

APPLICANT: HALDON STATION LIMITED

REPORT OF RICHARD DE JOUX

Consent ID	Description	Table 3 Location	Table 5 Location
CRC042561	To take and use groundwater at a maximum rate of 100 l/s from 2 bores, 70.3m and 80.0m deep.	Not applicable	Upstream of Waitaki Dam, but not upstream of the outlets of the glacial lakes
Activity Status			
<p><u>TRP:</u> The TRP permits the taking of up to 100 m³ water per day. The volume and rate of water requested exceed the permitted rates therefore a resource consent is required.</p> <p><u>Overall status:</u> Discretionary</p>			
Consent ID	Description		
CRC082268	To disturb the bed of Stony River to maintain an existing weir and irrigation intake structure		
Activity Status			
<p><u>TRP:</u> There is no operative regional plan so S77C of the RMA applies, and the activity is discretionary.</p> <p><u>NRRP:</u> The activity does not comply with condition 1 of Rule BLR2 (discharge of sediment) and condition 8 of Rule BLR3 (works in surface water), therefore the activity is discretionary under rule BLR8.</p> <p><u>Overall status:</u> Discretionary</p>			
Consent ID	Description		
CRC082269	To divert water at a rate of up to 320 l/s and to take and use water at a maximum rate of 280 l/s for irrigation of 470 hectares		
Activity Status			
<p><u>Rule 2, Table 3 WCWARP:</u> The take complies with the environmental flow regime specified for (xxii) All other rivers and streams</p> <p><u>Rule 6, Table 5 WCWARP:</u> The proposed annual volume is within the allocation limit for "Upstream of Waitaki Dam".</p> <p><u>Rule 15 WCWARP:</u> The activity complies with rules 2, 6, and 7 of the WCWARP and is therefore discretionary.</p>			

<u>Overall status:</u> Discretionary	
Consent ID	Description
CRC082270	To dam Stony River to a maximum height of 1 metres at the intake weir to allow flow to the irrigation intake
Activity Status	
<p><u>TRP:</u> The TRP permits damming of intermittently flowing streams subject to certain conditions. At the location of the existing weir the river flow is permanent, therefore the damming of water is considered to be discretionary.</p> <p><u>WCARP:</u> Rule 2 and 6 require minimum flow and allocation limits to apply. No minimum flow or allocation limit has been proposed for this activity therefore Environment Canterbury have considered that the activity is non-complying.</p> <p><u>Overall status:</u> Discretionary</p>	
Consent ID	Description
CRC082271	To discharge water from an irrigation race into Stony River (up to 10 l/s), and to discharge bywash water into Stony River (up to 280 l/s)
Activity Status	
<p><u>TRP:</u> The TRP does not have any provision for discharges of water into water as requested in this application, therefore the activities are discretionary.</p> <p><u>NRRP:</u> Rule WQL60 classifies the discharge of a contaminant into water as a non complying activity</p> <p><u>WCARP:</u> There are no rules relating to discharges within the WCWARP</p> <p><u>Overall status:</u> Non-complying</p>	

1 PROPOSAL

1. Haldon Station (the Applicant) is located on the north eastern shores of Lake Benmore. It originally comprised 57,000 acres, and was acquired by Frederick and Tom Teschemaker in December, 1857, and was first stocked a hundred head of cattle from the Thomson's Otaio Station, and 300 ewes and 40 weathers from Delamain, of Rollesby.
2. With the recent purchase of the Stony River block, Haldon Station now covers 22,000 hectares of land, and currently runs approximately 6000 deer, 11,000 sheep and 1000 cattle. Mr Paddy Boyd, farm manager, will describe the present farm operations in more detail.
3. Irrigation of pasture has been an integral part of the property since the early 1970's (Figure 1). The property currently irrigates 380 hectares of pasture using borderdyke methods, and 90 hectares of spray irrigation. The existing irrigation consents (WTK864681A-C) expired in 30 June 2008.
4. Water is abstracted from an existing intake located within Stony River. An existing weir structure within the bed of Stony River maintains a stable bed and water level at the intake. Although the structure is technically a "dam", the structure does not provide any storage of water and is not capable of regulating any surface flow.

5. Applications to continue those activities (CRC082268-71) were lodged 6 months prior to the expiry date.
6. Haldon Station have a separate consent application (CRC042561) to allow the taking of groundwater for an additional 190 hectares of land to provide grazing for the fattening of stock. Water will be abstracted from 2 bores at depths of 70.3m and 80.0m below ground, and used for spray irrigation of pasture on land that is presently unirrigated (Figure 2, Plate 10).
7. Consent application CRC042561 was applied for on 24 May 2004, which predates the replacement consents (CRC082268-71) referred to above. Consent application CRC042561 therefore has a higher priority relative to consents CRC082268-71. Legal submissions on priority for Haldon Station consent applications will be presented by Ms Rachel Dunningham.

1.1 Timeline and Summary of Significant Amendments made to the Applications

Timeline	CRC042561	CRC082268-71
Timeline	24 May 2004	20 December 2007
Date of Lodging	24 May 2004	25 February 2008
First Notifiable Date	24 May 2004	n/a

8. Application CRC042561 was lodged on 24 May 2004 seeking a new consent. The application was notified on 4 August 2007.
9. On 17 February 2009, Environment Canterbury were notified that the requested annual volume of 1,278,700m³ should be reduced to 1,140,000m³, and that the expiry date for the consent should be 30 April 2025. The changes were required to comply with the annual volume applicable to 190 Mackenzie Irrigation Company (MIC) shares, and was a requirement of obtaining the derogation approval from Meridian Energy Ltd.
10. On 18 February, Environment Canterbury responded to confirm the changes and to confirm that these did not affect the priority of the application.
11. No other amendments have been made to the application.
12. Applications CRC082268-71 were lodged on 20 December 2007. On 22 January 2008, the applicant received a letter from Environment Canterbury confirming that the applications had been received more than 6 months prior to the expiry of consents WTK864681A.1-C.1. The letter confirmed that the applicant could continue to operate under the existing consents until a determination was made on the current applications.
13. On 22 January 2008 Environment Canterbury requested further information relating to the maximum rates and volumes of the diversion, clarification of a proposed minimum flow, fish screen details, reasonable use for stock water supply, landscape, water quality and derogation approval from Meridian. A response addressing these matters was provided on 21 February 2008. The stock water requirement was amended to an annual volume of 73,780 m³, and was duly notified on 3 May 2008.
14. Subsequent to the notification of the application, the applicant has received Meridian Energy derogation approval (8 December 2008). A review of the hydrology of Stony River has now been completed and a minimum flow of 200 l/s in Stony River at the downstream site known as Hinch Bend has been proposed by the applicant.
15. No other amendments have been made to the application.

2 BACKGROUND INFORMATION

2.1 Water Sources

16. The source of water for application CRC042561 is groundwater contained within the outwash gravels of the area known as Maggies Flats. This area lies within the Tekapo Basin Aquifer described by Sinclair Knight Merz (2004). SKM estimate that the aquifer has a rainfall recharge

component of 25.8 million cubic metres per year, and an estimated storage of 2,579 million cubic metres.

17. Bores I39/0004 and I39/0005 are the first deep bores to be drilled in the south eastern margin of the Mackenzie Basin. The nearest existing deep bore is H38/0035, 113.4m deep located 7.4km distant.
18. Bore I39/0004 encountered dry gravels to 9.8 metres, moist gravel to 29.8 metres, and water bearing gravels from 29.8m to 69.4 metres. Drillers' estimated water yields within the strata increased from 2 l/s at 30.6 metres to 20 l/s at 65.8 metres. Water yields reduced below 69.4 metres. The standing water level after completion of the bore was 6.35 metres below the top of the casing, indicating the aquifer is under artesian pressure.
19. A step drawdown test carried out on bore I39/0004 between 22nd and 23rd March 2004 indicates an aquifer transmissivity of approximately 300 m²/day (Figure 3). The bore was pumped at a maximum rate 50 l/s for 8.5 hours.
20. Bore I39/0005 was drilled adjacent an outcrop of basement rock known as Mt Maggie. The bore encountered yellow silty clay and medium angular gravels to a depth of 42 metres overlying water bearing gravels to 58.7 metres. Basement rock was encountered at a depth of 65 metres. The bore, which has yet to be tested, has been capped.
21. Given the lack of obvious significant confining strata, it is reasonable to assume that the aquifer is semi-confined.
22. The nearest surface water resources are Stony River, Lake Benmore and the Tekapo River.
23. Stony River is a tributary of Lake Benmore, and is the source of water for consent applications CRC092268-71. Although its lowest reaches (near the Lake) retain a permanent flow, the middle reaches of river between its gorge and Haldon Road Bridge are usually dry during each summer. During these times, permanent flow is maintained at the Haldon Road Bridge through discharges from the Haldon Station irrigation race. A separate report on the hydrology of Stony River is appended to this evidence.
24. Stony River is included as "all other rivers and streams" within the water bodies in Table 2, Rule 2 of the WCWARP.

2.2 Existing Irrigation system

25. Water is abstracted from the Stony River via an intake structure located downstream of the site known as Slip Panels Corner. The level of water at the intake is stabilised by an existing weir structure within the river bed. Water is transported via an open race to the head of the border dyke scheme, 1.4km downstream of the intake.
26. An existing fish screen located at the intake is to be replaced by a buried gallery screen at the head of the border dyke system.
27. Water is distributed to the borders via a number of head races. By wash water is collected in storage ponds downstream of the border dyked area, and is re-cycled by pumping to a centre pivot irrigator. Surplus water can either be re-cycled or discharged back to the lower reaches of Stony River. Mr Boyd will describe the operation of this scheme in more detail.

2.3 Mackenzie Irrigation Company shares held

Name: Haldon Station Ltd	Number
Property Shares	1
Irrigation Shares	190

28. Irrigation shares are required for consent application CRC042561 for the full irrigation area of 190ha as this is an application for a new activity
29. MIC shares are not required for the replacement consent application CRC082269.

2.4 Derogation Approval

30. Derogation approvals were obtained from Meridian Energy Limited on 8 December 2008 (CRC082269) and 11th September 2009 (CRC042561). Copies are attached in Appendix 1
31. In accordance with the derogation approval obtained from Meridian Energy Ltd for consent CRC042561, the applicant will abide by the requirements of the derogation approval as proposed in the conditions

3 SUBMISSIONS

Resource Consent	Submissions in support	Submission in opposition	Neutral
CRC04561	4	16	2
CRC082268-71	2	5	0

32. Details of the submissions received specific to these applications are as follows:

CRC042561

Submitter	Issues	Support/ neutral/ oppose	To be heard
Upper Waitaki Community Irrigation	WAP allows for use of water for irrigation, applications consistent with objectives of the WAP.	Support	Yes
Mr M Urquhart	Supports taking groundwater for irrigation if metered as reduces reliance on streams, irrigation reduces soil loss.	Support	Yes
Dr D. Scott	Irrigation potential of at least 45,000 hectares in the Mackenzie Basin	Support	yes
Mackenzie Branch Federated Farmers	Increasing agricultural production of the area.	Support	no
Mr S Carswell	Degradation of water quality	Oppose	Yes
Ms J Zusters	Potential adverse effects on the natural landscape values of the Mackenzie Basin and upper Waitaki catchment.	oppose	yes
Meridian Energy Limited	MIC shares, flow regimes, metering, water quality	Oppose	Yes
Ms J	Adverse effects on the natural landscape values of the	Oppose	Yes

Submitter	Issues	Support/ neutral/ oppose	To be heard
Kollmann	Mackenzie Basin and upper Waitaki catchment from infrastructure and water application		
Ms R Williams			
M A Rose			
Mr R J Blackmore	Concerns over individual small streams and aquifers being over allocated	Oppose	No

CRC082268 - 71

Submitter	Issues	Support/ Oppose	To be heard
Mr M. Urquhart	Renewing consents gives confidence to invest. Irrigation good use of water. Minimum flow on Stony Stream not appropriate as regularly dry. Metering and efficiency.	Support	-
Department of Conservation	Incomplete information on minimum flow for Stony River. Uncertainties about design of fish screen. No assessment on environment.	Oppose	Yes
Mr F Hocken (Ruitaniwah a Farm)	Water worth more for farming than for hydro.	Support	No
Fish and Game	Concerned about effect of proposal on Stony River and fish passage as not enough detail provided in relation to minimum flow and fish screening.	Oppose	Yes
Meridian Energy Limited	Unclear how stockwater will be included in Rule 6 of the WCWARP. Effects on water quality and water metering.	Oppose	Yes
Te Runanga o Waihao	Cannot make informed decision without all relevant information to hand and assessed. Recommend duration of 10 years. Further monitoring of fish in stream.	Oppose	No
Waimate Rod and Gun Club Inc	Stony River is a good spawning stream for trout fishing and needs protecting.	Oppose	No

33. Further information and consultation has taken place with Fish and Game Council in respect to fish screening, rates of discharges and fish passage at discharge points. Fish and Game support the

proposed minimum flow of 200l/s at the location known as Hinch Bend, downstream of the irrigation scheme discharge point.

34. The applicant has also proposed mitigation by way of a Farm Environmental Management Plan (FEMP) to ensure that effects on water quality are minor.

3.1 S42A REPORTS

35. I have read the S42A reports prepared by Susannah Vesey for these applications. I consider that they accurately summarise the existing and proposed activities and provide a realistic assessment of the potential effects. There are some parts of the reports where a response is requested of the applicant, and I make comments on these at the appropriate sections in the following evidence.

4 CRC042561 – ASSESSMENT OF ENVIRONMENTAL EFFECTS – TO TAKE AND USE GROUNDWATER

36. Based on ECS experience with similar applications and reference to Environment Canterbury's web-site, the following effects on the environment have been scoped as relevant to the proposal, for the reasons stated.

- Adverse effect of take on surrounding groundwater users
- Cumulative effect (in combination with other takes) of take on other groundwater users
- Adverse effect of inefficient take on other groundwater users
- Adverse effect of take on aquifer stability
- Adverse effect from cross-connection on groundwater quality
- Adverse effect of take on surface water flows
- Adverse effect of use on water quality
- Adverse effect of take on landscape

4.1 Adverse Effects of Take on Surrounding Groundwater Users

37. The abstraction of groundwater creates a drawdown cone that extends laterally from the pumping bore, and may result in a lowering of groundwater levels in neighbouring bores. Such lowering may have serious consequences for existing users by preventing them from taking their authorised amount, and may also result in increased costs for such users through having to lower their pump, change from a surface to submersible pump or by using more electricity to abstract water.
38. Schedule WQN10 of the Proposed Natural Resources Regional Plan (NRRP) describes the method in which drawdown effects on neighbouring bores are to be calculated. The schedule gives effect to Policy WQN20, and requires an assessment of all bores within a 2km radius of the proposed abstraction. In this instance, there are no neighbouring users of groundwater within a 2km radius of the proposed bore. The closest neighbouring bore that is screened at a similar depth is H38/0035, located 7.4km distant, therefore no estimation of drawdown effects has been considered to be necessary.
39. It is concluded that there are no adversely affected groundwater users.

4.2 Cumulative Effect (in combination with other takes) of Take on Other Groundwater Users

40. Presently there is only one known bore abstracting water from a similar depth in this area. That bore (H38/0035) is screened between 71.5m and 113 metres and, given the significant distance between that bore and the applicant's bores, most probably intercepts a separate aquifer.
41. Policy 6 of the WCWARP specifies that "all groundwater taken above Lake Benmore or in the Hakataramea or Maerewhenua catchments where the average depth to groundwater is less than 10 metres (shallow groundwater) is to be considered within the environmental flow regime for the surface water body to which it contributes flow."
42. This abstraction is from groundwater that is greater than 10 metres below ground.
43. Ensor (2008) reviews the WCWARP planning provisions for the taking and use of groundwater. Ensor notes that the WCWARP does not contain references to "unconnected" groundwater, and concludes that in his view, "unconnected" groundwater should not be subject to an environmental flow and level regime, and that Rule 2 of the WCWARP is not applicable. Ensor further notes that

for annual allocations, all groundwater is to be included in the annual allocation specified in Table 5, Rule 6.

44. Given the low existing use of the aquifer, it is considered that the proposed take will not significantly affect groundwater levels in the area, either alone or cumulatively with other takes. However, given that there is no information on the aquifer, it would be appropriate for the applicant to monitor the non-pumping depth to water within one of the bores on a regular basis to determine if there is any long term decline in groundwater pressures.

4.3 Adverse Effect of an Inefficient Take on Other Groundwater Users

Reasonable and Efficient Use Seasonal Volumes and Land Use	
Land Use	Intensive pasture (Sheep and Beef)
Area to be irrigated (hectares)	190
Method of application	Spray
Efficiency of application	80%
Daily application depth	4.5 mm
Return period	6-7 days
Return period application depth	15 – 28 mm
Soil profile available water	30mm – 45mm
Effective Irrigation Season Rainfall	140mm/year
Assessment criteria (based on)	Policy 10-14 (WCWARP)
Seasonal volume required (m ³ /year)	1,140,000m ³ /year, as per MIC shares
Volume to be included in Table 5 (WCWARP) allocation	1,140,000m ³ /year, as per MIC shares
Comments	The proposed annual volume has been based on the 190 MIC shareholding.

45. The applicant proposes to avoid and mitigate adverse effects resulting from the inefficient taking of water by :
- Use of a spray irrigation system;
 - Limiting depth of application to 15 - 28mm per application.
 - Limiting peak application rate to less than the maximum rate of evapotranspiration¹;
 - Taking all practicable steps to:
 - ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity²; and
 - avoid leakage from pipes and structures; and
 - avoid using water on non-productive land such as impermeable surfaces and river or stream riparian strips.

¹ Evapotranspiration rates in the area range from 4.5 – 5.2 mm/day during the summer months.

² This will be achieved through appropriate irrigation scheduling gained by local experience, rainfall and evapotranspiration records and reference to internet services.

46. The maximum application depths will be less than $\frac{1}{2}$ the estimated water holding capacity, and will promote the harvesting of deeper percolated soil moisture by plants, thereby reducing opportunity for additional leaching.

4.4 Adverse Effect of Take on Aquifer Stability

47. Documented cases of land subsidence from overseas commonly occur in thick unconsolidated sequences of aquifers and aquitards. Land subsidence has occurred when there is an over-pumping of aquifers (eg. gravels) results in a lowering of water pressures and drainage of water from the overlying aquitards. Aquitards with a high proportion of silt or clay are particularly susceptible to compression, which leads to subsidence. Aquifer drainage can also result in subsidence but to a much lesser amount than the aquitard because of the nature of the aquifer materials.
48. The aquifers in the vicinity of the applicant's well are gravel based, hence there is little likelihood of aquifer subsidence.

4.5 Adverse Effect from Cross-Connection on Groundwater Quality

49. Since the applicant's bores are screened in only one aquifer, there is no risk of contamination of deeper aquifers with groundwater from the upper aquifer. In the event of the bores being used to distribute fertiliser, the installation of a backflow prevention valve will ensure that there is no backflow of contaminated water into the aquifer.

4.6 Adverse Effect of Take on Surface Water Flows

50. Bore I39/0005 is located 1.5km from Stony River (although separated from it by the bedrock mass of Mt Maggie), 2km from the nearest shore of Lake Benmore, and 3km from the Tekapo River. The equivalent distances for bore I39/0004 are 1.2km, 3km and 4km distant. The top of the aquifer from which water is to be abstracted is at least 30m below ground and is at least semi-confined. Given the ephemeral nature of Stony River upstream of Haldon Station Road it is concluded that any abstraction of water from the aquifer will not have any impact on surface flows in Stony River.
51. If it is assumed that the aquifer was in direct hydraulic connection with the either Lake Benmore or the Tekapo River, the stream depletion factor at bore I39/0004 (assuming $t=300\text{m}^2/\text{day}$, $s=0.1$, $q=50$ l/s, $d=3000\text{m}$ or 4000m) exceeds 3000 days and 5000 days for Lake Benmore and the Tekapo River respectively. The equivalent stream depletion factors for I39/0005 ($d=2000\text{m}$ and 3000m) are 1334 days and 3000 days (Figure 4). These factors indicate a very poor hydraulic connection with the water bodies.
52. The estimated potential stream depletion on Lake Benmore after 150 days pumping each bore at 50 l/s are 1.8 l/s (I39/0005) and 0.1 l/s (I39/0004). Given the large separation distance between the bores and Lake Benmore, the fact that the Jenkin's assumptions require a fully penetrating aquifer and a stream bed with the same transmissivity as the aquifer are not met, any actual depletion effect on the Tekapo River will be significantly less than these estimates.
53. Policy WQN8 of chapter 5 of the Proposed Canterbury Natural Resources Regional Plan sets out the manner in which stream depletion effects are to be considered. Policy WQN8(1)(a) provides definitions of degrees of hydraulic connection. The degree of effect for this application is less than that defined for a "low degree of hydraulic connection". Policy WQN8(2) states that
54. Groundwater takes either not classified as having a high, moderate or low degree of hydraulic connection, or classified as having a low degree of hydraulic connection but with a stream depletion effect below the specified cut-off limit set in (1)(b)(iii) above, shall not be included in any surface water allocation block or subject to any minimum flow regime for the surface water body, but will be included in the appropriate groundwater allocation block. Ms Vesey agrees that Rule 2 WCWARP does not apply to this application. The annual volume required does need to be included in accordance with Rule 6 WCWARP.
55. The proposed abstractions have a minimal stream depletion impact on both the Tekapo River and Lake Benmore, and satisfy the criteria set out in WQN8(2). Accordingly it is concluded that the aquifer is not significantly hydraulically linked to the surface water resources, and that there will not be any adverse effects on surface waters as a consequence of pumping water from the aquifer.

4.7 Adverse Effect of Take on Water Quality

4.7.1 Local effects

56. The proposed use of groundwater is for spray irrigation of pasture grazed by stock excluding milking dairy cows. The land to be irrigated is located down gradient of Stony river, therefore will not affect the existing water quality within that river. At the application rates applied for, it is considered that any potential to adversely affect groundwater quality within the irrigated area is low.

4.7.2 Cumulative effects on water quality

57. The cumulative effects of the take, in combination with other applications, has been described in evidence presented by MWRL. The applicant is a member of UWAG, who contributed to this study. The following assessment includes the cumulative effects caused by the existing borderdyke irrigation carried out by the applicant on the property.
58. The property, according to the MWRL Water Quality Study, is located within the Tekapo River Basin groundwater catchment. For this property, there are no stream and lake mitigation requirements, so the overall property threshold is based on the proposed output thresholds from the MWRL Study.
59. The calculated nutrient mitigation requirement of the receiving environments determined in the MWRL Study has identified the N and P thresholds for the property. These are shown in the table below.
60. "OVERSEER® has been run by a qualified person to model the N and P outputs from the proposed farming system³. The results of the model have been incorporated into the table below. This table shows that the applicant can meet the property thresholds which are the most restrictive.

	Nitrogen Threshold	Phosphorous Threshold
MWRL Water Quality Study Property Thresholds	54,971	3,715
OVERSEER® outputs	52,429	3,281

61. Whilst the applicant is within their property thresholds, the MWRL Study identified that the applicant still has to consider specific on farm effects and the impacts these activities could have on the local receiving environment. This requires a specifically developed Farm Environmental Management Plan (FEMP) to identify and implement appropriate mitigation measures.
62. At a workshop held in Twizel in August 2009, the applicants met with Ms Melissa Robson of GHD Limited. A "desk top" on farm risk assessment was undertaken. This is considered to be the "starting point" of the FEMP.
63. The workshop identified potential on farm risks specific to each farm along with possible mitigation measures. The on farm risks identified during the desktop risk assessment need to be verified by an appropriately qualified person who has carried out a site visit. It is anticipated that this will occur should the application be granted.
64. The applicant has committed to implementing the FEMP including an on farm risk assessment, appropriate mitigation, monitoring and auditing within a year of this consent being granted. The FEMP has been proposed as condition of consent and the draft FEMP is attached to this evidence.
65. Given that the N and P thresholds from the MWRL Study can be met, and the applicant's commitment to addressing on farm risks with the implementation of the FEMP, the effects of the use of water on water quality for both the local receiving environment and cumulative effects are considered to be minor.

³ The modelling was re-calculated by Melissa Robson on 25 September to account for the increase in land area to 22,000 ha as a consequence of the purchasing of the Stony Creek block in early September 2009.

4.8 Adverse effect of take on Landscape

4.8.1 Cumulative effects

66. The cumulative effects on landscape, in combination with other applications to take and use water within the Mackenzie Basin will be described by Mr Andrew Craig, a landscape architect who is providing general and specific recommendations on behalf of UWAG clients to this hearing.
67. His conclusions reflect that the general effects on the MacKenzie landscape of these further applications within the basin will be significantly less than minor. I adopt his recommendations to the committee. In terms of the specific placement of the irrigation structures associated with this application, I confirm that the proposed pivot locate on the area known as Maggie's Flat will be a movable unit. Mr Paddy Boyd will provide details of the size and location of the pivot.

4.8.2 Local effects

68. Haldon Station is located at the end of a no exit road on the north eastern shores of Lake Benmore. With the exception of holiday makers, campers and boating enthusiasts, the property is not frequently visited by the general public, or by organised tourist operators. The general landscape has been significantly modified in the past through the formation of Lake Benmore, and cannot be considered to be a "natural" landscape.
69. The land to be irrigated comprises alluvial flats bounded to the north and west by the Tekapo River and by Lake Benmore. The flats are presently sparsely vegetated with scrub (notably Rose Hip) and tussock, with areas of exposed underlying soils and gravels caused through erosion and frost heave. Converting the flat land to permanent pasture will assist to stabilise and retain the soils, reducing losses from wind and climatic erosion.
70. Mr Chris Glasson has prepared a S42A report (Report 5) on landscape effects. He considers that "due to the close proximity of the circular site (CRC042561) to the Haldon Arm Road which is clearly visible from this road by travellers and recreationalists then the adverse effects would be moderate. If mitigation measures were undertaken such as moving the location away from the road and linking it to the adjacent site some to integrate it more with the landform patterns, then the adverse effects would be less than minor."
71. The applicant does not agree that the visibility of an irrigator at the proposed location would have a "moderate adverse effect". The Road referred to by Mr Glasson leads to a camping ground which is used extensively during summer months by holiday makers. Those people are more intent on ensuring that their speed boats, jet skis, caravans and trail bikes can have safe access to the camping ground than whether an irrigator is parked in a paddock. Tourists seldom visit the site.
72. The applicant would be able to control the travelling centre pivot such that it was not parked adjacent the road.

4.9 Effects on Tangata Whenua Values

73. Te Runanga O Ngai Tahu submitted on all applications in the catchment, seeking that all applications be declined.
74. The primary reasons for this were that the applications were considered to be inconsistent with the policies and objectives of the WCWARP, and also at odds with the cultural objectives of the RMA.
75. This application is a discretionary activity in terms of the WCWARP, and therefore, it is entirely within the limits defined by the WCWARP. Te Runanga O Ngai Tahu had considerable input into the creation of the WCWARP.
76. However, it is acknowledged that Te Runanga O Ngai Tahu have a significant relationship with the Waitaki Catchment, and as such, appropriate management of water quality effects are proposed by the applicant to ensure that the potential effects on the environment, including tangata whenua values are minor.

5 CRC082268 LAND USE CONSENT - ASSESSMENT OF ENVIRONMENTAL EFFECTS

77. This activity is to disturb the bed of Stony River for the purpose of maintaining an existing weir and intake structure. Maintenance is of a minor nature, usually requiring the use of a tractor mounted backhoe to ensure a flow of water to the intake structure. Periodically, it is necessary to trim or remove overhanging willows.
78. The potential effects considered to be relevant to this activity are summarised within the S42A report for application CRC082268 by Ms Vesey. As there is general acceptance of the assessment of effects and mitigation proposed by the applicant, I have included the summary of effects shown in table 1 of that report.

Adverse Effects	Applicant's assessment	IO audit	Conclusion
Water quality and ecosystems	Control weir which has been in place for many years assists in maintaining a stable reach. Mitigation ensuring bird survey prior to works, ensuring no plant seeds carried to site on machinery, minimise effects on wildlife and vegetation	Note river runs dry not much further downstream. Should some sediment flow through the applicant's irrigation race, it will pass through a series of existing settling ponds before the water reaches the lower reaches of the Stony River. Conditions 11-18	Effects minor and acceptable
Bed erosion and flooding	The existing diversion and works have not compromised the flood carrying capacity of the river. Mitigation proposed requiring applicant to repair any damage to stop banks or flood protection works.	Environment Canterbury Senior Engineering Officer Mr Scarlett does not have any concerns provided conditions relating to flood capacity and erosion included on consent. Conditions 4-7.	Given Mr Scarlett's comments, minor
Artificial structures	No assessment provided.	Assessment not necessary given river runs dry a little downstream from proposed works. Only structures likely to be affected are Haldon Stations irrigation intake structures.	Effects minor and acceptable
Amenity values	No assessment provided, but mitigation proposed to minimise effects on amenity.	Trees and vegetation obstruct clear view of the proposed works from further downstream. The site is not readily accessible or can be seen by the public. Conditions (20) and(21).	Effects minor and acceptable
Tangata Whenua values	No assessment provided	Effects on water quality, ecosystems and amenity considered to be minor. Submissions do not specifically relate to intake structures. Condition (19).	Effects acceptable

6 CRC082269 DIVERT, TAKE AND USE WATER FROM STONY RIVER- ASSESSMENT OF ENVIRONMENTAL EFFECTS

6.1 Effects on other water users

Effects on other water users	
Comments	This is a replacement consent application. There are no other users of water from Stony River

79. The taking of water for irrigation and stock water purposes has occurred since the early 1970's. No change in flow rate is requested. There are no other surface water abstractors on Stony River, and no other properties border onto the River.
80. The volume proposed, together with the applications that have priority over this application, are within the allocation limit of 275 million m³/year for the Upper Waitaki as per Table 5 of the WCWARP.
81. Given there are no other users and the volume proposed is within Table 5 requirements, effects on other users are considered to be minor.

6.2 Effects on instream values

Effects on in-stream values	
Comments	The proposed minimum flow of 200 l/s at Hinch Bend is consistent with the Table 3, row xxvi of the WCWARP

82. Table 3 of the WCWARP requires a minimum flow of the 5 year 7 day mean annual low flow (MALF) at the downstream end of the catchment.
83. A separate hydrology report has been prepared for Haldon Station. The report identifies that Stony River perennially ceases to flow in the reach downstream of the intake weir to a point below Haldon Station Bridge. The drying of the reach has been shown to occur naturally, and occurs irrespective of any abstraction of water by Haldon Station.
84. The hydrology report recommends a minimum flow of 200 l/s to be maintained at the downstream site known as Hinch Bend. The proposal has the support of Central South Island Fish and Game Council, and is also recommended within the S42A report by Mr David Stewart.
85. I note that the S42A reports of Susannah Vesey and Claire Penman recommend a flow sharing regime for this abstraction. I have already presented evidence to this hearing discussing the use of flow sharing when the monitoring site is downstream of all abstractions. A flow sharing regime is not necessary for this abstraction because the minimum flow site is located at the downstream end of the catchment. The imposition of a flow sharing regime would result in the residual flow being maintained at higher flows than the minimum flow, which is not the intention of the WCWARP.
86. A water level recorder will be required to be installed at Hinch Bend to enable compliance with the minimum flow. The take itself will also be appropriately metered

87. A buried gallery type fish screen will be installed at the head of the border dyke scheme. Ms Vesey refers to a lack of detail provided regarding the design of the fish screen. A schematic diagram of the screen has been supplied to Environment Canterbury. The screen will be buried with a minimum cover of 600mm gravel overlying the gallery. Given the relatively small flow rates involved and low flow velocities at the site, there is little potential for small fish to become entrapped within the gravels. Discussions have been held with Mr Mark Webb (CSIFGC) regarding the fish screen design. Mr Webb agrees that at times when the flow in Stony River ceases to flow below the intake weir, it will be preferable to ensure there is no discharge of water at the fish screen as this would encourage young trout to migrate into the dry river bed.
88. Given the minimum flow and fish screening proposal it is considered that in-stream values will be protected and that the effects on the actual in-stream values are considered minor.

6.3 Effects of inefficient water use

89. Policy 16 of WCWARP requires all applications for irrigation to meet a reasonable use test in relation to the instantaneous rate of take and the annual volume, including consideration of irrigation system operation and management (Policy 16(a)), an irrigation application efficiency of at least 80% (Policy 16(b)) and annual volumes based on either i) soil-moisture measurements, local rainfall and ET modeling for 1 in 5 year dry season or ii) the difference between peak total demand (e.g. WQN9v2) (Policy 16(c)).
90. An annual irrigation volume of 3,163,100 m³ has been requested. The volume was based on estimated land areas, soil PAW and rainfall with the WQN9v2 methodology. The volume is equivalent to an application of 673mm per year. A revised irrigation demand was calculated using the Irricalc method described by Mr Ian McIndoe. An annual volume of 4,178,700 m³ was considered to be required for 380ha border dyke and 90ha spray irrigation. That volume exceeds the volume notified, therefore the lower volume of 3,163,100 m³ has been retained.
91. Policy 21 of the WAP requires all water takes to be metered. To ensure that this application is consistent with this policy, the applicant proposes to meter their take.

6.4 Effects of the use of water on water quality

Effects on Water Quality	
Comments	<p>The CRC reporting officer for these applications is not currently satisfied that effects of water quality are minor.</p> <p>Cumulative effects on water quality have been addressed by Mackenzie Water Resources Limited (MWRL) and are summarized below.</p> <p>Local effects have also been addressed below</p>

92. The taking and use of water for borderdyke irrigation has occurred since the early 1970's. There is no intent to increase the present rates, volumes, or use of the water, therefore there will be no increase in any existing effects.
93. Water quality samples have been taken from Stony River upstream and downstream of the border dyked system. Some of the samples indicate an increase in nutrients downstream of the discharge near Haldon station Bridge. Mr Boyd will explain that in recent years, it has been the practice of the applicant to discharge some of the by wash and wipeoff water to ensure that there is a surface flow of water at the Haldon Station Bridge.
94. The majority of samples to date were collected prior to the recent expansion of storage ponds. The increase in retention time of this bywash water, in combination with nutrient reduction expected from riparian and wetland planting will ensure that any existing adverse effects will be reduced.
95. I note that the WQS modeled water quality within Stony River and concluded that there would be an increase in phosphorus and nitrate concentrations under increased irrigation scenarios. I have noted above that there will not be any increase in irrigation activity as a consequence of the abstraction of water from Stony River. The land to be irrigated from groundwater (consent

CRC042561) is located downgradient of Stony River and will therefore not cause any increase in nutrients to Stony River.

96. The cumulative effects of the continued activity have been addressed earlier in my evidence.

6.5 Landscape

6.5.1 Cumulative effects

97. The cumulative effects on landscape, in combination with other applications to take and use water within the Mackenzie Basin will be described by Mr Andrew Craig, a landscape architect who is providing general and specific recommendations on behalf of UWAG clients to this hearing.

98. His conclusions reflect that the general effects on the MacKenzie landscape of these further applications within the basin will be significantly less than minor. I adopt his recommendations to the committee

6.5.2 Individual Landscape Effects

99. The land currently irrigated by this consent application is located on private land. The border dyked land is generally sheltered from view by trees. The nearest point is 1.5km from Haldon station Road. The landscape is a modified farming environment with a pastoral rather than alpine scenery.

I note Mr Glasson (report 5) considers that "Due to the discrete location and low visibility of CRC082269, the adverse effects are less than minor." I agree, and consider that any landscape effects are less than minor.

6.6 Effects on Tangata Whenua Values

100. Te Runanga O Ngai Tahu submitted on all applications in the catchment, seeking that all applications be declined.

101. The primary reasons for this were that the applications were considered to be inconsistent with the policies and objectives of the WCWARP, and also at odds with the cultural objectives of the RMA.

102. However, it is acknowledged that Te Runanga O Ngai Tahu have a significant relationship with the Waitaki Catchment including the headwaters of Lake Tekapo and as such Buddy Mikaere was engaged to address cultural matters on behalf of the applicant.

7 CRC082270 DAM WATER AT THE WEIR AND INTAKE ASSESSMENT OF ENVIRONMENTAL EFFECTS

103. Because the weir structure maintains the water level at the intake, a permit is required to “dam” the water. The activity has occurred since the construction of the irrigation system, however the previous consent authority (Waitaki Catchment Commission) did not consider it necessary to require a separate consent for this activity.
104. Although the weir technically is a “dam”, the weir does not provide any storage of water and is not capable of controlling or altering the water levels at the intake. Ms Vesey refers to the definitions of a “dam” in paragraphs 13 to 19 of her S42A report. I note her comments relating to Rule 2 WCWARP (minimum flow) and Rule 6 (annual volume). Her conclusion is that the activity will be non-complying because no minimum flow has been proposed.
105. I believe it is reasonable in this case to consider that a strict interpretation of Rule 2 for this activity is unnecessary because it is not possible to actually stop the “damming”. The applicant has proposed a minimum flow on the taking of water, which complies with Rule 2.
106. The potential effects considered to be relevant to this activity are summarised within the S42A report for application CRC082268 by Ms Vesey. As there is general acceptance of the assessment of effects and mitigation proposed by the applicant, I have included the summary of effects shown in table 1 of that report.

Table 1: Summary of potential adverse effects from application CRC082270			
Adverse Effects	Applicant’s assessment	IO assessment	Conclusion
Natural and physical environment	The structure does not have any storage capacity so incapable of manipulating downstream flows.	River flows naturally over the weir when flows high enough. At other times water flows through diversion channel and rejoins river slightly lower down the reach.	Effects minor and acceptable
Ecosystems	When the river has sufficient flow to maintain downstream fish passage, the weir causes a drop in water level of approximately 0.3-0.4 metres and fish passage not inhibited. When river ceases to flow downstream of the weir, the pool immediately downstream of the weir provides some temporary refuge for fish.	As explained in Report 18A, no fish natural fish passage between upper and lower reaches of Stony River in summer months. I note this activity has been occurring for a number of years now and likely the ecosystem has adapted to the diverted water. Due to dry nature of middle reach of river, no minimum flow to be maintained directly downstream of the weir. Associated water permit CRC082269 to be managed on minimum flow for lower reaches of Stony River.	Effects minor and acceptable
Dam failure	Not assessed	While no assessment has been provided, I visited this site and there appear to be only applicant owned paddocks downstream of the weir which may be affected if it should fail. Additionally I note the weir does not retain large volumes of water.	Minor
Amenity values, people and communities	Not assessed	Applicant owned land surrounding weir. River banks vegetated. Not visible to public, effects of dam	Minor

Table 1: Summary of potential adverse effects from application CRC082270

Adverse Effects	Applicant's assessment	IO assessment	Conclusion
		failure minor.	
Tangata Whenua values	Not assessed	Effects on environment, ecosystems and amenity considered to be minor. Submissions do not specifically relate to weir.	Minor

8 CRC082271 DISCHARGE WATER TO STONY RIVER - ASSESSMENT OF ENVIRONMENTAL EFFECTS

107. The activity includes the discharging of excess water back to the Stony River at the head of the borderdyke scheme (head race discharge), and the discharge of water including by wash and wipeoff water from settling ponds back to Stony River at or about Haldon Station Road Bridge.
108. These activities have occurred for many years.

8.1 Head race discharge

109. The head race discharge is required to allow excess water within the intake race to be discharged back to Stony River. Although the application was based on a flow rate of 40 l/s, that flow rate cannot be controlled and at times the flow rate will be higher than 40 l/s. At times of lower river flow, the discharge rate may cease altogether. I note that Mr Mark Webb (CSIFGC) considers it is desirable to reduce or cease the discharge rate at this point when the River is low. This would discourage young fish to enter the discharge race and be lost into a dry riverbed.
110. I note that Ms Vesey recommends that the rate of discharge from the head race is monitored. Given that the rate cannot be controlled and at times is self limiting, I cannot think of any compelling reason why the discharge rate needs to be monitored.
111. The water that is discharged at this location has the same physical and chemical properties as the water abstracted from Stony River. As there will be no change in the quality of the discharged water, any adverse effects on receiving water will be minor.
112. The discharge channel is well armoured with rock and medium size gravels. No erosion or scouring of the discharge channel has been observed in the past.
113. I note that Ms Vesey concludes that any effects of the discharge of water from the head race will be minor.

8.2 Bywash settling pond discharge

114. Effects on water quality
115. Mr Boyd will describe how efforts are made to ensure that water is discharged into Stony River near the Haldon Station Road Bridge in an effort to maintain a surface flow in the River at that location.
116. Ms Vesey refers to a memo prepared by Dr Meredith on 31 August 2009 regarding Haldon Station consent application effects. Dr Meredith comments on the effects of the discharge of bywash and wipeoff water into Stony River, and comments that improvements to the discharge should be made.
117. There needs to be a balancing of effects as a consequence of this discharge. In pragmatic terms, water of less than pristine quality is definitely more desirable than no water at all. It is noted that despite the quality of the discharge, the lower reaches of Stony River retains a healthy fishery and other environmental values.
118. Nonetheless, the applicant has taken recent steps to improve the quality of the discharged water by constructing 2 new storage ponds. A planting programme has been implemented and will be continued into the future. The increased retention time, together with the removal of nutrients from riparian and wetland planting will improve the quality of the discharged water and lead to a reduction in any existing adverse effects on Stony River.

8.3 Effects on bank erosion and stability

119. The discharge channel has a relatively flat slope and is well vegetated. Velocities within the race are low and no erosion or scouring of the bed is evident..

8.4 Effects on Tangata Whenua

120. General comments have been made previously in my report regarding effects on Tangata Whenua. With specific regard to the discharge of settling pond water, the discharge does not cause the mixing of waters. The present values within the lower Stony River exist despite this discharge. The applicant has taken steps to improve the quality of the discharge.

9 CONCLUSIONS

121. The potential effects associated with the continuation of the existing activities, together with the proposed new spray irrigation have been assessed. Provided that suitable mitigation is carried out, any effects on the environment are considered to be minor.

10 CONDITIONS

122. The S42A reports for these activities include a list of recommended conditions that will mitigate any adverse effects on the environment. There are a number of recommended conditions that I do not consider are necessary, or that are unable to be complied with.

10.1 CRC042561 – Take Groundwater

123. I consider that with the exception of condition 9 (code ME01), the recommended conditions are necessary and reasonable.
124. Condition 9 (code ME01) requires a datalogger to be connected to a remote telemetry system. The present mode of telemetry is either by telephone land line, cellular phone (GPRS), satellite, or local wireless network. There are many locations within the upper Waitaki basin where these modes are either not available or are unreliable. It is unreasonable to require telemetry of the abstractions because the technology may not yet exist to allow the consent holder to comply with the condition.
125. I suggest that condition 9 be amended to allow the use of telemetry as an option rather than as a requirement.

10.2 CRC082268 – Disturb bed of Stony River

126. I consider that the recommended conditions are reasonable and can be complied with.

10.3 CRC082269 – take and use water for irrigation and stock drinking

127. With the exception of recommended condition codes WP07, ME02, ME03, ME05 and WP08 the recommended conditions are considered to be reasonable and can be complied with.
128. Condition code WP07 refers to a minimum flow and for flow sharing. I have already addressed this matter in my evidence. The condition wording should be amended to remove any reference to flow sharing.
129. Condition code ME02 is simply a duplication of WP08 (see below) and should be removed.
130. Condition ME03 refers to inline flow meters, and is not applicable to open race flow measurement, and should be deleted.
131. Condition ME05 needs to be amended to remove the reference to telemetry systems.
132. Condition WP08 refers to telemetry. For the reasons previously mentioned, the condition should be amended to allow telemetry as an option rather than as a requirement.
133. I note that there is no recommended condition referring to fish screening. The applicant is prepared to install a gallery type fish screen that will be designed and installed by a suitably qualified person.

134. I also note that there is no requirement to monitor water quality within the property. The applicant is committed to following a Farm Environmental Management Plan, and is prepared to have a consent condition requiring compliance with the FEMP once it has been completed.

10.4 CRC082270 – Dam water in Stony River

135. I consider that the recommended conditions are reasonable and can be complied with.

10.5 CRC082271 – Discharge water

136. Condition DP01 for the headrace discharge limits the maximum rate of discharge to 40 l/s. I have already referred to the fact that the rate of discharge cannot be controlled and at times will exceed 40 l/s. It is suggested that the condition is reworded to the extent that all reasonable efforts will be made to limit the rate of discharge to 40 l/s or less.

137. Condition DP04 refers to the installation of water meters at the discharge sites. As these are open races, water meters are not applicable. Furthermore, it is considered that the continuous monitoring of the headrace discharge is not necessary and does not provide any mitigation. It is requested that there is no requirement to record the headrace discharge.

11 FIGURES, PLATES AND DEROGATION APPROVALS