

**Before the Hearing Panel
Appointed by the Gore District Council**

In the Matter of

The Resource Management Act
1991 (**Act**)

And

In the Matter of

the Proposed Gore District Plan

**Statement of Evidence of
Jason Alexander Bartlett
for McNabb Management Limited**

Dated: 7 October 2024

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Table of Contents

INTRODUCTION	2
SCOPE OF EVIDENCE.....	2
EXECUTIVE SUMMARY	3
BACKGROUND AND ROLE	4
TRAFFIC ASSESSMENT	5
CONCLUSION	15
ANNEXURE A – TRAFFIC GENERATION AND DISTRIBUTION.....	16
ANNEXURE B – AUSTROADS INTERSECTION WARRANT	17
ANNEXURE C – INTERSECTION MODEL OUTPUTS	18

INTRODUCTION

Qualifications and Experience

1. My name is Jason Alexander Bartlett.
2. I hold a Bachelor of Engineering from the University of Canterbury awarded in 1996. I have been a Member of Engineering New Zealand (MEngNZ) since 1995 and obtained the New Zealand Certificate in Engineering, Civil Option 1993.
3. I have over twenty five years' experience in road design, network management, traffic and transportation engineering including nine years in the UK. During my time in the UK I became a Chartered Engineer (CEng) and a Member of the Institution of Civil Engineers (MICE).
4. Since April 2008 I have been working as a traffic and transportation engineer in Queenstown. The first four of those years was for GHD Limited. I now operate my own traffic and transport engineering consultancy, Bartlett Consulting, which I established in July 2012.
5. I have been a practicing consultant involved in a wide range of developments, district plan policy development and the preparation and presentation of expert evidence before Councils and the Environment Court.

Code of Conduct

6. Whilst this is not an Environment Court hearing I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on material produced by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

7. My evidence will deal with the following:
 - (a) Background and role;
 - (b) Description of requested zoning;
 - (c) Traffic assessment; and
 - (d) Conclusions.

EXECUTIVE SUMMARY

8. I have undertaken a transport assessment to assess potential transport effects as a result of the requested zoning at 10 McKinnon Road, McNab. The requested rezoning includes:
 - (a) 2Ha of Māori Special Purpose Zone;
 - (b) 52.7Ha of Rural Lifestyle Zone; and
 - (c) 44.8Ha of Light Industrial Zone (McNab Precinct) to be provided in two parts including 2Ha adjacent to McKinnon Road and a larger 42.8Ha portion located adjacent to SH1.
9. My transport assessment indicates that, at average traffic generation rates, that the requested zoning can be accommodated within the road network with some intersection improvements at the intersection of McKinnon Road with SH1.
10. My transport assessment identifies provisions which may be integrated into the zone provisions for the larger (42.8Ha) portion of the Light Industrial Zone (McNab Precinct).
11. My modelling suggests that proposed the Light Industrial Zone activities (McNab Precinct) provisions should include:
 - (a) A buffer or screen on or near the State Highway 1 boundary;
 - (b) Upgrade the left turn treatment from SH1 to McKinnon Road;
 - (c) A traffic assessment undertaken prior more than 30% of the of McNab Precinct being developed; and
 - (d) A traffic assessment undertaken prior to more than 55% of the McNab Precinct being developed.
12. These provisions will allow for the required transport infrastructure, the monitoring and management of traffic effects and allow for the consideration and timing of alternative site access from SH1 or route options which may be required if the site traffic generation and/or background traffic growth are greater than anticipated in my traffic modelling.
13. Overall, I consider that the proposed rezoning will have noticeable transport effects as a result of additional traffic within the road network. With the upgrade of the left turn treatment, I am confident that effects will be able to be appropriately managed initially. This transport effect can then be monitored at an appropriate time through

my recommended zone provisions. These zone provisions allow for additional transport measures to be considered, if necessary, as the development of the Light Industrial Zone (McNab Precinct) progresses.

14. I consider that with appropriate zone provisions, there are no transport reasons to prevent zoning at 10 McKinnon Road as requested by the Submitter.

BACKGROUND AND ROLE

15. In June 2024 I was asked by the Submitters, McNabb Management Limited, to review the proposed rezoning of 10 McKinnon Road (**Site**) and related access provisions from both McKinnon Road and from Waipahi Highway (SH1). At this point I was also asked to review the Further Submission of Waka Kotahi NZ Transport Agency (**NZTA**) and their concerns with access from SH1. Since this initial engagement I have also been asked to assess the potential transport effects of the requested rezoning and to consider any possible zone provisions.
16. I have prepared this evidence including a transport assessment of the proposed rezoning and identify potential transport effects. In the preparation of this evidence I have liaised with NZTA regarding the requested zoning proposal and how access to the site may be possible.
17. In preparing this evidence I have reviewed the Site, being Lot 2 DP5980, Pt Sec 17 Blk I Waikaka SD & Lot 1 DP1293 and including Lot 1 DP2793 & Lot 1 DP5732. This also included review of a possible access from McKinnon Road, the intersection of McKinnon Road with SH1, the local road network and potential access routes. I am familiar with the Site and the surrounding road network.

DESCRIPTION OF REQUESTED ZONING

18. The Submitters propose to rezone the Site to enable the following:
 - (a) 2Ha of Māori Special Purpose Zone which would accommodate the relocation of the existing Marae currently located at the intersection of McKinnon Road with SH1 (at Lot 1 DP2793 & Lot 1 DP5732);
 - (b) 52.7Ha of Rural Lifestyle Zone which is greater than the originally proposed area of Rural Lifestyle within the site; and
 - (c) 44.8Ha of Light Industrial Zone (in two parts) to enable predominately rural industry activities (McNab Precinct) located close to the General Rural Zone and major transport corridors.

19. The Site, following rezoning, will have access from McKinnon Road. This will result in effects on the transport network, on McKinnon Road and at the nearby intersection McKinnon Road with SH1.

TRAFFIC ASSESSMENT

Existing Transport Network

20. McKinnon Road is a rural access road¹. This road provides a link between McNab and Northern Southland via the Mataura River valley, Mandeville or Riversdale. This route would avoid travelling through Gore (SH1/SH94). Observations suggest that this route is used by some heavy vehicles. McKinnon Road also provides access to the residential areas of East Gore via Talbot Street or Wentworth Street. McKinnon Road is considered to be a low volume road with an estimated (2023) traffic flow of 144 vehicles per day (vpd)². I suspect that in reality the existing traffic flow on McKinnon Road would be slightly higher than the estimate.
21. As a rural road, McKinnon Road has a speed limit of 100km/hr. At the Site McKinnon Road passes through a very tight 90-degree curve with an advisory speed of 35km/hr with a short length between this tight curve and the intersection with SH1. The McKinnon Road approach to the SH1 intersection, and the Talbot Street intersection will have a low operating speed, less than 35km/hr.
22. Talbot Street provides local access between McKinnon Road (McNab) and the residential area of East Gore. Talbot Street has an estimated (2023) traffic flow of 278vpd³. I suspect that in reality the existing traffic flow on Talbot Street would be slightly lower than the estimate. However, the combination of the estimated Talbot Street traffic flow, with the estimated McKinnon Road traffic flow (approximate 450vpd) would be an appropriate basis for the assessment of local traffic on the McKinnon Road approach to the SH1 intersection.
23. At the Site Waipahi Highway (SH1) is a Regional Highway providing a major transport route between Southland and Gore to Otago and Dunedin or to central Otago via SH90 (Tapanui). SH1 is a rural state highway with a speed limit of 100km/hr. The intersection with McKinnon Road is on the outside of a large radius curve with an advisory speed of 85km/hr. The operating speed of SH1 at the intersection with McKinnon Road is expected to have an operating speed of approximately 90km/hr and less than the 100km/hr speed limit at this location.

¹ Access Road is the classification from the Waka Kotahi (NZTA) One Network Road Classification.

² From Mobile Road (mobileroad.org) estimated Average Daily Traffic is 144vpd with 21.32% heavy vehicles dated 23/05/2023.

³ From Mobile Road (mobileroad.org) estimated Average Daily Traffic is 278vpd with 17.7% heavy vehicles dated 23/05/2023.

24. SH1 is managed by NZTA who has provided traffic counter data from their nearest automated traffic counter⁴ which is located adjacent to the site, on SH1 between Waikaka Valley Highway (SH90) and Ballast Road. This traffic data is directly relevant to the intersection with McKinnon Road. The data shows a relative consistent traffic flow over the last 5 years with an annual average daily traffic (AADT) flow of 4,540vpd in 2023 which is a slight decrease from a peak traffic flow in 2018 of 4,607vpd. The data included hourly traffic flow, the traffic profile is generally flat throughout the day (09:00 to 18:00) with a peak in the pm period (16:00 to 18:00) of 381 vehicles per hour (vph) in 2023⁵ and equivalent in 2019, 2021 being approximately 8% of the daily traffic flow.
25. At the McKinnon Road intersection, SH1 has been locally widened and the carriageway includes a marked right turn bay to McKinnon Road as a rural channelised right turn treatment (**CHR(s)**), which is appropriate for low to moderate turning volumes. The intersection arrangement includes seal widening only to provide additional space for left turning vehicles being a rural basic left turn treatment (**BAL**). This intersection arrangement appears to be appropriate for the current and existing traffic.
26. Within the last 5 years, 2019 to 2024 inclusive, there has been a single (1) non injury single vehicle crash to the west of SH1 intersection with McKinnon Road. Historically there have been a number of non-injury and minor injury crashes at this intersection or approaching this intersection. Overall, there is no identified systemic safety concern with the intersection or approach alignment.
27. For completeness, there are no public transport services established in Gore and the site is not served by any specific pedestrian and cycle networks.

Traffic Generation and Distribution

Māori Special Purpose (Marae)

28. The Submission requests 2Ha of Māori Special Purpose Zone which will enable the relocation of the existing Marae currently located near to the intersection of McKinnon Road with SH1 (Lot 1 DP2793 & Lot 1 DP5732).
29. As this aspect enables the relocation of an existing activity, this has not been considered within the transport assessment as any traffic generated by this activity are already considered within the existing road environment. However, it is acknowledged that the larger zoned area for this activity may enable greater development which would need to be undertaken through the consenting process.

⁴ From Gore Telemetry Site 45, site reference 01S00854.

⁵ Based on the average peak pm traffic flow in 2023.

Rural Lifestyle (Residential)

30. The submission requests 52.7Ha of Rural Lifestyle Zone. Based on the masterplan⁶ this could result in a possible development area of 42.3Ha⁷ or a maximum possible yield of 42 lots (residential dwellings). This will be slightly larger than the originally proposed rural lifestyle area within the site.
31. The NZTA research report 453 (RR453) provides traffic generation rates for a variety of residential activities including rural residential. This document suggests an average (50th percentile) peak hourly traffic generation rate of 1.1vph/dwelling⁸ increasing to a design (85th percentile) peak traffic generation rate of 1.4vph/dwelling. For residential activities the peak traffic generation rate typically occurs in the am peak period. The pm peak period traffic generation rate is usually less, say 80%, suggesting a pm peak period traffic generation of 37vph increasing to 47vph when considering the design (85th percentile) rate.

Light Industrial

32. The Submission requests 44.8Ha (in two parts)⁹ of Light Industrial Zone to enable predominately rural industry activities (McNab Precinct).
33. The area of Light Industrial Zoning includes 2Ha of land adjacent to McKinnon Road which is to become a transport yard. This element of the zoning has therefore been considered at an early stage of development whilst the remaining area, the larger portion of 42.8Ha adjacent to SH1, has been considered as future development.
34. It is expected that light industrial area would be developed to accommodate transport yards, agricultural equipment sales, agricultural equipment and transport servicing and other similar activities to aid the transport and agricultural industries. These are generally yard based activities similar to current activities which are visible in parts of Gore such as the Charlton Road/Racecourse Road area or the Hokonui Drive (SH94)/Ordsal Street area. These types of activities would have a typical built area of less than 20% of the available development site area. I expect this portion of the Site will be divided into smaller areas (lots) for specific activities. It is possible that some areas may be up to 5Ha whilst others may be 5,000m². I have considered the area as a whole with a potential maximum development site

⁶ Refer Southern Horizons, 23051 Plan 01 dated 1/10/24.

⁷ Allows for no build areas; Mahinga Kai Overlay and Flood susceptible and Access, approximately 10Ha.

⁸ Refer NZTA research report 453 (RR453) Based on the 50th percentile traffic generation rate, refer

⁹ Refer Southern Horizons, 23051 Plan 01 dated 1/10/24. Includes 2Ha adjacent to McKinnon Road and 42.8Ha adjacent to SH1.

area of 35.8Ha (in two parts)¹⁰, excluding no build areas such as flood susceptible areas and access (roads).

35. I have reviewed the Trips Database Bureau (**TDB**) traffic generation rates for similar industrial activities. The TDB records surveyed traffic generation rates for 5 general industrial subdivisions located in Christchurch and Hamilton. It is possible that general industrial activities in these areas will have a higher traffic generation rate than the proposed Light Industrial Zone at the Site as these are within larger urban areas rather than the requested rezoning which will remain rural in nature. The three sites in Christchurch also provides the traffic generation based on built floor area. This suggests that the surveyed sites have a general built area of approximately 20%. These adopted general industrial traffic generation rates will therefore provide a robust representation of the anticipated development within the areas of requested Light Industrial Zone.
36. The survey of general industrial sites suggests an average pm peak hour traffic generation rate of 0.23vph/100m² of site area increasing to an 85th percentile traffic generation rate of 0.35vph/100m² of site area. For the total 35.8Ha developable site area this suggests that the proposed Light Industrial Zone may have pm peak period traffic generation, at full development, of 823vph increasing to 1,253vph when considering the higher 85th percentile rate. It is noted that the surveyed pm peak traffic generation rate is slightly higher than the am peak traffic period.
37. I have discussed the proposed zoning and anticipated modelling with Waka Kotahi NZ Transport Agency (NZTA) who have requested that the Light Industrial Zone adjacent to SH1 is to include a buffer or screen on or near the SH1 boundary to prevent light glare to drivers on SH1 from activities within the Zone. The proposed buffer or screen will be on the northern side of SH1 and therefore the height, or position must not result in shading of the State highway during winter months.

Site Traffic Generation

38. The existing road network has a greater traffic volume in the pm peak period. This is reflected in the light industrial traffic generation. This suggests that the greatest traffic effects will be during the pm traffic periods when traffic volumes are highest. For this reason, only the pm peak period has been modelled and assessed. The pm traffic period will include a high traffic proportion turning right from McKinnon Road to SH1 towards Gore which is the traffic flow most susceptible to queuing and delay and therefore a robust indicator of network efficiency.

¹⁰ Refer Southern Horizons, 23051 Plan 01 dated 1/10/24. Includes 2Ha adjacent to McKinnon Road and 33.8Ha (42.8 less 9Ha for flood susceptible and access) adjacent to SH1.

39. The greatest traffic effects will be at the intersection of McKinnon Road with SH1. To get a better understanding of the traffic effects a number of traffic scenarios have been considered, these are:
- (a) Existing traffic, review the existing pm traffic flows to assess the existing, modelled, traffic efficiency and likely queuing at the intersection as a basis for comparison;
 - (b) Short term development, being a review of the possible traffic generation of the short term development of the site including the relocation of the Marae Māori Special Purpose Zone and establishment of 2Ha of Light Industrial Zone (transport yard) adjacent to McKinnon Road;
 - (c) Residential development within the Rural Lifestyle Zone to assess any changes needed within the existing road network to better accommodate the development within the Rural Lifestyle Zone; and
 - (d) Light industrial development and any changes needed to better accommodate the industrial development and to assess the need for any development triggers to be included within the Light Industrial Zone provisions.
40. This approach means that there is a simple and logical approach which can be applied to traffic distribution and modelling. In this respect **Annexure A** provides the traffic distribution at the McKinnon Road intersection with SH1.

Traffic Modelling

Austroads Intersection Warrant

41. Austroads guidance provides a simple warrant to justify different intersection turn treatment based on traffic flow¹¹. The traffic flow scenario discussed above have been reviewed against the intersection warrant to test the current McKinnon Road intersection with SH1 formation to assess any needed upgrades to support the requested zoning.
42. A review of the intersection turn treatment warrant based on the traffic flow from the proposed zoning (refer **Annexure B**) suggests the following:
- (a) The existing intersection of McKinnon Road and SH1 has the appropriate turn treatments for the current (existing) traffic flows of SH1 and McKinnon Road.

¹¹ Refer Austroads Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings Management, Figure 3.25: Warrants for turn treatments on major roads at unsignalised intersections.

- (b) The short term development including the relocation of the Marae (2Ha Māori Special Purpose Zone) and the transport yard (2Ha of Light Industrial Zone) will increase traffic flows at the intersection SH1 with McKinnon Road. This increase does not warrant any changes to the existing intersection turn treatments.
 - (c) The residential development will further increase traffic flows at the intersection of SH1 with McKinnon Road. At average traffic generation, the residential development can be accommodated within the existing intersection turn treatments. However, an upgrade to the left turn treatment, to a channelised left turn treatment (CHL)¹² may be justified to accommodate the full development of the Rural Lifestyle Zone. This is based on the 85th percentile traffic generation rates, or high background traffic growth which are possible.
 - (d) The development of the larger (42.8Ha) portion of the Light Industrial Zone will warrant the upgrade of the SH1 intersection with McKinnon Road to include a channelised left turn treatment (CHL). Even at a low level (20%) of this development the identified intersection upgrade will be warranted.
43. Based on the traffic modelling undertaken using the Austroads intersection warrant, this suggests that the intersection of SH1 and McKinnon Road will need to be upgraded to facilitate any development of the larger (42.8Ha) portion of the requested Light Industrial Zone. The intersection upgrade would include a dedicated left turn lane from SH1 to McKinnon Road. There is sufficient space within the existing road reserve area to accommodate this upgrade and no further land will be required.
44. It is recommended that the provisions for the Light Industrial Zone include the provision of an upgraded left turn treatment, such as a channelised left turn treatment prior to any development of the larger (42.8Ha) portion of the requested Light Industrial Zone. This upgrade turn treatment will not be necessary initially, it will become necessary as the larger Light Industrial Zone is developed.

Traffic Modelling (SIDRA)

45. Traffic modelling using SIDRA software can be used to assess the operational efficiency of the intersection and to predict delay time (level of service) and queue length as a result of increased traffic. The worst case traffic will be the right turning traffic from McKinnon Road to SH1 which will be greatest in the pm peak period.

¹² The Warrant (refer Annexure B) justifies an Auxiliary Left Turn (AUL) treatment but NZTA does not support this intersection type.

46. The traffic modelling undertaken (refer **Annexure C**) based on the traffic flow from the proposed zoning suggests the following:
- (a) The existing intersection will have minimal queuing. Generally this will be no more than 1 vehicle from SH1 to McKinnon Road and similar queue length (no more than 1 vehicle) on McKinnon Road. Turning traffic, either right turning from SH1 to McKinnon Road, or turning from McKinnon Road will have a delay of between 8 seconds to 9.8 seconds and corresponds to a level of service A for all intersection approaches.
 - (b) The short term development, the relocation of the Marae (2Ha Māori Special Purpose Zone) and the transport yard (2Ha of Light Industrial Zone), will increase traffic flows at the intersection of SH1 with McKinnon Road. This increase will have a minor increase to queuing and delay. The right turn, from SH1 to McKinnon Road, will have an increased delay of 0.1 to 0.2 seconds although still level of service A, the queue length does not change. The right turn from McKinnon Road will have increased delay time of between 0.4-0.6 seconds. This minimal change in delay is from 9.8 seconds to 10.4 seconds being a change in level of service from A to B. There is no change in the queue length being no more than 1 vehicle. Overall, this shows that the introduction of short term development including the 2Ha Māori Special Purpose Zone and 2Ha of the Light Industrial Zone is unlikely to have any noticed traffic effects on the overall operation or efficiency of the intersection of SH1 with McKinnon Road.
 - (c) The residential development will further increase traffic flows at the intersection of SH1 with McKinnon Road. However, the overall operation of the intersection remains unchanged with delay times increasing by only 0.2-0.4 seconds, queue lengths remain at not more than 1 vehicle. This suggests that full development of the Rural Lifestyle Zone is unlikely to have any noticed traffic effects on the overall operation or efficiency of the intersection of SH1 with McKinnon Road.
 - (d) Prior to any development of the larger (42.8Ha) portion of the Light Industrial Zone (that is after the initial 2ha is developed), the left turn treatment from SH1 to McKinnon Road will require upgrading to a Channelised left turn treatment.
 - (e) At 30% development of the larger (42.8Ha) portion of the Light Industrial Zone the right turn queue from McKinnon Road will extend to 2 vehicles when considering the 85th percentile traffic generation rates, or high background traffic growth. At this time the turning delay for this manoeuvre will increase to 13.4 seconds, being level of service B. At this stage the

intersection of SH1 with McKinnon Road will have been upgraded to meet the Austroads Warrant which does also increase the overall intersection capacity. At the higher 85th percentile traffic generation rates, or high background traffic growth scenario queuing will begin to extend into the intersection of McKinnon Road with Talbot Street. This same overall intersection efficiency would be reached at 50% development under the average traffic generation rates scenario. This suggests that queuing for the right turn from McKinnon Road to SH1 towards Gore may begin to effect traffic at the McKinnon Road intersection with Talbot Street.

- (f) The upgraded intersection of SH1 with McKinnon Road can accommodate the full development of the requested zoning including, 100% of the Light Industrial Zone, with average traffic generation rates. At this level of development, the SH1 approaches will operate at level of service A. The McKinnon Road approach, right turn to SH1 towards Gore, will have a delay of less than 20 seconds and level of service C. The queue length at this stage will be no more than 7 vehicles meaning this queue length will begin to extend to the existing 90 degree curve on McKinnon Road and the site access intersection. This is an acceptable operating efficiency for an intersection onto SH1. When considering the higher 85th percentile traffic generation rates, or high background traffic growth scenario this same intersection efficiency will be reached at 55% of the development of the light industrial zone land.

- 47. I recommend that the Light Industrial Zone provisions include a transport assessment at the time when queuing may extend into adjacent intersections, either Talbot Street intersection or the site access intersection from McKinnon Road. This would result in a transport assessment being required at 30% of development of the larger (42.8Ha) portion to assess effects of queuing at the Talbot Street intersection, and at 55% of development of the larger (42.8Ha) portion to assess effects of queuing at the site access intersection from McKinnon Road. These triggers are at the earliest time where queuing may influence intersection operation to allow the assessment based on actual traffic flows and to assess the need for an alternative SH1 access intersection or to consider alternative transport routes for the site.

Local Road Network

Talbot Street Intersection

- 48. The Talbot Street intersection with McKinnon Road is located approximately 20m from the SH1 intersection. This is not ideal as there is a very short separation distance. It is possible that the 90 degree curve on McKinnon Road assists in that approach speeds on McKinnon Road are kept to low, less than 35km/hr.

49. As identified in the modelling above, the queuing on the McKinnon Road approach to SH1 will extend to, and through, this intersection. As a staging point there will only be minimal effect on this intersection at the initial stages of development with the site. The development of the residential area in the Rural Lifestyle Zone will also have minimal effect on this intersection.
50. At a point, likely to be between 30% and 55% industrial development, it is possible that queueing on the McKinnon Road approach will extend to this intersection (2 vehicles). At this point it is possible to provide a 'keep clear', or similar, restriction within the intersection area to avoid blocking of this intersection. I suggest that a transport assessment is undertaken at this stage of development to consider:
- (a) Any specific intersection improvements required at the Talbot Street intersection with McKinnon Road;
 - (b) Any requirement for alternative site access or route options as a result of projected traffic generation; and
 - (c) The timing of implementation for any required alternative access or route options.
51. It is recommended that the Light Industrial Zone provisions include the provision of a transport assessment at the time that there may be queueing at the Talbot Street intersection at 30% of development of the larger (42.8Ha) portion of the requested Light Industrial Zone.

McKinnon Road and Access Intersection

52. It is expected that the site access from McKinnon Road would be formed at the existing 90 degree curve. This curve is currently posted with a 35km/hr advisory speed and is an appropriate location to form an access intersection given the low overall approach speed as result of the existing alignment.
53. It would be appropriate for the access intersection to be formed as a T-intersection. This would be formed based on resource consent for the formation of roads providing access to the Rural Lifestyle or the (larger portion) of the Light Industrial Zoning areas.
54. As identified in the modelling above it is possible that the full development of all the Light Industrial and Rural Lifestyle Zoning can be completed without impacting on an access intersection at the existing 90 degree bend based on the average traffic generation rates. However, should the proposed industrial development have a higher 85th percentile traffic generation rate, or higher background traffic growth scenario, traffic from the SH1 intersection could queue into the site access

intersection. This could occur at 55% of the of development of the larger (42.8Ha) portion of the requested Light Industrial Zone. I recommend that a transport assessment is undertaken at this stage of development to consider:

- (a) Any requirement for alternative site access or route options as a result of projected traffic generation; and
- (b) The timing of implementation for any required alternative access or route options.

Transport Assessment Findings

55. My assessment identifies a number of elements which will need to be considered for the development of the larger (42.8Ha) portion of the Light Industrial Zone (McNab Precinct). I consider that these can be appropriately assessed and monitored at certain development triggers within the zone provisions.

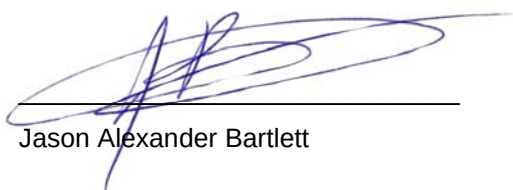
56. My modelling suggests that a number of trigger mechanisms will be needed to monitor and guide development within the requested zones. I recommend that the following trigger mechanisms are integrated into the proposed Light Industrial Zone activities (McNab Precinct) provisions:

- (a) A buffer or screen is to be established on or near the State Highway 1 boundary to prevent light glare to drivers on State Highway 1 as a result of activities within the precinct. The buffer or screen may not result in shading of the State Highway during winter months.
- (b) Prior to the operation of any industrial or rural service business within the McNab Precinct a left turn lane shall be constructed to the satisfaction of NZTA.
- (c) A traffic assessment must be undertaken prior to more than 30% of the McNab Precinct being developed to assess:
 - (i) Any specific intersection improvements required at the Talbot Street intersection with McKinnon Road;
 - (ii) Any requirement for alternative site access or route options as a result of projected traffic generation; and
 - (iii) The timing of implementation for any required alternative access or route options.
- (d) A traffic assessment must be undertaken prior to more than 55% of the McNab Precinct being developed to assess:

- (i) Any requirement for alternative site access or route options as a result of projected traffic generation; and
- (ii) The timing of implementation for any required alternative access or route options.

CONCLUSION

- 57. I have undertaken a transport assessment to assess potential transport effects as a result requested zoning at 10 McKinnon Road, McNab.
- 58. At average traffic generation rates the requested zoning can be accommodated within the road network with some intersection improvements at the intersection of McKinnon Road with SH1.
- 59. My transport assessment identifies provisions which may be integrated into the zone provisions for larger Light Industrial Zone (McNab Precinct). Overall, I consider that the proposed rezoning will have noticeable transport effects as a result of additional traffic within the road network. This transport effect can be monitored at appropriate time through my recommended zone provisions. These zone provisions allow for additional transport measures to be considered, if necessary, as the development of the Light Industrial Zone (McNab Precinct) progresses.
- 60. I consider that with appropriate zone provisions that there are no transport reasons to prevent zoning at 10 McKinnon Road as requested by the Submitter.



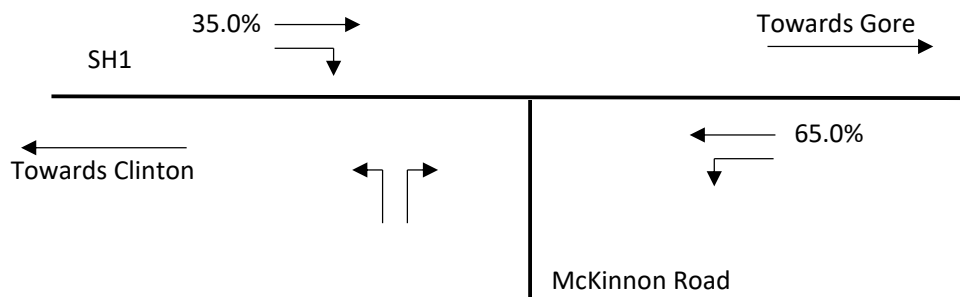
Jason Alexander Bartlett

7 October 2024

ANNEXURE A – TRAFFIC GENERATION AND DISTRIBUTION

Following is:

- Existing traffic distribution, includes; state highway traffic distribution, McKinnon Road traffic distribution and combined existing traffic volumes (average and 85th percentile).
- Proposed development traffic generation (average and 85th percentile).
- Proposed development traffic distribution and development traffic flows for; short term development, average traffic generation and 85th percentile traffic generation.
- Combined traffic flows for; short term development, average traffic generation and 85th percentile traffic generation.



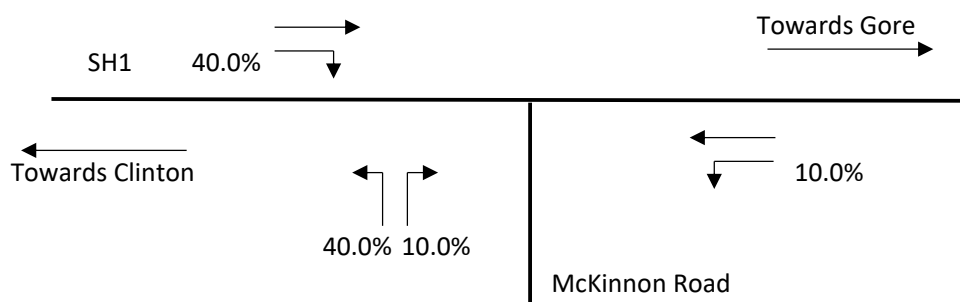
Based on:

Averaged annual daily traffic (AADT) on SH1 between 2018 and 2023 fluctuates between 4240vpd in 2020 to 4607vpd in 2018, 2023 AADT is 4540vpd.

Peak traffic period is in the pm peak period, between 4pm and 6pm, suggesting that there is a general out of Gore traffic flow.

Average pm peak period traffic flow varies between 359vph (8%) in 2020 and 395vph (9%) in 2018, 2023 pm peak is 381vph (8%).

SH1 McKinnon Road Intersection, McKinnon Road existing peak pm traffic distribution



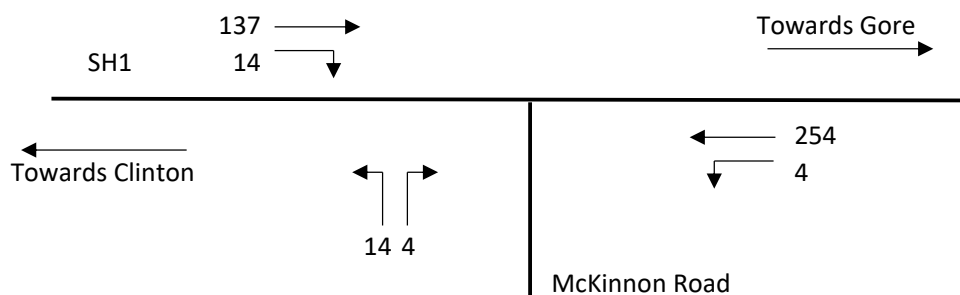
Based on:

Estimated average daily traffic (ADT) on McKinnon Road is 144vpd with 278vpd on Talbot Street, from www.mobileroad.org dated 23/05/2023 - 450vpd at SH1.

Assumes that peak period is the same as SH1 being in the pm peak period with a generally out of Gore traffic flow.

Existing 2023 pm peak period traffic flow at SH1 is assumed similar to SH1 being 35vph (8%).

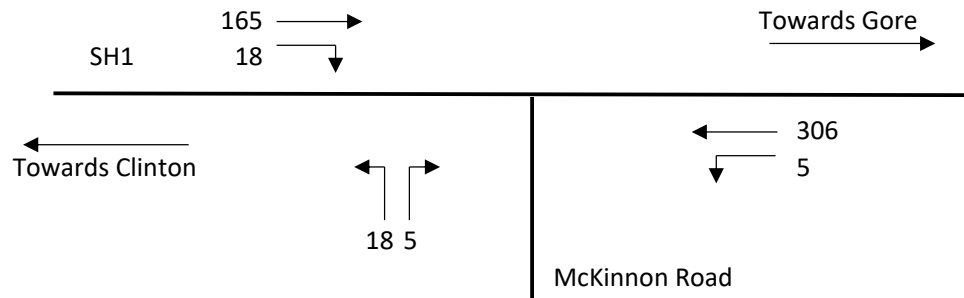
SH1 McKinnon Road Intersection, combined existing peak pm (average) traffic



Based on:

390 vph based on SH1 traffic over the last 6 years.

35 vph based on estimated McKinnon Road traffic.

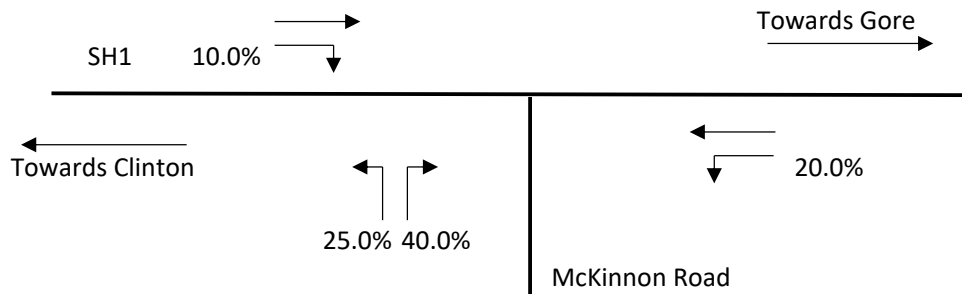


Based on:

470 vph based on 85th percentile hourly traffic flows, approx 10% of daily traffic flows.

45 vph based on 10% of daily McKinnon Road traffic flows.

Activity	Development Area		pm peak traffic generation			
			Rate	Rate Unit	Peak Period Correction	vph
Proposed Development - Short Term						
Transport Yard (Lot 1) - new development	2 Ha	2 Ha SA	Industrial	0.23 per 100m ² SA	100%	46
Marae Site (Lot 2)	2 Ha	Existing				
Relocated from Lot 1 DP5732 & Lot 1 DP2793						
Balance Lot (Lot 3) - Rural (single residential)	95.16 Ha	Existing				
Total Traffic Increase			46			
Proposed Zoning - Average						
Transport Yard (Lot 1) - industrial	2 Ha	2 Ha SA	Industrial (TDB)	0.23 per 100m ² SA	100%	46
Marae Site (Lot 2)	2 Ha	Existing				
Relocated from Lot 1 DP5732 & Lot 1 DP2793						
Industrial - possibly rural industrial	42.8 Ha	33.8 Ha SA	Industrial (TDB)	0.23 per 100m ² SA	100%	777
Rural Residential (min 1Ha Lot size)	52.3 Ha	42 dwellings	Rural Residential (RR453)	1.1 per Dweling	80%	37
Total Traffic Increase			860			
Proposed Zoning - 85th Percentile						
Transport Yard (Lot 1) - industrial	2 Ha	2 Ha SA	Industrial (TDB)	0.35 per 100m ² SA	100%	70
Marae Site (Lot 2)	2 Ha	Existing				
Relocated from Lot 1 DP5732 & Lot 1 DP2793						
Industrial - possibly rural industrial	42.8 Ha	33.8 Ha SA	Industrial (TDB)	0.35 per 100m ² SA	100%	1183
Rural Residential (min 1Ha Lot size)	52.3 Ha	42 dwellings	Rural Residential (RR453)	1.4 per Dweling	80%	47
Total Traffic Increase			1300			



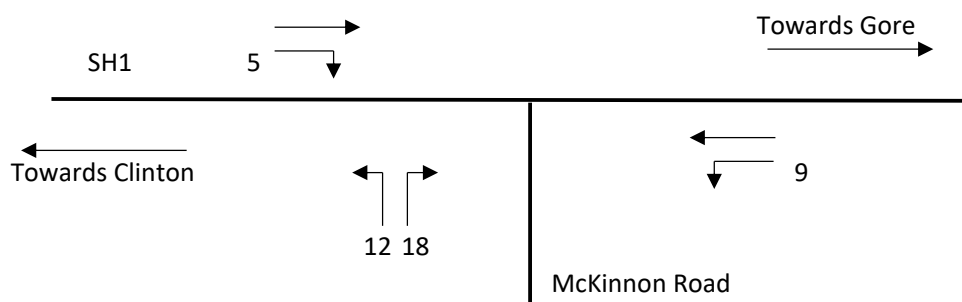
Based on:

Predominant traffic (70%) will leave, the majority will be travelling towards Gore.

Excludes vehicles that travel via McKinnon Road to Gore via Talbot Street or McKinnon Road/Wentworth Street

Allows for 5% traffic to/from Northern Southland via McKinnon Road

SH1 McKinnon Road Intersection, Short Term Development Traffic pm (average) peak traffic

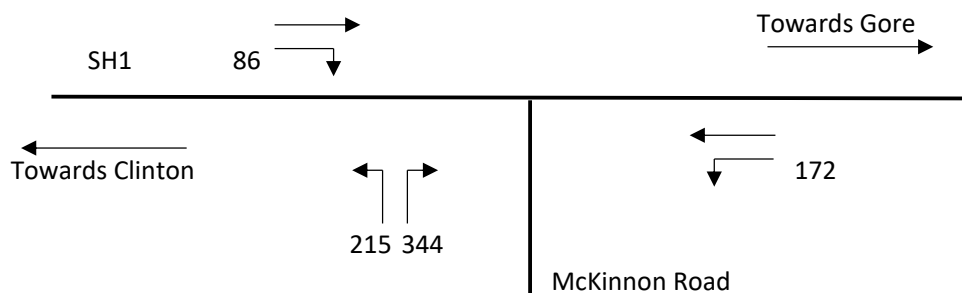


Based on:

46 vph based on average traffic generation rates to the proposed short term development activities

Allow for 2Ha of Industrial activities based on the average traffic generation rate for the developable site area from equivalent industrial subdivisions.

SH1 McKinnon Road Intersection, Development Traffic pm (average) peak traffic

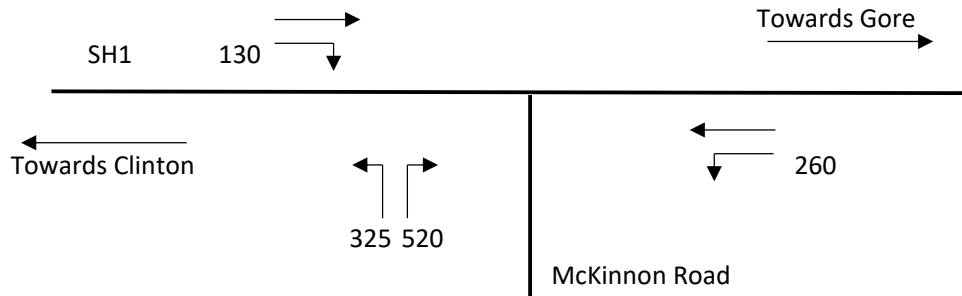


Based on:

860 vph based on average traffic generation rates to the proposed rezoning activities

Industrial activities based on the average traffic generation rate for the developable site area from equivalent industrial subdivisions.

Rural residential development based on average traffic generation rates for dwellings (rural).

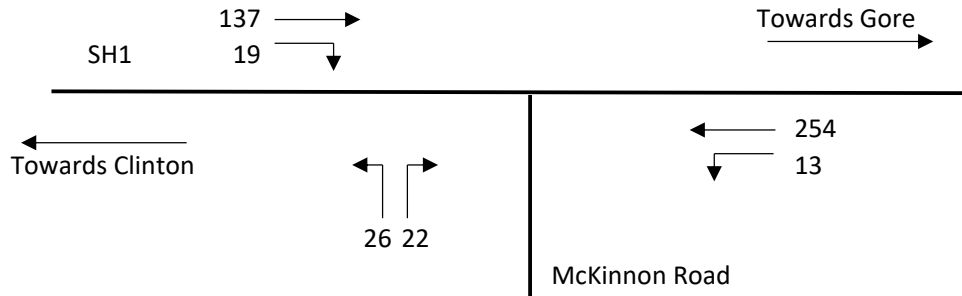


Based on:

1300 vph based on 85th percentile traffic generation rates to the proposed rezoning activities

Industrial activities based on the 85th percentile traffic generation rate for the developable site area from equivalent industrial subdivisions.

Rural residential development based on 85th percentile traffic generation rates for dwellings (rural)



Traffic Flows for Design

Right turn in

 Q_R

19

Left turn in

 Q_L

13

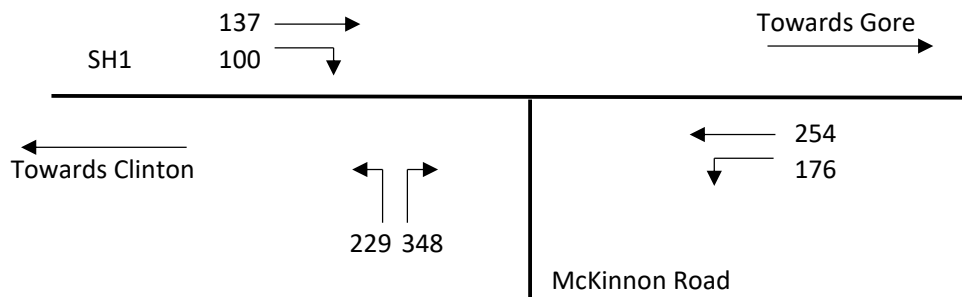
 Q_M

404

 Q_M

254

SH1 McKinnon Road Intersection, Combined Traffic pm (average) peak traffic



Traffic Flows for Design

Right turn in

 Q_R

100

Left turn in

 Q_L

176

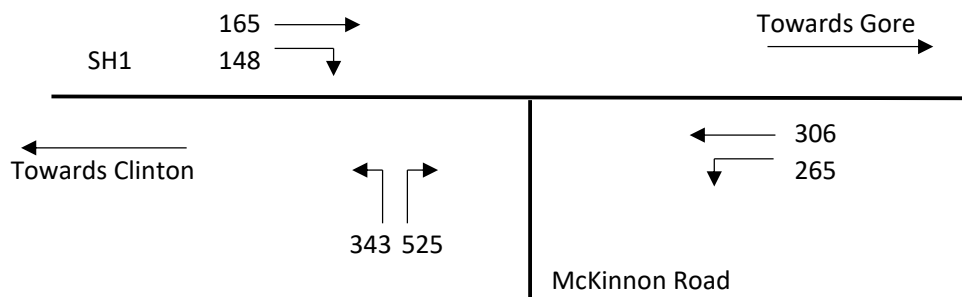
 Q_M

567

 Q_M

254

SH1 McKinnon Road Intersection, Combined Traffic pm (85th percentile) peak traffic



Traffic Flows for Design

Right turn in

 Q_R

148

Left turn in

 Q_L

265

 Q_M

736

 Q_M

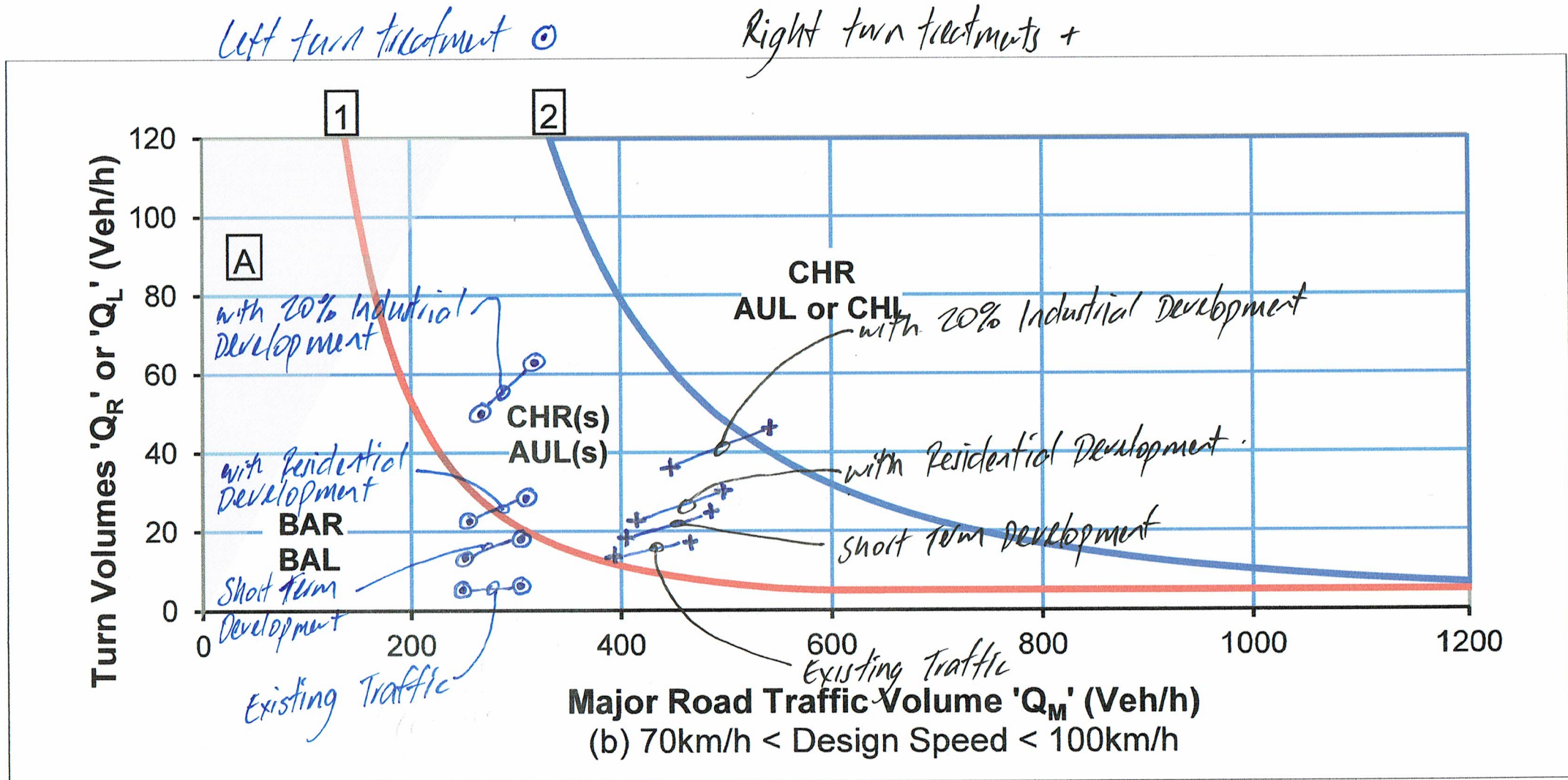
306

ANNEXURE B – AUSTROADS INTERSECTION WARRANT

Following is the turn treatment warrants based on Austroads Guide to Traffic Management, Part 6: Intersections, Interchanges and Crossings Management, Figure 3.25: Warrants for turn treatments on major roads at unsignalised intersections.

This turn treatment assessment is based on the following traffic flow scenario:

- Existing intersection, utilising the average pm peak traffic flow and 85th percentile pm peak traffic flows (high background traffic growth) at the existing (2023) intersection of SH1 and using McKinnon Road.
- Short term development, includes the relocation of the Marae (2Ha Māori Special Purpose Zone) and the transport yard (2Ha of Light Industrial Zone) utilising average and 85th percentile traffic generation rates.
- Residential development, includes the full development of the onsite Rural Lifestyle Zone and utilises average and 85th percentile traffic generation rates.
- Industrial development based on 20% of the larger (42.8Ha) portion of the Light Industrial Zone being developed as a possible low level or possible initial stage of development of the zone, approximately activity area of 6.8Ha.



ANNEXURE C – INTERSECTION MODEL OUTPUTS

Following is modelling output from SIDRA Intersection modelling software including:

- Existing McKinnon Road intersection layout and model output for existing traffic flows; average and 85th percentile.
- Model output for short term development (average traffic generation).
- Model output for residential development (average and 85th percentile traffic generation).
- Upgraded McKinnon Road intersection layout.
- Industrial modelling; 50% and 100% at average traffic generation rates.
- Industrial modelling; 30 and 55% at 85th percentile traffic generation rates.

SITE LAYOUT

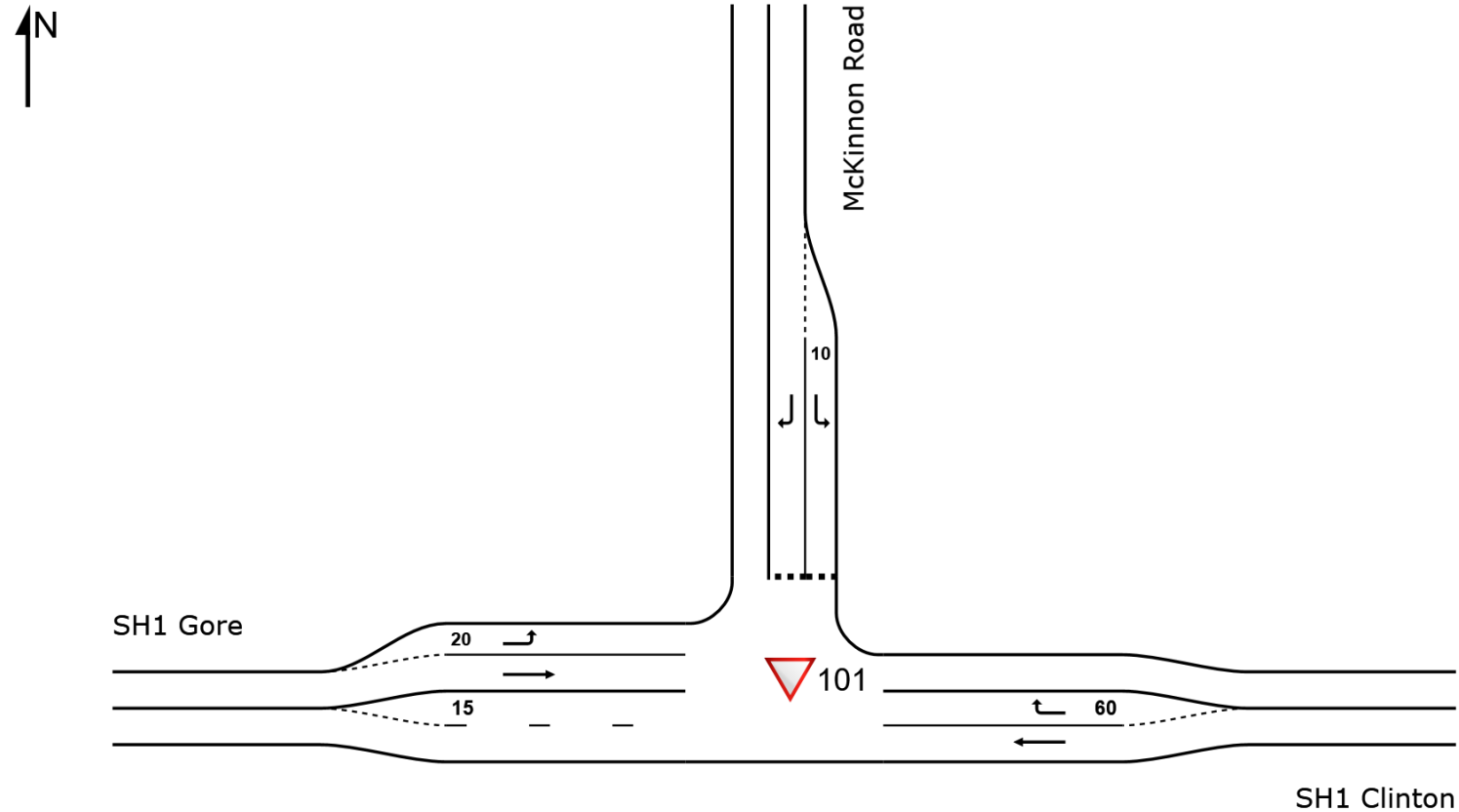
▽ Site: 101 [SH1 McKinnon Exist Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

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



MOVEMENT SUMMARY

▽ Site: 101 [SH1 McKinnon Exist Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	137	13.0	144	13.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
6	R2	14	10.0	15	10.0	0.015	8.8	LOS A	0.1	0.4	0.37	0.63	0.37	54.8
Approach		151	12.7	159	12.7	0.080	0.8	NA	0.1	0.4	0.03	0.06	0.03	84.9
North: McKinnon Road														
7	L2	14	10.0	15	10.0	0.016	5.9	LOS A	0.1	0.4	0.35	0.55	0.35	52.5
9	R2	4	10.0	4	10.0	0.008	8.5	LOS A	0.0	0.2	0.51	0.62	0.51	50.6
Approach		18	10.0	19	10.0	0.016	6.5	LOS A	0.1	0.4	0.39	0.57	0.39	52.0
West: SH1 Gore														
10	L2	4	10.0	4	10.0	0.002	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.9
11	T1	254	13.0	267	13.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		258	13.0	272	13.0	0.147	0.1	NA	0.0	0.0	0.00	0.01	0.00	89.4
All Vehicles		427	12.7	449	12.7	0.147	0.6	NA	0.1	0.4	0.03	0.05	0.03	85.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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 [SH1 McKinnon Exist 85% (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	165	13.0	174	13.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
6	R2	18	10.0	19	10.0	0.020	9.1	LOS A	0.1	0.6	0.41	0.65	0.41	54.7
Approach		183	12.7	193	12.7	0.096	0.9	NA	0.1	0.6	0.04	0.06	0.04	84.6
North: McKinnon Road														
7	L2	18	10.0	19	10.0	0.022	6.3	LOS A	0.1	0.6	0.39	0.58	0.39	52.3
9	R2	5	10.0	5	10.0	0.011	9.8	LOS A	0.0	0.3	0.56	0.67	0.56	49.7
Approach		23	10.0	24	10.0	0.022	7.0	LOS A	0.1	0.6	0.43	0.60	0.43	51.7
West: SH1 Gore														
10	L2	5	10.0	5	10.0	0.003	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.9
11	T1	306	13.0	322	13.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		311	13.0	327	13.0	0.177	0.1	NA	0.0	0.0	0.00	0.01	0.00	89.4
All Vehicles		517	12.7	544	12.7	0.177	0.7	NA	0.1	0.6	0.03	0.06	0.03	84.9

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 [SH1 McKinnon Short Term Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	137	13.0	144	13.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
6	R2	19	10.0	20	10.0	0.020	8.9	LOS A	0.1	0.6	0.38	0.63	0.38	54.8
Approach		156	12.6	164	12.6	0.080	1.1	NA	0.1	0.6	0.05	0.08	0.05	83.4
North: McKinnon Road														
7	L2	26	10.0	27	10.0	0.029	5.9	LOS A	0.1	0.8	0.36	0.57	0.36	52.5
9	R2	22	10.0	23	10.0	0.042	8.9	LOS A	0.2	1.2	0.53	0.69	0.53	50.4
Approach		48	10.0	51	10.0	0.042	7.3	LOS A	0.2	1.2	0.43	0.62	0.43	51.5
West: SH1 Gore														
10	L2	13	10.0	14	10.0	0.008	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.9
11	T1	254	13.0	267	13.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		267	12.9	281	12.9	0.147	0.4	NA	0.0	0.0	0.00	0.03	0.00	88.4
All Vehicles		471	12.5	496	12.5	0.147	1.3	NA	0.2	1.2	0.06	0.11	0.06	80.9

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 [SH1 McKinnon Residential Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	137	13.0	144	13.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
6	R2	22	10.0	23	10.0	0.023	8.9	LOS A	0.1	0.7	0.39	0.64	0.39	54.8
Approach		159	12.6	167	12.6	0.080	1.2	NA	0.1	0.7	0.05	0.09	0.05	82.6
North: McKinnon Road														
7	L2	35	10.0	37	10.0	0.039	6.0	LOS A	0.1	1.0	0.36	0.57	0.36	52.5
9	R2	37	10.0	39	10.0	0.072	9.1	LOS A	0.3	2.0	0.54	0.72	0.54	50.2
Approach		72	10.0	76	10.0	0.072	7.6	LOS A	0.3	2.0	0.45	0.65	0.45	51.3
West: SH1 Gore														
10	L2	21	10.0	22	10.0	0.013	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.9
11	T1	254	13.0	267	13.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		275	12.8	289	12.8	0.147	0.6	NA	0.0	0.0	0.00	0.05	0.00	87.6
All Vehicles		506	12.3	533	12.3	0.147	1.8	NA	0.3	2.0	0.08	0.15	0.08	78.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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 [SH1 McKinnon Residential 85% (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	165	13.0	174	13.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
6	R2	30	10.0	32	10.0	0.035	9.3	LOS A	0.1	1.0	0.43	0.67	0.43	54.5
Approach		195	12.5	205	12.5	0.096	1.5	NA	0.1	1.0	0.07	0.10	0.07	81.8
North: McKinnon Road														
7	L2	37	10.0	39	10.0	0.044	6.3	LOS A	0.2	1.2	0.40	0.60	0.40	52.3
9	R2	52	10.0	55	10.0	0.120	10.8	LOS B	0.4	3.4	0.59	0.81	0.59	49.1
Approach		89	10.0	94	10.0	0.120	8.9	LOS A	0.4	3.4	0.51	0.72	0.51	50.4
West: SH1 Gore														
10	L2	28	10.0	29	10.0	0.017	7.7	LOS A	0.0	0.0	0.00	0.65	0.00	66.9
11	T1	306	13.0	322	13.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		334	12.7	352	12.7	0.177	0.7	NA	0.0	0.0	0.00	0.05	0.00	87.4
All Vehicles		618	12.3	651	12.3	0.177	2.1	NA	0.4	3.4	0.09	0.17	0.09	77.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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.

SITE LAYOUT

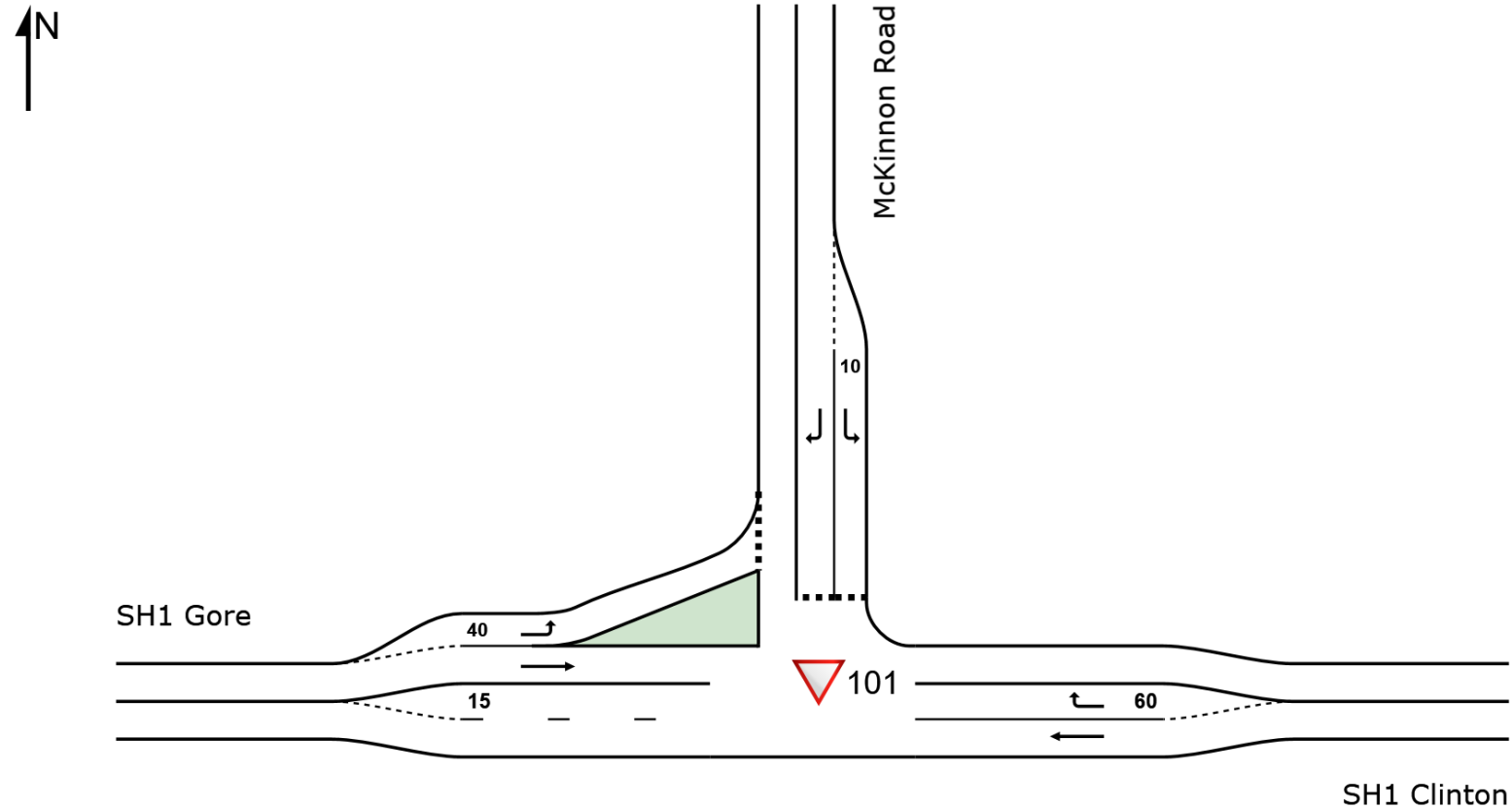
▽ Site: 101 [SH1 McKinnon 100% Industrial Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

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



MOVEMENT SUMMARY

▼ Site: 101 [SH1 McKinnon 50% Industrial Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	137	13.0	144	13.0	0.080	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
6	R2	61	10.0	64	10.0	0.049	8.5	LOS A	0.2	1.6	0.38	0.63	0.38	54.8
Approach		198	12.1	208	12.1	0.080	2.7	NA	0.2	1.6	0.12	0.20	0.12	75.1
North: McKinnon Road														
7	L2	132	10.0	139	10.0	0.117	5.8	LOS A	0.5	3.6	0.38	0.58	0.38	52.4
9	R2	193	10.0	203	10.0	0.364	11.1	LOS B	1.8	14.0	0.64	0.90	0.81	48.8
Approach		325	10.0	342	10.0	0.364	8.9	LOS A	1.8	14.0	0.53	0.77	0.64	50.2
West: SH1 Gore														
10	L2	98	10.0	103	10.0	0.070	8.3	LOS A	0.3	2.2	0.16	0.59	0.16	56.2
11	T1	254	13.0	267	13.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		352	12.2	371	12.2	0.147	2.3	LOS A	0.3	2.2	0.04	0.16	0.04	77.0
All Vehicles		875	11.3	921	11.3	0.364	4.9	NA	1.8	14.0	0.24	0.40	0.28	64.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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 [SH1 McKinnon 100% Industrial Av (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	137	13.0	144	13.0	0.080	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
6	R2	100	10.0	105	10.0	0.081	8.6	LOS A	0.4	2.8	0.39	0.65	0.39	54.8
Approach		237	11.7	249	11.7	0.081	3.7	NA	0.4	2.8	0.16	0.27	0.16	70.8
North: McKinnon Road														
7	L2	229	10.0	241	10.0	0.203	5.9	LOS A	0.9	6.7	0.40	0.60	0.40	52.3
9	R2	348	10.0	366	10.0	0.740	19.7	LOS C	6.7	50.6	0.83	1.32	1.90	43.8
Approach		577	10.0	607	10.0	0.740	14.2	LOS B	6.7	50.6	0.66	1.04	1.31	46.8
West: SH1 Gore														
10	L2	176	10.0	185	10.0	0.131	8.5	LOS A	0.6	4.3	0.22	0.59	0.22	56.0
11	T1	254	13.0	267	13.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		430	11.8	453	11.8	0.147	3.5	LOS A	0.6	4.3	0.09	0.24	0.09	72.0
All Vehicles		1244	10.9	1309	10.9	0.740	8.5	NA	6.7	50.6	0.37	0.62	0.67	57.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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 [SH1 McKinnon 30% Industrial 85% (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [Veh/h %]		DEMAND FLOWS [Total HV] [Veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	165	13.0	174	13.0	0.096	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
6	R2	65	10.0	68	10.0	0.056	8.8	LOS A	0.2	1.8	0.42	0.66	0.42	54.7
Approach		230	12.2	242	12.2	0.096	2.5	NA	0.2	1.8	0.12	0.19	0.12	76.1
North: McKinnon Road														
7	L2	136	10.0	143	10.0	0.128	6.1	LOS A	0.5	4.0	0.42	0.62	0.42	52.3
9	R2	194	10.0	204	10.0	0.422	13.4	LOS B	2.2	16.8	0.70	0.97	0.98	47.4
Approach		330	10.0	347	10.0	0.422	10.4	LOS B	2.2	16.8	0.58	0.82	0.75	49.3
West: SH1 Gore														
10	L2	99	10.0	104	10.0	0.071	8.3	LOS A	0.3	2.2	0.16	0.59	0.16	56.2
11	T1	306	13.0	322	13.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		405	12.3	426	12.3	0.177	2.0	LOS A	0.3	2.2	0.04	0.14	0.04	78.3
All Vehicles		965	11.5	1016	11.5	0.422	5.0	NA	2.2	16.8	0.25	0.39	0.30	64.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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 [SH1 McKinnon 55% Industrial 85% (Site Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] [veh/h %]		DEMAND FLOWS [Total HV] [veh/h %]		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] [veh m]		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH1 Clinton														
5	T1	165	13.0	174	13.0	0.096	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
6	R2	95	10.0	100	10.0	0.082	8.9	LOS A	0.4	2.7	0.43	0.67	0.43	54.6
Approach		260	11.9	274	11.9	0.096	3.3	NA	0.4	2.7	0.16	0.24	0.16	72.8
North: McKinnon Road														
7	L2	210	10.0	221	10.0	0.198	6.2	LOS A	0.8	6.4	0.44	0.63	0.44	52.2
9	R2	312	10.0	328	10.0	0.748	22.1	LOS C	6.3	47.8	0.86	1.35	2.00	42.6
Approach		522	10.0	549	10.0	0.748	15.7	LOS C	6.3	47.8	0.69	1.06	1.37	46.0
West: SH1 Gore														
10	L2	159	10.0	167	10.0	0.118	8.4	LOS A	0.5	3.8	0.21	0.59	0.21	56.0
11	T1	306	13.0	322	13.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	89.9
Approach		465	12.0	489	12.0	0.177	2.9	LOS A	0.5	3.8	0.07	0.20	0.07	74.4
All Vehicles		1247	11.1	1313	11.1	0.748	8.3	NA	6.3	47.8	0.35	0.57	0.63	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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.