.0
	R	8.0	8.3	9.2	9.5
All		**0.4**	**0.4**	**3.4**	**3.1**

Table 27 : Level of Service Key

A	B	C	D	E	F

Level of Service [LOS] is a qualitative measure of transport performance that normally ranges from very good conditions at LOS A, through to capacity at LOS E, with LOS F representing over-capacity situations. LOS D is commonly used as a design target for peak-hour conditions, although it is not uncommon for one or two movements at an intersection to have a poorer LOS during a peak period. For intersections the LOS is based on defined thresholds of average delay per vehicle, with different thresholds used for sign control, roundabouts, and signals.

Table 28: Whangarata/ Ewing. Average Delay and Level of Service - PM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2018	2027	2018	2027
Ewing	L	5.3	5.6	5.6	5.9
	R	6.0	6.5	11.8	15.0
Whangarata E	L	7.4	7.4	7.6	7.6
	T	0.0	0.0	0.0	0.0
Whangarata W	T	0.1	0.1	0.0	0.0
	R	8.5	8.8	8.9	9.3
All		**0.5**	**0.5**	**5.5**	**6.0**

Table 29: Whangarata/ Ewing. Average Delay and Level of Service - Weekend Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2018	2027	2018	2027
Ewing	L	5.1	5.3	5.4	5.7
	R	7.0	7.7	9.5	11.5
Whangarata E	L	8.5	8.5	7.6	7.6
	T	0.0	0.0	0.0	0.0
Whangarata W	T	0.0	0.0	0.0	0.0
	R	8.4	8.7	9.2	9.5
All		**0.3**	**0.3**	**3.6**	**3.5**

The intersection is expected to operate all a good level of service in each scenario. The worst movement is the right turn out of Ewing Road (as it must give way to most other movements), with that movement experiencing LOS A to LOS C. All other movements are at LOS A at all times.

6.3.4 Pokeno Road / McLean Road

This is a new intersection connecting Hitchen Road to Pokeno Road via the railway overpass currently under construction and is one of two road links connecting across the NIMT railway.

This intersection will initially be under Give Way control, and is signal-controlled in the PC21-2027 scenario.

Table 30: Pokeno/ McLean. Average Delay and Level of Service - AM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2027	PW-2021	2027	PW-2021
McLean	L	10.1	10.3	13.7	11.6
	R	33.8	22.8	50.9	22.8
Pokeno E	L	14.9	10.7	15.9	9.5
	T	30.4	17.5	35.8	17.3
Pokeno W	T	4.9	5.6	4.3	5.7
	R	34.6	21.9	39.0	27.7
All		**22.1**	**12.5**	**26.7**	**13.3**
Signal Cycle Time		50	40	70	40

Table 31: Pokeno/ McLean. Average Delay and Level of Service - PM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2027	PW-2021	2027	PW-2021
McLean	L	20.5	15.3	22.3	18.9
	R	48.0	29.8	55.8	33.2
Pokeno E	L	11.7	8.4	11.4	7.7
	T	28.3	19.1	28.5	15.4
Pokeno W	T	7.9	5.2	9.3	5.7
	R	38.6	28.6	40.6	35.4
All		**26.1**	**15.9**	**26.3**	**14.3**
Signal Cycle Time		88	50	91	60

With the TaTa Valley worst-case traffic added there is a small increase in average delay in the AM peak with no changes to LOS. In the PM peak the performance of the intersection changes with some movements better and some worse, and improved slightly overall. The right turn out of McLean has moderately high delays, but there is sufficient headroom in the signal cycle time to provide some additional capacity. As the worst-case traffic generation is not expected to occur regularly, no mitigation is considered to be necessary at this intersection.

6.3.5 Pokeno Road / Gt South Road

This intersection is currently priority-controlled, and is signal controlled in the PC21-2027 and PW-2021 scenario, although the PW layout is different.

Table 32: Pokeno/ Gt South. Average Delay and Level of Service - AM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2027	PW-2021	2027	PW-2021
Gt South S	L	11.8	7.3	12.7	9.5
	T	24.5	36.8	27.8	37.5
Gt South N	T	9.2	12.7	9.2	12.4
	R	19.3	30.8	24.6	39.8
Pokeno	L	9.2	9.1	8.8	9.3
	R	26.0	23.7	27.1	30.9
All		**16.4**	**20.4**	**18.2**	**24.7**
Signal Cycle Time		50	50	50	60

Table 33: Pokeno/ Gt South. Average Delay and Level of Service - PM Peak Hour – Worst Case

Approach	Turn	Without Proposal		With Proposal	
		2027	PW-2021	2027	PW-2021
Gt South S	L	10.2	6.4	11.1	6.4
	T	26.3	32.1	36.6	37.8
Gt South N	T	6.0	9.9	8.4	10.4
	R	28.6	34.4	41.4	44.8
Pokeno	L	19.2	17.0	24.9	19.0
	R	45.3	28.8	56.3	31.1
All		**23.0**	**19.7**	**31.0**	**22.9**
Signal Cycle Time		70	60	100	60

The performance in each peak is similar in each case. Some of the movements in the PM peak period have a poorer level of service with the worst-case trip generation; however, due as that level of traffic is not expected to occur frequently no mitigation is considered necessary.

6.3.6 Summary

Overall, the addition of the TaTa Valley traffic to the network is not expected to significantly change the operation of any intersection. The right turn into Pokeno Road from Helenslee Road would operate poorly in the PM peak, although the volume of traffic undertaking that movement is small and is unlikely to justify the installation of traffic signals; although the additional traffic from TaTa Valley would contribute to the need to eventually install signals at this intersection as recommended by the Pokeno West ITA.