BEFORE THE OTAGO REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991 ("the Act")
AND	
IN THE MATTER	Proposed Plan Change 5A: Lindis Integrated Water Management

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STATEMENT OF GEORGE RICHARD COLLIER
EVIDENCE ON BEHALF OF THE LINDIS CATCHMENT GROUP LTD

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STATEMENT OF EVIDENCE

1. My name is GEORGE RICHARD COLLIER and I am a Chartered Accountant and hold a Batchelor of Agricultural Commerce Degree and a Post-Graduate Diploma in Agricultural Science.

2. I am a Registered Farm Management Consultant residing in Alexandra and a Director and partner of ICL Limited, Chartered Accountants. I am a member of the Rural Advisory Committee for Chartered Accountants New Zealand & Australia.

3. I have been asked to describe the economic effects of the impact of imposing minimum flows within the Lindis catchment. This review of economic effects is based on the Compass Agri-Business Management Report and takes a Lindis River catchment approach and includes a regional economic impact analysis.

4. I have also been asked to comment on the Berl Economic Impact Report which was produced in March 2015, about the Economic impacts and minimum flow regimes on the Lindis River; a report to the Otago Regional Council.

5. I confirm that I have read and am familiar with the Code of Conduct for expert witnesses in the Environmental Court. I agree to comply with that code. Other than where I state I am relying on the evidence of another person, my evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

6. ICL Limited Chartered Accountants have many farming clients through Otago and Southland, including a number within the Lindis catchment area that fall within the scope of this report.

7. Our services include accountancy and business advice to a wide range of commercial clients, including farming businesses. We have 28 staff, including five directors/partners and have staff located in Alexandra, Ranfurly and North Canterbury.

SCOPE AND PURPOSE OF EVIDENCE

8. The aim of the analysis undertaken and reported on is to provide a framework and method to assess the potential production and economic impacts on the Lindis Catchment and the wider Otago region by imposing minimum flow levels on the Lindis River.

9. Throughout this report I have also commented on the Berl Economic Impact Report dated March 2015 on Economic Impacts of Minimum Flow Regimes on the Lindis River – a report to the Otago Regional Council.

Summary of Key Points

10. There are 2,300 litres per second of water currently taken within the Lindis catchment.

11. This will irrigate 3,833 hectares with an annual allocation of 600 mm/hectare/annum under spray irrigation. The economic impact analysis is based on 3,833 hectares.

12. The financial impact on farm and for the regional economy have been calculated based on the Compass Agribusiness Management finishing model (as contained in Mr Porter's evidence), adjusted to remove the dryland area within his farm model.

13. The financial impact associated with imposing minimum flows of 450 litres/second and 750 litres/second would have a significant financial impact for the Lindis catchment farmers.

14. Total Revenue on farm would reduce from $12 million to $9 million (450 l/s minimum flow) and to $7 million (750 litres/second minimum flow).

15. The regional economic impact would be a reduction in income from $35 million to $26 million (450 l/s minimum flow) and $20 million (750 litres/second minimum flow).

16. Farm Surplus would reduce from $5 million to $2.3 million (450 l/s minimum flow) and to $0.5 million (750 litres/second minimum flow).

17. The total direct value added to the regional economy would reduce from $11.3 million with a minimum flow of 450L/sec to $5 million with a minimum flow of 750L/sec.

18. The 3833 hectares irrigated equates to 29 full time equivalents(FTE's) within the Lindis Catchment. A further 67 FTE's would be employed off farm in the catchment, giving a catchment total of 97 FTE's as the status quo.

19. On farm employment would reduce by 7 FTE's with a minimum flow of 450L/sec and 24 FTE's with a minimum flow of 750L/sec.

20. The Berl Economic Report cannot be relied upon because of the following:

- It indicates loss of farm income of between $64000 for 450L/sec minimum flow to $99,000 for a 750L/sec minimum flow for the Lindis Catchment by imposing minimum flows. The impact on the regional economy was calculated to be between $187,000 to $287,000.
- It calculates the reduction of FTEs as one on farm FTE and two off farm FTE's for a minimum flow of 750 litres/second.
- Uses only 2204 hectares and farm revenue and expense information from other regions of New Zealand and as a result has modelled inaccurately low financial impacts.

METHODOLOGY USED FOR THIS REPORT

Farming Model used for this report

21. This report is based on farming models created by Compass Agri-Business Management for production systems that are currently being used within the Lindis catchment.

22. While we are aware there is some viticulture and flowers grown under irrigation within the Lindis catchment, we have excluded these even though the returns are typically higher on a per hectare basis. The reason for excluding this land use from the report is that they comprise less than 0.5% of the land area (12.4 hectares).

23. We have used the Finishing Model from the Compass Agri-Business Management Report and adjusted it by removing the dryland area from this model. The Finishing Model represents the most significant land use for irrigated land within the Lindis catchment. The other major land use is when small areas of irrigation are farmed as part of a larger high country property and provide a significant and critical complementary value, such as guaranteeing winter feed (supplements or crops), finishing livestock that otherwise would be sold as stores, or providing feed to lighter classes of livestock, ie strategic uses that have high value returns within a total high country farming system.

    The strategic use of this small area of irrigation would provide returns to the overall farming system that would be in excess of the returns obtained from finishing.

Berl Farming Model

24. The Berl Economic Impact Report assumed the land use was typically a combination of breeding and finishing, and then transposed Beef & Lamb New Zealand farming models from Southland, South and West Otago, Canterbury and the North Island, which included breeding and finishing farming systems which have stocking rates that varied from 8 to 11.6 stock units per hectare. It is a composite model from regions outside of Central Otago.

25. The stocking rate is too low: Developing a composite farm model derived from other regions of New Zealand (which are not irrigated), has had the effect of having a stocking rate that is well below what any irrigated farm in the Lindis catchment would have.

26. The feed grown within the Compass Agri-Business Management Report is based on 14,400 kg of pasture/annum under irrigation. Under a breeding and finishing farming system, this would give a minimum stock rate of 13.5 stock units per hectare.

27. The stocking rates used in the Berl Farming Model of between 8 to 11.6 stocking units per hectare are too low.

Irrigated Finishing Model adjusted to remove dryland area

28. The Compass Agri-Business Management Irrigated Finishing Model is a 400 hectare farm comprising of 340 hectares of irrigation and 60 hectares of dryland.

29. In order to compare the impacts of minimum flows on a catchment wide basis, I removed the dryland component of the Compass Agri-Business Management Finishing Model. This has the effect of increasing the returns and costs on the irrigated area of the property as can be seen in Table 1 below. Model calculations are included in the Appendix.

Table 1

	Irrigated Only (derived)	Dryland Only (derived)	Compass Combined Irrigated & Dryland
Kg Dry matter Per Hectare Utilised	12,721kg	2,899kg	11,248kg
Income Per Hectare	$3,122	$712	$2,761
Farm Expenses Per Hectare	$1,785	$407	$1,578
	_____	_____	_____
Trading Farm Surplus Per Hectare	$ 1,337	$ 305	$ 1,183

30. The figures that I have used for the economic impact analysis are based on the Irrigated only (derived) on a per hectare basis as shown above

Irrigated land area impacted by minimum lows

31. The current consented abstracted litres per second for irrigation within the Lindis catchment is approximately 2,300 litres/second.

32. We have assumed that irrigation water is used efficiently and all irrigation is undertaken by spray irrigation and that this is in place by the time minimum flows are implemented.

33. Allocation per hectare is assumed to be 600 mm/hectare/year. (This is based on Point 5.2 of the Compass Agri-Business Management Report, indicating 4.5 mm applied per annum over a 3,200 hour irrigation season).

34. The area able to be irrigated is therefore 3,833 hectares (600mm/year from 2,300 litres/second).

Berl Report: irrigated area

35. The Berl Economic Impact Report identifies areas currently irrigated from the Lindis catchment of 3,131 hectares, but then goes on to exclude 927 hectares to come up with an area of 2,204 hectares irrigated from the Lindis catchment.

36. Unlike the Berl Economic Impact Report, we have not considered any land that could access water from the Clutha as a substitute for water from the Lindis catchment. We have also assumed that any efficiencies that arise from changing to a more efficient irrigation system such as flood irrigation to spray irrigation will allow more hectares to be irrigated, (as per the existing Otago Regional Council Water Plan).

Berl farming model: inappropriate

37. Berl have used a composite of a breeding and finishing model where a straight finishing model should have been used

38. The returns for this model are significantly lower than a straight finishing model. For example, in the Compass Agri-Business Management Report, the average returns are:

- Breeding and Finishing Model 16 cents/kg dry matter utilised
- Straight Finishing of Livestock Model 25 cents/kg dry matter utilised.

39. The main reason for the improved returns from straight finishing farming systems is the improved feed conversion efficiency of converting dry matter feed into saleable product. Typical feed conversion efficiencies for the two different types of farming systems are:

- Breeding and Finishing Farming Systems: I kg of product sold requires 20 to 30 kg dry matter

- Straight Finishing Farming Systems: I kg of product sold requires 14 to 18 kg dry matter

40. The significant majority of irrigated land use in the Lindis catchment is either used for straight finishing or adding complementary value to a high country farming system.

41. By choosing a finishing and breeding system instead of a straight finishing system, the Berl Report significantly underestimates the income and expenses per hectare.

42. The gross income from a straight finishing farming model is typically 100% higher than from breeding and finishing. However, the expenses are typically higher also. This is reflected in the information displayed in Table 2.

Table 2: Financial Difference between our model and the Berl model

	Hectares Irrigated	Derived Gross Farm Revenue Per Hectare	Derived Farm Working Expenses Per Hectare	Derived Gross Margin Per Hectare	Total Farm Revenue	Total Gross Margin (Direct Value Added)
Compass Agri-Business Finishing Model	3,833ha	$ 3,122	$ 1,785	$ 1,337	$11,966,000	$5,124,000
Berl Economic Model	2,204ha	$ 1,671	$ 875	$ 797	$3,684,000	$1,756,000
Difference	1,624ha	$ 1,451	$ 910	$ 694	$8,282,000	$3,368,000
% Difference	74%	82%	104%	68%	224%	190%

43. The difference in gross revenue is $8,282,000 (+224%) and in gross margin or direct value added is $3,368,000 (+190%).

44. The difference in the gross revenue can be explained by:

- **Difference in Hectares:**

  1,629 Hectares x $3,122/hectare = $5,084,000

- **Difference in Gross Revenue Per Hectare:**

  2,204 Hectares x $1,451/hectare = $3,198,000

Effect of Restricted Lindis Flows Per Hectare

Tables 3

a. Compass Agri-Business Model (Derived Fully Irrigated Income & Expenses)

	Current Irrigation	450 Litres Per Second	750 Litres Per Second
Gross Income/Ha	$ 3,122	$ 2,338	$ 1,828
Farm working expenses/Ha	$1785	$1739	$1,698
Trading Surplus	$ 1,337	$ 599	$ 130
% Reduction from current Gross Income	-----	- 25%	- 41%
Farm Expenses	------	- 3%	-5%
Trading Surplus	------	- 58%	- 90%

b. Berl Model

	Unrestricted	450 Litres Per Second	750 Litres Per Second
Gross Income	$ 1,672	$ 1,643	$ 1,627
*Farm Expenses	$ 875	$ 875	$ 875
Trading Surplus	$ 797	$ 768	$ 752

* Assumed to be the same for each model

c. Percentage Reduction from Current

	Unrestricted	450 Litres Per Second	750 Litres Per Second
Gross Income	-	- 2%	- 3%
Farm Expenses	-	-	-
Trading Surplus	-	- 4%	- 6%

Commentary on Tables 3 (a)-(c)

45. The Compass Agri-Business Management Model derived Irrigation model indicates that both gross farm income and trading surplus per hectare will be adversely affected by minimum flows of 450 and 750 litres per second, with reductions in gross income of between 25 to 41% and reductions in the farm trading surplus of between 58 to 90%

46. The farm trading surplus reduction percentages are significantly higher than the gross farm income percentage because the farm expenses are only marginally reduced.

47. The Berl Model indicates that with minimum flows of 450 and 750 litres per second, that gross farm income would be reduced by 2 and 3% and farm trading surplus would be reduced by 4 to 6%.

EMPLOYMENT

Estimated employment with irrigation on farm-within the Lindis Irrigation Catchment

48. In a report compiled by Stuart Ford in December 2002, (Economic & Social Assessment Of Community Irrigation Projects), MAF Policy Technical Paper, December 2002, Irrigation Impacts On The Lower Waitaki, this calculated 10.4 extra full time equivalents (FTE) employed on farm for every 1,000 hectares irrigated or 96 hectares of irrigation per FTE.

49. In a report compiled by Harris Consulting, Butcher Partners Limited and University of Auckland in 2006 on the Opuha Dam – in an ex post study of its impacts on the provisional economy and community, they estimated that 9.5 FTE's were employed on farm for every 1,000 hectares irrigated or 105 hectares per FTE.

50. In analysing the Opuha Dam report, 50% of their land use was dairy farming, which has a much higher ratio of labour input per hectare than a finishing farm.

Berl Model

51. The Berl Economic Impact Report has calculated 14.2 FTE's for 2,204 hectares or 155 hectares per FTE. The Berl Report (aside from FTE's for viticulture), has derived its information from Beef & Lamb New Zealand farming models in Southland, Canterbury and the North Island, most of which have no irrigation.

52. The employment ratio we have used is midway between the Opuha Dam information (105 irrigated hectares per FTE), and the Berl Economic Model (155 hectares per FTE). We have used 130 irrigated hectares of irrigation per FTE.

53. We have analysed a number of straight finishing farming systems in the Lindis catchment to verify the ratio of 130 hectares of irrigation per FTE.

54. For 3,833 hectares, this equates to 29 FTE's. The Gross Farm Income for 3833 hectares is $11,966,000 which equates 1 to $413,000 per FTE. In calculating the impacts of employment on farm we have equated one FTE reduction to a reduction of $413,000 in gross income.

Estimated employment created off-farm

55. Harris Consulting Limited in its assessment of regional economic benefits for Tarras Water Limited (2009), estimated 2.3 extra jobs created off-farm for every job on-farm from processing and flow on effects of jobs on-farm.

56. The Opuha Dam Ex Post Study (August 2006), concluded the same ratio of jobs created off-farm (2.3) for every job on an irrigated property.

57. For the 29 FTE's employed on irrigated farmland within the Lindis catchment, this would equate to a further 67 FTE's employed off-farm. Total FTE's would be 96 as a result of irrigation in the Lindis catchment.

SOCIAL IMPACT – POPULATION IN THE LOCAL COMMUNITY

58. The current population of the local Tarras community is 205 people. The Tarras community has a school which employs one full time teacher and one part time teacher and has 10 children attending.

59. According to Harris et al (2004), irrigation should have a positive effect on the demographics of the Waitaki Valley.

60. The Harris Report used a multiplier of 2.5 per FTE to estimate population changes associated with the move to irrigation.

61. I feel this multiplier of 2.5 per FTE is too high to estimate population changes associated with irrigation within the Lindis catchment.

62. This ratio would be closer to a multiplier of 2 for the Lindis catchment as some of the FTE's employed on farm live outside the Lindis catchment.

63. For 29 FTE's employed on irrigated farms with a population multiplier of 2, there would be an effect on the local Lindis catchment population of 72 people.

64. This is significant in the current context of the local Lindis population at 205.

65. The effect of imposing minimum flows will have an effect on the local population and would undoubtedly put the ongoing viability of the Tarras school at risk of closing.

DISTRICT & WIDER REGIONAL ECONOMIC IMPACTS

66. The wider economic impacts are estimated by using multipliers that relate to the matters outlined below.

Indirect Economic Impacts

67. The indirect impact arises from increased spending by businesses as they buy additional inputs so they can increase production.

68. The inputs that are used to derive the farm gate income then have a ripple effect of the spending to the wider economy. For example, inputs such as fertiliser. The economic ripple effect flows onto the contractor who carts and spreads the fertiliser. The contractor has to buy, fund and get his truck serviced. The mechanic servicing the truck has to buy electricity and employ staff. All of these businesses employ staff. All the employment, output and added value, (apart from that on the farm), are the indirect economic effects.

Induced Economic Impact

69. This comes about as a result of increased household income being earned and spent, which leads to a further ripple effect of increased employment output and income.

Downstream Impacts

70. These economic impacts and effects are not driven by a farmers demand for inputs, but arise as a result of producing a particular product for sale. For example, meat processing, because the product sold from the farm leads to increased activity in the freezing works.

Total Economic Impacts

71. The total economic impact is the sum of their:

    a. Direct economic impact on-farm production and returns

    b. Indirect economic impact from on-farm inputs

    c. Induced economic impact as a result of lower household income being earnt and spent

    d. Downstream economic impact or direct impact on processing of farm products produced.

Economic impact multipliers used

72. The scope of this report is unable to accurately determine with certainty the exact multiplier applicable to the impact of reduced irrigation quantities, as this would involve a detailed survey with a significant number of farming businesses in the catchment.

Regional Economic Multiplier Used

73. In a study of the Opuha Dam by Harris Consulting, Butcher Partners and the University of Auckland, they found that for every $1 of income on-farm, there was another $2.10 of economic output beyond the farm gate at a regional level. (Effectively a multiplier of 3.1).

74. In another study which assessed the Regional Economic benefits of Tarras Water Limited (2009) by Harris Consulting, they used a multiplier of 2.9 to calculate the Regional Economic benefit.

75. For every $1 of income on-farm (direct economic impact), there is another $1.90 of economic output beyond the farm gate at a regional level. (Effectively a multiplier of 2.9).

76. If farm income reduces by $1/hectare, the total economic effect is $2.90/hectare to the regional economy.

77. This analysis has used a multiplier of 2.9.

Direct Value Added Multiplier Used

78. The direct value added is the trading farm surplus generated after farm working expenses have been deducted but before debt servicing.

79. The report which assessed the Regional Economic benefits of Tarras Water Limited (2009) by Harris Consulting estimated the value added multiplier at 2.2.

80. For every $1 of farm trading surplus generated on-farm, there was another $1.20 of value added off-farm.

81. The Berl Report has calculated this multiplier at 2.43.

82. We have used the multiplier from the Harris Report of 2.2.

Table 4

(a) Reduction In Regional Economic Outcomes From Imposing Minimum Flows

Irrigation Status	$ 000 Gross Farm Income	Economic Multiplier For Gross Income	$ 000 Regional Economic income	$ 000 Value Added Farm Trading Surplus	Value Added Multiplier	$ 000 Total Value Added (Otago Region)	Impact On Gross Farm Income	$ 000 Impact On Regional Economy	Impact On Total Value Added
Current Irrigation	11,966	2.9	34,684	5,126	2.2	11,277			
450 Litres / Second	8,963	2.9	25,993	2,296	2.2	5,051	- 3,003	- 8,691	- 6,226
750 Litres / Second	7,005	2.9	20,315	497	2.2	1,093	- 4,961	- 14,369	- 10,184

(b) Berl Report Reduction in Regional Economic Outcomes

	$ 000 Gross Farm Income	Economic Multiplier For Gross Income	$ 000 Regional Economic Impact	$ 000 Value Added Farm Trading Surplus	Value Added Multiplier	$ 000 Total Value Added (Otago Region)	Impact on Gross Farm Income	$ 000 Impact On Regional Economy	Impact On Total Value Added
Current Irrigation	3,685	2.9	10,687	1,757	2.43	4,270	-	-	-
450 Litres / Second	3,621	2.9	10,500	1,692	2.43	4,114	- 64	- 187	- 158
750 Litres / Second	3,586	2.9	10,400	1,657	2.43	4,027	- 99	- 287	- 243

Table 5

(a) Reduction In Employment(FTEs) From Imposing Minimum Flows – Based On 3,833 Hectares

	Employment On Farm	Employment Off Farm Multiplier	Total Employment Otago Region	Reduction In Employment On Farm	Reduction In Employment Otago Region
Current Irrigation	29	67	97	-	-
450 Litres / Second	22	51	73	- 7	-24
750 Litres / Second	17	39	56	- 11	- 41

(b) Berl Report – Reduction in employment (FTEs) from imposing minimum flows based on 2204 hectares

Berl Report	Employment On Farm	Employment Off Farm Multiplier	Total Employment Otago Region	Reduction In Employment On Farm	Reduction In Employment Otago Region
Current Irrigation	14.2	16.5	30.7	-	-
450 Litres / Second	13.4	16.2	29.6	- 0.8	- 1.1
750 Litres / Second	13.2	15.5	28.7	- 1.0	- 2.0

Impact of minimum flow

83. The impact within the Lindis catchment from imposing a minimum flow will be a loss of on farm revenue of between $3 million (450 l/s minimum flow) and $4.96 million (750 l/s minimum flow).

84. The added valued (Farm Trading Surplus) impact will be $2.8 million (450 l/s minimum flow) and $4.6 million (750 l/s minimum flow). The Total Added value impact will be $6.2 million (450 l/s) and $10.2 million (750 l/s) The impact on the regional economy will be $8.7 million (450 l/s) and $14.4 million (750 l/s).

The BERL Report

85. The Berl report indicated that the impact on farm revenue would be a reduction of $64,000 (450 l/s) and $99,000 (750 l/s) for the entire Lindis catchment. The Added value (Farm Trading Surplus) impact for the entire Lindis catchment would be $64,000 (450 l/s) and $99,000 (750 l/s).

86. The Berl report indicated that the total added value impact for the Otago Economy would be $158,000 (450 l/s) and $243,000 (750 l/s).

87. It also concluded that the impact on the Regional Economy would be $187,000 (450 l/s) and $287,000 (750 l/s)

Commentary on the BERL report

88. The Berl report uses 2204 hectares compared to the model I have used of 3,853 hectares.

89. The Berl model is based on a breeding and finishing system whereas the model I have used is based on a finishing system, which produces almost twice as much income per hectare compared to a breeding and finishing system.

90. The biggest difference however is reflected in the loss of revenue per hectare between the Berl report and the evidence of Mr Porter, by imposing minimum flows.

Table 6

	Compass Agribusiness (Mr Porter's evidence) (gross revenue per hectare)	% reduction in gross revenue Compass Agribusiness (Mr Porter's evidence)	Berl Model (gross revenue per hectare)	% reduction in gross revenue (Berl)
Current irrigation	$3122	-	$1672	-
450 l/s	$2338	-25%	$1643	-2%
750 l/s	$1828	-41%	$1627	-3%

91. Table 6 shows that the Berl model completely underestimates the economic impacts of imposing minimum flows.

Employment Commentary

92. The small decrease that has been modelled in Berl economic returns as a result of imposing minimum flows correspondingly has a small

impact on employment i.e reduction in on farm employment equates to 1 FTE and in regional employment between 1 and 2 FTE.

93. The impact however will be much more significant for 3833 hectares of irrigation as 29 FTE's would be employed on farm and a further 67 within the region – a total of 97 FTE's.

94. Imposing minimum flows will have a dramatic effect on the employment on farm and this will flow onto regional employment.

95. On farm employees would reduce by 7 at 450 l/s minimum flow and 12 at a 750 l/s minimum flow.

96. The consequences of this will be felt very heavily on the local population and would impact the community such as the viability of the local Tarras school.

Dated this 18 day of March 2016

George Collier

Appendix One: Irrigated only returns, costs and farm trading surplus per hectare

REFERENCES

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