

In The Matter                      Of the Resource Management Act 1991 ("the Act")

And

In The Matter                      Of an application by Haldon Station Limited for consents to disturb the bed of Stony River, carry out maintenance on the existing weir and diversion structure, take water for stock use and irrigation and discharge bywash water (CRC082268, CRC082269, CRC082270, CRC082271, CRC042561)

---

**BRIEF OF EVIDENCE OF ANDREW WEBSTER MACFARLANE**

---

**BUDDLE FINDLAY**  
Barristers and Solicitors  
Christchurch

Solicitor Acting: **Rachel Dunningham**  
rachel.dunningham@buddlefindlay.com  
Tel 64-3-379 1747 Fax 64-3-379 5659 PO Box 322 DX WP20307 Christchurch 8140

1. My full name is Andrew Webster Macfarlane.

### **Experience and qualifications**

2. I graduated from Lincoln College in 1981 with a Bachelor of Agricultural Science degree. I have 29 years experience as a Farm Management Consultant, 28 of which have been in private practice. I am a registered member of the New Zealand Institute of Primary Industry Management and am the current New Zealand President of that Institute.
3. I have been farming on my own account, with both border-dyke and spray irrigation, for 20 years. My home property was awarded the "Ballance Farm Environment Award" (for setting a high standard in environmentally sustainable farming) in 2003.
4. My advisory work involves crop and animal systems, the impact of soil fertility and water availability on them, and the financial analysis of such systems. I have been advising farmers on management of their border-dyke and spray irrigation schemes for 28 years. In recent years a significant amount of my time has been involved in assisting farmers:
  - Re-develop existing irrigated areas (both spray and border-dyke) to enhance efficiency of resource use and hence profitability.
  - Develop sound design and management practices for proposed water use, both individual and group schemes.
  - Manage production and financial risk around water enhancement schemes, both group and individual.
5. I have read the code of conduct for expert witnesses in the Environment Court practice note, and confirm that I have complied with the code in the preparation of my evidence. I will comply with that code when giving this evidence.

### **Haldon Station**

6. I have been employed by Haldon Station Ltd as their farm management consultant since 2003.
7. I regard Haldon Station as one of New Zealand's best examples of how to integrate multiple classes of livestock at a high level of productivity while maintaining environmentally friendly outcomes in a potentially fragile environment.
8. Haldon's expertise in that skill base has been independently recognised.

9. From my perspective, that quality of outcome at Haldon, from a productive and environment perspective, is due to factors I would summarise as:
- (a) **Owner willingness to reinvest.** Han and Jenny Klisser, as owners of Haldon, have always demonstrated a willingness to reinvest profits to improve both the asset and the outcomes from the asset.
  - (b) The **size and relative profitability of the station** has generated cash able to be reinvested in most years.
  - (c) **Timely decision making in a potentially fragile ecosystem.** With climatic extremes prevalent at Haldon, ability to foresee animal and plant stress and make management decisions accordingly is critical. Paddy Boyd is a very proactive decision maker. As a result, animal condition always remains at a high level, and plant survival is optimised for the environment.
  - (d) Where ground cover, (plant survival) or animal condition may be compromised to long term detriment, Paddy will **feed supplement**. In dry years that supplement is purchased, and is therefore a major drain on finances requiring a strong balance sheet and underlying profitability to sustain.
  - (e) **Integration of stock policies.** The ability to integrate classes of livestock for the benefit of both animal and plant is crucial to farming in the Haldon environment.
- Deer have strengths in their ability to browse. They control weeds and weed seeds such as brier and horehound. They survive well with snow on the ground. They have a relatively low winter feed demand, and can, at times of the year, utilize roughage.



- The Merino also have strengths in survival under dry and/or cold or heat. They forage well under tussocks and matagouri



where large tongues can not reach.

- The cattle have an ability to utilize poor quality feed (roughage). They have a beneficial impact on parasite life cycles in sheep and deer. The cows, like the ewes, predominantly winter without supplement, but the cows have a much greater ability to safely mobilise backfat (to be replaced in spring). Their higher grazing height protects low ground cover.



- (f) **Emphasis on good weed and pest control.** Other than utilization of the integrated livestock policies, large consistent resources have been applied to weed and pest management. Typically at least \$100,000/year is applied to control of ferrets, rabbits, broom and wilding pine.

Without such an investment, Haldon would rapidly revert to an arid, pine infested landscape.



Photos show the impact of rabbit grazing on newly improved pasture.





This photo shows the impact of rabbits on native oversown pasture either side of the rabbit fence

- (g) **Partial irrigation.** The ability to grow reliable feed on the existing irrigated area enables less grazing pressure to be placed on dry land. In turn, better cover, less bare ground, less weed invasion, less wind and water erosion and less fertility transfer, lead to higher productivity.

A key benefit to the irrigated area is the productivity gain on associated dryland, which while minor on a per hectare basis, is major over the large dryland area.

At present the ratio of irrigated to non irrigated land is too low to make Ha don self sufficient in supplementary feed in drought years.

A rebalancing of that ratio will have just as large a cumulative beneficial impact on the dryland part of the farm as the newly irrigated small footprint.

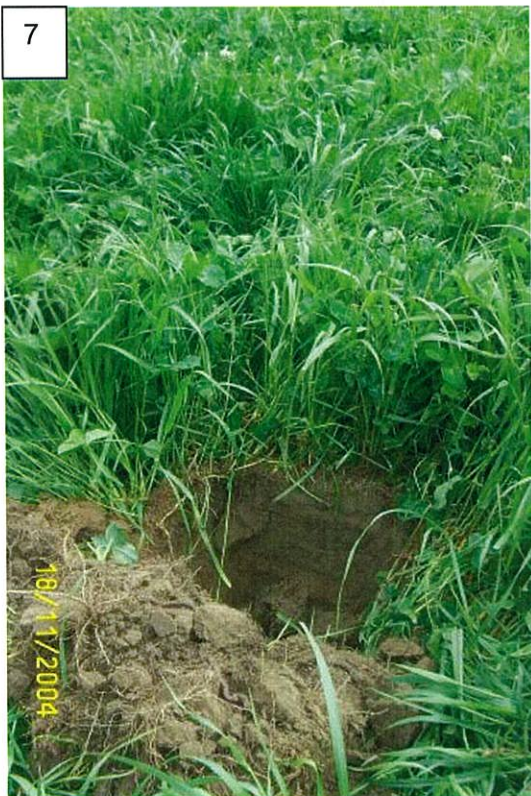
- (h) **Good fencing and subdivision** to prevent fertility transfer, and excessive continuous grazing to pasture.
- (i) **Optimisation of ground cover.** As alluded to in point 9(d), Haldon places great emphasis on maintaining ground cover in a fragile environment where frost heave, drought, heat, and wind all contrive to loosen soil for potential loss.

10. A significant investment in dryland pasture species has been made in order to increase root mass, which, in turn, holds soil together.
11. The degree of root matter increase possible in selected areas is demonstrated in pictures 1,2,3,4,5,6. Pictures 1 and 2 show the degree of root mass (over 25cm long) in ryecorn relative to its top growth. Pictures 3 and 4 show the plants in situ, and unwashed. Picture 5 shows a similar impact from short rotation ryegrass. Picture 6 shows dryland ryegrass after 5 years, where both top and root growth are severely restricted.
- Pictures 7 and 8 shows the same ryegrass, 3 years old, under pivot irrigation.
12. The contrast in cover can be seen in picture 9, where the foreground is unimproved, the middle is improved, but dryland, and the back area is the irrigated part of photos 7 and 8.
13. Contrast these photos with photo 10, showing the Maggies flat area, which is ungrazed, and incapable of sustainably supporting plant life without water.

Compare that photo to 11, where although drought ravished, and rabbit eaten, the dryland pasture on other soils is at least holding plant cover and root mass which prevents erosion and nutrient runoff.

14. It is the area pictured in photo 10, that Haldon deem most profitable, and more environmentally sensible, to irrigate.





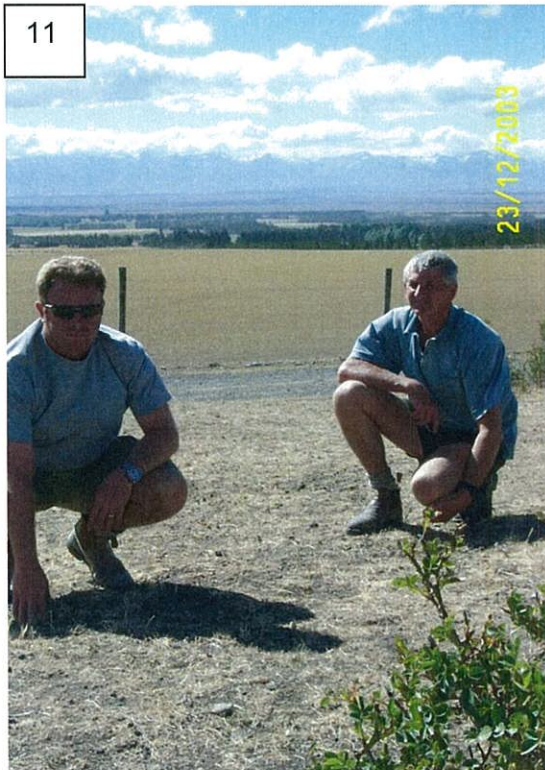
9



10



11



15. The factors described above minimize the majority of potential adverse effects of farming on this land. Other potential adverse impacts come from animal wallowing, nutrient runoff, and water use efficiency. These potential impacts have been specifically addressed on the existing irrigated area.
16. Any animal wallowing has been almost eliminated either by lining of races (photo 12) or by fencing off sensitive areas (photo 13). While animal contact with water races can not be eliminated, it is now either low density, or low risk of sedimentation



17. Nutrient runoff can be a specific risk with borderdyke irrigation if water is applied too soon after fertilizer application.

Haldons borderdyke system has a higher fall (slope from headrace to end of paddock) than similar systems on the plains. The fall enables quick watering and hence a lower, more efficient application rate, around 60mm per application, and not far higher than most spray irrigation. When the grass is long (pre-silage cut) the irrigation rate slows, and application rate can temporarily rise to 75mm.

18. While fast, efficient watering does significantly improve water use efficiency, it also, by definition, increases the risk of nutrient runoff. That risk is mitigated by not applying fertilizer close to any irrigation. Application is either late winter with spring growth to occur pre irrigation, or autumn, after the last irrigation.
19. The concentration of nitrate in water from the borderdyke is low, partly because virtually no artificial nitrogen is used anyway, partly because mixed animal systems reduce nitrogen loss from urine, and partly because the dilution rate with borderdykes is higher than from pivots.

20. Any nutrient runoff that does occur is recycled through the ponding system as described by Paddy Boyd. That ponding system has been evolving in complexity, and is now a very efficient harvester of water and any residual nutrient for utilization with the irrigation pivot.

## Nutrient Overseer Budget

21. Agresearch was commissioned by MWRL to complete Overseer information for the MHC irrigation area and its associated catchment. Haldon was one of the properties used as a template by AgResearch to develop Overseer information for the catchment.
22. Haldon is a complex property on which to run Overseer, having multiple land classes, stock classes, and irrigation and dryland systems. Minor changes to input assumptions can lead to significant changes in output data, due to its large scale.
23. Richard de Joux, Paul Johnston (Ballance senior rep), Paddy Boyd and I have spent considerable time analysing and adapting the AgResearch run of Overseer for Haldon to enhance accuracy. While our figures vary in a relatively small way from those adapted by Melissa Robson (based on the AgResearch numbers updated by us), they are within the bounds of error that would be expected on a property of this size.
24. Due to its extra detail resulting from intimate property knowledge we will be working off our version, but accept the N & P output as proposed by Miss Robson. Over time, we hope to prove her numbers are conservative.
25. I summarise the Overseer output for Haldon (22,040ha) including newly purchased "Stoney" block, as:

	<i>WQS Threshold</i>	<i>GHD</i>	<i>Haldon consultants Overseer</i>	
	<i>Post dvpt</i>	<i>Post dvpt output</i>	<i>Pre dvpt output</i>	<i>Post dvpt output</i>
<i>N</i>	54,971	52,429	46,733	48,414
<i>P</i>	3,715	3,281	1,282	1,117
<i>Assumption of SU carried</i>				
<i>Sheep</i>		9,348	14,554	14,565
<i>Cattle</i>		5,809	5,795	6,779
<i>Deer</i>		9,123	10,400	10,897
		<b>24,280</b>	<b>30,749</b>	<b>32,241</b>

26. I have examined the input parameters for the GHD (Melissa Robson) version and ours. The two major differences revolve around the degree of recycled water and the degree of deer wallowing, both of which are more significant in relative terms to Phosphorus than nitrogen.
27. For example, we believe we can recycle enough water to irrigate 75ha, but have yet to quantify the exact water flow rate. If that 75ha of water can not be recycled, then a further 807kg P, and 3,903kg N are added to the output. It is that 75ha of recycled water that prevents P loss increasing with the irrigation development.
28. Haldon has placed a huge resource from a planning, management, and finance perspective, into preventing opportunities for deer to wallow. Such initiatives as density of stocking rate, fence placement, trough water where appropriate, and naturally rocky or artificially rock lined water course access (where trough water is not possible) for drinking all contribute to a low P output. Variance around assumptions on deer wallowing account for the balance of the difference between the GHD output and the Haldon consultants output.
29. I am therefore comfortable that we understand where any variances may occur, how Overseer accounts for those differences in assumption, and how we can work to mitigate any issues.
30. Many of the issues described above are covered in detail in the Farm Environment Management Plan.
31. Macfarlane Rural Business built a template in 2000 called "Environmental Checklist for Irrigated Farms:", and with an objective of "quantifying environmental audit procedures associated with irrigation development". The project was funded by the Ministry for the Environment Sustainable Management Fund. A number of Canterbury farmers, including Haldon, have been loosely following that template since.
32. My involvement with Ballance Farm Environment award winners, both personally and professionally, has also focused me on the need to record and monitor environment relevant information. To that end, I had an input into adapting Melissa Robson's (GHD) template for MIC into its final document form.

33. I regard the FEMP as a living document to which is regularly added photos, records, and documents. My own farm plan, which is now nine years old, is two Eastlight folders in size.
34. The Haldon plan categorises mitigation measures into nutrient management, water use, weed control, pest control, fertilizer control, and optimisation of land cover.
35. The "Overseer" program is most sensitive to animal connectivity with water, and nutrient runoff. It is those two areas where Haldon has been very proactive over the past decade.
36. Haldon has demonstrated leadership over a number of years with management of environmental outputs. All associated with Haldon, including owners, managers and consultants, are still learning as we attempt to reconcile objective data with instinctive good management practices.
37. The length of time Haldon has been collecting data makes our assumptions and conclusions as accurate as we can be at present, and this work to date is reflected in Haldon's FEMP.
38. I have no doubt we will learn a lot more as science and farm management progress in the future, and these developments will be progressively integrated into the FEMP through the regular review process and implemented on farm.

A handwritten signature in black ink that reads "A. W. Macfarlane". The signature is written in a cursive style with a long horizontal flourish extending to the right.

A Macfarlane B Ag Sc  
MNZIPIIM  
Registered Farm Management Consultant