



RIDGEBURN

ARROWTOWN JUNCTION

Residential & Mixed Use Development Morven Ferry Road

Transportation Assessment Effects on External Transport Networks



CARRIAGEWAY
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traffic engineering | transport planning



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1. Introduction

- 1.1. This Transportation Assessment has been prepared to support a Substantive Application made by Ridgeburn Limited under the Fast Track Approval Acts 2024 in accordance with the requirements of Section 42. The proposal is a Referred Project and this report has been prepared to support an application to develop land at 122 Morven Ferry Road for a residential and mixed use development.
- 1.2. Section 43 of the Fast Track Approval Act sets out the information to be included in a substantive application, which includes an assessment of adverse effects of the project on the environment. This report has been prepared to assess the transportation effects of the project on the external state highway network (with a second report addressing matters pertaining to the internal site layout and effects on the district road of Morven Ferry Road).
- 1.3. This Transportation Assessment sets out a detailed analysis of the transportation issues associated with the proposed development on the state highway network including changes in travel patterns that are likely to arise. Where potential adverse effects are identified, ways in which these can be addressed are set out. Matters relating to the effects on district roads and within the application site are addressed within a separate report ('Transportation Assessment: District Roads and Internal Site Layout')
- 1.4. This report is cognisant of the guidance specified in the New Zealand Transport Agency's '*Integrated Transport Assessment Guidelines*' and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered.
- 1.5. This report has been prepared by Mr Andy Carr, in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2023). Mr Carr's qualifications and experience are summarised in Appendix A.



2. Site Overview

2.1. Location

2.1.1. The development site is some 212 hectares in size, and is located at 122 Morven Ferry Road, broadly located between Arrowtown and the Kawarau River. The site is proposed to have access only onto Morven Ferry Road, which in turn connects to State Highway 6. The site is zoned as a mix of Wakatipu Basin Rural Amenity Zone and Rural Zone in the proposed Queenstown Lakes District Plan (**District Plan**) and is presently used for rural and rural residential purposes.

2.1.2. The location of the site in the context of the local area is shown in Figure 1 and in more detail in Figure 2.



Figure 1: General Location of Development Site

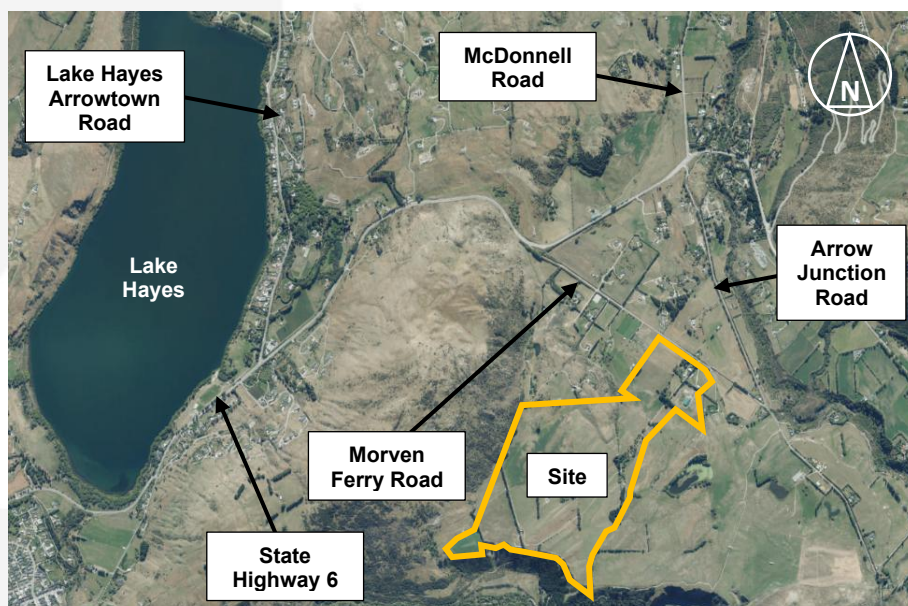


Figure 2: Aerial Photograph of Development Site and Environs



2.2. Road Hierarchy

- 2.2.1. State Highway 6 is defined as a State Highway under the District Plan roading hierarchy. Highways are managed to minimise their local access function.
- 2.2.2. Towards the west of the site, Arrowtown Lake Hayes Road is an Arterial Road in the roading hierarchy, indicating a role of providing connectivity between settlements in the district and predominantly accommodating through traffic (although the nature of many Arterial Roads in the District is that they also provide for property access).
- 2.2.3. McDonnell Road to the east of the site is a Collector Road, which provides for both through traffic and property access.
- 2.2.4. Morven Ferry Road and Arrow Junction Road are both Local Roads, indicating that they provide largely for property access.
- 2.2.5. The Twin Rivers cycle trail runs along the northern side of the Kawarau River and hence through the southernmost part of the site, terminating just south of the Morven Ferry Road / Arrow Junction Road intersection. For completeness, there is a second cycle trail, the Arrow Bridges Cycle Trail, which runs along Arrow Junction Road (to the north of the site) and connects to Morven Ferry Road east of the site. This passes within 400m of the site.

3. Current Transportation Networks

3.1. *Roading Network*

- 3.1.1. The site is accessed via Morven Ferry Road. This road presently has two traffic lanes (one in each direction) and a seal width of around 6m, but in view of this providing the key access to the site, it is proposed that this will be upgraded (as discussed in the 'Transportation Assessment: District Roads and Internal Site Layout' report). The road is also subject to an 80km/h speed limit, which may also be reviewed when the road is upgraded (although changes to the speed limit are outside the resource consenting process).



Photograph 1: Typical Alignment of Morven Ferry Road

- 3.1.2. At its northern end, Morven Ferry Road rises slightly and meets State Highway 6 at a priority ('give-way') intersection. The intersection is formed with a formal right-turn bay for the movement from west to south, and there is a widened shoulder which assists drivers turning left from the highway to move clear of the westbound through lane. Sightlines at the intersection are excellent in all directions.



Photograph 2: State Highway 6 / Morven Ferry Road Intersection

- 3.1.3. The speed limit on State Highway 6 at the intersection is 100km/h but because the alignment of the highway is curved, there is an advisory 85km/h speed limit in place for vehicles on the highway in this location, with associated chevron signage.
- 3.1.4. State Highway 6 provides one traffic lane in each direction (other than where auxiliary lanes are developed for turning traffic) which sealed and metalled shoulders of varying widths. The speed limit varies, so that although the limit is 100km/h at its intersection with Morven Ferry Road (albeit with the advisory 85km/h limit), it reduces to 80km/h some 750m to the east and through its intersection with Arrow Junction Road and McDonnell Road. The speed limit also changes from 100km/h to 80km/h 1.9km west and through the intersection with Arrowtown Lake Hayes Road.
- 3.1.5. There are no other district roads in the immediate area of the State Highway 6 / Morven Ferry Road intersection, which means that any vehicle that is turning to or from Morven Ferry Road (and the site) must therefore pass through either the State Highway 6 / Arrowtown Lake Hayes intersection approximately 2.2km to the west, or the State Highway 6 / McDonnell Road / Arrow Junction Road intersection approximately 1.1km to the northeast.
- 3.1.6. Between Morven Ferry Road and Arrowtown Lake Hayes Road, State Highway 6 passes around the northern side of Morven Hill, and therefore has a curvilinear alignment. It then straightens and descends on a gentle gradient to meet Arrowtown Lake Hayes Road at a priority ('stop') intersection¹.
- 3.1.7. The intersection has auxiliary right and left-turn lanes for drivers exiting the highway, and there is also a short left-turn lane for drivers exiting Arrowtown Lake Hayes Road separated from the right-turn lane by an area of hatching.

¹ In passing, 'stop' control is used when sightlines are restricted at a distance of 9m from the limit line of an intersection. On-site observations show that there are presently no such restrictions at this intersection. However the available sightline to the east passes over land that formally lies within Amisfield (but is grassed at the moment) and the sightline to the west passes over a recreational reserve (where there are no obstructions). It is anticipated that the 'stop' control is in place because both of these sightlines pass outside the legal road corridor and they could be obstructed as of right.



Photograph 3: State Highway 6 / Arrowtown Lake Hayes Road Intersection

- 3.1.8. In the vicinity of the intersection, Arrowtown Lake Hayes Road has a straight alignment but rises slightly to meet the highway. It provides two lanes (one in each direction) with a varying shoulder width. In the vicinity of the intersection, it has a number of vehicle crossings to residential properties and also to the Amisfield Winery.



Photograph 4: Arrowtown Lake Hayes Road

- 3.1.9. West of this intersection, State Highway 6 passes through the Ladies Mile area and into Frankton, where it connects to State Highway 6A which in turn serves Queenstown town centre. State Highway 6 turns southwards at State Highway 6A, and ultimately terminates in Invercargill. Arrowtown Lake Hayes Road continues for approximately 5km, where it links to the western edge of Arrowtown.
- 3.1.10. Between Morven Ferry Road and McDonnell Road, State Highway 6 has a straight alignment (other than for the curve at the Morven Ferry Road intersection). The State Highway 6 / McDonnell Road / Arrow Junction Road intersection lies around 1km east of Morven Ferry

Road, and is formed as a priority ('give-way') controlled intersection with an auxiliary lane for traffic turning right from the highway and a widened shoulder (approximately 5m width) to support vehicles turning left into Arrow Junction Road. Sightlines for exiting traffic are good, and appropriate for the posted speed limit.



Photograph 5: State Highway 6 / Arrow Junction Road Intersection

3.1.11. Approximately 60m east of the State Highway 6 / McDonnell Road / Arrow Junction Road intersection, McDonnell Road joins the highway from the north. In view of the short separation distance between the intersections, the design of one influences the other, such that there is flush median between the right-turn bay for Arrow Junction Road and a right-turn bay provide for traffic turning into McDonnell Road. There is also an auxiliary left-turn lane (150m long) for vehicles turning left into McDonnell Road, and therefore this lane passes through the State Highway 6 / McDonnell Road / Arrow Junction Road intersection.



Figure 3: State Highway 6 / McDonnell Road / Arrow Junction Road Intersection

3.1.12. The State Highway 6 / McDonnell Road intersection has auxiliary turning lanes on the highway as noted above, and there is also a short lane for drivers turning left from McDonnell Road and eastwards. This is separated from the right-turn lane by a hatched area.



Photograph 6: State Highway 6 / McDonnell Road Intersection

3.1.13. McDonnell Road provides a connection to the southern parts of Arrowtown.

3.1.14. Immediately east of this intersection, State Highway 6 descends and turns eastwards to cross the Arrow River. Approximately 800m from this, State Highway 6 is met by Crown Range Road which in turn provides a route to Cardrona and Wānaka. The highway continues eastwards where it passes through Gibbston Valley and Cromwell before turning northwards to pass just east of Wānaka, and then to the West Coast of New Zealand.

3.2. *Non-Car Modes of Travel*

3.2.1. As this is presently a rural environment, the roads and highways do not have footpaths immediately adjacent, although there are grassed berms which can be used by pedestrians.

3.2.2. As noted above, the Twin Rivers Cycle Trail passes to the south of the site. This terminates just to the northeast of the site, but towards the west it provides an off-road connection to the residential areas of Lake Hayes Estate and Shotover Country (where there is a primary school), and beyond to terminate at the Falls Bridge across the Kawarau River.

3.2.3. The Arrow Bridges Cycle Trail passes to the northeast of the site. In the vicinity of the site this runs alongside the Arrow River, passing beneath State Highway 6 and the using Arrow Junction Road, passing approximately 400m to the northeast of the site.

3.3. *Future Changes*

3.3.1. There are no known changes to the roading environment in the immediate area of the site that are set out in any overarching strategies or guides.



4. Current Transportation Patterns

4.1. Traffic Flows

4.1.1. As part of this commission, traffic surveys were carried out at the intersections noted above. These were undertaken on Thursday 30 October 2025 between 6am to 7pm via a video recording method, with the records subsequently processed to identify traffic volumes and turning movements. No inclement weather nor any other issues were reported on the survey day that could have given rise to unusual traffic volumes.

4.1.2. As a first task, the overall peak hours on the roading network were determined. Due to the very low volumes of turning traffic flows at the State Highway 6 / Arrow Junction Road, these do not have a major effect in respect of determining the peak hours and have not been considered further for ascertaining the peak hours.

4.1.3. The morning peak hours at each intersection occurred as follows:

- State Highway 6 / McDonnell Road:
 - 10:00am to 11:00am (1,067 vehicles in total);
 - Note though that 7:15am to 8:15am had 1,061 vehicles in total, so very similar volumes;
- State Highway 6 / Morven Ferry Road:
 - 7:15am to 8:15am (890 vehicles in total);
- State Highway 6 / Arrowtown Lake Hayes Road:
 - 10:00am to 11:00am (1,324 vehicles in total);
 - Note though that 7:15am to 8:15am had 1,207 vehicles in total, and within 9% of the true peak;

4.1.4. The evening peak hours at each intersection occurred as follows:

- State Highway 6 / McDonnell Road:
 - 4:45pm to 5:45pm (1,278 vehicles in total);
 - Note though that 4:30pm to 5:30pm had 1,268 vehicles in total, so very similar volumes;
- State Highway 6 / Morven Ferry Road:
 - 4:30pm to 5:30pm (1,059 vehicles in total);
- State Highway 6 / Arrowtown Lake Hayes Road:
 - 4:30pm to 5:30pm (1,485 vehicles in total)

4.1.5. On this basis it is considered reasonable to use the following as the peak hour on the network:

- 7:15am to 8:15am as the morning peak hour; and
- 4:30pm to 5:30pm as the evening peak hour.

4.1.6. The traffic flows in the peak hours are set out below.

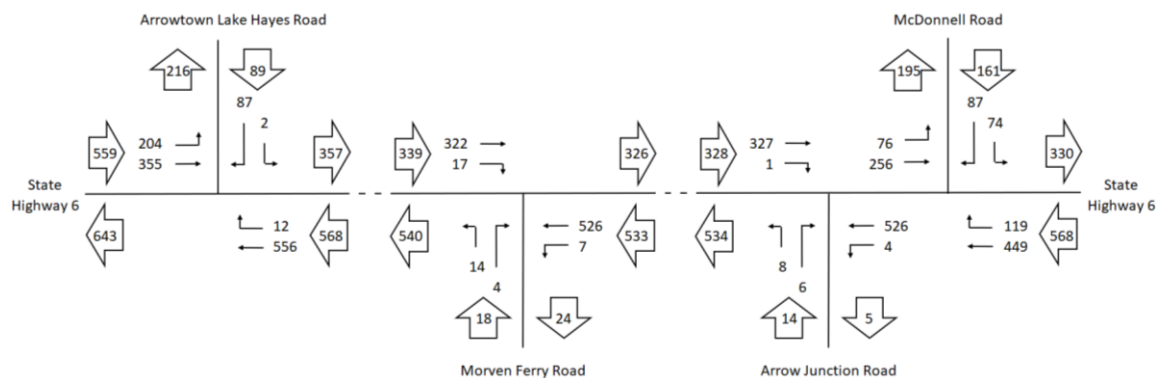


Figure 4: Surveyed 2025 Morning Peak Hour Traffic Flows

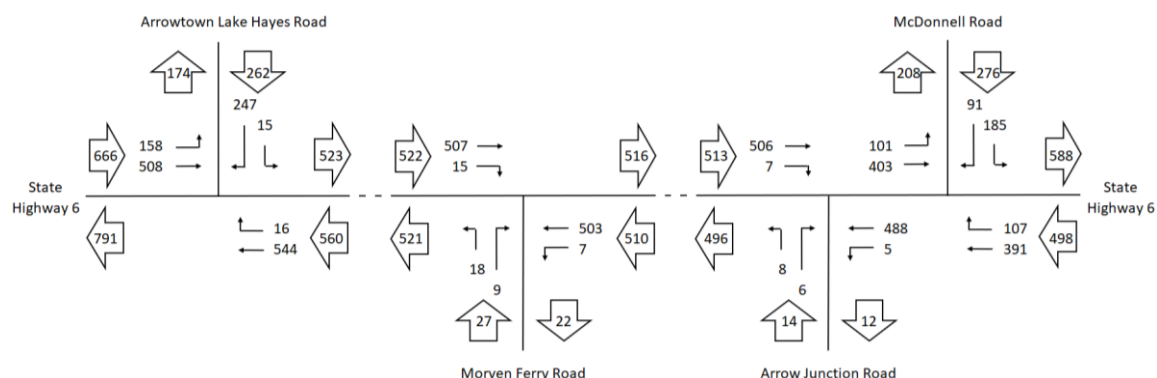


Figure 5: Surveyed 2025 Evening Peak Hour Traffic Flows

4.1.7. By way of a check on the data, there are two NZTA traffic counters in the area on State Highway 6:

- On the bridge over the Arrow River, towards the northeast of the site (id:00600984); and
- West of Arrowtown Lake Hayes Road, towards the west of the site (id:00600988)

4.1.8. The counters record every hour (reporting the volume on the hour), and so it is straightforward to compare the surveyed results with those observed at the counters. The comparison is set out below:

Location	Period	Traffic Volume Towards Queenstown			Traffic Volume Away from Queenstown		
		Survey	NZTA	Difference	Survey	NZTA	Difference
Arrow River (00600984)	7am to 8am	553	531	4.1%	286	264	8.3%
	8am to 9am	479	443	8.1%	374	352	6.3%
	4pm to 5pm	527	503	4.8%	535	498	7.4%
	5pm to 6pm	471	451	4.4%	569	555	2.5%
West of A'town Lake Hayes Road (00600988)	7am to 8am	617	618	-0.2%	495	459	7.8%
	8am to 9am	515	484	6.4%	579	561	3.2%
	4pm to 5pm	705	655	7.6%	675	671	0.6%
	5pm to 6pm	744	731	1.8%	630	600	5.0%

Table 1: Comparison of Traffic Volumes

4.1.9. Differences in the data is to be expected because the counting methods were different. A video-type survey has the potential for coding errors, and an automatic count can differ from the actual volumes due to the miscalibration of the counter. Overall the surveyed volume are around 4.5% greater than those from the automatic counts, suggesting that they are robust.

4.1.10. An examination of the two traffic counters has been undertaken to establish the historic traffic growth on this section of the highway. Volumes in 2020 and 2021 were affected by travel restrictions due to Covid-19 and to ensure that this short-term change does not affect the analysis, a ten-year period has been evaluated:

- On the bridge over the Arrow River, towards the northeast of the site (id:00600984):
 - 2015 AADT: 6,625
 - 2024 AADT: 10,727
 - Annual growth as a proportion of 2024 volume: 4.3%
- West of Arrowtown Lake Hayes Road, towards the west of the site (id:00600988)
 - 2015 AADT: 9,733
 - 2024 AADT: 14,368
 - Annual growth as a proportion of 2024 volume: 3.6%

4.1.11. It can be seen that overall, the growth rate is of the same order as the annual growth rate. In other words, the difference between the observed traffic volumes and those collected by NZTA as summarised in Table 1 above, equates to one year of traffic growth (based on historic volumes). On this basis, it is not considered that the difference in the two sets of data will have a material effect on the outcomes of the analysis.

4.1.12. The intersections have been modelled using the computer software package Sidra Intersection and the results are summarised below. The model includes gap acceptance parameters, and the models have initially been run using the standard New Zealand values, as set out in Table 7.1 of the Austroads Guide to Traffic Management Part 3 ('Transport Study and Analysis Methods').



Standard driving on the left model						
	2-lane major road			4-lane major road		
STOP sign	t_c	t_r	s	t_c	t_r	s
Minor road: left turn	4.5	2.5	1440	5.0	3.0	1200
• through	5.0	3.0	1200	6.5	3.5	1029
• right turn	5.5	3.5	1029	7.0	4.0	900
Right turn from major road	4.0	2.0	1800	4.5	2.5	1440
GIVE-WAY / YIELD sign	t_c	t_r	s	t_c	t_r	s
Minor road: left turn	4.0	2.2	1636	4.5	2.7	1333
• through	4.5	2.7	1333	6.0	3.2	1125
• right turn	5.0	3.2	1125	6.5	3.7	973
Right turn from major road	4.0	2.0	1800	4.5	2.5	1440

Table 2: Gap Acceptance Parameters (Table 7.1, Austroads Guide to Traffic Management Part 3)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	8.7	0.0	A	9.1	0.1	A
Arrowtown Lake Hayes Road	L	8.8	0.0	A	10.0	0.1	B
	R	23.1	1.2	C	186.7	28.9	F
State Highway 6 (west)	L	7.7	0.6	A	7.7	0.4	A

Table 3: 2025 Existing Peak Hour Levels of Service at the State Highway 6 / Arrowtown Lake Hayes Road Intersection

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Morven Ferry Road	L	9.4	0.1	A	9.3	0.1	A
	R	14.8	0.0	B	17.7	0.1	C
State Highway 6 (east)	L	7.2	0.0	A	7.2	0.0	A
State Highway 6 (west)	R	9.3	0.1	A	9.1	0.1	A

Table 4: 2025 Existing Peak Hour Levels of Service at the State Highway 6 / Morven Ferry Road Intersection

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Arrow Junction Road	L	9.4	0.0	B	9.1	0.0	A
	R	14.8	0.1	C	17.0	0.1	C
State Highway 6 (east)	L	7.2	0.0	A	7.2	0.0	A
State Highway 6 (west)	R	9.1	0.0	A	8.9	0.0	A

Table 5: 2025 Existing Peak Hour Levels of Service at the State Highway 6 / Arrow Junction Road Intersection

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	6.5	0.4	A	7.2	0.4	A
McDonnell Road	L	6.6	0.2	A	7.5	0.8	A
	R	14.4	0.9	B	16.5	1.0	C
State Highway 6 (west)	L	6.0	0.2	A	6.0	0.3	A

Table 6: 2025 Existing Peak Hour Levels of Service at the State Highway 6 / McDonnell Road Intersection

4.1.13. The modelling shows that the intersections in the area presently operate with modest queues and delays, and good levels of service². The exception is the State Highway 6 / Arrowtown Lake Hayes Road intersection in the evening peak hour, where the model shows large queues and delays. A view of the videos taken at the time showed that queues of more than ten vehicles were regularly observed, but the position of the video camera did not capture the whole of the queue length.

4.1.14. Consequently a second survey was undertaken using a ‘floating observer’ method, whereby the length of the queue was observed by a surveyor who moved according to where the end of the queue was seen (so that a more accurate assessment could be made of the queue length). Lengths were recorded every minute between 4pm and 6pm on 20 November 2025, in order to ensure that the evening peak hour was captured.

4.1.15. When processed, the data showed that a 95th percentile queue length of 39 vehicles was observed in the evening peak hour.

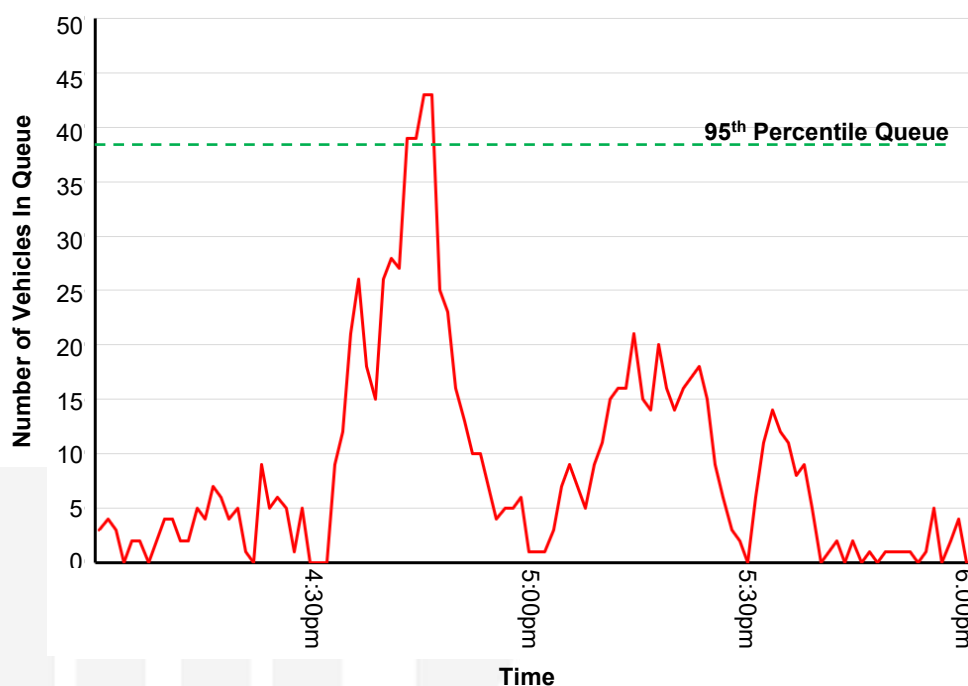


Figure 6: Graph of Observed Queue Lengths at the State Highway 6 / Arrowtown Lake Hayes Road Intersection

² Level of Service is a measure that describes the quality of motor vehicle driver experience, and is based on the delay they encounter. It ranges from Level of Service A (the very best and minimal delays) to Level of Service F (the worst, and long delays)

- 4.1.16. The graph shows two peaks, with a lull around 5pm. The nature of a survey that collects 'snapshots' every minute is that it can capture observations when the queue has completely cleared only for it to rapidly increase again, and so this outcome is not uncommon for this type of survey. Irrespective, the observed queues were seen to be longer than modelled. In practice, if the intersection is operating at Level of Service F as indicated, then small increases in the traffic flows will have a disproportionate effect and so the difference is to be expected. Informal observations were also carried out during the evening on Friday 28 November and although these were carried out after 5:00pm, they showed queues of the magnitude recorded in the previous surveys.
- 4.1.17. On this basis it is considered that the model of the State Highway 6 / Arrowtown Lake Hayes Road intersection is reflecting (and potentially underestimating) the queues and thus the delays at the intersection. No changes have therefore been made to the gap acceptance parameters at the intersection (or other intersections modelled).
- 4.1.18. In passing, the video showed that the vast majority of drivers were not obeying the 'stop' signage and instead, were simply slowing down to assess whether other vehicles were approaching on the highway, and if not, then exiting Arrowtown Lake Hayes Road (that is, using the intersection as 'give-way'). This can again be an indication of an intersection approaching capacity. For clarity, the gap acceptance parameters used have been for 'stop' control, partly because drivers are legally obliged to obey such signage and partly because the use of these parameters better reflects the observed queue lengths than for 'give-way' control.
- 4.1.19. Volumes on the roading network grow gradually over time in response to new development elsewhere in the district. While analysis of general growth at traffic counters (as set out above) is helpful, for this assessment Queenstown Lakes District Council has made available its strategic transportation model for the relevant intersections for both the current year of the model (2024) and the design year (2039), which enables a more refined approach to be taken. This has been to:
- Identify the traffic flows on each turning movement in 2024 (one of the years that has been modelled);
 - Subtract the traffic flows expected on each turning movement in 2039 (another of the years that has been modelled); and
 - Divide by 15 (the number of years between 2024 and 2039) to get the increase in the number of vehicles each year.
- 4.1.20. Other fast-track proposals have been assessed on the basis of a future year horizon and the same approach has been taken here. The growth on each turning movement has been drawn from the model as set out above, and thus the 'design year' volumes are shown below.

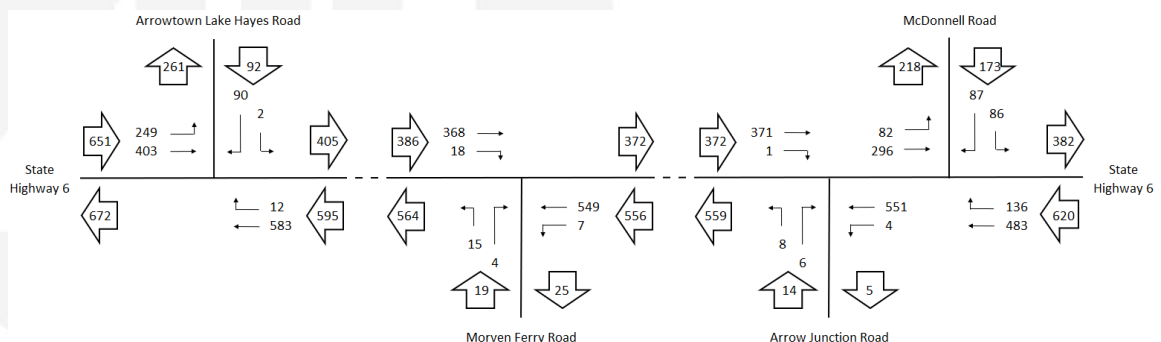


Figure 7: Design Year (2035) Morning Peak Hour Traffic Flows

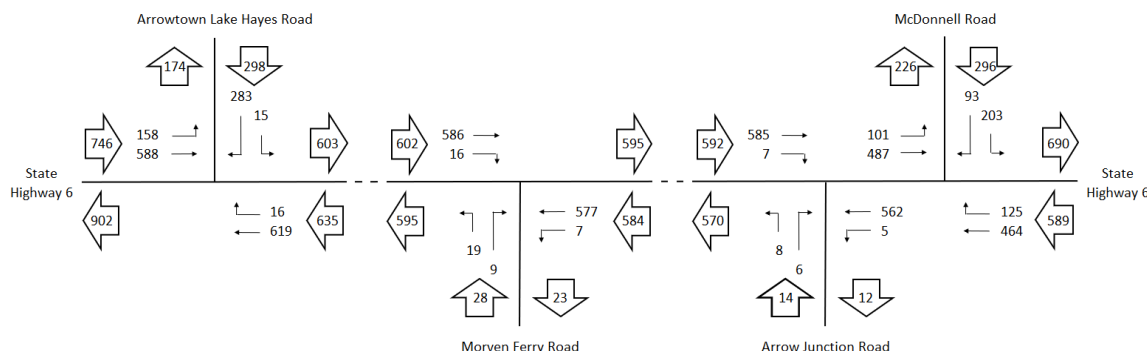


Figure 8: Design Year (2035) Evening Peak Hour Traffic Flows

4.1.21. The intersections have been remodelled with these volumes and the results are set out below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	9.0	0.0	A	9.6	0.1	A
Arrowtown Lake Hayes Road	L	9.0	0.0	A	13.4	0.1	B
	R	27.4	1.5	D	733.6	88.1	F
State Highway 6 (west)	L	7.7	0.7	A	7.7	0.4	A

Table 7: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrowtown Lake Hayes Road Intersection, No Development

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Morven Ferry Road	L	9.5	0.1	A	9.8	0.1	A
	R	16.4	0.0	C	22.0	0.1	C
State Highway 6 (east)	L	7.2	0.0	A	7.2	0.0	A
State Highway 6 (west)	R	9.4	0.1	A	9.6	0.1	A

Table 8: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Morven Ferry Road Intersection, No Development

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Arrow Junction Road	L	9.5	0.0	A	9.6	0.0	A
	R	16.0	0.1	C	21.0	0.1	C
State Highway 6 (east)	L	7.2	0.0	A	7.2	0.0	A
State Highway 6 (west)	R	9.3	0.0	A	9.4	0.0	A

Table 9: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrow Junction Road Intersection, No Development



Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	6.7	0.5	A	7.7	0.5	A
McDonnell Road	L	6.8	0.3	A	8.1	0.9	A
	R	16.7	1.0	C	22.8	1.5	C
State Highway 6 (west)	L	6.1	0.2	A	6.0	0.3	A

Table 10: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / McDonnell Road Intersection, No Development

4.1.22. The analysis shows that the intersections continue to operate with modest delays, but the State Highway 6 / Arrowtown Lake Hayes Road intersection remains with large queues and delays in the evening peak hour. In practice it is unlikely that delays of this scale (more than 12 minutes) would arise as drivers would likely change their route or time of travel, but the analysis continues to show that this intersection has insufficient capacity. For clarity, this scenario is **without** any development of the Ridgeburn site, and the analysis shows that the current observed queues and delays will increase over time due to ambient traffic growth on the roading network.

4.2. Non-Car Modes of Travel

- 4.2.1. Given that the area is predominantly rural, it can reasonably be expected that it will be relatively infrequently used by pedestrians. Although no formal surveys have been carried out, informal observations indicate negligible pedestrian and cycling movements along the highway.
- 4.2.2. The current levels of infrastructure provided for both pedestrians and cyclists are considered to be appropriate for the likely volumes.
- 4.2.3. There are no regular bus services that pass the site. Although several longer-distance services pass nearby on State Highway 6, there are no bus stops provided within walking distance of the site.
- 4.2.4. The site lies partially within the enrolment zone of Arrowtown Primary School, and fully within the enrolment zone of Shotover Primary School. There are no school buses that serve Shotover Primary School but there is presently a school bus that provides a service between the school, running past the site using Morven Ferry Road and Arrow Junction Road.

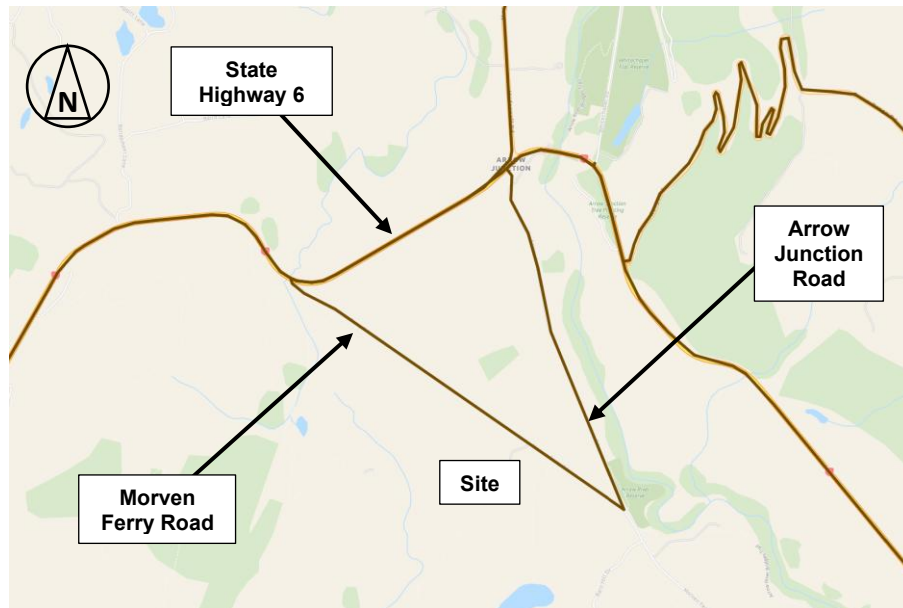


Figure 9: Route of Arrowtown School Bus (Shaded Brown) (Ministry of Education, Annotated).

4.3. Road Safety

4.3.1. The NZTA Crash Analysis System has been used to establish the location and nature of the recorded traffic crashes in the vicinity of the development site. All reported crashes between 2020 and 2024, plus the partial record for 2025 were identified for a distance of 100m west of the State Highway 6 / Arrowtown Lake Hayes Road intersection, to 100m east of the State Highway 6 / McDonnell Road intersection.

4.3.2. This assessment identified 25 reported crashes:

- 7 crashes were recorded at the State Highway 6 / McDonnell Road intersection:
 - One crash occurred when a driver on McDonnell Road failed to slow at all for the intersection, travelling straight ahead, and left the road. The police report notes that there was no apparent reason for this. The crash resulted in serious injuries;
 - One crash occurred when an eastbound driver on the highway ran into the rear of other vehicles that had slowed down (for an unidentified reason). The crash did not result in any injuries;
 - One crash occurred when a driver turned left out of McDonnell Road, failed to give-way to an eastbound truck on the highway, and collided with it. The crash did not result in any injuries;
 - Two crashes occurred when a driver turned right from the highway and onto McDonnell Road, but failed to give-way to eastbound vehicles on the highway and were struck. One crash resulted in minor injuries and one crash did not result in any injuries. The police report in one instance notes that the at-fault driver was distracted by talking with their passenger;
 - One crash occurred when a driver turned right out of McDonnell Road, but failed to give-way to an eastbound vehicle on the highway and was struck. The crash resulted in minor injuries;
 - One crash occurred when a driver entered the left-turn lane into McDonnell Road at high speed, causing a driver turning right into McDonnell to try to avoid a collision by sudden braking. However this resulted in their vehicle stopping within the eastbound traffic lane of the highway, and they were then struck by an eastbound vehicle. The crash resulted in minor injuries;



- 1 crash was recorded mid-block on State Highway 6 between McDonnell Road and Morven Ferry Road:
 - The crash occurred when a driver on the highway lost control of their vehicle and left the road. The police report notes that the driver was 14 years old and was using their mobile phone. The crash did not result in any injuries;
- 9 crashes were recorded mid-block on State Highway 6 between Morven Ferry Road and Arrowtown Lake Hayes Road:
 - Two crashes occurred at the curve in the highway approximately 350m west of Morven Ferry Road, when a driver lost control of their vehicle on a wet road surface, and left the road. The crashes did not result in any injuries;
 - One crash occurred just west of the curve in the highway approximately 350m west of Morven Ferry Road, when a driver had a medical event, lost control of their vehicle, and left the road. The crash resulted in minor injuries;
 - One crash occurred approximately 850m west of Morven Ferry Road, when a driver attempted to overtake a vehicle in a location where overtaking is prohibited. In undertaking the manoeuvre, they lost control of their vehicle and left the road. The crashes did not result in any injuries;
 - Two crashes occurred at the curve in the highway approximately 1.2km west of Morven Ferry Road, when eastbound drivers crossed the centreline of the highway and collided with westbound vehicles. In one case the at-fault driver was intoxicated and in the other case, the driver had looked away from the road ahead to reach for an item within their car. Both crashes resulted in serious injuries;
 - One crash occurred at the curve in the highway approximately 1.2km west of Morven Ferry Road, when a westbound driver had a medical event, lost control of their vehicle, and left the road. The crash resulted in serious injuries;
 - One crash occurred on the straight section of road to the east of Arrowtown Lake Hayes Road, when a westbound driver lost control on an area of spilled diesel oil and left the road. The crash did not result in any injuries;
 - One crash occurred on the straight section of road to the east of Arrowtown Lake Hayes Road, when an eastbound driver turning right into a driveway and was struck from the rear by another vehicle. The crash did not result in any injuries;
- 8 crashes were recorded at the State Highway 6 / Arrowtown Lake Hayes Road intersection:
 - Five crashes occurred when a driver turned right out of Arrowtown Lake Hayes Road but failed to give-way to eastbound vehicles on the highway and were struck. The crashes did not result in any injuries;
 - One crash occurred when a driver turned right out of Arrowtown Lake Hayes Road but failed to give-way and in attempting avoid other vehicles left the road. The crash did not result in any injuries;
 - One crash occurred when three vehicles were turning left from the highway into Arrowtown Lake Hayes Road and when the first vehicle stopped to give-way to another vehicle, the others ran into their rear. The crash resulted in minor injuries;
 - One crash occurred when a driver turned right from the highway onto Arrowtown Lake Hayes Road, and failed to give-way to an eastbound vehicle, and the two collided. The crash resulted in minor injuries.

4.3.3. The crash rate is not untypical for a section of road, with fewer crashes in the midblock sections and most crashes occurring at intersections. Of the 12 midblock crashes, unlawful behaviour accounted for three, with medical events resulting in a further two crashes, and a diesel spill and an intoxicated driver both resulting in one crash. The remaining crashes five crashes involved a slippery road surface (three crashes), driver distraction (one crash) and following too closely (one crash). The locations and/or contributing factors for the crashes are generally all different and it is therefore not considered that there is evidence of an existing adverse road



safety record in these locations (although it is suggested that the curve where drivers lost control on a wet surface could be reviewed for an advisory speed limit or a PW-41.2 ('slippery surface when wet') sign).

- 4.3.4. Of the crashes at the State Highway 6 / McDonnell Road intersection, the contributing factors are different, which does not suggest a deficiency in the roading environment.
- 4.3.5. Six of the eight crashes at the State Highway 6 / Arrowtown Lake Hayes Road intersection arose from drivers exiting Arrowtown Lake Hayes Road and failing to give-way to others on the highway. This type of crash can be associated with congested intersections, as drivers emerge into gaps in the traffic stream that are too short. This explanation aligns with the on-site observations of queue lengths and the modelling undertaken.



5.1. The proposal is for a residential and mixed use development, which comprises:

- 5.2. The most recent information provided shows that the non-residential activities comprise:

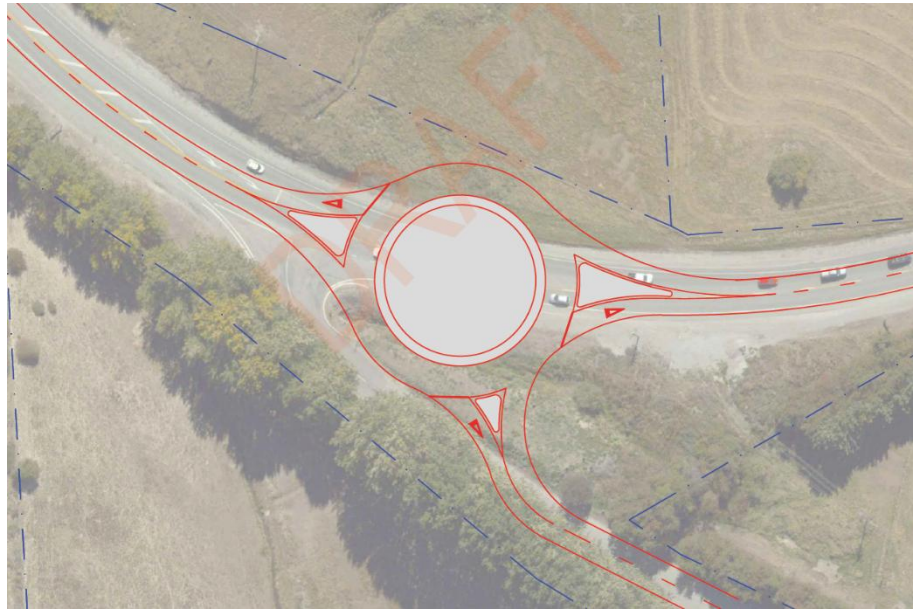
- 5.3. The masterplan for the development is shown below.



- ## Proposed Residential and Mixed Use Development

the site access and State Highway 6, and therefore enter and exit the state highway network through the State Highway 6 / Morven Ferry Road intersection.

- 5.6. In recognition of the importance of this intersection, the Referral Application set out that the current priority intersection will be upgraded to a roundabout, as shown below.



**Figure 11: Proposed Roundabout Layout at State Highway 6 / Morven Ferry Road Intersection
(Extract from Referral Application)**

- 5.7. The masterplan scheme also includes a park-and-ride area located at its northern end and fronting onto Morven Ferry Road. This is initially proposed for approximately 60 parking spaces, but with an area located to the immediate west that provides for future expansion. Although this extended area has not been designed, it can potentially mean that the park and ride site is able to accommodate around 150 cars in total (depending on the final layout).

6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. The development comprises several elements, which are discussed separately below.

6.1.2. With regard to the traffic generation of the residential component of the proposal, developments within the Queenstown Lakes District have adopted a range of values, drawn from different sources. As part of this commission, a number of potential rates have been assembled from publicly available sources, as summarised below:

Location	Source	Trip Rate per Residential Lot		Comments
		AM Peak Hour	PM Peak Hour	
Jack Hanley Drive	Homestead Bay Fast-Track application	0.87	0.89	It is noted that these value may be distorted due to construction work
Māori Jack Road	Homestead Bay Fast-Track application	0.71	0.58	
Shotover Country	Trips and Parking Bureau	0.98	0.93	2025 survey done on two days. Subdivision includes a school.
		1.14	1.09	
716 Frankton Road (Potters Hill)	Trips and Parking Bureau	0.52	0.65	2025 survey. Noted to be a high percentage of Air BnB
Huxley Place, Lake Hayes Estate	Trips and Parking Bureau	0.44	0.80	2025 survey but small data set of 25 houses
Lake Hayes Estate	Traffic Design Group	0.61	0.87	2009 survey so dated
	Carriageway Consulting	-	0.81	
Jacks Point (Average)	Bartlett Consulting	0.62	0.59	2019 with 298 survey days, dwellings calculated monthly, 513 dwellings Dec
Jacks Point (85th Percentile)	Bartlett Consulting	0.76	0.67	2019 with 298 survey days, dwellings calculated monthly, 513 dwellings Dec
Arthurs Point (Atley Road)	Bartlett Consulting	0.73	0.68	Survey June 2025 with 205 dwellings

Table 11: Residential Trip Generation Rates

6.1.3. The morning peak hour shows a highly variable rate of 0.44 to 1.14 vehicle movements per household. The highest value is at Shotover Country, which appears much higher than other locations. Upon further investigation, the trip rate for Shotover Country has been calculated using the assumption that this area has 983 residential properties. However the 2023 census identified that the area had 1,335 residential properties. Taking this into account, the trip rates for Shotover Country reduce as follows:

Location	Source	Trip Rate per Residential Lot		Comments
		AM Peak Hour	PM Peak Hour	
Shotover Country	Trips and Parking Bureau	0.75	0.87	Adjusted to reflect census information.
		0.74	0.84	

Table 12: Adjusted Residential Trip Generation Rates for Shotover Country

- 6.1.4. The surveys at Potters Hill and Huxley Place appear to be distorted through either being a small sample or having a high proportion of Air Bnb units. Disregarding these two locations, the mean trip rate is 0.72 vehicle movements per lot in the morning peak hour, and 0.76 vehicle movements per lot in the evening peak hour.
- 6.1.5. By way of comparison, the matter of residential trip rates was considered within a recent fast-track application under the COVID-19 Recovery (Fast-track Consenting) Act 2020 for the Flints Park development in the Te Pūhahi Ladies Mile Zone, approximately 4.7km west of the site. This project was considered and approved (and attracted support from NZTA) based on trip rates of 0.74 vehicle movements per lot in the morning peak hour, and 0.77 vehicle movements per lot in the evening peak hour, almost the same as devised from the data listed above. This supports the calculated trip rates.
- 6.1.6. In the morning peak hour, 75% of trips have been anticipated to exit the site (with 25% entering) and in the evening 65% of trips have been anticipated to enter the site (with 35% exiting). These directional splits are typical for residential property, and they also align with those adopted for Flints Park.
- 6.1.7. The location of the site means that it is unlikely that the daycare, community facilities / gym and the bar / pizzeria will generate significant volumes of external trips. Rather, the bulk of patrons will be drawn from those already living in the immediate area. As such, these trips will not appear on the external road network.
- 6.1.8. For a supermarket of the proposed size (3,650sqm GFA), the peak hour traffic generation rates range from 10 vehicles per hour per 100sqm GFA to 14 vehicles per hour per 100sqm GFA. A rate of 13 vehicle movements per 100sqm GFA has been adopted, given that the potential for non-residents to travel by active modes is limited. It is likely that a person visiting the supermarket may also visit the other retail units, but for the purposed of assessment, the additional 450sqm of additional retail has been assessed using the same trip rate as the supermarket. Retail does not generate a significant amount of traffic in the morning peak hour, and so a notional allowance has been made for the morning peak hour to generate 25% of the evening peak hour traffic.
- 6.1.9. The offices have been assessed using a standard trip generation rate of 2.5 vehicle movements per 100sqm GFA.
- 6.1.10. People staying within visitor accommodation typically time their journey to avoid peak hours on the road network, as they have no need to travel for work or for employment. Consequently, the highest traffic generation from this aspect of the site is likely to arise if it is used as worker accommodation.
- 6.1.11. A trip generation rate for worker accommodation is difficult to assess because in some cases, employers will provide a company bus to transport them. However a recent application for worker accommodation at Mt Iron, Wānaka, applied a rate of 0.5 vehicle movements per room (with these being distributed as per residential activity). As workers though, it can be expected

that there will be a higher proportion of vehicles leaving the site in the morning, and arriving in the evening, than the standard residential development.

6.1.12. On this basis then the basic traffic generation of the site is as follows:

Activity	Size	Morning Peak Hour			Evening Peak Hour		
		Rate	In	Out	Rate	In	Out
Residential	1,210 Units	0.72	218	653	0.76	598	322
Daycare	100 children	-	-	-	-	-	-
Supermarket	3,650sqm GFA	3.25	59	59	13	237	237
Other retail	450sqm GFA	3.25	7	7	13	29	29
Offices	2,650sqm GFA	2.5	60	7	2.5	7	60
Worker accom	220 rooms	0.5	11	99	0.5	99	11
Gym / hall	450sqm GFA	-	-	-	-	-	-
Bar / pizzeria	150sqm + 150sqm	-	-	-	-	-	-
Total	-	-	355	825	-	970	659

Table 13: Basic Trip Generation of the Proposed Development

6.1.13. However, not all of these vehicle movements will be newly generated on the network. The traffic generation of supermarkets is known to comprise of new trips, but also trips that are already on the road network and divert to the site, and trips that are already passing by the site. For this assessment, 40% of trips have assumed to already be passing by the site. Of the centres of population in the area, Shotover Country and Lake Hayes Estate are closer to two supermarkets in Five Mile than to this site (3.3km compared to 5.9km) making it unlikely that residents of these areas would use the proposed supermarket. The 2023 census showed Arrowtown has a similar number of residential properties to what is proposed for Ridgeburn and so of the remaining 60% of trips, it is considered that 30% will be associated with trips by residents of Ridgeburn and 15% will be made by Arrowtown residents (and 15% will be made by properties towards the west of Ridgeburn).

6.1.14. The same ratios have been applied to the other retail activities in the site.

6.1.15. It is likely that there will also be linked trips associated with the supermarket arising from the offices and worker accommodation (for example, an office worker may call in at the supermarket prior to leaving the site to travel home). There is little data available for this, and in this analysis a conservative approach has been taken of applying a 5% reduction for this.

6.1.16. It is also likely that travel to the offices will be made by residents of the site. This is difficult to forecast with certainty as it is uncommon that offices and residential activity are in such close proximity, but intuitively it is not unreasonable that residents will choose to live in the site if they also work there. Anticipating that the potential to work at the offices relates to the population in the nearby area, the census indicates that around 10% of the population could be expected to live within the site, and so an allowance of 10% has been made for internal trips to the offices.

6.1.17. Pass-by travel is not common for offices, but in this instance it is considered that it is likely to arise as businesses choose to locate there rather than in other locations further west. There are no formal surveys available that demonstrates an appropriate proportion, and so no allowance has been made for this.



- 6.1.18. There are two further factors that have been considered with regard to the traffic generation of the residential units. Firstly, the (consented) application for Flints Park noted that due to expected congestion on State Highway 6 in the area (that is, around 4km west of Ridgeburn), it could be expected that a proportion of trips would instead move to public transport. Accordingly, an allowance was made for 10% of the calculated trips to be move to bus.
- 6.1.19. In this instance, the site provides for a park and ride facility, and it is therefore considered reasonable to make a similar adjustment.
- 6.1.20. The second matter is the extent to which residents of Ridgeburn would otherwise have lived elsewhere but used the same roads to travel. By way of example, a number of people who live in Cromwell, Wānaka and further afield commute to work in the Queenstown area. If, instead of living in those locations, they were able to live at Ridgeburn instead, then their trip into Queenstown would not be new on the network – it is simply that instead of travelling between (say) Cromwell and Queenstown, they would be travelling between Ridgeburn and Queenstown. There would therefore be no net increase on the traffic volume using the highway.
- 6.1.21. The 2023 census showed that of the journeys to work made from the Cromwell area, 8.8% were made into the Wakatipu Basin (or put another way, of all trips made to work in the Wakatipu Basin, 3.5% came from the Cromwell area). This equates to 282 trips made towards Queenstown from the Cromwell area, and a further 75 trips came from the Wānaka area. It is not feasible that all of these residents would instead live in Ridgeburn, but it is not unreasonable to make an allowance for trips that are already being made on the highway. If just one third of these journeys were already using the highway (89 trips in the morning peak hour), this would equate to a 14% reduction in the new traffic generation of the site. Adopting a conservative approach, the number of new trips has been reduced by 10%.
- 6.1.22. In summary then, the trip generation of the site is expected to be as follows:



Activity	Size	Morning Peak Hour			Evening Peak Hour		
		Rate	In	Out	Rate	In	Out
Residential	1,210 Units	0.72	218 22 on bus 22 already on highway 174 new	653 65 on bus 65 already on highway 522 new	0.76	598 60 on bus 60 already on highway 478 new	322 32 on bus 32 already on highway 258 new
Daycare	100 children	-	-	-	-	-	-
Total retail ³	4,100sqm GFA	3.25	66 26 pass-by 20 internal 3 linked 17 new	66 26 pass-by 20 internal 3 linked 17 new	13	266 106 pass-by 80 internal 13 linked 67 new	266 106 pass-by 80 internal 13 linked 67 new
Offices	2,650sqm GFA	2.5	60 6 internal 54 new	7	2.5	7	60 6 internal 54 new
Worker accom	220 rooms	0.5	11	99	0.5	99	11
Gym / hall	450sqm GFA	-	-	-	-	-	-
Bar / pizzeria	150sqm + 150sqm	-	-	-	-	-	-
Total	-	-	355 22 already on highway 26 pass-by 26 internal 3 linked 256 new	825 65 already on highway 26 pass-by 20 internal 3 linked 645 new	-	970 60 already on highway 106 pass-by 80 internal 13 linked 651 new	659 32 already on highway 106 pass-by 86 internal 13 linked 390 new

Table 14: Adjusted Trip Generation of the Proposed Development

6.2. Trip Distribution

- 6.2.1. It is considered that the residential components of Ridgeburn will have a similar distribution of traffic to Arrowtown, which is of a similar size and located nearby. The Council's transportation model has been used to consider journey to work, and this shows that 90% of movements out of Arrowtown were towards the west, with 10% towards the east.
- 6.2.2. One difference between the two locations is that there is a primary school within Arrowtown. The school has an enrolment zone which covers part (but not all) of the Ridgeburn site. At present, the school does not have sufficient capacity to accommodate a large increase in enrolments from the Ridgeburn area. If this remains the case then school travel will take place to/from the west, but if the Ministry of Education was to expand the school capacity, then there could be school travel between the site and Arrowtown. That said, as set out previously, there is presently a school bus that provides a service between the school and Morven Ferry Road which could easily be diverted into the park and ride facility of the site, and therefore serve student residents.

³ The retail activities have been added together for the calculation to minimise any rounding errors

- 6.2.3. Although it is unlikely that caregivers will exit the site in the morning and turn right towards Arrowtown School, it is possible that residents will have employment in Arrowtown. To take this into account, a distribution of 85% of residential traffic west and 15% of traffic travelling east has been adopted, with 25% of the eastern traffic travelling to and from Arrowtown.
- 6.2.4. For the retail aspects, there are already supermarkets towards the west that serve the populations in Shotover Country and Lake Hayes Estate, and so residents in these areas are highly unlikely to use the supermarket within the site. However this would be the closest supermarket for residents of the Dalefield area and also for Arrowtown. It would also be the closest supermarket for residents of Gibbston Valley. The new trips have therefore been distributed equally on all routes.
- 6.2.5. In respect of the offices, anticipating that the distribution of traffic is related to the locations of population in the area, then 90% of travel will be associated with the west and 10% towards the east (which in practice is most likely to be Arrowtown).
- 6.2.6. Thus the proposal can be expected to generate the following vehicle movements at peak times:

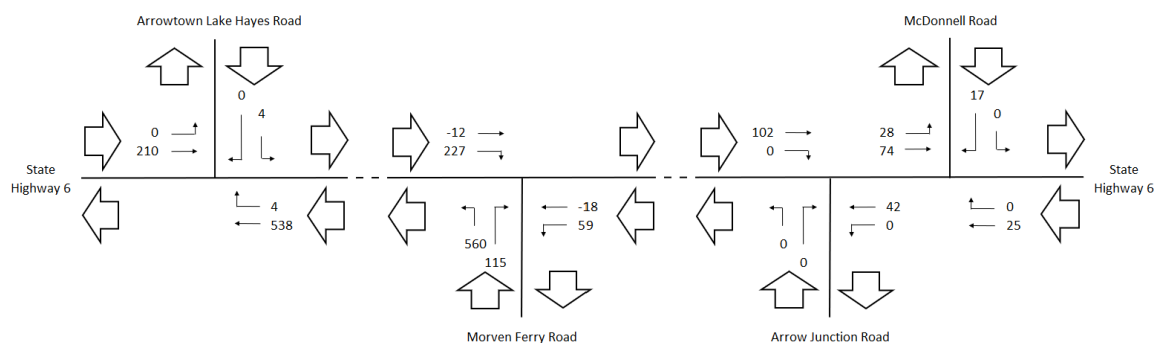


Figure 12: Traffic Generation of Development, Morning Peak Hour Traffic Flows

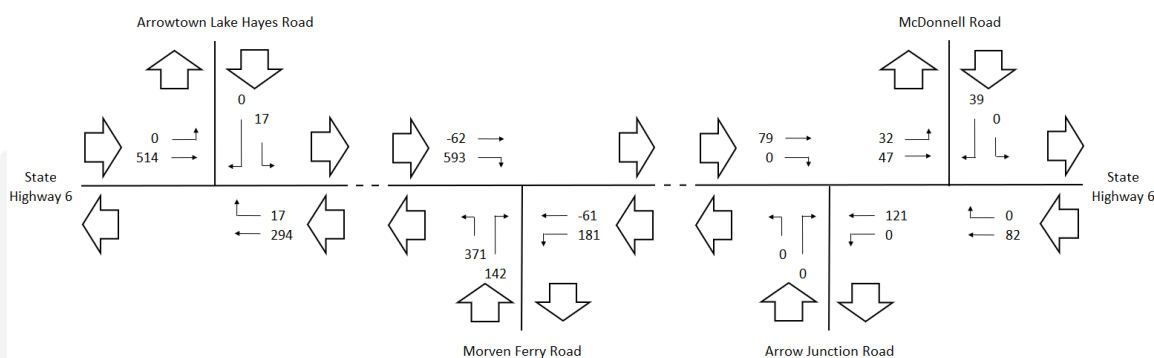


Figure 13: Traffic Generation of Development, Evening Peak Hour Traffic Flows

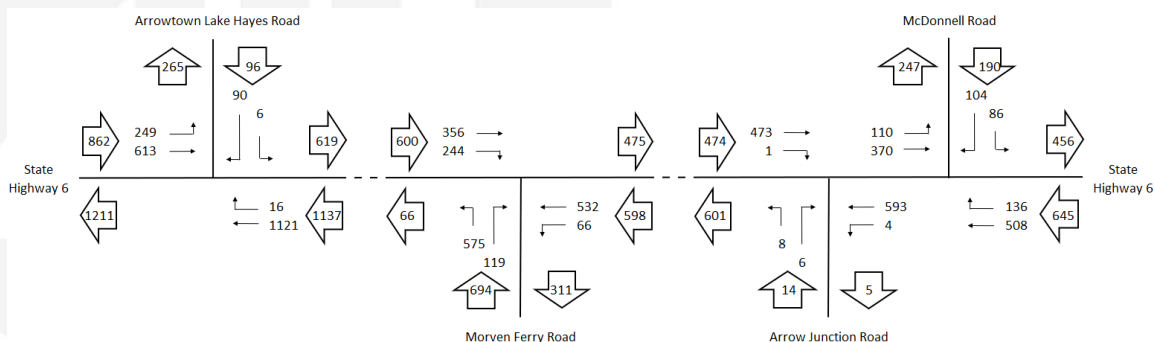


Figure 14: Total Traffic on the Network (Existing Plus Development), Morning Peak Hour

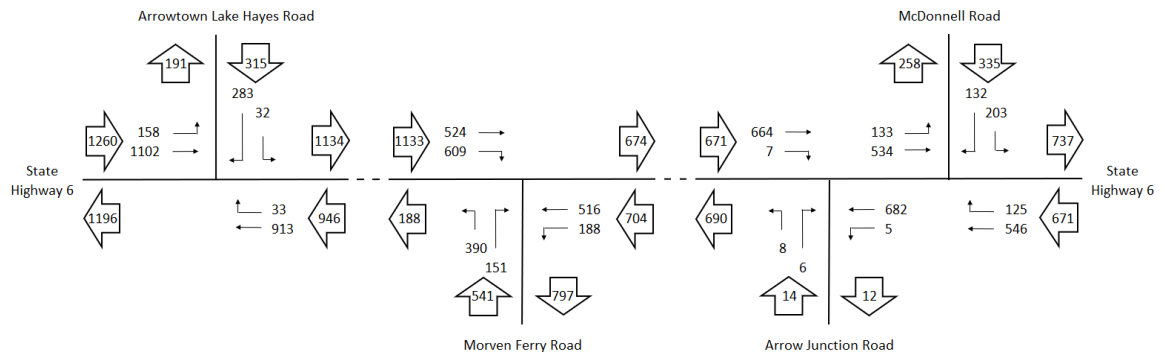


Figure 15: Total Traffic on the Network (Existing Plus Development), Evening Peak Hour

7. Effects on the Transportation Networks

7.1. Roading Network Capacity

- 7.1.1. The nearby intersections have been assessed using the computer software package Sidra Intersection. In view of the extent of traffic increase at Morven Ferry Road, this intersection has been modelled as the proposed roundabout illustrated previously in this report, as set out below.

Road and Movement	Morning Peak Hour			Evening Peak Hour		
	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Morven Ferry Road	26.8	18.9	C	15.7	8.8	B
State Highway 6 (east)	8.3	4.9	A	104.1	56.8	F
State Highway 6 (west)	9.5	4.7	A	15.0	23.6	B

Table 15: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Morven Ferry Road Intersection, with Full Development and Proposed Roundabout

- 7.1.2. It can be seen that for the existing traffic flows, a roundabout with one leg on each approach has insufficient capacity. An assessment has been carried out with the addition of a short (20m) second approach lane on the Morven Ferry Road and State Highway 6 (east) approaches, since there is sufficient land available within the road reserve in these locations. The results are summarised below.

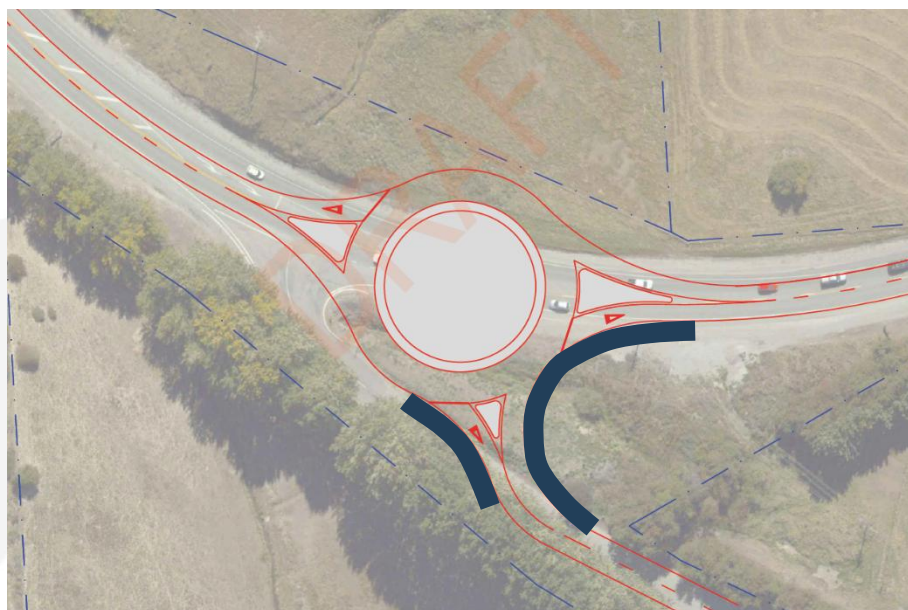


Figure 16: Proposed Roundabout Layout at State Highway 6 / Morven Ferry Road Intersection Illustrating Second Approach Lanes within Legal Boundary

Road and Movement	Morning Peak Hour			Evening Peak Hour		
	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Morven Ferry Road	11.5	6.1	B	10.8	3.6	B
State Highway 6 (east)	8.3	4.9	A	12.2	7.3	B
State Highway 6 (west)	9.5	4.4	A	14.6	21.8	B

Table 16: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Morven Ferry Road Intersection, with Full Development and Proposed Roundabout Plus Second (Short) Approach Lanes

- 7.1.3. It can be seen that with the addition of these lanes, the roundabout operates with a good level of service.
- 7.1.4. The efficiency of the State Highway 6 / Arrow Junction Road and State Highway 6 / McDonnell Road intersections with the full development is summarised below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Arrow Junction Road	L	10.7	0.0	B	11.7	0.0	B
	R	26.6	0.1	D	43.5	0.2	E
State Highway 6 (east)	L	7.2	0.0	A	7.2	0.0	A
State Highway 6 (west)	R	10.4	0.0	B	11.5	0.0	B

Table 17: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrow Junction Road Intersection, with Full Development

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
Arrow Junction Road	L	+1.2	-	A to B	+2.1	-	A to B
	R	+10.6	-	C to D	+22.5	+0.1	C to E
State Highway 6 (east)	L	-	-	-	-	-	-
State Highway 6 (west)	R	+1.1	-	A to B	+2.1	-	A to B

Table 18: Difference Between 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrow Junction Road Intersection, with and without Development

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	7.1	0.5	A	8.1	0.6	A
McDonnell Road	L	7.1	0.3	A	8.5	1.0	A
	R	21.3	1.5	C	41.1	3.4	E
State Highway 6 (west)	L	6.1	0.3	A	6.0	0.4	A

Table 19: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / McDonnell Road Intersection, with Full Development

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	+0.4	-	-	+0.4	+0.1	-
McDonnell Road	L	+0.3	-	-	+0.4	+0.1	-
	R	+4.6	+0.5	-	+18.3	+2.9	C to E
State Highway 6 (west)	L	-	+0.1	-	-	+0.1	-

Table 20: Difference Between 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / McDonnell Road Intersection, with and without Development

- 7.1.5. The modelling indicates that the intersections will generally provide an appropriate level of service, and although the right-turn movement out of McDonnell Road in the evening peak hour provides Level of Service E, the queue is only forecast to be an increase of 3 vehicles compared to the situation without the development. The full extent of development increases the delay for this movement by 18 seconds, and in view of this being an assessment ten years' hence, it is considered likely that this level of delay will not be uncommon for priority intersections onto the state highway network at this time.
- 7.1.6. The modelling shows that the forecast delay for right-turning vehicles at the State Highway 6 / McDonnell Road intersection, plus ten years of growth and the proposed development is 41 seconds, with queues of 3-4 vehicles. By way of comparison, this compares to a delay for right-turning vehicles at the State Highway 6 / Arrowtown Lake Hayes Road intersection **at the current time** of more than three minutes and queues of nearly 30 vehicles. This demonstrates that the State Highway 6 / McDonnell Road intersection has considerably more capacity to absorb additional traffic volumes, and also noted above, the bulk of traffic generated by the proposed development does not pass through this intersection.
- 7.1.7. At the State Highway 6 / Arrowtown Lake Hayes Road intersection, the current levels of traffic cannot be accommodated without the proposed development in place, and so the analysis has not been repeated for the scenario with the proposed development.
- 7.1.8. As noted above, at present the crash record for the intersection shows that there is (on average) more than one non-injury crash per year relating the drivers failing to stop for other vehicles on the highway. At least one police report notes that the crash could have resulted in serious injuries under slightly different circumstances. The survey of the intersection also showed that drivers were not stopping as required but were treating the intersection as 'give-way' control, which will also likely contribute to the road safety record.



- 7.1.9. State Highway 6 at the intersection with Arrowtown Lake Hayes Road is presently posted with an 80km/h speed limit, and at such speeds, the evidence suggests that there is a high potential for crashes to result in serious injuries. This being the case, it can be anticipated that as part of a Safe System approach, NZTA will consider reducing the speed limit on this section of highway to below the threshold for serious injuries (one recent and local example of this is that a reduction from 100km/h to 80km/h or lower was assumed when the transportation analysis for the Te Pūtahi Ladies Mile zoning was undertaken). Under this outcome of a lower speed limit, additional options become available for improving the capacity of the intersection in a cost-effective manner.
- 7.1.10. One such treatment would be a ‘seagull’ layout, where *“provision is made for vehicles turning right from the stem of the T to be sheltered within a central median where provision is also made for acceleration of those turning vehicles before they merge with through traffic travelling along the top of the T”* (NZTA Traffic Control Devices Manual Part 4). In essence, this means that rather than waiting for a gap in both directions on the highway, drivers turning right out of Arrowtown Lake Hayes Road only need to wait for a gap in the eastbound traffic, before proceeding into the lane in the centre of the road and then merging with westbound traffic.
- 7.1.11. A range of potential seagull layouts have been drawn up based on the parameters in Part 4 of the Traffic Control Devices Manual. If the present 80km/h speed limit was to be retained, this would result in the merge of the two westbound traffic lanes occurring in the same location as the Sicilian Lane intersection, which would potentially lead to adverse road safety outcomes. However with a reduction to 70km/h or 60km/h, this merge occurs further east and so drivers turning to and from Sicilian Lane only need to cross the same number of movement lanes as they do at present.
- 7.1.12. Discussions with NZTA have identified that they consider their ability to reduce speed limits is constrained at present. If a reduced speed limit is allowed for then it is likely that either a 70km/h or 60km/h could be put in place. The Setting of Speed Limit Rules 2024 Schedule 1 sets out minimum lengths for sections of road with the speed limit. The minimum length for 80km/h is 800m which would take a driver 36 seconds to traverse. This same distance could be travelled at 70km/h in 41 seconds and at 60km/h it could be travelled in 48 seconds. Thus even under the greatest reduction in speed, the increase in journey time would only be 12 seconds.
- 7.1.13. On the basis of the discussions with NZTA, at present a seagull design for a 70km/h speed on the highway has been evaluated. A layout for this is shown below.

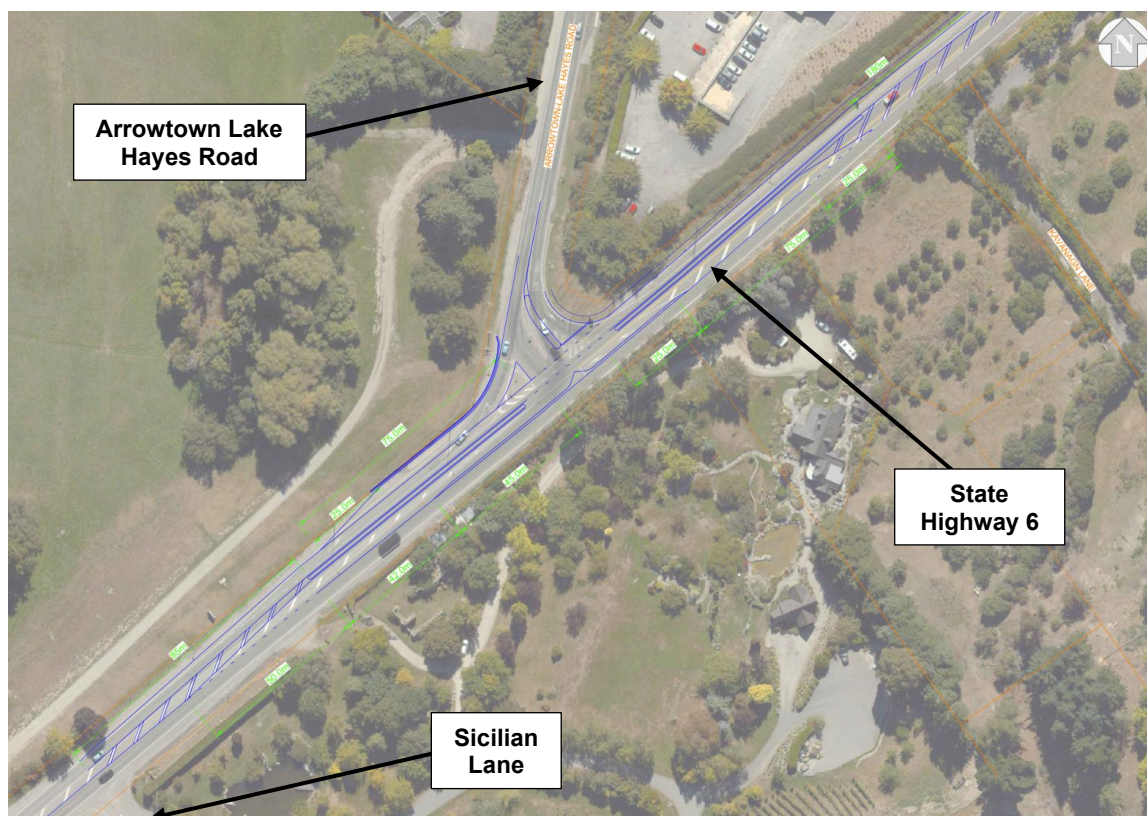


Figure 17: Proposed Seagull Layout at the State Highway 6 / Arrowtown Lake Hayes Road Intersection

7.1.14. An assessment has been carried out based on drivers only needing to cross the eastbound traffic lane using the Sidra Intersection computer software, and the results are summarised below. It is highlighted that with a reduced speed limit, 'give-way' rather than 'stop' control becomes the appropriate approach, but for ease of comparison, no adjustment has been made to the gap acceptance parameters of the modelling shown below. For completeness though, if the seagull was to operate under 'give-way' control, queues and delays would be lower than those shown below.

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	9.5	0.1	A	16.9	0.4	C
Arrowtown Lake Hayes Road	L	8.9	0.0	A	20.4	0.4	C
	R	11.1	0.4	B	26.9	4.4	D
State Highway 6 (west)	L	6.2	0.7	A	5.7	0.5	A

Table 21: 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrowtown Lake Hayes Road Intersection, with Full Development and Seagull

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (east)	R	+0.5	+0.1	-	+7.3	+0.3	A to C
Arrowtown Lake Hayes Road	L	-0.1	-	-	+7.0	+0.3	B to C
	R	-16.3	-1.1	D to B	-706.7	-83.7	F to D
State Highway 6 (west)	L	-1.5	-	-	-2.0	+0.1	-

Table 22: Difference Between 2035 Anticipated Peak Hour Levels of Service at the State Highway 6 / Arrowtown Lake Hayes Road Intersection, with/without Development and Seagull

- 7.1.15. The analysis shows that the introduction of a seagull layout (coupled with a slightly reduced speed limit) resolves the identified capacity constraints, such that the performance of the intersection with the development is better than expected that under the status quo.
- 7.1.16. On this basis, it is considered that the introduction of a roundabout at the State Highway 6 / Morven Ferry Road intersection, and revisions to the State Highway 6 / Arrowtown Lake Hayes Road intersection (the reduction of the speed limit to better align with a Safe System approach and the consequent revision to a 'seagull' layout) addresses the capacity constraints on this part of the state highway network.
- 7.1.17. For completeness, discussions with NZTA identified that in addition to the effects expected within the immediate area of the site, they also sought an assessment of the effects further afield, specifically at the Frankton - Ladies Mile section of State Highway 6 and the bridge across the Shotover River, located approximately 5-6km from the site. No assessment is included within this report as it is understood that such an assessment is beyond the geographic scope of a transportation analysis for the proposed Ridgeburn development.

7.2. Timing of Rooding Improvements

- 7.2.1. As Morven Ferry Road will provide the access to the site, it will be utilised by construction traffic travelling to and from the site. Accordingly, it is considered that this should be improved prior to the occupation of the first residence in Ridgeburn.
- 7.2.2. At any intersection, the addition of a small amount of traffic does not produce substantial changes in queues and delays. However multiple small changes in traffic volumes give rise to a cumulative effect such that larger changes in queues and delays arise. As such, it is likely that some amount of development within Ridgeburn will have minimal effects at the State Highway 6 / Arrowtown Lake Hayes Road intersection, but as the site is more extensively developed, the queues and delays will increase more substantially. As a result, it is considered that the timing of improvements to the State Highway 6 / Arrowtown Lake Hayes Road intersection is a matter for further discussion between the applicant and NZTA.
- 7.2.3. It is understood that the timing of upgrades to Morven Ferry Road and the State Highway 6 / Arrowtown Lake Hayes Road intersection are to be offered as conditions of consent.
- 7.2.4. For clarity, construction traffic associated with the site will change the normal operating conditions on the roading network and therefore will be required to move under the control of a Construction Traffic Management Plan, produced under the New Zealand Guide to Temporary Traffic Management (**NZGTTM**). Any such plan requires the approval of the road controlling authorities (in this case both the Council and NZTA, as movements will occur on



the highway) prior to construction traffic travelling on the roading/highway networks. This process means that the safety and efficiency effects of construction vehicles will be assessed and mitigated as appropriate. Consequently it is not considered that any roading improvements are justified as a result of construction works associated with Ridgeburn.

- 7.2.5. An assessment has been carried out of the point at which the State Highway 6 / Morven Ferry Road priority intersection requires upgrading to a roundabout. NZTA does not have any 'hard and fast' criteria for the point at which an intersection requires upgrading, but this is typically requested when the 'worst case' level of service changes from C to D, or from D to E.
- 7.2.6. In order to identify these points, the existing priority intersection has been remodelled repeatedly using different traffic flows to ascertain when Level of Service D first occurs and when Level of E first occurs. For the purpose of this assessment, only residential development has been considered, since at lower numbers of dwellings, it is unlikely that a substantial amount of non-residential development would occur. The same parameters for traffic generation and distribution of the site has been retained as set out above (paragraphs 6.1.4, 6.1.6 and 6.2.3).
- 7.2.7. The results show that the right-turn movement out of Morven Ferry Road changes from Level of Service C to D at a yield of 210 residences within the site. The intersection approach overall however has Level of Service B. The right-turn movement out of Morven Ferry Road changes from Level of Service D to E at a yield of 610 residences within the site but again, the approach overall has Level of Service B.
- 7.2.8. Given the importance of the intersection in providing access to the site, the Applicant proposes a condition of consent that the roundabout will be in place prior to the occupation of the first house in Phase 3 of the development (which equates to 321 residences being occupied in Ridgeburn). This lies slightly above the point where Level of Service D first occurs, but well below the point where Level of Service E arises, and is therefore considered to be a pragmatic and conservative threshold.

7.3. Non-Car Modes of Travel

- 7.3.1. It is unlikely that the development will lead to an increase in the extent of walking or cycling on the state highway network due to distances involved meaning that these non-car modes of transport are unlikely to be attractive. In the event that there is an increase in cycling, it is most likely that this will occur using the Twin Rivers Cycle Trail to the south of the site or the Arrow Bridges Cycle Trail towards the north, rather than along the highway.
- 7.3.2. The scale of development may mean that a bus service could be supported. Accordingly, the proposed changes in roading infrastructure at the State Highway 6 / Morven Ferry Road and State Highway 6 / Arrowtown Lake Hayes Road intersections will need to allow for the movement of these vehicles. The provision of a park and ride site within Ridgeburn will proactively support residents and visitors to use public transport for at least part of their journey.



7.4. Road Safety

- 7.4.1. The crash record does not suggest that the development will give rise to adverse road safety effects. However the revision of the State Highway 6 / Arrowtown Lake Hayes Road intersection will likely have a positive effect on the current road safety record in this location because at present there is a prevalence of drivers exiting Arrowtown Lake Hayes Road and colliding with vehicles on the highway, and this is a movement that would be addressed through the improvement measures discussed above.
- 7.4.2. NZTA Research Report 644 considered the crash performance of seagull intersections. This concluded that crash risk appears to increase for JA-type crashes (in this case, the right-turn out of Arrowtown Lake Hayes Road colliding with eastbound through traffic on State Highway 6) and LB-type crashes (in this case, the right-turn into Arrowtown Lake Hayes Road colliding with eastbound through traffic on State Highway 6). In this instance however, the volume of traffic turning right into Arrowtown Lake Hayes Road is very small, and the research report notes that the change in LB crash type may be an outcome of a high movement. Increased crash risk is also related to reduced sight distances (represented by the intersection being 'stop' controlled) but in this case, drivers undertaking the right-turn movement out of Arrowtown Lake Hayes Road have excellent sight distance in this direction.
- 7.4.3. The Research Report also sets out that one previous study showed that where seagull intersections were properly designed, they did not give rise to elevated crash numbers. Conversely, the factors listed in the report which appear to lead to an adverse road safety outcome can be 'designed out' of any geometric changes at the State Highway 6 / Arrowtown Lake Hayes Road intersection. The report also noted that relevant factors were the posted speed limit and the extent of conflicting vehicle movements.
- 7.4.4. On this basis then, at this stage it does not appear that the conversion of the State Highway 6 / Arrowtown Lake Hayes Road intersection from a simple priority intersection to a seagull intersection will lead to adverse road safety outcomes, but the layout will need to be designed carefully to eliminate risks. It should also be borne in mind that the current 'do nothing' scenario with crashes already occurring that involve the right-turn movement out of Arrowtown Lake Hayes Road will not resolve itself, and the risk of severe injury will remain high under the current speed regime.
- 7.4.5. The proposed change at the State Highway 6 / Morven Ferry Road intersection from priority control to a roundabout can be designed to meet current guides and standards, and can therefore be expected to operate safely.



8. Conclusions

- 8.1. This report has identified, evaluated and assessed the various transport and access elements of a proposed residential and mixed use development at Morven Ferry Road on the state highway network.
- 8.2. The analysis shows that at the current time (2025), the State Highway 6 / Arrowtown Lake Hayes Road intersection has minimal available capacity and by the design year of 2035, queues and delays are substantial. This intersection therefore has insufficient capacity for the expected ambient traffic growth (that is, the traffic growth expected without development of the site). This conclusion is supported by the current cluster of crashes at the intersection associated with the right-turn movement out of Arrowtown Lake Hayes Road, and observations that drivers are not adhering to the 'stop' control at the intersection (and they are legally required to do) but are treating it as a 'give-way' arrangement.
- 8.3. As part of the proposal, the State Highway 6 / Morven Ferry Road intersection will be upgraded to a roundabout. An initial roundabout layout was included within the Referral Application, but testing of this using the full traffic generation of the site shows that additional capacity is required on one approach (an extra approach lane). The legal highway reserve in this location is very wide and additional lanes can be accommodated within the legal highway.
- 8.4. The bulk of the traffic is expected to be associated with destinations towards the west, based on the distribution of trips currently occurring in nearby Arrowtown. This being the case, there is an increase in traffic flow at the State Highway 6 / Arrowtown Lake Hayes Road intersection, which as noted above, is expected to be operating at capacity even without the proposed development. However it can be expected that NZTA will address the road safety issues at the intersection through adopting a Safe System approach of reducing the speed limit, and this being the case, a 'seagull' layout can be easily implemented within the legal highway reserve which increases the intersection capacity. With this revision (a change in the speed limit plus a change to a 'seagull') then the revised intersection is easily able to accommodate the additional traffic generated by the proposed development. The modelling shows that the resultant queues and delays at this revised intersection plus the full development, are lower than if the current configuration was retained and the proposed development did not proceed.
- 8.5. While delays increase at the State Highway 6 / Arrow Junction Road and State Highway 6 / McDonnell Road intersections, the changes arising due to the proposed development are modest. The performance of these intersections with the full extent of development in 2035 is considerably better than is presently occurring at the State Highway 6 / Arrowtown Lake Hayes Road intersection at the current time.
- 8.6. The legal widths of the highways are sufficient to accommodate the expected improvement schemes described above (a roundabout at the State Highway 6 / Morven Ferry Road intersection, and a 'seagull' at the State Highway 6 / Arrowtown Lake Hayes Road intersection). Conditions of consent are offered that require the upgrading of these intersections at an appropriate time.
- 8.7. The crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal, subject to the layout of the State Highway 6 / Arrowtown Lake Hayes Road intersection being addressed. The 'seagull' intersection at the latter will be required to be designed with care to ensure that elements which are shown to introduce an adverse road safety outcome are not incorporated into the layout. However the research does not suggest that a properly designed 'seagull' intersection within a lower speed environment



would have inherently worse road safety outcomes than the current layout (taking into account the ambient traffic growth and existing speed limit).

- 8.8. Overall, subject to the improvement schemes set out above, it is considered that the traffic generated by the development can be accommodated on the adjacent state highway network without capacity or efficiency issues arising. It can therefore be supported in this regard, from a traffic and transportation perspective.

Carriageway Consulting Limited
March 2026



Appendix A

Qualifications and Experience of Report Author



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Qualifications and Experience

Report Author: Andy Carr

Professional Qualifications

1988	Bachelor of Science with Honours (Computing Science), University of Newcastle upon Tyne
1989	Master of Science (Transport Engineering and Operations), University of Newcastle upon Tyne
1998	Master of Business Administration (Distinction): University of Newcastle upon Tyne
2006 - present	Chartered Professional Engineer (Practice field: Transportation engineering)
2006 - present	International Professional Engineer (NZ)
2006 - present	APEC Engineer
2006 - present	Chartered Member, Engineering New Zealand

Employment Profile

2014 - present	Director and Owner, Carriageway Consulting Limited – involved in numerous transportation engineering projects from transportation assessments for new developments and plan changes, to roading design, road safety audits, and independent peer reviews for local authorities and government departments. Preparation and presentation of expert evidence to Council Hearings and the Environment Court.
2012 - 2014	Associate Principal, Abley Limited - leading a range of transportation assessments for land-use projects throughout the country, and provision of expert evidence.
2005 - 2012	Senior Transport Planner and progressing to Senior Associate / Office Manager, Traffic Design Group - responsible for sourcing, managing and overall technical direction of the transportation assessments for land use development projects throughout the South Island.
2004 - 2005	Senior Transport Planner, Beca - assisting in a variety of roading projects with particular responsibility for writing the first New Zealand Pedestrian Planning Guide.
1990 - 2004	Traffic engineer in various private sector roles in the UK, ranging from Graduate (1990-1992) to Principal (2000-2004) with a range of roles, initially assisting with a variety of projects assessing land use changes, road safety and strategic transportation studies, and ultimately managing a local team with technical oversight of all work carried out, client liaison and sourcing commissions.

Additional Information

Member, Resource Management Law Association

Member, Engineering New Zealand Transportation Group

Associate Member, New Zealand Planning Institute



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