Appendix 3

Transport Assessment – November 2010 and March 2011

Silver Stream Estates Limited

Private Plan Change Request, Darfield

Transportation Assessment Report

Traffic Design Group

September 2010

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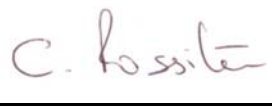
Silver Stream Estates Limited

Private Plan Change Request, Darfield

Transportation Assessment Report Quality Assurance Statement

Prepared by:



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Status: FINAL

Date: September 2010

Executive Summary

Silver Stream Estates Limited proposes a private Plan Change to the Selwyn District Plan to facilitate residential and business development on the south-eastern edge of Darfield. The proposed Plan Change has two objectives. Firstly, it will relocate the Business 2 (B2) zone accessed from Mathias Street to south of State Highway 73. Secondly, it proposes to remove the Deferral status from the Living 2A Deferred zone to the south-east of the B2 zone and create a new Living 1 (L1) zone on part of the land that is currently zoned L2A Deferred.

While the proposed Plan Change will increase the size of the business zone, its primary purpose is to facilitate residential development.

This Transportation Assessment Report includes a description of the transportation networks in the vicinity of the Plan Change area documents and provides an assessment of the likely transportation effects of development of the Plan Change area.

The Outline Development Plan that accompanies the Plan Change request has been assessed against the transportation related rules of the Selwyn District Plan and it is considered that the proposed road network within the Plan Change area will be fully compliant with those rules.

The analysis of the expected traffic effects associated with the development that would be facilitated by the proposed Plan Change has also determined that the existing road network has sufficient capacity to accommodate the expected traffic volumes. It is therefore considered that the proposed residential development that would be facilitated by the proposed Plan Change can be safely and efficiently accommodated within the local transportation environment.

Consequently, there are considered to be no transportation related issues that would prevent approval of proposed Plan Change.

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1. Introduction

Silver Stream Estates Limited proposes a private Plan Change to the Selwyn District Plan to facilitate residential and business development on the south-eastern edge of Darfield. The proposed Plan Change has two objectives. Firstly, it will relocate the Business 2 (B2) zone accessed from Mathias Street to south of State Highway 73. Secondly, it proposes to remove the Deferral status from the Living 2A Deferred zone to the south-east of the B2 zone and create a new Living 1 (L1) zone on part of the land currently zoned as L2A Deferred.

This Transportation Assessment Report documents and summarises an assessment of the transport related issues associated with the development facilitated by the proposed Plan Change. The assessment undertaken considers the existing transport environment in the area, the traffic generation associated with the proposed development and provides an assessment of the potential transport related effects.

2. Existing Transport Infrastructure

2.1 Site Location

The proposed Plan Change site lies to the east of Darfield on the southern side of West Coast Road (SH73). Figure 1 shows the location of the site within the surrounding road transport network including the classifications of the Selwyn District Plan (District Plan) road hierarchy.

The adjacent activities are most notably dominated by the existing settlement of Darfield to the west, surrounding a number of existing retail and commercial activities within the town centre.

2.2 Site Description

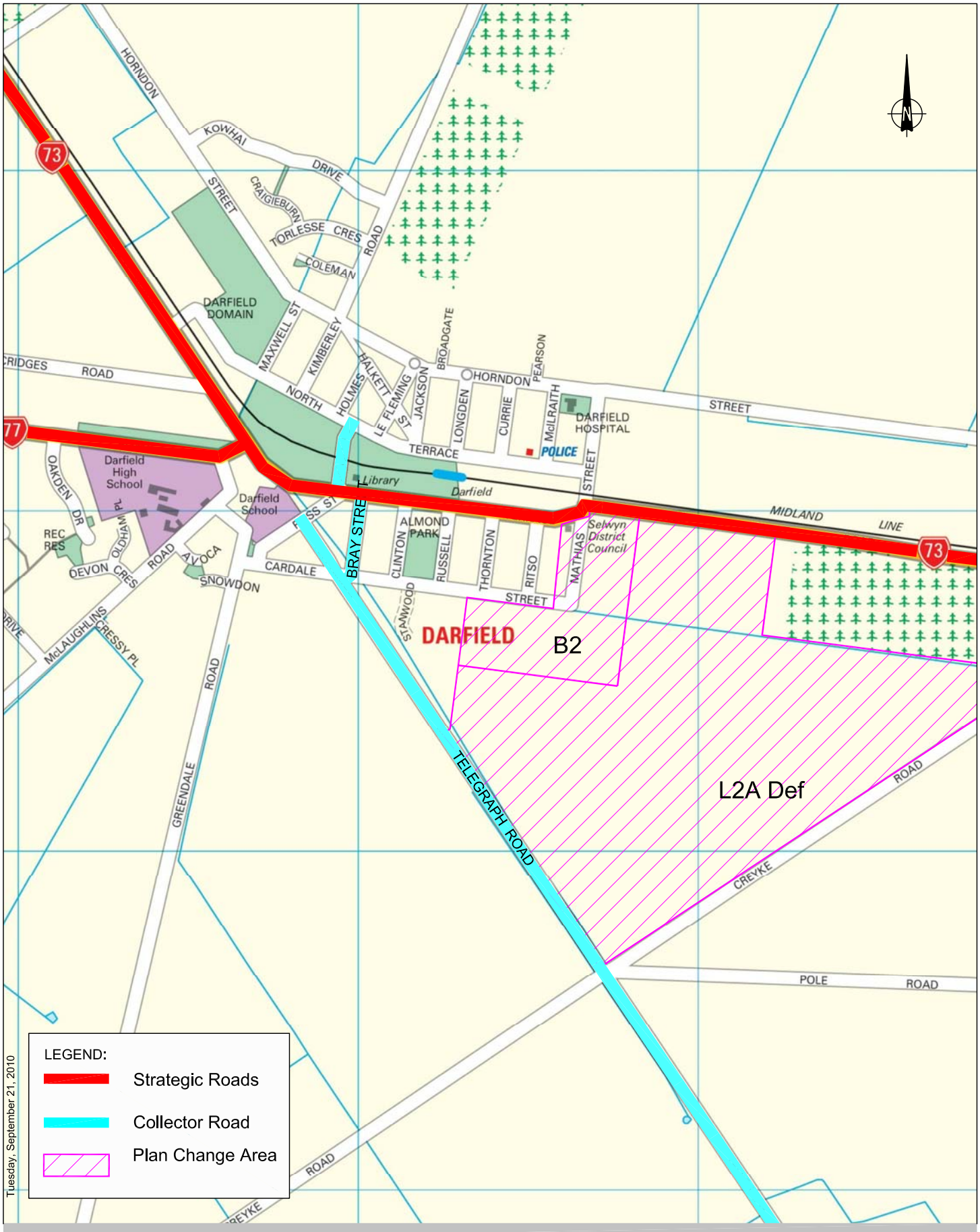
The proposed Plan Change will affect the existing B2 zone to the south and east of Mathias Street and the L2A deferred zone to the south and east of the B2 zone, an area of approximately 103ha of green-field land. The Plan Change area is bounded to the southeast by Creyke Road and to the southwest by Telegraph Road. The northwest boundary is formed by commercial and residential lots in and the remainder of the site boundary is formed by adjacent greenfield lots, with a short section on the northern edge of the site fronting onto SH73.

To the west of the L2A def zone is land currently zoned Business 2 (B2) in the District Plan. There are nine existing lots within the B2 zone south of Cardale Street with direct access to Cardale Street. These lots are partially developed for commercial use. There are a further four rear lots within the B2 zone that have access from an extension to Mathias Street south of Cardale Street.

2.3 Roading Network

Mathias Street provides access to the development site and is situated to the northwest of the site. It is identified as a local road in the District Plan and runs in a generally north-south alignment with a two lane unmarked carriageway and a typical carriageway width in the vicinity of the site of 8.5m. The posted speed limit along Mathias Street is 50km/h. Photograph 1 shows Mathias Street in the vicinity of the site.

Photograph 1: Typical view of Mathias Street



Darfield Resource Consent

Site Location & Road Hierarchy

Traffic Design Group

1

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The most notable road in the vicinity of the development site is State Highway 73 (SH73) which follows South Terrace to the west of Mathias Street and West Coast Road to the east of Mathias Street. SH73 forms the northern boundary of the L2A Def zone and runs in an approximately east-west alignment. Through Darfield, South Terrace is classified as a Strategic Road and is generally a two-lane two-way road with a central painted median. The lane widths are typically 3.8m in both the westbound and eastbound directions, with the central median typically measuring 3.0m. There are wide sealed shoulders that provide for parking on both sides of the road with 6.2m available in the eastbound direction and 6.0m in the westbound direction. Right turn bays are generally provided within the central median for access to streets off South Terrace. The posted speed limit along South Terrace is 50km/h.

Photograph 2: Typical view of South Terrace (SH73)

North of the Plan Change area, Mathias Street meets West Coast Road / South Terrace (SH73) at a Stop controlled cross road intersection, with priority to West Coast Road / South Terrace traffic.

The location of the intersection on a bend in West Coast Road / South Terrace results in some limitations in the available sight distance from the Mathias Street intersection, when looking to the east. The Austroads Guide to Road Design Part 4A “Unsignalised and Signalised Intersections” gives the minimum sight distance requirement for an intersection in a 50km/h zone as 97m.

Photograph 3 shows the available sight distance looking to the east measured 5m from the edge line of SH73 in accordance with the methods prescribed by the Austroads guide. At 5m back from the edge line, the available sight distance is approximately 90m to the east along West Coast Road and approximately 250m to the west along South Terrace.

Photograph 3: View of available sight distance east from Mathias Street, taken from 5m back

By adopting the minimum AUSTROADS standard in which sight distance is measured 3m back from the edge line, the available sight distance is improved by a further 20m, to approximately 110m, therefore meeting the minimum sight distance requirements.

Cardale Street is identified as a local road in the District Plan and provides a connection from the proposed development site to the existing L1 zone in the south of Darfield. It starts from the southern end of Mathias Street and runs in a generally east – west alignment parallel with South Terrace. Cardale Street is generally comprised of a two lane unmarked carriageway and has a typical carriageway width of 11.8m.

Photograph 4: Typical view of Cardale Street

Telegraph Road forms the south-western boundary to the Plan Change area and is classified as a Collector Road in the District Plan. The road is sealed and has been constructed with a straight and level alignment in this area.

Creyke Road forms the south-eastern boundary of the Plan Change area and has not been sealed between SH73 and Telegraph Road.

2.4 Public Transport

There are currently no public transport services within Darfield and therefore there are no bus stops or infrastructure for buses near the development site. There are local shuttle services that operate daily return trips between Christchurch and the West Coast which can make a scheduled stop in Darfield however there are no bus stops associated with these services.

The TranzAlpine train service also operates daily between Christchurch and Greymouth and includes a stop in Darfield where passengers can embark or disembark. The railway station is situated on the northern side of South Terrace (SH73) opposite the intersection of South Terrace and Russell Street.

2.5 Footpaths and Cycle Routes

There is a 1.6m wide pedestrian footpath situated at the northern end of Mathias Street, south of SH73, on the western side of the street. The footpath starts at the intersection with SH73 and continues to the vehicle access at the rear of the Selwyn District Council's Service Centre office. The eastern side of Mathias Street does not have any formal pedestrian facilities however there is a wide grassed berm along the length of the street along which pedestrians can walk. The photograph below shows Mathias Street south of SH73 with the footpath visible on the right hand side of the photograph.

Photograph 5: View looking south along Mathias Street from South Terrace

Cardale Street has a 1.2m wide pedestrian footpath on the northern side of the road separated from the carriageway by a 3.7m wide grass berm. As shown in the photograph below, the available footpath width is reduced to approximately 0.8m due to grass growing over the sides of the path.

Photograph 6: View of pedestrian footpath looking west along Cardale Street

South Terrace has pedestrian footpaths on both sides of the road along most of its length through Darfield. The footpath on the southern side of South Terrace is approximately 1.9m wide, generally separated from the carriageway by a 1.9m wide grass berm, and stretches from Mathias Street in the east to Trinity Church situated on the southern corner of West Coast Road (SH73) and Bangor Road. The footpath on the northern side of the road is approximately 1.6m wide and is generally situated adjacent to the carriageway. It stretches from Mathias Street in the east to the Four Square supermarket situated on the northwest corner of South Terrace and McMillan Street.

South Terrace has five pedestrian refuges situated in the middle of the carriageway through Darfield township, with these being situated between Ritso Street and Thornton Street, opposite the railway station and public toilets near Russell Street, immediately east of Clinton Street, immediately east of Bray Street and opposite the Four Square west of Ross Street / McMillan Street. Each of these crossing points has tactile paving provided at the dropped kerb crossing and within the pedestrian refuge. The typical layout of these pedestrian crossing points is shown in photograph 7 below.

Photograph 7: View of pedestrian crossing place on South Terrace

3. Travel Patterns

3.1 Traffic Volumes

The annual average traffic volumes on State Highway 73 have been used to determine the background rate of growth in the Darfield area and are summarised in the following table. Within Darfield, traffic volumes having been growing at about 3% per annum over recent years.

Year	West of SH77	West of Clinton St	West of Aylesbury Corner
2001	1,500	3,570	2,780
2002	1,020	3,270	2,720
2003	1,690	3,730	3,010
2004	1,660	3,880	3,460
2005	1,780	4,010	3,420
2006	2,020	4,520	3,260
2007	1,770	4,350	3,510
2008	1,810	4,110	3,490
2009	1,780	4,190	3,840
Growth/Annum	85	140	115
	5%	3%	3%

Table 1: State Highway 73 Traffic Volumes - AADT

Selwyn District Council (SDC) has provided details of the most recent traffic count data for roads in the vicinity of the site. This data has been obtained from SDC's Road Assessment and Maintenance Management (RAMM) database and is available for Mathias Street, Cardale Street and Creyke Road. Detailed traffic count data was also obtained from NZTA for South Terrace (SH73) with two-way flows recorded every hour over the course of one full week. The results are summarised in Table 1 below.

Road	Classification	ADT	Date
South Terrace (SH73), between Russell Street and Clinton Road	Strategic	4,264	Sept 2008
Mathias Street, SH73 to 150m south of SH73	Local	601	Nov 2006
Cardale Street, Mathias Street to Ritso Street	Local	424	Oct 2006
Creyke Road, south of SH73	Local	52	Dec 2005
Telegraph Road, between Cardale St and Creyke Road	Collector	1,028	Dec 2005

Table 2: Traffic Volumes

Table 1 shows that the pattern of daily traffic volumes on the network generally reflects the role of each route within the hierarchy of roads.

Figure 2 shows the surveyed hourly traffic flows on South Terrace (SH73) between Russell Street and Clinton Road, about 450m to the west of Mathias Street.

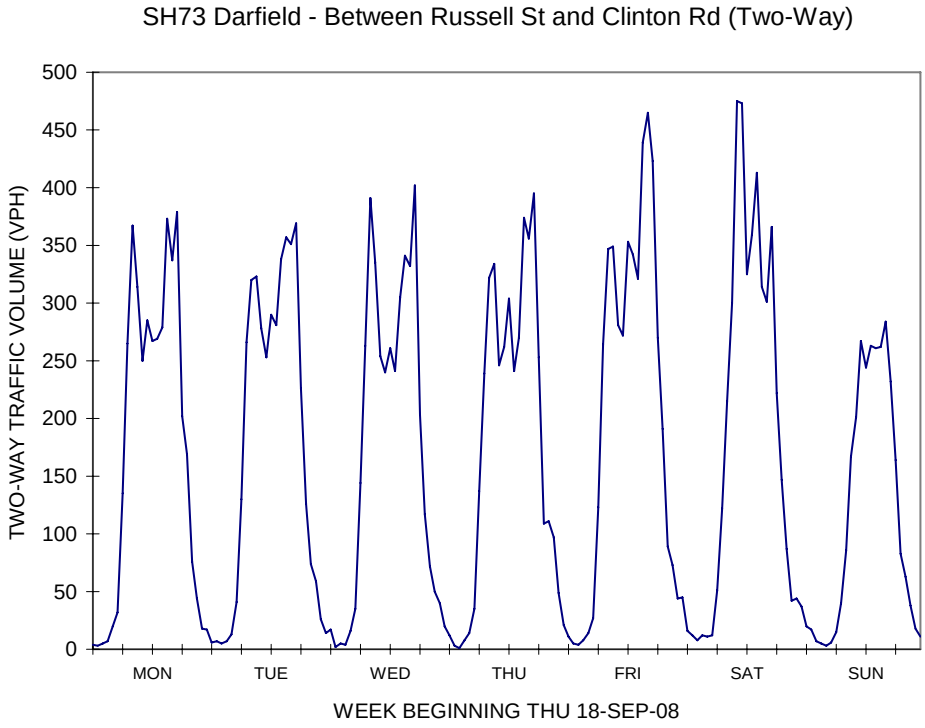

Figure 2: South Terrace (SH73) Hourly Traffic Pattern

The patterns show the weekday traffic flow on South Terrace is dominated by morning and evening peak periods with the peak hour for traffic movements occurring between 5pm to 6pm with about 240 vehicle movements per hour (vph) westbound and 160vph eastbound.

The SDC count data for Mathias Street to the south of SH73 indicates an average daily traffic volume of 600 vehicles for 2006. Allowing for 3% per annum growth, the current daily traffic volume is estimated to be 650 vehicle movements per day (vpd). For the existing commercial activity on Mathias Street, the peak hour factor is likely to be in the range 10-15% which represents peak hour traffic volumes of 60-100vph. In the evening peak, there is likely to be a higher proportion of outbound traffic than inbound.

The average daily traffic volume on Mathias Street to the north of SH73 was estimated as 1,500vpd. This area is more strongly influenced by the residential area to the north of SH73 and a peak hour factor of 10% would be typical giving an estimated peak hour volume of 150vph. In the evening peak, a typical distribution of movements would be 65% towards homes with 35% outbound.

Figure 3 shows the estimated turning volumes at the SH73 / Mathias Street intersection during the evening peak hour for the current situation based on the traffic movement distribution and traffic volume described above.

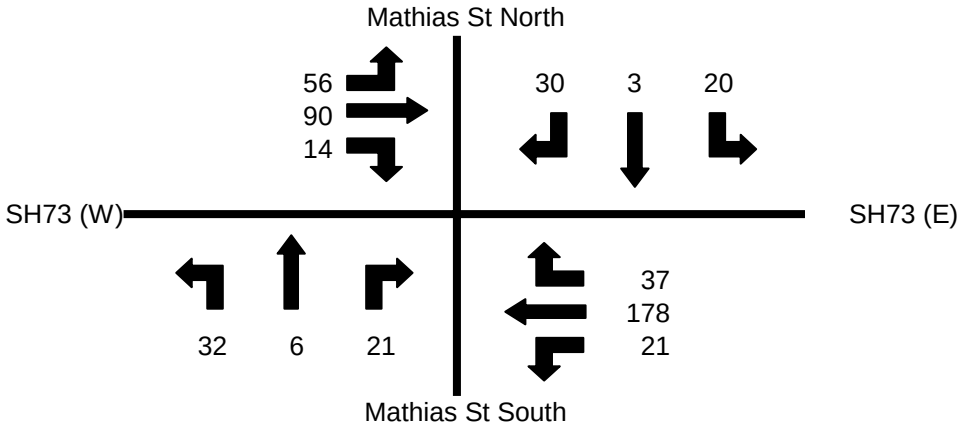

Figure 3: SH73 / Mathias Street Peak Hour Turning Volumes – Existing Situation

3.2 Public Transport

Local shuttle services run by Atomic Shuttles and West Coast Shuttles operate daily between Christchurch and the West Coast and can make pre-booked stops in Darfield. Atomic shuttles will stop in Darfield at approximately 8am on its westbound journey to Greymouth / Hokitika and will stop in Darfield at approximately 4:30pm on its return trip to Christchurch. The West Coast Shuttle can make pre-arranged stops in Darfield at approximately 10:30am in the eastbound direction and at approximately 4:30pm in the westbound direction.

The TranzAlpine train service also operates daily between Christchurch and Greymouth with stops scheduled in Darfield for 8:53am in the westbound direction and 5:29pm in the eastbound direction.

3.3 Cyclists and Pedestrians

No formal surveys have been undertaken of the extent of walking and cycling activity in the area however informal observations during a site visit indicated the level of walking and cycling activity to be low.

3.4 Parking

No formal parking is provided along Mathias Street or Cardale Street however informal roadside parking does occur along these streets. It is noted that a number of vehicles also currently park on the grass verge along Mathias Street. These vehicles appear to be associated with the Sicon depot which has accesses directly on to Mathias Street. This parking activity occurs during typical weekday working hours.

SH73 South Terrace generally has roadside parking available adjacent to the roadside kerbs within the wide carriageway shoulders. During a site visit on 27 November 2009 the level of parking demand along South Terrace was observed to be low.

4. Road Safety

A search of the NZTA accident database (CAS) was undertaken for the most recent full five year period between 2005-2009 and available data for 2010. The area of the assessment includes West Coast Road and South Terrace for a distance of 500m in either direction from Mathias Street, Cardale Street (east of Thornton Street), Mathias Street south of SH73, Ritso Street and Thornton Street.

There were three reported accidents in the search area during the five year review period, with all of these occurring on SH73. One accident resulted in minor injuries but no injuries were reported for the other two accidents.

The minor injury accident occurred at the intersection with Thornton Street. The accident description states a passenger was sitting on the back of a flat deck truck, heading west along South Terrace, and fell from the vehicle on to the road as it turned left in to Thornton Street.

One non-injury accident occurred approximately 250m east of Mathias Street. The accident description states that a westbound motorist on SH73 lost control, crossed the centreline and collided with a tree and a sign on the roadside. Alcohol was identified a possible contributing factor.

The other non-injury accident occurred approximately 120m west of Mathias Street and occurred when an eastbound car on SH73 collided with a car that was performing a u-turn. The u-turning car had been parked on the road side facing the eastbound direction before attempting the turn. The cause of the crash was attributed to the driver of the u-turning car failing to see or look behind when changing direction.

The low number of crashes along roads within the vicinity of the development site indicates there are no underlying safety concerns with the local road network.

5. Existing Levels of Service

5.1 Existing Intersections

5.1.1 South Terrace (SH73) / Mathias Street intersection

The capacity of this intersection has been analysed using the SIDRA Intersection Analysis Software. The intersection performance with existing traffic volumes is shown in Table 2 below.

Road	Movement	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	2	1	B
	T	2	1	B
	R	2	1	B
South Terrace (East)	L	1	1	A
	T	0	0	A
	R	1	1	A
Mathias St (south)	L	2	1	B
	T	2	1	B
	R	2	1	B
South Terrace (West)	L	1	1	A
	T	0	0	A
	R	1	1	A

Table 3: 2010 PM Peak – South Terrace / Mathias Street Intersection Performance

As shown in Table 2, the existing intersection currently operates at a high level of service during the evening peak period with the worst movements operating at level of service B.

5.1.2 Mathias Street / Cardale Street intersection

Mathias Street and Cardale Street do not currently form an intersection with no formal continuation of Mathias Street existing to the south of Cardale Street.

5.2 Public Transport

As discussed in Section 3.2, there are no local bus routes for residents of Darfield although local shuttles currently provide a limited service. The existing level of service provided by public transport is considered to be low.

5.3 Walking and Cycling

While no formal surveys have been undertaken of the extent of walking and cycling in the area, informal observations suggest that the levels of activity are low.

The existing pedestrian path along the northern side of Cardale Street provides a convenient route from the Plan Change area to the west. There are no footpaths on Mathias Street however all of the remaining local roads connecting between Cardale Street and South Terrace have a pedestrian footpath available on at least one side of the road as well as wide grassed berms.

Overall, the existing level of provision is considered to be appropriate given the low pedestrian and cyclist numbers currently experienced in the general vicinity.

6. Traffic Growth

6.1 Potential Background Growth

As part of the assessment of likely traffic effects associated with the development of residential lots, it is necessary to consider not just the initial residential development but also the business development that could develop within the existing adjacent B2 zone. Therefore a background traffic level to the assessment has been prepared for the scenario where the land zoned for business has been fully developed.

The District Plan (Table C16.1) permits a maximum building height in a B2 zone of 15m which could allow for five floors within the building. There are no rules that specify maximum site coverage or building coverage for a B2 zone, with this being controlled indirectly by landscaping requirements, parking requirements and building setbacks. For commercial activities, typical site coverage would be about 50% with lower rates for industrial / warehouse type activities. With the building height limits, the plot ratios for the buildings with commercial activity could easily be in the range 1-2.

The B2 zone is described in the District Plan as an area where those activities with lower aesthetic and amenity standards than Business 1 zones would be located. It is expected that B2 zones will include more industrial, warehousing or storage type activities with relatively small amounts of commercial retail / office activity.

Since the District Plan allows some flexibility as to what could be developed, the assessment of traffic effects has been prepared for two scenarios; continued development based on the existing development pattern and a more intensive development scenario that represents the maximum expected level of development.

6.1.1 Growth Scenario 1 – Low Intensity Development Scenario

This scenario assumes development of a similar type and in a similar manner to the existing development within the B2 zone. With this type of development it is predicted that the total traffic generation of the B2 zone for Mathias Street south could increase from 640vpd to about 1,300vpd, effectively doubling the traffic volumes. The following figure shows the predicted turning volumes for this development scenario.

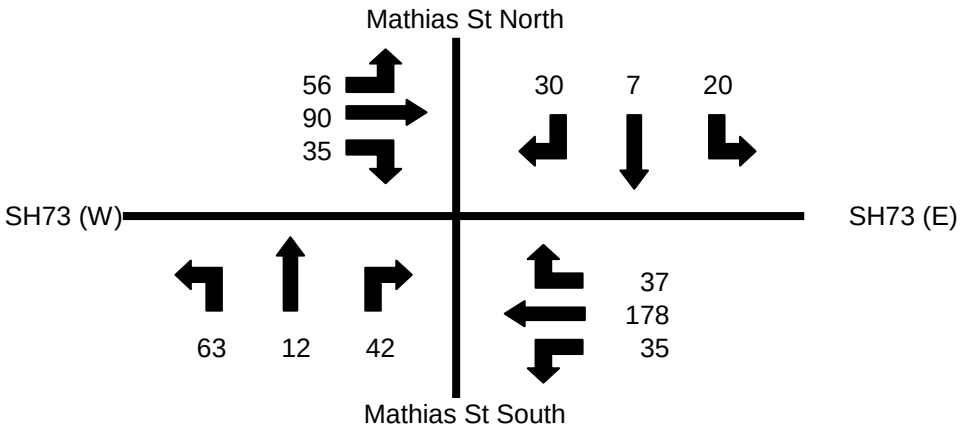

Figure 4: SH73 / Mathias Street Peak Hour Turning Volumes – Low Intensity Development Scenario

6.1.2 Growth Scenario 2 –Practical Development Scenario

If there were no road network constraints on the development of the B2 zone, it is considered that it would be possible in principle to develop buildings with about 50,000m^2 Gross Floor Area in the B2 zone and meet the necessary parking requirements of the District Plan. With this level of development, the potential daily traffic generation could be 15,000-20,000 vehicle movements per day. This would require major upgrades to Mathias Street and signalisation of the SH73 / Mathias Street intersection. Since this scenario would represent a three to four-fold increase in the total traffic generation of Darfield, it is considered highly unlikely to occur in practice.

A "practical" development scenario has been defined that is based on increased demand for retail and commercial facilities within Darfield with part of the B2 zone developed to include a supermarket within a small shopping centre, some offices and a hardware supplier, in addition to the existing activities. Under this development scenario the traffic generation of the B2 zone could increase to about 7,000vpd. It is considered unlikely that all of the additional traffic would use Mathias Street because a supermarket could attract a large number of trips from the residential areas to the west and therefore, about 50% of the trips would be on Cardale Street. The net effect is predicted to be an increase in the traffic volume on Mathias Street south to about 5,500vpd. In this scenario, the peak hour turning volumes would be as shown below.

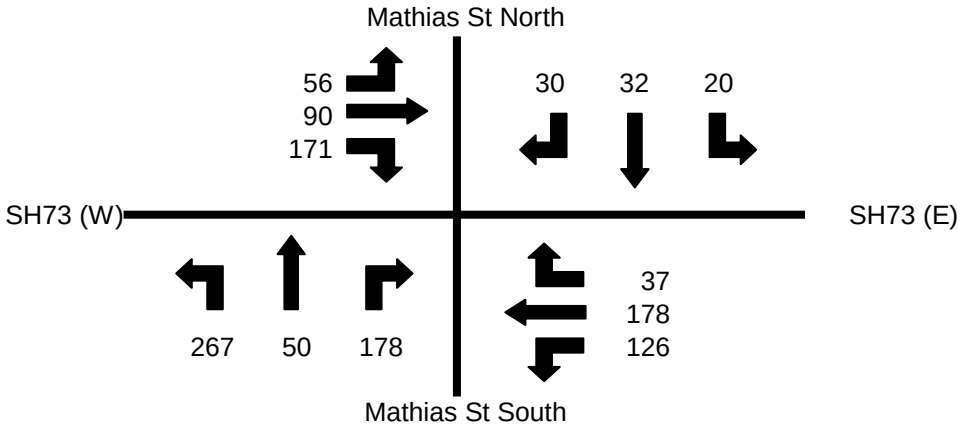

Figure 5: SH73 / Mathias Street peak Hour Traffic Volumes – Practical Development Scenario

6.2 Background Growth Analysis

The intersections of South Terrace / Mathias Street and Mathias Street / Cardale Street are considered to be the two locations where the effect of development traffic will have the most significant impact.

Analysis of the traffic growth scenarios provides an assessment of the impact at these intersections of the level of development that could be anticipated within the existing B2 zone adjacent to the proposed development site.

6.2.1 South Terrace (SH73) / Mathias Street Intersection

The capacity of the South Terrace / Mathias Street intersection with the level of business development under both growth scenarios has been analysed using the SIDRA Intersection Analysis Software. The intersection performance with background business development traffic volumes are shown in Tables 3 and 4 below.

Road	Movement	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	2	1	B
	T	2	1	B
	R	2	1	B
South Terrace (East)	L	1	1	A
	T	0	0	A
	R	1	1	A
Mathias St (south)	L	2	1	B
	T	2	1	B
	R	2	1	B
South Terrace (West)	L	1	1	A
	T	0	0	A
	R	1	1	A

Table 4: 2010 PM Peak South Terrace / Mathias St Intersection Performance – Low Intensity Development

Road	Movement	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	2	1	B
	T	2	1	B
	R	2	1	B
South Terrace (East)	L	1	1	A
	T	0	0	A
	R	1	1	A
Mathias St (south)	L	4	1	B
	T	4	1	B
	R	4	1	B
South Terrace (West)	L	1	1	A
	T	0	0	A
	R	2	1	A

Table 5: 2010 PM Peak South Terrace / Mathias St Intersection Performance – Practical Development Scenario

As shown in the above tables, the level of traffic that could be expected under both growth scenarios will have only a minor effect on the level of delay experienced and will not result in any change to the existing level of service at the intersection.

6.2.2 Mathias Street / Cardale Street intersection

The land currently zoned for B2 development covers an area of approximately 14.0ha. Part of the B2 zone has direct access to Mathias Street with the rest of the zone having access to Cardale Street. Therefore, the anticipated level of traffic generated from the B2 zone under the growth scenarios has been distributed to each of the roads from which they obtain access.

Under both development scenarios, it is expected that there would be a requirement for Mathias Street to be extended to the south of Cardale Street. With this extension, it is expected that the through movements on Mathias Street at the Cardale Street intersection will exceed the turning movements to / from Cardale Street. In this situation, it would be considered appropriate for the existing priorities at the intersection to be altered to create a standard T-intersection.

7. Proposed Plan Change

7.1 Description

The proposed Plan Change affects two existing zones to the south-east of Darfield, the B2 zone to the south and east of Mathias Street and the L2A Deferred zone to the south and east of the B2 zone.

It is proposed that a revised B2 zone is formed east of Mathias Street between West Coast Road and an eastern extension to Cardale Street as shown in Figure 6. The revised B2 zone will have an area of about 17ha excluding roads, an increase of about 2.5ha compared with the existing B2 zone. The existing portion of the B2 zone south of Cardale Street will be re-zoned as Living 1 (L1).

It is also proposed that the Deferral on the L2A Deferred zone is lifted and that the zone is divided to create an L1 zone and an L2A zone.

The new L1 zone will have an area of about 45ha. The District Plan rules specify a minimum average allotment size for L1 zoned land of 650sqm. If the L1 zone was developed to its maximum potential, it is considered that about 550 dwellings could be constructed (based on 20% of the land being used for roads and reserves). However, it is understood that the L1 zone would be developed to a lower intensity and provide about 400 dwellings.

The new L2A zone will have an area of about 55ha and the District Plan rules specify a minimum average allotment size for L2A zoned land of 1ha. Again, allowing for 20% of the total land being allocated as road or reserves, it is considered that up to 45 dwellings could be constructed in the L2A zone.

7.2 Access

The Outline Development Plan (ODP) for the Plan Change area shows the new roads proposed for access within the Plan Change area. The ODP includes three Local Area Streets and two Neighbourhood Streets.

One Local Area Street will be formed to the east of Mathias Street as an extension to Cardale Street with an alignment roughly parallel to West Coast Road. This road will provide the primary access to the B2 zone.

A new Local Area Street will be constructed as a southern extension to Mathias Street and form a spine road through the L1 zone. The Mathias Street extension will meet another Local Area Street that generally separates the L1 zone and L2A zone and provides connections to Telegraph Road and Creyke Road.

Neighbourhood Streets are proposed to connect the Local Area Streets with Telegraph Road and Creyke Road.

Darfield
Outline Development Plan

Notes

1) A connected road network is to be formed, linking Telegraph Road, Mathias Street and Creyke Road. This alignment may vary from that shown on the plan.

2) Roads are to be aligned to provide a view along the road towards the Southern Alps

3) Provisions are to be made for road links between land zoned Inner Plains and both the L2A and B2 zone to allow for either living or industrial use in the future.

4) Any fencing along the Telegraph Road or Creyke Road frontages or the boundary with the Inner Plains zone to be generally consistent along the length of he frontage/boundary and to be of open rural style, such as post and rail or post and wire.

- Local Area Street
- Neighbourhood Street
- Provision to be made for possible future road connection
- No vehicular access to SH 73 except for existing accesses
- No individual property accesses except for those already existing
- Pedestrian / cycle links
- Water race amenity feature
- Water race reserve - minimum 10m wide
- Landscaping strip planted with trees and shrubs to screen industrial activities - minimum width 5m
- Landscaping strip planted with trees and shrubs to screen industrial activities - minimum width 10m
- Existing shelterbelt to be retained, except for road accesses. If for any reason it needs to be removed or partially removed , note 4 above applies

Tuesday, September 21, 2010

REVISION	DATE	DESCRIPTION
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Darfield Resource Consent

Proposed Residential Subdivision

DRAWN: DKN
DATE: 21.09.2010
SCALE: NTS
DWG NO:10423-1-C6A

Traffic Design Group

6

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8. District Plan Provisions

While the Selwyn District Plan contains detailed rules relating to transportation matters, it is not considered appropriate or practical to provide an assessment of the proposed Plan Change against all of these rules at this stage because the ODP does not provide sufficient detail for an assessment and the development concept could change when the land is subdivided. A summary of the relevant transport rules is outlined below in the following table.

Rule	Requirement	Provided	Compliance
13.2.3	**Sight Distance** On roads other than State Highways 45m sight distance shall be provided in Living Zones and 80m minimum sight distance shall be provided in Business Zones.	>80m	Yes
13.3.1	**New Roads** 1. Any new road shall be laid out and vested in the Council in accordance with the standards contained in Table E13.9. <u>Local Roads - Living 2 and 2A zones,</u> Minimum legal width = 15m; maximum legal width = 20m. Minimum carriageway width = 7m; maximum carriageway width = 8m. Kerb and channel and footpath are not required. 2. The carriageway of any new road laid out and vested in accordance with Table E13.9 shall be formed and sealed. 3. Any footpath shall be constructed as a sealed strip of 1.5m width within the berm. All areas of berms not sealed in footpath are to be formed in grass, except in the Business Zones where the full width of berm shall be formed.	Min legal width = 15.0m Max legal width = 20.0m	Yes
13.3.2	**Road Intersection Spacing** 1. The spacing between road intersections shall comply with Table E13.10. Posted speed limit 50km/h – 125m spacing.	Closest intersection spacing is greater than 150m	Yes

Table 6: Selwyn District Plan Requirements

It is considered that the proposed development which would be facilitated by the proposed Plan Change is in general accordance with the Transportation Rules of the District Plan. The following details provide additional assessment where the District Plan provisions are not met in full or where items within the assessment above require discussion.

Sight Distance: Since the Plan Change area is generally level and the road alignments are generally straight, there are no reasons why the required sight distance could not be achieved at any of the proposed intersections.

9. Traffic Generation and Distribution

9.1 Expected Traffic Generation

9.1.1 B2 Zone

The District Plan allows for a wide range of activities to be developed within a B2 zone but generally includes "*activities likely to be considered less pleasant by people*". Since the proposed Plan Change will result in an increase in the size of the B2 zone compared with the existing zoning, it is expected that there would be a corresponding increase in the traffic generation.

If B2 zone is developed to include similar activities to those that currently exist, the daily traffic generation of the B2 zone is expected to increase by about 15% to about 1,500vpd. However, if the B2 zone was re-developed with higher intensity, it is expected that the total traffic generation could increase to about 8,000vpd.

9.1.2 Living Zones

The traffic generation rates of residential developments within urban centres are typically in the range 6 to 10 vehicles per day (vpd) per household. The variability within this range is largely determined by the proximity of employment, education and retail opportunities and the need for vehicle trips to be combined.

Given the location of Darfield some 40km west of Christchurch, it is considered that the traffic generation rates for the Plan Change area are likely to be towards the lower end of this range as fewer daily vehicle trips would typically be generated due to an increased likelihood of 'trip-linking'.

The average daily traffic volumes on SH73 have been used to provide an indication of the external traffic generation of Darfield as a whole. The weekday average daily traffic volume is 1,600vpd to the west of Darfield and 3,500vpd to the west of Aylesbury Corner. If 1,000 of the trips represent through traffic, then Darfield generates about 3,000 external vehicle trips on SH73. Given that the number of households in Darfield is about 600, this represents an external trip generation rate on SH73 of 5vpd per household.

For the purpose of this traffic assessment, a residential traffic generation rate of 6vpd per household has been adopted to reflect local trips and trips on roads other than SH73. Based on 450 households being constructed within the L1 and L2A zone, it is expected that the residential development will generate about 2,700 vehicle movements per day.

During the morning or evening peak period, residential activity typically generates one movement per hour per household. Therefore, it is expected that the residential zone will generate about 450 vehicle movements during the morning or evening peak hour.

9.2 Traffic Distribution

The expected distribution of vehicle trips associated with the Plan Change area has been based on the traffic volumes observed on SH73 to the east and west of Darfield as well as within Darfield. The following table shows the forecast distribution of trips.

Zone	B2	L1	L2	East	West	North	Darfield
B2		20%	10%	25%	25%	10%	10%
L1	10%			25%	25%	10%	30%
L2	10%			25%	25%	10%	30%

Table 7: 2021 Forecast Traffic Distribution

The busiest period on the road network is expected to be during the evening peak period because it will include business and employment related trips. In the morning peak, it is considered that the vehicle trips will be predominantly employment based as most business activities do not start until later in the day.

During the evening peak, vehicle movements associated with residential zones are generally homebound. Typically, about 65% of traffic would be expected to be returning home and this proportion has been adopted for the subsequent analysis.

Since the directionality of vehicle trips associated with business activity is strongly influenced by the type of activity, this analysis undertaken for this assessment has been based on 50% of vehicle trips being inbound and 50% outbound which is considered representative of a small shopping centre.

10. Effects on the Transport Network

10.1 Intersections

10.1.1 South Terrace (SH73) / Mathias Street intersection

Under the low growth scenario for the B2 zone, the daily traffic generation of the B2 zone is expected to be about 1,500vpd. The expected operational performance of the SH73 / Mathias Street intersection has been determined using the SIDRA Intersection Analysis software for 2021 as this represents a year by which the complete Plan Change area could be fully developed. A background growth rate of 3% per annum has been applied to the State Highway traffic volumes for this analysis.

Road	Movement	Traffic Volume (vph)	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	30	2	1	B
	T	40	2	1	B
	R	40	2	1	B
South Terrace (East)	L	110	1	1	A
	T	230	0	0	A
	R	50	1	1	A
Mathias St (south)	L	100	3	2	B
	T	30	3	2	B
	R	80	3	2	B
South Terrace (West)	L	70	1	1	A
	T	120	0	0	A
	R	110	1	1	A

Table 8: Expected Performance of SH73 / Mathias Street Intersection - 2021PM Peak (Likely B2)

In this low growth scenario, it is expected that the existing intersection will continue to operate with a good level of service.

The following table shows the expected performance of the intersection if the B2 zone was developed to the maximum practical level. While it is expected that there is potential for longer queues on Mathias Street South, the average stop line delays on all turning movements remain small and a good level of service is maintained at the intersection.

Road	Movement	Traffic Volume (vph)	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	30	3	2	B
	T	70	3	2	B
	R	40	3	2	B
South Terrace (East)	L	190	2	2	A
	T	230	0	0	A
	R	50	1	1	A
Mathias St (south)	L	180	5	5	B
	T	60	5	5	B
	R	160	5	5	B
South Terrace (West)	L	70	1	1	A
	T	120	0	0	A
	R	190	2	1	A

Table 9: Expected Performance of SH73 / Mathias Street Intersection - 2021PM Peak (Maximum B2)

10.1.2 Mathias Street / Cardale Street Intersection

Within the ODP that accompanies the proposed Plan Change request, the Mathias Street / Cardale Street intersection will become a cross-roads intersection. Under the development scenarios considered in this report for the B2 zone, it is expected that Mathias Street will carry higher traffic volumes than Cardale Street and therefore it is considered appropriate that vehicles on Mathias Street have priority over vehicles on Cardale Street. In the event that the traffic generation of the B2 zone becomes significantly higher than the combined L1 and L2A zones, it may be necessary to re-consider the intersection design and a change of priorities may be required.

The following table shows the expected performance of the intersection with priority given to vehicles on Mathias Street for the 2021 evening peak period. It indicates that the intersection will operate with a good level of service.

Road	Movement	Traffic Volume (vph)	Average Stopline Delay (sec/veh)	95%ile Queue Length (veh)	Level of Service
Mathias St (north)	L	240	1	2	A
	T	170	1	2	A
	R	20	1	1	A
Cardale Street (East)	L	120	3	1	A
	T	40	3	1	A
	R	240	6	3	B
Mathias St (south)	L	50	1	1	A
	T	90	1	1	A
	R	20	1	1	A
Cardale Street (West)	L	30	3	2	A
	T	40	3	2	A
	R	90	3	2	A

Table 10: Expected Performance of Cardale Street / Mathias Street Intersection - 2021PM Peak (Maximum B2)

10.2 Roads

The ODP shows new roads connecting to Telegraph Road and to Creyke Road. While Telegraph Road provides a connection to areas to the south of Darfield, it is expected that any increase in the traffic volume due to the development of the Plan Change area will be small and that the road will have sufficient capacity to accommodate the increased traffic.

Creyke Road will provide a link between the L2A zone and SH73 east of Darfield. It is expected therefore that this road would be used for travel between the L2A zone and Christchurch. Even in the unlikely event that all trips between the Christchurch and the L1 and L2A zones used Creyke Road (about 100vph in the evening peak), it is considered that the road will have sufficient capacity to accommodate the additional traffic.

10.3 Cyclists and Pedestrians

The roads within the proposed Plan Change site are expected to allow for footpaths on at least one side, providing good access for pedestrians.

Cyclists will share the carriageway with motorised vehicles with the proposed roadway width expected to provide sufficient space for cyclists.

11. Conclusions

This Transportation Assessment has considered the potential transportation impacts of the proposed Plan Change request which would facilitate the development of up to 450 households to the south east of Darfield.

A review of the records reported for crashes in the vicinity of the proposed Plan Change site over the most recent five year period has not identified any major safety concerns with the surrounding road network.

Analysis of the expected traffic effects associated with the development that would be facilitated by the proposed Plan Change has determined that the existing road network has sufficient capacity to accommodate the expected traffic volumes. It is therefore considered that the proposed residential development that would be facilitated by the proposed Plan Change can be safely and efficiently accommodated within the local transportation environment.

The Outline Development Plan that accompanies the Plan Change request has been assessed against the transportation related rules of the Selwyn District Plan and it is considered that the proposed road network will be fully compliant with those rules.

Consequently, there are considered to be no transportation related issues that would prevent approval of proposed Plan Change.

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September 2010

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Dear Russell

Darfield Plan Change: Transportation Assessment Report

Following Council's Request for Further Information, we are pleased to respond as follows.

1. Resolution of Level of Service F at SH73 / Mathias Street Intersection for Maximum Development of B2

Since the maximum intensity development scenario for the existing B2 zone was considered highly unlikely, we have not investigated intersection improvement options in detail within the report (for that scenario). However, in response to Council's concerns we have undertaken an initial investigation with the SIDRA intersection analysis software. This indicates that a roundabout with a similar configuration to the SH73 / Pound Road roundabout would operate with level of service LOS B, and address the matter of the Level of Service F that would otherwise arise.

2. Suggested Change of Priority at Mathias Street / Cardale Street Intersection

As we indicated in our report, the form of the Mathias Street / Cardale Street intersection and the assignment of the priority movement will be strongly influenced by the level of traffic generation associated with the B2 zone and in particular the volume of traffic approaching the intersection from the eastern extension to Cardale Street.

With the low intensity development scenario, the dominant traffic movement will be north to south on Mathias Street and on the basis of that dominant traffic flow we suggested that a cross-roads intersection with Mathias Street as the major road would provide an acceptable level of service.

With the medium intensity development scenario, the traffic generation associated with the B2 zone will be greater than the traffic generation associated with the proposed L1 and L2 zones, meaning that Cardale Street would carry the higher traffic volume and therefore it would be appropriate to give this road the priority (***if*** the intersection was retained as a priority intersection). Notwithstanding this, the Level of Service would be such that a roundabout would be the more efficient arrangement.

With the maximum intensity development scenario, then the intersection would operate most efficiently with a roundabout.

On the basis of our analysis, we would agree with council's suggestion that to accommodate Scenario 2, a right-turn lane should be provided at SH73 / Mathias Street together with a roundabout at the Mathias Street / Cardale Street intersection. However, given the existing underlying zoning, these would be potentially required irrespective of whether the proposed plan change proceeds.

3. Traffic Generation and Distribution

The traffic distribution model that was developed for investigating the traffic effects did not include traffic movements to the south along Telegraph Road but this was reflected in the low traffic generation rate adopted for the analysis which was more focussed on SH73. The model did include movements on Creyke Road but assumed that only the L2 traffic would use Creyke Road.

In response to Council's comments, the distribution model has been updated so that 50% of the L1 traffic travelling to / from the east also uses Creyke Road and to include the movements to / from the south on Telegraph Road. The following diagrams show the predicted traffic volumes for the three B2 development scenarios that are outlined in the report.

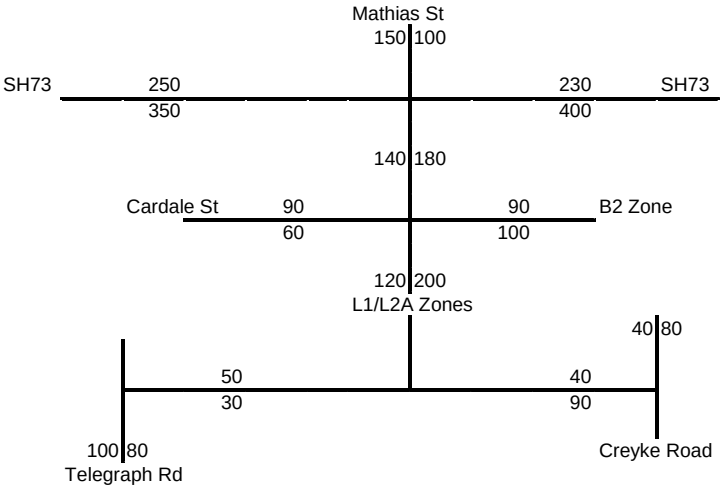

Diagram 1: Expected Traffic Volumes – 2021 Evening Peak hour (Low Intensity B2)

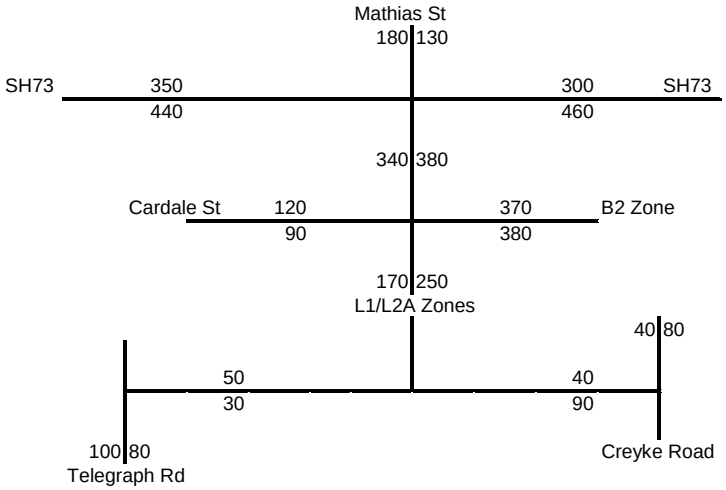

Diagram 2: Expected Traffic Volumes – 2021 Evening Peak hour (Illustrative Example B2)

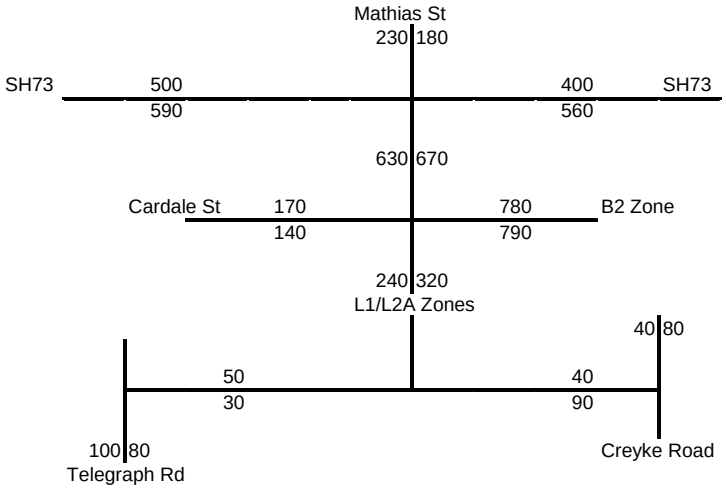

Diagram 3: Expected Traffic Volumes – 2021 Evening Peak hour (Maximum Intensity B2)

The main effect of the revised distribution is a small reduction in the expected traffic volume on Mathias Street south of SH73.

The model indicates that the evening peak hour traffic volume on Creyke Road south of SH73 will be about 120 vehicles per hour (vph) which would represent a daily traffic volume of about 1,200 vehicles (based on a generic 10% peak hour factor).

The existing daily traffic volume on Telegraph Road between Cardale Street and Creyke Road is about 1,000 vehicles. The updated distribution model indicates that the evening peak hour volume will be about 180vph or a daily volume of 1,800 vehicles (again based on a 10% peak hour factor).

The revised analysis does not change any of the conclusions within our report in regard to the intersection forms. That is, a right turn lane will be required on the southern approach to the SH73 / Mathias Street intersection and the preferred orientation of the priority movement at the Cardale Street / Mathias Street will be dependent on the level of development that occurs within the B2 zone. Under the illustrative development scenario 2, the intersection

will provide a better level of service with Cardale Street having priority over Mathias Street. In the maximum development scenario, a priority intersection would operate with level of service LOS D and a roundabout would be preferred.

4. Road Hierarchy

The forecast traffic volumes on the extension of Mathias Street south of Cardale Street are strongly dependent on the level of development within the B2 zone, and do not take into account the potential for many of the trips between the B2 zone and L1 / L2 zones to be made on foot or by cycle.

As a Local Area street, it is expected that the role of this road in the network will be more of a distributor than local access provider and therefore, we agree that it would meet the description of a Collector Road.

Plan Change 12 to the Selwyn District Plan updates the road hierarchy and also introduces some new road definitions and in particular, several sub-classes of local road. The following table provides the likely classification of the new roads within the Plan Change area under PC12 with maximum development of the B2 zone. The closest road classification from the New Zealand Subdivision Standard NZS4404:2010 has also been shown for reference.

Road	Selwyn District Plan Classification		NZ4404:2010
	Existing	With PC12	
Mathias St North Cardale St	Collector	Collector	Connector / Collector
Cardale St East of Mathias St	Collector	Local Business	Connector / Collector
Mathias St S Cardale St	Local	Local Major	Collector / Local
Subdivision Spine Road	Local	Local Intermediate	Local
Subdivision neighbourhood streets	Local	Local minor	Local / Lane

Table 1: Road Classification

If the B2 zone is developed to a higher intensity in line with the illustrative development scenario, then the function of Mathias Street south of SH73 will change and will be more representative of a collector road because it will link the B2 zone with the state highway network. Within the B2 zone, the Cardale Street extension will operate with a high level of through traffic as well as providing for property access.

We trust that this information provides the necessary clarification for you but we would be happy to discuss this further as necessary.

Yours faithfully
Traffic Design Group Ltd

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