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APPENDIX 1

1200l/sec flow scenario

During 2020 and the beginning of 2021 modelling work was completed by ORC to understand the economic implications that altered flow scenarios would impose should they be applied to irrigators in the Manuherikia. The flow scenarios modelled included 900, 1500, 2000, 2500 and 3000l/sec and for each scenario at 3 different locations reflecting upper and lower mainstem as well as tributary reliabilities, full farm systems were modelled to allow scaling up to a catchment impact. Near the end of this process, a further analysis of 1200l/s scenario was requested. Due in part to time constraints, a full hydrology, pasture, system model was not undertaken and instead the impact of a 1200l/s regime was determined by a different process.

Process to determine impact of 1200l/sec

Full farm system analysis was conducted as to the impact of 900 and 1500l/s flow regimes. A key outcome from this work was the EBIT or earnings before tax and interest that was generated for each farm system at each location over 47 years of actual flow. The reliabilities for the flow at each location was determined by hydrology and that outcome used to model pasture production impact. Subsequently, the reliability of the 1200l/s scenario was determined and provided in a table. The shift in reliability was then used in the following way

$EBIT_{1200} = EBIT_{900} - (Rel_{1200}-Rel_{900})/(Rel_{1500}-Rel_{900})*(EBIT_{900}-EBIT_{1500})$

The process was applied for each farm system for each location on each year. We understand that the approach taken underestimates the potential dry season impact but should give a reasonable representation of mean EBIT impact. The table outlining the mean EBIT with the difference between 900l/sec and 1200l/sec as the main output is attached.

From this work, each farm type at each location was scaled based on a land use table provided by ORC.

	Ha in zone	irrig area per farm	900	1200	1500	Difference/farm	per Ha mean	TOTAL
Omakau								
Sheep	3340	220	163913.1	163192.5	156947.5	$ 720.58	$ 3.28	$ 10,939.68
Dairy Support	1376	235	204410.8	203373.8	194387	$ 1,036.94	$ 4.41	$ 6,071.61
Dairy	2062	280	544869.1	542566.4	522609.6	$ 2,302.70	$ 8.22	$ 16,957.73
Lauder								
Sheep	5672	220	165033.9	163328	148544	$ 1,705.85	$ 7.75	$ 43,979.94
Dairy Support	951	235	182044.5	180144.6	163678.8	$ 1,899.89	$ 8.08	$ 7,688.51
Dairy	452	280	498911.6	478371.7	458912.9	$ 20,539.89	$ 73.36	$ 33,157.25
Alexandra								
Sheep	2922	253	184187.4	182548.6	172306.3	$ 1,638.77	$ 6.48	$ 18,926.85
Dairy Support	886	246	195447.5	193670.6	182565.5	$ 1,776.82	$ 7.22	$ 6,399.43
TOTAL	17661							$ 144,121.01

Notes

1. The total EBIT per farm includes income derived from non irrigated area
2. The difference in EBIT is solely associated with the impact of reduced water availability

The impact at Lauder is greater than that at Omakau as the relative reliability difference between 900 and 1200l/s is greater in the Lauder zone representing tributary availability.

The difference between the EBIT generated at 900l/s and 1200l/s is $144K which represents a reduction of 0.8% across both irrigated and dryland areas modelled. As with the other flow scenarios modelled, the dry seasons are where the greatest impact occurs.