BEFORE THE HEARINGS COMMISSIONERS
APPOINTED BY THE CENTRAL OTAGO DISTRICT COUNCIL

UNDER	the Resource Management Act 1991
IN THE MATTER	of a submission on Plan Change 19 under clause 6 of Schedule 1 of the Act
BY	**LOWBURN VITICULTURE LIMITED**
	Submitter 123

STATEMENT OF EVIDENCE OF ANDY CARR

Dated: 16 May 2023

Statement of evidence of Andy Carr

Introduction

[1] My name is Andrew David Carr.

[2] I am a Chartered Professional Engineer and an International Professional Engineer (New Zealand section of the register). I hold a Masters degree in Transport Engineering and Operations and also a Masters degree in Business Administration.

[3] I served on the national committee of the Resource Management Law Association between 2013-14 and 2015-17, and I am a past Chair of the Canterbury branch of the organisation. I am also a Chartered Member of Engineering New Zealand (formerly the Institution of Professional Engineers New Zealand), and an Associate Member of the New Zealand Planning Institute.

[4] I have more than 33 years' experience in traffic engineering, over which time I have been responsible for investigating and evaluating the traffic and transportation impacts of a wide range of land use developments, both in New Zealand and the United Kingdom.

[5] I am presently a director of Carriageway Consulting Ltd, a specialist traffic engineering and transport planning consultancy which I founded in early 2014. My role primarily involves undertaking and reviewing traffic analyses for both resource consent applications and proposed plan changes for a variety of different development types, for both local authorities and private organisations. I have previously been a Hearings Commissioner and acted in that role for Greater Wellington Regional Council, Ashburton District Council, Waimakariri District Council and Christchurch City Council.

[6] Prior to forming Carriageway Consulting Ltd I was employed by traffic engineering consultancies where I had senior roles in developing the business, undertaking technical work and supervising project teams primarily within the South Island.

Code of Conduct for Expert Witnesses

[7] I confirm I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. 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

[8] I have been instructed by the submitter, Lowburn Viticulture Limited to give expert traffic advice in respect of its submission on Plan Change 19 by the Central Otago District Council with regard to its site (**the site**) at Lowburn Valley Road.

[9] Prior to being instructed to prepare this Statement of Evidence, I was not involved in the submission. Accordingly, I firstly evaluated the transportation-related effects of the development that would be facilitated by the submission (if accepted). The first part of my evidence summarises my findings. I then briefly discuss the s 42A report of Ms White, consultant planner to the council.

[10] I visited the site twice during April 2023, but have travelled along State Highway 6 adjacent to Lowburn Valley Road on a number of occasions as part of my involvement with other projects in the general vicinity and also in respect of personal business.

Executive Summary

[11] Since I was not previously involved in the submission, I have assessed the transportation related effects associated with the development of the site (if rezoned) and set these out in a Transportation Assessment.

[12] My analysis was based on the rezoned site being developed for 18 residences. I found that the traffic generated from these could be easily accommodated on the adjacent roading network without adverse effects on capacity or road safety.

[13] With particular regard to the State Highway 6 / Lowburn Valley Road intersection, I carried out a sensitivity test to allow for growth in traffic on the highway in future. My revised analysis continued to show that the traffic generated by full development of the rezoned site could easily be accommodated at the intersection.

[14] The formed width of Lowburn Valley Road presently does not currently meet council's Code of Practice, and this remains the case if the site was to be rezoned and developed. However in practice, the road currently operates satisfactorily under current volumes, and I consider it will continue to do so with the small traffic increase associated with the site.

[15] If site access was to be achieved via Judare Drive, I consider that widening of this roadway would be required, and I understand that the necessary land can be acquired for this.

[16] Turner Terrace is able to serve a small number of additional residences under its current configuration but if more lots were to be served then it would require upgrading to meet the Code of Practice. That said, the upgraded formation would mean the road was able to accommodate the traffic from up to 150 residences, far more than would occur in this instance. As such, I consider that such upgrading would represent a high degree of over-design for the limited amount of additional traffic that the road would carry.

[17] The site frontage onto Lowburn Valley Road also creates the opportunity to provide access into the site via a new roading connection. Based on my site visits I consider that a new intersection can be achieved that fully meets appropriate design guides and standards.

[18] In all cases, I consider that any internal roads within the site can be constructed to fully meet the Code of Practice.

[19] No changes to the geometry of the State Highway 6 / Lowburn Valley Road intersection are warranted based on current traffic flows and those that would arise with development of the site (if rezoned).

[20] Although no layout is currently proposed for the site, it is highly likely in my view that it would be possible to devise a layout that complies with all relevant transportation-related provisions.

[21] I have reviewed the s 42A report of Ms White, but note that she does not address transportation matters at the submitter's site.

[22] Overall, I am able to support the rezoning request from a traffic and transportation perspective.

Summary of Transportation Assessment

[23] Since I was not previously involved in the submission, I have assessed the transportation related effects associated with the development of the site (if rezoned) and set these out in a Transportation Assessment. The Transportation Assessment is **attached** to this Statement of Evidence.

[24] In summary, my analysis has relied on information provided to me which indicates that up to 18 residential properties could be developed if the site was rezoned (although in practice, the number may be lower, at 14 lots). My analysis found that the vehicles generated by these residences could easily be accommodated on the adjacent roading network without adverse effects on capacity or road safety.

[25] With particular regard to the State Highway 6 / Lowburn Valley Road intersection, I then carried out a sensitivity test, to allow for growth in traffic on the highway in future, and increased the peak hour volumes passing the site by 46%. My revised analysis continued to show that the traffic generated by full development of the rezoned site could easily be accommodated at the intersection.

[26] The Council has a Code of Practice which sets out appropriate widths for roading outside and within the site, Lowburn Valley Road does not currently meet the Code of Practice, but the extent of traffic increase arising from development of the site is small and does not cause the road to move into any different category within the Code of Practice. Accordingly, the extent of any shortfall in cross-section is unaltered by the proposal. I consider that in practice, the road currently operates

satisfactorily under current volumes, and will continue to do so with the small traffic increase associated with the site.

[27] It is possible that site access could be achieved via Judare Drive and Turner Terrace. The 4-5m current formed width of Judare Drive is unlikely to be sufficient for any increase in traffic associated with the site's rezoning, and in my view widening will be necessary. The nature of the widening required would be dependent on the number of lots that would be accessed from Judare Drive but I understand that the necessary land can be acquired for any necessary widening.

[28] The cross-section of Turner Terrace means it could serve another 4 lots without falling into the next classification of the Code of Practice but if more lots were to be served then Turner Terrace would require upgrading to comply. However, the required formation is capable of accommodating the traffic from up to 150 residences, far more than would occur in this instance. Upgrading to this standard is likely to represent a high degree of over-design for the limited amount of additional traffic that the road would carry.

[29] The site frontage onto Lowburn Valley Road also creates the opportunity to provide access into the site by way of a new roading connection. Based on my site visits I consider that a new intersection that fully met appropriate design guides and standards could be achieved.

[30] In all cases, I consider that any internal roads within the site could be constructed to fully meet the Code of Practice.

[31] I consider that the traffic flows at the State Highway 6 / Lowburn Valley Road intersection currently justify the provision of an auxiliary left-turn bay (but one is not provided). This conclusion remains the same if the site was to be rezoned. No auxiliary right-turn bay is required at the current time, or with the additional traffic expected to be generated by the site, if rezoned. Accordingly, rezoning the site does not result in the need for any geometric changes at the State Highway 6 / Lowburn Valley Road intersection.

[32] Although no layout is currently proposed for the site, I reviewed the likelihood that transportation-related non-compliances with the District Plan would result from subdivision of the site. In my view, it would be possible to devise a site layout that was able to comply with all relevant transportation-related provisions.

[33] In the Transportation Assessment I therefore concluded that the rezoning request could be supported from a traffic and transportation perspective. I remain of this opinion.

Officers' Reports

[34] I have been reviewed the s 42A report of Ms White but I note that when considering the site she does not mention transportation matters. I appreciate that it is possible that she has not turned her mind to this given her recommendation that the submission is not accepted, but this means that I am therefore unable to identify the council's views on traffic and transport issues associated with the site.

Conclusions

[35] On the basis of my assessment of traffic and transportation matters, I consider that there are no reasons why the site could not be rezoned as requested.

Andrew David Carr

16 May 2023

Lowburn Viticulture Limited

Proposed Rezoning
Lowburn Valley Road
Lowburn

Transportation Assessment

CARRIAGEWAY
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traffic engineering | transport planning

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1. Introduction

1.1. Lowburn Viticulture Limited has made a submission to the Central Otago District Council's Plan Change 19 (**PC19**) regarding its site at Lowburn Valley Road, Lowburn (**the site**). The site is not presently within the area identified through PC19, but the submission seeks to include the site and for it to be rezoned as Large Lot (Precinct 2) Residential Zone (**LLRZ(P2)**).

1.2. This Transportation Assessment sets out a detailed analysis of the transportation issues associated with the requested rezoning including changes in travel patterns that are likely to arise from subsequent development of the rezoned site. Where potential adverse effects are identified, ways in which these can be addressed are set out.

1.3. 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.

2. Site Overview

2.1. Location

2.1.1. The site is located around 1.4km northwest of State Highway 6. The site has frontage onto only Lowburn Valley Road and is currently zoned as Rural Resource Area in the Central Otago District Plan ('*District Plan*'). It is currently vacant.

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.

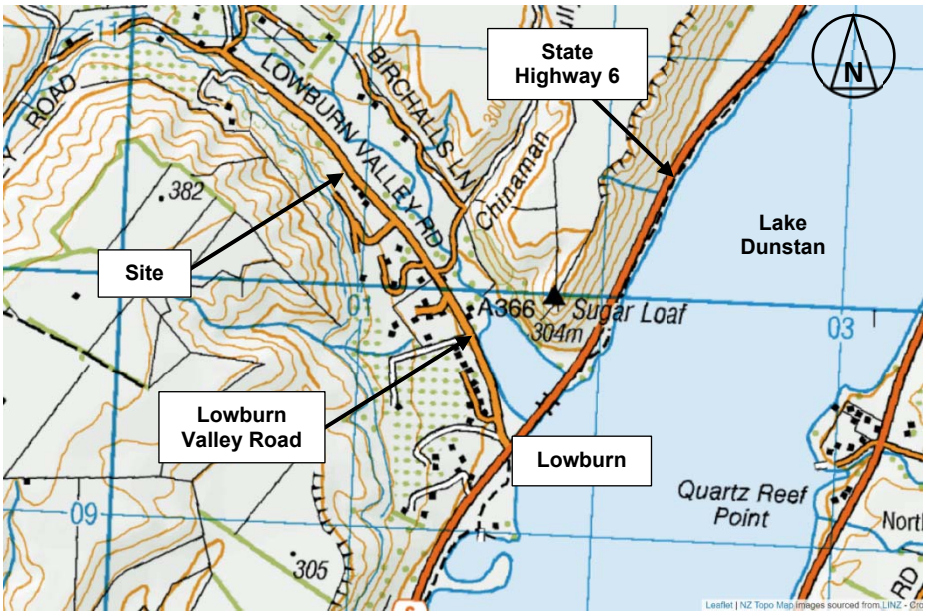


Figure 1: General Location of Site

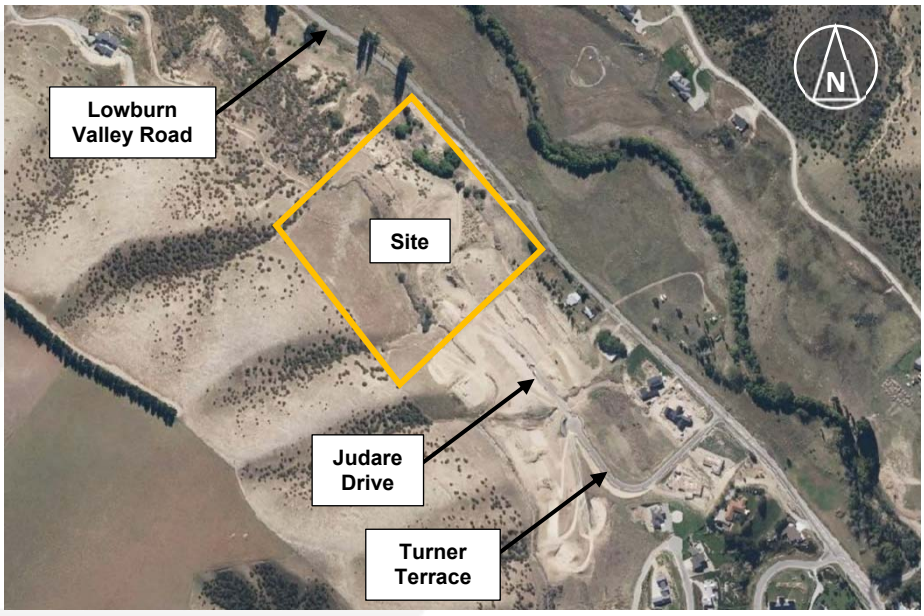


Figure 2: Aerial Photograph of Site and Environs

2.2. Roading Classification

2.2.1. The District Plan classifies Lowburn Valley Road as a Rural Collector Road, indicating a role in providing for property access as well as for through traffic. Other roads in the immediate vicinity are Local Roads.

2.2.2. State Highway 6 is classified as a Rural State Highway, and it forms part of the strategic highway network.

3. Current Transportation Networks

3.1. Roading Network

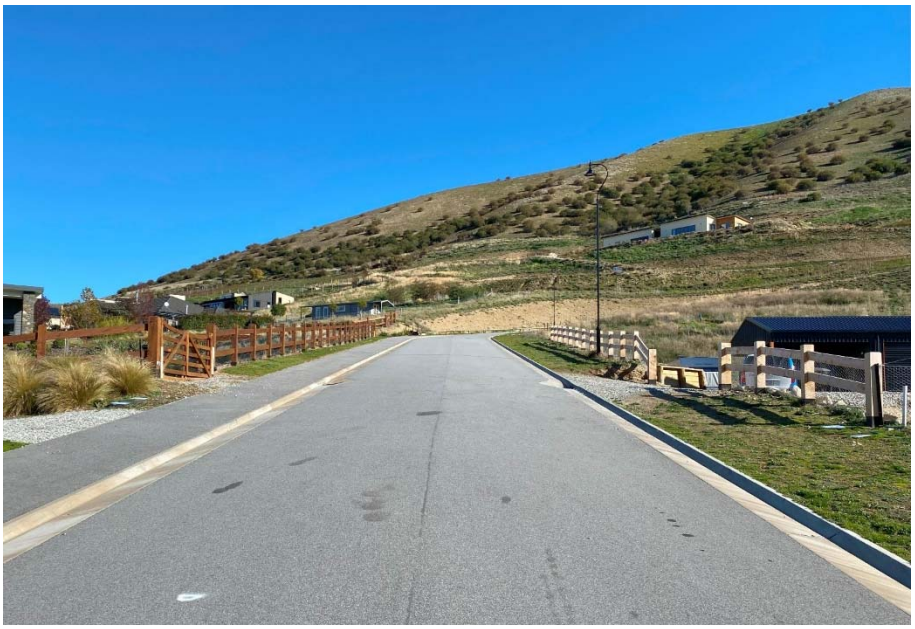
3.1.1. In the vicinity of the site, Lowburn Valley Road is subject to an 80km/h speed limit. It has a curvilinear alignment, with a crest curve located close to the northern site boundary, and a 5.7m wide seal with a centreline but no edgeline markings, and narrow gravel shoulders.

Photograph 1: Lowburn Valley Road Looking South (Site on Right)

3.1.2. Approximately 200m south of the site's southern boundary, the speed limit transitions from 80km/h to 60km/h, and there is the start of a taper for an auxiliary right-turn bay that serves Turner Terrace, a local road serving residential development. The intersection is newly-constructed and is well-delineated with signage and carriageway markings.

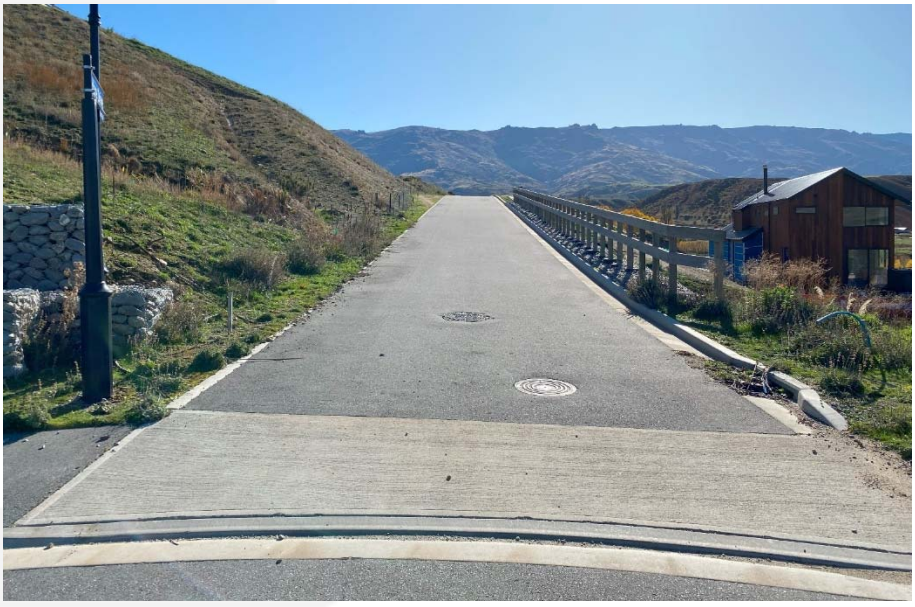
Photograph 2: Lowburn Valley Road / Turner Terrace Intersection Looking North

3.1.3. Turner Terrace has a 6m wide carriageway and ascends from Lowburn Valley Road at a gradient of 1 in 8. Approximately 130m west of Lowburn Valley Road, Turner Terrace turns through 90-degrees to the north before terminating at an 18m diameter turning head some 100m away. There are no speed limit signs posted meaning that drivers could reasonably expect that the prevailing 60km/h speed limit of Lowburn Valley Road continues on Turner Terrace, but the National Speed Limit Register sets out that Turner Terrace is subject to a 50km/h speed limit.



Photograph 3: Turner Terrace Looking West

3.1.4. Judare Drive is a right-of-way that connects to the northern side of the turning head and runs northwards for 160m before terminating at the southern boundary of the site. This has a straight alignment and a gentle gradient, with a 5m seal width over much of its length, although this reduces to 4m wide approximately 100m from the turning head. Judare Drive meets the turning head at a vehicle crossing, rather than at an 'intersection'.



Photograph 4: Judare Drive Looking North Showing Alignment and Vehicle Crossing

3.1.5. To the south of its intersection with Turner Terrace, Lowburn Valley Road continues with a curvilinear alignment with gentle horizontal and crest curves, and widens to a 6.7m seal with wide flat verges and a narrow gravelled shoulder. At its southern end, it meets State Highway 6 at a priority intersection, which is formed to a typical 'Diagram E' layout, with widened shoulders but no auxiliary turning lanes. Sight distances for tuning traffic at this intersection are excellent due to the flat and straight alignment of the highway.

Photograph 5: State Highway 6 / Lowburn Valley Road Intersection

3.1.6. A new auxiliary turning bay has recently been constructed to serve the freedom camping site and water park access towards the south. The widening for this commences immediately south of the State Highway 6 / Lowburn Valley Road intersection.

3.1.7. State Highway 6 is subject to a 100km/h speed limit and provides one traffic lane in each direction. Towards the south it provides access to Cromwell approximately 5.5km away, and further south to Queenstown and Invercargill. Towards the north, the highway connects to State Highway 84 (that serves Wanaka) and to the West Coast.

3.2. Non-Car Infrastructure

3.2.1. Due to the rural nature of the site, there is no specific infrastructure for walking or cycling at Lowburn Valley Road. However there is a 1.5m footpath on the southern side of the whole length of Turner Terrace, and this continues onto Lowburn Valley Road, terminating at the Lowburn Valley Road / Mallett Lane intersection some 400m south of Turner Terrace.

Photograph 6: Footpath on Lowburn Valley Road Just South of Turner Terrace Intersection

3.2.2. Judare Drive does not have any formal walking provision, and there is also no formal walking or cycling provision on Lowburn Valley Road between Mallett Lane and State Highway 6.

3.2.3. There is a walking and cycling route on the eastern side of State Highway 6, forming part of the Lake Dunstan Cycle Trail that connects Pisa Moorings to the north with Clyde to the south.

Photograph 7: Walking/Cycling Route on Eastern Side of State Highway 6

3.2.4. There is no public transport in the area. However school bus route 8009 operates along the full length of Lowburn Valley Road (and therefore passes the site).

3.3. Future Changes

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

4. Current Transportation Patterns

4.1. Traffic Flows

4.1.1. According to the MobileRoad website, Lowburn Valley Road adjacent to the site carries an estimated 250 vehicles per day (two-way) and at its southern end carries an estimated 600 vehicles per day (two-way). A road typically carries around 10-15% of its daily traffic flows in the peak hours, which suggests that the peak hour traffic flows on Lowburn Valley Road are around 25-40 vehicles per hour (two-way) at the site and 60 to 90 vehicles per hour (two-way) at its southern end.

4.1.2. As part of this commission, an evening peak hour turning count was carried out at the State Highway 6 / Lowburn Valley Road intersection. This was undertaken on 4 May 2023, between 4pm and 6pm, and the weather on the day was fine. There were no known incidents that could have affected the traffic volumes. The results for the peak hour (4:35pm to 5:35pm) are shown below.

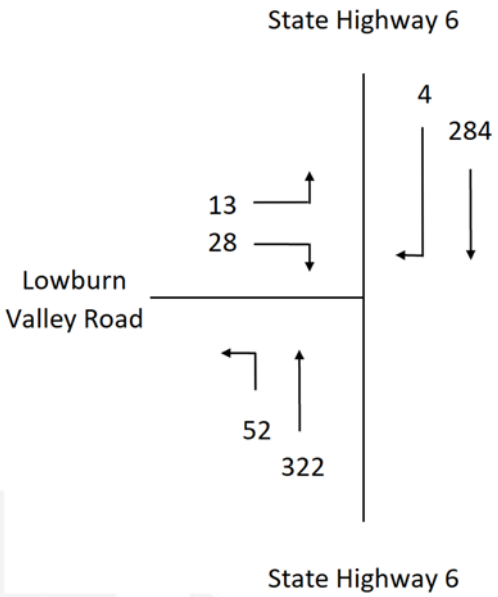


Figure 3: Evening Peak Hour Traffic Volumes, State Highway 6 / Lowburn Valley Road Intersection

4.1.3. It can be seen that the peak hour traffic flow is 97 vehicles (two-way) on Lowburn Valley Road, which is slightly higher than would be expected based on the daily count, and suggests that the daily flow is potentially around 750 vehicles (two-way).

4.1.4. Of note is that the shoulder widening on the eastern (lake) side of the highway was sufficient that when a vehicle turned right into Lowburn Valley Road, other southbound vehicles were observed to pass the turning vehicle without being obstructed. Similarly left-turning vehicles were observed to pull onto the widened shoulder when slowing to turn into Lowburn Valley Road, and be overtaken by northbound vehicles.

4.1.5. Although no morning peak hour survey was undertaken, from the data collected it is possible to synthesize the morning peak hour, taking into account the direction of traffic and the differing generation / direction of residential development between the morning and evening peak hours. The synthesized traffic count is shown below.

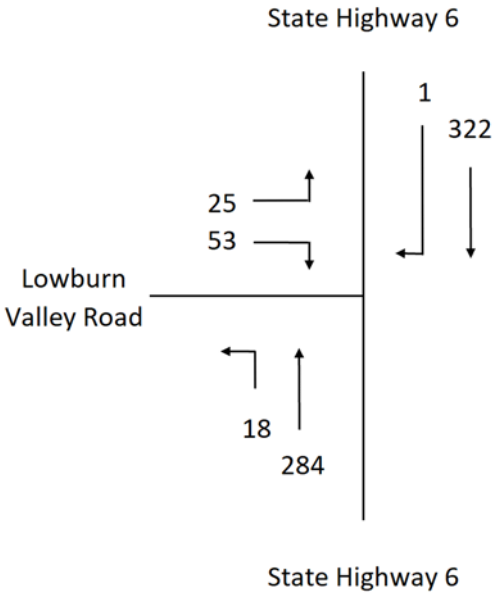


Figure 4: Synthesized Morning Peak Hour Traffic Volumes, State Highway 6 / Lowburn Valley Road Intersection

4.1.6. The operation of the intersection has been modelled using the Sidra Intersection computer software package and the results are 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
State Highway 6 (south)	L	8.3	0.0	A	7.9	0.0	A
State Highway 6 (north)	R	9.6	0.0	A	9.8	0.1	A
Lowburn Valley Road	L	6.7	0.5	A	6.8	0.3	A
	R	11.2	0.5	B	11.2	0.3	B

Table 1: Current Peak Hour Levels of Service at the State Highway 6 / Lowburn Valley Road Intersection

4.1.7. It can be seen that the intersection operates with an excellent level of service and low queues and delays. A general absence of queuing was also noted during the traffic survey.

4.1.8. There is a Waka Kotahi traffic counter on State Highway 6, located 500m to the south of Lowburn Valley Road. In 2021 (the last full year for which data is available) this shows that the highway carried an Annual Average Daily Traffic of 6,100 vehicles (two-way). Ambient traffic growth is difficult to quantify in view of travel restrictions during Covid-19 travel restrictions over the past few years, but in the ten years prior this this (2009 to 2019), traffic grew by 4.6% per annum (expressed as percentage of the 2019 volume), This is a greater rate than would normally be expected[1], but has been adopted for the purposes of this analysis.

4.1.9. The average weekday peak hour flows on the highway were 510 vehicles (two-way) in the morning peak hour and 620 vehicles (two-way) in the evening peak hour. The latter figure

[1] Ambient traffic growth of around 3% per annum is more common on the roading network

corresponds well with the 686 vehicles seen on the highway during the 2023 evening peak hour survey, making allowance for two years of ambient traffic growth.

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 lightly used by pedestrians and cyclists. It is considered that the absence of infrastructure for these road users is therefore not unreasonable.

4.2.2. The presence of bus services depends on the available patronage, and given that Lowburn has a small population, it is not unreasonable that there are no scheduled services in the area. As would be expected, the school bus operates once at the start and once at the end of the of the school day.

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 site. All reported crashes between 2013 and 2022 were identified[2], plus the partial record for 2023, for Lowburn Valley Road between the site and the state highway. The State Highway 6 / Lowburn Valley Road intersection has been reviewed for the past five years (2018 to 2022)[3].

4.3.2. On Lowburn Valley Road there have been no crashes recorded over the past ten years.

4.3.3. At the State Highway 6 / Lowburn Valley Road intersection there has been one crash recorded over the past five years. This occurred when a vehicle turned right out of Lowburn Valley Road and collided with a northbound car on the highway. The crash resulted in serious injuries.

4.3.4. One crash has been recorded on State Highway 6 within 200m of the intersection. This occurred 180m to the south, when a driver stopped to turn right into the water park, and was struck from behind by another vehicle. This crash has been addressed through the recent provision of an auxiliary right-turn bay for the access into the water park (which also serves the freedom camping site).

4.3.5. The historic pattern of crashes does not indicate any particular safety-related deficiencies on this part of the roading network.

[2] A ten-year period has been used due to the traffic volumes on Lowburn Valley Road being less than 1,000 vehicles per day.

[3] Five years is appropriate due to the higher traffic flows.

5. Proposal

5.1. It is understood that as notifed,PC19 proposes to rezone the existing residential area to the immediate south of the site as Large Lot (Precinct 2) Residential Zone (**LLRZ(P2)**). The submission seeks to rezone the site as LLRZ(P2)) also.

5.2. Since the proposal is for a rezoning, there is no confirmed scheme plan for development of the area. However, it is understood that some parts of the site are likely to gain access onto Lowburn Valley Road, with the upper part of the site gaining access via Turner Terrace and Judare Drive.

5.3. Information provided indicates that up to 18 lots could be achieved if the rezoning request was approved, although due to adverse topography over part of the site, this is likely to be limited to no more than 14 lots in practice.

6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. Traffic generated by residential developments is known to vary for a variety of reasons, with one such reason being the proximity (or otherwise) to employment and community facilities. Where a dwelling is some distance from these types of facilities, the traffic generation rates tend to be lower than for residences that are closer due to 'trip chaining', that is, the tendency of a resident to carry out multiple visits to different destinations during the same trip away from the dwelling.

6.1.2. In this case, it is likely that traffic will be associated with employment locations in Cromwell or further afield in Alexandra, and there is also likely to be travel to schools in Cromwell. As Cromwell is only around 5.5km away (around a 5-6 minute drive), for this analysis a rate of 8 vehicle movements per day per residence has been used, with 1 vehicle movement per residence occurring in each of the peak hours.

6.1.3. As noted above, 14 to 18 residences could be developed under the requested zoning. To allow for a robust analysis, this assessment has been based on 18 lots.

6.1.4. In the morning peak hour, around 80% of the traffic generation of a typical residential development will exit the site, and in the evening 40% of the volume will exit while 60% enters[4].

6.2. Trip Distribution

6.2.1. It is anticipated that the directions of travel will be as observed during the survey discussed previously in this report. Accordingly, an allowance has been made for 18% of traffic to travel to and from the north and 82% to travel to and from the south. Accordingly, the traffic generation associated with the rezoned site is as follows.

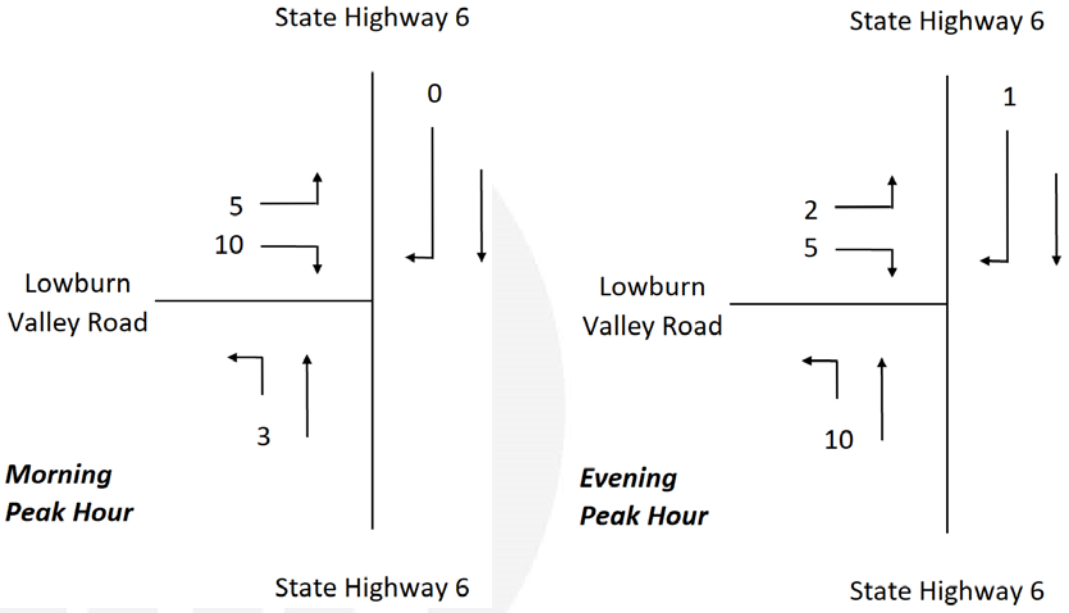


Figure 5: Peak Hour Traffic Volumes Generated by Development of the Site, State Highway 6 / Lowburn Valley Road Intersection

[4] The evening peak hour survey confirmed comparable proportions in this location, with 42% of traffic exiting the site and 62% entering.

7. Effects on the Transportation Networks

7.1. Roading Capacity

7.1.1. Based on the traffic flows above, the increases due to development of the site will be:

- Daily Traffic Volumes:
  - Lowburn Valley Road prior to rezoning: 750 vehicles (two-way)
  - Lowburn Valley Road after rezoning: 894 vehicles (two-way)
  - State Highway 6 (south of site) before rezoning: 6,100 vehicles (two-way)
  - State Highway 6 (south of site) before rezoning: 6,214 vehicles (two-way)
  - State Highway 6 (north of site) before rezoning: 6,100 vehicles (two-way)
  - State Highway 6 (north of site) before rezoning: 6,130 vehicles (two-way)
- Peak Hour Traffic Volumes[5]:
  - Lowburn Valley Road prior to rezoning: 97 vehicles (two-way)
  - Lowburn Valley Road after rezoning: 115 vehicles (two-way)
  - State Highway 6 (south of site) before rezoning: 686 vehicles (two-way)
  - State Highway 6 (south of site) before rezoning: 701 vehicles (two-way)
  - State Highway 6 (north of site) before rezoning: 632 vehicles (two-way)
  - State Highway 6 (north of site) before rezoning: 638 vehicles (two-way)

7.1.2. These anticipated volumes are well within the capacity of the roads. The average traffic volume on Lowburn Valley Road with the rezoning is just one vehicle movement every 30 seconds, and the increase on the highway represents just 2% of the current traffic volumes.

7.1.3. The operation of the State Highway 6 / Lowburn Valley Road intersection has been remodelled using the Sidra Intersection computer software package and the additional traffic, and the results are 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
State Highway 6 (south)	L	8.3	0.0	A	7.9	0.0	A
State Highway 6 (north)	R	9.6	0.0	A	9.8	0.1	A
Lowburn Valley Road	L	6.7	0.6	A	6.8	0.3	A
	R	11.3	0.6	B	11.3	0.3	B

Table 2: Peak Hour Levels of Service at the State Highway 6 / Lowburn Valley Road Intersection with Development of Site

7.1.4. The intersection performance differs very little from that without the site being developed, with increases in queues of no more than 0.1 vehicles and increases in delays of no more than 0.1 seconds per vehicle. It is unlikely that this would be noticeable in practice.

7.1.5. Since the proposal is for a rezoning, an assessment of the intersection adopting a design year of ten years hence is appropriate. This equates to flows on the highway increasing by an additional 46% over above the volumes seen in 2023. The performance of the State Highway

[5] Based on the surveyed volumes

6 / Lowburn Valley Road with the increased traffic loading (that is, an increase of 46%) is 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 (south)	L	8.3	0.0	A	7.9	0.0	A
State Highway 6 (north)	R	11.1	0.0	B	11.6	0.1	B
Lowburn Valley Road	L	7.5	0.7	A	7.6	0.4	A
	R	17.0	0.7	C	16.7	0.4	C

Table 3: Peak Hour Levels of Service at the State Highway 6 / Lowburn Valley Road Intersection, No Development, Ten Years of Ambient Traffic Growth

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 (south)	L	8.3	0.0	A	7.9	0.0	A
State Highway 6 (north)	R	11.1	0.0	B	11.7	0.1	B
Lowburn Valley Road	L	7.9	0.9	A	7.7	0.5	A
	R	17.6	0.9	C	17.0	0.5	C

Table 4: Peak Hour Levels of Service at the State Highway 6 / Lowburn Valley Road Intersection, With Development of Site, Ten Years of Ambient Traffic Growth

7.1.6. It can again be seen that the performance of the intersection with and without development of the site differs little. Queues and delays remain low, and the site development only results in an increase of at most 0.2 vehicles queuing and 0.6 seconds additional delay per vehicle. It is not considered that these changes would be noticeable to drivers.

7.1.7. Given that levels of service are very good at the State Highway 6 / Lowburn Valley Road intersection, no analysis has been carried out at the Lowburn Valley Road / Turner Terrace intersection, where there may also be an increase in traffic generation due to site development. Traffic flows in this location must necessarily be considerably lower than at the State Highway 6 / Lowburn Valley Road intersection, and therefore queues and delays must also be much lower. The Lowburn Valley Road / Turner Terrace intersection will therefore also function with a very good level of service.

7.1.8. Overall then, the traffic generated by full development of the rezoned site can easily be accommodated on the road network.

7.2. Non-Car Modes of Travel

7.2.1. The development of the site may result in increased levels of walking and cycling in the immediate area. However, these will only be small because of the small scale of development. Depending on the levels of activity on Lowburn Valley Road at the site frontage, a footpath might also be desirable in this location. However this is a matter for assessment at subdivision, and in view of the legal width of the road being 20m, a footpath can easily be accommodated if justified.

7.2.2. It is not considered that additional cycling provision is justified. The Waka Kotahi Cycle Network and Route Planning Guide suggests that cycling on the shoulders of Lowburn Valley Road will be appropriate, but again, this is a matter for assessment at subdivision stage and the legal width of the road means that appropriate provision can be made. The Guide also notes that cyclists sharing the road with motorised vehicles on Turner Terrace is appropriate.

7.2.3. The size of the subdivision is not sufficient that it will give rise to the need for a public transport service.

7.3. Road Safety

7.3.1. Based on a review of the road safety records, the proposal is unlikely to result in adverse road safety effects arising as a result of the increase in traffic flows on the road network.

7.4. Assessment of Need for Roading Improvements

Lowburn Valley Road

7.4.1. Development of the site will increase traffic flows on Lowburn Valley Road. As noted above, the existing seal is 5.7m wide near to the site, increasing to 6.7m towards the southern end of the road.

7.4.2. For Rural Collector Roads, such as Lowburn Valley Road, the Council's Engineering Code of Practice only specifies a cross-section for roads that carry more than 500 vehicles per day. However, as set out above, adjacent to the site, Lowburn Valley Roadcarries only half this volume. Given this, for the purposes of the Code of Practice, Lowburn Valley Road could reasonably be assessed as a Local Sealed road (in recognition of the low traffic volumes), for which the Code specifies a width of 6.0m with 0.25m metalled shoulders. If assessed on this basis, there is only a very minor shortfall in the current provision, where a seal width of 5.7m gives rise to a shortfall of 0.3m. The small increase in traffic on the road associated with development of the site under the proposed LLR (2) zoning would not cause the road to move into any different category within the Code of Practice, such that the degree of the shortfall (0.3m of seal width) would not be altered by the rezoning.

7.4.3. Further south, Lowburn Valley Road carries 600 vehicles per day. The Code of Practice only references a scenario where all roads with a 60km/h speed limit are to be assessed as urban roads, and requires an urban road carrying 600 vehicles per day to have a total seal width of 14m, with parking lanes, footpaths and cycle lanes also expected. The existing scenario (without the rezoning of the site) falls considerably short of achieving this, with a current 6.7m seal width, no parking lanes, footpaths of cycle lanes. This existing shortfall is likely due to the speed limit being lowered at some point in time, whereupon the Council has not then undertaken or required the road to be upgraded in line with the Code's expected standards (which change significantly when the posted speed limit is reduced to 70km/h or less).

7.4.4. Conversely, if Lowburn Valley Road was considered as a rural road instead of an urban road, due to the nature and extent of activities fronting the road, the Code of Practice would expect a seal width of 7m. However, strictly speaking, this provision only applies for a road where the speed limit is 80km/h or more, which is not the case for this road.

7.4.5. In summary, while the existing seal width of Lowburn Valley Road south of the site does not technically comply with the Code of Practice, the extent of traffic increase arising from development of the site is small, and again does not cause the road to move into any different

category within the Code of Practice, such that the extent of any shortfall in cross-section for this southern part is unaltered by the proposal.

7.4.6. In practice, the excellent crash record of Lowburn Valley Road suggests that the current cross-section is operating satisfactorily with current traffic volumes, and therefore there are no reasons why the small increase in traffic that zoning the site would bring about would justify any widening.

Turner Terrace

7.4.7. Turner Terrace falls into the category of a cul-de-sac serving up to 20 residences. At present, it is estimated that it serves 16 lots, meaning that it could serve another 4 lots without falling into the next classification of the Code of Practice, being a 'Residential' road which requires an 8.5m seal width, greater legal width and a footpath on each side. However this type of road is expected to accommodate the traffic associated with up to 150 residences, considerably greater than would occur in this instance. By way of comparison, the more recent Standard NZS4404:2010 (Land Development and Subdivision Infrastructure) sets out that a 5.7m seal width is sufficient for the expected traffic volumes generated by 200 residences. Overall, rigidly applying the Code of Practice to this scenario, when the extent of development is only slightly greater than at present, will likely represent a high degree of over-design for the limited amount of additional traffic that the road would carry.

Judare Drive

7.4.8. The 4-5m current formed width of Judare Drive is unlikely to be sufficient for any increase in traffic associated with the site's rezoning, and widening will be necessary. The nature of the widening required would be dependent on the number of lots that would be accessed from Judare Drive. but at between 5 and 20 lots, a cross-section identical to Turner Terrace is the expectation under the Code of Practice. Although Judare Drive is currently not formed to this standard, it is understood that the necessary land can be acquired for the widening.

State Highway 6 / Lowburn Valley Road Intersection

7.4.9. At the State Highway 6 / Lowburn Valley Road intersection, there will be a minor increase in vehicles turning left and right into Lowburn Valley Road. Accordingly, an assessment has been carried out of the potential need for auxiliary turning bays at the intersection.

7.4.10. The warrants for turning bays are set out in the Austroads Guide to Traffic Management Part 6 ('*Intersections, Interchanges and Crossings'*) and depend on the volume of through traffic and of turning vehicles. Given that the highway is subject to a 100km/h speed limit in this location, the graph applicable is set out below.

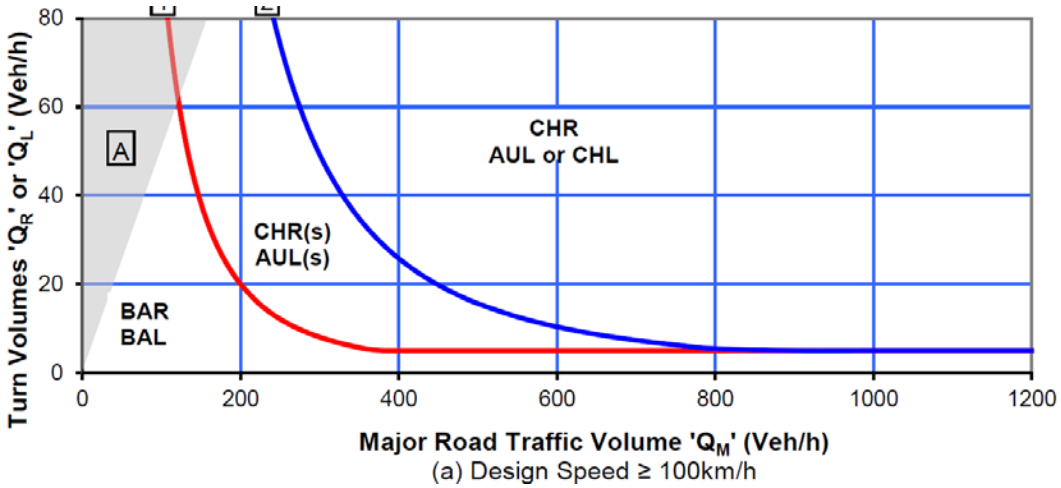


Figure 6: Extract from Austroads Guides Showing when Auxiliary Turning Lanes are Required

7.4.11. The x-axis comprises the 'major road traffic volume' which, when considering a left-turn bay in this instance, is the number of 'through' vehicles travelling northwards. The major road traffic volume for a right-turn bay is the two-way through traffic, plus left-turning traffic.

7.4.12. One particular issue that arises on the graph showing the warrants (as above) is that two lines are shown, representing two different types of auxiliary lane (a short lane which is represented by the red line, or a full lane which is represented by the blue line). However layouts with short auxiliary lanes are not used in New Zealand.

7.4.13. Under previous iterations of the Austroads Guide, Waka Kotahi issued supplementary guidance that auxiliary turning lanes were only required when the criteria for a 'full' turning lane were met (that is, when the blue line was crossed). Although this guidance is no longer current, Waka Kotahi typically continue to apply this arrangement.

7.4.14. The evening peak hour represents the time period when the greatest number of vehicles will enter the site and hence the time which should be used for assessing the need for turning bays. Taking into account the traffic flows discussed previously in this report, in 2023, 52 vehicles were observed turning left into the site and at the same time, there were 322 northbound vehicles. Therefore under current traffic volumes, a left-turn auxiliary lane is warranted. Allowing for 4.6% traffic growth on the highway in future means that an auxiliary left-turn lane will continue to be justified.

7.4.15. The additional left-turning traffic arising from the development of the site does not affect this conclusion, since the auxiliary lane is justified without any site development.

7.4.16. In 2023, 4 vehicles were observed turning right into the site and at the same time, the major road traffic flow was 658 vehicles. This does not warrant an auxiliary right-turn bay. The additional traffic associated with site development only adds one extra vehicle to the right-turn movement, and this continues to mean that an auxiliary right-turn bay is not warranted. Under current traffic flows on the highway, there would need to be 8 right-turning vehicles in the evening peak hour, and the current proposal does not result in this outcome.

7.4.17. It can be seen from Figure 6 above, that the threshold for when an auxiliary right-turn bay is required is when there are 6 right-turning vehicles in the peak hour. The proposal is anticipated to result in 5 right-turning vehicles, which lies below this threshold.

7.4.18. Moreover, as noted previously, the analysis is carried out on the basis of 18 lots being developed which is potentially greater than could be achieved. With a lower yield, the increase in vehicles turning right into the site could be less than allowed for.

7.4.19. Accordingly it is not considered that the rezoning triggers the need for any upgrade of the State Highway 6 / Lowburn Valley Road intersection.

Site Access from Lowburn Valley Road

7.4.20. The site frontage onto Lowburn Valley Road also affords the opportunity to provide access into the site by way of a new roading connection. The current speed limit of 80km/h means that a sight distance of 180m would be required to meet current intersection design guides, and this is currently available over the southernmost 50% of the site frontage (as towards the north it is restricted by a crest curve in the road).

7.4.21. In this location, the road reserve is 20m wide, which is ample for the provision of an intersection that meets current guides and standards. It would also be 300-400m from the Lowburn Valley Road / Turner Terrace intersection, which achieves an appropriate separation of 14-18 seconds of travel time (by way of comparison, the travel time between Turner Terrace and Lowburn Terrace is 13 seconds).

7.4.22. Within the site, any new access road could be constructed to fully meet the Code of Practice.

Summary

7.4.23. Overall then, it is considered that no revisions will be required to Lowburn Valley Road or Turner Terrace to accommodate increased traffic arising from the rezoning. Both roads would fall slightly below the expected cross-sections of the Code of Practice, but for Lowburn Valley Road this is an existing shortfall, and both roads would remain appropriate for the volumes of traffic that would be carried if the site is rezoned as proposed. Judare Drive will require widening however.

7.4.24. It is considered that the need for any widening of existing roads can properly be assessed and confirmed when land use and/or subdivision consents are sought, since in practice, the increase in traffic associated with development of the site can be easily accommodated by the existing road formations, with the exception of Judare Drive, but for which there is an ability to acquire land for any necessary upgrades.

7.4.25. A new road serving the site could be constructed directly from Lowburn Valley Road which could be constructed to fully meet the Code of Practice.

7.4.26. No changes are considered to be necessary at the State Highway 6 / Lowburn Valley Road intersection.

8. Statutory Framework

8.1. Introduction

8.1.1. Given that the proposal is for the rezoning of the site, there is no specific site layout presently available. This assessment focusses on whether the transportation-related provisions of the District Plan can be achieved through a subdivision of the site.

8.2. Central Otago District Plan

8.2.1. The District Plan sets out a number of transportation-related rules with which any development is expected to comply. Although the proposal is for a rezoning, consideration of these rules is important at this stage in order to identify whether there are any likely impediments to a complying subdivision layout and which might affect the desirability of rezoning.

8.2.2. Consequently an assessment of the transportation rules has been undertaken and the results are summarised below.

8.2.3. District Plan Part 12.7.1: Access Standards from Roads: Part (ii): Sight Distances

8.2.3.1. Under the District Plan, assuming that roads within the site are subject to a speed limit of 50km/h (being typical for a residential subdivision) then each lot requires a sight distance of 40m at its access. It is likely that this can be achieved through careful site layout design, or that reduced sight distances can be justified due to lower operating speeds than 50km/h.

8.2.3.2. Accesses onto Lowburn Valley Road would require 105m sight distances. These are likely to be achievable, although careful design will be required towards the very north of the site where the crest curve may create a limitation on sightlines.

8.2.4. District Plan Part 12.7.1: Access Standards from Roads: Part (iv): Access to Rural Collector Roads

8.2.4.1. This part of the District Plan requires accesses to be constructed to particular layouts, and these can be achieved.

8.2.5. District Plan Part 12.7.2: Parking: Part (i): Number of Spaces

8.2.5.1. At this stage, no detailed layout has been produced for the individual lots. However their likely size means that each will be able to provide several car parking spaces, meeting Plan requirements.

8.2.6. District Plan Part 12.7.2: Parking: Part (ii): Parking in Excess of Three Spaces

8.2.6.1. It is not expected that any lots will provide more than three parking spaces.

8.2.7. District Plan Part 12.7.3: Loading and Manoeuvring: Part (i): Servicing Activities

8.2.7.1. The proposal is for residential activities and therefore the loading and unloading of goods is not expected to occur frequently.

8.3. Council's Engineering Code of Practice

8.3.1. The Council has a Code of Practice which sets out appropriate widths for roading outside and within the site, and this has been discussed in detail above. In brief, Lowburn Valley Road does not currently meet the Code of Practice, but the extent of traffic increase arising from development of the site is small and does not cause the road to move into any different category within the Code of Practice. Accordingly, the extent of any shortfall in cross-section is unaltered by the proposal. In practice, the road currently operates satisfactorily under current volumes, and will continue to do so with the small traffic increase associated with the site.

8.3.2. The cross-section of Turner Terrace means it could serve another 4 lots without falling into the next classification of the Code of Practice. If more lots were to be served then Turner Terrace would be classified as a 'Residential' road under the Code of Practice and require upgrading to comply. However, the 'Residential' road is capable of accommodating the traffic from up to 150 residences, far more than would occur in this instance. Upgrading to this standard is likely to represent a high degree of over-design for the limited amount of additional traffic that the road would carry.

8.3.3. Judare Drive will require widening from its current formation and it is understood that the necessary land can be acquired for this.

8.3.4. A fully complying direct roading access into the site could be constructed from Lowburn Valley Road.

8.3.5. If it is proposed to deviate from the Code of Practice, an application would need to be made and considered at the appropriate time.

8.4. Summary

8.4.1. It is considered that the site layout is likely to be able to comply with all the transportation requirements of the District Plan. There may be non-compliances with the Engineering Code of Practice in respect of road widths but having assessed these in detail in practice, the increase in traffic associated with development of the site can be easily accommodated by the existing road formations, with the exception of Judare Drive, but for which there is an ability to acquire land for any necessary upgrades. A fully complying direct roading access into the site could be constructed from Lowburn Valley Road.

8.4.2. It is considered that the need for any widening of existing roads can properly be assessed and confirmed when land use and/or subdivision consents are sought,

9. Conclusions

9.1. This report has identified, evaluated and assessed the various transport and access elements of a rezoning request for residential activities (facilitating up to 18 lots) at Lowburn.

9.2. Overall it is considered that the traffic generated by the development of the rezoned site can be accommodated on the adjacent roading network without capacity or efficiency issues arising. In practice, the traffic flows on Lowburn Valley Road are very low at present, and development of the site generates comparatively little traffic, meaning that the roading network will continue to operate well within its maximum capacity.

9.3. The crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal.

9.4. The internal roads within the site are likely to be able to comply with the Council's standards. Lowburn Valley Road itself presently does not comply with the Council's Engineering Code of Practice, but as the development of the site generates only a small amount of traffic, and Lowburn Valley Road is already lightly-trafficked, in practice the current carriageway width will function adequately. Turner Terrace and Judare Drive are also unlikely to meet the Code of Practice, but with some upgrading of Judare Drive, their cross-sections can be justified with reference to current Standards.

9.4.1. It would also be possible to construct a fully complying direct roading access into the site from Lowburn Valley Road.

9.5. At the State Highway 6 / Lowburn Valley Road, an auxiliary left-turn bay is currently warranted on the basis of existing traffic flows, but is not provided. An auxiliary right-turn lane is not justified, due to the low numbers of vehicles turning right from the highway and onto Lowburn Valley Road. The rezoning of the site does not affect these conclusions, and accordingly it is not considered that the rezoning triggers the need for any intersection upgrade.

9.6. Although the request is for a rezoning, it is likely that there will be a high degree of compliance with the transportation requirements of the District Plan and at this stage no non-compliances are expected.

9.7. Overall, and subject to the preceding comments, the rezoning request can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why the request could not be approved.

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