BASELINEGROUP

Appendix 9: Transport Assessment

RJ and CE Wright

Proposed Private Plan Change Darfield

Transportation Assessment

CARRIAGEWAY CONSULTING

traffic engineering | transport planning

Table of Contents

Main Report

Photographs

Figures

Tables

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1. Introduction

1.1. RJ and CE Wright propose to submit a private plan change request to Selwyn District Council to rezone an area of land in the settlement of Darfield. If the plan change is approved, it will result in the site being rezoned from Outer Plans to a combination of Living 2A and Business 2.

1.2. This Transportation Assessment sets out an evaluation of the transportation issues associated with the development of the plan change area 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.

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 development site is located on the eastern side of Darfield and is presently zoned as Outer Plans in the Selwyn 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.

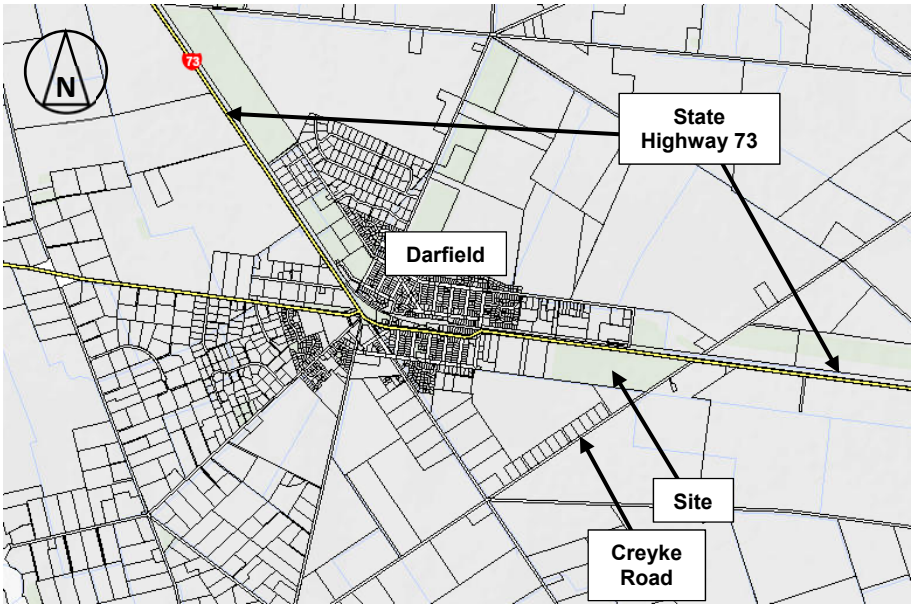

Figure 1: General Location of Development Site

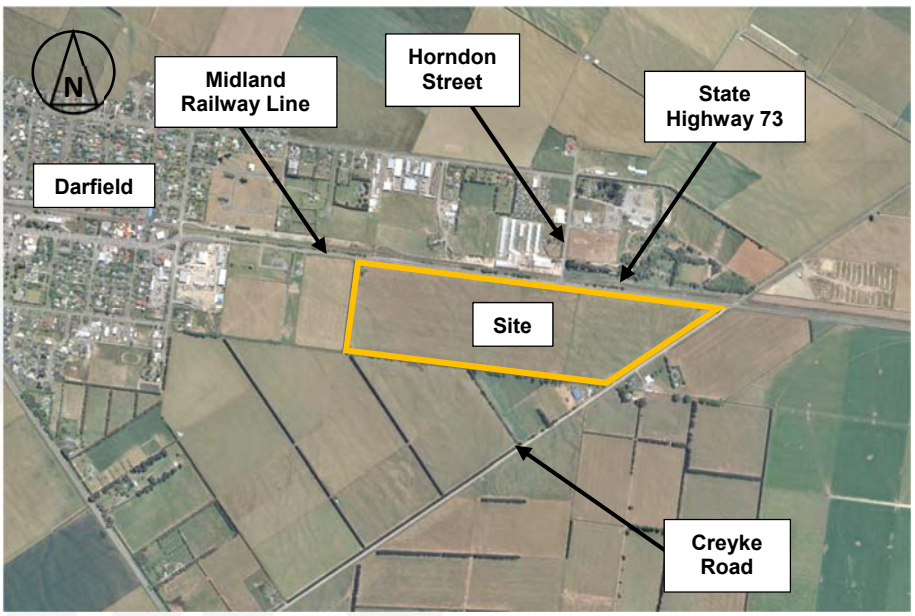

Figure 2: Aerial Photograph of Site and Environs

2.2. Road Hierarchy

2.2.1. Under the District Plan, State Highway 73 is a highway which is "*the highest in the roading hierarchy*" and "*required to accommodate connections of arterial roads, collector and local roads in a very controlled manner. Due to the higher volume and speed of traffic, the function of State Highways to carry 'through' traffic takes precedence over other functions of these roads*" (District Plan Policy B2.1.1, Explanation and Reasons).

2.2.2. Creyke Road and Horndon Street are Local Roads, whose function "*is almost entirely to provide for access to properties and adjoining land uses"* and which *"are not intended to act as main through routes for traffic and generally have lower traffic volumes*" (District Plan Policy B2.1.1, Explanation and Reasons).

3. Current Transportation Networks

3.1. Roading Network

3.1.1. The proposed roading connection into the plan change area is via the eastern end of the site, and onto Creyke Road. In this location, Creyke Road has a flat and straight alignment, and a sealed carriageway width of 6.5m but with no centreline or edegline markings. There is a 0.5m metalled shoulder on each side of the road, and then grassed verges to the road boundary. The road is subject to a speed limit of 100km/h, and the legal road width is 20m.

Photograph 1: Creyke Road Looking South (Site on Left)

3.1.2. At the northeastern corner of the site, Creyke Road meets State Highway 73 at a four-arm priority ('stop') controlled intersection, with Creyke Road forming the fourth approach towards the north. The intersection has an auxiliary turning lane for the movement from south to west but no right-turn or left-turn lanes on the highway for drivers turning into Creyke Road.

Photograph 2: State Highway 73 / Creyke Road Intersection Looking South (Site Centre-Right)

3.1.3. The minor approaches to the intersection are at 40 degrees to the highway, rather than the more usual 90 degrees. This means any driver turning right has to look over their left shoulder and through the rear passenger-side window rather than the front window.

3.1.4. Sight distances at the intersection are affected by an overgrown shelter belt towards the west. However cadastrals show that the edge of the nearest traffic lane is 5.5m from the highway boundary, and since sightlines are measured at 5.5m from the edge of the nearest traffic lane, this means that if the shelterbelt is trimmed, the sightline would lie wholly within the highway reserve (the shelterbelt currently reduces this 5.5m distance to 3.5m).

Photographs 3 and 4: Sight Distances along State Highway 73 from Creyke Road at 5.5m Back from Traffic Lane Showing Effect of Shelterbelt

Photographs 5 and 6: Sight Distances along State Highway 73 from Creyke Road at 3.5m Back from Traffic Lane Showing Excellent Distances

3.1.5. State Highway 73 has a flat and straight alignment and is subject to a speed limit of 100km/h. There is one traffic lane in each direction of 3.6m width and a sealed shoulder of 0.7m on each side, and the carriageway is marked with edgelines and a centreline. There are grassed verges on each side of the highway, with the Midland Railway Line running parallel to the highway towards the north, some 20m away.

Photograph 7: State Highway 73 Looking West (Site on Left)

3.1.6. Towards the west, the highway passes through Darfield and other townships before running through Arthurs Pass and providing a connection to the West Coast. To the east, the highway connects to State Highway 1 and terminates in Upper Riccarton in Christchurch.

3.1.7. Creyke Road continues to the north of the intersection. Around 20m north of the intersection, the road crosses the railway at a level crossing, which has flashing lights and bells, but no barriers. The road rises up in order to cross the railway.

Photograph 8: Creyke Road Level Crossing Looking North

3.1.8. To the north and south of the site, Creyke Road connects to the district roading network around Darfield which provide access to a number of rural activities.

3.2. Non-Car Modes of Travel

3.2.1. There is no specific infrastructure for walking or cycling in the immediate area of the site, although the wide berms are suitable for walking and the low traffic flows on Creyke Road mean that cyclists can share the road with motorised traffic.

3.3. Future Changes

3.3.1. The land to the immediate south of the site is addressed in an Outline Development Plan ("*ODP*") set out in Appendix 41 of the District Plan, for development as residential lots. The ODP does not show any direct connection between that area and the proposed plan change area.

Figure 3: Approved ODP for Area South of Site

3.3.2. This area of land is presently not subdivided into lot sizes that would result in an intensification of the traffic flows. Accordingly, for the purposes of this analysis it is anticipated that the development of the land would require resource consents, and so any increases in traffic flows arising from development have not been taken into account within this assessment.

4. Current Transportation Patterns

4.1. Traffic Flows

Prevailing Traffic Flows

4.1.1. The New Zealand Transport Agency ("NZTA") carries out regular traffic counts on the state highway network throughout the country. The closest count sites to the proposed plan change site are located within Darfield (between Clinton and Russell Streets) and west of Aylesbury, some 11km from the site. Neither location is likely to be fully representative of traffic volumes past the site – in the case of the Darfield counter this is because it will record local trips within the town, and in the case of the Aylesbury counter, this is because the settlement of Kirwee lies between the counter and the site. However both are helpful indicators of traffic flows.

4.1.2. The most recent two-way traffic flows recorded at each counter are as follows:

Location	Weekday		Saturday		Sunday	
	Daily	Peak Hours	Daily	Peak Hour	Daily	Peak Hour
Darfield	5,225	420 (AM) 500 (PM)	4,550	425	3,850	375
Aylesbury	5,125	505 (AM) 550 (PM)	4,675	400	4,175	375

Table 1: Traffic Flows on Adjacent Road Network

4.1.3. It can be seen that there is little difference between the two locations. In practice this is likely to be due to an offsetting effect – the Darfield counter will record local movements which will not be present at Aylesbury, and the Aylesbury counter will record movements to/from Kirwee which will not be present in Darfield. However neither the local movement, nor the movements to/from Kirwee, will be present on the highway adjacent to the site and consequently the volume passing the site will be less than shown above. As a result, using the recorded data means that any analysis of the site will be robust, and this is the approach which has been taken.

4.1.4. Selwyn District Council carries out regular traffic counts on the key vehicle routes throughout the district. Data recorded in the NZTA Crash Analysis System, which in turn is sourced from Council RAMM databases, shows that the traffic flows on Creyke Road at the site are in the order of 200 vehicles per day (two-way), with 600 vehicles per day north of the highway.

4.1.5. Peak hour volumes are usually around 10% to 15% of the daily flows, meaning that peak hour volumes past the site on Creyke Road will be 20 to 30 vehicles (two-way) and 60-90 vehicles (two-way) north of the highway. This level of traffic is commensurate with the extent of development served by the road.

Traffic Growth

4.1.6. Data from the NZTA counters shows that traffic on the highway has grown by an average rate of 5.3% within Darfield and 3.6% at Aylesbury each year for the past five years. It is likely that the latter reflects through-traffic growth with the former including a higher number of local trips made within Darfield. Consequently the lower growth rate has been used within this analysis.

Roading Performance

4.1.7. 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, Creyke Road (north and south of the highway) provides Level of Service A at peak times, which is the best level of service possible (the scale runs from A to F). State Highway 73 provides Level of Service B at peak times. Both of these represent stable flow conditions and where drivers can largely select their own speeds on the roads.

4.1.8. The Austroads Guide to Traffic Management Part 3 ('*Traffic Studies and Analysis'*) also sets out thresholds regarding the need for detailed traffic analyses at intersections, and the traffic flows below which detailed analyses of unsignalised intersections are unnecessary. An extract from this is replicated below.

Major Road Type	Traffic Volumes (Vehicles Per Hour)	
	Major Road	Minor Road
Two lane road	400	250
	500	200
	600	100

Table 2: Extract from Table 6.1 of Austroads Guide to Traffic Management Part 3 (Intersection Volumes below which Capacity Analysis is Unnecessary)

4.1.9. Based on this, no analysis has been carried out at the State Highway 73 / Creyke Road intersection because it falls below these thresholds and will therefore operate under free-flow conditions.

4.2. Non-Car Modes of Travel

4.2.1. Given that the area around the site is largely rural, it can reasonably be expected that it will be relatively infrequently used by pedestrians and cyclists. As such, the current levels of provision are considered to be adequate.

4.2.2. There are no scheduled public transport services that operate within Darfield, but there is a service which provides a connection between Darfield and Christchurch to the east. This operates twice a day – once in the morning travelling eastbound and departing Darfield at 7:15am, and once in the evening travelling westbound and arriving at Darfield at 6:30pm.

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 2009 and 2018 were identified, for the following sections of road:

- Creyke Road, from 250m north of State Highway 73 to 200m south of the site southern boundary; and
- State Highway 73 for 250m either side of Creyke Road.

4.3.2. This showed that there were three reported crashes:

- One crash occurred on State Highway 73 around 200m west of Creyke Road when a driver lost control on black ice and slid off the highway. It resulted in minor injuries; and

- Two crashes occurred on Creyke Road at the level crossing some 30m north of State Highway 73 when drivers failed to stop and struck the side of a train. Neither crash resulted in any injuries.

4.3.3. No crashes have been reported at the State Highway 73 / Creyke Road intersection or on Creyke Road south of the intersection over this ten-year period.

4.3.4. It is therefore considered that there are no safety-related deficiencies in the roading network.

5. Proposal

5.1. The proposed plan change will facilitate a change of activity to enable residential and business activities to establish on the site. This will include:

- Living 2A: 35 rural residential lots of an average 2,500sqm each; and
- Business 2: An area of 19ha for business/industrial use

5.2. Access into the site will be via a new roading connection located around 400m southwest of the State Highway 73 / Creyke Road intersection (and around 400m northeast of the access into the approved ODP area towards the south). However in view of the increased traffic loading on the State Highway 73 / Creyke Road intersection, the ODP makes allowance for amendments to the geometry of this intersection, as discussed in more detail below.

5.3. The ODP for the area is shown below.

Figure 4: Outline Development Plan (Extract from Baseline Group Drawing)

6. Traffic Generation and Distribution

6.1. Traffic Generation

Residential Development

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

6.1.2. In this case, there are community facilities within Darfield, which are relatively close to the site, but employment opportunities are limited and so there will also be a proportion of residents who need to commute for work.

6.1.3. 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 0.9 vehicles movement in the peak hours.

Business / Industrial

6.1.4. It is understood that there are no rules for site density in the Business 2 zone, but there is a maximum building height (15m) plus also the need to provide for adequate car parking.

6.1.5. The bulk of standard traffic generation rates are based on floor area rather than total site area, and since there is no fixed site layout, this is not known. However the plan change which facilitated the Ashburton Business Estate adopted rates as follows:

Industry Type	Trip Generation Rates (Vehicle Movements Per Hectare)					
	Morning Peak Hour		Evening Peak Hour		Daily	
	In	Out	In	Out	In	Out
Light	13.9	2.5	5.4	12.7	53.5	53.5
Heavy	8.5	7.3	4.9	5.5	40.5	40.5

Table 3: Traffic Generation Rates for Industrial Activities

6.1.6. It can be seen that the light industrial activities typically have a greater traffic generation than heavy industrial activities, and therefore these rates have been used within this assessment.

Summary

6.1.7. On the basis of the traffic generation rates set out above, the traffic anticipated to arise from development of the site is as follows:

Activity	Trip Generation (Vehicle Movements)					
	Morning Peak Hour		Evening Peak Hour		Daily	
	In	Out	In	Out	In	Out
Residential	3	29	21	11	140	140
Business	264	48	103	241	1,017	1,017
Total	267	77	124	252	1,157	1,157

Table 4: Traffic Generation of Development of Plan Change Area

6.2. Trip Distribution

6.2.1. Because of the location of the site, it is considered likely that the bulk of drivers would seek to reach the state highway. The ODP allows for a future roading link toward the west of the site, but from a transportation perspective the greatest potential for adverse outcomes would arise if all traffic was to pass through the State Highway 73 / Creyke Road intersection.

6.2.2. Consequently for the purposes of this analysis, a distribution of 45% of traffic turning to/from the east at this intersection has been allowed for, with 45% turning to/from the west and 10% associated with movements to/from the north.

7. Effects on the Transportation Networks

7.1. Roading Network Capacity

7.1.1. The traffic flows generated by the site indicate that traffic flows could change as follows, allowing not only for development of the plan change area but also increased background traffic flows of 36%[1]:

Road	Traffic Volumes					
	Morning Peak Hour		Evening Peak Hour		Daily	
	Without Plan Change	With Plan Change	Without Plan Change	With Plan Change	Without Plan Change	With Plan Change
State Highway 73	680	835	750	920	7,100	8,150
Creyke Road (south of SH73)	25-40	370-385	25-40	405-415	270	2,390
Creyke Road (north of SH73)	85-125	115-155	85-125	120-160	820	1,050

Table 5: Change in Traffic Flows on Adjacent Road Network

7.1.2. Again using the Austroads Guide to Traffic Management Part 3 (‘*Traffic Studies and Analysis’*), Creyke Road (north of the highway) would continue to provide Level of Service A at peak times, which is the best level of service possible. Creyke Road (south of the highway) would provide Level of Service B, which still represents a very good level of service. State Highway 73 would provide Level of Service C in the morning peak hour and Level of Service D in the evening peak hour. These are both within the zone of stable flow, and are not unusual for a highway in the peak hours.

7.1.3. The State Highway 73 / Creyke Road intersection has been modelled using the computer software package Sidra Intersection, and the results are summarised below (for the existing intersection layout, but with an additional ten years of background traffic growth).

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 73 (east)	R	7.9	1	A	7.2	0	A
Creyke Road (north)	L/T	21.9	1	C	19.2	1	C
	R	19.1	1	C	19.9	1	C
State Highway 73 (west)	R	8.3	2	A	8.7	1	A
Creyke Road (south)	L/T	20.4	1	C	24.4	3	C
	R	21.2	1	C	25.0	3	C

Table 6: Performance of State Highway 73 / Creyke Road with Full Development of Plan Change Area

7.1.4. It can be seen that queues and delays are modest, and levels of service remain good on each approach.

[1] That is, ten years at 3.6% each year

7.2. Revisions to Existing Roads

7.2.1. As set out previously, the minor approaches of Creyke Road presently meet the highway at an acute angle. Consequently, the ODP makes allowance for the southern approach to the intersection to be straightened up and meet the highway at 90 degrees (or thereabouts), and hence meet current guides for such angles.

7.2.2. Given that the development of the plan change area will result in a significant increase in traffic emerging onto the intersection, it is considered that this realignment should be put in place prior to any development of the site, and a Rule included in the plan change provisions to this effect.

Figure 5: Illustrative Example of Road Realignment Approaching the Intersection

7.2.3. The warrants for the provision of turning lanes at intersections are set out in the Austroads Guide to Traffic Management Part 6 ('*Intersections, Interchanges and Crossings'*). Using these, the full development of the plan change area justifies both a right-turn and a left-turn auxiliary lane at the intersection.

7.2.4. A more detailed assessment has been carried out of the thresholds at which the turning lanes are required. This shows that the right-turn lane is required at 10% development of the plan change area, with the left-turn lane required at 85% development of the plan change area. On this basis, it is possible to include a 'trigger' rule within the plan change provisions to require upgrading once certain thresholds (10% and 85% respectively) are reached.

7.2.5. It should be noted that these thresholds are influenced by whether any access to the plan change area is available from the west, and the extent of any development within the ODP area towards the south. At present, there is no such connection able to be formed, nor is any development proposed towards the south.

7.2.6. Due to the proximity of the railway level crossing and because the road rises to cross the railway, the much (if not all) of the seal widening to create the auxiliary turning lanes would need to be formed on the southern side of the highway. In turn, this means that the position for sightline measurements moves south by around 3.5m. This then means that the required

sightlines towards the east and west along the highway may potentially pass over private land on each side of the intersection[2].

7.2.7. The extent of land affected by such a restriction depends on the detailed design of the road realignment, and this has not yet been determined. As a general principle, as the end of Creyke Road is moved further west, there is less potential that land towards the east will be required for the sightline. Irrespective of the exact location of the realignment though, land towards the west of the intersection will be certainly required for the sightline. The ODP makes allowance for this by imposing a restriction on the height of any objects within the affected area.

7.2.8. To illustrate the extent of land which may be required, a very preliminary assessment has been undertaken.

Figure 6: Land Potentially Required for Sightline towards East of (Realigned) Intersection (in Yellow)

Figure 7: Land Potentially Required for Sightline towards West of (Realigned) Intersection (in Yellow)

[2] The requirement is to measure the sight distance at 5.5m from the edge of the nearest traffic lane. The current edge of the traffic lane is 5.5m from the southern boundary of the highway, meaning that the sightline is (just) wholly within the legal highway. Moving the edge of the traffic lane south by 3.5m means that the point of measurement of the sightline moved south by 3.5m and hence the sightline near the intersection is outside the highway reserve.

7.2.9. ***If*** any land is required on the eastern side of the intersection (and noting that this cannot be addressed until the road realignment is confirmed), one possibility is a land swap with the superfluous road reserve for Creyke Road. By way of example, the area shown on Figure 6 is 95sqm, compared to around 120sqm which would become unused through the road realignment.

7.2.10. Creyke Road to the south of the highway would carry in the order of 2,300 vehicles per weekday when the site is fully developed. As such, it is considered that the status of the road would be better reflected by it becoming a Collector Road, and the higher traffic flows may in turn result in widening of the carriageway. However the 20m legal width means that any necessary widening can be accommodated within the existing road corridor (other than the northern section of the road where it is to be realigned, as discussed above). Any widening would be a matter for assessment when subdivision consents are sought.

7.2.11. Similarly there are no reasons why a suitable intersection design into the site from Creyke Road, or internal roading layout, could not be constructed to meet the requirements of the District Plan and other relevant guides, since a 20m width is ample for all types of priority intersection.

7.2.12. One other further matter is whether under such a scenario the existing 100km/h speed limit remains appropriate, particularly with the potential for an increased proportion of large, slower-moving vehicles to be travelling between the highway and the site. In order to reduce the speed differential between light and heavy vehicles, it is considered that there is merit in reducing the speed limit to 80km/h over this section of Creyke Road (and possibly further, depending on whether any development takes place within the ODP area to the south). However reducing the speed limit is a process which is outside the Resource Management Act and cannot be addressed within a plan change request.

7.2.13. No changes are considered necessary for Creyke Road north of the highway. Flashing lights and bells remain the appropriate treatments for the railway level crossing, and the increase in traffic flows is insufficient to justify any widening. There is no change to the left and right turning movements at the intersection and hence no requirement for any auxiliary turning lanes.

7.3. Non-Car Modes of Travel

7.3.1. It is likely that development of the plan change area will lead to increased volumes of walking and cycling in the area, but the location of Darfield means that these trips will either be within the township or for longer-distance recreational purposes. Since the extent of development is modest, any increase in walking and cycling will be similarly low, and can be accommodated within the existing transportation networks.

7.3.2. The ODP makes allowance for walking/cycling links towards the south so that any residents in that area would be able to walk to employment in the proposed Business 2 zone rather than having an extended journey distance by having to use the roading network. Similarly, two links are provided through the residential area to facilitate non-car links into the approved ODP for the southern area (shown on Figure 3 above).

7.3.3. The internal roads within the site are anticipated to meet the District Plan requirements, with footpaths provided as appropriate.

7.4. Road Safety

7.4.1. 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. It is anticipated that the proposed roads and intersections associated with development of the plan change area will meet current guides and standards, and as such, can be expected to function safely.

7.4.2. It is not anticipated that there will be any deficiencies in respect of sight distances at any of the intersections, and the proposed realignment towards the northeast of the DP area addresses an existing deficiency on the roading network associated with the acute angle that Creyke Road (south) approaches the highway.

8. District Plan Matters

8.1. Introduction

8.1.1. The District Plan sets out a number of transportation-related Rules with which any development is expected to comply. Although this is a plan change request, a review against these has been undertaken in order to ensure that the proposal is able to comply with the relevant Rules, or whether exemptions to the Rules should be considered as part of the plan change provisions.

8.2. Rule 5.1: Road and Engineering Standards

8.2.1. The land is relatively flat and so the slope (Rule 5.1.1.1) and road gradients (Rule 5.1.1.2) will be compliant.

8.2.2. The road formation is required to meet Appendix E13.3.1 and E13.3.2. The first of these relates to the provision of new roads (as is expected to occur) and the 'green field' nature of the plan change area means that these provisions can be achieved.

8.2.3. The road within the Business 2 area is shown on the ODP as being a cul-de-sac and this permitted (Appendix E13.3.1.4). Since access is expected to be predominately towards the highway, it is not expected that a cul-de-sac formation will result in any poor transportation planning outcomes in practice.

8.2.4. Appendix E13.3.2 addresses intersection spacing. In this case the intersection onto Creyke Road is 400m from the highway, compared to an 800m spacing required under this provision. However, as set out above, there is a technical case to reduce the speed limit on Creyke Road to promote road safety, and with a lower maximum speed, the requirements of this rule will be met.

8.2.5. Within the site, the speed limits are not yet known. However the separation of intersections is in the order of 140-150m which is appropriate for a 50-60km/h speed limit.

8.3. Rule 5.2: Vehicle Accessways

8.3.1. The proposed lots will all have access onto a legal road (Rule 5.2.1.1) and all of the lots will have access onto the internal roading network which will be a Local Road (Rule 5.2.1.2). The site is relatively flat so achieving appropriate gradients should not be problematic (Rules 5.2.1.3 and 5.2.1.4).

8.3.2. The crossings are required to meet Appendix E13.2.1, which stipulates the requirements for the minimum widths. These can all be achieved.

8.3.3. There is no reason why more than six lots should share a private accessway, rather than being accessed by a road (Rule 5.2.1.7).

8.4. Rule 5.3: Vehicle Crossings

8.4.1. Any vehicle crossing is required to meet Appendices E13.2.2, E13.2.3, E13.2.4 and E13.2.5.

8.4.2. Appendix E13.2.2 addresses the separation of accesses and intersections. For intersections between Local Roads, a 10m separation distance is required and there are no reasons why this cannot be achieved.

8.4.3. Appendix E13.2.3 addresses sight distances from vehicle crossings, but this depends on the speed limit(s) which are not yet known. That said, it seems likely at this stage that the required sight distances will be met.

8.4.4. Appendix E13.2.4 addresses the design and siting of vehicle crossings. One crossing per site can be achieved (Appendix E13.2.4.2), and the distance between crossings and the crossing width can be achieved (Appendix E13.2.4.5).

8.4.5. Appendix E13.2.5 addresses the standard of vehicle crossings, which can be provided according to the nature of the activity served.

8.4.6. The crossings can be sealed (Rule 5.3.1.2) and will not gain access directly onto a state highway or arterial road (Rule 5.3.1.4).

8.5. Rule 5.4: Traffic Sight Lines – Road/Rail Crossings

8.5.1. The site is not sufficiently close to the road/rail crossing for these provisions to apply.

8.6. Rule 5.5: Vehicle Parking and Cycle Parking

8.6.1. The number of parking spaces per lot can be achieved and the spaces can be designed to be accessible at all times (Rule 5.5.1.1 / Appendices E13.1.1 and E13.1.2).

8.6.2. Regarding the design of the parking spaces and maneouvring areas (Rule 5.5.1.2), there are no reasons why pedestrian areas will be obstructed (Appendix E13.1.5.2), parking spaces / garages can be of the appropriate size (Appendix E13.1.6), and the site is relatively flat and so gradients will not be exceeded (Appendices E13.1.7 and E13.1.8).

8.6.3. For on-site maneouvring, the layouts are able to be designed to ensure that vehicles do not reverse from the site unless this is a permitted activity, and the parking spaces can be designed to be accessed with just one reverse movement (Appendix E13.1.9). Queuing space can be provided (Appendix E13.1.10) and illumination can be provided as required (Appendix E13.1.11).

8.7. Summary

8.7.1. The ODP for the site is capable of complying with the requirements of the District Plan, although compliance with Rule 5.1 (and Appendix E13.3.2) depends on the speed limit(s) on Creyke Road and on the internal roads, which are not yet confirmed. However the ability to amend speed limits is not within the scope of the Resource Management Act.

9. Conclusions

9.1. This report has identified, evaluated and assessed the various transportation matters of a proposed plan change to facilitate residential and business development within the settlement of Darfield.

9.2. Overall it is considered that the traffic generated by the development arising from the plan change can be accommodated on the adjacent roading network without capacity or efficiency issues arising. Queues and delays remain low at the State Highway 73 / Creyke Road intersection.

9.3. The crash history in the vicinity of the plan change area does not indicate that there would be any adverse safety effects from the proposal. However in view of the increased traffic flows arising from the proposal, the ODP makes allowance for the southern Creyke Road approach to be straightened up to better achieve current design standards and best practice through meeting the highway at an angle of 90-degrees or thereabouts.

9.4. Upgrades to the State Highway 73 / Creyke Road intersection to provide auxiliary turning lanes are justified with a right-turn lane needed at 10% of the site being developed and a left-turn lane required at 85% development. These improvement measures can be addressed through Rules within the plan change provisions.

9.5. The associated seal widening for the improved intersection will result in the sightlines at the intersection moving 3.5m further south and they will therefore pass across land outside the road reserve. An area within the site close to the intersection has been identified where there will be a height restriction in order to ensure that sight distances towards the west are maintained. ***If*** the sightlines pass over land towards the east, there are a number of ways in which this can be addressed.

9.6. Creyke Road may require widening to accommodate the increased traffic flow and there may also be a case for reducing the current speed limit. These can be addressed when subdivision consents are sought, and there are no constraints to achieving the requirements of the District Plan due to the ample legal width. However it is noted that changing a speed limit is beyond the scope of a plan change request.

9.7. New transportation infrastructure which will be provided will meets appropriate guides and standards (or exemptions from the District Plan will be sought when subdivision consents are applied for). Walking/cycling routes are provided within the ODP which ensure good non-car connections to the area towards the south.

9.8. The ODP will meet (or is capable of meeting) the transportation requirements of the District Plan, although compliance depends on speed limits which are not yet known.

9.9. Several potential rules for the plan change package have been suggested within this assessment:

- The Creyke Road approach to the state highway should be straightened-up prior to any development taking place;
- A right-turn auxiliary lane should be provided at the State Highway 73 / Creyke Road intersection at 10% development of the site;
- A left-turn auxiliary lane should be provided at the State Highway 73 / Creyke Road intersection at 85% development of the site; and

- Provision should be made to ensure the appropriate sightlines are available to the east and west for drivers emerging from Creyke Road.

9.10. There are two provisions to support the plan change which are not within the remit of the plan change request:

- Creyke Road from the highway to the site access should be reduced from a 100km/h to 80km/h speed limit; and
- Creyke Road from the highway to the site access should be designated as a Collector Road within the road hierarchy.

9.11. Overall, and subject to the preceding comments, the proposed plan change can be supported from a traffic and transportation perspective.

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