

4 July 2025

Greg Dewe  
Fulton Hogan Land Development Limited

**By e-mail only:** s 9(2)(a)

Dear Greg

### **Parkburn: Update of Transportation Matters**

This letter sets out an update to the transportation modelling associated with the Parkburn subdivision, adjacent to Pisa Moorings, Cromwell. It builds on and updates the analysis that was carried out for Plan Change 21 (PC21), and consequently we have not repeated much of the background information associated with PC21 other than where needed to understand this outcomes of this letter.

### **Site Location and Previous Analysis for PC21**

The Parkburn site is located approximately 9km north of Cromwell (with Cromwell being the closest settlement). Wanaka lies approximately 45km towards the northwest, with Queenstown being 67km to the west. To the immediate south lies the small settlement of Pisa Moorings, and to the immediate north lies a site owned by HWR Property Limited which is presently being quarried.

Because Lake Dunstan lies to the immediate east of the site, vehicular access to the site can only be achieved via State Highway 6, which runs along the western site boundary. State Highway 6 provides the primary roading connection to Cromwell, Wanaka and Queenstown.

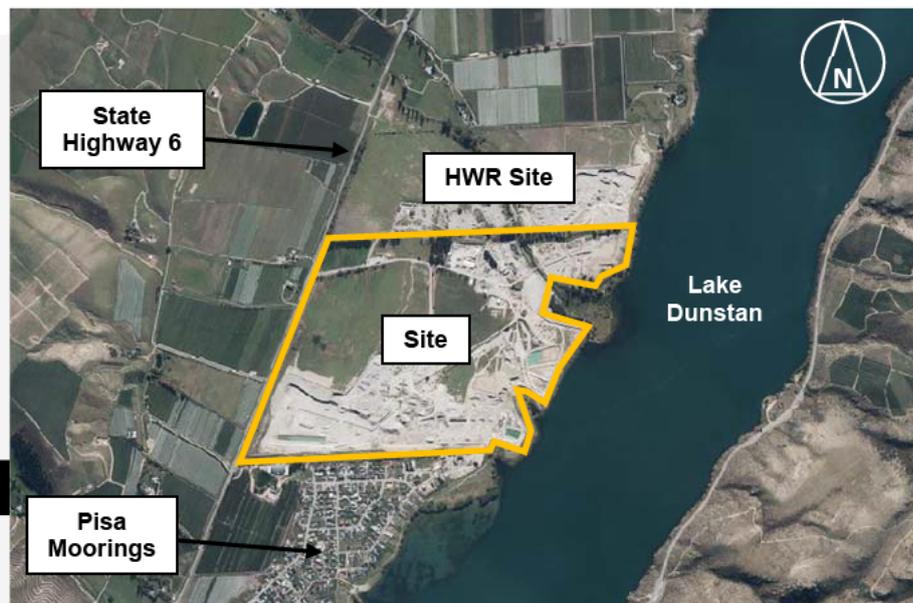


Figure 1: Site Location and Environs

Given that the site is required to gain access onto State Highway 6, the function and performance of the intersections on the highway are of critical importance to the accessibility of the development. This depends on the traffic generation of the proposal and this in turn is influenced by the nature and scale of land use activities. These have been revisited as part of the current project.

The nature of the traffic is that it will approach from, and depart towards, the north and south of the site via the state highway. There are no major roads that connect to State Highway 6 to the immediate north and south of the site, and so traffic travelling to and from the site will pass through intersections some distance from the site itself. The effects on the performance of these that arises from the development also needs to be evaluated.

In considering the development of the site through PC21, the effects on roading capacity were modelled using the Council's transportation model. The current proposal has also been assessed using the Council's transportation model<sup>1</sup>, which provides a consistent approach between the two. We highlight that the Council only has a weekday evening peak hour model not a morning peak hour model.

The masterplan tested within PC21 is shown below:



Figure 2: Masterplan Proposed in PC21 (Extract from Baxter Design Drawing)

This scale of development allowed for:

- 81.15ha of Residential Resource Area (Low-Density Residential);
- 10.09ha of Residential Resource Area (Medium-Density Residential);
- 4.72ha of Business Resource Area (3);
- 2.32ha of Industrial Resource Area (2); and
- [REDACTED] of Industrial Resource Area (3).

### **Current Proposal**

An updated masterplan for the proposed layout has been received and is shown below:

<sup>1</sup> Council's permission to use the model was received by mail on 26 March 2025



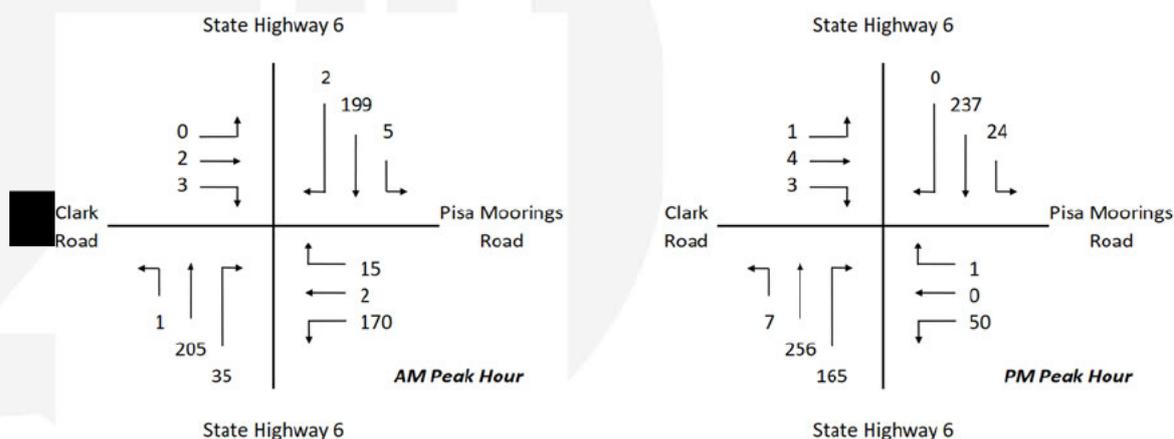
**Figure 3: Proposed Masterplan (Extract from Woods Drawing)**

It can be seen that the current proposal anticipates a more intensive use of the area for residential activity, with a corresponding reduction in the extent of commercial / non-residential use.

### **Traffic Generation of Pisa Moorings**

During initial discussions with the modelling team, it emerged that the traffic generation rate used for residential activities for PC21 had been based on a typical residential subdivision within Cromwell. Intuitively this introduces a potential error, because residences that are some distance from settlements usually have different trip-making characteristics to those that are within towns. For example, drivers living more remotely will set off earlier on their journey due to longer travel distances, and trips into town will be organised to visit several different destinations as part of the same trip ('trip-chaining').

Given that the site is proximate to Pisa Moorings, we anticipate that the trip generation per household of the site will be the same (or very similar) to that of Pisa Moorings. Helpfully, there is only one point of access to Pisa Moorings, and accordingly, we arranged for a traffic survey to be undertaken at the State Highway 6 / Pisa Moorings Road / Clark Road intersection during a typical weekday in March 2025, in the periods 7:30am to 9:30am and 3:45pm to 6:15pm. The results for the peak hours are summarised below.



**Figure 4: Turning Volumes at Access to Pisa Moorings, March 2025**



When these results are compared to the assumed traffic generation at Pisa Moorings used within the PC21 assessment, considerable differences are noted. The PC21 work was based on a peak hour traffic generation rate for Pisa Moorings (and the site) of 1.33 vehicle movements per household, with all households being occupied. We have counted the current extent of development within Pisa Moorings and have identified approximately 450 residences. The survey shows peak hour volumes of 229 and 244 vehicles (two-way) on Pisa Moorings Road, and this equates to a traffic generation rate of 0.51 to 0.54 vehicle movements per household, that is, around 60% lower than had previously been anticipated.

This outcome could occur if a high proportion of holiday/second homes were present in Pisa Moorings. If, say, 50% of the houses were unoccupied, then this would equate to a traffic generation rate per occupied residence of 1.02 to 1.08 vehicle movements per household, much closer to the original estimates. However the 2023 census showed that on census night (held on Tuesday 7 March 2023), only 19% of residences in Pisa Moorings were unoccupied. While the extent of occupancy can vary, our traffic survey was fortuitously carried out on Tuesday 4 March 2025. This means that it is highly likely that there was the same pattern of household occupancy at the time of the survey as for the census, almost exactly two years prior. In other words, we can expect, with a reasonable degree of confidence, that during our survey 81% of the households were occupied.

We also assessed the traffic passing by the site on the state highway to ensure that it was consistent with the previous analysis. This was to eliminate the possibility that there had been some event elsewhere on the roading network that resulted in fewer vehicles entering and exiting Pisa Moorings. While the observed volumes were slightly lower than the modelled volumes, this alone would not account for the difference in the trip generation rate per household.

With this in mind, we consider that the previous modelling carried out for PC21 adopted a trip generation rate that was too high. For the assessment of the masterplan, we have adopted a rate of 0.57 vehicle movements per household for both Pisa Moorings and also for the development site. This is the higher of the observed values from the survey, plus an additional 5% for day-to-day variability.

As a final comment, the surveys show that 90% of the traffic associated with Pisa Moorings was travelling to or from the south. This is consistent with the assumptions made through PC21 and so it has not proved necessary to adjust the distribution of traffic (only the traffic volume has been changed).

### ***Additional Modelling Undertaken***

The new masterplan has been coded into the model. We have then critically reviewed the model inputs.

#### *Parameters Used in the Model*

The initial PC21 yield was for 543 residences and this has now been increased to 1,047 residences based on the plans provided. As set out above though, the trip rate per household has been [REDACTED]

Scaling from the plans, the masterplan includes approximately 6,500sqm GFA of commercial activities and a potential primary school. In view of the location of the site, we have assumed that the final scale of the commercial activities will be appropriate only for servicing Pisa Moorings and the development site (and also the HWR site to the north, if it is developed). This matter is important because if the commercial development was to attract traffic from further afield then this would increase the turning volumes at the new intersections onto the highway. Conversely, serving the



immediate area only means that the traffic generation of the commercial activities is contained wholly within the sites (subject to a road link being provided between them, as discussed subsequently).

PC21 was modelled on the basis of a 'design year' of 2034, and the same approach has been taken for the new modelling. As noted above, the Council only has a weekday evening peak period model, and thus at this stage no analysis has been carried out for the morning peak hour.

With regard to the speed environment at the access points into the site, the State Highway 6 / Pisa Moorings Road / Clark Road intersection presently operates with a 100km/h speed limit on the highway, although the average operating speed across all traffic is affected by the slower speeds of vehicles as they slow to enter the side roads and accelerate after exiting. The model has adopted the same parameter as for PC21, of a free-flow speed of 85km/h past the site. This is lower than the maximum speed limit, but in practice, there is little difference between this and allowing for a 100km/h speed past the site (and again, this speed environment is the same as per the earlier PC21 assessment).

We consider that in due course, it is possible that the speed limit on the highway past Pisa Moorings and the site (and potentially further north) will be reduced. Crashes involving a side-on collision, as is common at priority intersections, typically have a higher rate of injury and more severe injuries than nose-to-tail crashes, and so there may be a case for implementing a lower (80km/h) speed limit. However this is not included within the modelling at this stage since there can be no reliance on this being implemented.

The modelling has allowed for the site accesses to be priority intersections, with auxiliary left-turn and right-turn lanes. This is aligned with the approach taken in PC21. It also means that through traffic on the highway will not be delayed by vehicles that are slowing to enter the site.

Delay at intersections is typically expressed in terms of a Level of Service, on a scale of A (the best) to F (the worst). Levels of Service A, B, C and D are considered to represent a situation of 'stable' flow but where Level of Service D represents the point at which 'congestion' starts to occur. As such, Level of Service E is considered to be 'unstable' operating conditions, which delays are significant and Level of Service F represents severe queues and delays. For the purposes of this exercise then, we have identified the thresholds for development where Level of Service D changes to Level of Service E as being the point just prior to which intersection improvement schemes are required.

## **Results**

### *Introduction*

PC21 reported on three scenarios:

- Scenario 0: 2034, with no development of the site;
- Scenario 1: 2034, with 50% development of the site; and
- Scenario 2: 2034, with 100% development of the site

To enable comparison of the outputs, we have endeavoured to retain some degree of consistency with this approach. We have extracted the relevant results from the model and summarised these below, alongside the results that were previously presented in the Transportation Assessment for PC21.

*PC21 Scenario 0: No Site Development*

Although this scenario does not include any development traffic, there are differences in the results because of the lower traffic generation rate at Pisa Moorings.

Intersection	PC21 Modelling as per ITA			Updated Modelling		
	Veh/hr	Delay (s)	LoS	Veh/hr	Delay (s)	LoS
SH6 / PC21 South	651	2	A	768	3	A
SH6 / PC21 North	667	5	A	768	7	A
SH6 / Pisa Moorings Rd / Clark Rd	1,329	8	A	1,097	7	A
SH6 / Lowburn Valley Road	1,429	>150	F	1,061	8	A
SH6 / Burn Cottage Road	1,499	36	E	1,308	2	A
SH6 / Shortcut Road	1,529	14	B	1,337	9	A
SH6 / SH8B	2,109	12	B	1,960	9	A

**Table 1: Intersection Performance, No Site Development**

It can be seen that with the updated modelling, all intersections operate with an excellent level of service. The capacity concerns reported within the previous Integrated Transportation Assessment (ITA) at the SH6 / Lowburn Valley Road and SH6 / Burn Cottage Road intersections do not arise. The ITA reported that there should be consideration of upgrades for these intersections irrespective of any development of Parkburn, but the new modelling shows that this is no longer justified.

*PC21 Scenario 1: 50% Development of the PC21 Site (270 households)*

Under the ITA, 50% of the site development was considered as an option because at this threshold, it would be necessary to upgrade the SH6 / SH8B roundabout with a second circulating lane, and the SH6 / Pisa Moorings Road / Clark Road intersection needed to be converted to a roundabout.

Due to the lower traffic flows generated by the site, no modelling has been carried out of this scenario.

*PC21 Scenario 2: 100% Development of the PC21 Site (543 households)*

Under the ITA, this scenario required intersection improvements. In the results set out below for the new modelling, no intersection improvements have been modelled.

Intersection	PC21 Modelling as per ITA (Incl Intersection Improvements)			Updated Modelling (No Intersection Improvements)		
	Veh/hr	Delay (s)	LoS	Veh/hr	Delay (s)	LoS
SH6 / PC21 South	1,328	11	B	1,174	17	C
SH6 / PC21 North	869	7	A	946	7	A
SH6 / Pisa Moorings Rd / Clark Rd	1,982	6	A	1,493	29	D
SH6 / [Redacted]	2,127	>150	F	1,322	8	A
SH6 / Burn Cottage Road	2,095	10	A	1,547	4	A
SH6 / Shortcut Road	2,118	4	A	1,573	13	B
SH6 / SH8b	2,564	5	A	2,163	12	B

**Table 2: Intersection Performance, 543 Households in the Site**



It can be seen that under this scenario, the two intersections previously noted as requiring upgrading continue to perform well without the need for any upgrades. At the SH6 / SH8B roundabout, the ITA commented that the delay on the southern approach was 106 seconds and Level of Service F. Under the revised modelling, this has been reduced to 22 seconds and Level of Service C (again noting that this is due to the lower trip rate used and without any upgrading). As set out above, Level of Service C lies within a range that indicates that an intersection is functioning satisfactorily.

The situation is more complex at the SH6 / Pisa Moorings Road / Clark Road intersection. In this case, Level of Service D arises for traffic approaching from the east (Pisa Moorings Road) which is unable to merge onto the highway. This occurs because the traffic travelling to and from the site reduces the gaps in the traffic stream on the highway, and limits the ability for drivers to exit Pisa Moorings. Further, the site traffic also limits the ability of drivers to turn right into Pisa Moorings Road, and these vehicles then obstruct drivers attempting to turning right out of Pisa Moorings Road.

Level of Service D spans a range of 25 to 35 seconds delay per vehicle, and the modelling shows that the delay is 29 seconds, meaning it falls mid-way in the range. As set out above, Level of Service D represents satisfactory performance.

#### *New Scenario 3: Assessment of When Level of Service D at the SH6 / Pisa Moorings Road / Clark Road Intersection Changes to Level of Service E*

In order to identify where the extent of development results in a change to Level of Service E and an unsatisfactory outcome, in practice the only approach is to repeatedly run the model with different amounts of development and review the results. This could be done by increasing the yield by one lot each time and re-running the model but this would be highly time-consuming. Consequently the approach taken in this instance has been to model yields in increments of 200 residences, and then interpolate between these results to identify the point where Level of Service E arises.

On this basis, we find that Level of Service D changes to Level of Service E at a yield of 710 residences.

Consequently we recommend that development within Parkburn is limited to 710 residences until such time as roading improvements are put in place. We discuss options for this below.

#### *Variation to Scenario 3*

One way to achieve greater capacity for traffic turning onto State Highway 6 is to create an additional point of access. Under this scenario, drivers would therefore have a second option for exiting Pisa Moorings.

One option in this regard is Pony Court. This is presently a cul-de-sac located at the northwestern corner of Pisa Moorings, but is close to the southern boundary of the site. If a roading link could be created between Pony Court and the highway, then this would create additional capacity for traffic that is attempting to exit the site. Motorists would not be obliged to exit via Pisa Moorings Road but could instead make use of the southern site access. Furthermore, trips that are presently made for a short distance on State Highway 6 (such as between Pisa Moorings and the commercial area within the site) would occur wholly internally and this would also reduce the amount of traffic turning to and from the highway and providing a further beneficial effect.

The option of a Pony Court link has been modelled and the interpolation of the results shows that with 710 dwellings within the site, the SH6 / Pisa Moorings Rd / Clark Rd intersection would operate

with Level of Service C. That is, if there is a connection to Pony Court and options to gain access to the highway via alternative routes, then the level of service at the SH6 / Pisa Moorings Road / Clark Road intersection improves such that an intersection improvement scheme would not be required in that location.

On this basis then, we consider that one condition of consent for the site could be that development within Parkburn is limited to 710 residences until such time as a direct roading link is provided between the site and Pisa Moorings to the south.

*New Scenario 4: 100% Development of the Site (1,047 households)*

The result shown below set out the outcomes of the full extent of development within the site, and including for the Pony Court link. For clarity, no intersection improvements are included within these results.

Intersection	Updated Modelling (No Intersection Improvements) with Pony Court Link		
	Veh/hr	Delay (s)	LoS
SH6 / PC21 South	1,384	27	D
SH6 / PC21 North	982	9	A
SH6 / Pisa Moorings Rd / Clark Rd	1,636	19	C
SH6 / Lowburn Valley Road	1,553	8	A
SH6 / Burn Cottage Road	1,787	6	A
SH6 / Shortcut Road	1,805	26	D
SH6 / SH8b	2,386	27	C

**Table 3: Intersection Performance, 1,047 Households in the Site with a Pony Court Link**

It can be seen that the effects of the Pony Court link mean that the level of service at the SH6 / Pisa Moorings Road / Clark Road intersection remains appropriate, and no intersection improvement would be required to provide additional capacity.

Upon more detailed review of the results, we find that although the overall level of service at the SH6 / SH8B roundabout is acceptable (Level of Service C), this masks that Level of Service F arises on the southern approach to the roundabout (as it did for the initial PC21 work). As such, we have assessed the point at which this transitions from Level of Service D to E, using the interpolation approach described above. This shows that Level of Service E arises at a threshold of 875 residences within the site.

Consequently we recommend that once development within Parkburn reaches 875 residences, some form of improvement scheme is required at the SH6 / SH8B roundabout (for example, the installation of a second northbound approach lane).

**ma [redacted] conclusions**

The traffic survey carried out at Pisa Moorings indicates that the trip generation rate used for the development contemplated in PC21 was too high, although the direction of vehicle movements was appropriate. The use of a revised trip generation rate has identified that a greater proportion of the site can be developed before intersection improvements are required. However it continues to show that full site development cannot occur unless improvements are put in place, albeit that the site is anticipated to be more intensively developed than was initially evaluated.

It is possible to model any scale of yield in the site, but to maintain consistency with the work carried out previously, the modelling work to date has considered the previous full development of the site (543 residences) and the new full development of the site (1,047 residences). While other parameters in the model have been reviewed, these have not been changed from the PC21 modelling.

The model shows that without development of the site, the key intersections on the roading network all intersections operate with an excellent level of service.

With 543 residences (being the previous full development of the site and approximately 50% of the new yield), the key intersections on the roading network generally continue to provide a good level of service. This is based on the site accesses being formed as priority intersections, with auxiliary left-turn and right-turn lanes. However the SH6 / Pisa Moorings Road / Clark Road intersection is starting to approach an unsatisfactory level of service and further testing (and interpolation of results) shows that development within the site should be limited to 710 residences until roading improvements are put in place. In practice, the formation of a direct link between the site and Pisa Moorings addresses this issue without the need for any intersection improvements.

When the new full development of the site is considered (1,047 residences), the key intersections continue to provide a good level of service. However Level of Service F arises on the southern approach to the SH6 / SH8B roundabout (as it did for the initial PC21 work). Further assessment shows that this reaches an unsatisfactory level of service at 875 residences and so we consider that improvement of the southern roundabout approach will be justified at this point.

We have compared the PC21 provisions with the new modelling results:

PC21 Provision (SUB-S2)	Comment / Assessment
2. No more than 559 residential allotments shall be created (titled) within the Schedule 19.28 Parkburn Structure Plan area	The modelling now shows that additional residential lots can be accommodated
3. No residential allotments shall be created (titled) within the Schedule 19.28 Parkburn Structure Plan, until:	
i. The existing northern priority intersection onto SH6 is upgraded to include a separated left turn lane; and	We consider that this remains a valid provision, given that NZTA now seeks separated left-turn lanes at priority intersections for safety reasons
ii. The new intersection to the south of the existing northern intersection onto SH6 is constructed as a priority controlled intersection or single lane roundabout	The modelling shows that a priority intersection has sufficient capacity and that a roundabout is not required at this point.
4. No more than 286 residential allotments shall be created (titled) within Schedule 19.28 Parkburn Structure Plan, until:	
i. The SH6/SH8B intersection has been upgraded to a dual lane roundabout	The modelling shows that this upgrading is not needed at 286 lots, but rather, at 875 lots.
ii. The SH6/Pisa Moorings Road has been upgraded to a single lane roundabout	The modelling shows that such an upgrade is not needed at 286 lots, and that the full site development can be achieved provided that a direct link to Pisa Moorings is formed
OR	
other upgrade solution including banning turns and/or providing an alternative roundabout connection to	We have not assessed alternative options as part of this exercise



SH6 through the Schedule 19.28 Parkburn Structure Plan area.	
5. No residential allotments shall be created (titled) within Lot 16 DP 514674 of the Schedule 19.28 Parkburn Structure Plan, until:	
i. The Pony Court road connection has been vested as road.	The modelling shows that the Pony Court connection provides a benefit to the site, but it is not needed at lower numbers of lots as discussed above.

**Table 4: Commentary on PC21 Provisions**

### **Concluding Comments**

As set out in PC21 and earlier emails, one limitation of the modelling carried out is that the Council's model only assesses the weekday evening peak hour, and it is intuitive that travel patterns are different during the weekday mornings. However the modelling of the evening peak was used to confirm PC21 and consequently at this stage we anticipate that an assessment of the evening peak hour will be sufficient for this exercise also.

NZTA's submission to PC21 sought a direct connection between Pisa Moorings and the site, in order to ensure that short-distance trips between the two areas were not carried out on the highway. In our view, the modelling supports the benefits of such a link (from an efficiency perspective) at a threshold of 710 residences within the site. For clarity, although we have referred to a 'Pony Court link', the same positive outcomes would be achieved if a direct link was able to be provided elsewhere (in other words, the link does not have to be via Pony Court to be beneficial).

In summary, we consider that development within the site can be supported subject to the following:

- Development within the site should be limited to 710 residences until a direct link between the site and Pisa Moorings is created; and
- Development within the site should be limited to 875 residences until the southern approach to the SH6 / SH8B roundabout is improved to create additional capacity.

As always, we would be pleased to discuss this letter with you at your convenience.

Kind regards  
**Carriageway Consulting Limited**

Andy Carr  
**Traffic Engineer | Director**

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