PRIVATE PLAN CHANGE REQUEST

INTEGRATED TRANSPORT ASSESSMENT

PREPARED FOR WELHOM DEVELOPMENTS LIMITED | APRIL 2022

Stantec

This document entitled Welhom Developments Ltd – Private Plan Change Request - was prepared by Stantec New Zealand (Stantec) for the account of Welhom Developments Ltd (Client). The material in it reflects Stantec's professional judgment in light of the scope, the Client's brief (if any) and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published. In preparing the document, Stantec may have relied on information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. No liability is accepted by Stantec or any employee or sub-consultant of Stantec with respect to its use by a third party.

Quality statement

Project manager	Project technical lead
Mark Georgeson	

PREPARED BY Andrew Leckie		27 / 04 / 2022
REVIEWED BY Mark Georgeson		27 / 04 / 2022
APPROVED FOR ISSUE BY Mark Georgeson		27 / 04 / 2022

Hazeldean Business Park, 2 Hazeldean Road, Addington, Christchurch 8024
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 3 366 7449
STATUS Final | Project No 310204948

Contents

List of appendices

List of tables

List of figures

1 Introduction

This request by Welhom Developments Limited is for a private Plan Change to re-zone a block of rural land on the northern edge of Masterton for residential use (Plan Change). The Plan Change relates to an approximately 14.7ha property (Site), located to the immediate north of the Cashmere Oaks subdivision.

The location of the Site in relation to State Highway 2 (SH2) and Cashmere Oaks Drive can be seen in Figure 1-1. SH2, to the east of the Site, generally runs north - south. To the south of the Site, Cashmere Oaks Drive provides local road access to the Cashmere Oaks subdivision. To the immediate west is the Wairarapa Railway Line.

Figure 1-1 : Location of Site (Aerial Image Source: MDC LocalMaps)

The Site is located on Rural (Primary Production) zoned land and currently has a rural use. Other adjacent zones to the Site are the Residential zone to the south (Cashmere Oaks subdivision) and a pocket of Industrial zoned land east of SH2. The location of the Site in the context of the District Plan zoning can be seen in Figure 1-2.

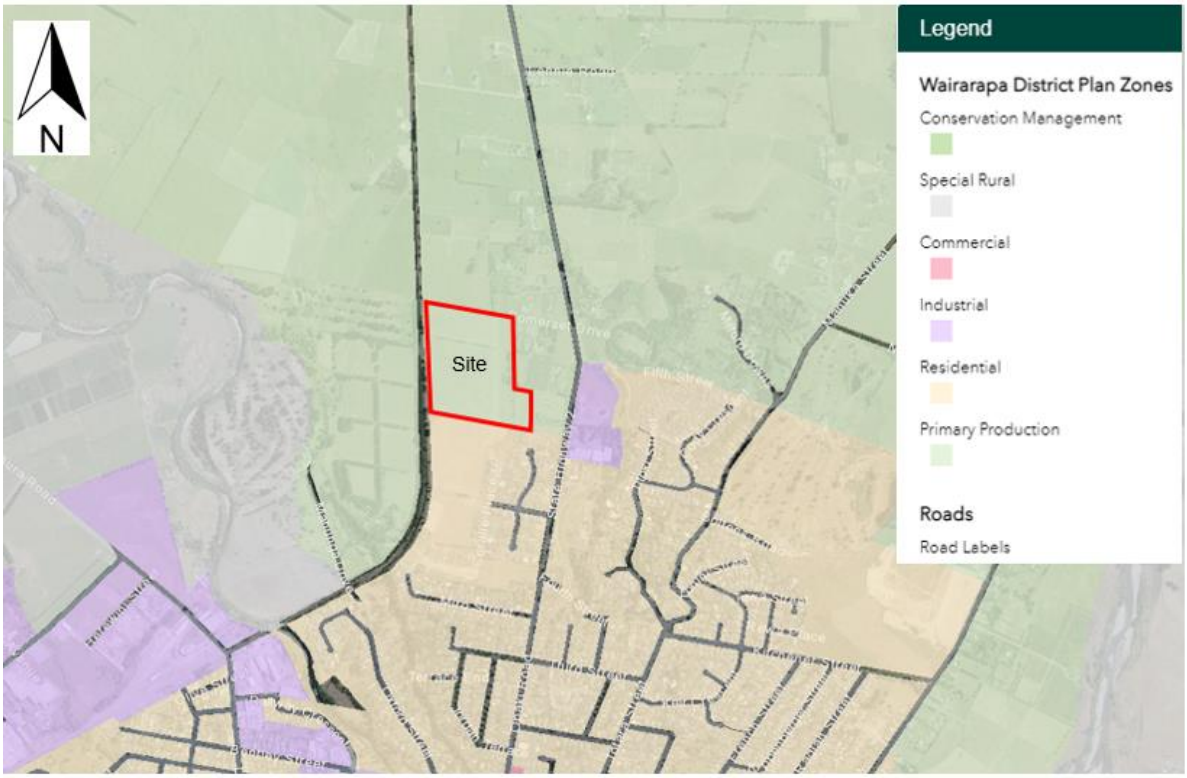

Figure 1-2 : Land Zoning and Site Location (MDC LocalMaps)

This report provides an assessment of transportation matters associated with the Plan Change. Including integration of the Site with the adjacent transport network, the future safety and performance of the surrounding road network, specifically at the SH2 intersection with Cashmere Oaks Drive. To provide a detailed assessment of transportation matters in relation to the Site this report considers the following:

- Existing Transport Network;
- Existing Traffic Volumes;
- Existing Road Safety;
- Future Environment;
- Proposed Plan Change;
- Traffic Generation and Distribution;
- Impacts on the Road Network;
- Non-Car Travel; and
- District Plan Provisions.

2 Existing Transport Network

2.1 SH2

SH2 past the Site (Figure 2-1) is formed as a typical two-lane State Highway. The traffic lanes are approximately 3.5m wide and have sealed shoulders. The speed limit is 100km/h, with the Masterton urban speed limit of 50km/h beginning 120m south of Cashmere Oaks Drive. There is no transition speed zone between the 50 km/h and 100km/h threshold.

Figure 2-1 : Looking North at the Intersection of SH2 with Cashmere Oaks Drive

2.2 SH2 / Cashmere Oaks Drive Intersection

Cashmere Oaks Drive meets SH2 at a priority-controlled give-way T-junction. As shown in Figure 2-2, there is a right turn bay on SH2 and in front of that there is an approximately 35m long space for use by vehicles to turn right out of Cashmere Oaks Drive, although observations show that drivers do not typically use it in that way. The right turn bay is one of two back-to-back right turn bays, with the other being the right turn into the nearby Opaki Meadows Lane.

Figure 2-3 shows the intersection as viewed from Cashmere Oaks Drive.

Figure 2-2 : SH2 / Cashmere Oaks Drive Intersection

Figure 2-3 : Cashmere Oaks Drive Approach to SH2

2.3 Cashmere Oaks Drive

Cashmere Oaks Drive is the primary vehicle access from SH2 for the Cashmere Oaks subdivision and will serve as the main access for the Site. It has an 11m wide carriageway with no road markings (as shown in Figure 2-4). The road has an urban formation with kerb and channel, footpaths, and unrestricted kerbside car parking. The local roads within the Cashmere Oaks subdivision have 50km/h speed limits.

Figure 2-4 : Cashmere Oaks Drive Looking West

2.4 Public Transport

The Metlink Route 203 bus service connects the Masterton town centre to the northern part of the town. The closest bus stop to the Site is at Third Street / Stamford Place intersection, an approximate 1.4km walk away via Cashmere Oaks Drive and SH2. This bus service runs infrequently with stops at the Third Street / Stamford Place bus stop at 10:20am and 11:30am in the mornings and one stop at 2:45pm in the afternoon. As shown in Figure 2-5, the route does not pass the Cashmere Oaks subdivision as it travels up Totara Street and back to the Masterton town centre via SH2.

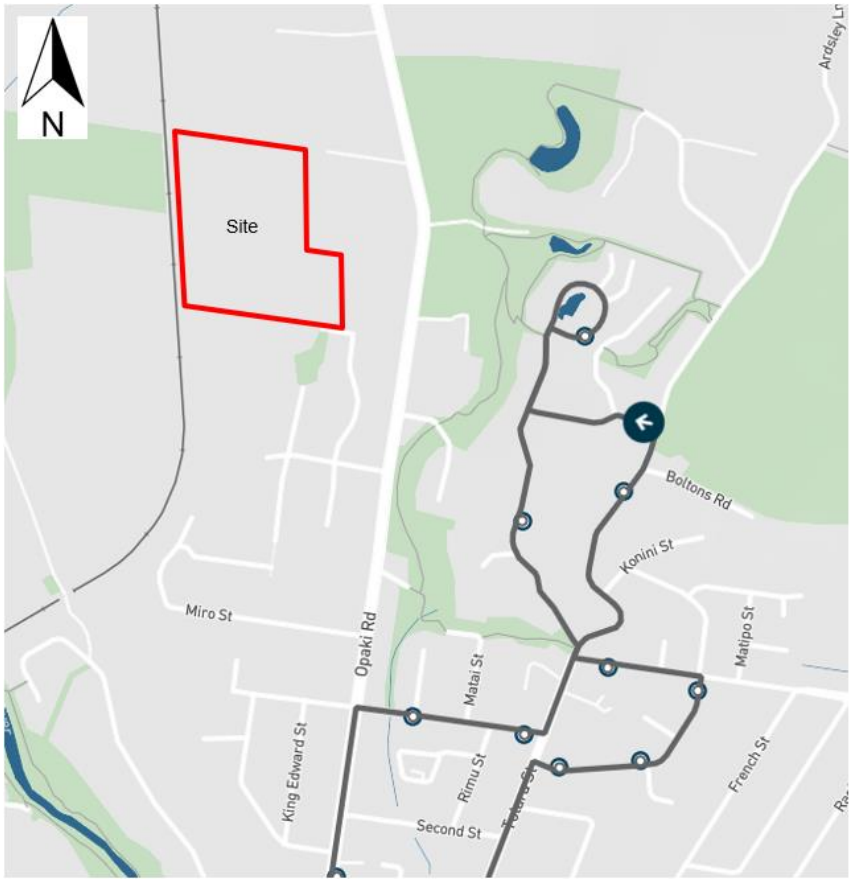

Figure 2-5 : Metlink Route 203 Near the Site

The Masterton Railway Station is located on Perry Street in the northern part of Masterton. It is located approximately 3.5km by road from the Site. The Metlink Wairarapa Line runs from Masterton to Wellington three times during the morning commuter period (departing between 5:46am and 6:47am and arriving between 7:30am and 8:30am), and then twice more throughout the remainder of the day. Weekend evening trips are available on Friday, Saturday, and Sunday at 8:15pm, 7:45pm and 4:45pm respectively.

Given the relative remoteness of these public transport services, it is not reasonable to expect that staff, residents and visitors of development within the Site would use these services without other connecting modes of transport. An established Park & Ride carpark exists at the Masterton Railway Station, for use by bus and rail passengers.

2.5 Active Travel Modes

The pedestrian network on Cashmere Oaks Drive is well established, with footpaths on both sides of the road and on other subdivision roads. On SH2 there is a footpath on the western side, extending south from Cashmere Oaks Drive. The nearest dedicated pedestrian crossing point on SH2 is to the south of Third Street, in the form of a refuge island with kerb extensions. North of Cashmere Oaks Drive on SH2 there are no footpaths.

There are no dedicated cycle facilities near the Site.

3 Existing Traffic Volumes

3.1 Daily Traffic Volumes

Table 3-1 summarises available annual average daily traffic (AADT) volumes for SH2 and for Cashmere Oaks Drive. For SH2, the closest count sites are 18km to the north and 850m to the south of Cashmere Oaks Drive. The traffic volume on SH2 past the Cashmere Oaks Drive intersection is estimated to be closer to the northern (south of Readers Cutting) count given the southern count captures additions from a significant part of the urban area to the south of Cashmere Oaks Drive.

Cashmere Oaks Drive carries a low traffic volume given the limited level of development it accommodates. Given the absence of highway traffic data near the Cashmere Oaks Drive intersection, a series of turning movement counts was commissioned at the intersection to provide the basis of the traffic analysis undertaken. These counts are described at Section 3.2 of this report.

Table 3-1 : Daily Traffic Volumes

Road and Location	AADT	Source
SH2 South of Readers Cutting (Approx. 18km north of Cashmere Oaks Drive)	3,232vpd	Waka Kotahi NZTA TMS
SH2 South of Second Street (Approx. 850m south of Cashmere Oaks Drive)	9,705vpd	Waka Kotahi NZTA TMS
Cashmere Oaks Drive	604vpd	Mobile Road Estimate June 2021

Figure 3-1 shows the reported AADTs for SH2 north of the Site over the last decade (prior to 2020 when reported AADTs were affected by Covid lockdowns). During this period, the growth in AADTs can be approximated as linear with a 2% growth rate.

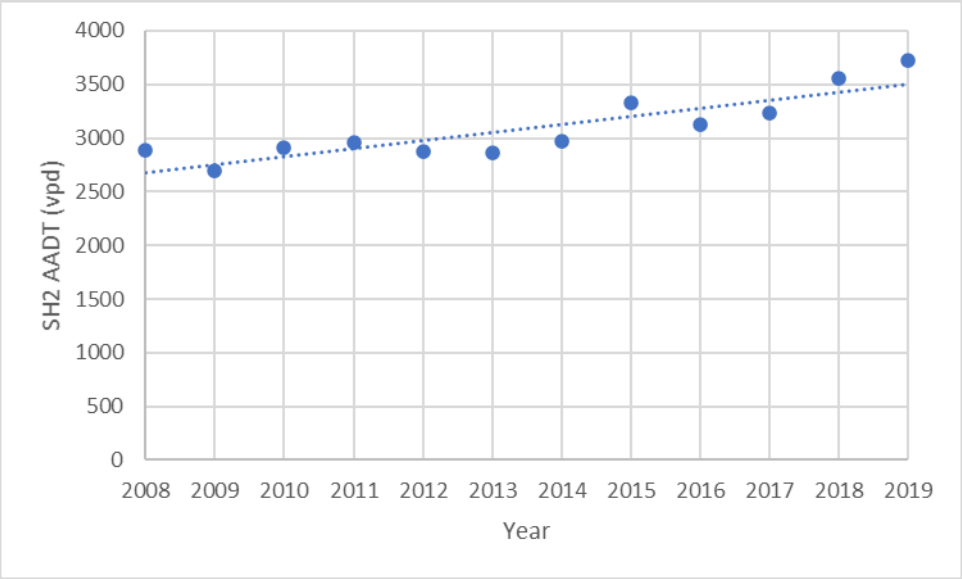

Figure 3-1 : Historical AADT Growth on SH2 North of Masterton

3.2 SH2 / Cashmere Oaks Drive Intersection Counts

Peak hour turning counts were undertaken at the intersection on Thursday 3 March 2022. The counts covered the 7:00am-9:00am, 12:00pm-2:00pm and 4:00pm-6:00pm periods. The following table summarises the counts by hour.

Cashmere Oaks Drive Volumes - Vehicles Only 3 March 2022			Vehicles					
			Cashmere Oaks - West Leg		SH1 - North Leg		SH1 - South Leg	
Peak	Hour Start	Type	Left	Right	Right	Thru	Left	Thru
AM	7 AM	Light	6	26	1	182	15	143
	8 AM		4	30	2	252	10	198
IP	12 PM		1	15	0	147	22	163
	1 PM		2	19	0	134	24	156
PM	4 PM		4	11	2	172	21	190
	5 PM		3	20	4	163	37	227
AM	7 AM	Heavy	3	2	0	13	3	16
	8 AM		1	0	0	26	0	23
IP	12 PM		0	0	0	14	0	12
	1 PM		0	2	0	14	2	15
PM	4 PM		0	0	0	7	1	8
	5 PM		0	0	0	10	1	6
AM	7 AM	All	9	28	1	195	18	159
	8 AM		5	30	2	278	10	221
IP	12 PM		1	15	0	161	22	175
	1 PM		2	21	0	148	26	171
PM	4 PM		4	11	2	179	22	198
	5 PM		3	20	4	173	38	233

Figure 3-2 : SH2 / Cashmere Oaks Drive Traffic Count Summary

As would be expected, traffic volumes turning out of Cashmere Oaks Drive are highest in the morning when people are leaving the residential area for work and vice versa in the evening. Most turning movements are to and from the south which is to be expected given the location of the subdivision relative to Masterton. SH2 traffic volumes towards Masterton are highest in the morning peak. Two-way traffic volumes of up to approximately 500 vehicles per hour (vph) are modest for a State Highway and the intersection will be operating efficiently currently with low levels of delay or queuing. These counts have formed the basis of the traffic analysis undertaken and reported at Chapter 8.

A very low level of pedestrian and cyclist activity was recorded during the counts.

3.3 Existing Cashmere Oaks Subdivision Traffic Generation

The recorded traffic volumes have been used to estimate the traffic generation rate per household occurring in the existing subdivision.

It was observed during a site visit that there were 63 houses served by Cashmere Oaks Drive (constructed and occupied at the time of the traffic counts). In addition, there were two houses under construction with eight contractor vehicles observed to be present. To make an estimate of the traffic generation of the existing subdivision, the volumes of traffic turning into Cashmere Oaks Drive during the morning and out of it in the evening have been reduced by three vehicle movements per hour to allow for contractor traffic (recognising that not all construction vehicles would arrive and leave in the peak hours).

The following table summarises the calculated traffic generation for the existing subdivision. The rates are based on the busiest hours during the morning, inter-peak (IP) and evening periods surveyed.

Table 3-2 : Summary of Existing Residential Traffic Generation

Period	Traffic Generation Rate	% In / Out	% North / South
AM	0.7vph / house	24% / 74%	18% / 82%
IP	0.6vph / house	58% / 42%	3% / 97%
PM	0.8vph / house	65% / 35%	16% / 84 %

4 Existing Road Safety

The NZTA Waka Kotahi Crash Analysis System (CAS) has been used to review crash records in the vicinity of the Site for the full five-year period of 2017 to 2021. The search area, illustrated in Figure 4-1, encompasses both the Opaki Meadows Drive / SH2 and Cashmere Oaks Drive / SH2 intersections as well as the Cashmere Oaks subdivision roads.

Figure 4-1 : Crash Search Area and Results 2017 to 2021

As shown, only two minor-injury crashes were reported in the search area, both occurring on SH2 between Opaki Meadows Drive and Cashmere Oaks Drive. Both are reported to have been single-vehicle crashes involving drivers losing control, with fatigue and excessive speed recorded as causal factors. There were no crashes reported at the Cashmere Oaks Drive intersection or within the Cashmere Oaks subdivision, suggesting that the intersection and the local roads are operating safely.

5 Future Environment

5.1 Cashmere Oaks Subdivision

The future stages of the Cashmere Oaks Subdivision, shown below in Figure 5-1, are planned to accommodate an additional 79 lots. The continuation of Cashmere Oaks Drive, labelled as Road 1, provides the main access to the consented subdivision. The section of Road 1 west of Coralie Place has an 11m wide carriageway to tie in with the existing section of Cashmere Oaks Drive. A roading plan for the subdivision indicates it is proposed with 3.9m wide traffic lanes and a 3.2m wide marked flush median or similar. Further into the subdivision, there are sections of central swale proposed with 4.85m traffic lanes either side. Road 1 is indicated to end in a turning head at the northern end of the subdivision (adjacent to the Site). Roads 2, 3 and 4 are short cul-de-sacs which all extend off Road 1.

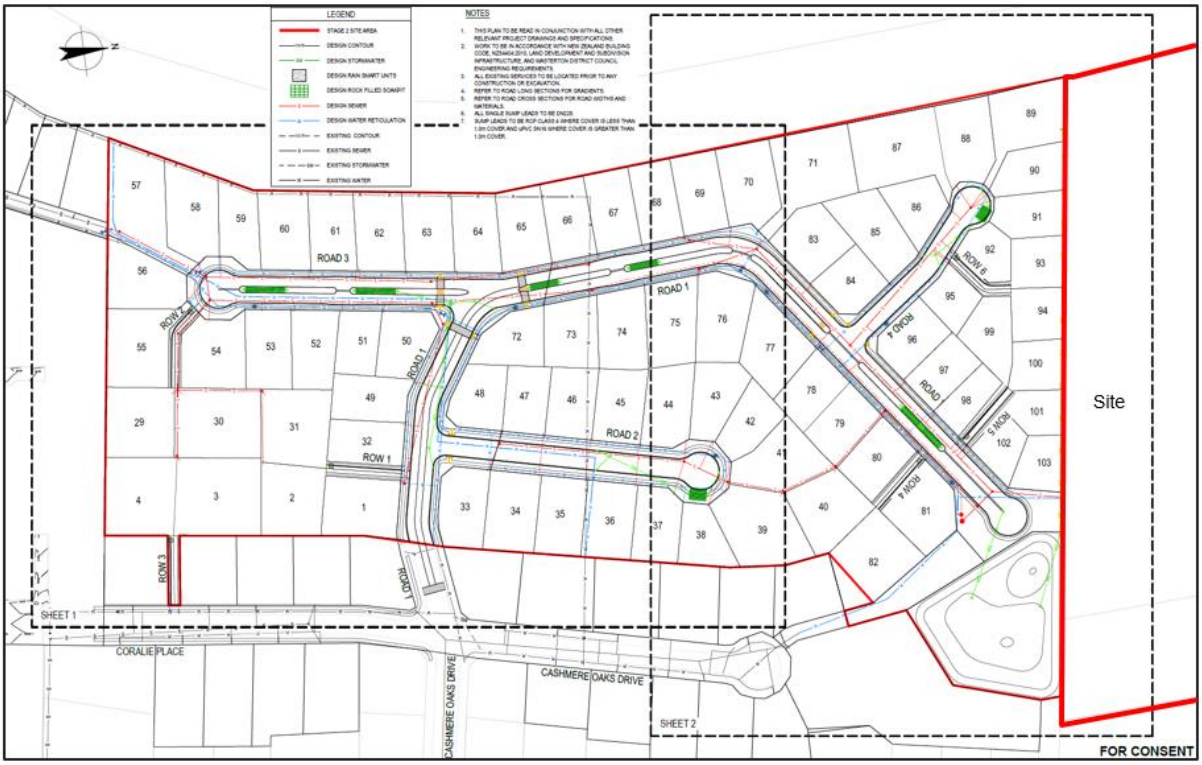

Figure 5-1 : Future Stages of Cashmere Oaks Subdivision (with Site to North)

There are 82 lots within the existing stages of the subdivision which will gain vehicle access via Cashmere Oaks Drive (of which 63 contain a house constructed and occupied as outlined earlier). With the future stages, the Cashmere Oaks subdivision is planned to contain an overall total of 161 residential lots.

Based on the traffic counts recorded at the SH2 intersection, and the household traffic generation rates calculated at Table 3-2, the following Table 5-1 contains the expected peak hour traffic generation for the fully developed subdivision.

Table 5-1 : Future Cashmere Oaks Subdivision Traffic Congestion

Period	Forecast Traffic Volume with Full Development of Cashmere Oaks
AM	115vph
IP	100vph
PM	125vph

5.2 Long Term Plan

No transport-related projects relevant to the Plan Change have been identified in the MDC 'Long-term Plan 2021-2031'.

5.3 Masterton Growth

The Site is located within an area which has been deemed to have potential for future urban expansion as included in the 2019 Masterton Urban Growth Strategy. The Site location in relation to other potential areas of urban expansion is shown in Figure 5-2, where the Site is located within area C03.

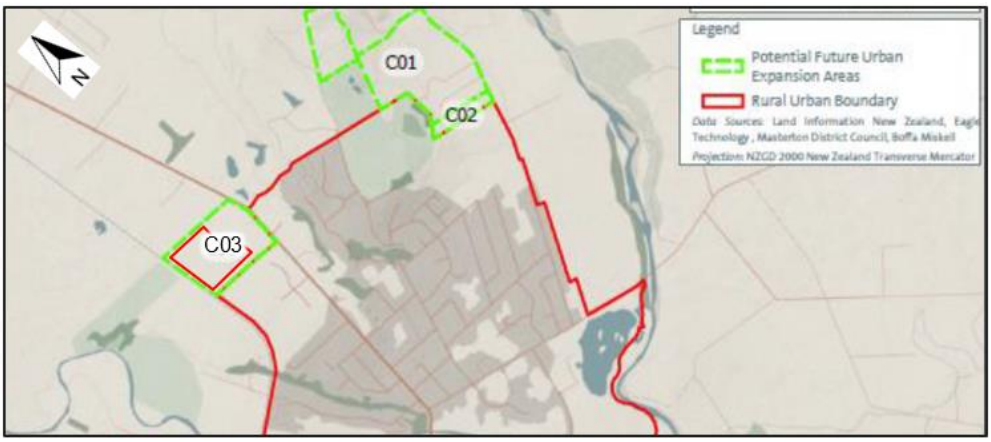

Figure 5-2 : 2019 Masterton Urban Growth Strategy Map (Site Outlined Red within Area C03)

5.4 SH2 Speed Limits

It is understood that Waka Kotahi is planning to review speed limits on its southern North Island network in the short-term. Given the residential development that has expanded to the north of Masterton, including the Cashmere Oaks subdivision and the prospects for future growth as included above in Figure 5-2, it is reasonable to anticipate that the existing open road speed limit could be revised downwards in the future.

No other plans for SH2 north of Masterton have been identified.

6 Proposed Plan Change

As outlined earlier, the Plan Change seeks to change the zoning of the Site to Residential, which would enable typical residential sections and dwellings to be constructed on the Site. Based on lot sizes of 400m^2, the Site could yield approximately 254 residential lots.

Aside from the rezoning that is the key change proposed, specific provision is intended to be made to allow for the potential development of a retirement village on the Site.

These represent the two potential development scenarios assessed.

Following the Plan Change, the Site is anticipated to be subdivided as shown in Figure 6-1.

Figure 6-1 : Proposed Plan Change Area with Future Anticipated Subdivision

7 Traffic Generation and Distribution

The analysis in this section is split into the two potential development scenarios for the Site, and traffic generation and distribution has been contemplated for both options. Scenario 1 considers traffic generation for standard residential development of the Site and Scenario 2 considers traffic generation for the Site developed with a mix of standard residential and retirement village living.

7.1 Scenario 1: Indicative Standard Residential Traffic Generation

Traffic generation for standard residential development that could occur on the Site would be expected to be consistent with those for the existing Cashmere Oaks subdivision. The following Table 7-1 summarises the possible traffic generation of 254 residential lots, based on the rates outlined in Section 3.

Table 7-1 : Potential Traffic Generation of 254-Lot Residential Development

Period	In	Out	Combined
AM Peak	44vph	137vph	181vph
Midday Peak	89vph	65vph	154vph
PM Peak	129vph	69vph	198vph

The split of traffic at the SH2 intersection would be expected to be consistent with that recorded in the traffic surveys. During the morning and evening peak periods, approximately 83% of traffic was recorded to travel to and from the south (Masterton), involving left turns in and right turns out, with the remaining 17% travelling to and from the north.

7.2 Scenario 2: Indicative Retirement Village and Balance Standard Residential Traffic Generation

Scenario 2 provides an indicative assessment of traffic generation with provision for a retirement village on approximately 9ha of the Site, and standard residential development for the balance of the Site. For the purpose of this assessment, this scenario assumes a village with 215 independent living units and 119 care suites, and 99 standard residential lots.

The most recent traffic surveys of a modern retirement village were carried out at the Summerset Wigram retirement village in Christchurch in 2018. The traffic surveys applicable to Scenario 2 are outlined in Appendix A to this report.

The following Table 7-2 shows the potential hourly traffic generation by direction based on the survey data.

Table 7-2 : Potential Retirement Village Traffic Generation by Direction

Period	In	Out	Combined
AM Peak	15vph	16vph	31vph
Midday Peak	52vph	46vph	98vph
PM Peak	45vph	40vph	85vph

The following Table 7-3 outlines the potential traffic generation of 99 residential units on the balance of the Site, based on the traffic generation reported earlier.

Table 7-3 : Potential Traffic Generation of Balance Residential Development

Period	In	Out	Combined
AM Peak	17vph	53vph	70vph
Village Peak	35vph	25vph	60vph
PM Peak	50vph	27vph	77vph

The following Table 7-4 contains the combined traffic generation for Scenario 2, being that of a retirement village and 99 balance standard residential lots.

Table 7-4 : Combined Potential Traffic Generation - Retirement Village Plus Balance Standard Residential

Period	In	Out	Combined
AM Peak	32vph	69vph	101vph
Midday Peak	86vph	71vph	157vph
PM Peak	95vph	67vph	162vph

As outlined above, it has been assessed that 83% of traffic would turn to and from the south at the SH2 intersection; that is, turn left into Cashmere Oaks Drive and turn right out of Cashmere Oaks Drive.

The Scenario 2 traffic generation is 80vph lower than that of Scenario 1 in the morning peak, 40vph lower in the evening peak and similar through the middle of the day. Scenario 1, therefore indicates the "worst case scenario", whereas Scenario 2 is anticipated to generate less traffic activity.

8 Impacts on the Road Network

This section provides a traffic assessment on the impacts for each scenario in relation to traffic modelling, intersection safety and local road suitability.

8.1 SH 2 / Cashmere Oaks Drive Intersection Modelling

The performance of the existing SH2 / Cashmere Oaks Drive intersection has been modelled using the SIDRA Intersection 9 traffic modelling software.

A ‘Future Base’ scenario has been developed by allowing for full development of the Cashmere Oaks subdivision, as outlined earlier in Section 5.1, and allowing for growth in the through traffic on SH2 of 20% to allow for 10 years’ worth of growth based on historical (pre-Covid) traffic growth patterns.

Both the morning and evening peak periods have been modelled, given these are the critical periods for assessment based on the combined influence of highway and residential traffic peaks. The inter-peak period could coincide with the peak traffic generation of a retirement village but the level of residential development across the Cashmere Oaks subdivision and the balance lot, and the lower passing traffic volumes on SH2 during the middle of the day, mean that this is not a critical period in terms of the SH2 intersection performance.

Default gap acceptance parameters have been adopted without the ‘Two Way Stop Control (TWSC) Calibration’. The default gap acceptance parameters adopted are as follows:

- 7 second critical gap and 4 second follow-up headway for the right turn out
- 5 second critical gap and 3 second follow-up heading for the left turn out
- 4.5 second critical gap and 2.5 second follow-up headway for the right turn in

The right turn out of Cashmere Oaks Drive has been modelled to give way to through traffic from both directions on SH2. While there is the space within the intersection which allows right turners to make the manoeuvre in two parts, not all drivers do so, and it has not been allowed for in the context of the current highway environment.

Figure 8-1, Figure 8-2 and Figure 8-3 show the forecast AM peak performance of the intersection in the future without and with development of the Site. That is, the ‘without’ scenario assumes full development of the Cashmere Oaks subdivision, and the ‘with’ scenarios add traffic associated with either of the Scenario 1 or Scenario 2 development options.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	23	0	24	0.0	0.171	7.8	LOS A	0.0	0.0	0.00	0.05	0.00	87.2
2	T1	276	26	291	9.4	0.171	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	98.1
Approach		299	26	315	8.7	0.171	0.6	NA	0.0	0.0	0.00	0.05	0.00	97.2
North: SH2 North														
8	T1	365	34	384	9.3	0.209	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	5	0	5	0.0	0.005	9.0	LOS A	0.0	0.1	0.39	0.62	0.39	56.4
Approach		370	34	389	9.2	0.209	0.1	NA	0.0	0.1	0.01	0.01	0.01	98.9
West: Cashmere Oaks Drive														
10	L2	15	0	16	0.0	0.018	6.1	LOS A	0.1	0.4	0.38	0.57	0.38	55.9
12	R2	72	0	76	0.0	0.290	19.4	LOS C	1.2	8.1	0.78	0.94	0.91	46.2
Approach		87	0	92	0.0	0.290	17.1	LOS C	1.2	8.1	0.71	0.88	0.82	47.7
All Vehicles		756	60	796	7.9	0.290	2.3	NA	1.2	8.1	0.08	0.13	0.10	87.5

Figure 8-1 : Future AM Peak Intersection Performance without Plan Change

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	59	0	62	0.0	0.192	7.9	LOS A	0.0	0.0	0.00	0.12	0.00	85.5
2	T1	276	26	291	9.4	0.192	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	96.0
Approach		335	26	353	7.8	0.192	1.4	NA	0.0	0.0	0.00	0.12	0.00	93.9
North: SH2 North														
8	T1	365	34	384	9.3	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	13	0	14	0.0	0.014	9.2	LOS A	0.1	0.4	0.41	0.65	0.41	56.3
Approach		378	34	398	9.0	0.211	0.3	NA	0.1	0.4	0.01	0.02	0.01	97.3
West: Cashmere Oaks Drive														
10	L2	40	0	42	0.0	0.049	6.2	LOS A	0.2	1.2	0.39	0.60	0.39	55.8
12	R2	185	0	195	0.0	0.784	38.1	LOS E	5.7	40.1	0.92	1.38	2.21	37.4
Approach		225	0	237	0.0	0.784	32.4	LOS D	5.7	40.1	0.83	1.24	1.89	39.7
All Vehicles		938	60	987	6.4	0.784	8.4	NA	5.7	40.1	0.20	0.35	0.46	71.6

Figure 8-2 : Future AM Peak Intersection Performance with Scenario 1

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	50	0	53	0.0	0.186	7.9	LOS A	0.0	0.0	0.00	0.10	0.00	85.9
2	T1	276	26	291	9.4	0.186	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	96.5
Approach		326	26	343	8.0	0.186	1.2	NA	0.0	0.0	0.00	0.10	0.00	94.7
North: SH2 North														
8	T1	365	34	384	9.3	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	11	0	12	0.0	0.012	9.1	LOS A	0.0	0.3	0.41	0.64	0.41	56.3
Approach		376	34	396	9.0	0.211	0.3	NA	0.0	0.3	0.01	0.02	0.01	97.7
West: Cashmere Oaks Drive														
10	L2	28	0	29	0.0	0.034	6.2	LOS A	0.1	0.8	0.38	0.59	0.38	55.9
12	R2	129	0	136	0.0	0.540	25.7	LOS D	2.7	19.1	0.85	1.09	1.33	42.8
Approach		157	0	165	0.0	0.540	22.2	LOS C	2.7	19.1	0.77	1.00	1.16	44.7
All Vehicles		859	60	904	7.0	0.540	4.6	NA	2.7	19.1	0.15	0.23	0.22	79.5

Figure 8-3 : Future AM Peak Intersection Performance with Scenario 2

In Scenario 1 (full standard residential development), the increase in traffic leaving the subdivision in the morning is shown to result in a deterioration in the performance of the critical right turn out movement. There would be queuing of up to approximately six vehicles and the average delay faced would approximately double to 38s, with a reduction in level of service from C to E. Other movements, including the through movements on SH2 would continue to operate efficiently.

In Scenario 2 (retirement village plus balance standard residential), the increase in the volume of traffic leaving the subdivision is smaller and hence there is only a small deterioration in the performance of the critical right turn, with the average delay for this movement forecast to increase by just 6 seconds. This small increase would be barely noticeable to most drivers.

Figure 8-4, Figure 8-5 and Figure 8-6 show the forecast PM peak performance of the intersection in the future without and with development of the Site. Again, the 'without' scenario assumes full development of the Cashmere Oaks subdivision, and the 'with' scenarios add traffic associated with either of the Scenario 1 or Scenario 2 development options.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	75	0	79	0.0	0.218	7.9	LOS A	0.0	0.0	0.00	0.13	0.00	85.4
2	T1	316	13	333	4.1	0.218	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	95.8
Approach		391	13	412	3.3	0.218	1.5	NA	0.0	0.0	0.00	0.13	0.00	93.6
North: SH2 North														
8	T1	278	12	293	4.3	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	8	0	8	0.0	0.009	9.5	LOS A	0.0	0.2	0.44	0.65	0.44	56.1
Approach		286	12	301	4.2	0.154	0.3	NA	0.0	0.2	0.01	0.02	0.01	97.8
West: Cashmere Oaks Drive														
10	L2	13	0	14	0.0	0.017	6.4	LOS A	0.1	0.4	0.40	0.58	0.40	55.7
12	R2	31	0	33	0.0	0.116	15.8	LOS C	0.4	2.8	0.71	0.87	0.71	48.5
Approach		44	0	46	0.0	0.116	13.0	LOS B	0.4	2.8	0.62	0.79	0.62	50.4
All Vehicles		721	25	759	3.5	0.218	1.7	NA	0.4	2.8	0.04	0.13	0.04	90.4

Figure 8-4 : Future PM Peak Intersection Performance without Plan Change

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	191	0	201	0.0	0.283	7.9	LOS A	0.0	0.0	0.00	0.26	0.00	82.5
2	T1	316	13	333	4.1	0.283	0.0	LOS A	0.0	0.0	0.00	0.26	0.00	92.2
Approach		507	13	534	2.6	0.283	3.0	NA	0.0	0.0	0.00	0.26	0.00	88.3
North: SH2 North														
8	T1	278	12	293	4.3	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	20	0	21	0.0	0.027	10.4	LOS B	0.1	0.7	0.51	0.73	0.51	55.3
Approach		298	12	314	4.0	0.155	0.7	NA	0.1	0.7	0.03	0.05	0.03	94.8
West: Cashmere Oaks Drive														
10	L2	33	0	35	0.0	0.042	6.4	LOS A	0.1	1.0	0.41	0.61	0.41	55.6
12	R2	79	0	83	0.0	0.345	22.0	LOS C	1.4	9.9	0.81	0.98	1.01	44.8
Approach		112	0	118	0.0	0.345	17.4	LOS C	1.4	9.9	0.69	0.87	0.83	47.5
All Vehicles		917	25	965	2.7	0.345	4.0	NA	1.4	9.9	0.10	0.26	0.11	81.6

Figure 8-5 : Future PM Peak Intersection Performance with Scenario 1

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	157	0	165	0.0	0.264	7.9	LOS A	0.0	0.0	0.00	0.23	0.00	83.2
2	T1	316	13	333	4.1	0.264	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	93.1
Approach		473	13	498	2.7	0.264	2.6	NA	0.0	0.0	0.00	0.23	0.00	89.5
North: SH2 North														
8	T1	278	12	293	4.3	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	20	0	21	0.0	0.026	10.1	LOS B	0.1	0.7	0.49	0.71	0.49	55.6
Approach		298	12	314	4.0	0.155	0.7	NA	0.1	0.7	0.03	0.05	0.03	94.8
West: Cashmere Oaks Drive														
10	L2	27	0	28	0.0	0.035	6.4	LOS A	0.1	0.8	0.41	0.60	0.41	55.7
12	R2	83	0	87	0.0	0.348	21.3	LOS C	1.5	10.2	0.80	0.98	1.00	45.2
Approach		110	0	116	0.0	0.348	17.6	LOS C	1.5	10.2	0.70	0.88	0.86	47.4
All Vehicles		881	25	927	2.8	0.348	3.8	NA	1.5	10.2	0.10	0.25	0.12	82.0

Figure 8-6 : Future PM Peak Intersection Performance with Scenario 2

As noted earlier, right-turn-out volumes and the performance of the right turn movement is more critical for the AM peak hour than the evening peak hour. The average delays modelled for the critical right turn out are shown to be 5-6 seconds higher with the Site fully developed, as compared to the baseline, but with an acceptable Level of Service (LOS) C remaining in all instances. There is a slightly increased delay for the right turn in, with a delay representative of a LOS B. This is due to the increased volume of left turn in movements which oppose the right turn in. However, the right turn in is a low volume movement and there is negligible queuing expected within the right turn bay.

8.2 SH2 / Cashmere Oaks Drive Intersection Safety Assessment

The future performance of the SH2 / Cashmere Oaks Drive intersection has been considered against the Government's 'Vision Zero' road safety strategy and the principles of the 'Safe System' approach.

The Safe System 'Treatment Philosophy' (Figure 8-7) promotes different kinds of treatments based on both Collective risk and Personal risk. Collective risk is defined as risk density and measured as the total number of crash causalities within a set distance of an intersection. For the SH2 / Cashmere Oaks Drive intersection, since crash patterns are low as reported at Chapter 4, Collective risk is at the lower end of the scale. Personal risk is defined as the risk to the

individual of a potential crash, and could be considered higher than Collective risk due to the open road speed limit, although again the crash history does not signify a high safety risk. As such, it is assessed the intersection is a low-risk location currently.

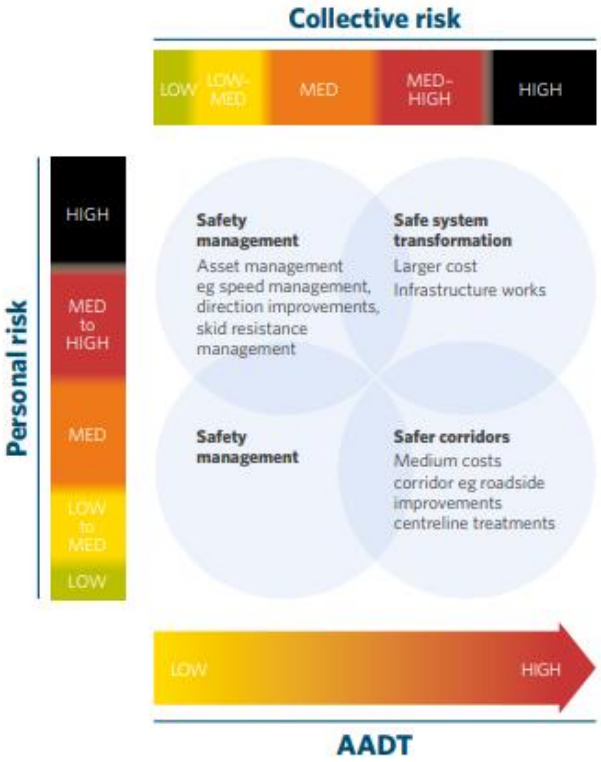

Figure 8-7 : Safe System Treatment Philosophy

The traffic modelling carried out demonstrates that the development under Scenario 2 would have little effect on the performance of the critical right turn out movement during the morning peak and therefore it would not be expected to alter its safety performance.

For the full standard residential development of Scenario 1, a greater change in the performance of the critical right turn out in the morning is forecast which may present increased risks from a safety perspective given the open road speed limit currently in place. Under the Safe System Treatment Philosophy, a standard response to a location with a low Collective risk and an increasing Personal risk is a 'safety management' response which could include highway speed management. The need for improvements and the types of responses required can be appropriately considered and addressed as part of any future resource consent process.

While Collective risk remains low, given moderate through volumes on SH2, a 'safe system transformation' such as a change in the form of the intersection (for example to a roundabout), would not be considered necessary. This is supported by Table 3.6 in Austroads Guide to Traffic Management Part 6 which notes that a roundabout or a signalised intersection would usually be an inappropriate treatment for an arterial road / local road intersection.

In the event a speed management response was identified and the urban speed environment was extended northwards beyond Cashmere Oaks Drive, the gap acceptance parameters adopted in the traffic modelling (as set out at Section 8.1.1) would be overly-conservative. Parameters of 5.5s headway and 3.2s follow-up headway would be more appropriate (but still considered conservative) for an urban T-intersection. The AM peak traffic model with full residential development of the Site has been re-run adopting these slower speed parameters, with the outputs as shown in Figure 8-8 below.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH2 South														
1	L2	59	0	62	0.0	0.192	7.9	LOS A	0.0	0.0	0.00	0.12	0.00	85.5
2	T1	276	26	291	9.4	0.192	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	96.0
Approach		335	26	353	7.8	0.192	1.4	NA	0.0	0.0	0.00	0.12	0.00	93.9
North: SH2 North														
8	T1	365	34	384	9.3	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	13	0	14	0.0	0.014	9.2	LOS A	0.1	0.4	0.41	0.65	0.41	56.3
Approach		378	34	398	9.0	0.211	0.3	NA	0.1	0.4	0.01	0.02	0.01	97.3
West: Cashmere Oaks Drive														
10	L2	40	0	42	0.0	0.049	6.2	LOS A	0.2	1.2	0.39	0.60	0.39	55.8
12	R2	185	0	195	0.0	0.467	15.5	LOS C	2.4	16.7	0.76	1.01	1.12	48.7
Approach		225	0	237	0.0	0.467	13.8	LOS B	2.4	16.7	0.69	0.94	0.99	49.8
All Vehicles		938	60	987	6.4	0.467	3.9	NA	2.4	16.7	0.17	0.28	0.24	78.4

Figure 8-8 : Forecast Intersection Performance with Reduced Gap Acceptance Parameters

This analysis shows that with a reduced speed limit on SH2, the existing Cashmere Oaks Drive intersection will be able to operate well with Scenario 1, with only short queues and delays consistent with an acceptable LOS C for the right turn out, commensurate with the existing performance.

The left turn into Cashmere Oaks Drive, particularly during the evening peak, is forecast to be made by approximately 190vph in Scenario 1 and 160vph in Scenario 2. The movements out of Cashmere Oaks Drive are not opposed by this movement so it does not impact delays faced on the side road. However, there is a risk with left turning traffic that it can obscure visibility of trailing vehicles which are travelling straight through. With the open road speed limit and the forecast traffic volumes, ideally a left turn lane well separated from the through lane would be provided so that visibility would not be obstructed. However, this has not been practicable given land constraints and the existing intersection was constructed with a short turn lane, deemed appropriate for this location and demonstrated by the safety records included at Chapter 4 to not give rise to any safety issues. A reduction in speed limit through this intersection would further reduce this risk without the need for the physical changes to the existing short left turn lane.

Minor improvements to the intersection such as those listed below can be investigated in association with any future resource consent process, and could provide safety benefits while the SH2 speed limit remains at 100km/h.

- Refreshing line marking
- Gating of give-way signs
- Installation of a diverge chevron board opposite T-intersection
- Installation of intersection warning sign on the northern approach
- Lighting improvements at the intersection
- Vegetation trimming / removal to protect driver sightlines and visibility of the intersection

Otherwise, a wide-spread transformation of the adjoining section of SH2 is not considered necessary to enable the development of a retirement village under Scenario 1.

8.3 Local Roads Assessment

Development of the Site could result in approximately an additional 100-180vph on Cashmere Oaks Drive during the morning peak period and 160-200vph during the afternoon and evening peak periods. The forecast peak hour traffic volumes on the initial length of Cashmere Oaks Drive with full development of the consented subdivision and the potential increases resulting from development of the Site are summarised below.

Table 8-1 : Potential Traffic Generation from both Scenario 1 and Scenario 2

Period	Forecast Traffic Volume with Full Development of Cashmere Oaks	Potential Traffic Volume with Plan Change- Scenario 1 (Increase)	Potential Traffic Volume with Plan Change- Scenario 2 (Increase)
AM	115vph	295vph (180)	215vph (100)
IP	100vph	255vph (155)	255vph (155)
PM	125vph	320vph (200)	285vph (160)

The existing 11m width of Cashmere Oaks Drive is wide enough for kerbside car parking on both sides of the road and two-way traffic movement. The 215-320vph which could occur if the Site is developed would not be an unusual traffic volume for a local road. Based on this, it is considered that the 11m width is a generous road width which will be able to accommodate the additional traffic that could be generated.

The Cashmere Oaks Drive / Coralie Place / Sir Herbert Hart Avenue Intersection (Figure 8-9) has been constructed with an unconventional layout. The two Cashmere Oaks Drive legs (west annotated as Road 1 which will provide for the future extension of Cashmere Oaks Drive towards the Site, and east) require drivers to change direction through the intersection. As such, and as the western arm of the intersection is developed, this intersection would benefit from some delineation along the major route to provide guidance through the intersection and to encourage drivers to stay on the correct side of the road. It is presumed that controls (e.g. stop signs and markings) will be introduced on the minor legs when Cashmere Oaks Drive is extended into the future subdivision stages.

Figure 8-9 : Existing Cashmere Oaks Drive / Coralie Place / Sir Herbert Hart Avenue Intersection (Aerial Image Source : Emap)

The first section west of Coralie Place is proposed with 3.9m traffic lanes either side of what appears to be a flush median or similar (Figure 8-10). This road layout suggests no on-street car parking and this 11m carriageway width will be more than wide enough to be able to accommodate the additional traffic that could be generated by development of the Site.

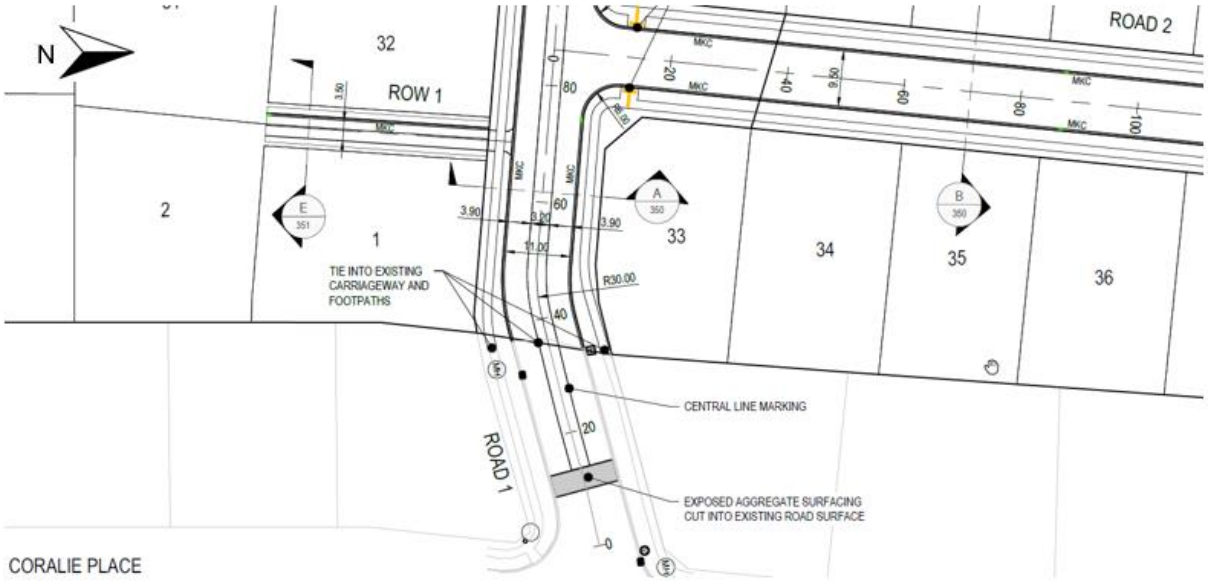

Figure 8-10 : Cashmere Oaks Drive Extension

Around the curve to the west, the remainder of Cashmere Oaks Drive is proposed with 4.85m lanes either side of a central swale, as shown in Figure 8-11.

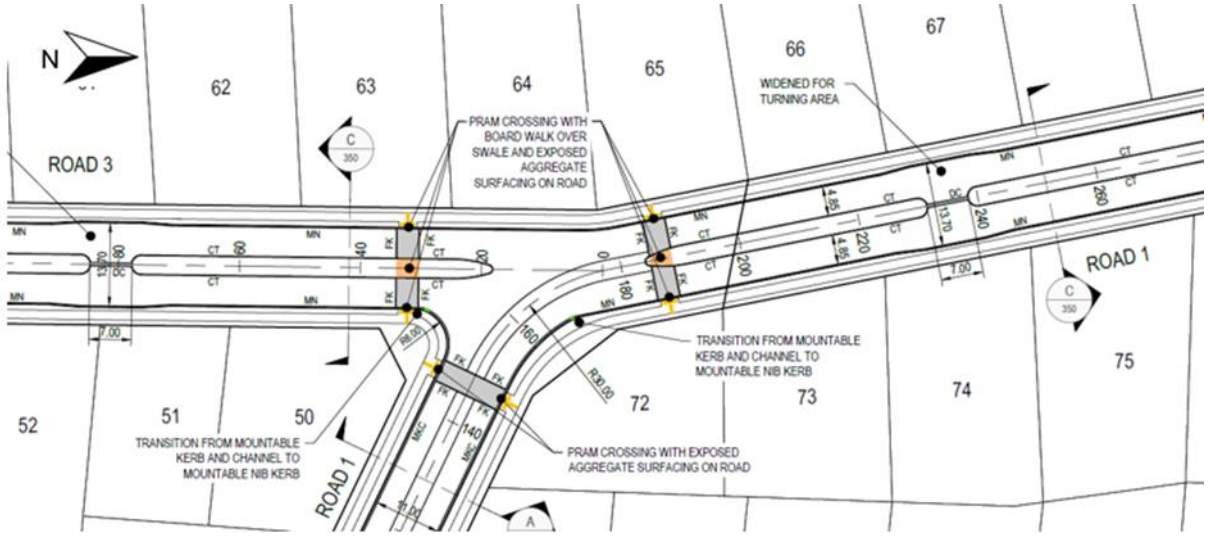

Figure 8-11 : Cashmere Oaks Drive Extension Curve at Road 3

The 4.85m lane widths will be able to accommodate the additional traffic that could be generated by development of the Site. This width will allow room for a vehicle to pass a cyclist at a slow speed but on-street car parking would not be expected.

9 Non-Car Travel

The assessment to follow in respect of pedestrians, cyclists and public transport is applicable for the future development options represented by both Scenarios 1 and 2.

9.1 Pedestrian / Cyclist Accessibility

The SH2 / Cashmere Oaks Drive intersection traffic counts showed a low level of activity by pedestrians and cyclists.

The Site will be connected to the Cashmere Oaks subdivision through footpaths alongside new roads joining to footpaths alongside Cashmere Oaks Drive. There are also off-road connections planned from the end of Cashmere Oaks Drive to the ends of the Roger Renall Avenue and Sir Herbert Hart Avenue cul-de-sacs.

Any cyclists travelling to or from the Site will be able to use the Cashmere Oaks subdivision roads. As outlined, the existing and proposed local road cross-sections will be suitable for shared use by cyclists. The 4.85m lane widths proposed either side of the central swale will be sufficient for vehicles to pass cyclists at a slow speed, while the 11m road width over the road's initial length will allow vehicles to pass low volumes of cyclists.

9.2 Public Transport

Currently, the nearest bus route serving Masterton north circulates through the residential areas east of SH2. As outlined earlier, the nearest bus stop is currently at the Third Street / Stamford Place intersection, approximately 1.4km from the Site. Given this distance, it is considered that the bus service uptake from development of the Site would be low. Public transport provision (e.g. bus routes), typically responds to demand. A bus route serving the Cashmere Oaks subdivision could be provided in the future and development on the Site would be able to connect to this through footpaths alongside subdivision roads.

10 District Plan Provisions

The requirements of Section 21.1.25 - Roads, Access, Parking and Loading Areas from the Combined Wairarapa District Plan, Masterton Edition have been reviewed to assess the extent to which development of the Site would align with the operative District Plan provisions. Relevant requirements are outlined in the table below along with comment on suitability. From this review, it is concluded that there are no concerns with the rules being applied to the Site as part of the Plan Change.

Table 10-1 : Assessment of Suitability of Roads, Access, Parking and Loading Areas Rules

Requirement	Comment on Suitability
21.1.25.a: All new roads, intersections, access, parking and loading areas shall be provided in accordance with the provisions of Appendix 5 – Requirements for Roads, Access, Parking and Loading.	
Urban roads, footpaths and privateways in accordance with NZS4404 Land Development and Subdivision Engineering. Amendment- for all road classifications other than minor local roads, a minimum seal width of 1m less than specified is acceptable.	Appropriate to rely on NZS4404 and local standards for design of new roads in the residential area. Understand requirements would not apply to retirement village.
Sightlines at non-State Highway intersections and driveway intersections- RTS6 Guidelines for Visibility at Driveways. At road intersections, no obstruction exceeding 1m in height will be permitted within a 6m x 6m triangle measured from a boundary intersection point.	Appropriate for new intersections within the residential development to meet local sightline standards. Understand requirements would not apply to retirement village.
Urban vehicle crossings - NZS4404. In Masterton District, new vehicle crossings on existing streets shall be constructed in accordance with MDC Plan 805 A, B or C. Where 3 or more dwelling units are using a common vehicle crossing, that crossing is to be constructed from kerb to boundary in concrete.	Appropriate to rely on local vehicle crossing standards for residential development. Retirement village would likely have specifically designed vehicle crossings which would be appropriately considered as part of any future resource consent process.
Off-street Parking Facilities- geometric layout to be in accordance with AS/NZS2890.1:2004 Parking facilities Part 1: Off-street car parking	Appropriate to rely on this standard for residential development. Car parking within the retirement village can be designed to suit and considered through any future resource consent process.
Turning paths Off-road parking facilities- 85% and 99% car- AS/NZS2890.1	Standard car parking and manoeuvring dimensions will allow these vehicles to be accommodated. Vehicle tracking will be checked for the retirement village as necessary through any future resource Consent process.

Requirement	Comment on Suitability
Off-road loading facilities- 99% rigid truck	Loading requirements for a retirement village would be confirmed through any future resource consent process. No loading requirements for standard residential lots.
Urban carriageway lighting	Appropriate to rely on local standard for street lighting in new residential area.
Facilities for disabled Pedestrian facilities- RTS14	Appropriate for tactile paving to be installed on new residential roads.
Mobility parking facilities- NZS4121	Mobility parking to be provided at retirement village in accordance with standard.
Vehicle Parking Spaces, Loading Spaces and Access Aisles All required vehicle parking spaces, loading spaces and access aisles shall be formed and sealed and shall be provided with surface water drainage in accordance with NZS4404.	Appropriate for all parking, loading and access to be sealed and drained.
21.1.25.b: All sites and activities shall have safe and practicable vehicle access from a public road. All vehicle crossings and intersections shall be positioned and constructed in accordance with the standards in Appendix 5.	Appropriate to rely on local vehicle crossing standards for residential development. Retirement village would likely have specifically designed vehicle crossings which would be considered through any future resource consent process.
21.1.25.c: Parking and Loading i) Provision for On-Site Loading 1. Every activity shall provide off-street loading for vehicles associated with the activity and vehicles expected to visit or be stored on the site in connection with the activity.	Retirement village would be designed to accommodate required service vehicles.
2. Where any activity is changed or any building erected or altered, sufficient vehicle loading shall be provided to meet the demands generated by the altered activity or building.	Not applicable for greenfield developments.
3. Related to parking requirements for multiple activities.	Not considered relevant since minimum car parking requirements have been removed.
4. Loading bays and spaces may be counted as parking spaces…	Not considered relevant since minimum car parking requirements have been removed.
iii) Parking for the Disabled Any activity shall provide parking for the disabled in accordance with NZS4121:2001 Design for Access and Mobility- Buildings and Associated Facilities.	Mobility parking will be provided within the retirement village.
iv) Vehicle Access and Manoeuvring Each required vehicle park shall have practical access from a public road. Sufficient manoeuvring space shall be provided to enable vehicles to enter and exit the site in a forward direction. Exception- Front lots in residential zones with a garage attached to a dwelling and that obtains access to a District Arterial, Collector or Local Road.	Retirement village will provide for this. Exception would apply to front lots in residential area given they will front local roads.
v) Vehicle Parking Spaces and Access Aisles to Remain Clear Dedicated vehicle parking space and access shall remain unobstructed by other activities and shall not be diminished by storage of goods or erection of any structure.	This requirement is appropriate to consider for car parking of any future retirement village on the Site.
vi) Design of Vehicle Parking and Loading Space 1. Every parking space shall be designed and constructed in accordance with AS/NZS 2890.1:2004 Parking Facilities.	Appropriate to rely on this requirement for standard residential lots. Any departure from this standard for a retirement village would be considered through any future resource consent process.
2. Each required loading space shall be of usable shape and have a minimum length of 7.5m, minimum width of 3.5m and	Loading space dimensions for a retirement village would be considered through any

Requirement	Comment on Suitability
minimum clear height of 4.5m. Sufficient manoeuvring spaces shall be provided to accommodate a 90 percentile two-axle truck.	future resource consent process.
vii) Standards of Construction of Vehicle Parking Spaces All required vehicle parking spaces and access aisles shall be formed, sealed and marked, and shall be provided with surface water drainage.	No 'required' vehicle parking spaces anymore but appropriate for all car parking to be formed, sealed and drained and for parking within a retirement village to be marked.

11 Recommendations and Conclusion

The Plan Change could allow for up to 254 standard 400m^2 standard residential lots to be developed on the Site. The Plan Change provisions for the Site alternatively enable a retirement village with the balance of the Site as standard residential lots.

It has been estimated that development of the Site could generate approximately 180vph in the morning peak and 200vph in the evening peak under Scenario 1 (two-way). Under Scenario 2, traffic generation is anticipated to be lower at approximately an additional 100vph in the morning peak and 160vph in the evening peak (two-way). This additional traffic would all be added to Cashmere Oaks Drive and its intersection with SH2.

Analysis of the performance of the SH2 intersection, allowing for full development of the consented Cashmere Oaks subdivision and 10 years of growth in passing SH2 traffic volumes, indicates that development of the Site for a combination of a retirement village and standard residential under Scenario 2 would have little impact on the performance of the SH2 / Cashmere Oaks Drive intersection, even without further intervention from Waka Kotahi. The small increases in queuing and delays on Cashmere Oaks Drive that could result from the increased traffic volumes would not be expected to noticeably impact the safety of the intersection.

With full standard residential development of the Site under Scenario 1, it is recommended that improvements are made to return a good level of service to the critical right turn out to SH2 from the Cashmere Oaks Drive intersection. A future response may be for the urban speed limit on SH2 to be extended to at least beyond the Cashmere Oaks Drive intersection. With an urban speed limit, lower gap acceptance conditions would occur, for which the traffic modelling has forecast that the existing T-intersection would be able to accommodate the additional traffic from a 254-lot residential development of the Site, at an acceptable level of performance.

Minor improvements at the Cashmere Oaks Drive and SH2 intersection have been recommended for investigation in the interim while the open road speed limit remains which will ensure the right turn out to SH2 performs at an acceptable level in the absence of Waka Kotahi reducing speed limits. The need for improvements and the types of responses required can be appropriately considered and readily addressed as part of any future resource consent process for either Scenario.

It has been assessed that Cashmere Oaks Drive has been built / is planned to be built to a generous standard for a local road and traffic volumes on the road will remain within expected local road traffic volume bounds. The Cashmere Oaks subdivision roads will be suitable for shared use by cyclists and pedestrians will be catered to through the provision of footpaths. There is no nearby public transport service, but the provision of footpaths connected from the Site along Cashmere Oaks Drive means that access to a potential future bus service in Cashmere Oaks subdivision would be possible.

From reviewing the operative district plan provisions regarding roads, access, parking and loading areas, it is concluded that there are no concerns with the rules being applied to the Site as part of the Plan Change and any future resource consent processes.

Appendix

We design with community in mind

Appendix A Traffic Generation Calculations for Retirement Village

The most recent traffic surveys of a modern retirement village were carried out at the Summerset Wigram retirement village in Christchurch in 2018.

Table A-1 shows the traffic generation rates calculated from these surveys for independent living units and assisted living suites / care beds, which have been adopted in transport assessments for a number of retirement villages, and consented as appropriate.

A-1 Recorded Retirement Village Traffic Generation Rates

Unit Type	AM Peak	Village Peak	PM Peak	Daily
Independent Living Unit	0.11vph/unit	0.25vph/unit	0.26vph/unit	3.03vpd/unit
Assisted Living / Care Bed	0.06vph/unit	0.37vph/unit	0.24vph/unit	2.56vpd/unit

The AM and PM peak traffic generation rates coincide with the highest hourly traffic generation rates recorded during the road network peak periods i.e. 7:00am-9:00am and 4:00pm-6:00pm. The 'village peak' traffic generation was recorded earlier in the afternoon.

With a potential retirement village development on Lot 1 involving 215 independent living units and 119 assisted living suites / memory care suites / care beds, the following **Table A-2** summarises the possible traffic generation of the village.

A-2 Potential Traffic Generation of Retirement Village

Unit Type	AM Peak	Village Peak	PM Peak	Daily
Independent Living Unit	24vph	54vph	56vph	651vpd
Assisted Living / Care Bed	7vph	44vph	29vph	305vpd
Total	31vph	98vph	85vph	956vpd

The following **Table A-3** summarises the directionality of traffic generation recorded at the Wigram village by period.

A-3 Directionality of Wigram Village Traffic Generation

Period	In	Out
AM Peak	48%	52%
Village Peak	53%	47%
PM Peak	53%	47%

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

New Zealand offices:
Alexandra, Auckland, Balclutha, Christchurch, Dunedin, Gisborne, Greymouth, Hamilton, Hastings, Nelson, Palmerston North, Queenstown, Tauranga, Wellington, Whangārei

Hazeldean Business Park, 2 Hazeldean Road, Addington, Christchurch 8024,
PO Box 13-052, Armagh, Christchurch, 8141
New Zealand: +64 3 366 7449 | www.stantec.com