

In the matter of:

The Resource Management Act 1991

And

In the matter of:

Resource Consent Applications to take and use
water downstream of Waitaki Dam, and ancillary
activities

SUPPLEMENTARY BRIEF OF EVIDENCE

KERI JOY JOHNSTON

Dated: 22 September 2008

1. This supplementary Brief of Evidence is to provide further information as requested by Commissioners throughout the course of the Lower Waitaki Hearing.
2. And, secondly, to report on changes made to the applications in response to submitters concerns.

Mr NJ Small – CRC041989

3. Mr Small had originally sought to take:
 - 2.1 30L/s from Grampians Stream, with a minimum flow of 1500/500 L/s on the Hakataramea River as measured at SH82, and 57L/s as measured on Grampians Stream as measured at Hakataramea Valley Road; and
 - 2.2 Up to 1, 000L/s from Grampians Stream, with a minimum flow of 4, 500L/s on the Hakataramea River as measured at SH82 (water harvesting).
4. Fish and Game raised concerns regarding the total allocation within the Hakataramea Catchment, but are supportive of applicants seeking to harvest and store water.
5. Given this, Mr Small amends his application and now seeks only to harvest water as per paragraph 2.2 of this Brief of Evidence. He does no longer wishes to pursue his application to take and use 30L/s from Grampians Stream as set out in paragraph 2.1.

Mr NJ Small – CRC041988

6. This application is the dam water in Mortons Stream.
7. The maintenance of a residual flow downstream of the dam had not been proffered as mitigation to date.
8. Mr Ross Dungey, an ecologist, had undertaken a survey of Mortons Stream in 2005. Mr Dungey was asked by the applicant to provide further information on what a suitable downstream residual flow would be for this stream based on the survey undertaken and in his expert opinion. Mr Dungey has provided a written statement attached to this report as Appendix One. He is available by telephone conference on 1 October 2008 to answer any questions that the Commissioners may have.
9. Mr Dungey advises :

“...if normal summer flows are in the order of 5 l/s in a dry year and slightly more than this, say 10 l/s, (figures supplied by K Johnston) in a normal year maintaining a residual flow of say 10 l/s is highly likely to ensure the existing aquatic biota remain at similar levels of productivity

post dam construction. Small streams are susceptible to temperature stresses in particular when they are abstracted. High temperature limit overall habitat and act as a barrier to fish movement. Small streams (<250 l/s) are at greater risk to low flow induced adverse impacts than larger for most fish species. A minimum flow of more than the 5 year 7dayQ10 or 5 year MALF will almost certainly benefit the aquatic ecosystem and make a significant contribution to the maintenance of species diversity and habitat quality. It seems from the hydrology information currently available that Morton Stream flows need further definition and the flow below the proposed dam should be set once this is gathered. As mentioned below (10) however, supplementation of Mortons Stream summer flows is a positive move in maintaining summer habitat in this stream.”

10. Given this, it is proposed to maintain a residual flow of at least 10L/s downstream of the dam at all times. The conditions have been amended to record the same.
11. The Commissioners asked the two maps presented by drawn to the same scale. This has been done and now clearly shows that there is no overlap in the area to be irrigated and the inundation area of the dam. The maps are attached to this report as Appendix Two.

RG & ZL Pringle – CRC050960

12. Mr and Mrs Pringle sought consent to divert 40L/s from Peters Stream and to take and use 35L/s for irrigation purposes. This application was subject to a proposed minimum flow of 1500/500L/s on the Hakataramea River measured at SH82.
13. Fish and Game raised concerns regarding the total allocation within the Hakataramea Catchment, but are supportive of applicants seeking to harvest and store water.
14. Given this, Mr and Mrs Pringle amend their application and seek consent to take water subject to a minimum flow of 4, 500L/s on the Hakataramea River as measured at SH82 (water harvesting).

Hakataramea Station (1990) Limited – CRC981376

15. Hakataramea Station (1990) Limited seek consent to divert 60L/s from McKays Stream into storage, subject to a cut off flow of 1500/500L/s on the Hakataramea River measured at SH82, and well as a minimum flow of 77L/s from McKays Stream as measured at Hakataramea Valley Road.
16. Fish and Game raised concerns regarding the total allocation within the Hakataramea Catchment, but were supportive of applicants seeking to harvest and store water.
17. Given this, Hakataramea Station (1990) Limited amend their application and propose to take water subject to a minimum flow of 4, 500L/s on the Hakataramea River as measured at SH82 (water harvesting).

RW & ME Sutton – CRC701114

18. Mr and Mrs Sutton applied to harvest water at a rate of 50L/s from Avonlea Stream when flows in the Hakataramea River are in excess of 4, 500L/s measured at SH82.
19. Mr and Mrs Sutton currently hold resource consent CRC980513.1 to take and use 5L/s from Avonlea Stream.
20. The additional harvesting water had initially been applied for as a change of conditions to CRC980513.1. The Canterbury Regional Council determined that it was a new application but continued to process the application incorporating by reference the consent to take 5L/s authorised under CRC 980513.1.
21. This has confused submitters. Therefore it is proposed to remove reference to the existing 5L/s from CRC071114. CRC071114 now only relates to new water being sought.

Star Holdings – CRC951776.4

22. Star Holdings have applied to consolidate three of their existing consents. This means transferring two of the three consents upstream on Station Stream. There are no other consent holders in the intervening area.
23. CRC951776.4 has a minimum flow of 1500/500L/s on the Hakataramea River as measured at SH82.
24. It was originally proposed to maintain this existing minimum flow for all three consents. However in discussions with the Canterbury Regional Council prior to this hearing commencing, a minimum flow on Station Stream of 67L/s as measured at the Kirkliston Foothills was recommended by the Canterbury Regional Council and agreed to by Star Holdings.
25. However, for the reasons set out in the Supplementary Evidence of Mr David Stewart proposed minimum flow on the tributary is no longer considered appropriate. Instead Star Holdings had adopted his recommendation of retaining the current minimum flow for CRC951776.4 of 1500/500L/s on the Hakataramea River as measured at SH82, and the inclusion of a minimum flow of 1500/750L/s for the months of April to August.

RG & ZL Pringle – CRC050940 and RPNZ Properties Ltd – CRC051767, CRC051768, CRC051769

26. The above applications seek to renew existing water rights for the take and use of water from the Hakataramea River.
27. A minimum flow of 1500/500L/s on the Hakataramea River as measured at SH82 had been proposed in order to ensure that existing users were not affected as

they potentially would be until such time as the environmental flow regime in the WAP was fully implemented.

28. Fish and Game expressed concern that the proposed minimum flow of 1500/500L/s did not incorporate the higher minimum flow of 750L/s for the months of April to August as specified in the WAP to allow for adult fish passage.
29. Given this, two options for minimum flows are being proffered for these applications.
30. Option 1 is the environmental flow regime for the Hakataramea River as specified in the WAP. Option 2 is the minimum flow as proposed of 1500/500L/s for the months excluding April to August, when it is 1500/750L/s. The conditions have been amended to reflect the same.

RJ Meikle

31. On Wednesday 3 September 2008, a step drawdown test was carried out on bore I40/0030 to determine if the bore could yield 12L/s as applied for. The results of this test are attached to this report as Appendix Three. The test was designed and performed by Paul Sullivan, Environmental Consultant, of Irricon Resource Solutions in consultation with Matt Smith, Groundwater Hydrologist for the Canterbury Regional Council. The test results were provided to Mr Smith on Friday 5 September 2008, as well as Mr David Just, Consents Investigating Officer for this application. I understand that Mr Smith and Mr Just conclude along with us that the test results demonstrate that the bore can yield 12 L/s.
32. Mr Simpson (Springside Farms Ltd) submitted in opposition to Mr Meikle. Mr Simpson advised that another of his bores (I41/0060) is closer to the Meikles bore than suggested in evidence.
33. Bore I41/0060 does not have a water permit associated with it (an application to take water [CRC084128] was filed with the Regional Council on 28 April **2008**. It has yet to be heard).
34. In addition, ECan's Wellcard system and the application for Mr Simpson's water permit records bore I40/0060 is not even drilled.

Waitaki Orchards Limited

35. Ms Pringle of Fish and Game criticised the fact that the Waitaki Orchards Limited had not considered alternatives to frost fighting than the use of water.
36. Ms Pringle suggested the use of helicopters, air fans and diesel burners as potential alternatives.
37. The nearest helicopter is located in Oamaru (approximately 50km) and getting a helicopter from here for frost fighting of a 7ha orchard is not feasible either logistically or economically.

38. For the other methods to be effective, an inversion layer is needed. There is no inversion layer in the Waitaki Valley, and this means that wind machines and burners would be ineffective as a means of frost protection as there is no warm air to push down to the crop. The spread of any temperature lift that may be obtained would be lessened by the presence of extensive shelter belts throughout the property. These cannot reasonably be removed as another of the climatic issues we are dealing with is wind. North-west winds are prevalent in the valley and shelter must be retained to reduce the impact of strong wind on crop quality.

Fencing of Waterways within Irrigated Areas

39. The following applicants now propose to fence permanently flowing waterways within the irrigated areas in general accordance with Environment Canterbury's "*Guide to managing waterways on Canterbury farms*" & companion guide "*Lowland Plains, Streams and Drains*".

- Maerewhenua District Water Resources Co Ltd
- Clarkesfield Holdings 1996 Limited
- Torach Farm Limited
- Westmere Estate Limited
- ER Rutherford
- Sunny Downs Limited
- DD & VJ Chalmers

40. The wording for the draft fencing condition is included in the updated conditions.

41. I note that the original conditions included a fencing provision for Maerewhenua District Water Resources Ltd set back 12m from surface waterways. Ms Torgesson gave evidence that it was not intended 12m setback apply to the Waitaki River Valley. Reference to a 12 m setback has been deleted from the conditions.

42. In accordance with Ms Torgesson's evidence RJ Meikle and Waitaki Orchards Ltd do not propose fencing.

Other Conditions

Fish Screens

43. Ms Pringle, Fish and Game, criticized the proposed Fish Screen conditions as not reflecting the standards of the NIWA 2007 Guidelines. This is incorrect. The proposed conditions incorporate all relevant standards. That said, I have amended the conditions to incorporate by reference the standard by including the words:

"The fish screen shall be designed and installed in general accordance with Fish Screening: good practice guidelines for Canterbury, NIWA Client Report: CHC2007. 092, October 2007 and will ensure that...":

Farm Management Plans

44. I have read Mr Potts evidence regarding Farm Management Plans. Mr Potts confirmed that his evidence was a repetition of evidence given by Ms Mulcock on behalf of the Hunter Downs Applications.
45. It is clear that Mr Potts had not read the proposed Farm Management Plan. The Plans include all of the elements referred to Mr Potts evidence. Those elements which are not included in the MRNAG applications are not included in the Hunter Down's proposed Farm Management Plan. In the case for MRNAG the reason for this is that those matters do not reflect either current or proposed landuse. There are two types of Farm Management Plans. The principle difference being whether the source of water is from a scheme (the schemes being Maerewhenua District Water Resources Co Ltd and Haka Valley Irrigation Ltd).
46. Ms Pringle of Fish and Game criticised the Plans stating there was no provision to update and change the same. This is incorrect. The conditions state:

"A Farm Management Plan shall be prepared and shall address the following objectives:

- *Procedures to ensure the preparation, implementation, regular review, updating of the Farm Management Plan".*

Land Area to be Irrigated Within a Irrigation Scheme

47. The Commissioners expressed concern that the actual land area to be irrigated within by a proposed scheme was not known. This is usual for an irrigation scheme which typically defines land area by reference to a command area. Within that command area water users will apply to the consent holder to take and use scheme water.
48. However, if this remains a concern the two Irrigation Schemes (being Maerewhenua District Water Resources Co Ltd and Haka Valley Irrigation Ltd) have proposed an additional condition requiring them to notify the Canterbury Regional Council of the land to be irrigated in the forthcoming irrigation season. For these applicants conditions have been updated to record:

"The consent holder shall, within 6 months of the first exercise of this consent, and annually thereafter, submit a Water Use Management Plan to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Officer. The purpose of this plan will be to promote the reasonable and efficient use of water within the <NAME OF THE SCHEME> (the Scheme) as a whole, as well as on individual shareholder properties within the scheme. The plan will describe:

- *the operation and monitoring of the Scheme intake and the distribution of water to the shareholder properties.*
- *the monitoring of the volume of water delivered to individual shareholder properties.*

The Plan shall include:

- *The area irrigated;*
- *A map showing the area to be irrigated;*
- *Detail of the properties being supplied by the scheme;*

Waitaki River – Minimum Flow

49. In respect of Waitaki Orchards Limited, Torach Farming Limited and DD & VJ Chalmers, at the time of notification these applicants had not sought a lower cut off flow below 150 cumecs for the Waitaki River.
50. In respect of Maerewhenua District Water Resources Co Ltd, ER Rutherford, Clarkesfield Holdings (1996) Ltd, WN Cameron, Wainui Station Ltd and Haka Valley Irrigation Ltd which had sought a lower cut off rate, two options for minimum flow conditions are now proffered.
51. Option 1 is a variable monthly minimum flow (in line with NBTC) and option 2 is a minimum flow of 150m³/s as specified in the WAP. Option 1 is the preferred option of all applicants including, if the Commissioners consider they have jurisdiction, those applicants which did not propose cut off flows lower than the minimum flow for the Plan. If NBTC is granted, it is highly desirable that takes above Black Point be subject to the same minimum flow rates. While an alternative is offered, under this alternative these consents will have to apply to change conditions to bring them into line with NBTC.
52. In addition, a condition enabling change of minimum flow conditions has been proposed in the event that a Water User Group is formed. Membership of the group is voluntary; that is members may opt in. This is done in recognition that that the cut off conditions proposed (option 1 or 2) is another suite of conditions on the mainstem of the Lower Waitaki River. This condition may facilitate the standardisation of consent conditions in the event existing consent holders are reviewed some time in the future. The condition reads:

“PROVIDED THAT whenever the Canterbury Regional Council, in consultation with a Water Users Committee representing, but not limited to, surface water and hydraulically connected groundwater users on the main-stem of the Lower Waitaki, has determined upon a water sharing regime which limits the total daily abstraction from the resource then the taking of water in accordance with that determination shall be deemed to be in compliance with condition

[] of this consent.”

Land Use Conditions – Hakataramea Catchment

53. Star Holdings Ltd, RG & ZL Pringle, NJ Small and Hakataramea Station (1990) Ltd have applied for resource consents to disturb the bed and banks of streams within the Hakataramea Catchment.
54. I consider the primary effect arising from such works is the sedimentation of waterways resulting in impacts to fisheries present in the streams, particularly at

sensitive times such as spawning. This is now addressed in conditions dealing with erosion and sediment controls.

55. While there is no evidence that the catchment has significant bird values I acknowledge that Ngai Tahu has a historical connection to bird life in the catchment. Given this, mitigation is also proposed to ensure that works are not carried out within 100m of birds nesting or rearing their young.
56. Conditions now make it clear that no works are to occur in flowing water at all for the period 1 April to 30 September inclusive to avoid fish spawning.
57. For Mr NJ Small, works are to occur in Grampians Stream, which has been identified by Mr Ross Dungey as a significant spawning tributary, and it flows all year round. For Mr Small, as well as no works being able to occur in the period identified in paragraph (47) above, I have also included provisions for Erosion and Sediment control plan to be created should works in flowing water need to occur outside the spawning time.
58. The land use conditions have been more clearly defined and specific to a potential adverse effect.

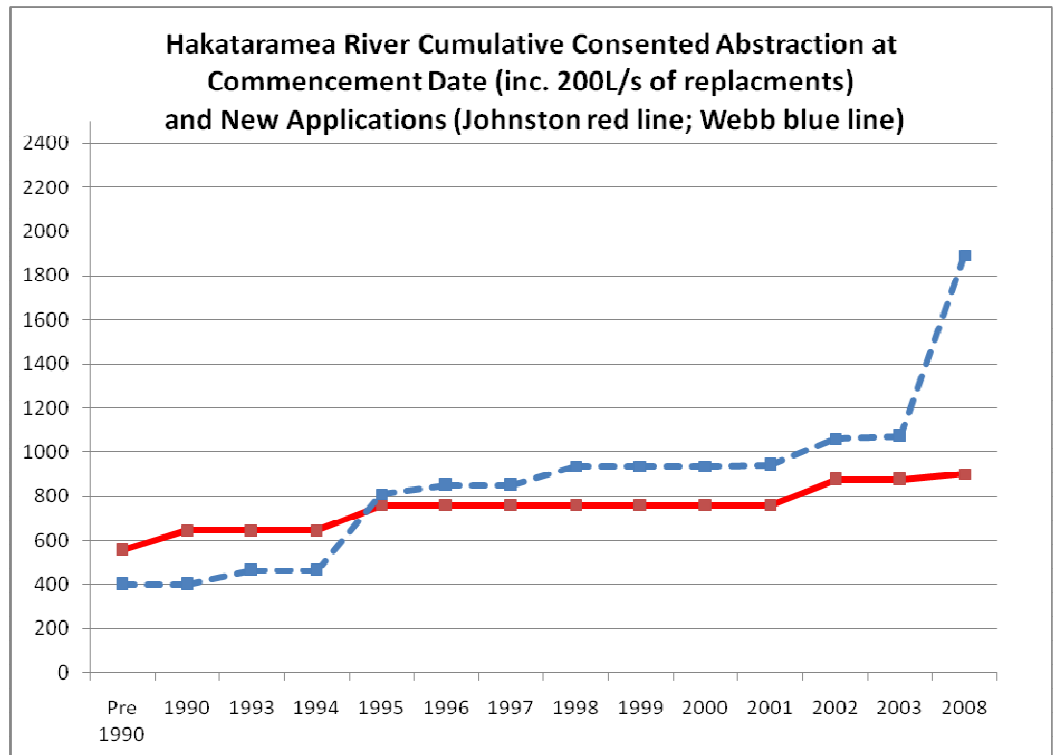
Total Allocation in the Hakataramea Catchment

59. The total existing allocation for the Hakataramea Catchment as described by Ms. Pringle of Fish and Game on pages 25 and 26 of her Brief of Evidence is incorrect.
60. I have undertaken this assessment, and my results are attached to the report as Appendix Four. The total amount of water currently allocated in the catchment is 874.3L/s (with 204L/s from the Hakataramea River and 668.3L/s from tributaries). This is compared with Ms Pringle's total allocation of 1051.5L/s.
61. The main differences between the my assessment and that of Ms Pringle are as follows:
 - a. CRC950409.4 (this consent currently has a minimum flow requiring the consent holder to cease abstraction when flows in the Hakataramea River as measured at SH82 are at or below 2, 500L/s for the months of 1 July to 31 March and 3, 000L/s for the months 1 April to 30 June.
 - b. CRC930653.3 and CRC930285.1 are replacement consents (RPNZ and Pringle)
 - c. CRC930942.1 expired on 1 June 2005 and has not been renewed.
 - d. CRC001883 is a take from Lake Aviemore.

62. There is currently 116L/s in process to take water from the Hakataramea River, of which 90L/s is for renewal of existing water rights. In addition, 110L/s is from

tributaries; all of this relates to applications to renew existing water rights. There is no new water being sought from the tributaries.

63. Together there is a total of 226L/s being applied for at this hearing, but of that 200L/s is for the renewal of existing water rights. 26L/s is new water being the application of RH Robertson.
64. Those seeking to harvest water have not been included in these totals as harvesting water is over and above the allocation limit set in the WAP.
65. I disagree with the numbers presented by Mr Webb of Fish and Game in paragraph's 66 to 72 of his Brief of Evidence. The total allocation is 874.3L/s and not 1051.5 L/s given in evidence by Ms Pringle and Mr Webb. 226L/s is in process at this hearing and not 822L/s as suggested by Mr Webb.
66. Since 1993, 30 consents have been issued by CRC in the catchment. 19 have been to replace existing use rights issued by the Waitaki Catchment Commission between 1969 and 1990. This is a total allocation of 675.2L/s. In contrast, Mr Webb suggested that the total allocation at that time was in the order of 400L/s.
67. Only 11 consents for "new" water have been granted the latest being in 2003. This is an increase of 333L/s, and not in excess of 600L/s stated by Mr Webb at paragraph 67.
68. Existing use rights have also varied over time. At the time of renewal, some rates of take were reduced while others increased. Many existing use rights never specified a rate of take, but a weekly volume and upon renewal received a rate of take. Therefore, while the totals in paragraphs 16 and 17 of this evidence are approximate am confident that they accurately reflect what has been allocated and abstracted within the catchment historically.
69. I have re-done Mr Webb's Figure 8 showing that in fact, there has not been a steady increase in consents granted in the Hakatamea Catchment. Rather what occurred was the replacement of existing consents with a small increase in allocation occurring in 1995 and then again in 2002. As above only 26L/s of new water being sought at this hearing.



Water Quality – Hakataramea Catchment

70. Ms Pringle of Fish and Game listed potential water quality impacts associated with land intensification in the Hakataramea Catchment. Of particular note is the bullet point relating to increased suspended sediment and sediment deposition smothering substrate and spawning gravel habitat and suffocating any incubating redds. On questioning in relation to this point, Ms Pringle stated that this could be caused by dairy cows and other stock having access to the stream, and trampling and collapsing banks.

71. Under the Farm Management Plans mitigation proposed by all the applicants in the Hakataramea Catchment requires waterways to be fenced off at distance of 12m within the irrigated area. Stock will not have access to any waterway on these properties. Ms Pringle appears to have overlooked the same.

72. Ms Pringle also stated that no evidence was given on the severity and frequency of dust storms. This was given in the evidence of Mr Bob Sutton (paragraphs 22 to 25).

Annual Allocation to Activities – Agricultural and Horticultural Activities – Waitaki Dam to Black Point

Allocation being sought

73. Mr Potts has identified a number of discrepancies in the Table 5 allocations I produced. Comments are as follows:
- 75.1 I have only included 735, 180 cubic metres per year for this Hakataramea Station (1990) Limited for the reasons I set out in my evidence. Mr Potts figure of 1, 148, 000 is incorrect.
 - 75.2 For Star Holdings Ltd, 3, 240, 000 cubic metres per year was allocated to CRC021585, as opposed to CRC072756.
 - 75.3 Waitaki Valley Vineyards Ltd has withdrawn this application and therefore, this allocation should be "0".
74. Mr Potts suggested that the application by MS Gillingham was withdrawn. This is incorrect.
75. In relation to the application by Wainui Station Ltd and Station Peak Ltd (CRC051795) Mr Potts considered that annual allocation associated with the diversion should be included in the total annual allocation as the race system used to convey water was leaky and therefore water was lost to groundwater.
76. Wainui Station Ltd and Station Peak Ltd hold resource consent to take and use water from the diversion channel (CRC960030.2). For all other diversions in the catchment where a take and use consent is also held, Mr Potts has only included the annual volume associated with the take and use in the total annual allocation, and not the annual volume associated with the diversion. , There is an inconsistency in regards to how this application is treated by Mr Potts.
77. Ultimately, water that is diverted, but not taken and used, is returned to the river directly, or indirectly via groundwater, and therefore. To include both the diversion and the take and use in the total annual allocation is double counting, and in my opinion, the diversion should be a "0" allocation in respect of Table 5.

Existing Allocation

78. Two additional mistakes have been identified in the existing allocation for this reach. Both arise as a result of errors in the Regional Council database.
79. CRC060832 (BW Nowell) and CRC022184.2 (Willander Family Trust) authorise the taking of water from Awamohoko Stream, which runs into Lake Waitaki, not the Waitaki River. Therefore, these two resource consents should not be included in the allocation below the Waitaki Dam.
80. These two applications have an annual allocation of 2, 242, 516 million cubic metres per year.
81. I have re-produced my Table 5, taking into account the revisions advised in the paragraphs above and reducing the existing annual allocation by 2, 242, 516 million cubic metres per year. This brings the total allocated in the reach between Waitaki Dam and Black Point to 150, 751, 964 cubic metres per year.

82. The application by Torach Farm Limited is the only one outside the allocation limit of 150 million cubic metres per year.

Appendix One - Statement of Mr Ross Dungey

**Irrigation Proposal for Mr N Small Grampians Stream,
Hakataramea Valley.**

Statement of Ross Dungey.

1. My name is Ross Gordon Dungey. I have a Bachelor of Science in Zoology and a Diploma in Science (freshwater ecology) from Otago University 1979.
2. I worked for Fisheries Research Division (now NIWA) on the lower Waitaki from 1980-84. During this period I was involved in various studies focused on the Hakataramea River. From 1984-98 I worked for the Otago Acclimatisation Society (now Fish and Game Otago) on issues of freshwater habitat, recreational user management and fish and wildlife management.
3. From 1998-present I have been operating as a consultant biologist on a variety of freshwater projects throughout the South Island gathering information in support of resource consent applications for various clients such as fish farms, forestry, gold miners, irrigators, and power companies. I have also worked extensively for the Department of Conservation on various projects related to native fish distribution assessment and monitoring. I have conducted survey work on native fish distribution in the Hakataramea Valley for the Department.
4. In 2005 I was commissioned by the Hakataramea Valley Irrigation Company and Mr N Small to conduct freshwater ecological studies on various streams in the Hakataramea Valley in support of irrigation proposals.
5. Scope of Evidence. I have been asked to comment further on Mr N Small's proposal for his irrigation scheme based on Grampians and Morton Streams, specifically fish passage, monitoring conditions and a residual flow on Morton Stream below the proposed dam.
6. As I understand the proposal it was to harvest some of the peak flow from floods and freshes (fresh = an elevated flow, but not large enough to be

called a flood) from the Grampians stream into the Morton Stream catchment via a canal. As water level increased during a flood or fresh, water would begin to spill from the Grampians Stream into the canal and flow into the Morton Stream catchment. The water so harvested was to be stored in a dam and later used for irrigation. The scheme did not allow the capture of normal or low summer flows.

7. As a general rule the summer low flows are accepted as limiting overall stream productivity. Harvesting high flow peaks instead summer flows in my opinion makes the scheme relatively environmentally friendly as it avoided creating additional stresses on the Grampians Stream aquatic ecosystem by abstracting water during these summer flows.
8. At the time of conducting the Mortons Stream survey the flows were elevated and water clarity limited. Only Longfin eels were found at that time but there are likely to be other species in Morton Stream, probably similar to those in Grampians, particularly bullies and galaxiids. The high flows would have limited our attempts to develop a comprehensive species list.
9. With regard to a residual flow, if normal summer flows are in the order of 5 l/s in a dry year and slightly more than this, say 10 l/s, (figures supplied by K Johnston) in a normal year maintaining a residual flow of say 10 l/s is highly likely to ensure the existing aquatic biota remain at similar levels of productivity post dam construction. Small streams are susceptible to temperature stresses in particular when they are abstracted. High temperature limit overall habitat and act as a barrier to fish movement. Small streams (<250 l/s) are at greater risk to low flow induced adverse impacts than larger for most fish species. A minimum flow of more than the 5 year 7dayQ10 or 5 year MALF will almost certainly benefit the aquatic ecosystem and make a significant contribution to the maintenance of species diversity and habitat quality. It seems from the hydrology information currently available that Morton Stream flows need further definition and the flow below the proposed dam should be set once this is gathered. As mentioned below (10) however, supplementation of Mortons Stream summer flows is a positive move in maintaining summer habitat in this stream.
10. Maintaining a flow that was equal to or higher than the summer norm in Morton Stream would be a measure to mitigate the presence of a dam. Using some of the harvested high flows from the Grampians freshes/floods to supplement Morton Stream flows below the dam is a good example of sharing the benefits of consumptive water use between commercial and natural values. Morton Stream below the dam would be enhanced during periods of low flow and the associated stress on resident fish species therefore reduced.
11. Fish stocks above the proposed dam are likely to be supplemented by some getting washed into the dam during flow capture from Grampians Stream. Presumably there will be something of a spillway on the dam and this could allow fish movement downstream during floods that would overtop the dam. If the enhanced residual summer flow was provided by a spill over the dam

this would also allow fish movement downstream. This is of importance mostly for the eels. The issue of eel passage upstream could be dealt with either by an elver pass (although it seems to be mostly adults moving in these streams) or simply conducting an annual capture program in the residual stream and transferring fish to above the dam. A run through with an electrofishing machine would be a suitable method to capture and transfer fish. Electrofishing would capture all sizes of eels. The dam is likely to increase habitat available to the eels.

12. In regard to monitoring on Morton Stream some temperature measurements during low flow summer periods would help determine if the temperature regime was likely to be limiting habitat and that the enhanced residual flow was having the desired effect of maintaining water levels and therefore temperatures to within tolerable ranges for indicator species such as brown trout (for which this information is available). Useful monitoring would therefore be recording Morton Stream temperatures below the Dam site and checking for continuity of flow for the length of Morton Stream below the dam during periods of low flow.
13. From a biological point of view the proposal to enhance existing flows during summer seems to me to be a very positive move and most likely to enhance rather than compromise fish habitat. The potential adverse impact of the presence of a dam is possibly restricting fish movement upstream but an alternative route of entry from further upstream on Grampians Stream via the canal is available though intermittent.
14. Another issue-potential impact, to be aware of is the entrainment of fish out of the stream-pond onto pasture during irrigation. Screens or an abstraction point that avoids locations where fish are likely to enter the pipe/channel should be considered. Screening to prevent entrainment seems to be adequately dealt with in the proposed conditions for this scheme.
15. In my opinion minimum flows of MALF or less are too low to protect anything other than token aquatic habitat values- for example the Hakatarmea salmon run. Abstraction appears to have increased the frequency and duration of low flows such that spawning salmon only occasionally have access to spawning grounds. For any fish community to be able to survive it is absolutely fundamental that access to and from spawning grounds is protected. This is a serious threat to the survival of salmon in the system and the type of impact that Mr Smalls proposed scheme will avoid for any fish species in the Grampians Stream
16. Conclusion. The harvest of a proportion of peak flows rather than abstraction of normal summer flows from Grampians Stream indicates this scheme is unlikely to have the adverse effects normally associated with an irrigation scheme, i.e. exacerbation of summer low flows and associated stresses. The scheme proposal provides an uncommon measure of protection to an abstracted waterway. The enhancement of summer flows in the residual Morton Stream is a good example of sharing the benefits of consumptive water use between commercial and natural values and will significantly

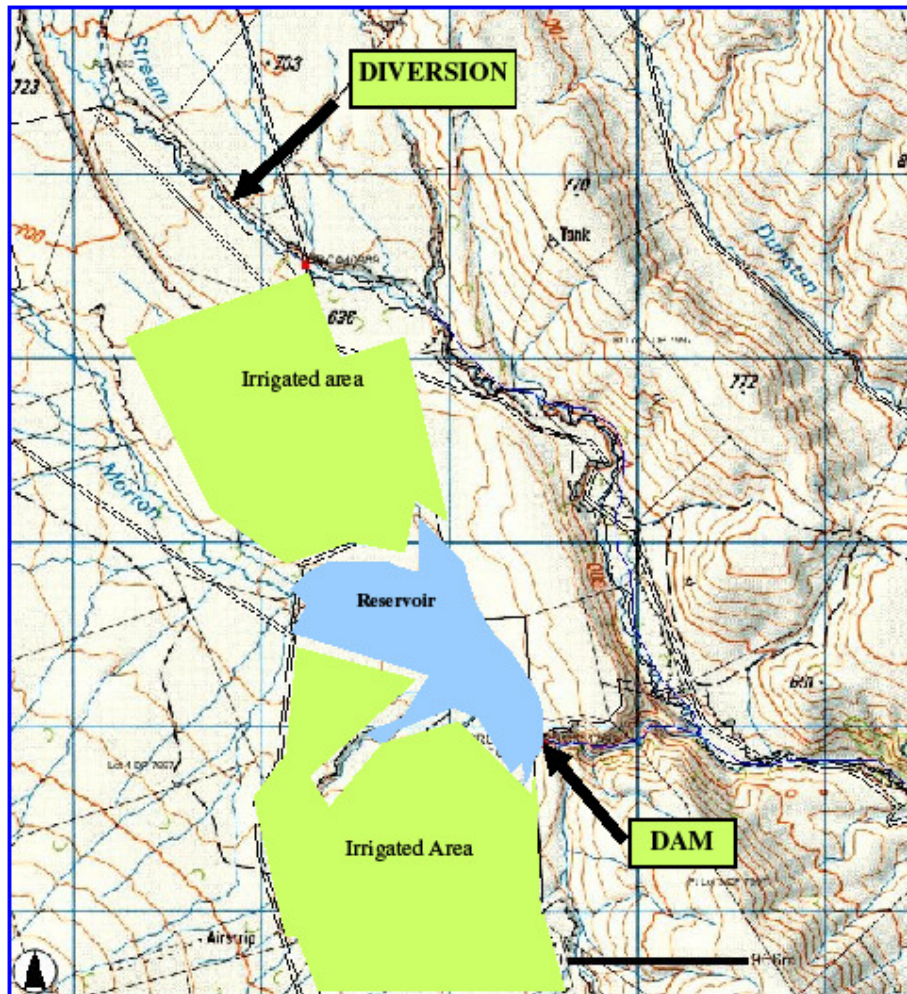
benefit Morton Stream. The issue of fish passage can be provided for by manually transferring adult eels above the dam and provision of a spillway that allows for downstream passage during overtopping or the enhanced summer residual flow. Screening of the irrigation intake is very important.

I have read through the proposed conditions for Mr Smalls scheme and the issues of riparian protection and screening of fish from the irrigation intake seem to be adequately addressed. Without knowing the details of farm management plans and nutrient budgeting the general approach seems to be likely to minimize impacts on waterways within the irrigated area.

Ross Dungey

29/8/08

Appendix Two – NJ Small Dam Inundation Area and Area to be Irrigated



NJ Small
Location Plan



Step Test on Bore I41/0030

Prepared for RJ Miekle

September 2008

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EXECUTIVE SUMMARY

Irricon Resource Solutions Ltd has conducted a step test for RJ Miekle on bore I41/0030, on the period 3rd September 2008. Bore I41/0030 is located on a property owned by Mr. Miekle adjacent to Livingston – Duntroon Road.

The purpose of testing was to ascertain if it was possible to take 12 l/s from I41/0030.

Bore I41/0030 is artesian (0.86m above ground) and was free flowed at 1.47l/s and 0.94l/s for 2 hours respectively. Measured drawdown was 0.43m and 0.13m respectively.

The specific capacity of the bore is in the order of 3l/s/m.

When considering the future pumping rate of 12 l/s from Mr. Miekle's bore I41/0030, the parameters derived from this test can be applied to predict the potential yield of this bore.

INTRODUCTION

Irricon Resource Solutions Ltd (Irricon) was contracted by Mr. Mickle to perform a step test on bore I41/0030 (the subject bore). This report presents the details and findings of the step test completed on this bore.

1.1 Scope and Purpose of Testing

The purpose of testing was to ascertain if it was possible to take 12 l/s from I41/0030. A step test on the subject bore was completed. This report presents the details and findings of that aquifer test.

1.2 Overview of Testing Completed

A constant-discharge test on the subject bore was completed on the 3rd September 2008.

1.3 Owner Details and Property Location

The subject bore is located on a property owned by Mr Mickle adjacent to Livingston – Duntroon Road.

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A site map showing the location of the bore associated with testing is provided in Appendix 1.

2. STEP TEST

2.1 Test Details

The step test was devised in consultation with Environment Canterbury Groundwater Scientist Matt Smith. The bore has no power or pump associated with it. It is however an artesian bore. It was determined that the falling head resulting from opening the gate valve at full and half open positions and measuring the drawdown in the bore would be sufficient to determine if the bore was capable of being pumped at 12 l/s. The 2 separate steps were undertaken at 2 hrs pumping and 1 hr recovery respectively.

Drawdown in the bore was measured using a water level pressure transducer.

To determine the static groundwater level a false level was constructed on the bore with pipe. It was sealed such that no water would be lost through the join. Water from the test was discharged down stream and down gradient from the bore through a 20ft hose attached to the gate valve.

Flow rates at the start (1st 20 mins) and end (last 20 min) were determined with a stop watch and measuring contained of known volume (45L).

2.2 Testing Procedure Summary

2.2 Testing Procedure Summary

The constant-discharge test procedure details are summarised as follows:

Table 2: Summary of constant-discharge test procedure

Pump Bore	I41/0030
Pump start (NZST)	03/09/2008, 11:05
Pump stop (NZST)	03/09/2008, 16:10
Pump rate (l/s)	1.47 & 0.94

2.3 Analysis

2.3.1 Analysis of results

Step	Rate l/s	Drawdown (m)	Specific Capacity (l/s/m)
Step 1	1.47	0.44	3.34
Step 2	1862	0.13	7.23

2.3.2 Step Test Parameter Certainty

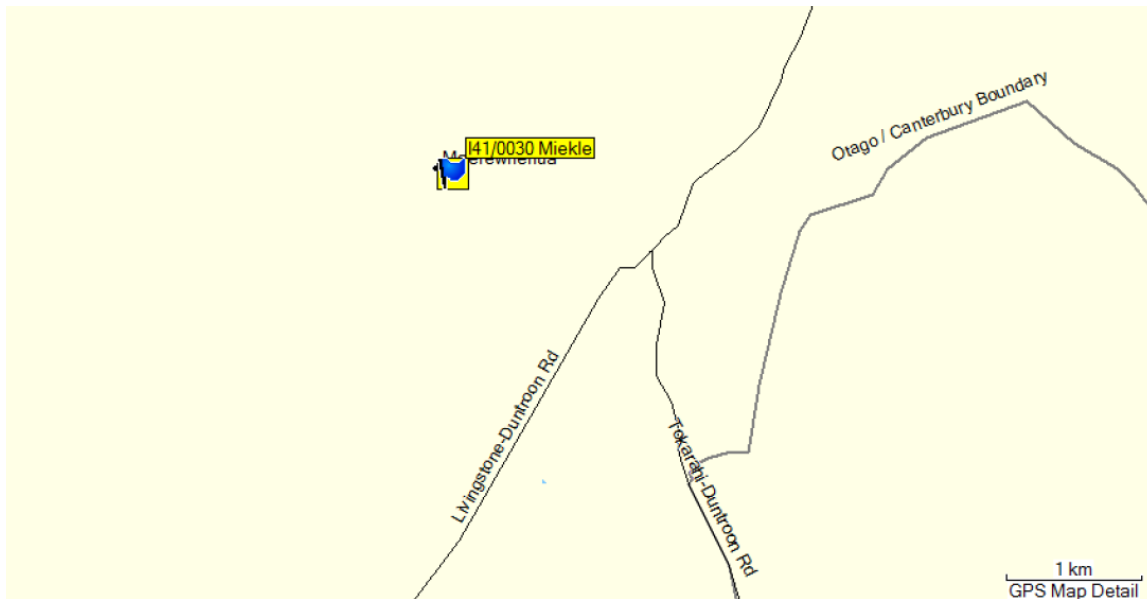
It is noted that in most cases, specific capacity reduces with increasing pumping rate and extended duration. The flow rate induced by artesian pressure is at a more reduced rate than the bore is proposed to be used at. This indicates that the specific capacity may drop slightly than reported in this test

3. Conclusions

The bore I41/0030 is artesian with a level above ground of 0.86m. It discharges at 1.47l/s. Assuming a surface pump is to be used to take water then an head of water of 6.86m is available (6m being a conservative estimate of the max lift of a surface water pump). The step test indicates that a specific capacity in the order of 3 l/s/m can be ascribed to I41/0030. This would indicate that utilizing a surface pump it would be possible to take 12l/s.

It is also noted that if a submersible pump was utilised and larger casing installed, then the full depth of the bore (15m) could be used to extract water and not jus the first 6m.

4. Appendix 1. Location of the bore





Appendix Four – Hakataramea Catchment Total Allocation

Haka water consents (current and pending)

Activity/Text	Name	Consent Number	Consent Holder	Grid Reference	Max Rate (L/s)	Previous consent	Comments
Please note, the minimum flow for each consent is 1500/500 unless otherwise stated in the comments column!							
Existing Hakataramea River							
Take Surface Water	Hakataramea River	CRC040308	Davenport Holdings Limited	140:129-091	110	WTK880561B	Davenport and Clarke were originally one consent that has been divided into two.
Take Surface Water	Hakataramea River	CRC931003.4	Mr & Mrs J R D & M M Clarke	140:129-091	110	WTK880561B	Only developed to full potential irrigation in last 2 years, yet consent held since 1993. Only dabbled in irrigation prior to this.
Take Surface Water	Hakataramea River	CRC950601.2	Mr & Mrs RH & J Robertson	140:188-109	28	WTK836171	
Take Surface Water	Hakataramea River	CRC950602.2	Mr & Mrs RH & J Robertson	140:213-154	45	CRC905087	
Take Surface Water	Hakataramea River	CRC980916	Montara Properties Limited	140:181-134	25		ECan have not included this in the Hakataramea River Allocation - I think it should be!
				TOTAL	208	318	The Davenport and Clarke consents are at the same point. One allows for 2 days irrigation in every 14, whilst the other allows for the remainder. ECan have included 220L/s in the allocation, although in reality, this cannot be abstracted.
Existing Tributaries							
Take Surface Water	Padkins Creek	CRC021480.1	Star Holdings Limited	140:1374-1442	30	WTK691210A	
Take Surface Water	Farm Stream	CRC010048.2	Star Holdings Limited	140:1352-1320	6.2	WTK841981	Was for 13L/s
Take Surface Water	Farm Stream	CRC950489.3	Star Holdings Limited	140:1169-1434	19	WTK691021	
Take Surface Water	Farm Stream	CRC950985.1	Mr G S Hay	140:120-124	80	WTK871111B	
Take Surface Water	Farm Stream	CRC951082.2	Star Holdings Limited	140:106-144	25	WTK851521C	Was for 35L/s
Take Surface Water	Farm Stream	CRC961543.2	Star Holdings Limited	140:1169-1434	40	WTK881101C	Was for 45L/s
Take Surface Water	Station Stream	CRC931005	Maungatiro Partnership	140:199-197	45	WTK690881A	
Take Surface Water	Station Stream	CRC950458.2	Hakataramea Station Ltd	139:150-232	55		
Take Surface Water	Station Stream	CRC951698.1	Star Holdings Limited	139:170-205	30		
Take Surface Water	Station Stream	CRC951776.4	Star Holdings Limited	139:1515-2250	43		
Take Surface Water	Station Stream	CRC951804.2	Star Holdings Limited	139:170-205	30		
Take Surface Water	McKays Stream	CRC931008	G K & J L Taylor Partnership	139:221-243	80	CRC895057A	30 L/s min flow on McKays Stream
Take Surface Water	McKays Stream	CRC950484.1	Hakataramea Station 1990 Limited	139:174-276	15	CRC895056A	Was for 60L/s
Take Surface Water	Cattle Creek	CRC981956	Keritworth Rural Water Supply Scheme	139:196-314	1	WTK846551.1	No min flow as the rate of take is so small and is a stockwater supply scheme
Take Groundwater	Farm Stream	CRC990514	Mr & Mrs RW & ME Sutton	140:1061-1363	30		
Take Surface Water	Scour Stream	CRC020842.1	RH & J Robertson Family Trust	139:2737-4000	70		70L/s min flow on Scour Stream
Take Surface Water	Hatcheries Stream	CRC020875.2	Woodrow Limited	140:1169-0776	19	WTK884221	
Take Surface Water	Unnamed Stream	CRC030278	Mr & Mrs C R A & G N Hay	140:1328-0990	5		
Take Surface Water	Kirkliston Stream	CRC030733	Hakataramea Water Scheme Inc Society	140:1309-1872	6.1	WTK691010	No min flow as the rate of take is so small and is a community supply scheme
Take Surface Water	Poplar Stream	CRC950480.2	Hakataramea Station Ltd	139:157-250	40	WTK824821	
Take Surface Water	Deadman Stream	CRC950482.4	Hakataramea Station Ltd	139:180-229	15	WTK824821	
Take Surface Water	Avonlea Stream	CRC980513.1	Mr & Mrs RW & ME Sutton	140:101-132	5		No min flow as the rate of take is so small
Take Surface Water	Kirkliston Stream	CRC980915	Montara Properties Limited	140:172-128	25		
				TOTAL	888		
				GRAND TOTAL EXISTING	874		
Take Surface Water	Padkins Creek	CRC950409.4	Star Holdings Limited	140:138-138	100		Has 2500L/s for the year except for April, May, June when it is 3000L/s
				TOTAL	100		

Haka water consents (current and pending)

Activity Text	Name	Consent Number	Consent Holder	Grid Reference	Max Rate (L/s)	Previous consent	Comments
In Process Hakataramea River (replacements highlighted in pink)							
Take Groundwater	Hakataramea River	CRC051789	RPNZ Properties Limited	I40:2077-1589	28	WTK828131	
Take Groundwater	Hakataramea River	CRC051789	RPNZ Properties Limited	I40:1446-1035	20	CRC042849	partial transfer from CRC950409.4
Take Surface Water	Hakataramea River	CRC031582	RH & J Robertson Family Trust	I40:168-109	26		dam
Take Surface Water	Hakataramea River	CRC050840	M & Mrs R G & Z L Pringle	89:259-346	14	CRC916726	could have dam
Take Surface Water	Hakataramea River	CRC051787	RPNZ Properties Limited	I40:218-164	30	WTK893311	
				TOTAL	118		
In Process Tributaries							
Take Surface Water	Kirkliston Stream	CRC011989	Padkins Community Race	I40: 131-197	110	WTK891210B	stockwater system, therefore, no min flow proposed
				TOTAL	110		
				GRAND TOTAL IN PROCESS	228		
In Process (harvesting)							
				Rates at 4.5 m ³ /s			
Take Surface Water	Grampians Stream	CRC040989	Mr NJ Small		500		dam
Take Surface Water	Station Stream	CRC021585	Star Holdings Ltd		103		dam
Take Surface Water	Avonlea Stream	CRC071114	M & Mrs RW & ME Sutton		50		dam
Take Surface Water	McKays Stream	CRC981376	Hakataramea Station 1990 Limited	89:174-276	50		dam
Take surface water	Peters Stream	CRC050860	M & Mrs R G & Z L Pringle		40		could have dam
				TOTAL	753		