BASELINEGROUP

Appendix 3: Transport Assessment

Brant Hammett

Proposed Private Plan Change Leeston

Transportation Assessment

CARRIAGEWAY CONSULTING
traffic engineering | transport planning

Table of Contents

Main Report

Photographs

Figures

Tables

CCL file reference	14379 leeston ta final
Status	Final
Issued	6 August 2019

1. Introduction

1.1. Brant Hammett proposes to submit a private plan change request to Selwyn District Council for rezoning an area of approximately 58.4ha of land at Leeston (**the plan change area, the site**). If the plan change is adopted, it will rezone the site from a mix of Living 1 Deferred, Living 2 Deferred and Outer Plans and to a mix of Living 1 and Living 2 zoning.

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 western side of Leeston and as noted above is presently zoned as a mix of Living 1 Deferred, Living 2 Deferred and 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.

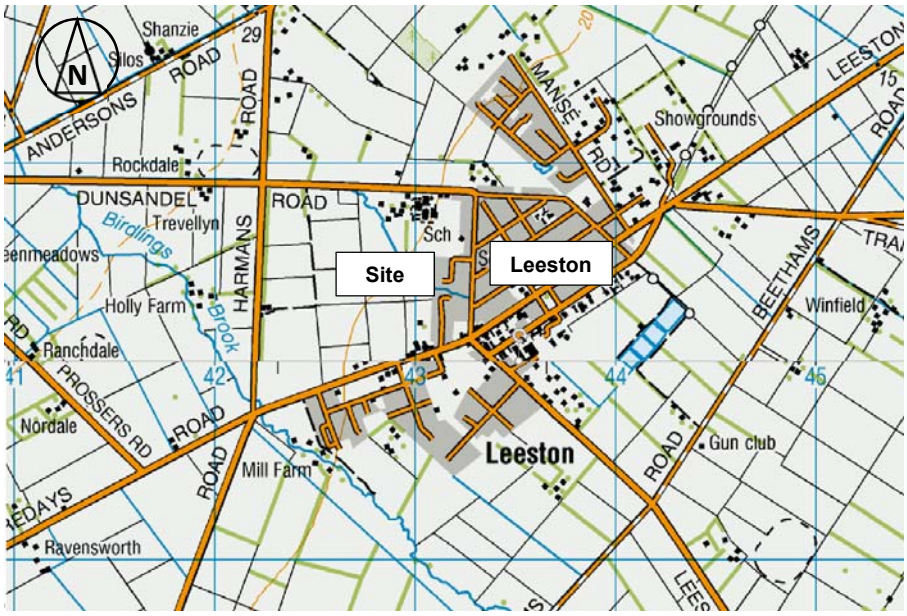


Figure 1: General Location of Plan Change Area

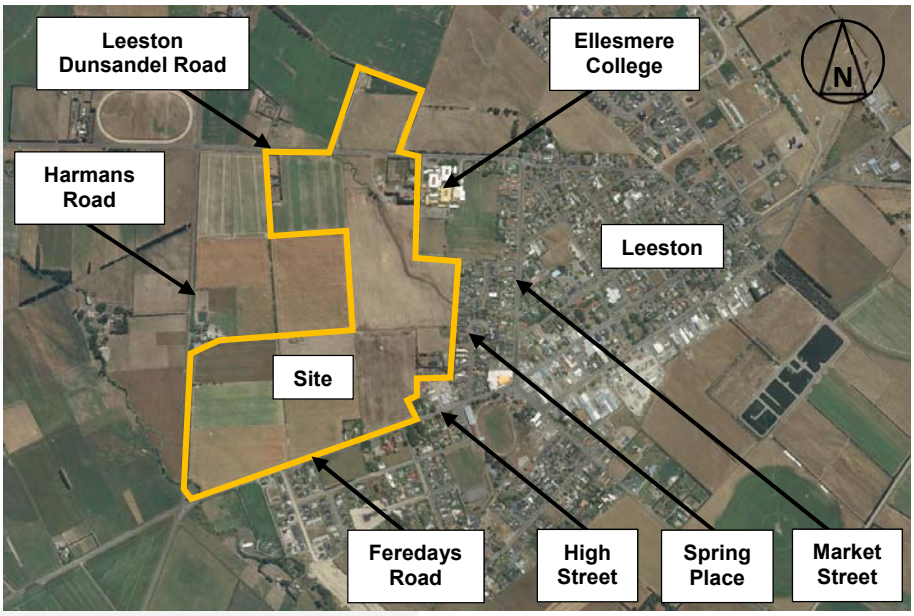


Figure 2: Aerial Photograph of Plan Change Area and Environs

2.2. Road Hierarchy

2.2.1. The District Plan classifies Feredays Road and Leeston Dunsandel Road as Arterial Roads, which "*connect areas of district importance (and) connect the districts townships and other important places and activities together*". These types of road are "*required to minimize, and control local road and property access to ensure they operate efficiently*" (District Plan, Definitions).

2.2.2. High Street and Market Street are Collector Roads which "*distribute and collect local traffic within and between neighbourhood areas*". These roads "*balance the necessary traffic movement function against the property access function that they also need to provide*" (District Plan, Definitions).

2.2.3. Harmans Road and Spring Place are Local Roads and "*their primary function is to provide property access, and they generally have lower traffic volumes*" (District Plan, Definitions).

3. Current Transportation Networks

3.1. Roading Network

3.1.1. Towards the west of the site, Harmans Road has a flat and straight alignment, with two traffic lanes but these are not marked with a centreline or edgeline markings. The seal is 6.5m wide with grassed verges of 8m on either side. The road is subject to a 100km/h speed limit.

Photograph 1: Harmans Road Looking North

3.1.2. Towards the northwest of the plan change area, Harmans Road meets Leeston Dunsandel Road at a 'stop' controlled crossroads where traffic on Leeston-Dunsandel Road retains the right of way. There are no auxiliary turning lanes, and sight distances are excellent in all directions. The speed limit on all intersection approaches is 100km/h.

Photograph 2: Leeston Dunsandel Road / Harmans Road Intersection Looking East

3.1.3. Leeston-Dunsandel Road has a flat and straight alignment, with two traffic lanes of 3.3m and sealed shoulders of less than 0.5m. It has a centreline and edgeline markings.and the road is subject to a 100km/h speed limit.

Photograph 3: Leeston Dunsandel Road Looking East

3.1.4. At its eastern end, Leeston-Dunsandel Road becomes more urbanised and the speed limit reduces to 50km/h at a small threshold treatment adjacent to the current urban boundary. In this location the movement lanes remain at 3.3m each but there are parking lanes on each side. Ellesmere College is located on the southern side of the road, just east of the speed limit threshold.

Photograph 4: Urban Section of Leeston Dunsandel Road Looking East

3.1.5. Approximately 1km east of Harmans Road and 0.35km east of the speed limit threshold, Leeston Dunsandel Road meets Pound Road at a priority intersection. However the priority of the road is given to the west-south approaches, meaning that Pound Road traffic has to yield,

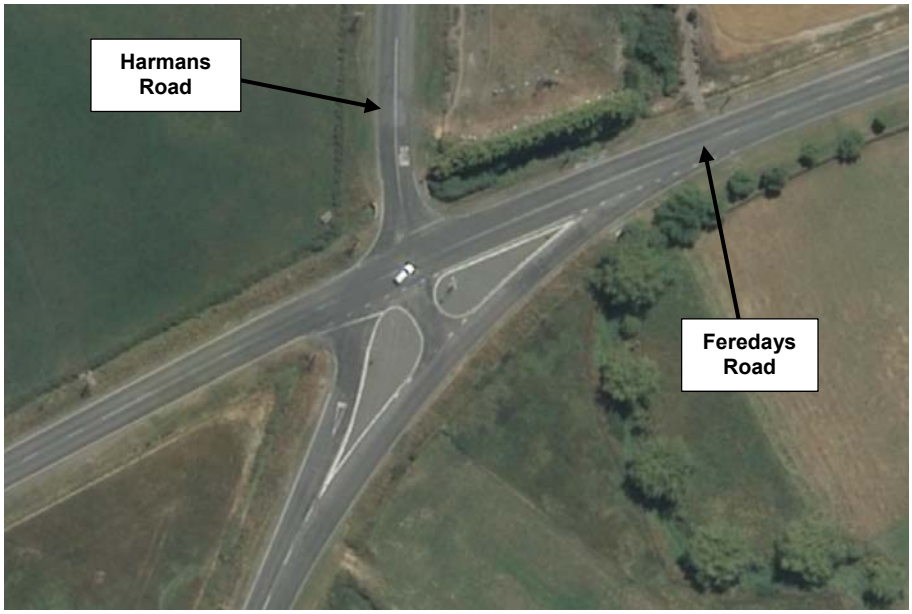
and the through traffic experiences are sharp 90-degree curve. Towards the south of the intersection the road is known as Market Street.

3.1.6. Market Street has two traffic lanes and an 11m seal width, and is kerbed. The alignment is flat and straight. Parking is permitted on both sides of the road although there is no formal parking lane, rather there is an intermittent grass verge which is sealed in locations to provide for parking. There are numerous private driveways on both sides which serve residential properties.

Photograph 5: Market Street Looking East

3.1.7. At its southern end, Market Street meets High Street at a priority ('stop') controlled intersection, with Leeston and Lake Road forming the southern approach. The intersection does not have any auxiliary tuning lanes.

3.1.8. Towards the southwest of the plan change area, Harmans Road meets Feredays Road at a 'stop' controlled crossroads where traffic on Feredays Road retains the right of way. There is an auxiliary turning lane for the east to south movement, due to the angle at which the southern approach meets the intersection, but no other auxiliary lanes. Sight distances are excellent in all directions. The speed limit on all approaches is 100km/h.



Photograph 6: Arial Photograph of Feredays Road / Harmans Road Intersection

3.1.9. Feredays Road has a flat and straight alignment, with two traffic lanes of 3.5m and sealed shoulders of around 0.5m. It has a centreline and edgeline markings, and in most locations has a grassed verge of around 7m width. The western part of the road is subject to a 100km/h speed limit, but this reduces to 50km/h approximately 200m east of Harmans Road at a small speed threshold treatment.

Photograph 7: Feredays Road Looking East

3.1.10. There are several priority intersections on Feredays Road to the east of Harmans Road. Approximately 350m to the east of the Feredays Road / Harmans Road intersection, Clausen Avenue joins from the south. This serves the Millbridge Estate residential subdivision. The intersection is 'give-way' controlled and has kerbing on the southern side. There are no auxiliary lanes for turning traffic.

Photograph 8: Feredays Road / Clausen Avenue Intersection Looking West

3.1.11. Approximately 750m to the east of the Feredays Road / Harmans Road intersection, Chapman Street joins from the south. Chapman Street serves residential development, and is formed with two traffic lanes. The intersection is priority 'give-way' controlled and has excellent sight distances on each side. Immediately west of the intersection is a short parking lane of 2.7m width (potentially associated with parking for the church) but on the eastern side the grassed verge remains in place.

Photograph 9: Feredays Road / Chapman Street Intersection Looking West

3.1.12. Feredays Road changes its name to High Street and some 230m east of Chapman Street, Spring Place joins High Street from the north. The intersection does not have any signs or markings.

Photograph 10: High Street / Spring Place Intersection Looking East

3.1.13. Spring Place is a cul-de-sac which has two traffic lanes. The carriageway width varies, being 8.5m wide towards the north but towards the south there is a grassed berm located between the carriageway and the kerbs, meaning that carriageway width reduces to 5.7m. There are numerous private driveways on both sides of the road.

Photograph 11: Southern Section of Spring Place Looking South

3.1.14. The High Street / Market Street intersection is located approximately 150m east of Spring Place.

3.2. Non-Car Modes of Travel

3.2.1. Since the plan change area is largely rural, there is limited infrastructure for non-car users in the immediate vicinity. However there is a footpath that runs along the southern side of High Street and Feredays Road as far as Clausen Avenue, where it then turns into the subdivision. This is 1.5m wide. There are also 1.5m footpaths on the eastern side of Spring Place, both sides of Market Street and on southern side of Leeston Dunsandel Road between Market Street and Ellesmere College.

Photograph 12: Footpath on Southern Side of Feredays Road / High Street

3.2.2. There is no specific infrastructure provided for cyclists or buses in the immediate area.

4. Current Transportation Patterns

4.1. Traffic Flows

Prevailing Traffic Flows

4.1.1. Selwyn District Council carries out regular traffic counts on the key vehicle routes throughout the district. Data recorded in the MobileRoad database shows that the current traffic flows are:

- Harmans Road: 250 vehicles per day;
- Feredays Road (east of Harmans Road): 3,100 vehicles per day;
- High Street (east of Spring Place): 4,060 vehicles per day
- Spring Place: 220 vehicles per day;
- Leeston Dunsandel Road: 600 vehicles per day; and
- Market Street: 1,000 vehicles per day.

4.1.2. The peak hour traffic flows on a road are typically no more than 15% of the daily volume, which suggests that in the peak hours the likely volumes are:

- Harmans Road: 35 vehicles (two-way);
- Feredays Road (east of Harmans Road): 470 vehicles (two-way);
- High Street (east of Spring Place): 610 vehicles (two-way);
- Spring Place: 33 vehicles (two-way);
- Leeston Dunsandel Road: 90 vehicles (two-way); and
- Market Street: 150 vehicles (two-way).

4.1.3. Since Leeston is a small town (recorded as less than 2,000 people in 2018), the low traffic flows are not unexpected. It can also be expected that ambient traffic growth is negligible since it will primarily be influenced by growth of the settlement, which has been limited.

4.1.4. 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, Harmans Road, Spring Place, Leeston Dunsandel Road and Market Street all provide Level of Service A, the best available. Feredays Road provides Level of Service B and High Street provides Level of Service C, both of which continues to represent a good level of service.

4.1.5. 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 1: Extract from Table 6.1 of Austroads Guide to Traffic Management Part 3 (Intersection Volumes below which Capacity Analysis is Unnecessary)

4.1.6. Based on this, no analysis has been carried out at any of the intersections since the traffic flows fall below these thresholds and the intersections 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 rural, it can reasonably be expected that it will be relatively infrequently used by pedestrians and cyclists. The small size of Leeston means that volumes of these road users will be small, other than around the college at the start and end of the academic day. As such, the current levels of provision are considered to be adequate.

4.2.2. There is one scheduled public transport services that operates in Leeston. This is a commuter service to and from Christchurch, which runs once a day. It departs Leeston at 7am and the return journey arrives in Leeston at 5:50pm. The bus stop is located on Chervier Street, meaning that the service passes along High Street adjacent to the plan change area.

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 plan change area. In view of the low traffic flows, a ten-year period has been adopted and therefore all reported crashes between 2009 and 2019 were identified, for the area bounded by Harmans Road, Leeston Dunsandel Road, Market Street, High Street and Feredays Road (and including their respective intersections).

4.3.2. This showed that there have been 16 reported crashes.

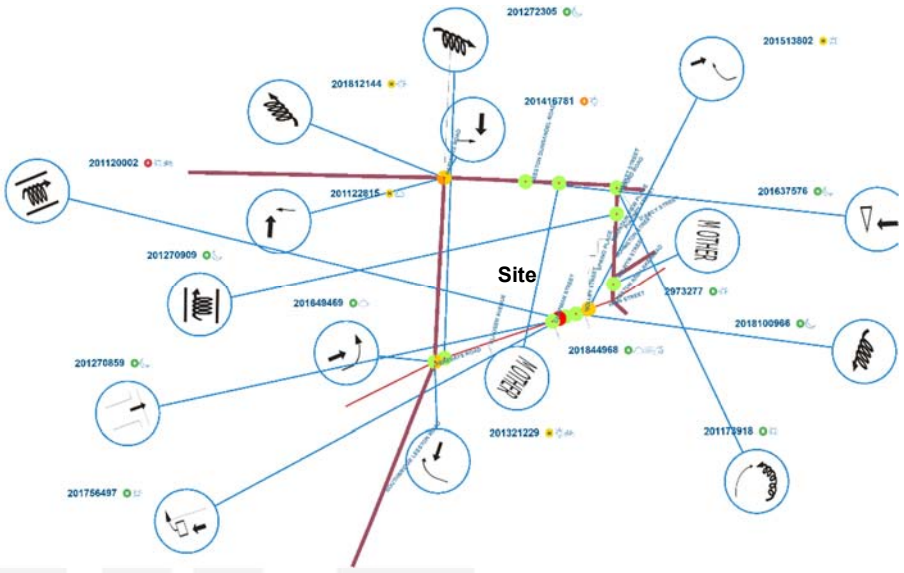


Figure 3: Location and Nature of Crashes

4.3.3. No crashes have been recorded on Harmans Road itself. However there have been two crashes at the Feredays Road / Harman Road intersection:

- One crash occurred when a car turning right from west to south was struck by a car travelling west to east which overtook them when turning. This did not result in any injuries;
- One crash occurred when a car emerging from the southern approach to the intersection struct a cyclist travelling east to west on Feredays Road. This resulted in minor injuries.

4.3.4. Three crashes have been recorded at the Leeston Dunsandel Road / Harman Road intersection:

- Two crashes occurred when a car travelling from north to south on Harmans Road failed to stop and was struck by a car travelling from east to west. In one case brake failure was noted as a contributing factor. One crash resulted in minor injuries and the other resulted in serious injuries; and
- One crash occurred when an eastbound driver lost control, left the road and struck a powerpole. This resulted in minor injuries.

4.3.5. Three crashes have been recorded on Leeston Dunsandel Road:

- One crash occurred around 250m west of the college, when a vehicle struck a cow. This did not result in any injuries;
- One crash occurred immediately adjacent to the college, when a driver attempted a u-turn but skidded on ice and left the road. This did not result in any injuries;
- One crash occurred at the curve where Leeston Dunsandel Road becomes Market Street. A driver travelled around the curve too quickly, crossed the centreline and struck an oncoming vehicle. This did not result in any injuries.

4.3.6. Two crashes have been recorded on Market Street:

- One crash occurred on the northern section of Market Street when a driver struck a powerpole. The crash report notes that driver intoxication was a contributing factor, and the crash did not result in any injuries;
- One crash occurred on the southern section of Market Street when a driver carried out a u-turn movement too quickly, lost control and struck a parked vehicle. The crash did not result in any injuries.

4.3.7. Six crashes have been recorded on Feredays Road / High Street:

- One crash occurred just east of the Feredays Road / Harmans Road intersection when an eastbound driver lost control and left the road. The crash report notes that driver intoxication was a contributing factor, and the crash did not result in any injuries;
- One crash occurred at the Feredays Road / Chapman Street intersection, when a driver emerging from Chapman Road failed to turn and went straight ahead, leaving the road on the northern side. The crash report notes that driver intoxication was a contributing factor, and the crash did not result in any injuries;
- One crash occurred between Chapman Street and Spring Place when a driver swerved to avoid a cat and struck a concrete block by the side of the road. The crash did not result in any injuries;
- One crash occurred between Chapman Street and Spring Place when a driver turning from the east into a driveway was struck from the rear by a following vehicle. The crash did not result in any injuries;
- One crash occurred between Chapman Street and Spring Place when a cyclist fell off their cycle and was struck by a vehicle. The crash report notes that cyclist intoxication was a contributing factor, and the crash resulted in fatal injuries to the cyclist;
- One crash occurred at the High Street / Spring Place intersection when a driver turning right into Spring Place struck a vehicle travelling from west to east on High Street. The crash resulted in minor injuries.

4.3.8. The reported crashes took place at different locations and/or had different contributing factors. On this basis, it is 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 more intensive residential development to occur. The part of the plan change area to the north of Leeston Dunsandel Road is expected to have 41 residential lots with the bulk of the plan change area towards the south having 328 lots. An indicative subdivision plan for the area is shown below.

Figure 4: Indicative Subdivision Plan (Extract from Baseline Group Drawing)

5.2. It can be seen that the plan change area is expected to be well-connected to the adjacent roading networks. Two road links are shown onto Feredays Road / High Street, directly opposite Clausen Avenue and Chapman Street. Both of these form routes through the plan change area such that there is also a new road link onto Leeston Dunsandel Road towards the north. Photographs 7 and 8 above show the current configurations of these intersections.

5.3. With regard to the connection onto Spring Place, there is presently an allotment which is undeveloped of 16.5m width, where a roading connection is proposed.

Photograph 13: Location of Proposed Roading Connection onto Spring Place

5.4. There are also connections to the east onto Harmans Road, and the northernmost part of the plan change area has one road connection onto Leeston Dunsandel Road.

6. Traffic Generation and Distribution

6.1. Traffic Generation

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, it is likely that some traffic will be associated with employment locations in Leeston but there is also likely to be travel to/from local destinations also. As a result, it is likely that there will be commuting to/from the township. 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.

6.1.3. In the morning peak hour, 90% of these vehicles are likely to be exiting the site, with 65% of the generated vehicle movements entering the plan change site in the evening peak hour.

Period	Area North of Leeston Dunsandel Road			Area South of Leeston Dunsandel Road		
	In	Out	Total	In	Out	Total
Morning Peak Hour	4	37	41	33	295	328
Evening Peak Hour	27	14	41	213	115	328
Per Day	164	164	328	1,312	1,312	2,624

Table 2: Traffic Generation of the Proposed Plan Change

6.2. Trip Distribution

6.2.1. In terms of the distribution of trips, residents travelling towards Rolleston, Lincoln and Christchurch (the greatest centres of employment) will travel eastwards, as routes towards the immediate north of the plan change area are indirect. Travel towards the west will only be towards locations such as Dunsandel and across the Rakaia River in the direction of Ashburton.

6.2.2. On this basis, it can be expected that around 10% of generated traffic will travel to/from the west with the balance traveling eastwards.

6.2.3. Drivers tend to select routes which minimise their journey time. Consequently it can be expected that people living in the northernmost part of the plan change area will use Leeston Dunsandel Road and Market Street to travel eastwards, rather than travelling through the site which is slightly longer and will be slower. Drivers living towards the south will use the route via High Street.

6.2.4. It is expected that volumes on Harmans Road will increase only slightly since there are few residences for which this is a convenient route (in the order of 20 residences). However, the connection through to Springs Road will be convenient for around 60-70 residences.

6.2.5. Overall then, for the purposes of this analysis, the following distribution has been used

Area	Number of Residences	Route	Morning Peak Hr		Evening Peak Hr	
			In	Out	In	Out
North of Leeston Dunsandel Road	40	10% west via Leeston Dunsandel Road	0	4	3	1
		90% east via Leeston Dunsandel Road	4	32	23	13
Eastern side	70	10% west via Spring Place and Feredays Road	1	6	5	2
		90% east via Spring Place and Feredays Road	6	57	41	22
Western side	20	10% north via Harmans Rd then west on Leeston Dunsandel Rd	0	2	1	1
		90% south via Harmans Road then east on Feredays Road	2	16	12	6
Northern side	50	10% west via Leeston Dunsandel Road	1	5	3	2
		90% east via Leeston Dunsandel Road	5	41	29	16
Southern side	190	10% west via Spring Place and Feredays Road	2	17	12	7
		90% east via Spring Place and Feredays Road	17	154	111	60
Total	**370**	**-**	**38**	**334**	**240**	**130**

Table 3: Traffic Distribution of Proposed Plan Change

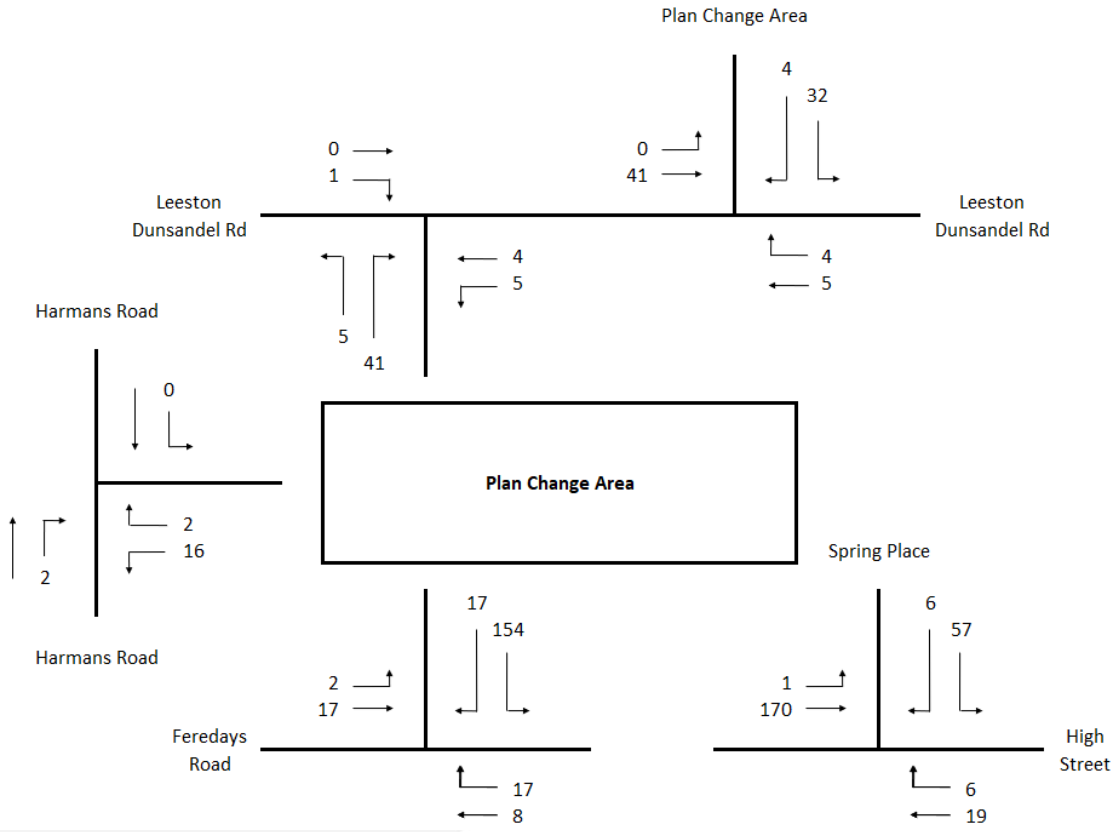


Figure 5: Traffic Generation, Morning Peak Hour

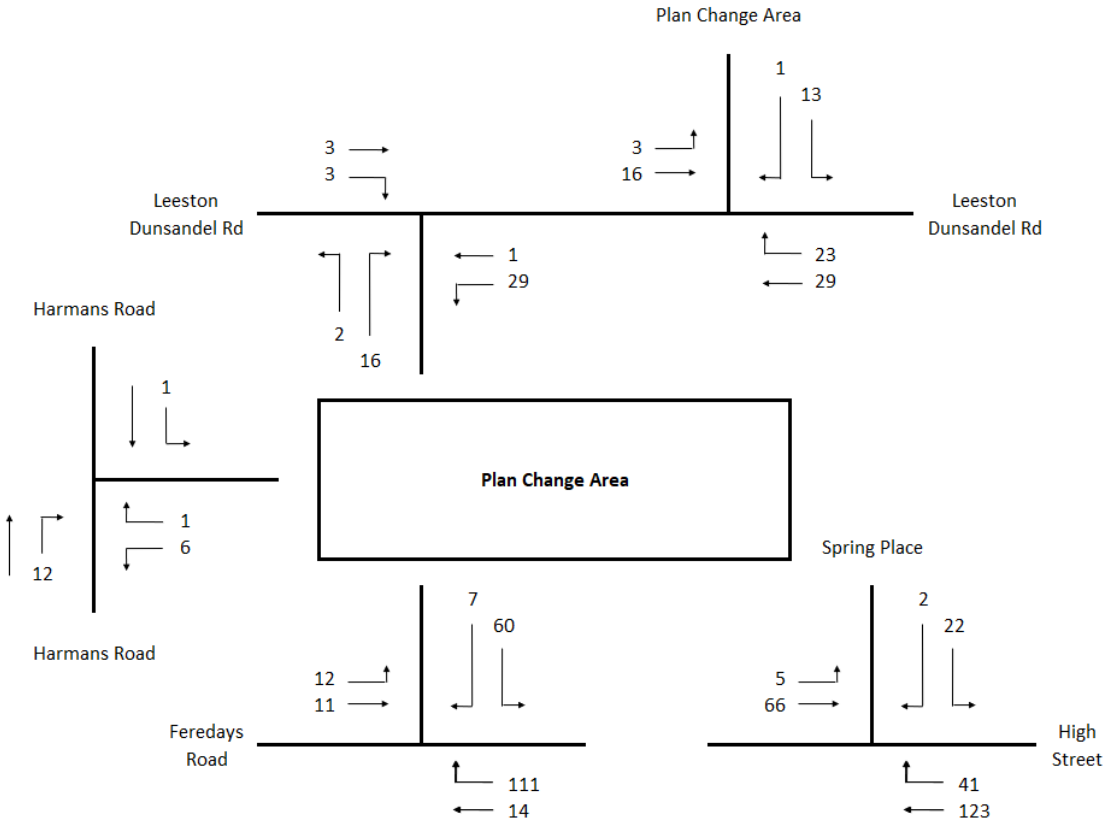


Figure 6: Traffic Generation, Evening Peak Hour

7. Effects on the Transportation Networks

7.1. Roading Network Capacity

7.1.1. The changes in traffic flows are as follows:

Road	Current Traffic Volumes		Traffic Volumes Generated by Plan Change		Total Traffic Volumes with Plan Change	
	Per Day	Peak Hour	Per Day	Peak Hour	Per Day	Peak Hour
Harmans Road	250	35	144	18	394	53
Feredays Road (east of Harmans Road)	3,100	470	352	44	3452	514
High Street (east of Spring Place)	4,060	610	2,016	252	6076	862
Spring Place	220	33	560	70	780	103
Leeston Dunsandel Road (east)	600	90	656	82	1256	172
Leeston Dunsandel Road (west)	600	90	96	12	696	102
Market Street	1,000	150	656	82	1656	232

Table 4: Traffic Flows on Adjacent Road Network

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 proposal. This shows that the roads will continue to provide the same levels of service other than Feredays Road which changes from Level of Service B to Level of Service C. This continues to represent a good level of service.

7.2. Intersection Capacity

7.2.1. The traffic volumes continue to fall below the thresholds at which there is a need for detailed traffic analyses at most locations, and therefore the intersections will continue to operate under free-flow conditions. The intersection with the heaviest traffic flows is at High Street / Spring Place and therefore this 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
High Street (east(	R	8.7	0	A	7.1	1	A
Spring Place	L	8.4	0	A	6.5	0	A
	R	10.6	0	B	11.1	0	B
High Street (west)	L	5.6	0	A	5.6	0	A

Table 5: Assessment of High Street / Spring Place Intersection, with Full Development of Plan Change Area

7.2.2. It can be seen that even at the most heavily-trafficked intersection, queues and delays remain low with excellent levels of service provided for each turning movement.

7.3. Potential Upgrading of Existing Roads

7.3.1. The existing roads in the area have the following characteristics:

- Harmans Road: 20m legal width, 6.5m formed width, no footpath;
- Feredays Road / High Street: 20m legal width, 7.0m movement lanes, footpath on eastern section;
- Spring Place: 17m legal width, 5.7m to 8.5m movement lanes, footpath on eastern side;
- Leeston Dunsandel Road: 20m legal width, 6.6m movement lanes, footpath on eastern section;
- Market Street: 20m legal width, 11m movement lanes, footpath on both sides.

7.3.2. Since the plan change request will increase the traffic flows on these roads, an assessment has been carried out to ensure that they remain appropriate for the greater volumes.

7.3.3. At Harmans Road, the current carriageway width of 6.5m is appropriate for a Local Road, and the small increase in traffic associated with the plan change is unlikely to justify a change in status of the road. No changes are therefore considered necessary for Harmans Road.

7.3.4. As an Arterial Road, Feredays Road should have a carriageway width of at least 7.5m to meet the District Plan requirements. Although the movement lanes are marked as less than this, the seal width meets this requirement. Further, west of the plan change area, the increase in traffic is low (9% over the prevailing volumes) which is insufficient to justify any improvement. East of the accesses into the plan change, the increase in traffic is greater (more than 40%) but the overall traffic flow remains relatively low.

7.3.5. Leeston Dunsandel Road is similarly an Arterial Road requiring a 7.5m wide carriageway. Again, this is provided, although the movement lanes are marked as less than this. The increases towards the west of the plan change area are modest and although there is a doubling of the traffic flows to the east of the plan change area, the total volume of 180 vehicles (two-way) in the peak hour equates to an average of just one vehicle movement very 20 seconds. No changes are therefore considered necessary for Leeston Dunsandel Road.

7.3.6. High Street is presently a Collector Road and therefore should have a carriageway width of at least 11m with a footpath on both sides. This is not achieved, since there is a footpath only on the southern side, and the carriageway width is around 8.5m (including the shoulders). However this additional width appears to be related to the provision of a parking lane, which is not present on High Street. The proposed plan change will not affect parking in the immediate area, and the extent of frontage development on High Street means that significant on-street parking is unlikely to arise.

7.3.7. Market Street is also a Collector Road, but over much of its length currently meets the Council's requirements. There are localised sections where there is no parking lane in favour of a grassed verge being provided, but this does not appear to currently adversely affect the operation of the road.

7.3.8. Spring Place is presently a Local Road with a 5.7m to 8.5m formed width. In view of the number of lots that would be served, an appropriate classification would be as a Local Major road, for which a legal width of 17m is appropriate (as is provided) but which requires two traffic lanes plus a parking lane within an 8.5m carriageway. This will require the southernmost section of

Spring Place to be reconfigured slightly, with the removal of the grassed berms (which will replicate the cross-section of the road further north).

7.3.9. Overall then, it is considered that only Spring Place requires some amendment as a result of the traffic generated by the proposed plan change.

7.3.10. Within the site itself, there are no impediments to achieving compliance with the District Plan in respect of the legal or formed widths of the roads.

7.4. Form of Access Intersections

7.4.1. The intersection modelling undertaken above was carried out on the basis of the plan change area being served by priority intersections. Even assessing the intersection with the greatest traffic volumes, queues and delays were very low.

7.4.2. The legal widths of the frontage roads are sufficiently wide to accommodate priority intersections, and this form of provision would be consistent with the existing intersections in the immediate vicinity. The flat and straight alignments of the existing roading network mean that excellent sight distances will be achieved at the intersections

7.4.3. Accordingly it is considered that priority intersections are an appropriate general form of intersection to serve the plan change area.

7.5. Non-Car Modes of Travel

7.5.1. It is likely that the development will lead to increased volumes of walking and cycling in the area, but the location of Leeston means that these trips will either be within the township or for longer-distance recreational purposes.

7.5.2. As noted above, within the site there are no reasons why the appropriate levels of provision could not be made. Externally, the roads provided the appropriate level of provision for pedestrians.

7.5.3. In respect of cycling, the District Plan sets out that for urban roads, Collector and Arterial Roads should have specific provision for cyclists. However there is no provision made on Feredays Road, High Street, Market Street or Leeston Dunsandel Road. This is an existing deficiency on the roading network, but there are no reasons why provision could not be made on the relevant roads. It is considered that this is a matter than should be addressed at the time that land use or subdivision consent is sought.

7.6. Road Safety

7.6.1. The crash history in the vicinity of the plan change area does not indicate that there are particular features or factors that would be affected by the proposed plan change.

7.6.2. 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.

7.6.3. Based on site visits, there are no deficiencies in respect of sight distances at any of the intersections onto the external roads. However at the proposed roading connection onto Spring Road there is a transformer located on the southwestern quadrant of the intersection. This may affect the sight distance in this location and thus may need to be relocated.

Photograph 14: Transformer on Spring Place

7.6.4. The proposal allows for new accesses into the plan change area to the immediate north of Clausen Avenue and Chapman Street, meaning that these would become crossroads. Both of these intersections lie within the 50km/h speed limit zone (meaning that they will not be high-speed crossroads) and in practice there will be little traffic crossing Feredays Road – rather, vehicles will turn to the east and west. Accordingly it is not considered that this form of intersection will result in any road safety concerns.

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.

8.1.2. Since the proposal will extend the current urban area of Leeston, the review has been undertaken against the Township Volume of the District Plan.

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. Under Appendix E13.3.1.4, cul-de-sacs are restricted to a maximum length of 150m, but two of the four cul-de-sacs proposed are more than 200m in length. It is considered that this can be addressed through minor redesign of the subdivision plans in due course.

8.2.4. Appendix E13.3.2 addresses intersection spacing. The classification of roads within the plan change area has not yet been determined but it would be reasonable at this stage to expect that they will be Local Roads and as such, a separate between intersections of 75m is required. This is achieved.

8.2.5. For completeness, the two access intersections onto Feredays Road do not meet this requirement because they align with Clausen Avenue and Chapman Road. However this has been done as a specific aspect of the design

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 roads *within* the site onto which access is gained have the same classification meaning that there is no preference as to where the accessways should be located (Rule 5.2.1.2). Externally, vehicle crossings can connect to the most appropriate road as defined under this Rule.

8.3.2. The site is relatively flat so achieving appropriate gradients should not be problematic (Rules 5.2.1.3 and 5.2.1.4).

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

8.3.4. 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 internally.

8.4.3. Externally, there are likely to be non-compliances with this Rule at Spring Road, where there are driveways proximate to the proposed roading connection. However there is no ability to relocate this point of access since the remaining lots are all developed.

8.4.4. One reason for this Rule (which is common to most District Plans) is to ensure that drivers do not become confused about the intentions of other drivers turning ahead of them (that is, whether they are unsure whether a driver is turning into an access or into an intersection). In this case, Spring Place is a Local Road and therefore drivers can be expected to have a high degree of familiarity with the layout. Speeds will also be low. Consequently, this non-compliance can be supported (although will require detailed assessment at the time of subdivision).

8.4.5. Appendix E13.2.3 addresses sight distances from vehicle crossings, and in this case 45m is required since the roads will be subject to a 50km/h speed limit. It is possible that compliance with this provision will not be achieved, because in some locations the sight distance will be constrained by the presence of intersections or curves in the road geometry, which limit the sightline. However the intersection or curve will also mean that drivers have to slow (and in the case of an intersection, potentially stop) which will result in speeds that are much lower than the maximum permitted. Accordingly, it is considered that the plan change provisions could seek to exempt certain lots from complying this this particular provision, or an assessment of the non-compliance could be made at the time a subdivision consent is applied for.

8.4.6. 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).

8.4.7. Appendix E13.2.5 addresses the standard of vehicle crossings. Since residential activity is proposed, standard vehicle crossings are required and these can be provided.

8.4.8. The crossings can be sealed (Rule 5.3.1.2).

8.4.9. The subdivision plan indicates that direct access is proposed onto Leeston Dunsandel Road and Feredays Road. These are both Arterial Roads, and thus the arrangement is not permitted under Rule 5.3.1.4 unless the speed limit is 70km/h or less. In this case, there is proposed development to the west of the 50km/h / 100km/h speed limit threshold on both roads.

8.4.10. Speed limits are set based on a number of factors, but one aspect is the extent to which there is frontage development. As such, given that the site is currently rural, the frontage roads having a speed limit of 100km/h is not unusual nor unreasonable. However the presence of development means that there is a (technical) case for reducing the speed limit. Such an outcome is very common, for example, speeds around the Faringdon subdivision in Rolleston were 100km/h prior to the development of the area, and afterwards were reduced to 50km/h.

8.4.11. It is expected therefore that the speed limit thresholds will move further west as a result of the development of the proposed plan change area, such that both Arterial Roads will be subject to a 50km/h speed limit from immediately east of Harmans Road.

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

8.5.1. The site is not in close proximity to a road/rail crossing.

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), 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 is not required (Appendix E13.1.11).

8.7. Summary

8.7.1. The layout of the plan change area is capable of complying with the bulk of the requirements of the District Plan, although there are a small number of exceptions.

- Appendix E13.3.1.4: there are two cul-de-sacs than are more than 200m in length compared to a requirement for 150m;
- Appendix E13.3.2: the two access intersections onto Feredays Road align with Clausen Avenue and Chapman Road rather than being separated by 75m;
- Appendix E13.2.2: there will be driveways on Spring Road that are closer than 10m from the proposed new road intersection;
- Appendix E13.2.3: sight distances are likely to be lower than requited under the Plan for driveways close to intersections and curves; and
- Rule 5.3.1.4: Vehicle crossings onto Arterials Roads subject to a speed of more than 70km/h are not permitted.

8.7.2. For the reasons set out above, these non-compliances can be supported at this stage.

9. Conclusions

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

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, even when allowing for full site development. In most instances, traffic volumes remain below the thresholds at which a detailed traffic analysis is required of intersections, meaning that the intersections will operate under free-flow conditions. Even at the most heavily-trafficked intersection, queues and delays remain low with the plan change site developed.

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. New transportation infrastructure which will be provided will meet appropriate guides and standards (or exemptions from the District Plan will be sought when land use and subdivision consents are applied for).

9.4. The indicative subdivision plan will largely meet (or is capable of meeting) the majority of transportation requirements of the District Plan. At this stage, five likely non-compliances with the Plan have been identified but at this stage, all can be supported. One matter to highlight is that in order for development of the plan change area to progress, the speed limit thresholds on both Feredays Road and Leeston Dunsandel Road will need to move to just east of Harmans Road such that those sections of road are subject to a 50km/h rather than the current 100km/h. This is a common outcome of development, but nevertheless, is outside the remit of the RMA.

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

Carriageway Consulting Limited
August 2019

CARRIAGEWAY
CONSULTING

traffic engineering | transport planning

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

CCL Ref: 14379-171019-tisch

17 October 2019

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

Adrianne Tisch
Baseline Group Limited

By e-mail only: adrianne@blg.nz

Dear Adrianne

Proposed Plan Change, Leeston: Response to Council Request for Further Information

Further to e-mails and our discussions, we have reviewed the Request for Further Information (**RFI**) issued by Selwyn District Council dated 19 September 2019. There are two matters relating to traffic issues, and we respond to both below.

Assessment of Market Street / High Street Intersection

In the Transportation Assessment, we noted that the traffic volumes generally fell below the threshold at which a formal intersection assessment was justified, even with the plan change area fully developed. However in view of the RFI, we have undertaken a more detailed assessment of the Market Street / High Street intersection.

To determine the existing traffic volumes, we surveyed the intersection during October 2019, and the results are shown below.

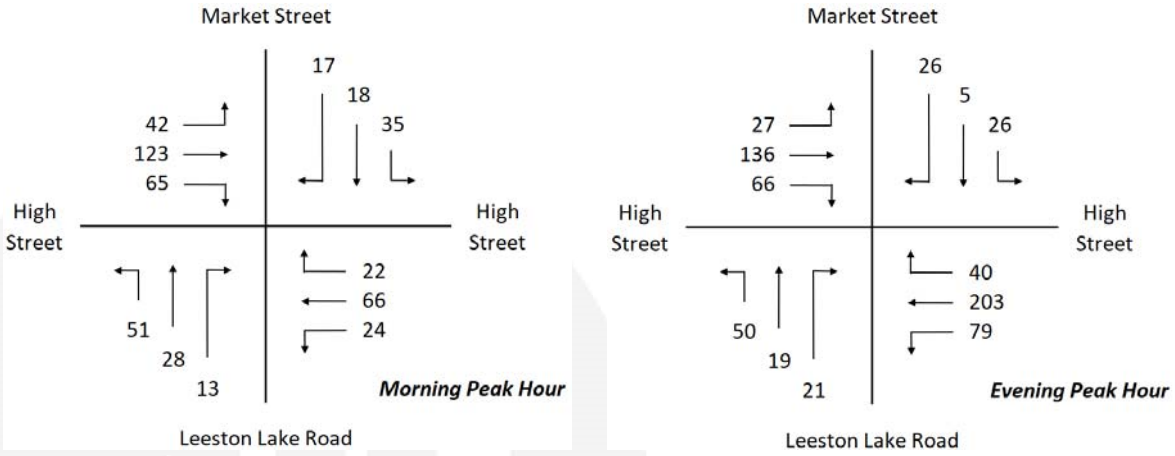


Figure 1: 2019 Peak Hour Traffic Volumes at Market Street / High Street Intersection

By way of a check, in the Transportation Assessment we identified that the traffic flows on High Street (west) were expected to be around 610 vehicles in the peak hour. The survey showed 508 vehicles in the peak hour, indicating that the Transportation Assessment used conservatively high values.

We then modelled the existing performance of the intersection (that is, without the plan change area being developed) 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
Leeston Lake Road (south)	L	8.5	0.2	A	9.1	0.2	A
	T	10.9	0.3	B	13.5	0.4	B
	R	12.0	0.3	B	15.2	0.4	C
High Street (east)	L	5.9	0.2	A	5.9	0.4	A
	R	6.1	0.2	A	6.3	0.4	A
Market Street (north)	L	8.7	0.1	A	8.8	0.1	A
	T	10.7	0.2	B	13.9	0.3	B
	R	12.5	0.2	B	15.3	0.3	C
High Street (west)	L	5.6	0.0	A	5.6	0.0	A
	R	5.9	0.2	A	6.7	0.2	A

Table 1: Existing (2019) Peak Hour Levels of Service at the Market Street / High Street Intersection

The results show low queues and delays. This aligns with our initial assessment, and also our observations on site during the surveys.

Figures 5 and 6 of the Transportation Assessment show the extent of traffic increase on High Street (west) arising from full development of the plan change area. However no assessment was included within the Transportation Assessment of the directions that these vehicles would travel. In this regard, we consider that few vehicles will be associated with Market Street, because any driver travelling in this direction is more likely to travel through the site and use Leeston-Dunsandel Road instead. Leeston Lake Road serves relatively little development, but High Street provides a route to major employment locations. Consequently for the purposes of our assessment, we have assigned all generated traffic to the east-west route.

By way of further discussion, the greatest delays at any priority intersection arise for the right-turn movement from the minor approaches. In this case though, the plan change does not increase the volume of traffic making this turn. Consequently, the greatest effect of the plan change traffic relates to the obstruction of the existing right-turn movements, and this arises from increases in the east-west traffic flow. Overall then, assigning all generated traffic to the east-west route results in a robust (that is, worst case) assessment of the intersection.

The traffic flows arising from development of the plan change area are:

- Morning peak hour:
  - 227 vehicles eastbound;
  - 25 vehicles westbound
- Evening peak hour:
  - 88 vehicles eastbound;
  - 164 vehicles westbound

We have added these vehicles into the traffic models 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
Leeston Lake Road (south)	L	8.6	0.2	A	10.2	0.2	B
	T	14.9	0.4	B	19.3	0.6	C
	R	17.0	0.4	C	22.7	0.6	C
High Street (east)	L	6.7	0.3	A	6.1	0.5	A
	R	7.3	0.3	A	6.8	0.5	A
Market Street (north)	L	10.0	0.1	A	9.2	0.1	A
	T	14.6	0.4	B	20.0	0.5	C
	R	18.0	0.4	C	22.8	0.5	C
High Street (west)	L	5.6	0.0	A	5.6	0.0	A
	R	6.0	0.2	A	7.6	0.3	A

Table 2: Peak Hour Levels of Service at the Market Street / High Street Intersection with Full Development of Plan Change Area

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
Leeston Lake Road (south)	L	+0.1	-	-	+1.1	-	A to B
	T	+4.0	+0.1	-	+5.8	+0.2	B to C
	R	+5.0	+0.1	B to C	+7.5	+0.2	-
High Street (east)	L	+0.8	+0.1	-	+0.2	+0.1	-
	R	+1.2	+0.1	-	+0.5	+0.1	-
Market Street (north)	L	+1.3	-	-	+0.4	-	-
	T	+3.9	+0.2	-	+6.1	+0.2	B to C
	R	+5.5	+0.2	B to C	+7.5	+0.2	-
High Street (west)	L	-	-	-	-	-	-
	R	+0.1	-	-	+0.9	+0.1	-

Table 3: Change in Peak Hour Levels of Service at the Market Street / High Street Intersection with and without Full Development of Plan Change Area

The modelling shows that there is very little change in queue length on any approach, and with regard to the delay, the greatest increase is 7.5 seconds. Overall, we consider that the intersection continues to operate with a good level of service, and Level of Service C (the lowest on any approach) is not unreasonable for an urban intersection in the peak hours.

Assessment of Effects if Connection to Spring Place is not Formed

The RFI queries the contingency plan if the connection through to Spring Place cannot be formed.

Based on the information provided, we understand that if the Spring Place connection is not in place, then there will be a secondary road that runs along the western side of the proposed reserve, and traffic will instead use the main north-south route through the site. As such, these vehicles would then join the external roading network at the new Feredays Road / Plan Change Area Access intersection.

One outcome of this is that this intersection would experience a greater traffic flow than set out in the Transportation Assessment (where some traffic used Spring Place). For completeness we have shown the expected traffic flows below (with full development of the plan change area):

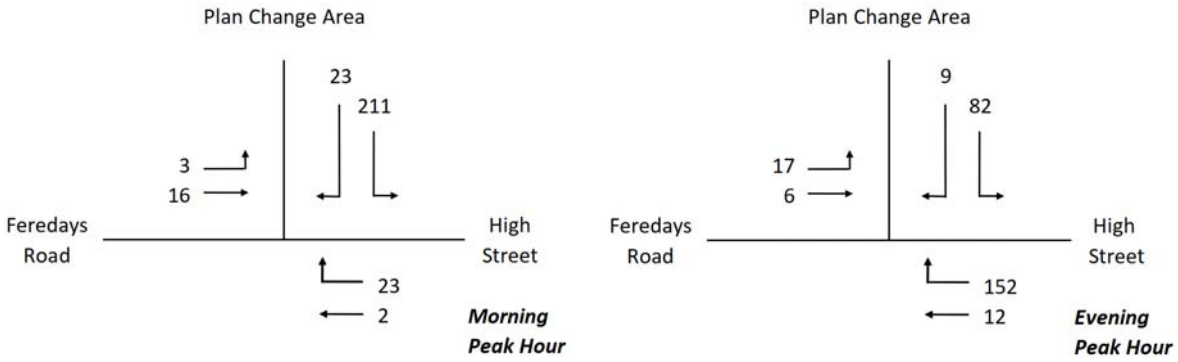


Figure 2: Traffic Generation from Plan Change Area onto Feredays Road (No Spring Place Access)

Allowing for the traffic flows on Feredays Road (as set out in Section 4.1.2 of the Transportation Assessment), this leads to the following intersection performance (assuming a priority intersection):

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
High Street (east)	T	0.3	0.2	A	0.6	1.3	A
	R	6.9	0.2	A	6.7	1.3	A
Plan Change Area Access	L	6.9	0.8	A	6.3	0.3	A
	R	7.9	0.1	A	8.9	0.0	A
Feredays Road (west)	L	5.6	0.0	A	5.6	0.0	A
	T	0.0	0.0	A	0.0	0.0	A

Table 4: Peak Hour Levels of Service at the Feredays Road / Plan Change Area Site Access Intersection with Full Development of Plan Change Area

The intersection provides an excellent level of service with low queues and delays, even under the expected traffic loading. In the event that the intersection was to be a roundabout (as we understand has been suggested), queues and delays would remain similarly small.

I trust that this responds to the Council's RFI, but please do not hesitate to contact me if you require anything further or clarification of any issues.

Kind regards
Carriageway Consulting Limited

Andy Carr
Traffic Engineer | Director

Mobile 027 561 1967
Email andy.carr@carriageway.co.nz