

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF applications for resource consents to abstract water from Grays River, Stony River and Tributaries of Omarama Stream

STATEMENT OF EVIDENCE OF RICHARD DE JOUX IN SUPPORT OF APPLICATIONS BY A N HOPE, GRAYS HILL STATION LIMITED, HALDON STATION LIMITED AND DUNSTAN PEAKS LIMITED

1. INTRODUCTION

Qualifications and experience

- 1.1 My name is Richard Trevor de Joux. I am a hydrologist and hydrogeologist, and hold the qualifications of Bachelor of Science (Geology) and New Zealand Certificate of Engineering (Civil). I have had 33 years experience in surface water and groundwater hydrology, and prior to setting up my own Consultancy Company in 1994 was employed by Environment Canterbury and by the South Canterbury Catchment Board. I presently manage a Consultancy (Environmental Consultancy Services Ltd) specialising in measuring and monitoring river flows, groundwater, irrigation abstractions, hydrological investigations and modelling, and preparation of resource consent applications.
- 1.2 I am familiar with the hydrology of the Upper Waitaki Basin, and carried out a number of flow measurements throughout the catchment during my employment with the South Canterbury Catchment Board.
- 1.3 My Company presently provides flow monitoring services within the upper Waitaki catchment to Haldon Station Ltd, Omarama Station Ltd and Tara Hills Station Limited.
- 1.4 Although this is a Regional Council hearing, I have prepared this evidence in compliance with the Code of Conduct for Expert Witnesses (31 July 2006). This evidence is within my area of expertise, except where I state that I am relying on facts or information provided to me by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

- 1.5 My evidence provides a summary of the hydrology of Grays River, Stony River and tributaries of the Omarama Stream, with particular reference to the location and magnitude of estimated 1 in 5 year 7 day mean annual flows (1:5yr MALF) in accordance with the requirements of Table 3, Rule 2 of the Waitaki Catchment Water Allocation Regional Plan (WCWARP). Copies of the hydrology reports are appended to my evidence.
- 1.6 In preparing my hydrology reports, I obtained hydrological flow information provided by Environment Canterbury. That information included summaries of flow measurements carried out by Environment Canterbury and Waitaki Catchment Commission staff within the Grays, Stony and Omarama Stream catchments. I was also provided with a dataset of “naturalised” daily flows for the Hakataramea River. I also had meetings and discussions with Environment Canterbury staff (Clair Penman, Adam Martin, Susannah Vesey), Fish and Game Council representative (Frank Scarf), and Mr David Stewart (hydrological consultant commissioned by Environment Canterbury).
- 1.7 Within my hydrology reports, I refer to a number of publications that are relevant, including Horrell & Gabites (Seven day mean annual low flow mapping of the tributaries of the Waitaki River) and Young (Omarama Stream Water Resources Inventory, Inventory of the Hydrology of the Waitaki River).

2. BACKGROUND

- 2.1 Flow measurements within the upper Waitaki Basin were originally carried out by Ministry of Works and the Waitaki Catchment Commission. Many of the measurements were specifically for hydro power investigations, primarily between 1960 and 1980. More recently, Environment Canterbury have carried out an intensive flow measurement programme within the basin, resulting in the estimates of 1:5yr MALF reported in Horrell & Gabites in 2005. The information provided in that report was used as the basis of setting minimum flows within the WCWARP. Since the publication of that report there have been further flow measurements and hydrological investigations carried out various organisations including Environment Canterbury, Boraman Consultants Ltd (BCL) and Environmental Consultancy Services Ltd (ECS). Those investigations have provided a better understanding of the hydrology of various tributaries within the upper Waitaki

Basin and I believe it is appropriate to use that information when considering the appropriate location and magnitude of minimum flows required by the WCWARP.

2.2 There are problems in relying on historic flow measurements to produce reliable estimates of flow statistics. I note that Mr David Stewart also refers to this in paragraphs 66 to 69 of his S42A report. Flow measurements prior to the early 1980's were usually not carried out to the quality standards required today. Gauging equipment usually comprised a large Watts type meter, which was not suitable for measurements within slow moving or shallow flow. Gauging data was recorded manually rather than electronically (introducing human errors). Flow measurements were primarily carried out for data collection purposes rather than being specifically for the purpose of setting minimum flows. Greater reliance should be placed on recent measurements, which comply with current quality assurance standards.

3. GRAYS RIVER

3.1 The Grays River catchment is located on the north eastern slopes of the Mackenzie Basin Lake Benmore and flows into the Tekapo River approximately 18 km upstream its confluence with Lake Benmore. The river obtains tributary inflows from Edwards and Sawdon Streams, and the Mackenzie and Snow Rivers. A significant portion of the base flow in the Grays River is derived from groundwater. Figures 1 and 2 show the location of relevant sites.

3.2 Applications have been made by A H Hope (CRC041542) and Grays Hills Station Ltd (CRC042661) to abstract water from the Snow River and Grays River. The minimum flow site specified for the Grays River catchment (including the Snow River) is specified in Table 3, Rule 2 of the WCWARP as being 1800 l/s at Days Bridge.

3.3 The following section summarises the information presented in Appendices A (Hydrology of the Snow and Grays Rivers – Lake Benmore) & B (Comments on Grays River Flow Data and estimates of MALF) of my evidence.

3.4 Gabites and Horrell (2005) used the historic gaugings carried out by the Waitaki Catchment Commission to obtain a correlation for the Grays River at Days Bridge with the Forks at Balmoral as follows:

$$\text{Grays at Days Bridge} = 1495.8 e^{0.000171 * \text{Forks}} \quad r^2 = 0.75$$

- 3.5 The correlation coefficient of 0.75 indicates that the relationship is relatively poor. Using this correlation, they estimated a mean flow of 2584 l/s, 7DMALF of 1873 l/s and 1:5 yr MALF of 1799 l/s. It is my understanding that this regression was used to determine the minimum flow of 1800 l/s for Days Bridge referred to in Table 3 of the WCWARP, and that this flow represented a 1:5 yr MALF.
- 3.6 Gabites & Horrell (2005) use a series of flow gaugings carried out between 2003 and 2005 to describe how the diversion of the Tekapo River for power generation purposes during the mid 1980's has reduced the flow rate within the lower Grays River, and show that this reduction is in the order of 3000 l/s above the confluence with the Tekapo River.
- 3.7 Using more recent gaugings carried out by Environment Canterbury in 2007 and 2008, I have estimated that the impact of diverting the Tekapo River has also reduced the flow in the Grays River at Days Bridge by approximately 500 l/s. For consistency with the Gabites & Horrell report, the estimation was based on a correlation with the Forks River.
- 3.8 The estimated 1:5yr MALF was 1238 l/s, however the correlation coefficient was poor (figure 3).
- 3.9 The change in flow regime was in part inferred using estimations of groundwater flow presented in figure 5A of Sinclair Knight Merz report on groundwater information prepared in 2004. In combination with land surface contours and aerial photographs, it appeared to be evident that any reduction in river flows within the upper Tekapo River would result in a reduction in recharge of groundwater within the mid to lower reaches of the Grays River.
- 3.10 The reasoning and assumptions used were similar to those used by Environment Canterbury hydrogeologist Lee Burbery, who provided a memorandum dated 18 August 2009 hypothesising the direction of groundwater flow and recharge within Manuka Creek (D Stewart S42A report, para 330 – 331).
- 3.11 Environment Canterbury staff reviewed my assessment and disagreed with the assumption that the change in flows within the Tekapo River would have had any effect on the rates of flow at Days Bridge. In summary, they considered that the reduction of flow in the Tekapo River would not cause such an impact “across the basin”, and that the SKM report was based on minimal groundwater information.

- 3.12 The Environment Canterbury review indicated that a better correlation of Grays River flows had been obtained using the Mary Burn flow recorder site. Using that information, I prepared a second memo (appendix B) in which I reviewed the accuracy of the available flow gaugings. After removing a number of gaugings that were obviously incorrect, I obtained a correlation using ALL flow gaugings where $\text{Flow} = 5.6946 \times \text{Mary Burn} + 205.8 \text{ l/s}$, with a correlation coefficient of 0.8736. The calculated 1:5yr MALF was 1570 l/s.
- 3.13 For whatever reason, it is clear that there has been a reduction in flow rates within the Grays River since the 1980's and I do not believe it is justifiable to include all historic gaugings when trying to derive a 1:5yr MALF that is representative of the present day hydrology.
- 3.14 The available data for 2007 / 08 gaugings provides a correlation of $\text{Flow} = 758.17 e^{0.0027 \text{ MaryBurn}}$ $r^2 = 0.9627$ (figure 4). The gaugings cover a spread flows between the low to median flow range, and the correlation coefficient of 0.9637 is superior to the previously obtained correlation. The estimated 1:5 yr MALF is 1450 l/s.
- 3.15 As Mr Dave Stewart rightly points out, there have been discussions regarding the exact value that should be used as a minimum flow for the Grays River at Days' Bridge, and that it is likely to be in the range 1450 l/s and 1560 l/s. Agreement has been reached between Environment Canterbury, Fish and Game and the applicants that a minimum flow of 1500 l/s should be adopted as the 1:5 yr MALF at Days Bridge. It is understood that this flow would be reviewed once more accurate assessments of the flow are obtained following the installation of a flow recorder at Days Bridge.

4. **STONY RIVER**

- 4.1 Stony River catchment is located on the north eastern slopes of Lake Benmore and drains into the Haldon Arm of that lake. Haldon Station Limited have applied for replacement consents to allow for the continued abstraction of water from Stony River at the same rate (280 l/s) and volumes as previously authorised. The intake site is located downstream of a site known as Slip Panels Corner. Abstraction of water has occurred since the early 1970's. Haldon Station is the only abstractor of water from Stony River.

- 4.2 The following section summarises information contained within appendix C of my evidence. Figure 5 and 6 show the location of relevant sites.
- 4.3 Historic information collected by the Waitaki Catchment Commission has been incorporated with more recent data collected by Environment Canterbury between 2003 and 2005, and by Environmental Consultancy Services Ltd. from 2007 to 2009.
- 4.4 The information confirms the fact that Stony River losses water into its alluvial fan below Slip Panels Corner. The River ceases to flow under natural low flow conditions downstream of Slip Panels Corner and is usually dry in its middle reaches. Surface flow reappears approximately 1km upstream of Haldon Station Road Bridge. Permanent flow occurs upstream of the site known as about Hinch Bend, which is located downstream of the Haldon Road, approximately 1 km upstream of Lake Benmore. .
- 4.5 Estimates of flow statistics for Stony River at Slip Panels Corner (upstream of the Haldon Station Intake) and at Hinch Bend (1km upstream of Lake Benmore) have been made based on the flow record available for the Hakataramea River at Main Highway Bridge.
- 4.6 Gabites & Horrell (2005) estimated the 1:5yr MALF for Stony River at Slip Panels Corner would be 332 l/s. The estimate was based on the historic WCC gauging data.
- 4.7 A further 14 flow measurements have been carried out at Slip Panels Corner since the publication of that report, and this has allowed for a revision of the flow statistics at this site. Using all flow gaugings carried out to date, the following regression was obtained:
- 4.8 Stony at Slip Panels Corner = $0.6511 \times \text{Haka}^{0.9015}$, $r^2 = 0.8151$ (Figure 7)
- | | |
|-----------------|------------|
| Mean flow | = 1625 l/s |
| 7DMALF | = 370 l/s |
| 1:5 year 7DMALF | = 265 l/s |
- 4.9 Stony at Hinch Bend = $1.1536 \text{ Slip Panels Corner} - 184.38$ $r^2 = 0.8813$ (Figure 8)
- | | |
|-----------------|------------|
| Mean flow | = 1692 l/s |
| 7DMALF | = 239 l/s |
| 1:5 year 7DMALF | = 120 l/s |
- 4.10 Stony River losses significant amounts of water into its alluvial flood plain downstream of Slip Panels Corner. A Waitaki Catchment Commission report prepared during the

granting of previous resource consents for Haldon Station noted *“Numerous spot gaugings at various locations in the Stony catchment yield the information that the mean flow at the mouth of Slip Panels gorge is 1.8 m³/s and the median flow about 1.2 m³/s. Flows as low as 230 litres per second have been recorded in severe droughts but 400 litres per second is a more usual dry weather flow. Below that site the stream is ephemeral for 4-5 km with dry weather surface flow resuming 1-2 km above Haldon homestead. The flow lost in the ephemeral (Mile Grass) section is all regained prior to discharge to Lake Benmore. These conditions exist unaffected by the Haldon irrigation diversion except that drainage channels constructed to convey bywash water to Stony River may enhance flows above the homestead.”*

- 4.11 ECS Ltd. have carried out a number of flow measurements at various sites between the Haldon Station weir and intake and Hinch Bend. Unfortunately, the majority of the measurements have been carried out during the irrigation season at times when the Stony River was dry downstream of the weir, making it difficult to accurately define rates of losses and gains throughout the River.
- 4.12 From the information collected to date it is estimated that under natural summer flow conditions
- a. A flow of at least 1800 litres per second is required at the Haldon weir to maintain continuous flow to Haldon Station Bridge under natural summer conditions; and
 - b. A flow of 370 l/s (7DMALF) would reach a distance 2km downstream of the weir; and
 - c. A flow of 265 l/s (1:5 7DMALF) would reach a distance of 1.5km downstream of the weir.
- 4.13 A minimum flow site located at Hinch Bend meets the requirements of row xxii, table 3, rule 2 of the WCWARP (ie is at the “downstream end of the catchment”). The lower reaches of Stony river below Haldon Station Bridge support brown and rainbow trout fisheries and serve as spawning and rearing waters for Lake Benmore, therefore a minimum flow at Hinch Bend will provide protection for instream requirements.
- 4.14 A minimum flow rate of 200 l/s, which is approximately the average of the 1:5 year 7DMALFs for Slip Panels Corner (265 l/s) and Hinch Bend (120 l/s) could be adopted as a minimum flow at Hinch Bend.
- 4.15 A flow of 200 l/s exceeds the estimated 1:5 year 7DMALF at Hinch Bend

5. UPPER OMARAMA STREAM

- 5.1 Omarama Stream is located in the south western portion of the Upper Waitaki Basin and is a tributary of the Ahuriri River. Dunstan Peaks Limited have applied for replacement resource consents to continue to divert, take and use water for irrigation purposes from the Omarama Stream, Little Omarama Stream, Middle Gully and Twaddles Creek. Evidence in support of those applications will be presented by Ms Cathy Begley of GHD consultants.
- 5.2 The following section summarises information contained within appendix D of my evidence.
- 5.3 Figure 14 of Mr David Stewarts S42 A report provides a location map showing the location of Omarama Stream and the relevant abstraction points. A is attached as figure 9 of my evidence.
- 5.4 The National Water Conservation (Ahuriri River) Order 1990 (the "Order") became operative in July 1990. The purpose of the Order was to protect the Ahuriri River and its tributaries for their outstanding wildlife habitat, outstanding fisheries and outstanding angling features. The "protected waters" within the Order include the Omarama Stream downstream of the bridge on Broken Hut Road (NZMS 260 H39:6094-2343). For the purposes of the Order, the Omarama Stream is managed as two reaches. The "Mid reach" extends from the Omarama Swamp Outfall (H39:6083-2471) and a point downstream of Tara Hills Station (H39:6880-2820). The reach between the latter point and the confluence with the Ahuriri River (H39:6965-3227) is referred to as the "lower reach".
- 5.5 Clause 6 of the Order specifies minimum flows to be retained within the "mid reach" and the "lower reach. The Order does not include the upper reaches of the Omarama Stream within the protected waters, and does not specify any minimum flow regime for the upper reaches. The abstraction of water by Dunstan Peaks Limited is from water that is upstream of the "protected waters" and is therefore technically not subject to the specified minimum flow regime.
- 5.6 Historic flow gaugings have been carried out by the Waitaki Catchment Commission at the site know as Dunstan Peaks, which is located upstream of the Dunstan Peaks

irrigation intake. Gabites & Horrell carried out a correlation of flows in the Omarama Stream at Dunstan Peaks using flow records from the adjacent Manuherikia Catchment. They estimated a 1:5 yr MALF of 159 l/s. I also used a correlation with the Manuherikia Catchment and obtained a similar value of 148 l/s.

- 5.7 The reach of river between Dunstan Peaks intake and the Twin Peaks Bridge loses water naturally into the underlying gravels. Gabites & Horrell section 3.2.1 make the following relevant comments.
- 5.8 *“A discussion with Rod Patterson, of Dunstan Peaks Station, on 01/10/04, revealed that a reach of the Omarama Stream goes dry downstream of the Twin Burn Bridge almost every summer, usually for about 3-4 months, with exceptions of very wet years. Despite two divert/take/discharges above this dry reach, Robinson (1983) stated that it had not been established whether abstractions in the upper catchment (Twin Burn and Berwen Takes) affect flows below Omarama Swamp. The dry reach effectively cuts off the headwater inflows to the catchment except that discharged from the Dunstan Peaks divert/take/discharge directly into the swamp. According to Robinson (1983) the divert/take/discharge generally begins before the reach dries up, but did state during years when the onset of drought happened quickly, the drying of the reach is likely to be a natural phenomenon.*
- 5.9 There are observations by local landowners and others that show that the Omarama Stream does not support continuous flow under natural conditions between Waldron Road Bridge and Clifton Downs Bridge a stretch of some 6 kilometres. The Stream is regularly dry throughout this section. The effect of upstream abstraction on the frequency and extent to which the stream cease to flow has not been determined. Anecdotal evidence suggests that this reach will cease to maintain a continuous flow regardless of any upstream abstractions:
- 5.10 Wing (2001) refers to the Omarama Stream comprising two separate reaches for fisheries purposes. *“The reason being, during the majority of the year from a point downstream of the bridge (near Clifton Downs) on the Broken Hut Road (map ref H39:610234) to downstream of the bridge (map ref H39:613193) between the Dunstan Peaks homestead and the Twinburn homestead the river dries up. This is a distance of approximately 4.5km certainly preventing passage of fish. Old records and local knowledge indicate that this occurred long before any water abstraction.*

- 5.11 Robinson (1983) refers to the dry reach of the upper Omarama Stream (section 3.8.3). *“It has not been established that abstractions in the upper catchment affect flows below the Omarama Swamp. Omarama stream usually goes dry at the bridge on the Berwen Road (map reference S116:580309) in mid-late December, effectively cutting off the surface flow from the principle headwaters apart from about 60 – 100 litres per second discharged more directly to the Swamp when Dunstan Peaks irrigation commences. Usually this event precedes the drying up of the main stream, but in years when the onset of instream droughts were very sudden it was possible to establish ephemerality as a natural phenomenon.”*
- 5.12 Young 1987 states *“Rainfall and flow records suggest that near baseflow levels (refer Figure 4.3.2 for baseflows) are reached on a 1 in 3 year return frequency. On such occasions the Omarama dries up between Waldron Road Bridge and Clifton Downs Bridge a stretch of some 6 kilometres.”*
- 5.13 Plates 1 to 3 show the flows within the upper Omarama Stream taken on 1st July. These clearly show the rates of flow upstream (Twinburn Bridge) and downstream (Twin Peaks Bridge), and the intervening dry section of Stream (Clifton Downs Bridge). No water had been abstracted from the Stream for irrigation purposes since April 2009. Significant rainfalls have occurred during May 2009 and June 2009, and the catchment was certainly not in a “dry” state. Despite this, the Stream does not maintain a continuous flow.
- 5.14 The abstractions by Dunstan Peaks Limited are from reaches of the Omarama Stream that are outside (upstream) of the “protected waters” and are therefore technically not included within the Ahuriri River Conservation Order. It is my understanding that Dunstan Peaks have abided by the rules within the Conservation Order for a number of years.
- 5.15 I note that the S42A reports recommend that the abstractions for Dunstan Peaks are not only restricted in accordance with the Conservation Order, but are also to be required to cease when the flow in Omarama Stream upstream of their top intake is at or below 160 l/s.
- 5.16 The abstractions are from water bodies specified in Table 3(xxii) Rule 2 of the WCWARP. They are required to cease abstraction when a minimum flow equal to the 5-year 7 day MALF “set at the downstream end of the catchment” is reached.

5.17 Gabites & Horrell have estimated the 5 year 7DMALF for Omarama Stream as:

Site	Map reference	5yr 7DMALF
Omarama Stream at Dunstan Peaks	H40:611-154	159
Omarama Stream at Twin Peaks	H39:612-251	370
Omarama Stream above Tara Hills	H39:625-259	470

5.18 A minimum flow based at Dunstan Peaks is upstream of the abstractions and therefore is not consistent with Table 3(xxii) Rule 2.

5.19 A minimum flow based on the flow at Twin Peaks is consistent with Table 3(xxii) Rule 2, but that site is located within the “protected waters” of the Ahuriri Conservation Order, therefore the environmental flow regime set out in the Order applies. It is also noted that the 5yr 7DMALF at Twin Peaks (370 l/s) is more restrictive than the 250 l/s flow specified within the Order.

5.20 There is an underlying assumption that any surface flow within the upper Omarama Stream will either flow directly into the lower Omarama Stream, or will be intercepted as underflow by the Omarama Swamp. Accordingly, it is presumed that any abstraction of water from the upper reaches of Omarama Stream and its tributaries will reduce the volume of water entering Omarama Swamp which, in turn, will reduce the flow in the middle and lower reaches of Omarama Stream.

5.21 Until such time as a better understanding is gained of the natural flow losses within the upper reaches of Omarama Stream it seems logical to restrict the taking of water by Dunstan Peaks in accordance with the Ahuriri Conservation Order flow sharing regime. Reasons for this include:

- Any abstraction of water within the upper catchment reduces the volume of water entering the Omarama Swamp and ultimately impacts on the rates of flow within the lower Omarama Stream. It appears to be an anomaly that the upper Omarama Stream was not included within the “protected waters” specified in the Ahuriri Conservation Order.
- Consistency with other abstractions on Omarama Stream. Resource consent CRC960328, which authorises the taking of water from Little Omarama Stream by

Berwen Station has conditions specifying the Conservation Order flow regime. Consent CRC960328 is adjacent the Dunstan Peaks intake on Little Omarama Stream.

- Logically, Dunstan Peaks Limited have an interest in ensuring as much water as possible reaches the Omarama Swamp, as this will reduce the frequency at which abstractions must cease.
- It would be inequitable to impose a more restrictive minimum flow on the Dunstan Peaks abstractions than required by other downstream users. To do so would require this abstraction to cease while allowing downstream users to continue abstract the resulting residual flow.

6. Comments on Claire Penman proposed flow sharing regime and recommended minimum flow conditions

6.1 Claire Penman makes comments in her S42A report (2A) regarding minimum flows and flow sharing regimes. Paragraphs 145 to 148 refer to her reasoning for proposing a pro rate sharing regime for all abstractions. Her reasoning is based on the presumption that the minimum flow site is upstream of all the abstractions, thereby necessitating a sharing regime to ensure that the residual flow does not recede below the minimum. The sharing regime is required to ensure that the minimum flow is maintained at the bottom end of the catchment.

6.2 The approach is correct and reasonable if the minimum flow sites that are upstream of any abstractions because it ensures the downstream abstractions can reduce linearly while maintaining the required minimum flow at the downstream end of the catchment.

6.3 However, in the case where the minimum flow site is located downstream of the abstractions, the proposed sharing regime maintains a residual flow that is higher than the specified minimum. This is unduly restrictive on the applicant's and occurs whenever the flow at the downstream site is within the range of {minimum flow plus total upstream abstraction} and {minimum flow}

6.4 To illustrate this, consider a hypothetical case where there is a maximum abstraction of 14 litres per second, an upper trigger flow for restrictions occurring at 74 l/s and a minimum flow of 60 l/s. The following table shows the residual flow that occurs at the

downstream end of the catchment depending on whether the minimum site is upstream or downstream of the abstraction(s).

Upstream minimum flow site		
Minimum flow	Take	Residual
>74	14	>74
74	14	60
72	12	60
70	10	60
68	8	60
66	6	60
64	4	60
62	2	60
60	0	60

Downstream minimum flow site			
Minimum flow	take	residual	upstream flow
>74	14	>74	>88
74	14	74	88
72	12	72	84
70	10	70	80
68	8	68	76
66	6	66	72
64	4	64	68
62	2	62	64
60	0	60	60

6.5 The minimum flow sites for A N Hope, Grays Hills Station Ltd, Haldon Station Ltd, Irishman Creek Station Ltd, and Dunstan Peaks Limited are located downstream of the abstraction points. In these cases, the specified minimum flow can be maintained without the need for a specified flow sharing regime, because abstractions cannot technically reduce the residual flow below the specified minimum.

6.6 The recommended minimum flow conditions for Irishman Creek, Grays River, Stony River, and Omarama Stream outside WCO (paragraphs 1, 2, 16, and 21 of Attachment four of Claire Penman’s report), should be amended to simply read “Whenever the flow (expressed in litres per second) in [water body], as estimated by the Canterbury Regional Council at map reference NZMS 260 [map reference] falls below [minimum flow] litres per second, the taking of water in terms of this permit **for irrigation purposes** shall cease.”. The reference to irrigation purposes is required to allow for the fact that any stockwater component of the consent application should not be restricted, and is consistent with the recommendation of Susannah Vesey’s S42A report for Haldon Station consent CRC082269 (Table 5, condition no. 7)..