River Terrace Developments Limited

Proposed Plan Change Cromwell

Transportation Assessment

CARRIAGEWAY CONSULTING
traffic engineering | transport planning

Table of Contents

Main Report

Photographs

Figures

Tables

CCL file reference	14326 cromwell ta draft 1.docx
Status	Draft 2
Issued	14 December 2017

1. Introduction

1.1. River Terrace Developments Limited is requesting a private plan change to the operative Central Otago District Plan to rezone land i the western part of Cromwell for residential purposes. If approved, the plan change area ("*the site*") would be able to accommodate around 840 residential properties (comprising of approximately 690 residential lots plus 150 retirement village villa units). As is common with a plan change, the exact number of units will only be determined at the time of subdivision.

1.2. This Transportation Assessment sets out a detailed analysis of the transportation issues associated with the proposed plan change including changes in travel patterns that are likely to arise when the site is fully developed. Where potential adverse effects are identified, ways in which these can be addressed are set out.

1.3. This report is cognisant of the guidance specified in the New Zealand Transport Agency's '*Integrated Transport Assessment Guidelines'* and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered.

2. Site Overview

2.1. Location

2.1.1. The site is located to the immediate west of Sandflat Road and south of State Highway 6, approximately 3.3km to the southwest of Cromwell town centre. The site is zoned part Rural Resource Area and part Rural Residential Resource Area in the Central Otago District Plan ('*District Plan*') and is currently used for agricultural purposes.

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.

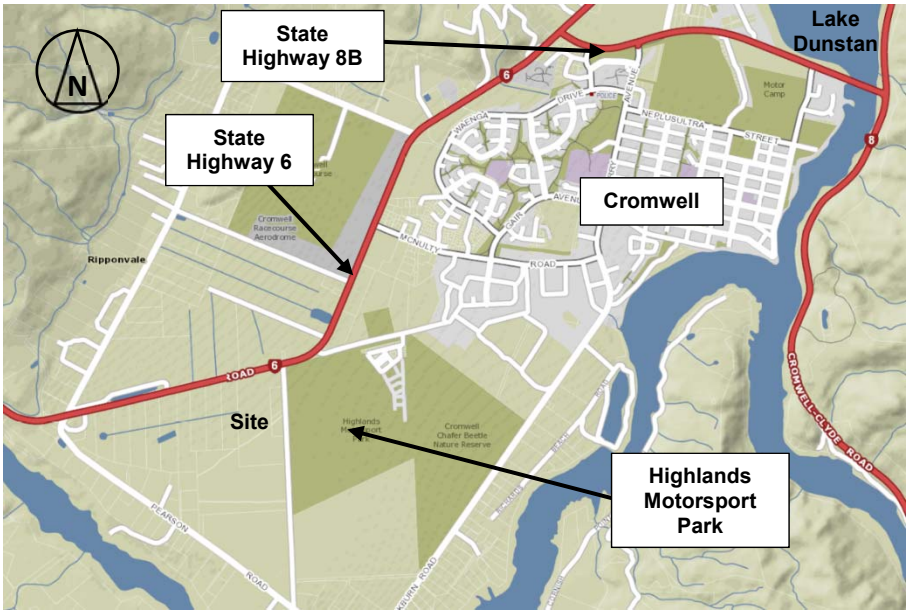


Figure 1: General Location of Plan Change Area

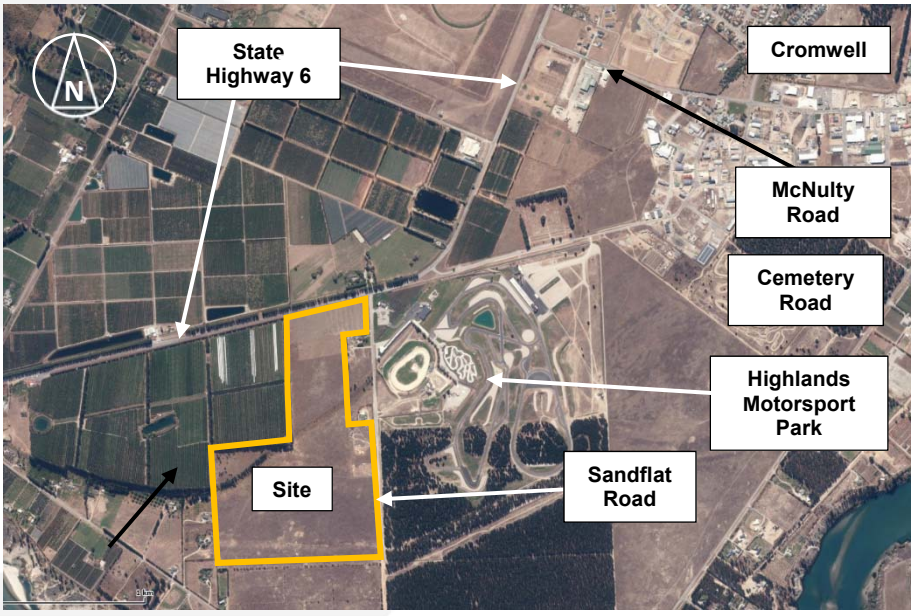


Figure 2: Aerial Photograph of Plan Change Area and Environs

2.2. Roading Classification

2.2.1. The District Plan classifies State Highway 6 to the north of the site as a Rural State Highway. McNulty Road is classified as an Urban Arterial Road, with Sandflat Road and Cemetery Road being classified as Rural Local Roads.

2.2.2. On this basis, it is reasonable to conclude that the primary role of the highway is to carry through traffic, with the balance of the roads providing for local journeys and property access. As a general principle then, it would seem reasonable that any direct access between the site and the state highway should be avoided if possible.

3. Current Transportation Networks

3.1. Roading Network

3.1.1. Sandflat Road has a straight horizontal alignment and over its northernmost section has a flat vertical alignment also. It provides one traffic lane in each direction, with a carriageway width of 6.5m and it has a speed limit of 100km/h. There is a centreline but no edgeline markings. At the very northern end, Sandflat Road serves the entrance to Highlands Motorsports Park, and the carriageway in this location has been widened to 12.5m to facilitate access to that facility.

Photograph 1: Northern End of Sandflat Road, Looking South

Photograph 2: Sandflat Road South of Highlands Motorsports Park, Looking South

3.1.2. Approximately 360m south of its intersection with State Highway 6, there is a crest curve in Sandflat Road, where the road descends towards the south. However there are no 'no

overtaking' restrictions marked in this location, indicating that forward sight distances remain appropriate.

Photograph 3: Crest Curve in Sandflat Road 360m South of State Highway 6, Looking South

3.1.3. There is a second crest curve 550m south of State Highway 6, and 50m south of this Sandflat Road becomes unsealed although the carriageway width remains at 6.5m. The southern portion of Sandflat Road is flat and straight until it meets Pearson Road some 1.2km further south.

Photograph 4: End of Seal in Sandflat Road, Looking North

3.1.4. At its northern end, Sandflat Road meets State Highway 6 at a priority intersection which has auxiliary right-turn lanes for traffic turning right into Sandflat Road and right into Papillon (furniture and handmade gifts workshops) which lies on the northern side of the highway, opposite the motorsport park.

Photograph 5: State Highway 6 / Sandflat Road Intersection

3.1.5. In this location State Highway 6 is subject to a 100km/h speed limit and has traffic lanes of 3.5m width. It has a flat vertical profile, and to the west of Sandflat Road has a straight horizontal alignment but to the east of Sandflat Road the highway curves towards the north although the curve has a large radius and traffic does not need to slow to negotiate it. The sight distance towards the left for drivers exiting Sandflat Road is approximately 300m, and towards the right, the sight distance is 285m (to slightly beyond the State Highway 6 / Cemetery Road intersection).

Photographs 6 and 7: Sight Distances to the Left and Right at Sandflat Road

3.1.6. No formal left-turn lanes are provided at the intersection. However towards the east of Sandflat Road is a 3.8m wide sealed shoulder which enables drivers to move out of the westbound through traffic lane of the highway to slow down before turning left. This widened shoulder runs the full length of the highway between Sandflat Road and Cemetery Road.

Photograph 8: Wide Shoulder on Southern Side of Highway (Looking West towards Sandflat Road)

3.1.7. Towards the east of Sandflat Road, the alignment of State Highway turns to have a more north-south orientation, and Cemetery Road meets the highway on the outside of the curve around 270m east of Sandflat Road. The State Highway 6 / Cemetery Road intersection is 'give-way' controlled, and does not have any auxiliary lanes for turning traffic. However there is a widened shoulder of 3m on each side of the highway which can be used by vehicles to move out of the through traffic lanes before turning.

Photograph 9: State Highway 6 / Cemetery Road Intersection, Looking North

3.1.8. The highway then runs with a flat and straight alignment, and 1km north of Cemetery Road meets McNulty Road at a priority intersection. This intersection has auxiliary lanes for each turning movement to and from the highway, with flush (painted) islands to assist drivers turning left into and left from McNulty Road.

Photograph 10: State Highway 6 / McNulty Road Intersection, Looking North

3.1.9. Due to the flat and straight alignment of the highway, sight distances in each direction for drivers emerging from McNulty Road are excellent.

3.1.10. McNulty Road provides a route into the southern parts of Cromwell from where all parts of the town can be accessed. It has a largely flat and straight alignment, and a speed limit of 70km/h over the first 500m from State Highway 6, reducing to 50km/ to the east of this. The carriageway is 6.5m wide with wide gravelled shoulders on each side.

Photograph 11: McNulty Road, Looking East

3.1.11. Some 2km north of McNulty Road, State Highway 8B joins State Highway 6 from the east. This is a short section of highway which has an east-west alignment and forms the connection between State Highways 6 and 8. The State Highway 6 / State Highway 8B is constructed as a high-capacity priority intersection with two approach lanes on State Highway 8B, and a long left-turn lane and raised deflection island for vehicles travelling from north to east. There is also an auxiliary lane for vehicles turning right from south to east.

3.2. Future Changes

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

4. Current Transportation Patterns

4.1. Traffic Flows

4.1.1. The New Zealand Transport Agency ("*NZTA*") carries out regular traffic counts on the state highway network. The closest count site on the state highway is site 00600947 which is located to the south of the State Highway 6 / State Highway 8B intersection. In 2015, the last year which is available, the highway had an Annual Average Daily Traffic of 3,890 vehicles (two-way). By way of a check on this, the traffic counter in the Gibbston Valley carried an almost-identical traffic flow, which is as would be expected due to the lack of development and roading connections for vehicles to leave or join the highway between the two locations. It can therefore be concluded that the recorded data represents the traffic flows past the site.

4.1.2. The survey station counts data continuously, and the following graph shows a breakdown of the daily flows for the past 12 months:

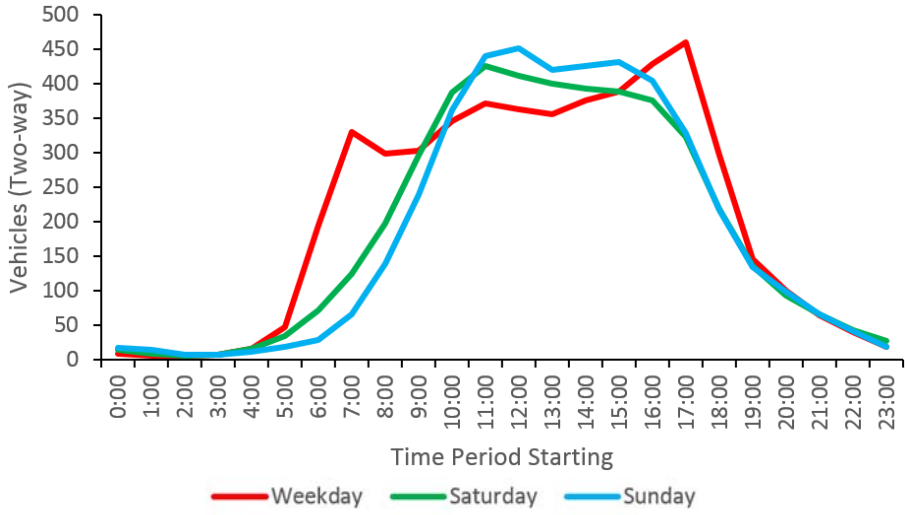


Figure 3: Traffic Flows on State Highway 6

4.1.3. As shown above, the weekday traffic flows display a morning and evening peak hour. The average recorded traffic flows were:

- Morning peak hour, 7am to 8am: 254 vehicles southbound, 77 vehicles northbound; and
- Evening peak hour, 5pm to 6pm: 171 vehicles southbound, 290 vehicles northbound

4.1.4. This indicates a tidal flow on the highway, towards the direction of Queenstown in the morning and away from Queenstown in the evening. Other surveys in the area have indicated a similar direction of travel.

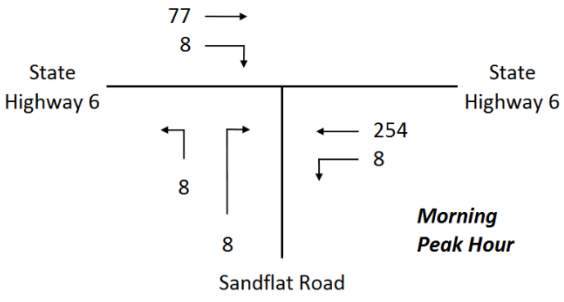
4.1.5. The data also shows that the traffic flows during the weekend are relatively high, and approach that of the weekday evening peak. This pattern of traffic flows is typical of a highway carrying recreational traffic. Further evidence of recreational traffic is shown in the seasonality of the highway. The average daily traffic volume during the summer months (December, January and February) was 5,634 vehicles (two-way), compared to 4,190 vehicles (two-way) during June, July and August, some 25% lower.

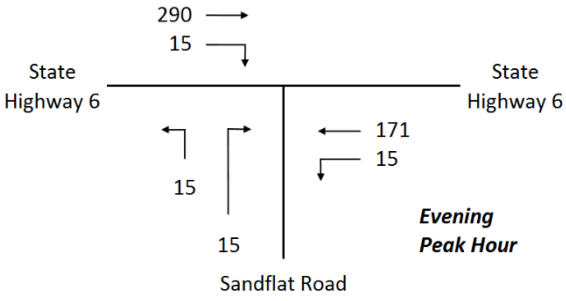
4.1.6. State Highway 8B towards the immediate east of its intersection with State Highway 6 carried an Annual Average Daily Traffic of 5,930 vehicles (two-way) in 2015.

4.1.7. The NZTA Crash Analysis System ("*CAS*") includes details of traffic flows on district roads obtained from council RAMM databases. This shows that Sandflat Road carries around 100 vehicles per day with Cemetery Road carrying about 50 vehicles per day and McNulty Road carrying 1,850 vehicles per day. A road typically carries 10% to 15% of its daily flow in the peak hours, meaning that the peak hour flows on Sandflat Road and Cemetery Road are very low (5 to 15 vehicles (two-way)) but with peak hour volumes of 200 to 250 vehicles on McNulty Road.

4.1.8. The northernmost part of Sandflat Road will be affected by the presence of the Highlands Motorsports Park. Surveys carried out in 2015 showed that two thirds of all vehicles using the northernmost part of Sandflat Road at weekends were associated with the motorsport park. Surveyed peak hour volumes on this part of Sandflat Road were around 60 vehicles (two-way) during weekends.

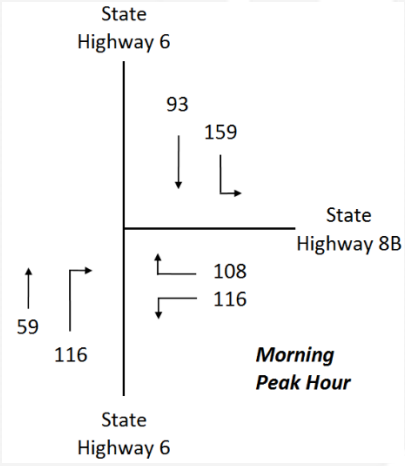
4.1.9. No formal traffic surveys have been carried out at the State Highway 6 / Sandflat Road intersection due to the existing low volumes of traffic. However, it is possible to reliably synthesize the turning movements by taking into account the directional flows recorded by the NZTA traffic counter and the observed traffic flows at Highland Motorsports Park. This gives the following turning volumes:

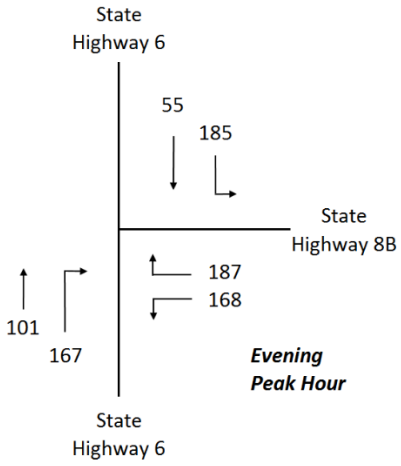




Figures 4 and 5: Peak Hour Traffic Flows at the State Highway 6 / Sandflat Road Intersection

4.1.10. Although no surveys have been carried out at the State Highway 6 / McNulty Road intersection, turning volumes are available for the State Highway 6 / State Highway 8B intersection further north. Since the traffic volumes on State Highway 8B are three times those on McNulty Road, and the traffic flows on State Highway 6 are similar to those at McNulty Road, it can be concluded that the performance of the State Highway 6 / McNulty Road will be at least as good, and most likely better than, that of the State Highway 6 / State Highway 8B intersection.





Figures 6 and 7: Peak Hour Traffic Flows at the State Highway 6 / State Highway 8B Intersection

4.1.11. The performance of both intersections has been modelled using the computer software package Sidra Intersection, 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
Sandflat Road	L	9.3	0	A	8.7	0	A
	R	9.6	0	A	10.8	0	A
State Highway 6 (east)	L	7.9	0	A	7.9	0	A
State Highway 6 (west)	R	8.6	0	A	8.3	0	A

Table 1: Performance of State Highway 6 / Sandflat Road Intersection (No Plan Change)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (south)	R	7.2	1	A	7.1	1	A
State Highway 8B	L	6.9	1	A	6.7	1	A
	R	8.6	1	A	9.6	1	A
State Highway 6 (north)	L	8.1	1	A	8.4	1	A

Table 2: Performance of State Highway 6 / State Highway 8B Intersection (No Plan Change)

4.1.12. It can be seen that the intersections currently provide an excellent level of service with low queues and delays.

4.1.13. Between 2010 and 2015 (the last year for which data is available), traffic growth on State Highway 6 was 4.6% per annum (expressed as a percentage of the 2010 volume). This equates to an increase of 145 additional vehicles per day using the highway, on average.

4.2. Non-Car Modes of Travel

4.2.1. Given that the area is predominantly rural at present, it can reasonably be expected that pedestrian and cyclist numbers will be relatively low and predominately associated with recreational travel. In view of this, it is considered that the current levels of infrastructure provided for both pedestrians and cyclists are appropriate.

4.2.2. There are no regular bus services that pass the site. Although several longer-distance services pass nearby on the highway, there are no bus stops provided within walking distance.

4.3. Road Safety

4.3.1. The NZTA Crash Analysis System has been used to establish the location and nature of the recorded traffic crashes in the vicinity of the site. All reported crashes between 2012 and 2016 were identified, plus the partial record for 2017, for the following sections of road:

- Sandflat Road (full length);
- State Highway 6, from 100m west of Sandflat Road to 100m east of McNulty Road;
- McNulty Road, from State Highway 6 to 100m east of the highway; and
- Cemetery Road, from State Highway 6 to 100m east of the highway.

4.3.2. This showed that there were four reported crashes in the area.

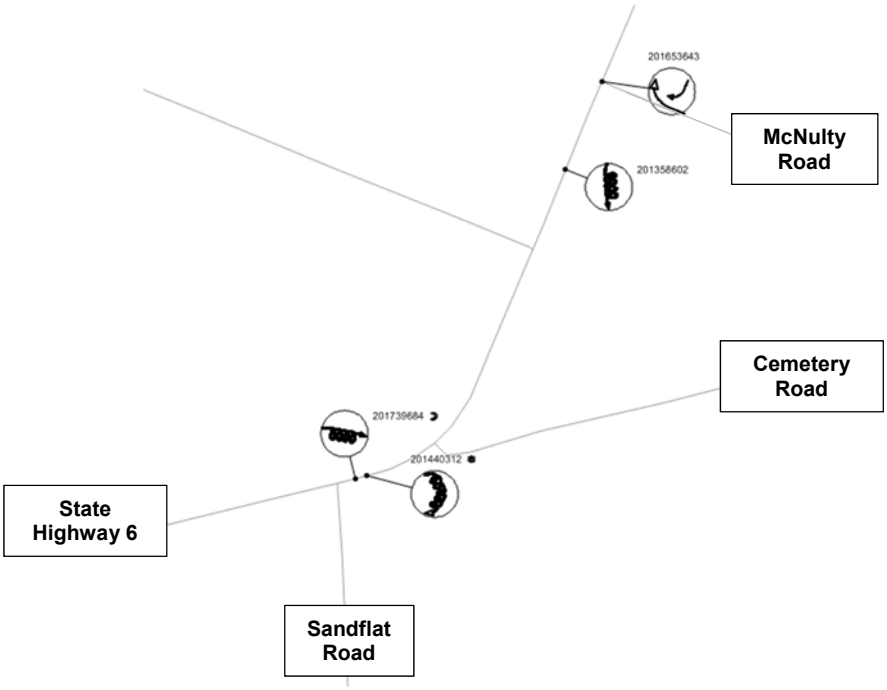


Figure 8: Location and Type of Reported Crashes

4.3.3. No crashes occurred on Sandflat Road or Cemetery Road. In view of the low traffic flows on these roads a further assessment was undertaken for 2007 to 2011 but again no crashes were recorded.

4.3.4. Three crashes have occurred on State Highway 6, and all involved just one vehicle where the driver left the road. One occurred when a southbound driver skidded in fog and black ice. One occurred when a driver was showing off and having completed two 'donuts' then lost control. One occurred when a southbound driver fell asleep. None of these crashes resulted in any injuries.

4.3.5. One crash occurred at the State Highway 6 / McNulty Road intersection, when a truck turning right into McNulty Road and cut the corner, hitting a vehicle that was stationary at the limit line. It did not result in any injuries.

4.3.6. Based on the prevailing crash record, it is not considered that there are any inherent deficiencies in the roading network in the vicinity of the site.

5. Potential Development within the Plan Change Area

5.1. The proposed plan change will facilitate the development of around 690 residential dwellings plus a retirement village of around 140 units. Since the proposal is for a plan change, the exact number of units will be determined at the time of subdivision.

5.2. An indicative masterplan has been prepared and this has been used to identify the likely effects and outcomes of the plan change. This shows that access is proposed to be provided by Sandflat Road only, with no access provided onto the highway. A total of six roading connections are proposed, but no lots will have direct access onto Sandflat Road. A network of internal roads is also proposed.

Figure 9: Indicative Site Layout (Extract from Jasmax Drawing 'Live Masterplan' Dated 16 October 2017)

5.3. The layout also shows that walking and cycling connections can be facilitated through the site, including via greenways which run north-south within the site in addition to provision made within the road reserve. The road cross-sections are discussed in more detail subsequently.

6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. The site is presently undeveloped and therefore has negligible traffic generation.

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

6.1.3. In this case, it is likely that some traffic will be associated with employment locations in Queenstown but there is also likely to be travel to/from local destinations also. Accordingly, for this analysis a rate of 8 vehicle movements per day per residence has been used, with 1 vehicle movement per residence occurring in each of the peak hours.

6.1.4. An allowance has been made for each dwelling to generate 1 vehicle movement in the peak hours. In the morning peak hour, 90% of these are likely to be exiting the development, with 65% of the generated vehicle movements entering the development site in the evening peak hour.

6.1.5. With regard to the retirement units, occupants have less need to travel at peak times and thus the traffic generation rates are lower. Based on the traffic generation characteristics of other retirement villages, it is anticipated that the villas will each generate 2 vehicle movements per day (allowing for both residents and guests). Of these, 20% of vehicle movements (0.4 movements per villa) will occur in the peak hours.

6.2. Trip Distribution

6.2.1. Ultimately the extent of movements that are made externally to Cromwell will depend on the amount of employment and community services provided locally, and this cannot be confirmed at present as it is likely to change as the extent of development in the town and the number of residents increases. For the purposes of this assessment, an allowance has been made for 25% of peak hour movements to be wholly within the town (such as for employment, travel to school and travel to community facilities) and for the remaining 75% of movements to be external.

6.2.2. It is considered that the bulk of external vehicle movements will be associated with destinations towards the west, that is, in the direction of Queenstown, although there will be a smaller proportion towards the north (towards Wanaka) and east (towards Alexandra). For this assessment, 80% of external travel has been assumed to be towards Queenstown with 10% towards Wanaka and 10% towards Alexandra.

6.2.3. With regard to the routes that these vehicles will use:

- Travel to/from the direction of Queenstown will be via Sandflat Road and State Highway 6 (west);
- Travel to/from the direction of Wanaka will be via Sandflat Road and State Highway 6 (east); and

- Travel to/from the direction of Alexandra will be via Sandflat Road and State Highway 6 (east).

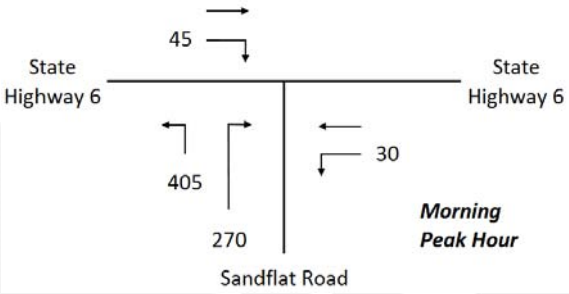
6.2.4. There are several routes that could be used to travel into Cromwell and in practice the route that is selected will depend on where the person wishes to go and where they live within the site. However drivers tend to choose the fastest route, and in this regard:

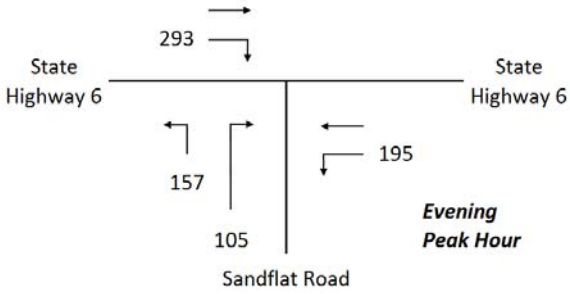
- A route between the site and town centre via Sandflat Road (south), Pearson Road and Bannockburn Road is approximately 6.4km long;
- A route between the site and town centre via Sandflat Road (north), State Highway 6 and Cemetery Road is approximately 5.0km long;
- A route between the site and town centre via Sandflat Road (north), State Highway 6 and McNulty Road is approximately 5.2km long;
- A route between the site and town centre via Sandflat Road (north), State Highway 6 and State Highway 8B is approximately 5.0km long.

6.2.5. While the route via Cemetery Road is slightly shorter than via McNulty Road, it involves negotiating several sharp curves, and yielding to traffic on McNulty Road. Conversely, the route via State Highway 6 and McNulty Road involves higher speed roads and drivers only need to give-way at the State Highway 6 / McNulty Road intersection. This means that this route is around 10% faster than travelling via Cemetery Road.

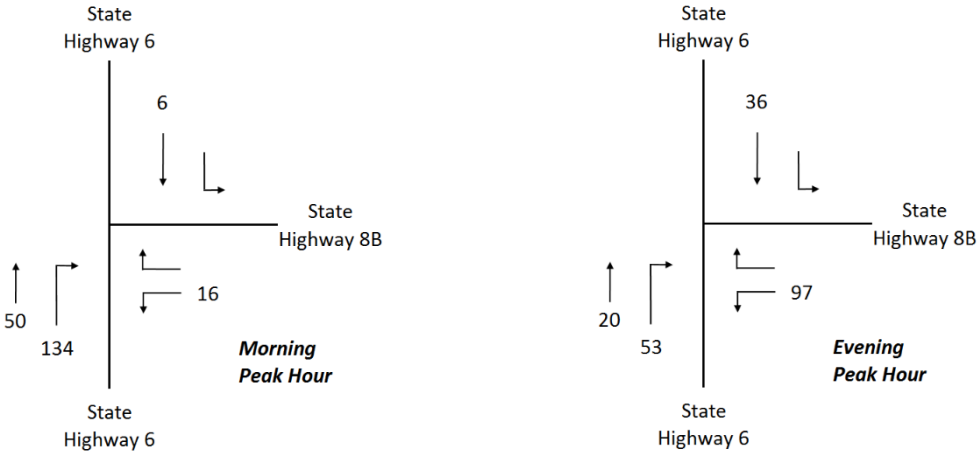
6.2.6. However the route via State Highway 6 and 8B is the shortest and fastest for travel. Accordingly, it is considered that this is the route most likely to be used, but that McNulty Road will be the preferred route for drivers travelling towards the south of the town centre. The traffic has been divided equally between these two routes.

6.2.7. This gives the following turning volumes generated by the site at maximum development of the site:





Figures 10 and 11: Peak Hour Traffic Flows Generated by the Site at the State Highway 6 / Sandflat Road Intersection



Figures 12 and 13: Peak Hour Traffic Flows Generated by the Site at the State Highway 6 / State Highway 8B Intersection

7. Effects on the Transportation Networks

7.1. Intersection Capacity

7.1.1. The performance of the State Highway 6 / Sandflat Road and State Highway 6 / State Highway 8B intersections have been remodelled using the computer software package Sidra Intersection. For this, and in accordance with best practice, ten years of ambient traffic growth has been applied to the existing traffic flows on the highways. The results are summarised below, and use the existing geometries of the intersections.

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
Sandflat Road	L	12.8	4	B	9.5	1	A
	R	14.7	3	B	25.1	2	D
State Highway 6 (east)	L	7.9	0	A	7.9	0	A
State Highway 6 (west)	R	9.3	0	A	9.9	1	A

Table 3: Performance of State Highway 6 / Sandflat Road Intersection (With Plan Change)

Road and Movement		Morning Peak Hour			Evening Peak Hour		
		Avg Delay (secs)	95 %ile Queue (veh)	Level of Service	Avg Delay (secs)	95 %ile Queue (veh)	Level of Service
State Highway 6 (south)	R	7.5	1	A	7.4	1	A
State Highway 8B	L	7.3	1	A	7.1	1	A
	R	14.0	2	B	22.4	6	C
State Highway 6 (north)	L	9.7	2	A	9.7	2	A

Table 4: Performance of State Highway 6 / State Highway 8B Intersection (With Plan Change)

7.1.2. The analysis shows (unsurprisingly) that the queues and delays increase when the site is fully developed. However they remain relatively low (less than 30 seconds for the highest delay) and queues remain modest.

7.1.3. In recent times, NZTA has sought to ensure that Level of Service C is provided on state highway intersections in the peak hours. This is achieved at the State Highway 6 / State Highway 8B intersection, but Level of Service D is provided at the State Highway 6 / Sandflat Road intersection.

7.1.4. The transition between Level of Service C and D occurs at a delay of 25 seconds, and the model forecasts that the delay is only slightly greater than this. The difference (just 0.1 seconds) is within the margin of error for the forecasts and would be resolved if only one less vehicle turned right at the intersection in the evening peak hour.

7.1.5. It is therefore considered that in practice, both intersections have sufficient capacity to accommodate the traffic generated by development of the plan change area.

7.1.6. As noted above, the traffic flows passing through the State Highway 6 / McNulty Road intersection are less than those at the State Highway 6 / State Highway 8B intersection. Accordingly, it can be concluded that queues and delays at this intersection will also remain low even when traffic generated by the site is present.

7.2. Non-Car Modes of Travel

7.2.1. Development of the site is likely to result in increased levels of walking and cycling in the immediate area. However the distance from the site to the town centre and other potential destinations is such that the bulk of these non-car movements will be made internal to the site rather than on the external networks. Consequently, it is not considered that any additional infrastructure is required for pedestrians or cyclists on the frontage roads.

7.2.2. The size of the development facilitated by the plan change request is not sufficient that it will give rise to the need for a public transport service.

7.3. Road Safety

7.3.1. In view of the excellent road safety record on the road network adjacent to the site, it is not considered that the additional traffic is likely to give rise to any road safety concerns. The intersections are designed to meet current standards and at those which are the most affected by turning movements have excellent sight distances for drivers on each approach.

7.3.2. The Austroads Guide to Road Design Part 4A ('*Unsignalised and Signalised Intersections*') sets out warrants for when auxiliary turning lanes are required. Taking into account the expected future traffic flows, a left-turn deceleration lane is justified at the State Highway 6 / Sandflat Road intersection. This is triggered when the site has around 40 residences developed and generating traffic. However the lane is partially formed at present, and therefore only minor works will be required to formalise this (in effect, simply marking the lane and potentially undertaking some very minor widening to form a sealed shoulder).

7.3.3. There are no warrants for a left-turn acceleration lane but the Austroads Guide notes that it is generally required when left-turning traffic flows reach 300 vehicles in the peak hour. The Figures shown above show that in the morning peak hour, at full site development 405 vehicles are expected to turn left, exceeding this threshold. Accordingly it is considered that a left-turn acceleration lane should be provided when 75% of the plan change area has been developed.

7.3.4. The provision of the acceleration lane will require the relocation of the powerpoles on the southern side of the highway (as can be seen in Photograph 5 above). From information provided, there is a distance of 5.9m between the existing edge of the traffic lane and the site boundary (although it is noted that cadastrals show a greater separation of around 10m). If the information provided is correct, this means that even if the powerpoles were moved adjacent to the site boundary, there would be a separation of only 2.4m between the edge of the acceleration lane and the poles. It is unlikely that this would be acceptable to NZTA since if a driver lost control within the acceleration lane, they would be unable to recover their vehicle before striking a pole. It is recommended that in this instance, specific crash protection is provided for the poles and that they are set back behind a crash barrier.

8. Potential Site Layout

8.1. Road Widths

8.1.1. When considering subdivision, Central Otago District Council adopts Standard NZS4404:2004, as amended to reflect local practices[1]. This sets out the following:

Type of Road	Road Characteristics					
	Number of Units Served	Road Reserve Width	Parking Lane	Traffic Lanes	Cycling	Footpath
Cul de sac	Up to 20	12m	1 lane, 2.5m wide	1 lane, 3.5m wide	n/a	1 path, 1.5m wide
Local Road	21-150	20m	1 lane, 2.5m wide	2 lanes, 3.0m wide	n/a	2 paths, 1.5m wide
Collector Road	150-450	20m	2 lanes, 2.5m wide	2 lanes, 3.5m wide	2 lanes, 1.0m wide	2 paths, 1.5m wide

Table 5: Roading Standards of Central Otago District Council

8.1.2. It is understood that a different regime for road widths is to be proposed as part of the plan change request, and the plans provided show the following provisions are proposed:

Type of Road	Road Characteristics				
	Road Reserve Width	Parking Lane	Traffic Lanes	Cycling	Footpath
A (Primary)	25m	2 lanes, 2.5m wide	2 lanes, 4.2m wide	3m shared cycleway	2 paths, 2.0m and shared 3.0m
B (Secondary)	16m	1 lane, 2.5m wide	2 lanes, 2.85m wide	n/a	2 paths, 1.5m wide
C (Neighbourhood)	12m	Within movement lane	2 lanes, 2.85m wide	N/a	2 paths, 1.5m wide
Greenway	20m	No	No	3.5m shared	3.5m shared

Table 6: Proposed Roading Cross-Sections

8.1.3. It can be seen that there are differences between the Council's Subdivision Code and the proposed road cross-sections. This primarily arises because the Council's provisions are based on a 2004 version of Standard NZS4404 (albeit with Council amendments made in 2008), whereas this Standard was wholly revised and updated in 2010, with the 2004 version being withdrawn. One particular aspect of the revision was to "*encourage sustainable development and modern design that emphasizes liveability and environmental quality*" and that a key change from the 2004 version of the Standard is "*that road design needs to allow 'context' or 'place' to be given significant emphasis and to require roads to achieve safe (slower) operating speeds*" (Standard NZS4404:2010, Introduction).

8.1.4. The proposed roads within the plan change area are fully compliant with Standard NZS4404:2010 and it is considered that this creates an appropriate level of provision for all road users within a specific roading hierarchy.

[1] http://www.codc.govt.nz/SiteCollectionDocuments/Policies/Regulatory/Engineering%20Standards%20Policy.pdf

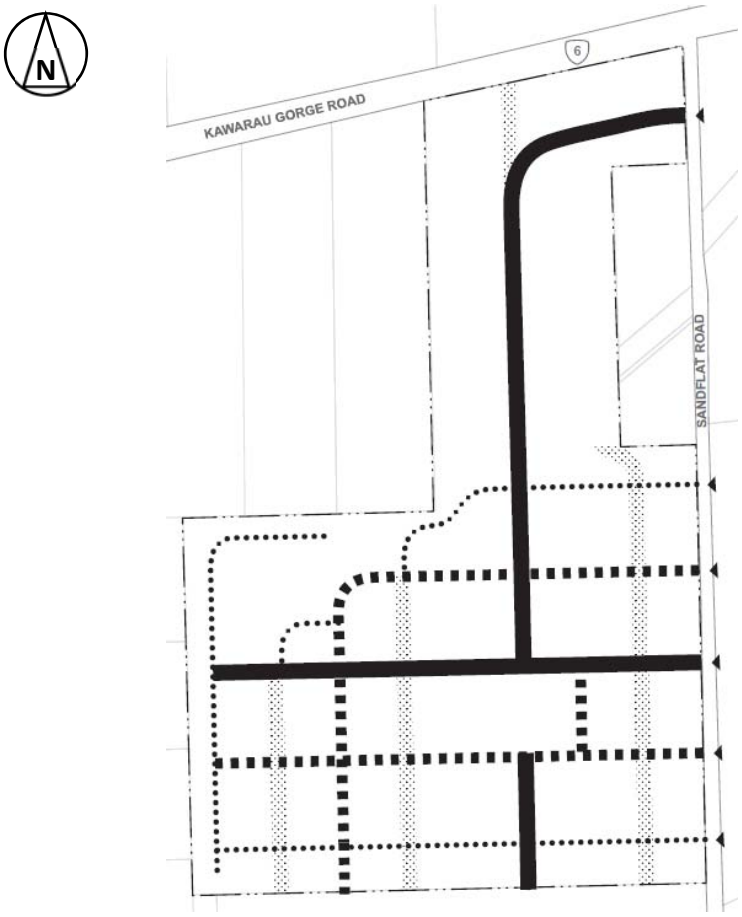


Figure 14: Roading Network (Extract from Jasmax Drawing 'Structure Plan' Dated 7 December 2017)

8.1.5. The primary road forms an east-west and a north-south route within the site. As such it will act as a focus for all movements and be the main route for the bulk of traffic entering and existing from Sandflat Road. Accordingly, it is has wider carriageways than other roads (the width replicates that of Sandflat Road), and makes specific provision for cycling and wider footpaths for pedestrian movements.

8.1.6. The secondary roads permeate further into the site but the volumes of all road users will be lower and hence the widths are less than those of the primary road. The dimensions are the same as for a 'Local Road' under the Council's Subdivision Code.

8.1.7. The neighbourhood roads will carry the least traffic volumes and have therefore been designed to have narrow carriageways to reduce speeds and provide greater road safety and amenity for non-car users. Any on-street parking will take place within the traffic lanes in order to slow through traffic even further.

8.1.8. Since the proposed road cross-sections fully comply with the later version of Standard NZS4404, they can be supported.

8.2. Intersection Spacing

8.2.1. The plans show that the intersections between the minor roads will be spaced at least 75m apart, with a spacing of 120m for the roads higher in the hierarchy. Standard NZS4404:2010 does not stipulate spacings for roads lower in the hierarchy but notes that a spacing of 150m

is required for connections between 'connector/collector' roads. There are no roads of this type within the site, but at a speed of 50km/h a separation of 120m equates to a travel time of nearly 9 seconds which is adequate for drivers to see and react to any vehicles turning ahead of them.

8.3. Jointly Owned Access Lots (JOALs)

8.3.1. The proposed masterplan includes a number of JOALs. These are communal areas which provide access to several different lots and their associated car parking spaces.

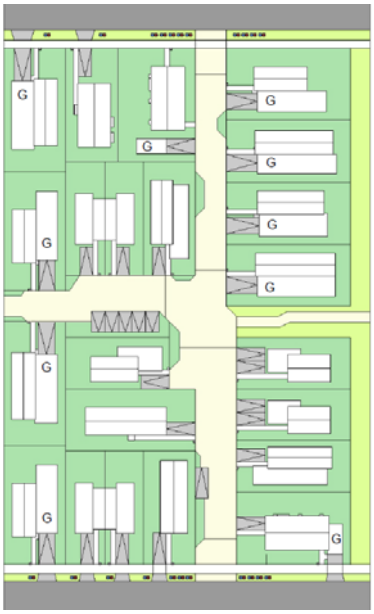


Figure 15: Example of JOAL (1)

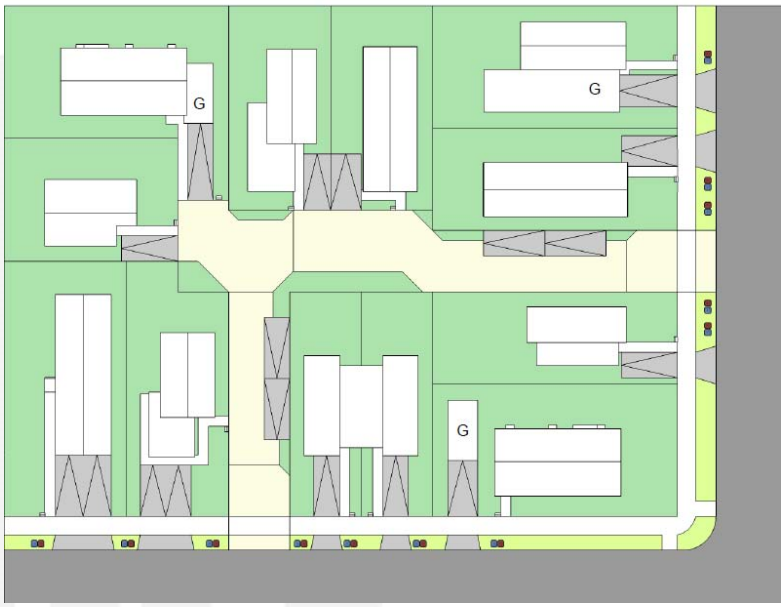


Figure 16: Example of JOAL (2)

8.3.2. The parking spaces shown within the JOALS are all at least 2.5m wide, 5.0m long and have an aisle of at least 6.0m width. These dimensions are appropriate to enable access by a car. The parallel parking spaces are shown as being 2.5m wide, and since they are adjacent to boundaries, it is expected that this comprises a 2.2m wide space plus 0.3m clearance (as

permitted under Standard AS/NZS2890.1:2004 'Parking Facilities Part 1: Off-Street Car Parking'). The landscaped areas at either end of the parallel spaces are likely to be over-run from time to time and so it is expected that hard landscaping will be used in these locations.

8.3.3. A number of the parked spaces are adjacent to lot boundaries that have not been splayed, or where a left-right (or (right-left) movement is needed to enter the space. As a result, the vehicle will either need to undertake a reverse movement when parking or over-run an adjacent lot. Since those that are parking will be residents who will be familiar with the layout, it is not expected that undertaking one reverse movement when parking will present significant issues, and the movements take place well away from public roading network meaning that passing traffic is not obstructed.

8.3.4. There are several parking spaces that are relatively close to the public road. However under the District Plan a parking area with up to 100 parking spaces required a queuing space of 6m (or more) and this is achieved.

8.3.5. Certain JOALs have sections of roadway that are 3.5m wide, meaning that they provide only one traffic lane. As a result, it is anticipated that these will operate in a one-way direction only, and that appropriate signage will be provided to indicate this to drivers.

8.4. Sandflat Road Upgrading

8.4.1. Development of the site will inevitably increase traffic flows on Sandflat Road. As noted above, part of the road is presently unsealed and as the site will have frontage onto this, it is recommended that the seal is extended as far as the southernmost site access.

8.4.2. Under Standard NZS4404:2010, a carriageway width of 5.5m to 5.7m is appropriate for traffic flows arising from 200 residences, but if a greater amount of development is served then a carriageway width of 8.4m is required. The northernmost part of Sandflat Road is already constructed to be wider than this, but it is likely that the carriageway width as far as the intersection with the east-west primary road will need to be widened to 8.4m. Since the legal width of Sandflat Road is some 18m wide, this can be achieved.

8.4.3. The alignment of Sandflat Road includes two crest curves. There are no restrictions on overtaking at these locations which indicates that sight distances remain appropriate, but it is possible that a minor lowering of the carriageway levels may be justified in order to improve sightlines. Again, the width of the legal road reserve means that any such works (and any associated batter slopes) can be accommodated without needing land outside the road boundary.

8.4.4. Finally, the proposal will create a number of priority intersections, and the more heavily trafficked of these may require formal provision for right-turn movement. Any widening of the carriageway to accommodate these can be carried out within the legal road reserve.

9. Overarching Planning Matters

9.1. Introduction

9.1.1. The District Plan sets out a number of transportation-related rules with which any development is expected to comply. Although the proposal is for a plan change, consideration of these rules is important at this stage in order to identify whether the plan change provisions should seek to exempt development from any rules, or conversely, to introduce new rules specific to the zone.

9.1.2. Consequently an assessment of the plan change provisions against these rules has been undertaken and the results are summarised below.

9.2. District Plan Part 12.7.1: Access Standards from Roads

9.2.1. Part (ii): Sight Distances

9.2.1.1. Under the District Plan, each lot requires a sight distance of 40m at its access but it is likely that there will be a number of lots which do not achieve the appropriate sight distance. This is either because the lot is adjacent to an intersection and the intersection geometry means that the sightline passes across land outside the lots and the road reserve, or because the access is on the inside of a curve and the curve restricts the sight distance.

9.2.1.2. The sight distance of 40m is based upon a vehicle speed of 50km/h. However as a vehicle approaches an intersection it must slow down in order to be able to give-way to other vehicles and/or to negotiate the intersection geometry. Since there is a direct relationship between vehicle speeds and sight distances, it follows that where speeds are physically reduced, sight distances can also be reduced while still allowing a driver to see and react to a potential hazard ahead.

9.2.1.3. Other developments in the district have encountered similar issues with regard to the sightlines, and the approach that has been taken is to limit the potential for obstructions to be placed within the sightlines. Potential ways of doing this are to include an additional Rule within the plan change provisions to ensure that a minimum setback distance is always provided, or to place a consent notice on the lot title, such that no obstruction of more than 1m in height is permitted to be placed within the sightline.

9.2.1.4. Taking these matters into account, it is considered that the sightline issue can be suitably addressed.

9.3. District Plan Part 12.7.2: Parking

9.3.1. Part (i): Number of Spaces

9.3.1.1. At this stage, no detailed layout has been produced for the individual lots. However it is expected that each lot will be able to provide at least one car parking space, as required under the Plan.

9.3.2. Part (ii): Parking in Excess of Three Spaces

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

9.4. District Plan Part 12.7.3: Loading and Manoeuvring

9.4.1. Part (i): Servicing Activities

9.4.1.1. The proposed plan change will enable residential activity and therefore the loading and unloading of goods is not expected to occur frequently.

9.5. District Plan Summary

9.5.1. The proposed site layout complies with all the transportation requirements of the District Plan, other than potentially in respect of Part 12.7.1(ii) Sight Distances. The likely non-compliance with the sight distances arises as some lots will be proximate to curves or intersections which limit sight distances, Those geometric features also mean that vehicle speeds will be reduced in the immediate area, which in turn means that shorter sight distances will be adequate, but this can also be controlled through a Rule within the plan change provisions, or a consent notice on the lot titles, to prevent obstructions being placed within the sightlines.

9.5.2. Taking these matters into account, it is considered that the proposed plan change will be able to meet the existing District Plan requirements.

9.6. NZTA Planning Policy Manual

9.6.1. Although the site does not have a direct access onto the highway, the Planning Policy Manual is relevant because it stipulates a minimum distance for an access on a district road from an intersection on a state highway. This distance is 60m and the plans provided show that a distance of 90m is to be provided to the first access road.

9.6.2. In practice, the access will be a legal road rather than a private access. NZTA does not set out any minimum separation distances for this, but rather, assesses each application on a case-by-case basis. This means that there is a great deal of discretion as to whether the location of district road intersections are acceptable or not. However even if this access road was not to be acceptable to NZTA for full turning movements, site access can be gained further towards the south with the northernmost road potentially operating as a left-out.

10. Conclusions

10.1. This report has identified, evaluated and assessed the various transport and access elements of a proposed plan change towards the west of Cromwell.

10.2. Overall it is considered that the traffic generated by the development of the site can be accommodated on the adjacent roading network without capacity or efficiency issues arising.

10.3. Under the expected future conditions for traffic flows, the warrants for auxiliary left-turn lanes are met at the State Highway 6 / Sandflat Road intersection, and it is considered that these should be constructed as part of the plan change provisions. The left-turn deceleration lane is required when 40 residences have been developed and are occupied, and the left-turn acceleration lane is required when the site is 75% developed (that is, 300 vehicles turn left out of Sandflat Road in the morning peak hour).

10.4. Subject to the provision of the auxiliary lanes, the crash history in the vicinity of the site does not indicate that there would be any adverse safety effects from the proposal. Sight distances for drivers turning at the intersections most affected by the generated traffic are excellent.

10.5. The internal roads will not comply with the Council's standards, but this is due to the use of a more up-to-date Standard, which aims to reduce vehicles speeds, promote road safety and better design outcomes. The proposed widths can be supported from a traffic engineering perspective but it is recommended that the issue is discussed with the Council to ensure that the roads are able to be vested in due course.

10.6. The potential site layout will comply with all but one of the transportation requirements of the District Plan. The non-compliance arises due to lots that are close to curves or intersections not being able to provide the required 40m sight distance from driveways. However those geometric features also mean that vehicle speeds will be reduced in the immediate area, which in turn means that shorter sight distances will be adequate. The matter can be addressed either through a Rule within the plan change provisions or through consent notices on the lot titles.

10.7. Sandflat Road itself will be required to be upgraded due to the increased traffic flows. All such upgrade works can be carried out within the legal road reserve.

10.8. Overall, and subject to the preceding comments, the plan change request can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why the plan change could not be recommended for approval.

Carriageway Consulting Limited
December 2017

CARRIAGEWAY
CONSULTING

traffic engineering | transport planning

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