SUMMARY STATEMENT OF MELANIE MUIRSON ON BEHALF OF WELHOM DEVELOPMENTS LIMITED

ROAD SAFETY EVIDENCE

1. SUMMARY OF KEY CONCLUSIONS

State Highway 2 / Cashmere Oaks Drive Intersection Safety Risk Assessment

1.1 My road safety assessment relates to the proposed Private Plan Change ("**Plan Change**") to rezone approximately 14.7ha of land in the northern fringe of the Masterton township ("**Site**").

1.2 My evidence included assessment of the intersection against the Safe System Treatment Philosophy. I outlined that I consider the collective risk at this intersection is towards the lower end of the scale (low or low-medium), which is reflective of the moderate traffic volumes passing on State Highway 2 ("**SH2**"). I consider personal risk to be medium due to the speed environment on SH2, noting that actual vehicle speeds are around 80km/h, which is lower than the posted speed limit of 100km/h. Also, these risk ratings would typically be based on crash frequency and there have been no intersection type crashes reported at the intersection.

1.3 For an intersection with a low-medium collective risk and a medium personal risk, a 'safety management' approach is an appropriate response under the Safe System Treatment Philosophy. The level of risk does not reach the levels where safety transformation, such as a roundabout, is required.

Safety Management Treatments

1.4 Reducing vehicle speeds is one of the most commonly adopted measures under a 'safety management' approach. Waka Kotahi plans to implement a reduced speed limit of 80km/h on SH2 from Cashmere Oaks Drive to the north through its Interim State Highway Speed Management Plan. Summerset submitted on this plan that it would be appropriate to extend the 50km/h zone by approximately 600m to north of the Arvida retirement village site.

1.5 It is likely a speed limit change will be in place prior to any development on the Site, although development of the Site would not depend on this as outlined by Mr Georgeson. Irrespective, in my view it would be appropriate to reassess

the safety and operation of the intersection at the time of any future subdivision or retirement village resource consent.

1.6 I outlined a range of other measures, which would be considered 'supporting treatments' under the Safe System Framework, including speed limit reduction, changing the priority control from Give Way to Stop on the Cashmere Oaks Drive approach, additional intersection warning signage, vegetation trimming and lighting upgrades, which I consider would further enhance the safety of the intersection. The requirement for such measures can be considered at the subdivision / resource consent stages.

1.7 I consider that while collective risk remains relatively low given forecast traffic volumes on SH2, a 'safe system transformation' approach is not justified as the risk rating is well below the high-risk threshold. A transformation treatment such as a change in the form of intersection (for example, to a roundabout) is disproportionate to the risk and would not be necessary.

1.8 To conclude, my opinion is that the existing T-intersection with a right turn bay will remain the appropriate intersection form, together with the supporting treatments described.

2. MATTERS OF AGREEMENT

2.1 Mr Connelly states (paragraph 79) that "The ultimate form and function of the intersection should be considered in context and integrated with the future development and road network, with safety being a key consideration". I agree with this statement on the basis that the safety and operation of the intersection in relation to the wider corridor and future speed management should be reassessed at the at the time of any future subdivision or retirement village resource consent.

2.2 Model limitations: I agree with Mr Landon-Lane's statement in paragraph 36, with regard to the crash prediction models being a "best guess" at likely outcomes and that not every intersection will perform as expected.

3. KEY OUTSTANDING ISSUES

SH2 / Cashmere Oaks Drive Intersection Safety Risk Assessment

3.1 The safety risk assessment for this intersection is referenced from Waka Kotahi's MegaMaps[1] which assesses a 9km section of SH2 extending from Cashmere Oaks Drive in the south to Paierau Road in the north. Noting Paierau Road is the northern outlet for the heavy vehicle bypass of the Masterton town centre.

3.2 The northern section from north of the Arvida development access is in accordance the definition of the One Network Framework ("**ONF**") road classification of Interregional Collector. However, the section of SH2 from the Arvida development south to the existing urban boundary does not look or feel open nor gives drivers the visual cues that they can travel at high speeds due to the presence of intersections, painted flush medians and right turn bay and visibility of building from the highway.

3.3 With the increase in development in this area, combined with the presence of the Hansells factory and two side roads providing access to residential developments, particularly to the north of Cashmere Oaks Drive, this section of SH2 is demonstrating Peri-urban characteristics.

3.4 Waka Kotahi's ONF Detailed Design Document defines Peri-urban roads as providing:

> "access to residential property in rural settlements, lifestyle blocks, sub-divisions and on the edge of urban areas where the main surrounding land-use is residential, but at a lower level than that found in urban residential locations. There are low levels of local street activity with residents going about their daily lives. Levels of motor vehicle traffic and freight will range from very high to low, depending on whether the peri-urban road is connecting to an interregional connector or rural road."

3.5 Therefore, the 750m road section from the existing Masterton urban boundary to immediately north of the Arvida development cannot be compared to an interregional collector which is defined as running through farmland and natural areas where there are low levels of roadside activity.

3.6 Table 2 of Mr Connelly's evidence summarises the latest speed survey results from November 2022. This survey confirms that the average and 85th percentile speeds on SH2 south of the Cashmere Oaks Drive intersection

[1] MegaMaps | Waka Kotahi NZ Transport Agency (nzta.govt.nz)

range between 63.4km/h – 65.4km/h and 74km/h, respectively. While the average and 85th percentile speeds on SH2 north of Hansells range between 80km/h - 82.4km/h and 90.7km/h – 93.2km/h, respectively.

3.7 Mr Connelly states in Paragraph 100 of his evidence that SH2 has the appearance of a rural road and "there is no definition or change of environment" from Cashmere Oaks Road to the north. I disagree as the road environment changes from being open with views of farmland and rural residential land uses. As the driver approaches Masterton from the north, the road changes with the view of the Arvida development facing the highway followed by the Hansells Factory and the existing Cashmere Oaks development. The trees and the footpath on the western side south of Cashmere Oaks Drive also provide drivers cues to the additional development in area. There is a clear delineation between this area which corresponds to the peri-urban definition and the section to the north which is clearly rural and the speed survey results demonstrate that the visual cues are influencing driver speeds in this section.

Analysis of Historic Crash Data

3.8 Crashes are random events, this is supported by Waka Kotahi's definition of a crash being: "rare, random, multifactor event preceded by a situation in which one or more persons failed to cope with their environment". The crash prediction models used by Mr Landon-Lane to assess DSIs have been developed on the basis of a site having an underlying crash risk.

3.9 Definition of crashes: The Waka Kotahi "Guide to Treatment of Crash Locations"[2] defines the crash types as follows:

(a) Fatal: A death occurring as the result of injuries sustained in a road crash within 30 days of the crash.

(b) Serious: Injury (fracture, concussion, severe cuts or other injury) requiring medical treatment or removal to and retention in hospital.

(c) Minor: Injury which is not 'serious' but requires first aid, or which causes discomfort or pain to the person injured.

(d) Non-injury: Property damage only (PDO).

---

[2] Waka Kotahi - Guide to treatment of crash locations - definitions (nzta.govt.nz)

3.10 Death and Serious Injury casualty equivalents ("**DSI**") are an estimation of the number of deaths and serious injuries likely to occur at an intersection or on a corridor based on the total number of injury crashes (fatal, serious and minor injuries) that have occurred.

3.11 The reported crash data in the Waka Kotahi Crash Analysis System ("**CAS**") was interrogated for T-intersections on 80km/h and 100km/h roads in the Masterton district, and this resulted in 6 fatal, 18 serious, 64 minor and 107 non-injury crashes (DSIs being 27% of the total injury crashes) since crash records were inputted into the database (circa 1980).

3.12 When T-intersections on the state highway network are separated out, this results in 2 fatal, 3 serious, 20 minor and 21 non-injury (equating to 20% DSI). Interestingly, it seems the state highway T-intersections are performing better as a subset of all T-intersections within the Masterton District.

3.13 The reported crashes at the state highway T-intersections over the last 10 years (2013 to 2022) include zero fatal, 1 serious, 5 minor and 17 non-injury crashes equating to 17% DSI.

3.14 The resulting DSIs from the above data interrogation demonstrate that the T-intersections on state highways in the Masterton District are performing better than the DSI severity factor of 32% of all injury crashes that occur at priority T-intersections on 80km/h and 100km/h roads. This value is based on the national data from CAS.

3.15 These lower DSIs are due to the function of this section of SH2 operating as a peri-urban road with lower average and 85th percentile speeds and more activity along the section.

Crash Prediction Modelling

3.16 Using the Waka Kotahi crash prediction tool from the Crash Estimation Compendium[3] for a priority T intersection in a high-speed environment (≥80km/h), equates to 0.18 injury crashes per year for the SH2 / Cashmere Oaks Drive intersection (i.e., approximately 1 per every 5 years). Applying the severity factor results in a prediction of approximately 1 DSI per 20 years. This aligns with Mr Landon-Lane's analysis presented in paragraph 53 for Scenario 2 mixed scenario development.

[3] Crash Estimation Compendium (New Zealand Crash Risk Factors Guideline) (nzta.govt.nz)

3.17 I have further investigated the crash prediction models for both the existing and future intersection forms using the Crash Estimation Compendium crash prediction models and tested against the roundabout for both the high speed (greater than 70km/h) and low speed (50 and 60km/h) options. The results are presented in Table 1.

3.18 A 2% per annum traffic growth has been applied to the SH2 traffic volumes over the 20 year period and the assumption has been made that the higher of the two scenario future traffic volumes on Cashmere Oaks Drive have been applied for the future years.

Table 1: Summary of cumulative DSI crashes for various crash models

Intersection Type	**Predicted DSI Equivalents at Year 20 (Existing volumes without additional development)**	**Predicted DSI Equivalents at Year 20 (With additional development)**
Priority T – 80/100km/h	0.74	1.25
Priority T – 50/60km/h	0.57	0.68
Roundabout – 80/100km/h	0.40	0.77
Roundabout – 50/60km/h	0.49	0.56

3.19 The Waka Kotahi Crash Estimation Compendium states that the model parameters need to be adjusted given the overall downward trends in crashes and because many of the crash prediction models predict crashes over five years rather than one year.

3.20 The Waka Kotahi Monetised Benefits and Costs Manual[4] ("**MBCM**") provides a methodology for applying a crash trend adjustment factor to take into account the downward trends in crashes since 1985. This is provided in Appendix 2, page 285 of the MBCM, a snapshot of the equation is below.

[4] Monetised benefits and costs manual | Waka Kotahi NZ Transport Agency (nzta.govt.nz)

Method B adjustment

This procedure should be followed if using method B and C. As the crash rates and crash prediction models in the *Crash estimation compendium* use historical crash data, the predicted number of crashes needs to be adjusted for crash trends:

$A = A_T \times (1 + f_t (y_z - 2006))$

where:

A is the crash rate adjusted for crash trends
A_T is the typical rate found from models or rates
f_t is the factor for adjusting the typical rate:
- -0.01 for sites with speed limits 60km/h and below
- -0.02 for sites with speed limits 70km/h and above

y_z is year zero of the analysis period

3.21 When the crash adjustment factor is applied to the models from Table 1, the resulting DSIs are reduced as shown in Table 2 below.

Table 2: Summary of cumulative DSI crashes for various crash models with crash trend adjustment

Intersection Type	**Predicted DSI Equivalents at Year 20 (Existing volumes without additional development)**	**Predicted DSI Equivalents at Year 20 (With additional development)**
Priority T – 80/100km/h	0.51	0.85
Priority T – 50/60km/h	0.48	0.57
Roundabout – 80/100km/h	0.28	0.52
Roundabout – 50/60km/h	0.42	0.47

3.22 The difference in cumulative DSIs between the high speed priority T-intersection with and without the proposed development traffic volumes (should the speed limit remain either at 100km/h or be reduced to 80km/h) is 0.51 DSI versus 0.85 DSI in 2043 (20 years).

3.23 I note that Mr Landon-Lane has not applied this crash trend adjustment factor in his DSI crash analysis.

3.24 A high-risk intersection is often identified as one with 3 or more death or serious injury crashes in 5 years.[5] The High Risk Intersections Guide states that high risk intersections are defined as having a high or medium-high Collective and Personal Risk.

3.25 This is not the case with the Cashmere Oaks Drive intersection with SH2, either in its existing state or as predicted for the future.

3.26 The crash prediction models provide a theoretical analysis that is based on national averages for crashes for the different intersection types obtained from the reported crash data from the CAS database. However, the analysis is not specific enough to accurately evaluate the impacts of changes at an intersection which has unique characteristics when compared to a national average.

Improvements to Cashmere Oaks Drive Intersection

3.27 Mr Connelly states in paragraph 93 that "A roundabout at this location may not be the only solution". This statement reiterates that there are other measures that could be implemented to address safety concerns at this intersection.

3.28 I reiterate the range of other measures, which would be considered 'supporting treatments' under the Safe System Framework, including speed limit reduction, changing the priority control from Give Way to Stop on the Cashmere Oaks Drive approach, additional intersection warning signage, vegetation trimming and lighting upgrades, which I consider would further enhance the safety of the intersection. The requirement for such measures can be considered at the subdivision / resource consent stages.

Melanie Muirson

8 March 2023

[5] Waka Kotahi High Risk Intersections Guide - Short Report (nzta.govt.nz)