

**UNDER** the Environment Canterbury (Temporary Commissioners and Improved Water Management Act) 2010 and the Resource Management Act 1991

**AND**

**IN THE MATTER OF** the hearing of submissions on the Proposed Land and Water Regional Plan.

**BY** **AQUALINC RESEARCH LIMITED**

Submitter

**TO** **CANTERBURY REGIONAL COUNCIL**

Local authority

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**BRIEF OF EVIDENCE OF MATT BUBB ON BEHALF OF AQUALINC RESEARCH LIMITED**

Dated: 04 February 2013

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## INTRODUCTION

### Qualifications and experience

1. My name is Matthew Bubb. I am a Senior Water Resource Engineer with Aqualinc Research Limited. I have over 14 years' experience of water engineering and resource management issues within New Zealand.
2. The majority of my experience in New Zealand has been within the Canterbury Region. I have extensive experience of applications for resource consent for water use. This has been one of my primary responsibilities since 1998. I have also carried out work on a contract basis for Ecan, auditing applications for taking and using water.
3. I have an honours degree in Construction Management and spent a number of years employed within the feasibility and planning side of the residential development sector within the UK. This included feasibility studies and work with the British system of resource consents.

### Code of Conduct

4. Notwithstanding that this is a Regional Council hearing, I have read the Environment Court Code of Conduct for expert witnesses and agree to comply with it.
5. I confirm that I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

### SCOPE OF EVIDENCE

6. Some of the topics raised within my submission have been covered in evidence presented on behalf of the Canterbury Primary Sector Policy Group (CPSPG). Where this is the case I will identify this and indicate whether I support the evidence presented on behalf of this group.
7. I am providing this evidence on behalf of Aqualinc Research Limited. A number of Aqualinc staff provided input into the formulation of this evidence.
8. The main topics covered by my evidence include:
  - a. **Objective 2.7** – provides a definition of over-allocation. There is currently too much uncertainty created by the current definition which is caused by the reference to, and contents of Table 1. My evidence outlines some areas of concern with Table 1 and recommends that the Table is removed.

- b. **Definition of 'changed'** – the current definition is difficult to understand and creates uncertainty. Evidence provides examples of why this is the case and proposes alterations to the definition.
- c. **Policy 4.1** and Table 1 outline outcomes for Canterbury Rivers, lakes and aquifers. Evidence is provided to indicate that some aspects of the tables are aspirational rather than providing robust limits or indicators.
- d. **Policy 4.11** prevents the discharge of contaminants having any adverse effects on drinking water quality. This Policy is unnecessarily restrictive and alternative Policy wording is proposed.
- e. **Policy 4.36** outlines some specific discharges that are allowed irrespective of the nutrient allocation status of the catchment. I do not support this Policy because each part of the community needs to accept its responsibility in meeting predetermined environmental outcomes.
- f. **Policy 4.47** outlines the limitations for allocating additional water within over-allocated catchments. I support this Policy in principal, although propose changes which prevent the Policy being overly restrictive.
- g. **Policy 4.55** deals with non-consumptive groundwater takes and states that they will not be subject to groundwater allocation limits provided that water is returned to the same aquifer. Because the groundwater allocation limits do not take account of aquifer depth this requirement is overly restrictive.
- h. **Policy 4.58** relates to interference effects of abstracting groundwater. The Policy seeks to protect 80% of the available drawdown. Evidence is presented to show why this is overly conservative in some situations and proposes alternative wording.
- i. **Policy 4.72** deals with the transfer of water permits. This requires that to enable the transfer the effects of the take and use of water are the same or less. It is not necessary or possible to comply with this condition. Evidence outlines why this is the case.
- j. **Rule 5.78** requires that there is a seal between aquifers. For most aquifers in Canterbury guaranteeing that there is a seal between aquifers is not practical or necessary. Alternative wording for the Rule is proposed.
- k. **Rule 5.82** sets out conditions required for developing and testing of wells. I oppose condition 3 of this Rule because it is overly restrictive and requires an assessment of effects on neighbouring wells when, in most cases, there will be insufficient information available to enable any meaningful assessment to be carried out.

- l. **Rule 5.106** makes the taking and use of groundwater and discharge of the same groundwater to the same aquifer a discretionary activity. I believe it is more appropriate to refer to groundwater allocation zones within this Rule, rather than specific aquifers.
- m. **Schedule 11** – Aquifer testing specifies a minimum duration of constant rate aquifer test. I suggest that some flexibility is allowed for by the Plan.
- n. **Schedule 12** – Well interference effects. Suggestions are provided for improving the wording of this Schedule.

My submission did include other parts of the Plan for which evidence is being presented by other parties. Where this is the case I have highlighted this in evidence and stated whether I support that evidence.

**Objective 2.7** states:

9. *Over-allocation is determined for the purpose of this Plan where a resource:*
  1. *has been allocated to users beyond a limit set by a rule in this Plan; or*
  2. *is being used to a point where an in-stream fresh water outcome described in a sub-regional section or Table 1 to Policy 4.1 is not being met.*
10. For a resource to be deemed “over-allocated” there needs to be a robust and transparent process for reaching that decision. Part 1 of this definition allows for such processes, although part 2 does not. If an in-stream fresh water outcome described in a sub-regional section or Table 1 to Policy 4.1 is not being met, it does not necessarily mean that the whole resource is over-allocated.
11. For example, within a catchment there may be a particular area with poor groundwater quality, perhaps as a result of a point discharge. This may mean that part of the catchment should be considered over-allocated, but not necessarily the entire catchment.
12. Table 1 in Policy 4.1 contains a number of outcomes for rivers, lakes and aquifers. By way of a further example, one outcome applicable to all aquifers requires that *“there is no landward movement of the salt-fresh water interface and saltwater contamination of fresh water aquifers is avoided.”*
13. Evidence specific to Table 1 is included below, but is mentioned here to illustrate the point. Development of a groundwater resource may indeed lead to a landward movement of the salt-fresh water interface. However, such movement in itself is not a reason for determination that a resource is over-allocated. It is only if such movement would start to pose a risk that this should be considered as a reason for determining that the resource is over-allocated.
14. Table 1 suggests that any potential landward movement of the interface is unacceptable. Because abstraction of groundwater may cause some movement of this interface, all groundwater resources that outfall to the coast could be considered over-allocated.
15. This example suggests that the current definition of over-allocation, with reference to Table 1, does not promote appropriate management and utilization of water resources.

**Decision sought:**

16. To remove part 2 of the definition so that it reads:

*Over-allocation is determined for the purpose of this Plan where a resource:*

*~~1. has been allocated to users beyond a limit set by a rule in this Plan; or~~*

*~~2. is being used to a point where an in-stream fresh water outcome described in a sub-regional section or Table 1 to Policy 4.1 is not being met.~~*

**Definition of ‘changed’ states:**

*means a change in land use, calculated on a per property basis that arises from either:*

- 1. a resource consent to use, or increase the volume of, water for irrigation on a property; or*
- 2. an increase of more than 10% in the loss of nitrogen from land used for a farming activity above the average nitrogen loss from the same land for the period between 1 July 2011 and 30 June 2013. The amount of nitrogen loss shall be calculated using the Overseer<sup>TM</sup> nutrient model for the 12 months preceding 1 July in any year and expressed as kilograms per hectare per year.*

17. This evidence will only comment upon part 1 of this definition. Although I do not support Part 2, the CPSPG will be providing detailed evidence on this part and I support their recommendations.

18. The current wording of this definition can cause some perverse outcomes. For example, the reference in part 1 to ‘a resource consent’ can capture all consent applications for using water for irrigation. In some situations this is not appropriate because the consent does not cause a change that would impact upon water quality.

19. For example, Aqualinc have recently submitted an application for groundwater allocation. Because of the reference to ‘a resource consent to use’ the current definition identifies this as a change. However, the groundwater was to replace scheme water that had been used on the property for many years, although was no longer available. The groundwater available to this property is less than their scheme allocation. As a result the property will have access to less water than they have historically. With no land use changes proposed it is likely that nutrient loss from the property will reduce. This situation should not be considered a change, but is classified as being a change under the proposed definition.

20. In addition to problems caused by the reference to ‘a resource consent’, the reference to an ‘increase in volume’ is also problematic. Does this volume refer to a daily volume, weekly volume or seasonal volume? Perhaps it means any increase in volume. The current definition is not clear.

21. The current interpretation by ECan staff is that this only refers to seasonal volume. A revised definition is not included in the Section 42A report as it indicates that this will be considered within Hearing 2. Even simplifying this definition to only include seasonal volume is still problematic. If a 'top-up' of seasonal volume is being proposed, it is not possible to accurately determine what the additional nutrient loss from this proposal will be. This is because the additional seasonal volume may only be required in high irrigation demand seasons. By virtue of the fact that the additional water is used in high irrigation demand seasons, the use of the 'additional water' is unlikely to result in much additional drainage.
22. Applying a volume of water threshold will result in detrimental outcomes inconsistent with CWMS target (Water Use Efficiency and Water Quality). Often the extra volume will be to improve reliability of supply and so will improve environmental performance – enable a change to an 'as and when' irrigation strategy as opposed to 'just in case' resulting in decreased water use and drainage (nutrient losses). The irrigation component should therefore be removed. If an irrigation component is to be included within the 'changed' definition it should only relate to additional irrigated area.

**Decision sought:**

23. Delete part 1 of the definition.

**Policy 4.1 states:**

24. *Lakes, rivers, wetlands and aquifers will meet the fresh water outcomes set in Sections 6-15. If outcomes have not been established for a catchment, then each type of lake, river or aquifer will meet the outcomes set out in Table 1.*
25. Tables 1a, 1b and 1c provide a useful set of numeric indicators and thresholds which provide some key generic values for rivers, lakes and aquifers.
26. However, these values are typically aspirational rather than providing any meaningful limits for specific water bodies. Limit setting for specific water bodies should be set using collaborative processes on a catchment specific basis and included within each catchment plan.
27. It is important that the implications of setting aspirational targets are given full consideration before they are set as limits within a plan. This should be done as part of the development of the zone plans rather than included as a Policy within this plan.

**Decision sought:**

28. Delete the reference to Table 1 in its current form.

**Specific comments on Table 1c – Outcomes for Canterbury Aquifers:**

29. Table 1c states that for coastal confined and deep unconfined aquifers that water quality is maintained at least in the state recorded or reasonably deduced in the three years prior to 1 November 2010.
30. This requirement is overly conservative in some areas. For example, in situations where an increase in nutrient concentrations would not cause an adverse effect that was any more than minor, then there is no need to protect the water quality to the level it was during an arbitrary period. If an activity has an impact upon the resource, this is not necessarily a problem unless that potential effect is more than minor.
31. Objective WQL2.1 of the NRRP had a mechanism to overcome this overly cautious approach. Part 2 of this objective states:
32. *In semi-confined, unconfined, or other confined aquifers manage groundwater quality to meet the following:*
- (a) *If, during the life of the NRRP, the overall maximum nitrate-nitrogen concentration exceeds 5.6 milligrams per litre in any aquifer, any increase in nitrate-nitrogen concentration shall not exceed a rate of 1.5 milligrams per litre every ten years. This rate shall be based on the overall maximum concentration measured or reasonably deduced in an aquifer in the three years prior to 1 November 2010;*
- (b) *Notwithstanding (a) above, the overall maximum nitrate-nitrogen concentration in any aquifer shall not exceed 11.3 milligrams per litre;*
33. This allows for further development and intensification to occur, whilst ensuring that groundwater quality remains at appropriate levels. This more appropriately reflects the targets set by the CWMS.

**Decision sought:**

34. If Table 1 is retained in the Plan, adopt parts (a) and (b) of NRRP objective WQL2.1 rather than preventing any reduction in groundwater quality in coastal confined and deep aquifers.



### **Salt-water intrusion**

35. Table 1c states that “there is no landward movement of the salt-fresh water interface and saltwater contamination of fresh water aquifers is avoided.”
36. Landward movement of the saltwater interface does not cause a problem unless such movement is sufficient that there is a risk that the quality of water being abstracted is affected.
37. In a similar way saltwater contamination of freshwater aquifers is not a problem unless abstraction occurs from that aquifer. Aquifers often extend beyond the coast line and saltwater contamination of those aquifers occurs naturally and so cannot be avoided. The groundwater pressures need to be managed so as to avoid the location of that mixing being such that abstracted groundwater quality is compromised.

### **Decision sought:**

38. If Table 1 is retained in the Plan, alter Table 1c saltwater intrusion section as follows:
- ~~39. there is no landward movement of the salt-fresh water interface and saltwater contamination of fresh water aquifers is avoided~~
- Groundwater pressures are maintained so as to avoid saltwater being drawn into bores.

### **Groundwater levels**

40. Table 1c states:
- 41. Long term average groundwater levels, and the flow and levels in surface water bodies is maintained.*
42. Any level of groundwater abstraction will have an influence upon long-term average water levels in the groundwater system. It is not possible to permit development of groundwater resources and to also expect that there will be no change to long term average groundwater levels.
43. The key is to ensure that if groundwater levels do change, that such a change does not have an effect that is any more than minor. It is also important that abstraction does not cause the groundwater levels to continue to decline year on year, suggesting that recharge is not keeping pace with abstraction (mining of the resource).

**Decision sought:**

44. If Table 1 is retained in the Plan alter Table 1c as follows:

~~*Long term average groundwater levels, and the flow and levels in surface water bodies is maintained.*~~

*Groundwater levels are managed so as to avoid significant adverse effects upon other lawfully established users of the groundwater resource and connected surface water bodies.*

**General comment on Table 1c**

45. Page 112 of the Section 42A Report indicates that submissions on Tables 1a – c have been reviewed and considered by Dr Adrian Meredith. His conclusions were that there should be no changes to these tables and his reasoning is outlined in Appendix 1 of the Officers' Report.

46. However, the feedback from Dr Meredith only considers Tables 1a and 1b. He does not comment upon Table 1c. Given this situation the Officers' Report does not indicate that due consideration has been given to submissions related to Table 1c.

**Policy 4.11 - Discharge of contaminants to land and water**

47. Part (C)(v) states:

48. *Any discharge of a contaminant into or onto land where it may enter groundwater shall not have any adverse effects on the drinking water quality of the groundwater.....*

49. The discharge of contaminants to land may have an impact upon the quality of drinking water. However, this is only of concern if such effect either in isolation, or cumulatively, is any more than minor.

50. Page 145 of the Section 42A Report states:

*Good quality drinking water is a primary requirement for people's health and this policy states that this quality is not to be compromised, especially if it already is part of a drinking water supply. The strength of this aspect of the policy should be retained. If the groundwater is of a type that is not suitable this policy does not require that it be "improved". With regard to particular standards to be met, that is something*

*that is appropriately dealt with in the rules and in Policy 4.20 and does not need to be duplicated in this policy.*

51. I agree that it is important to appropriately safeguard drinking water supplies. It is also important that we recognise that certain activities have some effects upon the environment. To enable appropriate development to occur there is always some form of trade-off that needs to be made. For example, intensification of farming or expanding community sewage discharges may impact negatively upon groundwater quality. Because there are a large number of groundwater sourced domestic water supplies this means that any such proposals would not meet this Policy.
52. Having 'an effect' upon this resource shouldn't necessarily prevent changes or development occurring. As long as those effects are no more than minor then there is no reason to prevent development.
53. The approach being taken by this Policy and highlighted in the ECan Officers' Report is one of preservation of the existing environment, rather than of sustainable utilisation and management of the resources.

**Decision sought:**

To change part (c)(v) to read:

*Any discharge of a contaminant into or onto land where it may enter groundwater shall not have ~~any~~ adverse effects that are any more than minor on the drinking water quality of the groundwater.....*

**Policy 4.36 states:**

- 54. Irrespective of the nutrient allocation status of a catchment as shown on the Planning Maps, to allow the following discharges:*
- (a) wastewater discharge from a marae;*
  - (b) community wastewater treatment schemes; or*
  - (c) wastewater discharge from a hospital, a school or other education institution.*
55. I do not support this policy. For the targets of the CWMS to be achieved it is essential that each part of the community understands their role and accepts their responsibility. If the rest of society and industry have to meet these requirements there seems little justification for a relaxation of the rules for these specified discharges. If these discharges are not subject to the same standards and limits as all others, any increase in their discharge will derogate the rights of others.

**Decision sought:**

56. To remove Policy 4.36.

**Policy 4.47 states:**

57. *Where the rate of take or volume of water consented for abstraction from a catchment exceeds the environmental flow and water allocation regime for surface water or stream depleting groundwater, or the groundwater allocation limit for that catchment, any further allocation of water is limited to:*

- (a) any abstraction necessary to meet community drinking and stockwater requirements; and*
- (b) the replacement of existing resource consents at the same or a lesser rate of take and the same or a lesser annual or seasonal volume, provided there are significant and enduring improvements in the efficiency of water use and reductions in any adverse effects.*

58. I support the clarity that this policy provides for the renewal of existing consents. However, it is not appropriate for such renewals to be on the basis of there being “significant and enduring improvements in the efficiency of water use and reductions in any adverse effects.”

59. It is appropriate to promote improvements in efficiency, although this policy has the potential to penalise those that have made significant efforts to already be efficient. It may not be practicable to make further efficiency gains, yet this policy is insufficiently flexible to take this into account.

60. I note that the Section 42A Report has taken account of submissions and proposes alterations to this Policy. The revised Policy states:

61. *Where the rate of take or volume of water consented for abstraction from a catchment exceeds the environmental flow and water allocation regime for surface water or stream depleting groundwater, or the groundwater allocation limit for that catchment, any further allocation of water is limited to:*

- (a) any abstraction necessary to meet group and community drinking and stockwater requirements; and*
- (b) the replacement of existing resource consents at the same or a lesser rate of take and the same or a lesser annual or seasonal volume, provided that:*

- (i) *there are significant and enduring improvements in the efficiency of water use and reductions in any adverse effects; or*
- (ii) *it can be demonstrated that the existing use of water is efficient and that the efficiency is enduring.*

**Decision sought:**

62. I support the proposed alteration to this Policy.

**Policy 4.55 states:**

*Non-consumptive groundwater takes, including the taking of heat from or adding heat to groundwater, will not be subject to any groundwater allocation zone limits, and will generally be supported, provided the water either remains in the aquifer, or is returned to the same aquifer within 24hrs and is protected from contamination.*

63. The methodology for calculating groundwater allocation takes no account of aquifer systems and treats each zone as a single “bucket”. As such, there is no reason to require that non-consumptive use should have to return water to the same aquifer.

64. There are existing examples of industrial takes from a deep aquifer using water for cooling and returning the water to the upper aquifer via galleries. In locations where the upper aquifer is depleted, this could be a beneficial effect, with significantly less cost and lower potential for operational / reliability issues. The proposed policy may prevent this activity for no obvious benefit.

65. What this Policy suggests is that abstraction from one aquifer but discharge to another will be subject to groundwater allocation limits. Given the way groundwater allocation limits are set, this cannot be the intention of this Policy.

66. The Section 42A Report states:

*While it is considered at an allocation zone level that there may be little impact, localised effects are a possibility. For example, taking water from a deep aquifer and discharging to a shallow aquifer could affect respective abstractions, and accordingly no change is recommended.*

67. I agree with the Officers’ Report that this activity may have localised effects. It is possible that there are localised effects of discharging to the same aquifer, especially where there is some distance between the points of abstraction and discharge. Such effects will have to be assessed when an application is made whether the discharge

is to the same aquifer or any other aquifer. Because of this, I do not agree with the Officers' conclusion and see no reason to require discharge not to the same aquifer to be subject to any groundwater allocation zone limits.

**Decision sought:**

68. Alter the policy to state:

*Non-consumptive groundwater takes, including the taking of heat from or adding heat to groundwater, will not be subject to any groundwater allocation zone limits, and will generally be supported, provided the water either remains in the aquifer, or is returned to the same ~~aquifer~~ groundwater allocation zone within 24hrs and is protected from contamination.*

**Policy 4.58 states:**

69. *The direct cumulative interference effect from new groundwater takes on existing groundwater takes is minimised by limiting the drawdown of any existing bore within a 2 km radius to no more than 20% of the available drawdown.*

70. This policy protects 80% of the water column in bores. Many bores do not require protection of 80% of the water available. Where self-induced drawdown in a bore is small, such as in many domestic and stockwater bores, protecting 80% of the water column may be unnecessarily restrictive. It is important that the yield of neighbouring bores is protected and this policy provides a useful surrogate for this. However, blanket protection of 80% is unnecessary and may prevent the most appropriate and economic use of the groundwater resource.

71. To illustrate this and to act as a common example, consider bore K37/1441. This is a domestic bore in mid-Canterbury. This bore is 48m deep and the screen is set from 45m. When the bore was tested by the well driller it produced a yield of 2l/s for a drawdown in water level of 4.6m. Assuming that for domestic supply the rate of abstraction would not need to be more than 1l/s the maximum drawdown would be in the order of 2.3m. The actual drawdown will be a little less than this because specific capacity is not a linear relationship between yield and drawdown, due predominantly to well efficiency losses. If we assume (conservatively) an allowance of 2m for the submersible pump, with 1m water cover and with a calculated minimum water level of 9.8m, the water column available in this well is 32.2m (i.e. 45m (top screen) – 2m (pump) – 1m (water cover) - 9.8m (water level) = 32.2m).

72. 80% of this figure (i.e. 25.76m) is available for the owners abstraction based on the requirements of Policy 4.58. Yet the above indicates that the owner only really needs in the region of 2.3m to deliver the domestic supply.

73. This situation can be avoided by allowing a re-calculation of what water column is required to protect the yield where sufficient information exists. This is a particular problem when assessing domestic bores (as just demonstrated) which may have moderate to large water columns, but do not require 80% of that water column to deliver required yields.

74. Page 235 of the Section 42A Report states:

*Restriction to 20% of the available drawdown, and the assessment method in Schedule 12, has been developed as a tool to apply to all aquifers and bores. It is designed to provide a sufficient level of protection to existing bores, and any applications to exceed this should be required to be assessed through the resource consent process. If the information regarding the bore and aquifer determines that a higher drawdown is appropriate, then the application will not offend the Policy. It is considered the proposed amendment will lead to uncertainty and is therefore considered inappropriate.*

75. I do not agree with this conclusion. Resource consent applications that cannot comply with the 20% restriction will be assessed against the Plan and will be unable to meet its requirements. As such, stating that ‘if information is available to suggest a higher drawdown is appropriate, such application would not offend this Policy’, is incorrect. If my proposed alterations to this Rule are incorporated, then the comments in the Officers’ Report would be correct.

**Decision sought:**

76. To provide an opportunity for further assessments to be carried out to determine whether a bores yield is likely to be adversely effected.

77. The following changes are suggested:

78. *The direct cumulative interference effect from new groundwater takes on existing groundwater takes is minimised by limiting the drawdown of any existing bore within a 2 km radius to no more than 20% of the available drawdown unless it can be demonstrated that the proposal will not have an impact upon the yield of the bore that is any more than minor.*

**Policy 4.72** states:

*79. Enable the transfer of water permits to take or use water, provided:*

- (a) the transfer of water is occurring within the same surface water catchment or sub-catchment, or the same groundwater zone, as defined in this plan;*
- (b) the same or a lesser amount of water is being taken or used; and*
- (c) the effects of the take and use of water are the same or less.*

80. I do not support the inclusion of part (c). This does not identify what “effects” need to be the same or less.

81. When transferring the take and use of water the effects will change. Some effects may be greater, others reduced. An example of where this broad policy does not work is for the transfer of groundwater consents. If the proposed drawdown at the new location is greater than the drawdown at the existing location and the drawdown effects at the new location are assessed as being acceptable, then there is no reason to prevent the transfer. Yet this would not meet the requirements of this policy.

82. Without revision, this Policy could prevent all transfers. There will always be an increased effect on something from the transfer of a take from one location to another.

**Decision sought:**

83. Delete part (c).

**Policy 4.73** states:

*84. In an over-allocated surface water catchment or groundwater zone, enable the transfer of water permits to take or use water where water is moving to an irrigation scheme, and in all other instances, enable the transfer of water provided there is a surrender of a proportion of the allocated water to the water body and it is not re-allocated.*

85. Evidence has been presented on this Policy by Ian McIndoe and Peter Callander. I support this evidence and the recommendations proposed.



## Rule 5.78

86. This rule sets out a number of conditions for the permitted activity status for the drilling of a bore.
87. Condition 3 states:
88. *The screening of any bore or gallery may only be into a single aquifer or water-permeable zone and all aquifers or water-permeable zones of differing pressure, water quality, or temperature are sealed to prevent the interconnection or movement of groundwater between aquifers or water-permeable zones;*
89. For permitted activity status the screening into a single aquifer or water-permeable zone is appropriate. However, the sealing between different zones is very difficult (and expensive) to carry out and even more difficult (if not impossible in many cases) to monitor for compliance. For most aquifers in Canterbury guaranteeing that there is a seal between aquifers is also not necessary.
90. Page 257 of the Section 42A Report states:
91. *The purpose of Condition 3 is to provide a clear description of key measures that are appropriate for a permitted activity in order to prevent the contamination of aquifers and water permeable zones. Removal of any of the measures is considered an inappropriate amendment for a permitted activity condition. The wording is considered to be clear as to its meaning and practicality and that generally competent drillers or geologists can meet the requirements of Condition 3.*
92. This response is surprising and it would seem that the author has not had specific discussions on this matter with well drillers or hydro-geologists, competent or otherwise. I have discussed this matter with drillers and with hydro-geologists and they agree that sealing between aquifers in the manner suggested by this Rule is not necessary for the vast majority of bores.
93. The location where it is most important to ensure a good seal is within the coastal confined aquifers. Appropriate well drilling methods in these locations will ensure that a seal exists anyway. This is achieved by ensuring a tight fit between the drill hole and the outside of the casing. However, in most cases there is no way of knowing that this has been achieved. Providing a seal in wells drilled outside of confined areas would serve very little purpose because the aquifers are generally leaky anyway.
94. Conditions requiring this type of seal have been incorporated onto a small number of consents. However, compliance with this condition has not been enforced by Ecan. The only wells I am aware of that have any artificial seal are the multi-level

piezometers installed by Ecan. It is clearly beneficial to do this for such bores because any leakage down the outside of the casing would warrant the whole bore useless. These bores are very expensive to install and technically very difficult to ensure that they are installed correctly.

95. The Section 42A Report seems to be suggesting that this requirement is only if you want to drill the bore as a permitted activity. The inference being that if you don't comply, then resource consent to drill will be necessary. My understanding is that the inclusion of this as a permitted activity is to remove unnecessary paperwork associated with applying for consents to drill wells. However, unless this part of the Rule is altered this will not be achieved because all bores that will go beyond the first aquifer will still need a resource consent for drilling. This is because no wells will be drilled that will comply with Condition 3 as it is currently drafted.

96. The alternative to this is that the interpretation of the condition is relaxed to essentially reflect the wording that I propose and that well drilling techniques continue as they currently are. It would seem to make more sense to ensure that the Plan appropriately reflects what will happen in practice.

**Decision sought:**

97. Alter condition 3 as follows:

98. *The screening of any bore or gallery may only be into a single aquifer or water-permeable zone. During bore installation reasonable and practicable methods should be used to help minimise the risk of ~~and all aquifers or water permeable zones of differing pressure, water quality, or temperature are sealed to prevent the interconnection or movement of groundwater between aquifers or water-permeable zones;~~*

**Rule 5.82 states:**

99. *The taking of water from groundwater for the purposes of carrying out bore development or pumping tests and the associated use and discharge of that water is a permitted activity, provided the following conditions are met:*

- 1) *The take continues only for the time required to carry out bore development or a pumping test and in any event, the taking does not exceed 120 hours within any 14 day period and total no more than 10 days in any consecutive 12 month period per bore;*

- 2) *Any bore development or pumping test is carried out in accordance with Schedule 11;*
- 3) *An assessment of interference effects, undertaken in accordance with Schedule 12, does not show that any community, group or private drinking water supply bore will be prevented from taking water; and*
- 4) *At the point and time of any discharge to surface water, the rate of flow in the river or artificial watercourse is at least five times the rate of the discharge.*

100. I do not support condition 3 of this rule for the following three reasons:

- Aquifer tests are usually carried out to try to determine the aquifer parameters. Until these parameters are known it is not possible to assess the potential effects upon neighbouring bores with sufficient accuracy.
- Aquifer tests are usually carried out at times when there will be little or no interference due to other groundwater abstraction. As such, the majority of tests are carried out in the winter. Schedule 12 however, assumes that all bores are abstracting water at their maximum consented rates. Using this Schedule clearly significantly over-estimates the potential effects during the time of testing.
- Schedule 12 is not the correct tool for assessing this impact because it seeks to protect 80% of bores available drawdown. However, condition 3 only requires that community, group or private drinking water supply bores will not be prevented from taking water. There is no need therefore to protect 80% of the available drawdown.

101. Page 261 and 262 of the Section 42A Report relate to this Rule. The Report does not propose any changes to the Rule. However, the Officers' Report does not appear to give due consideration to the three reasons outlined above.

102. The issue here is that requiring an assessment of interference effects to facilitate an aquifer test is unnecessary and will serve no useful purpose. In most cases there will be no aquifer parameters available to facilitate the assessment and the tool identified for doing the assessment (Schedule 12) is inappropriate for the job.

#### **Decision sought:**

103. To replace condition 3 with:

104. *Bore development or pumping tests shall cease upon notification that the pumping may be preventing access to community, group or private drinking water supplies.*

**Rule 5.102** states:

105. *The taking and use of groundwater where the point of abstraction is outside of a Groundwater Allocation Zone on the Planning Maps is a non-complying activity.*

106. Evidence has been presented on this Rule by Peter Callander. I support this evidence and the recommendations proposed.

**Rule 5.103** states:

107. *The taking and use of groundwater that does not meet one or more of conditions 1 and 4 in Rule 5.101 is a non-complying activity.*

108. Evidence has been presented on this Rule by Peter Callander. I support this evidence and the recommendations proposed.

**Rule 5.104** states:

109. *The taking and use of groundwater that does not meet one or more of conditions 2 and 3 in Rule 5.101 is a prohibited activity.*

110. Evidence has been presented on this Rule by Peter Callander and Ian McIndoe. I support this evidence and the recommendations proposed.

**Rule 5.106** states:

111. *The taking and use of groundwater and discharge of the same groundwater to the same aquifer is a discretionary activity.*

112. It is not clear what the status of a take from one aquifer but discharge to another aquifer may be. To overcome this, the rule requires changing.

113. Page 291 of the Section 42A Report agrees with our submission on this matter and suggests that this Rule is altered to state:

114. *The non-consumptive taking and use of groundwater and associated discharge to groundwater of the same groundwater to the same aquifer that does not meet one or more of the conditions of Rule 5.105 is a discretionary activity.*

**Decision sought:**

115. To change the rule as suggested within the Officers' Report.

**Rule 5.107** part 5 states:

116. *In a catchment where the surface water and/or groundwater allocation limits set out in Rule 5.96 or Sections 6-15 are exceeded any transferred water is surrendered in the following proportions:*

- (a) *0% in the case of transferring surface water to an irrigation scheme which includes a storage component;*
- (b) *25% in the case of transferring surface water from down-plains to up-plains;*
- (c) *25% in the case of transferring groundwater from up-plains to down-plains;*  
*and*
- (d) *50% in all other cases.*

117. Evidence has been presented on this Rule by Peter Callander and Ian McIndoe. I support this evidence and the recommendations proposed.

**Schedule 11 – Aquifer Testing**

118. Part 6 of the aquifer test minimum requirements for constant rate tests states:

*The duration of the constant rate discharge test shall be no less than 2880 minutes or two days.*

119. For the majority of constant rate aquifer tests this minimum requirement is appropriate. However, there may be circumstances which dictate that a shorter test is required. In such circumstances there should be scope for flexibility.

120. Page 318 of the Section 42A Report proposes that Part 6 is altered as follows:

121. *The duration of the constant rate discharge test shall be no less than 2880 minutes or two days, unless sufficient information is provided to justify a more appropriate duration.*

**Decision sought:**

122. To change condition 6 of Schedule 11 as identified within the Officers' Report.

## Schedule 12 – Well Interference Effects

123. The definition of “acceptable” direct cumulative effect is given as:
124. *...when the direct cumulative interference effect is no greater than 20% of the total available drawdown at times of low water level.*
125. Clarification is required to ensure that when referring to times of low water level, this only refers to the natural water level. The water level referred to here is not an observed water level, because any such observation would reflect the effects of abstraction. The water level being referred to is a calculated low natural water level. If it wasn't the natural water level, the effects of abstraction will be double counted.
126. Page 321 of the Section 42A Report recommends that this definition is altered as follows:
127. *...when the direct cumulative interference effect is no greater than 20% of the total available drawdown at times of low water level that is exceeded 80% of the time during the period of proposed water use, having taken into account individual bore and pump installation details (see Figure 12.1).*
128. I support this proposed change.
129. In my evidence relating to Policy 4.58, I identified that it is not always necessary to protect 80% of the available water in a bore. Where this is not necessary further development of the groundwater resource should not be prevented as long as it can be demonstrated that the effect upon the bores yield will be no more than minor.
130. Schedule 12 currently states:
- Where an existing bore adequately penetrates an aquifer, the existing bore should not have its protected available drawdown reduced due to the direct cumulative interference effects from other bores, unless the effect is mitigated.*
131. So that Schedule 12 reflects my previous comments on this subject, I propose that this statement is altered to enable an assessment of yield to be carried out.

## Decisions sought:

132. To change the definition relating to groundwater levels as proposed within the Officers' Report.

133. To change the statement about how much protection a bore should be afforded as follows:

134. *Where an existing bore adequately penetrates an aquifer, the existing bore should not have its protected available drawdown reduced due to the direct cumulative interference effects from other bores, unless it can be demonstrated that the proposal will not have an impact upon the yield of the bore that is any more than minor or unless the effect is mitigated.*

### **Schedule 13 – Requirements for implementation of water allocation regimes**

135. Evidence has been presented on this Schedule by Ian McIndoe. I support this evidence and the recommendations proposed.

**Evidence ends.**



**Matt Bubb**

04 February 2013