Gibbston Valley

Application for Inclusion on Schedule 2 of the Fast Track Approvals Bill 2024

Transportation Assessment

CARRIAGEWAY CONSULTING
traffic engineering | transport planning

Table of Contents

Main Report

Photographs

Figures

Tables

CCL file reference	15023 gvs ta final 2
Status	Final 2
Issued	3 May 2024

1. Executive Summary

1.1. Gibbston Valley Station is applying for inclusion in Schedule 2 of the Fast-Track Approvals Bill 2024, for residential activity and ancillary development within existing resort-zoned land in Gibbston (**the Site**). The Site is located to the north and south of Gibbston Highway, and the proposed development project includes subdivision and land use consent for approximately 900 residential dwelling units, plus supporting mixed use and commercial development of 8,000sqm GFA, and a 3ha school site to support up to 350 pupils.

1.2. This report sets out the results of an assessment of the various transport and access elements of the proposed development.

1.3. As the Site is located towards the north and the south of Gibbston Highway, access is therefore proposed to be from two locations. The existing Gibbston Highway / Vines Way priority intersection is proposed to serve the northern part of the Site, with the Gibbston Highway / Resta Road priority intersection serving the southern part of the Site. However the existing Gibbston Highway / Resta Road intersection is to be relocated slightly further to the west of the existing intersection location, and upgraded with auxiliary turning lanes as soon as any development takes place.

1.4. The traffic generation of the Site at full development has been calculated. There is some degree of uncertainty as to the extent of internal trips within the Site, which leads to a range of outcomes. The two access intersections have then been modelled using industry-standard computer software. When considering queues and delays, the results show that:

- At the Gibbston Highway / Vines Way intersection, a capacity-related improvement scheme is likely to be required between 63% and 85% of full development; and
- At the relocated/upgraded Gibbston Highway / Resta Road Way intersection, a further capacity-related improvement scheme is likely to be required between 75% and 88% of full development.

1.5. The percentage reductions noted above apply equally across all proposed activities in the Site.

1.6. Further assessment of the intersections shows that:

- At the Gibbston Highway / Vines Way intersection, a safety-related improvement scheme is likely to be required between 52% and 69% of full development; and
- At the relocated/upgraded Gibbston Highway / Resta Road Way intersection, a safety-related improvement scheme is likely to be required between 64% and 77% of full development.

1.6.1. In all cases however, the analysis shows that the majority of the Site can be progressed without the need for any infrastructure improvements to increase capacity. When intersection improvement schemes are required, it is relevant that all land in the immediate vicinity of the two intersections is either road reserve or land that is within the control/ownership of GVS. This therefore means that no third party land is required for any improvement schemes.

1.6.2. The most appropriate way of providing additional capacity and the timing of those schemes is best determined at a future time, such as through monitoring traffic flows. However, there are a range of scheme options that could be considered, including prohibiting right-turn movements and providing an underpass below the highway, or converting both intersections to roundabouts. Notably, the resort zoning provides for the establishment of an underpass, if that is required.

1.7. The crash history in the vicinity of the Site does not indicate that there would be any adverse safety effects from the proposal. The Gibbston Highway / Vines Way intersection is newly constructed and meets current guides and standards. It can be expected that the relocated/upgraded Gibbston Highway / Resta Road Way intersection will also be comply with current guides and standards.

1.7.1. It is likely that the development will lead to an increase in the extent of walking and cycling in the immediate area, but it is possible to connect the northern and southern parts of the site to support non-car travel between them. The size of the southern part of the Site means that all activities in this area are within a viable walking distance of each other.

1.7.2. Although currently there is no regular public transport service in the area, there are several longer distance services that pass the Site on Gibbston Highway. Consequently it would potentially be viable to make provision for these to pull off the highway and enter the development to pick up or drop off passengers.

1.8. The land to which this proposal relates is either road reserve or within the control/ownership of GVS. As such, it is not expected that there will be any constraints to achieving full compliance with the transport-related provisions of the Queenstown Lakes Proposed District Plan, at the stage of consenting.

1.9. Overall, based on the assessment of the likely effects, the proposed development can be supported from a traffic and transportation perspective.

2. Introduction

2.1. Gibbston Valley Station is applying for inclusion in Schedule 2 of the Fast-Track Approvals Bill 2024, for residential activity and ancillary development within existing resort-zoned land in Gibbston (**the Site**).

2.2. The proposed development project includes subdivision and land use consent for approximately 900 residential dwelling units, plus supporting mixed use and commercial development of 8,000sqm GFA, and a 3ha school site to support up to 350 pupils.

2.3. This Transportation Assessment sets out a high-level analysis of the transportation issues associated with the proposed development 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.

2.4. 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.

3. Site Overview

3.1. Location

3.1.1. The Site is located in Gibbston, approximately 14km east of Frankton and Queenstown Airport, and 22km west of Cromwell. The proposed development is split across two areas, with one area being on the north side of Gibbston Highway (part of State Highway 6) directly opposite the existing Gibbston Valley winery, and the other being on the south side of the highway and west of Resta Road.

3.1.2. The Site is zoned as Gibbston Valley Resort Zone within the Queenstown Lakes Proposed District Plan.

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

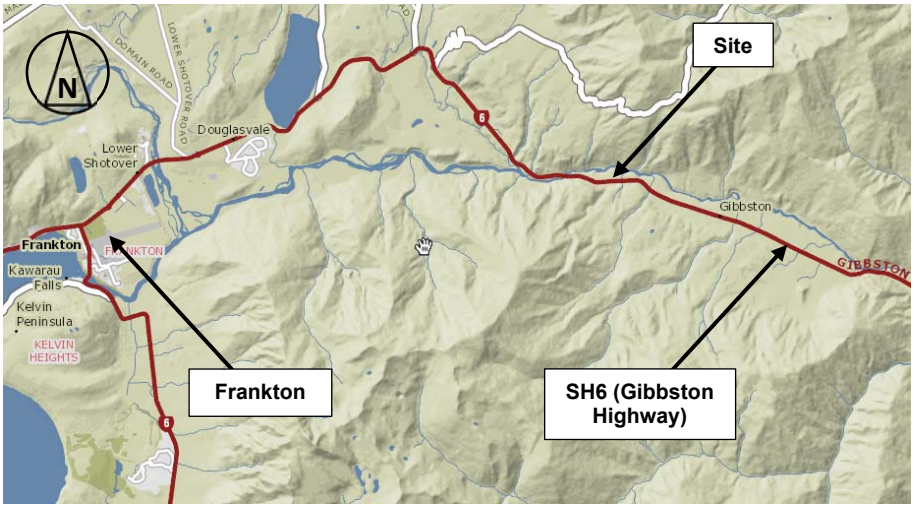

Figure 1: General Location of the Site

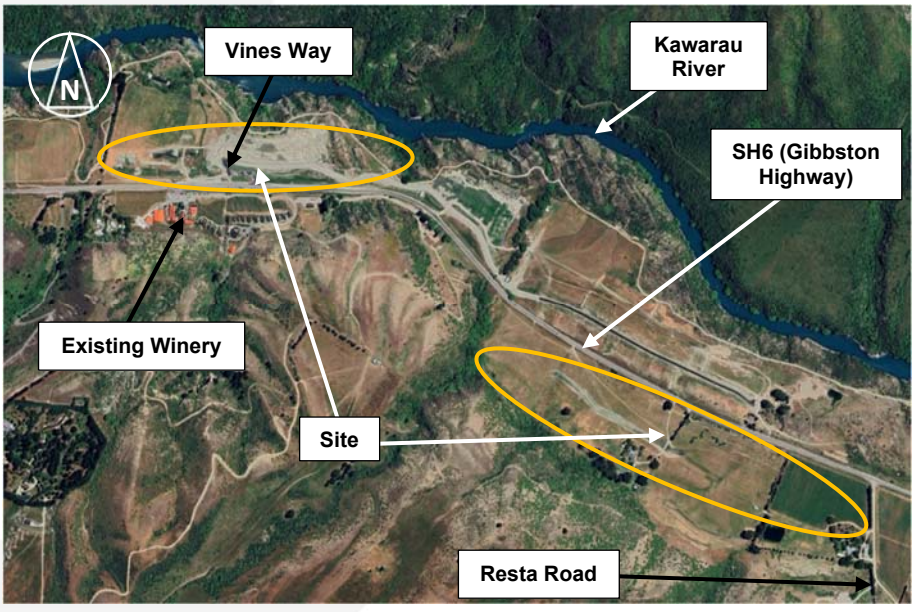

Figure 2: Aerial Photograph of the Site and Environs

3.2. Road Hierarchy

3.2.1. Gibbston Highway forms part of State Highway 6 and is defined as a State Highway under the District Plan roading hierarchy. Highways are managed to minimise their local access function. Resta Road and Vines Way are Local Roads, indicating a role of providing local property access.

3.2.2. The Site encompasses the Gibbston River Wine Trail, a part of the Queenstown Trail 'Great Ride' network. The trail begins at the Kawarau Suspension Bridge towards the west and terminates at Gibbston Back Road, around 6km east of the Site. Cycles can be hired at Gibbston Winery for use on the trail.

4. Current Transportation Networks

4.1. Roading Network

4.1.1. Gibbston Highway provides two traffic lanes (one in each direction) and is subject to a speed limit of 100km/h. The alignment in the vicinity of the Site is relatively straight with an east-west orientation, but there are a series of crest curves which means that there are intermittent 'no overtaking' yellow centrelines. The traffic lanes are 3.5m wide and there is a narrow sealed shoulder of around 1m on each side. The legal width of the highway is at least 20m.

Photograph 1: Typical Cross Section of Gibbston Highway Looking East

4.1.2. The proposed point of access into the north side of the Site is located approximately 220m to the east of the main entrance into Gibbston Valley Winery and Restaurant. The winery access itself is formed with an auxiliary right turn lane and a widened shoulder for vehicles turning left into the winery.

Photograph 2: Existing Entry into Gibbston Winery and Restaurant

4.1.3. The point of access to the north side of the Site (known as Vines Way) was constructed as part of resource consent RM201081, for visitor accommodation and a resort facility on the northern side of the highway. The intersection is constructed as a high-capacity priority arrangement, with auxiliary turning lanes for vehicles turning left and right off the highway.

Figure 3: Aerial Photograph of Entry into Gibbston Winery / Restaurant and Vines Way Intersection Serving the Site

Photograph 3: Gibbston Highway / Vines Way Intersection (Looking West)

4.1.4. Approximately 1.8km from Vines Way, Resta Road joins Gibbston Highway from the south. This is formed as a priority intersection with no auxiliary turning lanes, but with localised widening on the northern side of highway to allow a vehicle to pass another that has stopped to turn right into Resta Road.

Photograph 4: Existing Access Intersection into Northern Side of the Site (Looking West)

4.1.5. Resta Road has a narrow (5m) wide unsealed carriageway, with wide grassed verges on either side. It presently serves a small amount of generally rural activities.

4.1.6. This intersection was considered in some detail as part of land rezonings in the area through the Queenstown Lakes District Plan review. As part of this, it was identified that the existing intersection configuration had very limited ability to accommodate additional traffic flows, and that if there was to be a greater traffic volume turning at the intersection, then auxiliary turning bays would be required to be constructed. GVS has subsequently agreed with the road controlling authorities that if the Resort Zone land served by Resta Road is developed, then either the Gibbston Highway / Resta Road intersection will be improved through the provision of auxiliary turning bays, or the existing intersection will be closed and a new intersection constructed towards the west, which will also have auxiliary turning bays. For completeness, the current project being progressed under Fast Track legislation contemplates the latter, as discussed below.

4.1.7. Further east, Gibbston Highway provides the main route through Gibbston and the Kawarau Gorge to Cromwell, and to the wider state highway network. To the west, the highway continues towards Queenstown, turning southwards in Frankton and terminating in Invercargill.

4.2. Non-Car Modes of Travel

4.2.1. As this is a rural environment, the highway does not have footpaths immediately adjacent, although there are grassed berms which can be used by pedestrians.

4.2.2. As noted above, the Gibbston River Wine Trail is located towards the north of the highway. There is an existing at-grade crossing point of the highway for cyclists moving between the winery and the trail, located just east of the Gibbston Highway / Vines Way intersection. This is delineated with low wooden railings and signage for cyclists.

Photograph 5: Northern Part of Cyclist Crossing of Gibbston Highway for River Wine Trail

4.2.3. This crossing point has recently been put in place following the construction of the Gibbston Highway / Vines Way intersection. The assessment undertaken as part of this identified that sight distances for cyclists crossing the highway were appropriate, and the crossing place was subsequently approved by NZTA.

4.2.4. In the vicinity of the Site, the cycle trail is located on the northern side of the highway but does not run directly adjacent to it, rather, it is set back by 100m or more and runs through the Site. The cycle route extends as far as Gibbston Back Road, around 6km to the east of Gibbston Winery.

4.3. Future Changes

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

4.3.2. As set out above, GVS has previously agreed with the road controlling authorities that if the Resort Zone land served by Resta Road is developed, then there will be revisions to the layout/geometry of the current Gibbston Highway / Resta Road intersection. The current project being progressed under Fast Track legislation allows for the closure of the existing intersection, and for a new intersection to be constructed slightly further to the west of the existing location. For the analysis in this report , this is anticipated to have auxiliary turning lanes, and be constructed with the same general layout as the Gibbston Highway / Vines Way intersection.

4.3.3. GVS presently has several resource consents that are relevant to this application, in particular:

- 98 visitor accommodation units plus a resort facility (RM201081);
- A resort facility (also RM201081);
- 33 residential units (RM210524);
- 10 residential building platforms (RM220519); and
- A clubhouse (also RM220519).

4.3.4. The development consented under RM201881 occupies the same area as the proposed development. As a result, the two are mutually exclusive – that is, if the proposed development is approved and constructed then the development approved through RM201081 cannot be constructed, and vice versa. Therefore for the purposes of assessing the traffic generation of the proposed development, no allowance has been made for any traffic generation arising from development approved under RM201081.

5. Current Transportation Patterns

5.1. Traffic Flows

5.1.1. NZTA carries out regular traffic counts on the state highway network. The closest counter locations on Gibbston Highway lies to the immediate east of Gibbston Back Road (00600970) some 6.2km east of the Site. Conversely the counter location that lies to the west of the Site (Swiftburn) is closer at just 3km away from the Site (00600980) but this counter encompasses traffic travelling to and from the 'bungy jump' tourist attraction.

5.1.2. Gibbston Back Road carries only light traffic flows, with the MobileRoad website indicating a daily traffic flow of only 200 vehicles (two-way). There are also no major roads that connect to Gibbston Highway between the Site and this traffic counter, meaning that there are no locations where large volumes of traffic could join or leave the highway. As such, it is considered that the counter to the east of Gibbston Back Road will be indicative of the traffic flows past the Site.

5.1.3. The traffic counter records data continuously, and for the most recent year available (2023), the highway carried an Annual Average Daily Traffic of 5,715 vehicles (two-way). This reflects a return to traffic volumes seen pre-pandemic and before volumes reduced due to limitations of overseas tourists. In 2014, daily traffic volumes were 3,868 vehicles (two-way), indicating that traffic volumes have grown at a rate of 4.0% per annum, calculated as a percentage of the 2023 traffic flow.

5.1.4. Hourly volumes on the highway are plotted below for the 2023 calendar year.

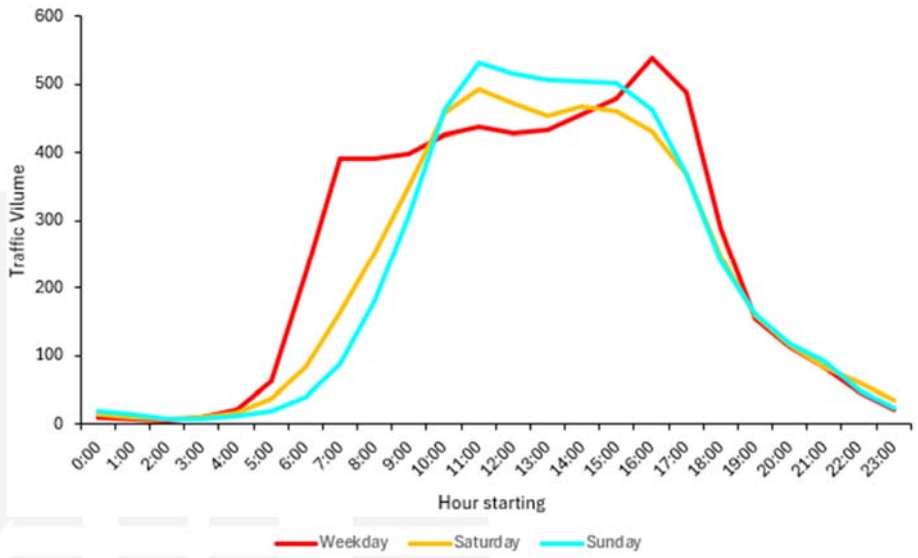

Figure 4: Traffic Volumes on Gibbston Highway, 2023 Data

5.1.5. The data shows that there is no particular weekday morning peak hour, but rather, traffic flows rise to a peak of 540 vehicles (two-way) in the evening. Conversely, traffic flows at weekends are generally higher than during the weekday for most of the daytime hours of Saturday and Sunday. This pattern is indicative of a highway carrying a mix of commuter and recreational traffic.

5.1.6. In 2023, the average weekday peak periods were:

- Weekday morning peak hour (7am to 8am):
  - East (the direction of Cromwell): 126 vehicles
  - West (the direction of Queenstown): 264 vehicles
- Weekday evening peak hour (4pm to 5pm):
  - East (the direction of Cromwell): 309 vehicles
  - West (the direction of Queenstown): 229 vehicles
- Saturday peak hour (11am to 12pm):
  - East (the direction of Cromwell): 242 vehicles
  - West (the direction of Queenstown): 250 vehicles
- Sunday peak hour (11am to 12pm):
  - East (the direction of Cromwell): 302 vehicles
  - West (the direction of Queenstown): 230 vehicles

5.1.7. This data suggests a tidal flow during weekdays, in the direction of Queenstown in the morning peak hour and in the direction of Cromwell in the evening peak hour. Anecdotal evidence is that there are a number of workers that live in Cromwell and work in Queenstown, and the traffic data reflects this.

5.1.8. The Austroads Guide to Traffic Management Part 3 ('Traffic Studies and Analysis') sets out a process by which the level of service of a road can be calculated. This shows that under these traffic flows, Gibbston Highway provides Level of Service C. This is within the zone of stable flow. Applying a rate of 4% annual growth for ten years (equating to a peak hour traffic flow of 753 vehicles, two-way) shows that the highway would continue to provide Level of Service C.

5.1.9. According to the MobileRoad website, Resta Road carries just 60 vehicles per day, indicating a peak hour volume of less than 10 vehicle movements (two-way).

5.2. Non-Car Modes of Travel

5.2.1. Given that the area is predominantly rural, it can reasonably be expected that it will be relatively infrequently used by resident pedestrians. Although no formal surveys have been carried out, informal observations indicate negligible pedestrian movements along Gibbston Highway.

5.2.2. However the cycling trail is very well-used. A short-term survey carried out during a weekday in March 2021 (which intuitively would not be a peak time) showed 24 riders over the course of a mid-morning hour. These were evidently recreational riders.

5.2.3. The current levels of infrastructure provided for both pedestrians and cyclists are considered to be appropriate for the likely volumes generated by present levels of development.

5.2.4. There are presently no regular bus services that pass the Site, although there are several longer-distance services that pass nearby on Gibbston Highway, including to Cromwell. However there are currently no bus stops on the highway.

5.3. Road Safety

5.3.1. 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 for a five-year period. All reported crashes between 2019 and 2023, plus the partial record for 2024 were identified for Gibbston Highway from a distance of 400m to the west of the north side of the Site, to 400m to the east of the south side of the Site.

5.3.2. This showed that there were five reported crashes in the area for this time period:

- Two crashes occurred at the access to the winery:
  - An eastbound driver misjudged the location of the access, failed to turn in time and struck the entrance wall feature. The crash did not result in any injuries;
  - An eastbound driver turning into the access failed to stop for a westbound vehicle, and collided with it. The police report notes that the at-fault driver experienced sunstrike. The crash resulted in minor injuries;
- One crash occurred around 750m east of Vines Way, when a westbound driver lost control of their vehicle and left the road. The police report notes that the driver was intoxicated and was texting on their phone. The crash resulted in minor injuries;
- One crash occurred around 800m west of Resta Road, when a westbound driver crossed the centreline, causing an eastbound driver to swerve but the vehicles collided. The police report notes that driver intoxication was suspected to be a factor. The crash resulted in serious injuries.
- One crash occurred around 450m west of Resta Road, when an eastbound truck driver lost control and left the road. The police report notes that this was due to the truck's load being not secured properly. The crash did not result in any injuries;

5.3.3. No crashes were recorded within 400m of the Resta Road intersection.

5.3.4. The different locations of the reported crashes and different causal factors do not indicate that there are any inherent road safety issues on this part of the roading network.

6. Proposal

6.1. The proposal is for the development of residential accommodation, plus ancillary development intended to meet the needs of residents and the nearby community.

6.2. GVS is seeking the inclusion of this proposal within Schedule 2 of the Fast Track Approvals Bill. While the plans are well advanced, there are no finalised scheme plans for the proposal at this stage with the intent being that the plans will be confirmed at the time nearer to consent lodgement. However in order to demonstrate the viability of the project and to assist in assessing potential effects, GVS has devised potential development scenarios as discussed below.

6.3. At Vines Way, a total of 250 residential units are anticipated within the northern part of the Site. These will all gain vehicular access from Vines Way and a small internal roading network.

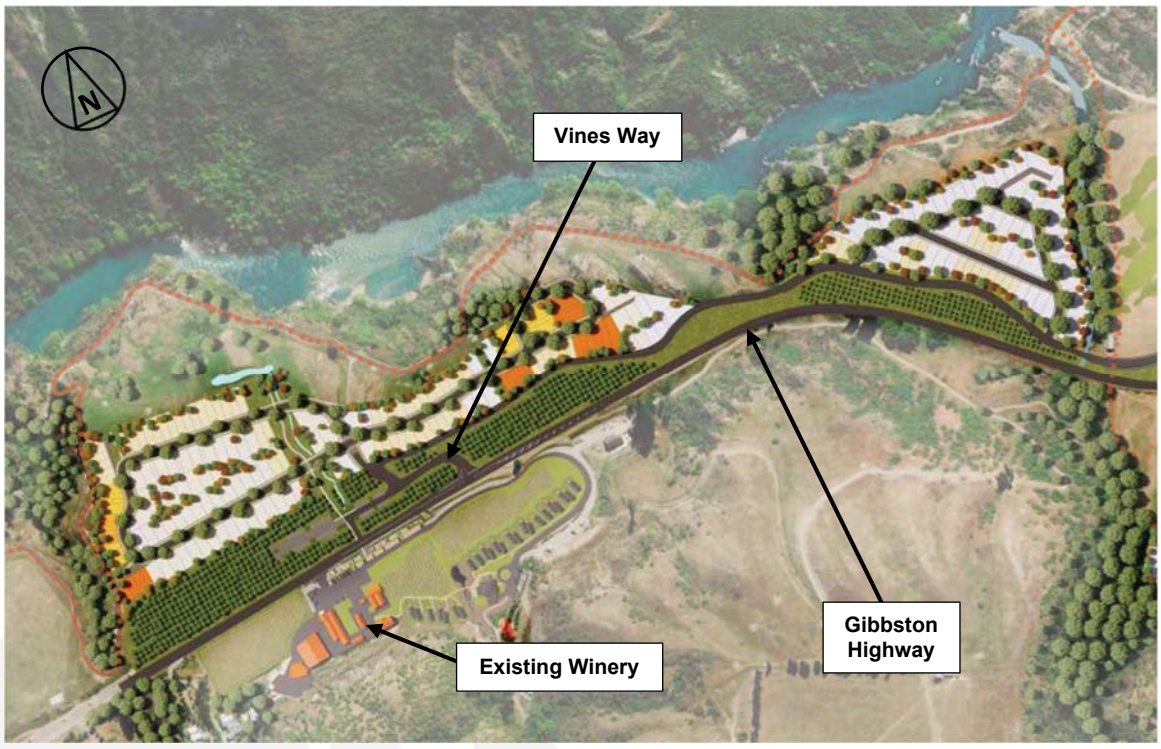

Figure 5: North Side of the Site (Extract from DCM Urban Drawing)

6.4. The south side of the Site is expected to be a mixed-use development, comprising the following:

- 650 residential units;
- 8,000sqm GFA of various commercial activities;
- 3ha for primary and intermediate school accommodating up to 350 students.

Figure 6: South Side of the Site (Extract from DCM Urban Drawing)

6.5. It is understood that the commercial activities will focus on meeting the needs of residents, those visiting Gibbston Valley Station, and passers-by on the highway. They will not be of a size or of a nature that they become a 'destination' in their own right for residents living further afield.

6.6. This part of the Site is anticipated to gain access onto Gibbston Highway by a new intersection located 250m west of the existing Gibbston Highway / Resta Road intersection. It is understood that as part of this, the existing intersection will be closed (and accordingly, Resta Road will be realigned through the Site). For context, this new intersection and the Gibbston Highway / Vines Way intersection are approximately 1.6km apart.

6.7. As can be seen from Figure 5 and 6 above, the Site will have a small internal road network. However GVS owns all land required for internal roading, and so this matter is not discussed further since there are no impediments to achieving an appropriate roading layout or road cross-sections. It is also relevant that GVS owns the land on either side of the legal highway/roading corridors, and therefore where upgrades to intersections are required (as discussed below), these too can easily be achieved.

7. Traffic Generation and Distribution

7.1. Traffic Generation

7.1.1. 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.

7.1.2. In this case, the proposal includes community facilities, including a primary school and retail, but these are located 1.6km from the north side of the Site. Accordingly, a peak hour traffic generation rate of 0.9 vehicle movements per residence has been adopted.

7.1.3. In the weekday morning peak hour, it can be expected that 85% of vehicles will exit the development and 15% will enter. In the weekday evening peak hour, 65% of vehicles will enter the development and 35% will exit.

7.1.4. With regard to the commercial development, because the mix of activities is not yet confirmed, a generic rate has been adopted for a medium-sized shopping centre of 14.6 vehicle movements per 100sqm GFA. For the proposed 8,000sqm GFA this equates to 1,168 vehicle movements (two-way) in the peak hour. However this peak hour will not occur in the weekday morning, rather an allowance has been made for this to occur in the weekday evening and a conservative assumption made that 25% of these trips will be made in the morning peak hour.

7.1.5. In this location, it can be expected that the proposed primary school will make extensive use of school buses for student travel from further afield, and that many students will be associated with the residential units in the immediate area and will therefore have the option to walk or cycle. Surveys of schools within more rural areas show that up to a third may travel by bus, with 50% travelling by car. Although in this location there would arguably be a higher proportion of non-car use, the trip generation has been based on 50% of students travelling by car and with an average of 1.3 students per car.

7.1.6. However, not all of the non-residential movements will be newly generated, as some will be existing trips that presently pass by the Site. Further, a proportion will occur wholly within the Site and will not occur on the external roading network. For this assessment, and recognising that the precise mix of commercial development has not been determined, the following allowance has been made:

- Residential development:
  - No revisions made to traffic generation
- Commercial development
  - Typically, a third of trips to commercial developments are newly-generated, with one third being trips already being made to other commercial developments which instead divert, and one third of trips being already on the roading network immediately adjacent to a site.
  - In this case though, the roading network is extremely limited (essentially being just the highway), meaning diverted trips are very unlikely. Further, the commercial development is aimed at those that live in the Site and those that are already passing the Site. In addition, the Site is some distance from other centres of population.

    - With this in mind, a conservative allowance has been made for 25% of generated trips to be already passing the Site, with 50% being generated by residents living within the Site (of which 75% will be associated with the south side of the Site and 25% will be associated with the north side, apportioned according to the number of residences in each) and 25% being new trips.
- School
    - According to the most recent census, the average household in Queenstown Lakes District New Zealand has 2.7 people
    - The extent to which there will be travel to and from the school internal to the Site depends on the composition of the households within the Site, which cannot be forecast with any certainty at this stage. That said, even if each household in the Site had an average of just 0.4 children of primary school age, then this would fully achieve the expected school roll of 350 students.
    - On this basis, it is not unreasonable to allow for 90% of students to be drawn from the Site itself, with 10% coming from elsewhere. However of this 90%, 65% would be drawn from the south side of the Site with 25% coming from the north side (apportioned according to the anticipated number of residences in each).

7.1.7. The nature of the development means that there will be a degree of drivers combining trips. For example, a caregiver leaving their house on the north side of the Site in the morning may firstly turn east to drop a child at the school but then 'double-back' and travel west in the direction of Queenstown for their employment. Similarly in the evening, they might travel past the north side of the Site to visit the commercial area before then returning home.

7.1.8. It is also possible that those living in the Site will also work in the Site, meaning that their movement between their home, employment and retail may generate very limited external traffic effects. Equally, some residents of the Site might otherwise have lived in Cromwell or further afield, meaning that their trips on the roading network are not 'new' as such, but simply replace another trip that would have been made to and from different destinations.

7.1.9. These factors are difficult to take into account, but they result in a degree of double-counting of the traffic generation. To recognise this, the traffic generation of the Site calculated above is therefore referred to as the 'worst case' scenario, because it makes no allowance for the double-counting. A second test has then been carried out, varying the trip generation rate of the residential development, referred to below as the 'sensitivity test'. In this regard, the north side of the Site provides a useful guide because it comprises only residential development and thus it is possible to relate the calculated traffic generation to the number of residences and ascertain whether the nett trip rate is reasonable. This is discussed further below.

7.1.10. With regard to traffic at the weekend, there will be less activity associated with the residential development and the school will not be operating. Consequently, although the commercial development is likely to be generating more traffic, the overall trip generation of the Site at weekends will be lower than during the weekday peak hours. It is also noted that the peak hour at the weekend is extremely similar to the weekday evening peak hour (within 1%). Accordingly, the weekday peak hours represent the time of greatest potential traffic impacts on the roading network. As such, the weekend traffic has not been considered further.

7.1.11. Finally, it is understood that a number of residences within the district are used as second homes or 'holiday homes'. One outcome of this is that such houses do not generate traffic volumes at peak times, as if they are not occupied than there will clearly be no traffic generation at all, and if used for holidays, travel typically occurs outside the peak hours on the roading network. Taking these into account therefore means that the traffic generation of the Site would

be lower than calculated above. However to ensure a robust assessment, no allowance has been made for second homes / holiday homes, but rather all residential properties have been assumed to be occupied and to generate traffic in the weekday peak hours.

7.1.12. Similarly all commercial development is assumed to be fully occupied, and the full school roll of 350 students is assumed to be present.

7.2. Trip Distribution

7.2.1. With regard to the distribution of vehicles, it is unlikely that many residents of the Site will be employed within Cromwell (as they are more likely to live in Cromwell), but it can be expected that residents who currently live in Cromwell and work in Queenstown will find this an attractive location to live. Accordingly, the traffic generation of the residential development has been assigned on the basis of 85% being associated with destinations to the west of the Site.

7.2.2. For the commercial development, the diverted trips will be in proportion to the vehicles passing the Site.

7.2.3. The traffic generation associated with full development of the Site, and based on the parameters above is therefore as follows for the 'worst case' scenario:

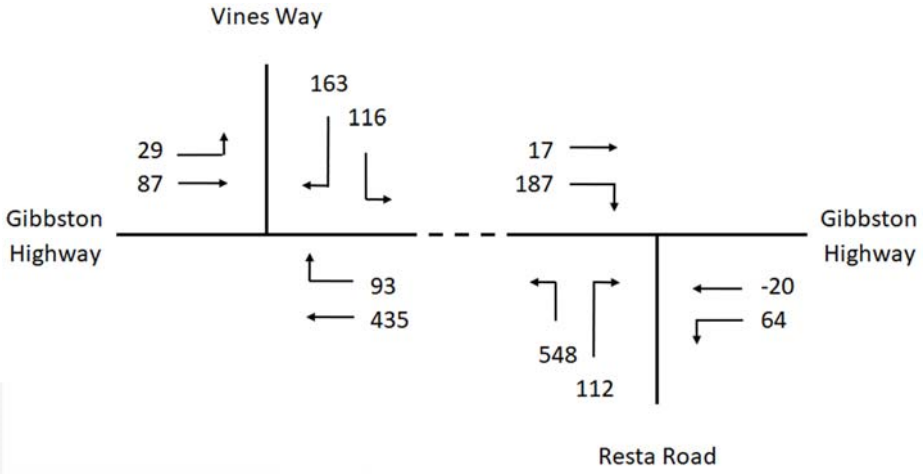

Figure 7: Traffic Generation of the Site at Full Development, Morning Peak Hour, 'Worst Case' Scenario

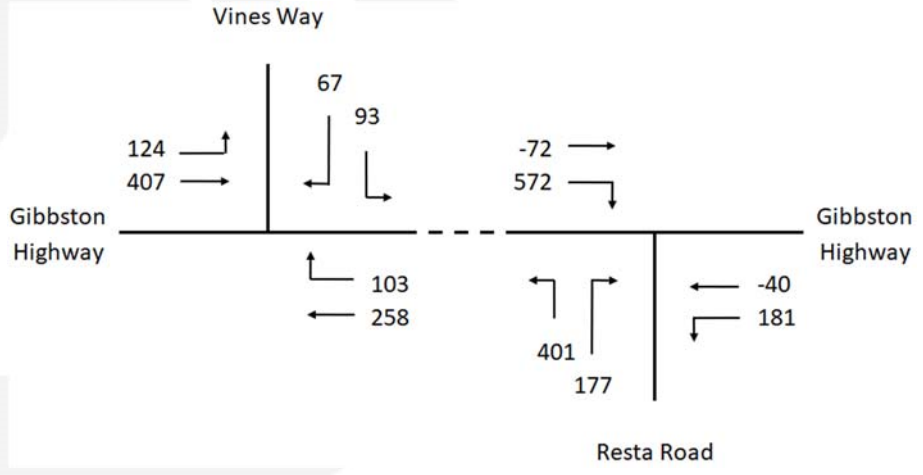

Figure 8: Traffic Generation of the Site at Full Development, Evening Peak Hour, 'Worst Case' Scenario

7.2.4. As set out above, there is a degree of double-counting within the calculation above, and this results in the nett trip generation of the north side of the Site equating to 1.55 trips per household in the peak hours. This is much higher than would typically be expected. Reducing the basic traffic generation of the residential development from 0.9 vehicle movements per household to 0.6 vehicle movements per household, to allow for multiple destinations to be visited during the one trip, results in the nett trip generation of the north side of the Site reducing to 1.25 trips per household in the peak hours. This is considered to be a more realistic outcome. Accordingly this scenario has been used as the sensitivity test for assessing the traffic effects of the proposal.

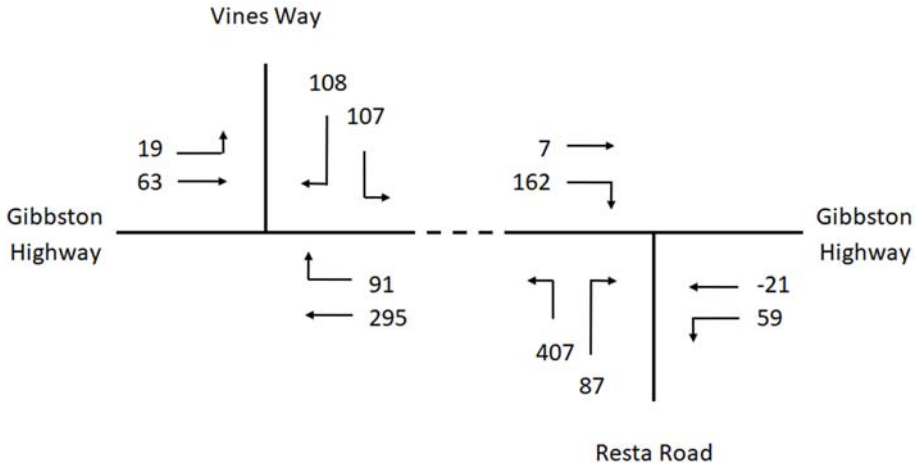

Figure 9: Traffic Generation of the Site at Full Development, Morning Peak Hour, Sensitivity Test

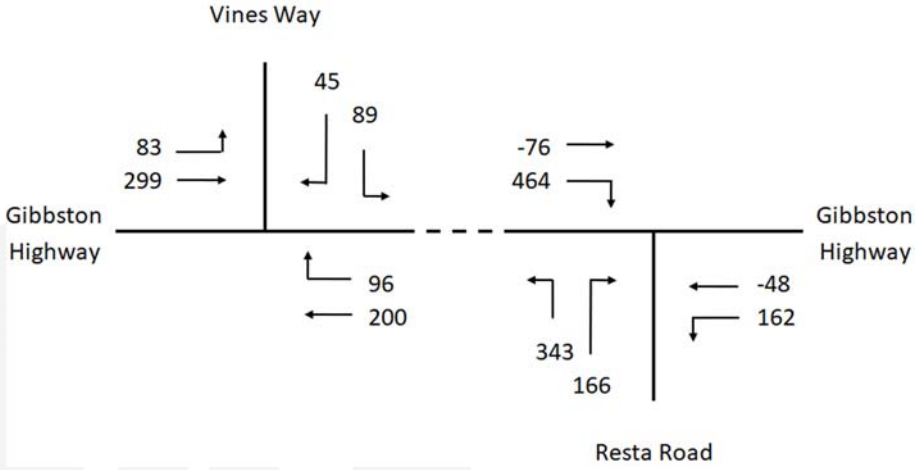

Figure 10: Traffic Generation of the Site at Full Development, Evening Peak Hour, Sensitivity Test

8. Effects on the Transportation Networks

8.1. Roading Network Capacity

8.1.1. Adopting the same methodology for the level of service on the highway, under the additional traffic loadings set out above for the 'worst case' scenario, plus ten years of ambient traffic growth, Gibbston Highway would provide Level of Service D in the weekday morning peak hour, but Level of Service E in the weekday evening peak hour. These compare with Level of Service C on the highway without the development in place as noted previously.

8.1.2. Level of Service D remains within the zone of stable flow, but Level of Service E indicates that the roading network is operating under unstable conditions where small changes to the traffic stream can result in disproportionately large effects. However a further assessment shows that the highway will have only just moved into Level of Service E, and that just a 3% difference in the traffic flows would mean that Level for Service D is provided. Consequently when the traffic flows calculated under the sensitivity test are assessed, Level for Service D is provided in both the weekday morning and evening peak hours.

8.1.3. On balance, and taking into account the double-counting identified above, it is considered that the most likely outcome is that the highway will operate under Level of Service D. Although this represents a reduced level of service compared to conditions without the development in place, Level of Service D is not an uncommon outcome for a highway (or district road) in the weekday peak hours.

8.1.4. The performance of the Gibbston Highway / Vines Way and Gibbston Highway / Resta Road intersections have been assessed using the computer software package Sidra Intersection and the results are summarised below. For this analysis, as discussed above it has been assumed that the Gibbston Highway / Resta Road intersection is upgraded to provide left and right-turn auxiliary turning lanes for traffic moving off the highway (essentially the same layout as at the Gibbston Highway / Vines Way 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
Gibbston Highway (east)	R	8.9	0	A	14.3	1	B
Vines Way	L	3.0	0	A	8.4	1	A
	R	262	26	F	352	13	F
Gibbston Highway (west)	L	8.9	0	A	8.9	0	A

Table 1: Peak Hour Levels of Service at the Gibbston Highway / Vines Way Intersection, 'Worst Case' Scenario

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
Gibbston Highway (east)	R	8.8	0	A	12.5	1	B
Vines Way	L	2.9	0	A	6.6	1	A
	R	23.4	2	C	49.3	2	E
Gibbston Highway (west)	L	8.9	0	A	8.9	0	A

Table 2: Peak Hour Levels of Service at the Gibbston Highway / Vines Way Intersection, Sensitivity Test

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
Gibbston Highway (east)	R	9.4	1	A	9.9	3	A
Resta Road	L	5.2	4	A	3.4	2	A
	R	11.2	1	B	495	44	F
Gibbston Highway (west)	L	9.2	0	A	11.6	1	B

Table 3: Peak Hour Levels of Service at the Gibbston Highway / Resta Road Intersection, 'Worst Case' Scenario

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
Gibbston Highway (east)	R	9.4	1	A	9.3	2	A
Resta Road	L	4.2	2	A	3.3	1	A
	R	9.7	1	A	153	16	F
Gibbston Highway (west)	L	9.1	0	A	10.8	1	B

Table 4: Peak Hour Levels of Service at the Gibbston Highway / Resta Road Intersection, Sensitivity Test

8.1.5. At the Gibbston Highway / Vines Way intersection, it can be seen that the intersection is generally able to accommodate the traffic flows associated with the sensitivity test. However under the 'worst case' scenario, there would be extensive queues and delays for the right-turn movement out of Vines Way.

8.1.6. Although there is no fixed point at which an intersection is 'overcapacity, it is commonly accepted that this occurs when Level of Service D changes to Level of Service E. This arises when the highest delay for any turning movement reached 35 seconds. Accordingly, the model has been repeatedly re-run to identify the threshold of development where any movement reaches this threshold. The following queues and delays are anticipated with 63% of the Site being developed[1]:

[1] That is, all parts of the Site (residential, commercial and school) reduced equally by 37%

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
Gibbston Highway (east)	R	8.7	0	A	11.9	0	B
Vines Way	L	2.8	0	A	6.0	0	A
	R	19.5	2	C	34.2	1	D
Gibbston Highway (west)	L	8.8	0	A	8.8	0	A

Table 5: Peak Hour Levels of Service at the Gibbston Highway / Vines Way Intersection, 63% 'Worst Case' Scenario

8.1.7. As noted above, the 'worst case' scenario adopts trip rates that do not make allowance for any double-counting of traffic flows arising from several destinations being visited during the one trip. As such, it represents the scenario where the greatest traffic flows might arise. Accordingly it is considered that a minimum of 63% of the total development could occur before any capacity-related improvements were required at the Gibbston Highway / Vines Way intersection.

8.1.8. The same process of repeatedly re-running the model has been used to identify the point at which Level of Service D transitions to Level of Service E at the Gibbston Highway / Resta Road intersection. The following queues and delays arise with 75% of the Site developed[2]:

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
Gibbston Highway (east)	R	9.4	1	A	9.4	2	A
Resta Road	L	4.3	2	A	3.3	1	A
	R	9.3	1	A	34.2	3	D
Gibbston Highway (west)	L	9.0	0	A	10.5	1	B

Table 6: Peak Hour Levels of Service at the Gibbston Highway / Resta Road Way Intersection, 75% 'Worst Case' Scenario

8.1.9. Again, the 'worst case' scenario adopts trip rates that do not make allowance for any double-counting of traffic flows arising from several destinations being visited during the one trip. As such, it represents the scenario where the greatest traffic flows might arise. Accordingly it is considered that a minimum of 75% of the total development could occur before any capacity-related improvements were required at the Gibbston Highway / Resta Road intersection.

8.1.10. The modelling of the sensitivity test shows that even under this scenario, both intersections typically experience levels of service that are greater than would be expected. It can reasonably be concluded therefore that both intersections will require upgrading prior to full Site development. To identify these points, the model has been repeatedly re-run using the sensitivity test parameters, to ascertain when Level of Service D changes to Level of Service E. This occurs at 85% of full development at the Gibbston Highway / Vines Way Road

[2] That is, with all parts of the Site (residential, commercial and school) reduced equally by 25%

intersection and 88% of full development at the Gibbston Highway / Resta Road intersection. In other words:

- Gibbston Highway / Vines Way intersection: a capacity-related improvement scheme is likely to be required between 63% and 85% of full development (with these reductions being applied equally for all proposed activities); and
- Gibbston Highway / Resta Road Way Intersection: a capacity-related improvement scheme is likely to be required between 75% and 88% of full development (with these reductions being applied equally for all proposed activities).

8.1.11. On this basis, it is considered that a relatively large proportion of the Site can be progressed without the need for any infrastructure improvements to increase capacity.

8.1.12. With regard to the possible intersection improvement schemes, as noted above all land in the immediate vicinity of the two intersections is either road reserve or land that is within the control/ownership of GVS. This therefore means that no third party land is required for any intersection improvements.

8.1.13. It is considered that for both of these scenarios, the most appropriate way of providing additional capacity and the timing of those schemes is best determined at a future time. This is because in part, the assessment relies on future growth on the highway which may be more or less than recent historic growth. Further, the specific nature of the commercial development will also affect the trip generation rates (which as noted above are generic at this stage), which also may then change the extent of development which can occur. Finally, measures such as the provision of a bus service can influence travel modes and therefore change timings.

8.1.14. That said, at a high level there are a number of options to improve capacity which could be considered. The type of priority intersections proposed cannot be revised to create additional capacity per se, and so possible options include:

- Change both intersections to operate as left-in/left-out arrangements through introducing a solid median barrier on the highway. In other words, eliminate the right-turn movements that have the highest delays. In order to avoid u-turns occurring on the highway, which would be unsafe, this option would need to also include a means by which drivers were able to move between the northern and southern sides of the highway, such as through an underpass. Thus for example, a right-turn movement from the north side of the Site would no longer occur from Vines Way but would instead be a movement underneath the highway and then a left-turn movement out of Resta Road; or
- Convert both intersections to roundabouts. Roundabouts have considerably more capacity than priority intersections and can easily accommodate the expected future traffic flows. Introduction of roundabouts would need to be done in conjunction with a reduction in the speed limit to 80km/h (at most) to ensure that the roundabouts operate safely; or
- A combination of the above. It would be possible to convert one intersection to a roundabout with certain turning movements prohibited at the other, such that for example, a right-turn movement from the north side of the Site would no longer occur from Vines Way but would instead be a left-turn movement and then a u-turn at a Resta Road roundabout.

8.1.15. One option which could be considered in respect of the timing and nature of any intersection upgrades would be to monitor the specific traffic generation of the Site as it develops. There are several other instances in Queenstown Lakes District where this type of condition of

consent has been imposed to monitor vehicle movements, with the observed volumes then determining when upgrades are necessary. From a practical perspective, this also means that the schemes can be devised to meet the then-prevailing patterns of traffic. It is considered that this is a reasonable approach to take in this instance.

8.1.16. The roading network within the Site itself can be constructed to meet current guides and standards, given that all the land is within the ownership/control of GVS.

8.2. Non-Car Modes of Travel

8.2.1. It is likely that the development will lead to an increase in the extent of walking and cycling in the immediate area. It is likely that these will mostly be contained within the Site as residents move between the different activities. In that regard, residents living in the north side of the Site may also find that it is viable to cycle between their homes and the non-residential activities within the south side. This then indicates that the Site should connect with the existing cycle routes in the area, such that it becomes easier for residents to cycle between the two parts.

8.2.2. It is likely that residents will need to cross the highway when on foot or by cycle. However there are numerous formal crossing places along this part of the highway, and no reason why a further cyclist/pedestrian crossing place could not be put in place on the highway to facilitate connectivity between the two parts of the Site.

8.2.3. It is commonly accepted that people will walk for a maximum of 1km to reach a particular destination. The size of the southern part of the Site therefore means that all activities in this area are within a viable walking distance of each other, suggesting a high degree of intra-site walking movements.

8.2.4. The size of development means that there may be elevated demand for public transport. However larger settlements (such as Wanaka, which is three times larger than the number of households proposed by GVS) are of insufficient size to support a scheduled bus service. Consequently it is unlikely that a public transport service would be financially viable.

8.2.5. That said, as there are several longer distance services that pass the Site, it would potentially be viable to make provision for these to pull off the highway and enter the development to pick up or drop off passengers.

8.3. Road Safety

8.3.1. The absence of any crash history in the vicinity of the Site does not indicate that there are any particular features or factors that would affect (or be affected by) the proposed development.

8.3.2. The Gibbston Highway / Vines Way intersection is newly constructed and meets appropriate design guides and standards. It can be expected that the realigned Resta Road and Gibbston Highway / Resta Road intersection will similarly meet appropriate design guides and standards. In both cases, the alignment of the highway means that appropriate sight distances for turning traffic can be provided.

8.3.3. Notwithstanding that the capacity threshold for an intersection is typically considered to be when Level of Service D transitions to Level of Service E, previous commissions in this area have indicated that NZTA considers that from a safety perspective, an elevated road safety risk may arise at a priority intersection where Level of Service C transitions to Level of Service

D. In order to identify this threshold, we have again re-run the model using the 'worst case' scenario and sensitivity test and find that:

- Gibbston Highway / Vines Way intersection: a safety-related improvement scheme may be required between 52% and 69% of full development (with these reductions being applied equally for all proposed activities); and
- Gibbston Highway / Resta Road Way Intersection: a safety-related improvement scheme may be required between 64% and 77% of full development (with these reductions being applied equally for all proposed activities).

8.3.4. On this basis, it remains the case that a relatively large proportion of the Site can be progressed without the need for any infrastructure improvements to address any safety concerns. Under this scenario, the thresholds above would become:

- When a maximum of 85 vehicles exit Vines Way in the weekday evening peak hour. In practice, as the north side of the Site comprises only residential development, this would equate to 130 residences being constructed; and
- When a maximum of 360 vehicles turn right into Resta Road in the weekday evening peak hour. As this traffic flow would include both residential and commercial traffic generation, it is not possible to be specific about particular quantums of development which would give rise to this figure

8.3.5. With regard to the possible intersection improvement schemes, as noted above all land in the immediate vicinity of the two intersections is either road reserve or land that is within the control/ownership of GVS. However the nature of any improvement schemes can be considered at a future time after monitoring shows that there is a need for such improvements, as noted above.

9. District Plan Matters

9.1. The Queenstown Lakes Proposed District Plan sets out a number of transportation-related Site Standards against which any development is expected to be assessed. The land to which this proposal relates is either road reserve or within the control/ownership of GVS. As such, it is not expected that there will be any constraints to achieving full compliance with the District Plan, at the stage of consenting.

10. Conclusions

10.1. This report has identified, evaluated and assessed the various transport and access elements of a proposed residential development with ancillary activities in Gibbston.

10.2. The Site is located towards the north and the south of Gibbston Highway, and access is therefore proposed to be from two locations. The existing Gibbston Highway / Vines Way priority intersection is proposed to serve the northern part of the Site, with the Gibbston Highway / Resta Road priority intersection serving the southern part of the Site. For clarity, the Gibbston Highway / Resta Road intersection is to be relocated slightly further to the west of the existing intersection location, and upgraded with auxiliary turning lanes as soon as any development takes place.

10.3. Analysis of both of these intersections shows that:

- At the Gibbston Highway / Vines Way intersection:
  - a capacity-related improvement scheme is likely to be required between 63% and 85% of full development; and
  - a safety-related improvement scheme is likely to be required between 52% and 69% of full development
- At the relocated/upgraded Gibbston Highway / Resta Road Way intersection:
  - a further capacity-related improvement scheme is likely to be required between 75% and 88% of full development; and
  - a safety-related improvement scheme is likely to be required between 64% and 77% of full development

10.4. For clarity, the percentage reductions noted above apply equally across all proposed activities in the Site.

10.5. The reason for the range in percentages is that:

- The figures make allowance for different proportions of traffic to be wholly internal to the Site rather than travelling to and from destinations further away on the highway; and
- The point at which a safety-related improvement may be required occurs with a lower level of delay than for a capacity-related improvement.

10.5.1. On this basis, the majority of the Site can be progressed without the need for any infrastructure improvements to increase capacity. When intersection improvement schemes are required, it is relevant that all land in the immediate vicinity of the two intersections is either road reserve or land that is within the control/ownership of GVS. This therefore means that no third party land is required for any improvement schemes.

10.5.2. It is considered that for both of these scenarios, the most appropriate way of providing additional capacity and the timing of those schemes is best determined at a future time such as through minotoring the traffic flows. However, there are a range of scheme options that could be considered, including prohibiting right-turn movements and providing an underpass below the highway, or converting both intersections to roundabouts.

10.6. The crash history in the vicinity of the Site does not indicate that there would be any adverse safety effects from the proposal. The Gibbston Highway / Vines Way intersection is newly constructed and meets current guides and standards, and it can be expected that the relocated/upgraded Gibbston Highway / Resta Road Way intersection will also be complying.

10.6.1. It is likely that the development will lead to an increase in the extent of walking and cycling in the immediate area, but it is possible to connect the northern and southern parts of the site to support non-car travel between them. The size of the southern part of the Site means that all activities in this area are within a viable walking distance of each other.

10.6.2. Although there is no regular public transport service in the area, there are several longer distance services that pass the Site on Gibbston Highway. Consequently it would potentially be viable to make provision for these to pull off the highway and enter the development to pick up or drop off passengers.

10.7. The land to which this proposal relates is either road reserve or within the control/ownership of GVS. As such, it is not expected that there will be any constraints to achieving full compliance with the transport-related provisions of the Queenstown Lakes Proposed District Plan, at the stage of consenting.

10.8. Overall, the proposed development can be supported from a traffic and transportation perspective.

Carriageway Consulting Limited
May 2024

CARRIAGEWAY
CONSULTING

traffic engineering | transport planning

A. PO Box 29623, Christchurch, 8540 **P.** 03 377 7010 **E.** office@carriageway.co.nz