SUMMARY OF EVIDENCE FOR PLAN CHANGE 7 HEARING

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Key points

- Effect of S-Map update on modelled N load
- Dairy and dairy support definitions
- S-Map soils updated 1 September 2020 and the effect of that is easy to view in Overseer-FM.
- An overall average from 5 light and very light dairy farm files in the Waimakariri shows 22% reduction in N lost to water from just updating soils.
- 'Dairy' makes up about 50% of gross N load.
- Approx. 60% of 'dairy' is on VL soils.
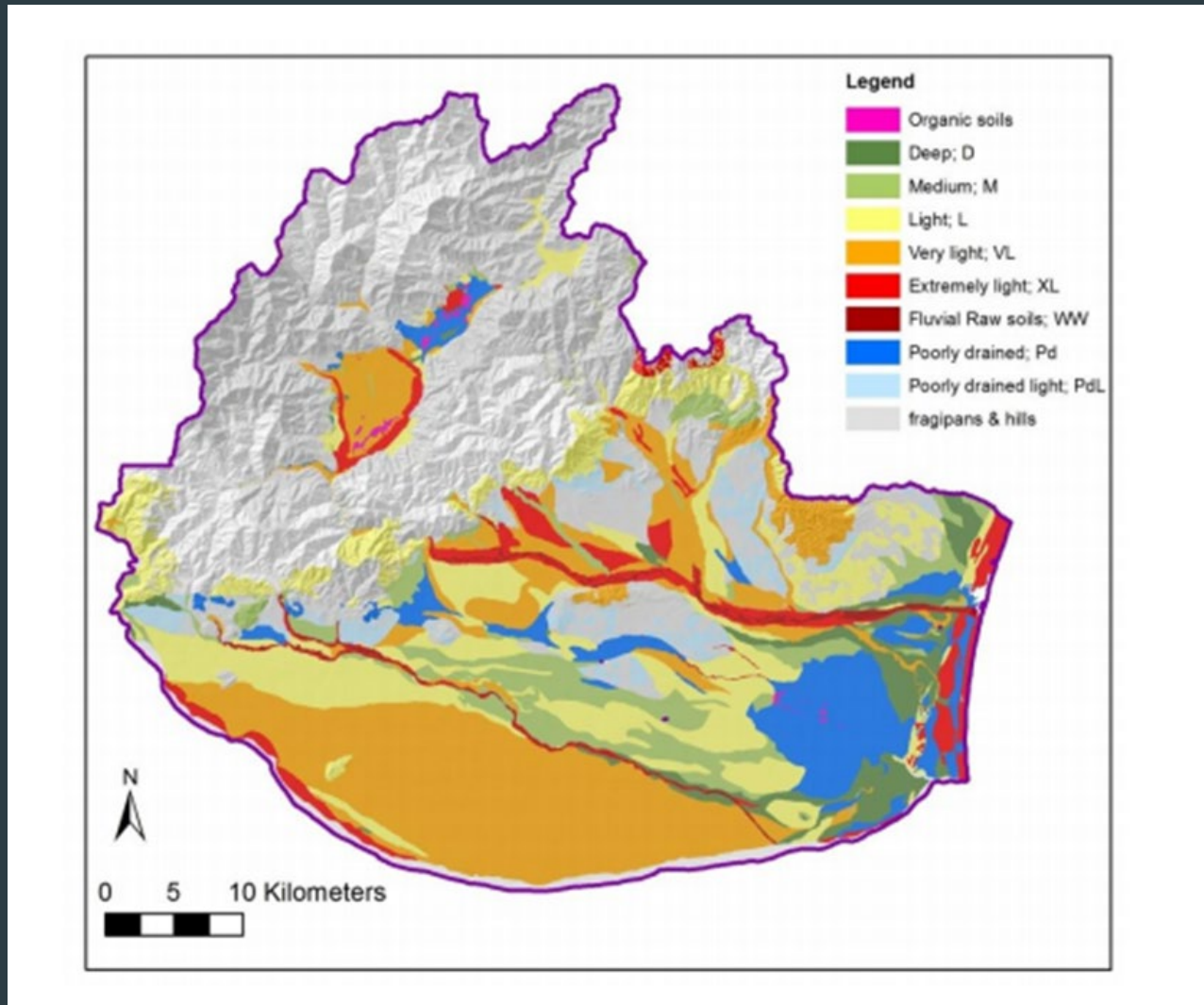
Origin of MGM files

- MGM files created for PC1, Selwyn Te Waihora.
- Soils were grouped by PAW of the dominant sibling in the soil unit. The "best" representative soil was then selected for the soil MGM category.
- For the VL group, Raka_13a.1 was selected.

MGM Soil categories for PAW

Table 4 Description of the Matrix of Good Management (MGM) soil categories for nitrogen loss along with the representative S-map sibling for each category (PAW: profile available water)

MGM Code	MGM Soil category	PAW to 1m	Slope	Other criteria	Representative S-map sibling and Topography class
O	Organic soils			Organic soil classification	Utuh_8a.1 (Flat)
D	Deep (on the plains and downs)	>150mm	<15˚		Barr_1a.1 (Flat)
M	Medium (on the plains and downs)	110-150mm	<15˚		Temp_7a.1 (Flat)
L	Light (on the plains and downs)	80-110mm	<15˚		Darn_1a.1 (Flat)
VL	Very light (on the plains and downs)	50-80mm	<15˚		Raka_13a.1 (Flat)
XL	Extremely light (on the plains and downs)	<50mm	<15˚		Wair_3a.1 (Flat)
WW	River beds			Hydric Raw soil classification	River_1a.1 (Flat)

(L Lilburn, T Webb, 2015)

MGM soil classes in Waimakariri

Legend
- Organic soils
- Deep; D
- Medium; M
- Light; L
- Very light; VL
- Extremely light; XL
- Fluvial Raw soils; WW
- Poorly drained; Pd
- Poorly drained light; PdL
- fragipans & hills

0 5 10 Kilometers

(Lilburn et al, 2019)

Soil PAW updates

S-map PAW 60cm			
	2019 (mm)	2020 (mm)	Difference
Raka_13a.1	58.6	62.7	4.1
Lism_2a.1	64.9	75.6	10.7

Overseer PAW 60cm			
	2019 (mm)	2020 (mm)	Difference
Raka_13a.1	60	63	3
Lism_2a.1	63	75	12

Reduction in N lost to water when soils updated

- Farm A 21%
- Farm B 15%
- Farm C 18%
- Farm D 29%
- Farm E 26%

- Average change   22%

- Note: In addition to soils, rainfall and the way irrigation is modelled is likely to affect the size of reduction

S-Map changes – *implications at MGM file level*

- PAW 60 was similar between Raka-13a.1 and Lism_2a.1 (58.6mm and 64.9mm)
- If the MGM soil for VL is Raka_13a.1 then there may be a modest reduction in N lost to water when updated.
- If the MGM soil for VL is Lism_2a.1 there is likely to be a significant reduction in N lost to water.
- Given the area of Raka_13a.1 vs Lism_2a.1 in the Waimakariri catchment, and similarity in PAW 60cm, Lism_2a.1 seems a more appropriate soil choice for to represent VL soils.
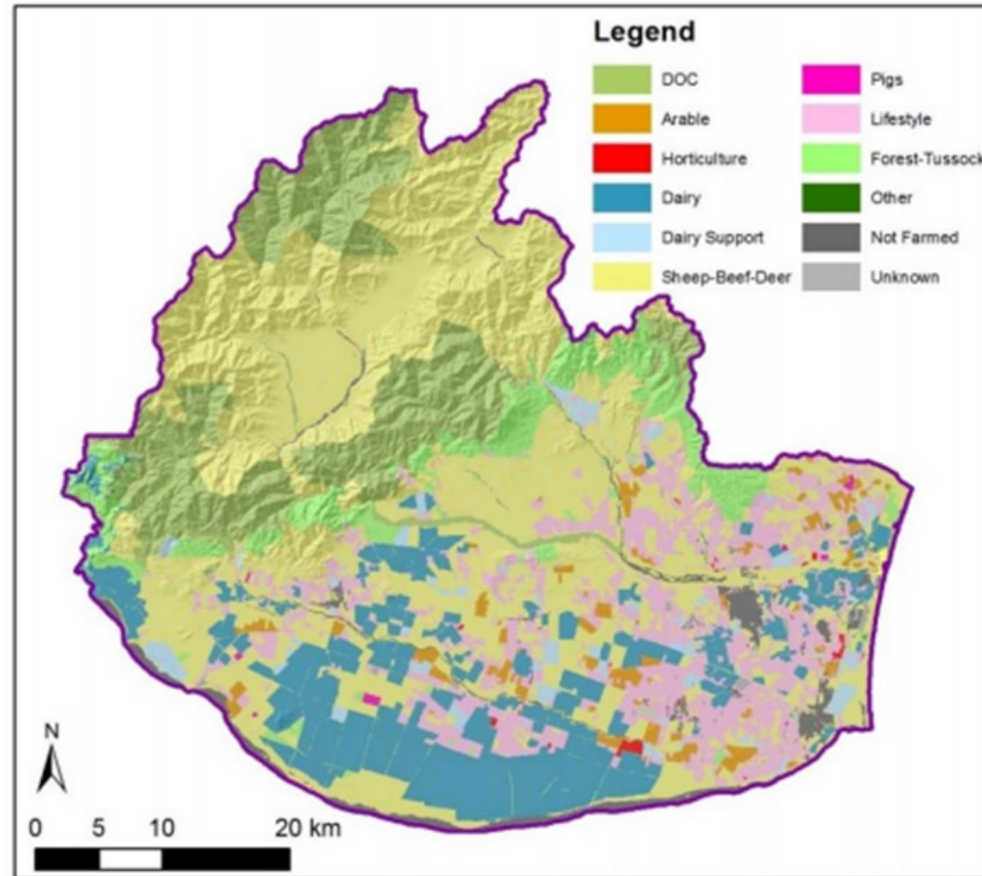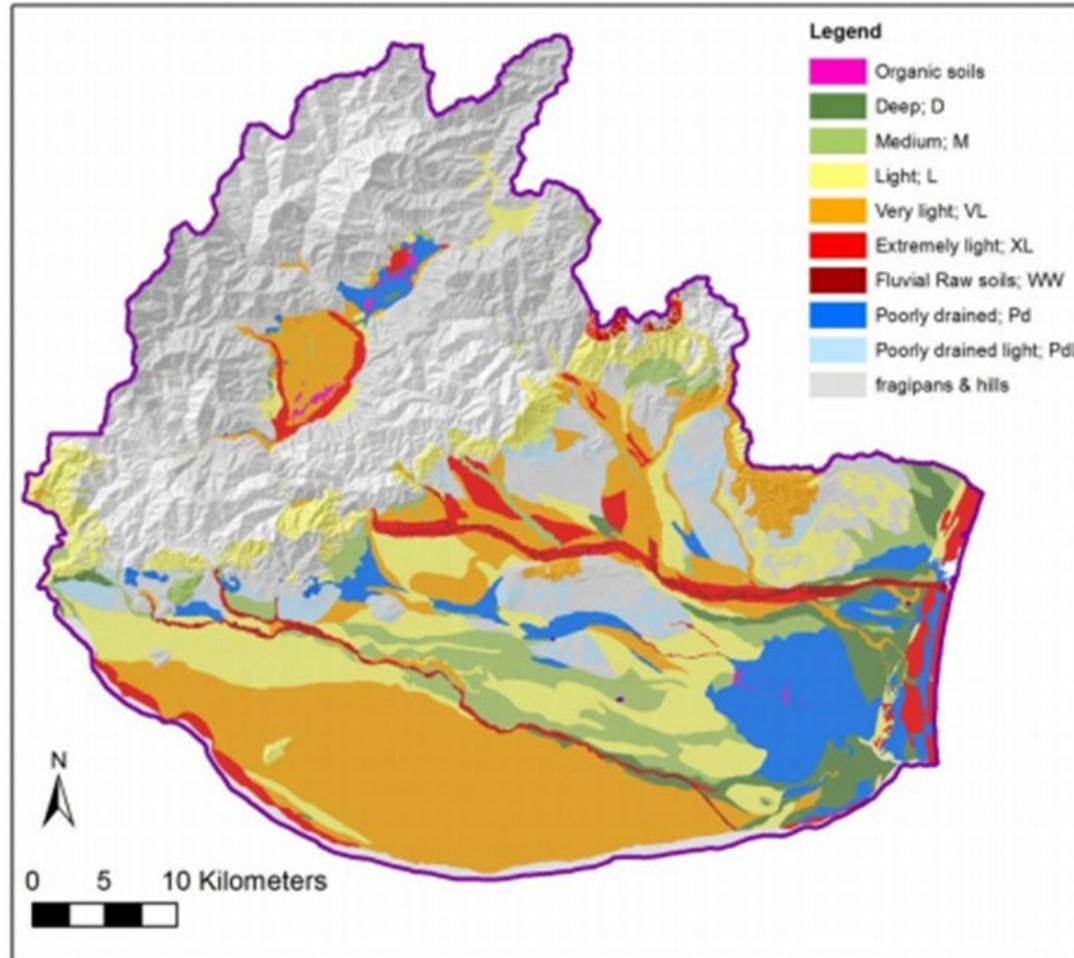
How significant might this change be?

Figure 5 Land use in 2015.

(Lilburn et al, 2019)

MGM soil classes in Waimakariri - again

(Lilburn et al, 2019)

Dairy land on VL was 19,86ha of 32,969ha, 58%.

Table 5 Area (ha) of Scenario 1 land use type by soil type

	WW,XL	VL	L	M	D	PdL	Pd	F1-F3	O	S1-S4	unknown	Grand Total
Arable	88	526	1,533	1,087	622	0	300	704	0	4	6	4,872
DairyFarm	395	19,186	6,051	2,447	813	1,139	2,860	0	0	0	77	32,969
DairySupport	505	1,380	751	537	445	22	760	458	33	176	4	5,070
Sheep-Beef-Deer	7,434	17,595	11,294	6,332	2,195	611	5,332	12,879	414	44,622	1,009	109,719
Forest-Tussock	772	3,617	8,609	705	242	809	60	4	0	277	11	15,106
Horticulture	2	123	22	48	198	4	23	0	0	0	0	418
Lifestyle	655	5,760	8,397	2,698	2,988	3,599	4,763	0	0	0	4	28,865
Pigs	0	136	35	37	48	7	10	0	0	0	0	273
DOC	1,301	123	45	69	9	79	14	1	0	0	33,191	34,831
NotFarm	1,497	452	506	449	636	16	484	68	0	214	2,917	7,239
Unknown	70	61	102	22	39	1	258	33	0	1	0	588
Grand Total	**12,719**	**48,959**	**37,346**	**14,430**	**8,236**	**6,287**	**14,863**	**14,147**	**447**	**45,296**	**37,220**	**239,949**

(Lilburn et al, 2019)

Summary of Sub Region Nitrate losses

Table 17 Total nitrate losses (t/yr) by farm type under the various scenarios

Farm type	Total area (ha)	Current Pathways	Current Pathways PC5	Scenario4		Draft ZIPA		Final ZIPA	
%PA uptake assumption		50	100	50	100	50	100	50	100
Arable	5,382	114	125	119	124	118	121	116	123
Dairy	32,714	1,949	1,956	1,952	1,955	1,950	1,952	1,727	1,953
Dairy support	5,069	181	205	191	201	188	194	184	197
Sheep, Beef, Deer	97,444	1,077	1,328	1,180	1,284	1,137	1,198	1,145	1,237
Forestry	21,341	34	81	53	71	45	56	48	61
Horticulture	418	13	15	14	15	14	14	13	15
Lifestyle	28,864	582	687	634	687	618	654	634	687
Pigs	273	10	11	11	11	11	11	11	11
DOC	34,831	8	8	8	8	8	8	8	8
NotFarmed	12,750	26	26	26	26	26	26	26	26
Unknown	588	10	12	11	12	11	11	11	11
Total	**239,674**	**4,004**	**4,452**	**4,198**	**4,393**	**4,125**	**4,246**	**3,922**	**4,329**

Total Sub-region N loss is 4004 t (current pathways). Dairy is 1949 t. On an area basis (underestimate) the VL would account for 1130 t .

(Lilburn et al, 2019)

Summary

- Lism_2a.1 would be a more appropriate soil for the MGM VL soil.
- Regardless of which soil (Raka_13a.1 or Lism_2a.1) is used, the updated soil has had a significant reduction in N lost to water.
- If this is confirmed then much of the modelling that follows, requires updating.
- This is another example of the shortcomings of using Overseer for absolute values.
- The soil on farm is still the same soil as it was a year ago.

References

L. Lilburne, H. North, M. Robson-Williams, O. Mojsilovic (2019). *Preparation of land use and nitrogen-loss data for the Waimakariri Zone limit-setting process.* Landcare Research New Zealand.

L. Lilburne, T. Webb. (2015). *Soil and climates in Canterbury: clusters for the Matrix for Good Management project.* Landcare Research New Zealand.