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## 1. Introduction

- 1.1. Universal Developments Limited proposes to develop a 400-lot residential subdivision on land to the immediate south of the existing urban areas of the township of Lake Hawea in Queenstown Lakes District.
- 1.2. This high-level Transportation Assessment sets out an overview 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, possible ways in which these can be addressed are set out. However this is not a detailed report, but rather, is intended to identify key issues and potential difficulties (and solutions).
- 1.3. This report is cognisant of the guidance specified in the New Zealand Transport Agency's '*Integrated Transport Assessment Guidelines*' and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered.
- 1.4. As instructed (by e-mail dated 13 March 2018), this report does not consider any matters relating to the state highway.





## 2. Site Overview

### 2.1. Location

2.1.1. The development site is located on the southern side of Cemetery Road, and on the southern side of the existing urban area of Lake Hawea township. The site is zoned Rural General in the Queenstown Lakes District Plan (*'District Plan'*).

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



Figure 1: General Location of Development Site

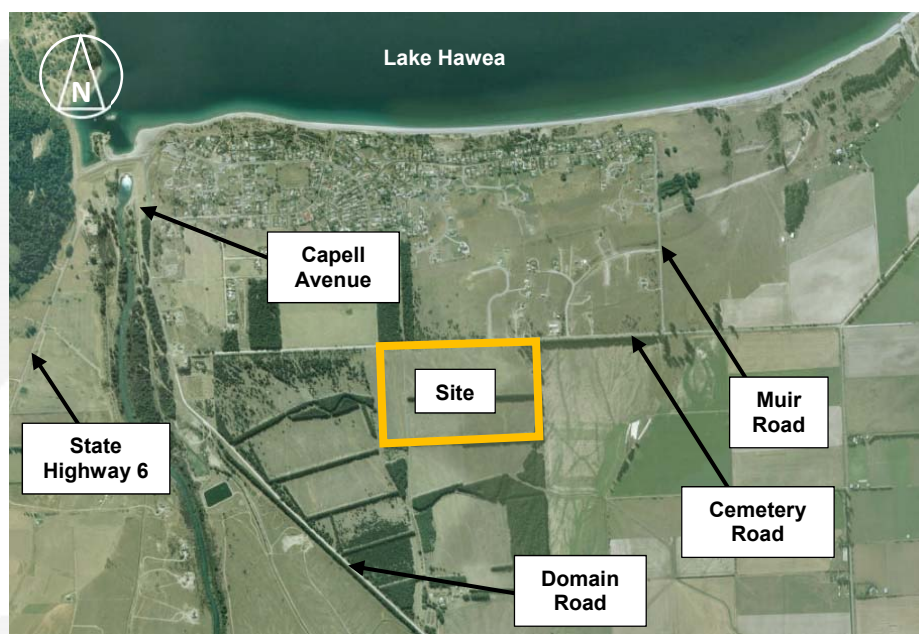


Figure 2: Aerial Photograph of Development Site and Environs



## 2.2. Road Hierarchy

- 2.2.1. The District Plan classifies State Highway 6 and Capell Avenue as Arterial Roads with a primary role of accommodating through traffic.
- 2.2.2. Cemetery Road to the east of Muir Road, and Muir Road are both Collector Roads, indicating that they “provide access to private properties fronting the road, however, the main function is to provide access to local roads” (District Plan, Objective 14.1, Explanation and Principal Reasons for Adoption). As such, they accommodate a mix of local and through traffic.
- 2.2.3. All other roads in the immediate area, including Domain Road and Cemetery Road adjacent to the site are Local Roads, and these types of road are expected to function “almost entirely as accessways to properties and are not intended to act as through routes for vehicles” (District Plan, Objective 14.1, Explanation and Principal Reasons for Adoption).

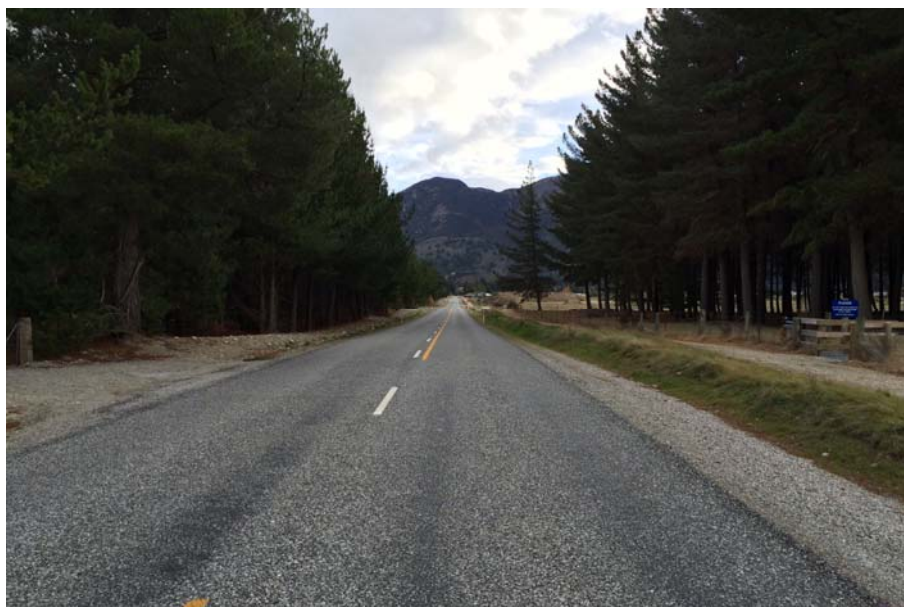




### 3. Current Transportation Networks

#### 3.1. *Roading Network*

- 3.1.1. In the vicinity of the site, Cemetery Road has a flat and straight alignment and is subject to a 70km/h speed limit (this is presently signposted as a temporary limit). The carriageway is 7m wide with a centreline marking but no edgelines. There are swales of around 2.5m on each side, and metalled shoulders. The road has relatively recently been sealed over its full length.



**Photograph 1: Cemetery Road Looking West (Site on Left)**

- 3.1.2. At its western extremity, Cemetery Road meets Domain Road at a priority ('give-way') intersection. The intersection does not have any turning lanes nor sealed shoulders to enable one vehicle to pass another. The flat and straight alignment of Domain Road in this location means that sight distances for turning traffic are excellent.



**Photograph 2: Cemetery Road / Domain Road Intersection Looking West**



- 3.1.3. Domain Road itself runs with a broadly north-south alignment. It is sealed with a 6m carriageway with 0.5m metalled shoulders, and has a centreline but no edgeline markings. In the vicinity of Cemetery Road, it is subject to a 70km/h speed limit but this decreases to 50km/h just south of Timsfield Road.



**Photograph 3: Domain Road Looking North**

- 3.1.4. At its northern end, Domain Road meets Capell Avenue at a complex priority ('give-way') intersection. This has separate traffic lanes for each turning movement and is designed in a manner that was common several decades ago whereby the various potentially conflicting movements are separated from one another.



**Photograph 4: Capell Avenue / Domain Road Intersection**

- 3.1.5. Towards the south of Cemetery Road, Domain Road turns to run in a northwest-southeast direction and connects to the district roading network further afield.
- 3.1.6. There are presently limited opportunities for vehicles to travel north-south from Cemetery Road. Sentinel Drive and Grandview Road both lie to the immediate north of the site, but



these do not provide a connection into the centre of Lake Hawea township itself. Both roads have priority controlled ('stop') intersections with Cemetery Road but do not have auxiliary turning lanes.



**Photograph 5: Cemetery Road / Sentinel Drive Intersection**

3.1.7. It is also understood that Capell Avenue will be formed in the near future as part of the Timsfield development and will connect to Cemetery Road. This will have a broadly north-south alignment and will connect to the existing formation of the road, which turns towards the west and connects to Domain Road as discussed above.

### **3.2. *Non-Car Modes of Travel***

3.2.1. There is a well-developed network of walking and cycling routes in the area. This includes a 3m wide shared walking/cycling route over the full length of the northern side of Cemetery Road, which is mostly metalled but is sealed over its eastern extremity and close to the Sentinel Park subdivision.



**Photograph 6: Cemetery Road Footpath/Cyclepath, Looking West**





- 3.2.2. This route turns northwards at the Cemetery Road / Domain Road intersection, and runs along the eastern side of Domain Road but then diverts further east to run just within the Timsfield subdivision. It then re-emerges on the eastern side of Domain Road and is elevated around the eastern side of the Capell Avenue / Domain Road intersection.



**Photograph 7: Elevated Footpath/Cyclepath on Eastern Side of Domain Road**

- 3.2.3. There are also north-south walking and cycling connections on Cemetery Road. This includes a 2m wide walking/cycling path which is located within the Capell Avenue road corridor and which connects to Cemetery Road opposite the site.



**Photograph 8: Capell Avenue Footpath/Cyclepath, At Cemetery Road**

- 3.2.4. There are also walking and cycling routes at the southern end of Isthmus Place (around 50m east of Capell Avenue) and opposite Swann Street, around 280m west of Capell Avenue. The latter is marked with 'cyclist crossing' signs on the Cemetery Road approaches, and is delineated by wooden fences on the approaches for pedestrians and cyclists.



**Photograph 9: Footpath/Cyclepath Crossing Cemetery Road Near Swann Street, Looking North**

3.2.5. No bus routes operate in the immediate area. However there is a school bus route which operates along Cemetery Road, and there is a school bus stop on the northern side of the road east of Domain Road.

### **3.3. Future Changes**

3.3.1. There are no confirmed and funded changes to the roading environment in the immediate area, other than the future formation of Capell Road as far as Cemetery Road.

3.3.2. The Timsfield and Sentinel Park subdivisions are presently underway on the northern side of Cemetery Road. These will result in an additional 500 (approximately) residential lots being formed in an area to the north and west of Capell Avenue and Cemetery Road.

## 4. Current Transportation Patterns

### 4.1. Traffic Flows

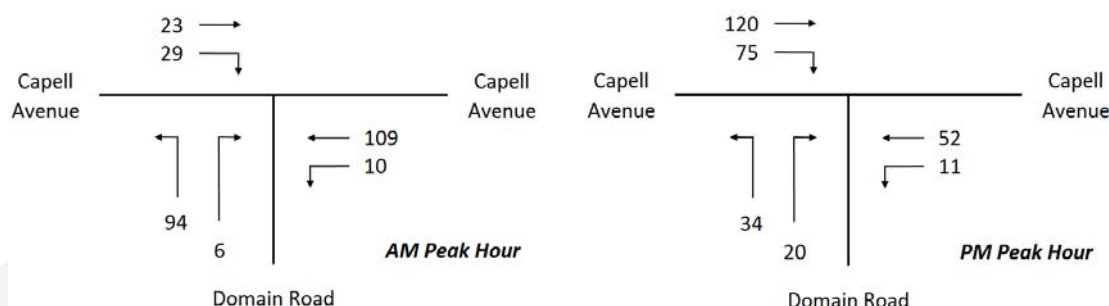
4.1.1. Queenstown Lakes District Council carries out regular traffic counts on the key vehicle routes throughout the district. The surveys show the following traffic volumes, which were observed prior to the Timsfield and Sentinel Park subdivisions being consented:

- Cemetery Road adjacent to site: 310 vehicles per day;
- Domain Road south of Capell Avenue: 900 vehicles per day;
- Capell Avenue (east of Domain Road): 1,600 vehicles per day; and
- Capell Avenue (west of Domain Road): 1,700 vehicles per day.

4.1.2. Peak hour traffic flows are generally around 10% to 15% of the daily volumes. This then indicates the following peak hour volumes prior to the Timsfield and Sentinel Park subdivisions being consented:

- Cemetery Road adjacent to site: 30-46 vehicles per hour;
- Domain Road south of Capell Avenue: 90-135 vehicles per hour;
- Capell Avenue (east of Domain Road): 160-240 vehicles per hour; and
- Capell Avenue (west of Domain Road): 170-255 vehicles per hour.

4.1.3. As part of this commission, a traffic survey was undertaken at the Capell Avenue / Domain Road intersection. The results of this are summarised below.



**Figure 3: Morning and Evening Peak Hour Volumes (2018 Observed)**

4.1.4. It can be seen that the observed peak hour volumes correspond well to those which were forecast:

- Domain Road south of Capell Avenue: 90-135 vehicles per hour forecast, 139-140 vehicles per hour observed (140 on average across both peak hours);
- Capell Avenue (east of Domain Road): 160-240 vehicles per hour forecast, 148-203 vehicles per hour observed (176 on average across both peak hours); and
- Capell Avenue (west of Domain Road): 170-255 vehicles per hour forecast, 255-281 vehicles per hour observed (268 on average across both peak hours).

4.1.5. On this basis, it is considered that the peak hour traffic flows appear to be closer to 15% of the daily flow, and that the peak hour volume on Cemetery Road should be adjusted to be 50 vehicles per hour.

4.1.6. The constructed and consented-but-not-constructed residences within the Timsfield and Sentinel Park subdivisions will result in increases in traffic volumes in the immediate area.





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.

- 4.1.7. In this case, it is understood that employment opportunities within Lake Hawea township are relatively limited, although it is reasonable to anticipate that the proximity to a workforce will attract at least some new businesses into the area. As a result, under current conditions it is likely that there is a high degree of commuting to/from the township.
- 4.1.8. Typical residential dwellings each generate 8-10 vehicle movements per day, dwellings and the lower rate has been used within this assessment to account for trip-chaining. An allowance has been made for each dwelling to generate 1 vehicle movement in the peak hours.
- 4.1.9. In the morning peak hour, it is considered that 90% of the traffic generated by the two subdivisions is likely to be exiting the subdivision, with 65% of the generated vehicle movements entering the plan change area in the evening peak hour.

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**

- 4.1.10. Because of their locations, it is considered that the bulk of vehicle movements will be associated with the northern part of Domain Road and Capell Avenue (east of Domain Road). It is also considered that 20% of the trips will be made internally within Lake Hawea township and the remaining 80% will be external.
- 4.1.11. This then suggests that the traffic flows in the area, adjusted for development that is either constructed or could be constructed as of right, would be:
- Cemetery Road adjacent to site: 50 vehicles per hour (no change);
  - Domain Road just south of Capell Avenue: 340 vehicles per hour;
  - Capell Avenue (east of Domain Road): 350-405 vehicles per hour; and
  - Capell Avenue (west of Domain Road): 455-480 vehicles per hour.
- 4.1.12. 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, the roads will provide:
- Cemetery Road: Level of Service A;
  - Domain Road (south of Capell Avenue): Level of Service B;
  - Capell Avenue (east of Domain Road): Level of Service B; and
  - Capell Avenue (west of Domain Road): Level of Service C.
- 4.1.13. All of these levels of service remain within the zone of stable flows. Further assessment shows that Cemetery Road and Capell Avenue (east of Domain Road) are both at the upper threshold for these levels of service, and that even a very small increase in traffic would result in Levels of Service B and C arising respectively.





4.1.14. The intersection that is most critical for the traffic flows expected to arise from these two subdivisions is where Domain Road meets Capell Avenue. This has been modelled using the computer software program Sidra Intersection using the observed turning volumes plus the expected traffic generation for the yet-unconstructed development, 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	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**

4.1.15. It can be seen that the intersection provides an excellent level of service with low queues and delays. This corresponds to the informal observations of queue lengths taken during the surveys.

#### **4.2. Non-Car Modes of Travel**

4.2.1. Given that the area around the site is only partially urbanised, it can reasonably be expected that it will be relatively infrequently used by pedestrians and cyclists. However volumes will be greater towards the north and within the township itself. Although no formal surveys have been undertaken, it is understood that the walking/cycling trail which uses Capell Avenue, the unformed legal road and Domain Road is used by caregivers and children travelling to/from Hawea Flat School, and is well-used by these groups.

4.2.2. The provision of off-road routes for walking and cycling means that the level of infrastructure already in place is excellent.

4.2.3. Although there are no scheduled bus services in the area, the population of Lake Hawea township is low and is not sufficient to justify a service.

#### **4.3. Road Safety**

4.3.1. The NZTA Crash Analysis System has been used to establish the location and nature of the recorded traffic crashes in the vicinity of the development site. All reported crashes between 2013 and 2017 were identified, plus the partial record for 2018, for the following sections of road:

- Cemetery Road adjacent to site;
- Domain Road from Cemetery Road to Capell Avenue; and
- Capell Avenue from Cemetery Road to the state highway.

4.3.2. This showed that there were no reported crashes in the area for this time period. The search was extended to cover the period 2007 to 2011 and again no crashes were recorded. The records therefore do not indicate any existing road safety deficiencies in the area.



## 5. Proposal

- 5.1. The proposed development is for a residential subdivision with around 400 sections. The preliminary plans show that there will also be a community hub located on Cemetery Road with residences arranged in rectangular blocks with a north-south alignment. A series of Local Roads is shown which provide connectivity to Cemetery Road to the north.

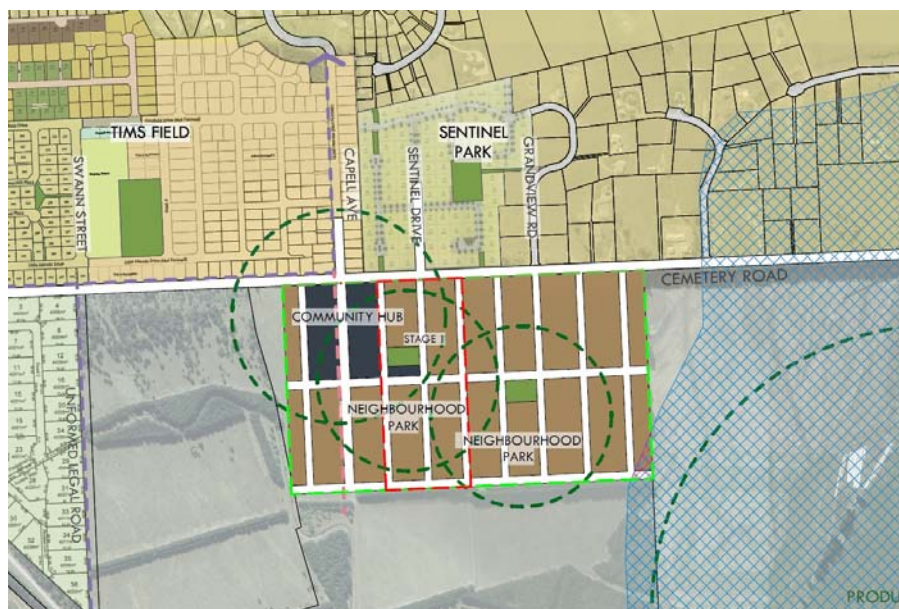


Figure 4: Indicative Subdivision Layout (Extract from Williams and Company Drawing)

- 5.2. At present it is understood that there are no confirmed plans available for the internal layout nor for the roading connections.



## 6. Traffic Generation and Distribution

### 6.1. Traffic Generation

6.1.1. The same allowances have been made for the traffic generation of the proposed development as for the Timsfield and Sentinel Park subdivisions. This leads to the following expected traffic generation:

Period	In	Out	Total
Morning Peak Hour	40	360	400
Evening Peak Hour	260	140	400
Daily	1,600	1,600	3,200

Table 3: Traffic Generation of the Proposed Development

### 6.2. Trip Distribution

6.2.1. It is considered that the bulk of vehicle movements will be associated with destinations towards the north, that is, in the direction of the facilities offered by the township and also journeys made towards the state highway. By way of comparison, towards the south the land is dominated by rural residential lots and agricultural uses, meaning that few trips will be made in this direction. There are also very limited opportunities to cross the Hawea River meaning trips towards the west are considerably constrained.

6.2.2. It is also considered that 20% of the trips will be made internally within Lake Hawea township and the remaining 80% will be external.

6.2.3. Drivers typically tend to choose the route which is the fastest, but in this case there is no clear preferred route. On this basis it is considered that:

- 50% of vehicles will travel to/from the north using the internal local roads and Capell Avenue (once formed); and
- 50% of vehicles will travel to/from the north using the internal local roads and Cemetery Road / Domain Road.



## 7. Effects on the Transportation Networks

### 7.1. Rooding Network Capacity

7.1.1. Allowing for the traffic generation figures and distribution noted previously, the proposed development would result in the following increases on the adjacent rooding network when fully developed:

Location	Traffic Volumes					
	Peak Hour			Daily		
	Current	Additional	Total	Current	Additional	Total
Cemetery Road	50	160	210	310	1,280	1,590
Domain Road south of Capell Avenue	340	160	500	2,500	1,280	3,780
Capell Avenue east of Domain Road	350-405	160	510-565	3,200	1,280	4,480
Capell Avenue west of Domain Road	455-480	320	775-800	3,300	2,560	5,860

**Table 4: Anticipated Changes in Traffic Volumes**

7.1.2. The Austroads Guide to Traffic Management Part 3 (*Traffic Studies and Analysis*) has again been used to assess the level of service allowing for the traffic generated by the subdivision. This shows that the roads will provide:

- Cemetery Road: Level of Service B;
- Domain Road (south of Capell Avenue): Level of Service C;
- Capell Avenue (east of Domain Road): Level of Service C; and
- Capell Avenue (west of Domain Road): Level of Service D.

7.1.3. The levels of service change as a result of the proposed development, and are one level lower than under the prevailing volumes. However they all remain within the zone of stable flow. Further, as noted previously, any development which led to even very small increases in traffic volumes on Cemetery Road and Capell Avenue (east of Domain Road) would result in Levels of Service B and C arising respectively, as is the case under the proposal.

7.1.4. The Capell Avenue / Domain Road intersection has been remodelled using the computer software program Sidra Intersection, using the development-related traffic flows, 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	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 5: Peak Hour Levels of Service at the Capell Avenue / Domain Road Intersection with Development**





- 7.1.5. It can be seen that queues and delays at the intersection remain low.
- 7.1.6. It is possible that the existing formation of a number of intersections within the township will need to be upgraded to accommodate the increased traffic flows arising from the various subdivisions. The timing of any such schemes will depend on the staging/timing of development within each subdivision, which can be expected to vary in response to market demands and other factors. Moreover each subdivision will contribute only in part to the need for any intersection improvements. However, the legal road widths available mean that there are no reasons why layouts which will meet current design guides could not be achieved. As such, the potential for future intersection upgrades is not considered to represent a constraint to development.

## **7.2. *Non-Car Modes of Travel***

- 7.2.1. It is likely that the development will lead to increased volumes of walking and cycling in the area, particularly to and from the township centre. However as noted above, the levels of infrastructure in the area for walking and cycling are already excellent.
- 7.2.2. There is likely to be a desire line between the site and the Capell Avenue extension, and this could be accommodated through providing a formal crossing point on Cemetery Road. For consistency, this could be constructed in the same manner as the crossing point near Swann Street, and there is sufficient space within the road reserve for this to occur.

## **7.3. *Road Safety***

- 7.3.1. The crash history in the vicinity of the site indicates that there are no particular features or factors that would be affected by the proposed development. The flat and straight nature of the roads means that sightlines are excellent, and any upgrades to intersections can be expected to be carried out to meet current standards/guides due to the wide legal road reserves.





## 8. District Plan Matters

- 8.1. The District Plan sets out a number of transportation-related Site Standards with which any development is expected to comply. An assessment of the proposed development against these has been undertaken, but as the site is presently undeveloped, there are no reasons why (at this stage) full compliance will not be achieved.
- 8.2. The potential exception to this relates to the separation distance between vehicle crossings and intersections (Site Standard 14.2.4.2vi). As the speed limit of Cemetery Road is 70km/h, a separation of 25m is required between a crossing and an intersection, which is typically difficult to achieve in many cases. However this depends on the pattern of the lots.
- 8.3. The site cannot be subdivided as of right under the District Plan, and thus if there are any non-compliances which arise through the detailed design process, the effects of these can be assessed when subdivision consent is applied for.
- 8.4. Similarly, full compliance with the Council's Subdivision Code with regard to the internal roading layout (Site Standard 14.2.4.1vi) is also likely to be achieved. However any deviations from this can be assessed when future consents are sought.
- 8.5. In the event that any existing roads need to be upgraded to meet the Council's Subdivision Code, there is sufficient width within the legal road reserve to achieve this.
- 8.6. The presence of an increased number of intersections on Cemetery Road may also mean that a reduction in the speed limit is justified. This is outside the scope of a subdivision (and in fact falls under different legislation to the Resource Management Act), but could be explored with the Council in due course.



## 9. Conclusions

- 9.1. This high-level report has identified, evaluated and assessed the various transport and access elements of a proposed 400-lot subdivision to the immediate south of Lake Hawea township. Overall it is considered that the traffic generated by the development is likely to be accommodated on the adjacent roading network without capacity or efficiency issues arising that are more than minor, even when allowing for traffic associated with the Timsfield and Sentinel Park subdivisions. Forecast queues and delays at the intersection which is the most likely to experience the greatest increase in traffic flows (Capell Avenue / Domain Road) remain low.
- 9.2. The crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal and the sight distances available for vehicles turning to or from the site are appropriate for the prevailing speeds.
- 9.3. The site layout may potentially have a non-compliance with the District Plan in respect of the separation of vehicle crossings and intersections, but this can be addressed once the layout is finalised and when subdivision consent is sought. There may also be a case for reducing the speed limits, but this is outside the scope of a subdivision (and in fact falls under different legislation to the Resource Management Act).
- 9.4. There may be a requirement to improve existing roads in the area to meet the Council's Subdivision Code as a result of increased traffic flows arising from the proposed development and also the traffic associated with the Timsfield and Sentinel Park subdivisions. However the legal widths are sufficient to enable this to occur. The need for any upgrades depends on a number of factors, notably the timing of the development of the various subdivisions.
- 9.5. Overall, and subject to the preceding comments, the proposed development can be supported from a traffic and transportation perspective.

Carriageway Consulting Limited  
May 2018