

**Before the Commissioners / Hearing Panel appointed
by Canterbury Regional Council**

IN THE MATTER OF The Resource Management Act
1991

AND

IN THE MATTER OF 78 Applications to Take Water
in the Ashburton River and
Valetta Groundwater
Allocation Zones.

Section 42A Officer's Report

Date of Hearing: 21 July 2008

Report of Dana Bamberg

Qualifications and Experience

1. My name is Dana Bamberg; I have been working as an Investigating Officer in the Consents Section of the Canterbury Regional Council since January 2007. I have a post-graduate diploma in Environmental Sciences and a Bachelor of Science in Biology from Canterbury University. I have been auditing applications to take and use water for the Canterbury Regional Council for 18 months.
2. I acknowledge that I have read the code of conduct for expert witnesses contained in the Environment Court's Practice Note dated 31 March 2005. I have complied with it when preparing my written statement of evidence and I agree to comply with it when I give oral evidence.

Ambit of my evidence

3. In my evidence I look at the individual audits of the Assessments of Environmental Effects provided in support of these applications.
4. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows Council Officers to provide a report to the decision-maker on a resource consent application made to the Council, and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A "any information or advice that is relevant and reasonably necessary to determine the application".
5. All of the applicants have appointed Consultants to represent them and provide Assessments of Environmental Effects to support their proposals. In the preparatory work for this hearing, the Consultants prepared summary sheets for each application. In some cases these sheets indicated changes from the original proposals and/or provided additional information.

ASSESSMENT OF ACTUAL AND POTENTIAL EFFECTS

6. This report should be taken in conjunction with that of Mr Fietje who will address the cumulative effects of the takes on other water users and the environment.
7. The taking of groundwater results in a number of potential adverse effects on the environment. The Consultants have identified a number of potential effects resulting from the taking and using of water. From experience in auditing similar groundwater applications; and reference to relevant policies in the Regional Policy Statement and Proposed Natural Resources Regional Plan (PNRRP); I consider the lists of effects identified by the Consultants is appropriate. The effects dealt with in this report are listed as follows:
 - Adverse effect of individual takes on surrounding groundwater users
 - Adverse effect of inefficient take on other water users
 - Adverse effect of take on other users from seawater intrusion
 - Adverse effect from cross-connection on groundwater quality
 - Adverse effect of individual takes on surface water flows

- Adverse effect of use on water quality
8. Given the length of time between the first applications being received and this hearing the applications have been audited by various Investigating Officers, many of whom no longer work at Environment Canterbury.
 9. The audits were carried out using the methodology in place at the time they were lodged and unless changes have been made to the applications they have not been reassessed using today's methodology and policies.
 10. A summary of the details of what is being applied for by each of the applicants is provided in Appendix 4 of the report of Mr Fietje, and the applicants' Consultants and I are largely in agreement for the details included.

Applications Withdrawn

11. I note that there are several applications that were notified with applications being heard that have since been withdrawn. These applications are listed in Appendix 1. following applications which may have been notified with applications being heard here have been withdrawn:
 12. Following the notification of Variation 9 of the PNRRP, the following applications that may have been notified with applications being heard here, were considered to be within the Mayfield Hinds Groundwater Allocation Zone and have been heard separately:
 - CRC054299, Mr J Tait
 - CRC051157, Kohique Farms Limited
 - CRC050926, Mr and Mrs M W and C G Hyde
13. I also note that several of the applicants' names have changed since the applications were lodged. For clarity I have referred to the name included in the notification notice in all comments and appendices. Appendix 2 includes a list of the applications where the name has changed subsequent to notification.

Adverse Effects of Take on Surrounding Groundwater Users

14. Chapter 9 Policy 5 of the Regional Policy Statement states:

"Where a water flow, level, or allocation regime for a water body has not been specified, the granting of a permit for the taking, use, damming or diversion of water should not preclude the reasonable exercise of an existing resource consent to take, use, dam or divert water; except with the agreement of the holder of that existing consent".
15. Chapter 9 Policy 6 of the Regional Policy Statement states:

"In considering a permit to take water, a consent authority should, as part of the requirements of s.104 of the Act, consider the need to: (c) provide for existing water permit holders to have priority for the term of their permits".
16. Policy WQN20 of the PNRRP further refines these policies by establishing a threshold of acceptable interference. This Policy requires that any new bore be located so that the abstraction from it does not cause any significant interference with abstractions

from neighbouring bores, provided the neighbouring bores penetrate to an adequate depth that allows effective access to the resource.

17. Policy WQN20 states that the extent of the direct cumulative interference effect on any neighbouring bore should not exceed 20% of the available drawdown in any other bore with an existing authorisation that is within two kilometres, unless the effect is mitigated. The Applicant Group has agreed that Policy WQN20 represents an appropriate threshold against which to evaluate interference effects.
18. Well interference assessments using Schedule WQN10 (which gives effect to Policy WQN20) have been carried out by the Consultants. Appendices 3 and 4 (Ashburton River and Valetta respectively) identify applications where the well interference exceeds the thresholds set out in Policy WQN20. In summary there are:
 - 36 applications that have potential adverse well interference effects in excess of the Policy thresholds where written approvals have not been provided by the respective bore owners.
 - Two applicants who provided aquifer test results which have been provided for assessment to Environment Canterbury groundwater staff.
 - Six applicants who proposed an aquifer test to determine if other bores will be adversely affected.
19. There are several applications where all the adversely affected parties, in relation to well interference, have provided their written approval of the activity. I have not identified these applications as having well interference effects in Appendices 3 and 4 as pursuant to Section 94A(c) of the Act a consent authority:

“must disregard any effect on a person who has given written approval to the application.”
20. To determine the effects of any changes made on neighbouring bores subsequent to notification, I have checked the information provided in the Consultant’s summary sheets against that stored in Environment Canterbury’s RMA database and the Wells Database. Changes related to well interference included but were not limited to changes in location or depth of the pumping bores and rates of take. These are also included in Appendices 3 and 4.
21. These changes have also been assessed against the information included in the applicants’ AEEs and the notification notices for each application to determine whether the proposed changes are within the scope of the original application. Where the application is considered to be within the scope, no additional parties are considered to be adversely affected This detail is also included in Appendices 5 and 6.
22. There are six applications where changes have occurred subsequent to them being publicly notified, where in my view the change may not be within the scope of the original application. These changes are also summarised in Appendices 4 and 5. In many cases, the Consultants have provided an assessment of these changes. This is also noted in Appendices 4 and 5 and where practicable, these changes have been audited by an Investigating Officer.
23. Six applications include bores from which water is consented to be abstracted under an additional water permit, and are included in Appendices 3 and 4. Two of these

bores are included on consents that have been transferred for a limited duration to applicants being heard here, with the transfers expiring on 1 July 2009 and 30 June 2010., the applicants have stated that these consents are not intended to be operated concurrently with those being heard.

24. Well interference assessments were carried out taking into consideration the taking of water from these bores via an additional consent. Appendices 7 and 8 note that additional mitigation is recommended in relation to the rate of take and daily volume abstracted from these bores to ensure that the rate abstracted does not exceed that assessed. I consider that additional metering conditions may also be required in relation to these bores to accurately allow the measurement of the volume of water being taken in terms of these permits.
25. Appendices 7 and 8 include screening depths for proposed bores; depths have either been included in the AEE or have been agreed by the Consultants. In the analyses of well interference, bores may have been excluded based on depth.
26. In conclusion I consider that for 36 applications, there are persons who have not provided their written approvals who may be adversely affected by the proposed takes.
27. I note that there are two parties who submitted on the basis of well interference effects who are considered to be adversely affected by the proposed take by Mr & Mrs M A & SK Etheridge (CRC063212). These parties were both in support of the application provided it could be determined that the effects on their pumping bores are minor.
28. I also noted that there are 18 proposed bores for which land use permits to drill the bores have since expired. If these consents are granted these applicants will need to reapply for land use consents for these bores prior to their being drilled and water being abstracted. Appendices 9 and 10 list the applications where the bore permits have expired and the bores are yet to be drilled.

Adverse Effect of Inefficient Take on Other Groundwater Users

29. Policy 3 of Chapter 9 of the Regional Policy Statement aims to:
"Promote efficiency in the use of water."
30. Supporting comments in the Regional Policy Statement refer to efficiency involving both a technical evaluation and an evaluation of allocative efficiency.
31. An efficient way of dealing with an existing or potential shortage is to encourage people to undertake water conservation measures to preserve the resource. The test of reasonable use requires a test of technical efficiency of water use in the particular circumstances of the applicant. In other words, is water needed for the purpose intended and will the proposed abstraction method yield the quantities sought?
32. Objective WQN5 and Policy WQN17 of the PNRRP give effect to the above Policy. Objective WQN5 seeks to:
"achieve a high level of efficiency in terms of resource availability and the use of water".
33. Policy WQN17 notes that it will be necessary to improve the level of efficiency currently achieved by many activities that use water and in particular irrigation use. Policy WQN17(3)(a) identifies that Schedule WQN9 (revised via Variation 2 to the

PNRRP) has determined amounts that are considered reasonable assuming the irrigation system is 80% efficient, and given the land use of the irrigated area, the soils and the climatic conditions of the locality.

34. As groundwater in Canterbury is managed on a volumetric basis, all of the applicants have proposed an annual volume using the methods described in Schedule WQN9 version 2. Where these volumes were not included with the original applications, they have been provided with the summary sheets or in subsequent correspondence with the Consultant.
35. With the use of efficient irrigation management practices, where application rates do not exceed the soil infiltration rate or the ability of plants to uptake water, and where appropriate irrigation scheduling is used, there should be no surface run off , or potential for deep percolation of water and nutrients beneath the root zone. Also, when there are no leakages in the delivery system and no irrigation of non-productive areas, this also ensures good water conservation management practises. The applicants have proposed mitigation to promote such practices which I consider adequate to ensure efficient use.
36. PNRRP Policy WQN16 refers to the measurement and recording of water abstraction. If water use is not measured then it is very difficult to efficiently and effectively manage it so that the least amount of water is used to achieve the outcome sought. Measuring and recording will help ensure that allocation regimes are appropriate, identify water that may be allocated but not used, and assist in compliance with allocation regimes, particularly during periods of water restriction. Measurement and recording of water abstraction is also essential where groundwater management involves annual water allocations. The measurement and recording of water proposed by the applicants is considered adequate.
37. Policy WQN17(1) aims to ensure that the instantaneous rate of abstraction, the return period and the annual volume of water permits for taking, using or diverting water are no more than reasonable for the intended end use, and thereby avoiding significant wastage of water and limiting the adverse effects on water quality. Schedule WQN9 version 2 identifies application rates based on the above which are considered to be reasonable given the intended use.
38. Working with Ms Christmas I have identified where there are other authorisations for the taking and using of water on the property. A list of these consents has been put together using the information included in the AEEs and summary sheets provided with each application. This list has been exchanged with Ms Christmas and we are largely in agreement regarding its content. It is included in Appendices 3, 4, 7 and 8 which also outlines where several applicants have advised that they intend to surrender existing authorisations should these applications be granted.
39. Appendices 3, 4, 7 and 8 list these applications and the consents that the applicants intend for them to operate with. Means of limiting these applications in terms of the volume applied to the irrigation areas have not been resolved. Should the consents be granted, they may need to be limited in terms of the volume applied to the irrigation areas in combination with these consents. Several applicants have advised that they would surrender their existing authorisations should the applications be granted, these are included in Appendices 7 and 8. I have recommended that conditions requiring the surrender of these consents be included on consents.
40. There are also eight applicants whose properties are served by one of the irrigation schemes in the area. Two of these applicants have advised that they are likely to sell

their scheme shares should the applications be granted. The applicants with access to scheme water on their properties are listed in Appendices 3 and 4. Should the applications be granted, limitations may be required in combination with the use of scheme water.

41. Appendices 3 and 4 also identify applications where I do not consider that the annual volumes applied for are consistent with Schedule WQN9 version 2 or where the applicant has not adequately considered how the consent would operate with existing authorisations on the property.
42. I cannot be satisfied that the effect of inefficient take is likely to be minor given that several applications are not consistent with the volume calculated using Schedule WQN9 version 2.

Adverse Effects of Take on Other Users from Seawater Intrusion

43. Policy WQN11 of the PNRRP aims to protect groundwater quality from the effects of groundwater abstraction. This effect is mitigated by limiting the annual volume of water abstracted from a zone.
44. Contamination of saltwater can occur if potentiometric levels in coastal aquifers fall below that of sea level, reversing the hydraulic gradient and resulting in movement of saltwater into the aquifer. This contamination may arise due to excessive pumping of groundwater, but it can also occur because of seasonal decline in water levels relative to sea level. A lowering of aquifer pressures in the coastal confined zone would have the potential to cause a shift in the saltwater-freshwater interface.
45. Environment Canterbury's coastal aquifer saltwater intrusion assessment guidelines (Aitchison-Earl et al November 2003 R04/18) specify that the potential adverse effect of saltwater intrusion should be considered for individual groundwater applications where bores are located within 2,000 metres of the coast.
46. There are two applications with bores within two kilometres of the coast, CRC051418 Messrs P J & C J Hampton) in the Valetta Groundwater Allocation Zone and CRC061073 R A Bennett in the Ashburton River Groundwater Allocation Zone. The audits for these two applications concluded that a sufficient head of water would remain with the proposed abstraction scenarios to ensure that saltwater intrusion was not a significant risk.
47. Given the above I agree with the Consultants for each of these applications Mr Ian McIndoe (CRC051418) and Mr Matthew Bubb (CRC061073), and consider the effect of the takes on other users from seawater intrusion to be *de minimis*.

Adverse Effect from Cross-connection on Groundwater Quality

48. This occurs when fertiliser, effluent or other contaminants are injected into irrigation systems and water flows into the bore when pumping stops. One way to reduce this risk is to require that a backflow preventer be installed and maintained within the pump outlet or mainline.
49. Cross-connection can also occur when water is taken from more than one source, and water from a contaminated source is able to flow into a less contaminated source. It can result in groundwater becoming unsuitable as a source of potable supply, and can also exacerbate well interference issues.

50. The majority of applicants have proposed the inclusion of a condition requiring the installation of a backflow preventer should the irrigation system be used to distribute any added contaminants. I consider that the mitigation proffered is adequate and would recommend its inclusion on all applications should they be granted.
51. I note that all the deep bores have either been drilled and reported as screened in one aquifer or have had screening conditions proposed. The relevant land use consents for the drilling of the bores include conditions to prevent cross contamination and ensure that water is accessed from a single water-bearing zone only. The following are the standard conditions included on a consent to drill a bore:
- Only one aquifer or water-permeable zone shall be accessed by a single bore.
 - All aquifers and permeable zones of differing pressure, water quality, or temperature shall be sealed to prevent the interconnection or movement of groundwater between aquifers and permeable zones.
 - The annulus of the bore shall be sealed with grout to above the screen pack or one metre below ground level, whichever is the lesser, to prevent fluid movement down the sides of the casing into the screened collection layer.
 - The top of the bore shall be covered or capped to prevent contaminants entering the bore and underlying groundwater.
52. Where screening has been proposed, it would be included within any consent that may be granted, Appendices 7 and 8 include the screening depth (i.e. minimum depth below ground level to the top of the screen) for each of the proposed bores.
53. Given the above, I agree with the applicant's Consultants and consider the effect of the takes on groundwater quality from cross-connection is likely to be minor.

Adverse Effect of take on Surface Water Flows

54. Chapter 9, Policy 1 of the Regional Policy Statement requires that water flow; level or allocation regimes should be set and managed in accordance with specified values within Objective 1. Policy 2 states that:
- "Subject to Policy 1, all water flow, and level, and allocation regimes should be set and managed with the aim of: (a) maximising the wellbeing obtained by people and communities from Canterbury's water resources through taking account of its value both instream and out of stream;"*
55. Policy WQN3 of the PNRRP addresses the impacts of reduced groundwater levels on the frequency, duration or severity of low flows in surface water bodies to meet the requirements of Objective WQN1. Policy WQN3(2)(c) controls the taking and using of water from an individual bore or borefield where this causes a high or moderate stream depletion effect as identified in Policy WQN8. Policy WQN3(2)(d) limits all groundwater abstractions which cumulatively reduce groundwater levels and thereby causes or are likely to cause a significant increase in frequency, duration or severity of breaches of a minimum flow, or adversely affect the hydrology of a wetland.
56. Taking hydraulically linked groundwater can deplete surface flow as effectively as a direct take, depending on distance and degree of connection. As the Policy indicates, this can affect both instream values and values to other users taking water out of stream, by reducing their reliability of supply.

57. Policy WQN8 defines and classifies groundwater takes by the degree of hydraulic connection to a surface water body, it then sets out the management approach for those groundwater takes that are hydraulically connected. At the meeting with the applicant group, on 12 June 2007, it was agreed that Policy WQN8 would be used to delineate the degree of connection with surface water.
58. For a groundwater take with a moderate degree of hydraulic connection to a surface water body the Policy requires the stream depletion effect to be included in the surface water body allocation block (Policy WQN14) and where the stream depletion effect exceeds the cut-off limit set in Schedule WQN1 or five litres per second, the take shall be subject to a minimum flow regime and to restrictions in accordance with Policy WQN19.
59. There are two applications with bores that are considered to be stream depleters with a moderate degree of connection, both within the Ashburton River Groundwater Allocation Zone, CRC052609 (Mr & Mrs N C & G M Currie) and CRC054425 (Tullymett Farm Limited).
60. Current estimates indicate that the A block allocation for the Ashburton River is fully allocated. The existing A permits exceed the A block limit, to the point that there is no separation between the A and B blocks as intended by Schedule WQN1 and therefore the reliability of supply to existing permits is already compromised and the benefits to instream values, by allowing for some medium freshes, are not being experienced.
61. It is considered that B block allocation limits may need to be set on both the main stems of the Ashburton River and also on some of the main tributaries. New B permit applications to take water from the Ashburton River or its tributaries are currently on hold as work is underway to establish more appropriate allocation regimes and limits for the B allocation block. As such I consider that it is not appropriate to grant further connected groundwater takes when the allocation for these surface water features is uncertain.
62. However if the commissioners are of a mind to grant these applications, existing B permit minimum flows are the best available mitigation. I note that being restricted to a B permit minimum flow would only allow water to be taken during high flows, which predominantly occurs in the winter months. Therefore, without storage, a B permit may not be a viable option for the applicants.

CRC054425-Tullymett Farm Limited:

63. The Investigating Officers, auditing this application agreed with the Consultant, Mr Gary Rae, that there is a moderate connection between bore K36/0793 and the Ashburton River, with stream depletion above 5 l/s.
64. In order to reduce the effect on Taylor's Stream to below 5 l/s, the Applicant reduced the proposed rate of abstraction to 14 l/s. The Investigating Officers considered that the Consultant's proposed Transmissivity value was too low (between 326 and 408 m²/day) and therefore did not demonstrate that the abstraction would reduce flow by less than 5 l/s. The Consultant was advised that a pump test may be appropriate to resolve this issue.
65. The final advice offered by Ms Philippa Wingate (Team leader Consents) to the Mr Rae by e-mail of 2 August 2005 was that the A allocation for the Ashburton River was exceeded therefore the minimum flow for B allocations would be recommended.

66. As mentioned above, it is now considered that there may not be sufficient water available in the Ashburton River for additional B permits to be granted, however if the commissioners are of a mind to grant this application I consider the following the most appropriate mitigation for the application:
67. The recommended minimum flows in relation to this consent are as follows:
- “The taking of water in terms of this permit from bore K36/0793 shall only occur when flows are at or above:
- (i) 14, 000 litres per second on the Main Stem of the Ashburton River at State Highway 1; and
 - (ii) 3,000 litres per second on Taylor’s Stream immediately upstream of the confluence with the South Branch of the Ashburton River.”
68. Please note that the location of the minimum flow on Taylor’s Stream differs from that in the PNRRP as it is intended to be downstream of the confluence with Bowyers Stream rather than at NZMS 260 K36:902-222, as described in Schedule WQN1.

CRC052609 Mr & Mrs N C & G M Currie

69. The Investigating Officers who audited this application agreed with the Consultant, Mr Grant Mills, that there is a moderate connection between bore K36/0813 and Taylor’s Stream, but were unable to agree to an appropriate Transmissivity value.
70. As mentioned above, it is considered that there may not be sufficient water available in the Ashburton River for additional B permits to be granted, however if the commissioners are of a mind to grant this application I consider the following the most appropriate mitigation for the application:
- “The taking of water in terms of this permit from bore K36/0813 shall only occur when flows are at or above Ashburton River at State Highway 1 Bridge 14,000 litres per second.”
71. Based on the information provided above I disagree with the applicant’s Consultants and consider the effect of the takes on surface water flows are more than minor.

Adverse Effect of Use on Water Quality

72. Chapter 9, Policy 9 of the Regional Policy Statement contains provisions to establish water quality standards in plans to ensure that Objective 3 is met – this sets the lowest acceptable standards, although protection could be set at a higher level.
73. Objective 3 aims to:
- “Enable people to gain benefits from the water quality in Canterbury water bodies while safeguarding: drinking water sources, life supporting capacity of water, Maori cultural values, preserving natural character, protecting habitat of trout and salmon.”*
74. Chapter 9, Policy 11 promotes land use practices that maintain and enhance water quality, both groundwater and surface water replenished by groundwater.
75. Objective WQL2 of Chapter 4 of the PNRRP sets objectives for groundwater quality. There are various policies related to acceptable limits and various groundwater areas

have been singled out for special attention due to their extreme sensitivity to additional contamination. Policy WQL12 refers to the need to avoid the potential contamination of community drinking water sources.

76. The use of groundwater when applied to soil for irrigation purposes, can depending on the type and intensity of the land use and the inputs of contaminants to the soil from the land use, degrade water quality. This degradation of water quality may have adverse effects on other groundwater users and as a consequence of groundwater contamination, on surface water resources.
77. Objective WQL2 requires proposed consents not to be able to raise the nitrate-nitrogen concentration in groundwater by more than two milligrams per litre (above the maximum concentration measured between 1996 and 2001, and reported in 2002), and the maximum concentration to not exceed 11.3 milligrams per litre.
78. Where it is proposed that the land use will be converted to irrigated pasture for milking dairy cattle, nitrate assessments were required and have been audited, Appendices 7 and 8 includes a list of those applications intending to irrigate dairy pasture.
79. Appendices 5 and 6 include applications where subsequent to notification, the applicant proposed to include irrigation of dairy pasture as part of the consent, this table also includes whether these changes are considered to be within the scope of the original application.
80. Appendices 3 and 4 list the applications to irrigate dairy pasture where the nitrates assessment indicates an increase of greater than two milligrams per litre of nitrate nitrogen may occur.
81. In conclusion, for the Valetta Groundwater Allocation Zone applications:
 - On the basis of advice received from Mr Carl Hanson, two applications CRC054361 (The Mounds Limited) and CRC054364 (Mr F Luxton), will exceed the threshold for nitrate nitrogen set out in Objective WQL2.
 - Seven applications were changed to provide for Dairy Conversion after notification, and all were considered to not require re-notification.
 - Two applications are considered to exceed the limits set out in Objective WQL2.
82. In conclusion for the Ashburton River Groundwater Allocation Zone applications:
 - Two applications were changed to provide for Dairy Conversion after notification, and all were considered as not requiring re-notification.
 - One application CRC052478- Roxburgh Farms Ltd had a nitrates assessment supplied with the summary sheets, however these parameters were not supported. On the basis of advice from Mr Hanson and when analysed using the ECan Model the increase in nitrate leachate exceeded the change threshold set out in Objective WQL2.
83. The agreed statements of Messrs Carl Hanson and Rob Burden include a suggested mitigation measure for all applications that provide for the irrigation of dairy pasture.

OTHER RELEVANT MATTERS

84. The Mounds Limited (CRC054361) and Mr F Luxton (CRC054364) requested that their applications be amalgamated and were advised by Investigating Officer Mr David Hendrikz to make this request at the hearing. I note that the applications are on adjacent properties at Mayfield and that the assessment in relation to water quality has been carried out across the two properties. I am uncertain whether the well interference effects would increase from that assessed if the consents were to be amalgamated, as the 150-day pumping rate may increase for any of the subject bores resulting from annual volumes being combined.
85. I note that these applications have the same notifiable date and accordingly have the same priority. Based on this I would recommend that the applicant be permitted to amalgamate these consents provided they can demonstrate that effects would not increase from that predicted as a result of the amalgamation.

RECOMMENDED CONDITIONS

86. Should the Commissioners decide to grant any or all of the consent applications, I have attached Appendix 11 which includes a suite of standard conditions to be included on all applications. In addition to this I recommend the applications be subject to a number of specific conditions, to ensure effects upon other users and uses of water are acceptable.
87. The following provides a summary of the mitigation discussed in earlier sections of the report. Appendices 7 and 8 should be used in conjunction with this section as they identify which consents and bores the following conditions should be used with.

Well Interference, cross-connection

88. In relation to proposed bores, in particular where surrounding groundwater users and effects on surface water flows were excluded from assessment based on depth, and to prevent cross-contamination of water-bearing zones.
- The depth at which water is drawn into the bore shall not be less than X metres below ground level.
89. In relation to applications with bores on multiple consents, the following applies:
- The maximum volume of water taken under this resource consent CRC(Consent number) shall be restricted to ensure that the combined volume taken from bore (bore number) does not exceed (Maximum rate for bore under this consent) litres per second and (Maximum daily volume under this consent) cubic metres per day.
90. The commissioners also need to be satisfied that the takes can be monitored given the commonality of a bore.

Adverse effect of inefficient take on other groundwater users

91. In relation to consents accessing water via an irrigation scheme:
- When this resource consent and (Scheme name) Irrigation Scheme are exercised concurrently, the maximum volume of water taken under this resource consent shall be restricted to ensure that the combined volume taken does not exceed X cubic metres per day and Y cubic metres in any period of Z consecutive days.

- Records of the daily volume of water taken from the (Scheme name) Irrigation Scheme, shall be recorded in a logbook kept for that purpose and shall be supplied to the Canterbury Regional Council attention: RMA Compliance and Enforcement Manager annually during the month of June or when requested in writing.

92. In relation to applications with other authorisations for the taking and using of water consents on the property:

- The volume of water taken under this consent shall not exceed XX cubic metres (*the full WQN9 annual volume for the property*) between 1st July and the following 30th June, less the volume taken under consent CRCXXXXXX (*the other consent*), or any subsequent replacement consents, over the same period.
- This consent shall only be exercised when the consent holder has installed a measuring device to the satisfaction of the RMA Compliance and Enforcement Manager, Canterbury Regional Council, to accurately measure the volume of water taken under consent CRCXXXXXX (*the other consent*), or any subsequent replacement consent, such that compliance with part (a) may be determined.

Adverse effect of take on surface water flows

93. The following condition in relation to CRC054425 Tullymett Farm Limited:

- The taking of water shall in terms of this permit from bore K36/0793 shall only occur when flows are at or above:
 - (a) 14, 000 litres per second on the Main Stem of the Ashburton River at State Highway 1; and
 - (b) 3,000 litres per second on Taylor's Stream immediately upstream of the confluence with the South Branch of the Ashburton River.

94. The following condition in relation to CRC052609 Mr & Mrs N C & G M Currie

- The taking of water shall in terms of this permit from bore K36/0813 shall only occur when flows are at or above Ashburton River at State Highway 1 Bridge 14,000 litres per second.

Adverse effect of use on water quality

95. Applications clearly stating that the irrigation water will be used to irrigate dairy pasture do not require this condition to expressly exclude "milking dairy cows", these applications may also require further mitigation as identified by Messrs Hanson and Burden.

- Water shall only be used for irrigation of crops and pasture for grazing stock, excluding milking dairy cows, as described in the application, on the area of land shown in attached plan CRC(Consent Number), which forms a part of this consent.

Signed: _____

Date: _____

Dana Bambery
Consents Investigating Officer

REFERENCES

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