Stantec

Memo

Project:	Kevler Development Subdivision	**Project No:**	310203486
To:	Mat Collins cc: Fiona Aston	**Date:**	19 July 2023
From:	Andrew Metherell		

RE: Additional Assessment of Safety Risk at Intersections

Dear Mat

Thank you for the discussion about your progress on considering your position on road safety effects following receipt of my evidence.

1. Crash Risk Analysis Methods

In my evidence, I set out detail of the crash history of the relevant intersections and how that has changed over time as the surrounding traffic, roading, and landuse environment has also changed.

Actual crash data is available for approximately 2.5 years since the changes were made to the Springston Rolleston Road / Selwyn Road intersection including speed limit changes and additional intersection delineation changes as described in my evidence. The reported crash pattern shows no reported crashes in that time and I noted that is pointing to a significant step change in crashes from the historical crash history.

We discussed a need to consider crash risk in addition to crash history. I acknowledge that the nature of how injury crashes occur can still mean that residual crash risk remains as a result of the combination of traffic volumes and intersection form, even though the crash data to date has signalled a significant reduction in crash occurrence at Springston Rolleston Road / Selwyn Road.

Typically, this crash risk is assessed based on DSI (death and serious injury crashes) calculations using established methods that account for existing crash history, intersection form, and typical crash rates. It is important to understand that the models are indicative of crash risk based on national averages, as they use empirically derived models from intersections throughout New Zealand. Individual intersections can perform better or worse.

Since submitting evidence, I have been able to use the latest traffic count data and my short-medium term forecasts to complete a crash risk analysis for the three intersections of interest. I have applied the procedures included in the Waka Kotahi Monetised Benefits and Costs Manual ("MBCM") (Appendix 2: Crash Analysis) for three assessment years 2016, 2023, and 2028. These years have been assessed for the following reasons:

- 2016: represents the rural formation of the intersections with traffic volumes counted at two of the three intersections ahead of the significant change in development in the south of Rolleston.
- 2023: recent traffic counts, and the Springston Rolleston Road / Selwyn Road intersection has been changed to urban speed.
- 2028: the year assessed in my evidence as being the approximate timeframe of the Council planned changes in intersection form, and as assessed in evidence from a capacity perspective.

The crash histories adopted for analysis are set out below:

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Intersection	Period	Fatal	Serious	Minor	Non-Injury
Springston Rolleston Road / Selwyn Road	2016-2020 (prior to changes)	1	1	3	4
Lincoln Rolleston Road / Selwyn Road	2018-2022	0	0	2	2
Selwyn Road / Weedons Road	2018-2022	0	0	0	6

Table 1: Crash History Adopted for Crash Risk Assessment

The flow chart in Figure A1 of the MCBM has been referenced to determine the crash analysis method. No fundamental change has been allowed for in assessing intersections ahead of future upgrades to roundabouts.

Crash models adopted are as shown in Table 2. No crash modification factors related to specific treatments were included as the primary change between existing and future is the urbanisation of Springston Rolleston Road / Selwyn Road which is already allowed for in the change in model type. Allowance has been made for reducing crash rates over time in accordance with crash procedures.

Intersection	**2016**	**2023**	**2028**	
			Existing Form	**Roundabout**
Springston Rolleston Road / Selwyn Road	High speed priority crossroads ≥ 80km/h (Method A)	General urban cross and T-junction intersection 50-70km/h (Method A)	General urban cross and T-junction intersection 50-70km/h (Method A)	General urban roundabouts 50-70km/h (Method B)
Lincoln Rolleston Road / Selwyn Road	High-speed priority T-junctions ≥ 80km/h (Method C)	High-speed priority T-junctions ≥ 80km/h (Method C)	High-speed priority T-junctions ≥ 80km/h (Method C)	General urban roundabouts 50-70km/h (Method C)
Selwyn Road / Weedons Road	High speed priority crossroads ≥ 80km/h (Method C)	High speed priority crossroads ≥ 80km/h (Method C)	High speed priority crossroads ≥ 80km/h (Method C)	General urban roundabouts 50-70km/h (Method C)

Table 2: Crash Model and Method Adopted

2. Crash Risk Modelling Outputs

The modelling output the following predicted DSI per annum. It is noted that the higher DSi for 2016 and 2023 compared with existing data at 2016 and 2023 is because the modelling allows for corrections for under-reporting of crashes, and models are based on national averages.

Intersection	2016	2023	2028		
			Existing Form		Roundabout
			Without Development	With Development	With Development
Springston Rolleston Road / Selwyn Road	0.80	0.61	0.63	0.66	0.11
Lincoln Rolleston Road / Selwyn Road	0.11	0.20	0.23	0.24	0.05
Selwyn Road / Weedons Road	0.14	0.21	0.24	0.24	0.04

Table 3. Modelled DSI per annum

Of note is that the Springston Rolleston Road / Selwyn Road intersection has a 25% drop in DSi between 2016 to 2023 due to urbanisation of the intersection, although there is a residual risk which is substantially higher than indicated by the actual recent crash history.

The DSi analysis indicates that the full development traffic generation has the potential to add between 0.00 and 0.03 DSi per annum at each of the intersections at the point in time that intersections will have or should have been upgraded to a roundabout. This is considered to be both a small absolute, and relative change in crash risk.

It is also clear that the future change to a roundabout reduces crash risk significantly, particularly at Springston Rolleston Road / Selwyn Road. The change due to intersection control is many times greater than the change due to development. In other words, Council can in theory save 0.55 DSi per year by bringing forward the upgrade by a year, whereas delaying the Kevler development will have a 0.03 DSi saving per annum. Clearly this points to timing and need being a Council matter to address existing issues rather than being affected by development.

A further consideration is that of cumulative effects of the development over the period from receiving subdivision consent to implementation of an intersection upgrade. The subdivision will take time to reach full traffic generating potential, and that means that changes in DSi will be less than modelled at 2028. My calculation below indicates development could contribute approximately 0.07 DSi through to 2027 compared with 3.10 DSi forecast for that period without development. This is considered negligible change in terms of the impact on timing of or need for upgrades which are already planned in the short-medium term.

	2023	2024	2025	2026	2027	**2023-2027**
Base	0.61	0.614	0.619	0.624	0.629	**3.10**
Dev	*0.63*	*0.638*	*0.644*	*0.650*	*0.656*	
Develop 100%	*0.02*	*0.02*	*0.03*	*0.03*	*0.03*	
Forecast % Developed	*0%*	*20%*	*60%*	*100%*	*100%*	
Devt contribution to Dsi	0.00	0.00	0.02	0.03	0.03	**0.07**
						2.3%

Table 4: Springston Rolleston Road / Selwyn Road Cumulative Change to DSI ahead of Roundabout

This small change is further illustrated in Tables 5 and 6, where the small changes in DSI at 2028 between Base (no development) and "with development" scenarios would not change the Collective or Personal Risk ratings of the intersections.

Intersection	2016	2023	2028		
			Do-min		Roundabout
			Base	With Development	With Development
Springston Rolleston Road / Selwyn Road	Medium	Medium	Medium	Medium	Low
Lincoln Rolleston Road / Selwyn Road	Low	Low	Low	Low	Low
Selwyn Road / Weedons Road	Low	Low	Low	Low	Low

Table 5: Collective Risk Rating

Intersection	2016	2023	2028		
			Do-min		Roundabout
			Base	With Dev	With Dev
Springston Rolleston Road / Selwyn Road	High	High	High	High	Medium-High
Lincoln Rolleston Road / Selwyn Road	Medium-High	High	Medium-High	Medium-High	Low-medium
Selwyn Road / Weedons Road	N/A	High	High	High	Low-medium

Table 6: Personal Risk Rating

3. Additional Discussion on Treatments

I have also referred to the Waka Kotahi High Risk Intersection Guide for a general treatment philosophy from a safe system perspective.

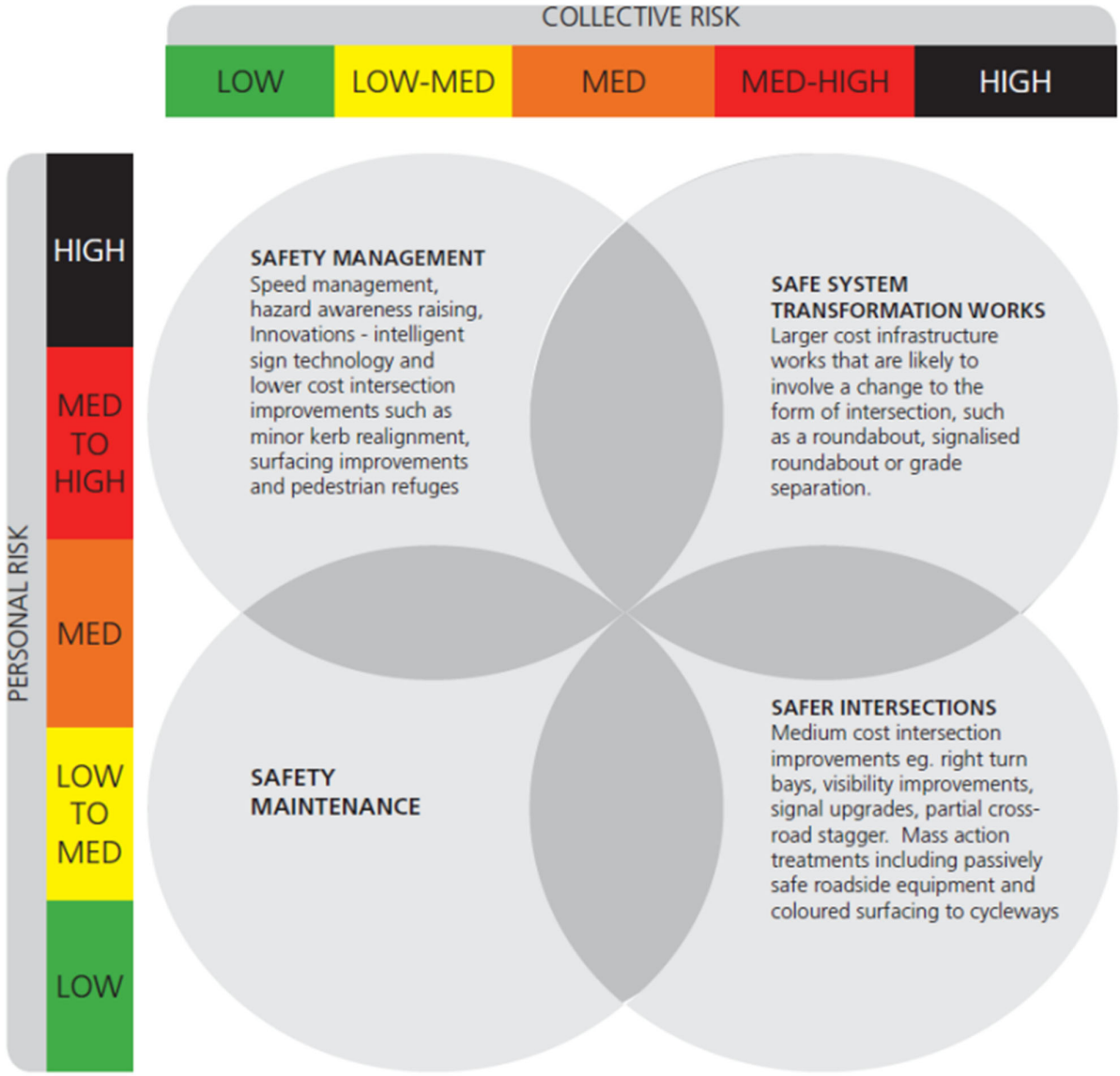

Figure 1: Safe System Treatment Philosophy

It can be seen that the risk ratings for the existing intersection form at Springston Rolleston Road / Selwyn Road would place the intersection between safety management and safe system transformation. As set out in evidence the safety management treatments already employed by Council appear to be reducing crash occurrence, and ultimately the future roundabout (transformation) provides the full safe system response.

The other intersections fall within the Safety management treatment quadrant, rather than transformation (construction of roundabouts). As I discussed in evidence, I consider this is a role for Council to address at those intersections and it would be inappropriate to limit development ahead of the long term need for a roundabout.

4. Conclusion

I consider the additional crash risk analysis supports my primary evidence that the proposed subdivision will have negligible influence on the timing or need for upgrades, and the change in risk is not of significance warranting the development to be staged to the Council planned upgrades.

Yours sincerely

Stantec New Zealand

Andrew Metherell
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