

## Memo

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Date	6 November 2017
To	Ned Norton
CC	
From	Ogi Mojsilovic

### Estimates of area for winter forage crops in Hurunui and Waiau catchments

This preliminary GIS study estimates the land available for winter forage cropping in Hurunui and Waiau River catchments. It also estimates what a possible narrative permitted activity rule, one that specifies the maximum area of winter forage cropping on individual farms, would mean for the catchment area available for permitted winter forage cropping development.

### Methodology and assumptions

This study uses the wording of the permitted activity rule in Plan Change 5 to the Land and Water Plan, which permits 10% of a farm, with a minimum of 10 ha and maximum of 100 ha, to be used for winter forage cropping.

Land lower than 800 m in altitude was grouped into two slope-based classes for constraining the land most suitable for winter forage cropping:

- land less than 15 degrees in slope, and
- land greater than 15 degrees but less than 25 degrees in slope.

The study excluded Department of Conservation estate, urban and impervious surfaces, land under bare, sparse or native vegetation cover, and residential and lifestyle parcels from land deemed suitable for winter forage activity. Water bodies, and a 10 meter buffer, were also excluded.

Land was aggregated using a layer that divides Waiau and Hurunui River catchments into broad hydrological and nutrient user zones. The nutrient user zones distinguish between the irrigation user groups – Amuri Irrigation Limited, Hurunui Water Project, Emu Plains, Ngai Tahu Balmoral Plantation, and Cheviot/Independent irrigators - from dryland areas.

To estimate the maximum realisation of the permitted activity development of winter forage crop areas, I used North et al. (2017) classification of 2016 winter forage crops, modelled farm boundary layer, and the 2016 irrigated land layer (Brown, 2016).

For understanding where the additional permitted winter forage cropping development could occur, the modelled farms were classified as being:

- *Irrigated*, if they have more than 50 ha of irrigation, or

- *Dryland and within an irrigation user area*, if they have less than 50 ha of irrigation but have more than 50 ha of land within the irrigation user group zones, or
- *Dryland farms*

## Results

Figures 1 and 2 map the zones and the slope classes created within the Hurunui and Waiau River catchments. Slope classed within the irrigation user zones is masked, as it is less than 15 degrees in slope.

Table 1 presents the sum of land in the different slope classes, broken down across catchments and zones. Table 2 presents the estimates of the outcome of the PC5 permitted activity, split into current and additional pools. The modelled farms are classified according to their existing irrigation status, or if they are dryland, whether a meaningful area extends into the irrigation user zones.

*Table 1. Catchment and zone breakdown of farm land across different slope and elevation classes.*

Catchment	Sub-catchment	Zone	Slope classes below 800 m asl (ha)		Other land (ha)
			< 15 deg	> 15 and < 25 deg	
Hurunui	Mandamus		3,200	1,900	97,000
	SH 1	AIC	18,200	300	1,700
		HWP	23,000	600	1,300
		NTP	8,200	0	400
		Dryland	13,400	19,900	51,800
	Mouth	Cheviot irrigators	3,300	300	300
		Dryland	2,700	3,700	3,400
Waiau	Marble Point		12,500	3,500	180,000
	Mouth	AIC	14,700	700	1,700
		Cheviot irrigators	8,300	600	900
		EPI	11,300	3,200	9,900
		Dryland	11,400	19,200	39,000

*Table 2. Estimates of existing and additional areas of winter forage cropping assuming Plan Change 5 permitted activity rule. Farms are spatially grouped into sub-catchments and types. A 2016 classification of winter forage crops is assumed to represent the existing development.*

Catchment	Sub-Catchment	Farm type	Estimate of existing winter forage area (ha)	Estimate of additional winter forage area (PC5 provisions (ha))
Hurunui	Mandamus	Dryland farms	110	350
	SH 1	Dryland farms	200	1,840
		Dryland farms (in irrigation user areas)	880	3,380
		Irrigated farms (>50 ha irrigation)	1,650	0
	Mouth	Dryland farms	40	440
		Dryland farms (in irrigation user areas)	140	290
		Irrigated farms (>50 ha irrigation)	100	0
Waiau	Marble Point	Dryland farms	220	880
		Irrigated farms (>50 ha irrigation)	230	0
	Mouth	Dryland farms	570	2,430
		Dryland farms (in irrigation user areas)	640	2,290
		Irrigated farms (>50 ha irrigation)	1,330	0



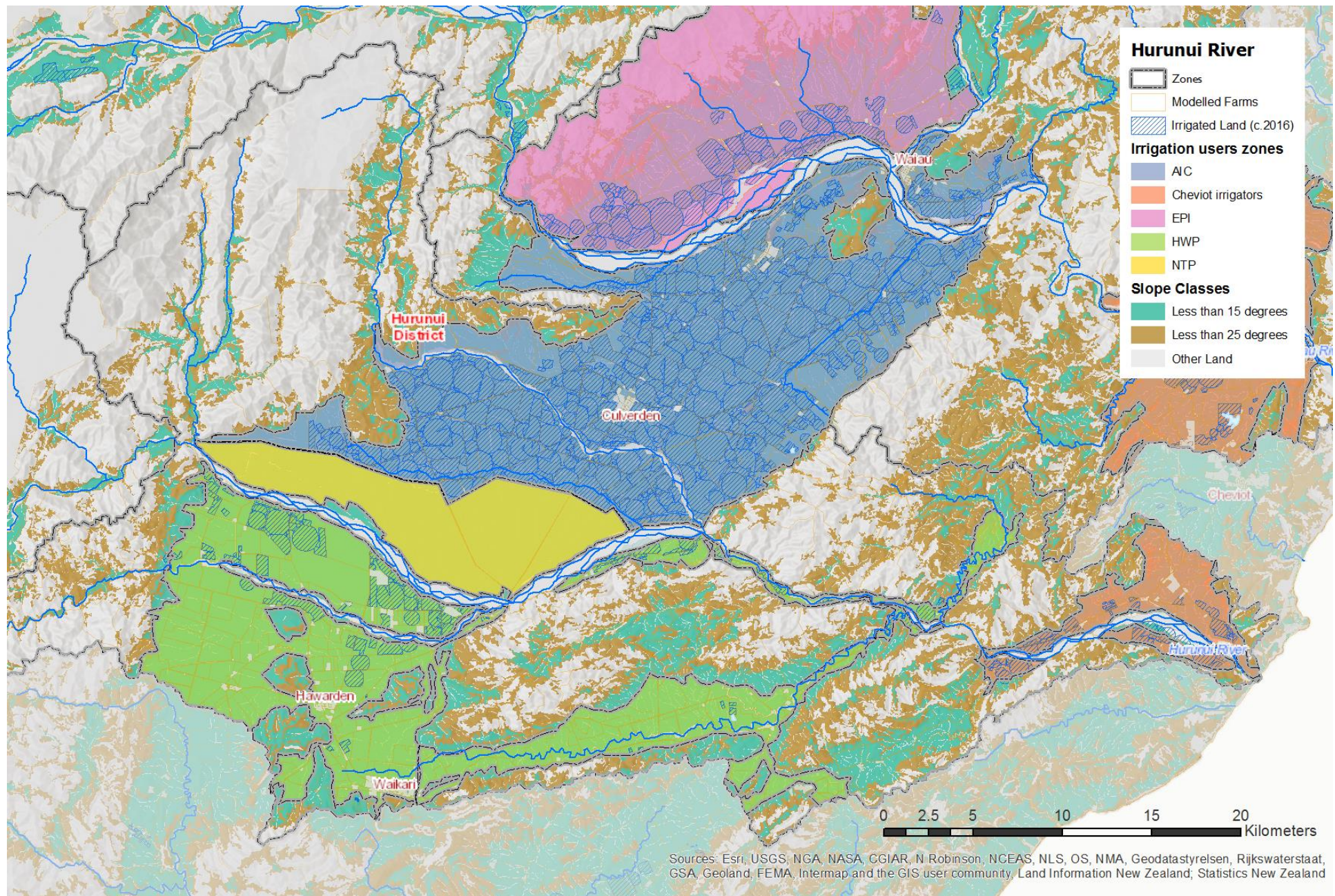


Figure 1. Hurunui River catchment zones and slope classes.



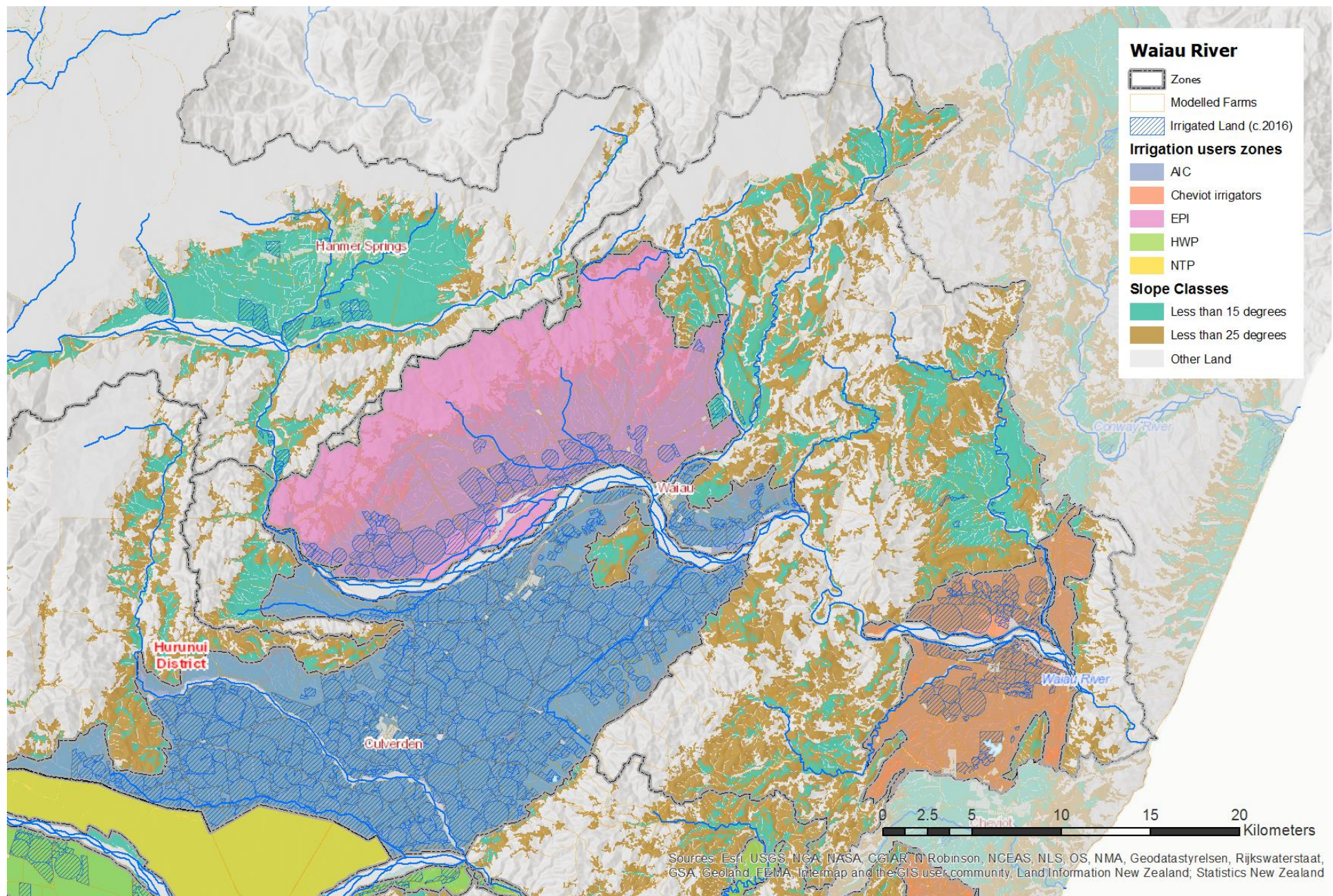


Figure 2. Waiau River catchment zones and slope classes.

## References

Brown, P. 2016. Canterbury Detailed Irrigated Area Mapping. Prepared for Environment Canterbury. Aqualinc.

North, H. C., Belliss, S. E., & Pairman, D. (2017). *Winter livestock forage map: Canterbury region 2016*. Prepared for Environment Canterbury. Contract Report No. LC2742. Landcare Research.