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Dear Tim

**Proposed Special Housing Area, Lake Hawea Township: Additional Information**

Further to our emails and conversations, we understand that Queenstown Lakes District Council has requested an assessment of the traffic effects should the Capell Avenue link to Cemetery Road not be formed, and that traffic instead uses the Cemetery Road / Domain Road route.

The Council has also asked that the sizes of the consented Sentinel Park and Timsfield subdivisions are revised to reflect what has been consented (in this regard we note that the subdivisions are smaller than previously modelled).

The analysis relies upon some information previously presented in the Transportation Assessment and we have therefore replicated this below to assist.

***Executive Summary***

Based on our assessment, we consider that there is no difference in the level of service provided by Domain Road when comparing the scenario with and without the Capell Avenue link being formed.

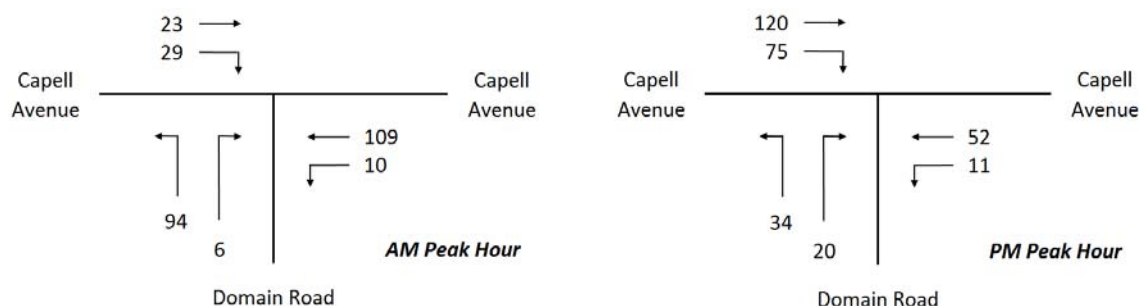
Similarly there are negligible differences in the queues and delays at the Capell Avenue / Domain Road intersection with or without the Capell Avenue link being provided.

On this basis we consider that the difference between the scenarios with the Capell Avenue link formed, and the link not being formed, will be imperceptible to road users.

***Background***

Within the Transportation Assessment, we set out the existing peak hour volumes on Domain Road south of Capell Avenue as 90-135 vehicles per hour.

We also noted the location through which the bulk of vehicles would travel would be the Capell Avenue / Domain Road intersection. Observed traffic volumes were:



**Figure 1: Morning and Evening Peak Hour Volumes (2018 Observed)**

We then highlighted that additional traffic volumes were anticipated to be generated by the Timsfield and Sentinel Park subdivisions as follows:

Period	In	Out	Total
Morning Peak Hour	50	450	500
Evening Peak Hour	325	175	500
Daily	2,000	2,000	4,000

**Table 1: Traffic Generation of the Timsfield and Sentinel Park Subdivisions**

We distributed these vehicles with 20% being internal to Lake Hawea township and the remaining 80% being external. Of the latter half were expected to use Domain Road and half use Capell Avenue (east of Domain Road), due to the Capell Avenue extension being in place.

Taking this into account, we found that traffic flows on Domain Road would increase to 340 vehicles per hour. 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 showed that under these traffic flows, Domain Road would provide Level of Service B. This is within the zone of stable flow.

We also evaluated the performance of the Capell Avenue / Domain Road intersection using these volumes:

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
Domain Road (south)	L	6.9	2	A	5.3	0	A
	R	7.0	0	A	9.2	0	A
Capell Avenue (east)	L	4.6	0	A	4.6	0	A
Capell Avenue (west)	R	5.8	0	A	5.3	1	A

**Table 2: Peak Hour Levels of Service at the Capell Avenue / Domain Road Intersection with Consented Subdivisions**

We concluded that the intersection provided an excellent level of service with low queues and delays.

We then added the traffic associated with the proposed SHA, and found that the peak hour volumes on Domain Road would increase to 500 vehicles per hour, which equates to Level of Service D.

Adding the traffic to the modelling of the Capell Avenue / Domain Road intersection produced the following queues and delays:

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
Domain Road (south)	L	11.7	5	B	5.7	1	A
	R	8.8	0	A	14.0	0	B
Capell Avenue (east)	L	4.6	0	A	4.6	0	A
Capell Avenue (west)	R	6.7	1	A	5.7	3	A

**Table 3: Peak Hour Levels of Service at the Capell Avenue / Domain Road Intersection with Consented Subdivisions and Proposed SHA**

### **Additional Analyses**

#### *Size of Sentinel Park and Timsfield*

Our earlier assessment allowed for Sentinel Park and Timsfield to have 300 and 200 residential lots respectively. We understand that these are now confirmed as 90 residential lots within Sentinel Park and 300 lots within Timsfield. Thus there is a reduction of 110 lots (22%) that was previously modelled as being part of the receiving environment. Thus the traffic generation of the two subdivisions is as follows:

Period	In	Out	Total
Morning Peak Hour	39	351	390
Evening Peak Hour	254	136	390
Daily	1,506	1,560	3,120

**Table 4: Revised Traffic Generation of the Timsfield and Sentinel Park Subdivisions**

#### *Redistribution of Sentinel Park and Timsfield Traffic*

Our earlier assessment allowed for the traffic from Sentinel Park and Timsfield to be split between Domain Road and Capell Avenue (east).

In the first instance, we have allowed for full development of these subdivisions but assuming that 80% of the generated traffic uses the Domain Road route to reach Capell Avenue (the remaining 20% is an internal movement). For this analysis, no development of the SHA has been allowed for.

This results in an increase of 310 vehicle movements in the peak hour on Domain Road, meaning that the total volumes would increase from 90-135 vehicles per hour (without any subdivision traffic) to up to 450 vehicles per hour. The Austroads Guide to Traffic Management Part 3 sets out that this equates to Level of Service C. This is not uncommon for a road in the peak hours and remains within the zone of stable flow.

We have then remodelled the Capell Avenue / Domain Road intersection using these volumes, 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
Domain Road (south)	L	5.4	2	A	4.9	1	A
	R	5.7	0	A	7.7	0	A
Capell Avenue (east)	L	4.6	0	A	4.6	0	A
Capell Avenue (west)	R	5.0	0	A	5.1	1	A

**Table 5: Peak Hour Levels of Service at the Capell Avenue / Domain Road Intersection with Consented Subdivisions, All External Movements via Domain Road**

The modelling shows that the intersection continues to perform well with the consented subdivisions being fully developed.

#### *Addition of SHA Traffic*

We have then added the expected traffic generation for the SHA, as set out in the Transportation Assessment but adding all traffic onto Domain Road. This increases the volume on Domain Road by a further 320 vehicle movements, to 770 vehicles per hour. The Austroads Guide to Traffic Management Part 3 sets out that this equates to Level of Service D. Again, this is not uncommon for a road in the peak hours and remain within the zone of stable flow.

We have then remodelled the Capell Avenue / Domain Road intersection using these volumes, 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
Domain Road (south)	L	5.6	3	A	4.9	1	A
	R	6.0	0	A	10.3	1	B
Capell Avenue (east)	L	4.6	0	A	4.6	0	A
Capell Avenue (west)	R	5.1	0	A	5.4	2	A

**Table 6: Peak Hour Levels of Service at the Capell Avenue / Domain Road Intersection with Consented Subdivisions plus SHA, All External Movements via Domain Road**

The intersection continues to perform well, and the difference between this and the situation without the SHA is very low. The reason for this is that existing traffic flows at the intersection are low, meaning that the predominant volumes relate to Sentinel Park, Timsfield and the proposed SHA. As such, although Domain Road carries a large volume of vehicles, there is little existing (non-subdivision) traffic which opposes the turning movements.

#### **Comparison with Previous Assessment**

The particular matter raised by the Council is whether there are any implications for the roading network if the Capell Avenue link to Cemetery Road was not to be formed. With that in mind, we have compared the analysis above with that set out in our earlier Transportation Assessment, in order to highlight any differences.



Comparing the two, we find there is no difference in the level of service provided by Domain Road. In each of the assessments, Level of Service D is provided.

Similarly there is little difference in the level of service forecast on any movement at the Capell Avenue / Domain Road intersection, other than for the left-turn out of Domain Road in the morning peak hour, when the level of service is better than previously forecast due to the lower traffic volumes expected to be generated by the consented subdivisions.

On this basis we consider that the difference between the scenarios with the Capell Avenue link formed, and the link not being formed, will be imperceptible to road users.

### **Summary / Conclusions**

This assessment has been carried out on the basis that all traffic was to exit Hawea township via Domain Road. On Domain Road, there is no change in the level of service provided compared to the scenario previously presented where the Capell Avenue link was formed.

Queues and delays at the Capell Avenue / Domain Road intersection remain low and are virtually unchanged from those expected if the Capell Avenue link was to be formed. The difference is such that it is unlikely to be perceptible by road users.

We understand that if the SHA proceeds, there may be a reduced extent of development progressed in Timsfield. If this situation was to arise, then the results presented above would not arise, but rather, queues and delays would be lower than shown.

Please do not hesitate to contact me if you require anything further or would like clarification of any matters.

Kind regards

**Carriageway Consulting Limited**

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