

Report No L05261/1 October 2005 and the addendum to this report (October 2006) provides an assessment of the Waipara groundwater allocation zone limit, including a review of the zone area.

Report U07/09 provides an assessment of the South Canterbury groundwater allocation zones south of Timaru, including review of the effect of the loess soils on recharge, the contribution of streams and rivers to and from groundwater and a revision of the zone boundaries.

A memo by Gabites and Williams (11 April 2007) provides a review of the allocation zone limit in the Selwyn-Waimakariri groundwater allocation zone, including the contribution from groundwater required to sustain flows and allocations in lowland streams.

A memo by Smith (16 April 2007) provides a review of the zone boundary between the Mayfield-Hinds and Valetta zones.

As a result of this, allocation limits have changed for these areas. These changes are incorporated into Variation 4.

In order to determine the allocation status of each zone it is necessary to estimate the amount of water allocated to water permit holders. Policy WQN14 specifies how this is to be carried out. As ECan has applied this approach there have been questions about the management of the stream depletion effect between surface and groundwater allocation regimes. A memo by Aitchison-Earl, Scott (June 26 2006) provides discussion of an alternative approach depending on whether or not the stream depletion effect makes a positive contribution to the groundwater resource. This approach is being incorporated into the NRRP via this variation.

3.3 Record of meetings

A record of the consultation meetings undertaken for Variation 4 is provided below:-

Date	Time (Attendance approx)	Group	Venue
6 November 2006	1:00 pm to 3:00 pm (40)	Timaru Public meeting	Environment Canterbury Office, Timaru
6 November 2006	7.00 pm to 9.00pm (15)	Waimate Public meeting	St Patricks Hall Waimate
7 November 2006	1.00 pm to 3:00 pm (80)	Ashburton Public meeting	Ashburton Hotel, Ashburton
7 November 2006	7.00pm to 9.00pm (50)	Christchurch Public meeting	Environment Canterbury Office, Christchurch
8 November 2006	1.00 pm to 3.00 pm (40)	Waipara Public meeting	Public Hall Waipara
8 November 2006	7.00 to 9.00pm (4)	Kaikoura Public meeting	Public Hall Kaikoura
1 December	10.00 am to 12.00	Lower Valetta	Longbeach

2006	(4)	water users	Ashburton
11 December 2006	1.00 – 3.00 pm (5)	Christchurch City Council	Environment Canterbury Offices, Christchurch
22 January	9.00 – 2.30 pm (15)	Iwi/runanga	Environment Canterbury Offices, Christchurch
2 February 2007	10.30am – 11.30am (20)	Valetta and Ashburton Water applicants	Environment Canterbury Offices, Christchurch and Timaru (via video link)
14 March 2007	10.30 am -12.00pm (2)	Corrections Department	Environment Canterbury Offices, Christchurch
12 April 2007	4.00 - 5.30 pm (1)	Timaru consultants	Environment Canterbury Offices, Timaru
12 April 2007	7.30 - 10.00 pm (20)	Waimate Public meeting	St Patricks Hall, Waimate
17 April	1.00 – 2.15 pm (1)	Valetta and Ashburton Water applicants / groundwater consultant	Environment Canterbury Offices, Christchurch

3.4 Key areas of concern

The following list provides a summary of the key questions, concerns and matters raised at these meetings.

- (a) Allocation – how good are the allocation limits?
- (b) How reliable is the approach generally if the Waipara limits can change and change again?
- (c) Measuring use, what happens now and what will change with this variation?
- (d) Full allocation – red zones – what is the status of resource consent applications?
- (e) Storage is needed where there are water shortages or full allocation.
- (f) Common expiry dates are needed for catchments?
- (g) How good is the estimate of effective allocation (the amount of water allocated from the zone)?
- (h) Implementation limitations – e.g. inaccuracy of records can lead to wrong estimates of effective allocation
- (i) Concerns that reliability of supply to individual abstractors could be less than 100% and that groundwater takes could be subject to restrictions.
- (j) Surface water restrictions may prevent taking full annual volumes depriving others of a share.
- (k) Set limits will not be able to change as more irrigation occurs (when it is accepted in the ECan approach that irrigation does contribute to an increase in the land surface recharge).
- (l) Surface water / groundwater linkages. The opportunity to shift from a surface water take to groundwater takes is not available where a groundwater zone is fully allocated. In situations where groundwater fed streams are now less reliable is there merit in taking from ground rather than directly from the stream to the direct benefit of the stream?
- (m) Is it possible to divide up zones?
- (n) What is the programme for bringing zones into Schedule WQN3?

- (o) Will the schedule WQN3 regimes increase the allocated amounts and/or is the interim approach precautionary?
- (p) Will there be further consultation with communities on specific allocation regimes?
- (q) There are divergent scientific views but can work be done to find common agreement?

3.5 Discussion

Brief comments on these key areas of concern are provided below.

(a) The allocation limits are derived using the best understanding of the groundwater resource and the recharge processes that are held at this time. It is acknowledged that understanding is limited and that further investigation is needed to gain better understanding. With that changes may be justified. The current approach determines an allocation limit for an entire zone based on annual limits. Later approaches may become more detailed with modelling more accurately determining water availability (and effects on other parameters), and the setting of level and restriction regimes in addition to annual limits. Variation 4 will set the allocation limits in Schedule WQN4 and in so doing provides a specified limit. More detailed work may lead to future change. Applicants can apply for water in excess of this limit and Policy WQN14(9)(d) provides direction on this.

(b) Waipara allocation limits have changed to “red” and back to yellow as ECan has implemented its current approach. The initial change caused concern and the area of the zone was reviewed in light of more recent geological information. Once allocation limits are set these changes won't be able to occur without a further variation or change to the NRRP. This should provide more certainty.

(c) Implementation of allocation regimes relies on other details being brought into line. Annual volumes need to be fixed on water permits for taking water, water metering needs to be installed for each take, data retrieval, storage and monitoring systems need to be set up, stream deletion effects need to be determined and managed. Variation 4 does not change any of these requirements. But the change proposed will allow for instigating reviews of water permits for zones with an allocation limit set in Schedule WQN4. This is different to the previous approach where no reviews were envisaged.

(d) Once an allocation limit set in Schedule WQN4 is full it is a non-complying activity to apply to take more water (except where it is for a replacement of an expiring water permit that is already being counted within the amount that is allocated). This is already established in the rules. Policy WQN14(9)(d)(ii) and (iii), and (f) provides direction for applications of this nature. Variation 4 does not change this.

(e) Storage is not addressed by this variation but limits on the availability (or reliability) of water may be able to be addressed by storage options.

(f) Common expiry dates are not addressed by this variation.

(g) Effective allocation is the measurement of the amount that is allocated from an allocation block. In the case of groundwater, because few consents have an annual volume fixed as a condition of consent, it is necessary to derive the annual volume by other methods until they are fixed. The effective allocation is an adjustment of the annual volume to reflect an average usage. For irrigation this is taken as 90% of the annual volume allocated or estimated. This is not affected by this variation. For community water supply this is taken as the daily volume multiplied by 150 and then adjusted to 90% of this annual volume. Variation 4 will remove this adjustment as the reduction to 90% is considered to be included in error. This annual volume was derived from an analysis of Christchurch City Council water use. It was found that recorded use approximated the daily rate multiplied by 168 days. This was adjusted to 150 days in the plan to represent the effective allocation. The extra adjustment of 90% is an over adjustment.

(h) The estimate of effective allocation is as good as it can be given that it has been introduced on top of the previous less detailed water permit administration approach. It provides a reasonable estimate of the volumes of water that are allocated and on average used from a groundwater zone. A number of factors mean the determination of the effective allocation is not precise. These include:

- the current need to estimate annual volumes rather than having precise amounts fixed on each consent;
- some consents can have conditions that prevent concurrent use, and this may not always be apparent on the data base;
- the determination and apportioning of stream depletion effects of groundwater takes is not always complete and may not be until the plan is operative and the precise approach is finalised.

This will improve as management develops. This is a reason to allow consideration of resource consent applications even though the zone is determined as being fully allocated. It may be possible to demonstrate that the effective allocation has been over estimated. This variation will affect how the stream depletion effect of takes is apportioned between surface and groundwater regimes which may affect the effective allocation for surface and groundwater allocation regimes, and therefore the allocation status of each allocation regime.

(i) Effects on reliability of supply. NRRP Policy WQN14(7) indicates that groundwater will be allocated to give reasonable reliability of supply, but not necessarily 100% reliability of supply. The allocation limits being set in Schedule WQN4 will not of themselves affect reliability of supply, but in combination with annual volumes and possible restrictions could. The reason for setting limits is in part to provide a reliable supply to those authorised to take from the resource. It is also to protect other values such as stream flows and outflows to the coast that sustain the freshwater/seawater interface offshore.

The precise quantification of these latter values has been a point of contention with the Valetta/ Ashburton/ Rakaia-Selwyn group. There has been an ongoing exchange of letters over this. ECan provided a response to questions arising from the February 2nd meeting in a letter dated 1 March 2007. In a response letter dated 29 March the group make the following statement. "The instream/intrinsic values to be safeguarded and sustained by an interim allocation block are unknown. Also unknown is the volume of groundwater required to maintain the freshwater seawater interface."

What the NRRP has indicated is that there is a need to set limits so these values are not compromised. Without good knowledge of these relationships some precaution has been applied in setting allocation limits. ECan has not quantified the freshwater/seawater interface because it cannot. It will monitor groundwater to see that saltwater intrusion does not appear as a problem. With increasing knowledge and understanding of the dynamic relationships of groundwater inflows and outflows, allocation regimes will be modified and brought into Schedule WQN3. Other policies address the setting of flow regimes for surface water bodies and the effects of groundwater allocation regimes will need to be assessed in conjunction with these. There is evidence of diminishing flows in lowland streams in the Rakaia Selwyn area that has been attributed to increasing groundwater abstraction. Variation 4 will set allocation limits in Schedule WQN4, refine how stream depletion is apportioned between surface and groundwater allocation zones and indicate that water permits that take from groundwater allocation zones included in Schedule WQN4 may need to be reviewed in order to introduce restrictions.

(j) There will be times when resource consents cannot be fully exercised. The NRRP water Schedule WQN4 allocation approach does not provide for this. It anticipates that if everyone is able to fully exercise their water permit they will take up to the annual volume that is assigned to them. It also anticipates that in some years not all of what is allocated will need to be taken. Variation 4 will not change this situation.

(k) An effect of irrigation of land is to cause more water to pass into the ground than would have occurred in a dryland situation. This fact is recognised and factored into the determination of the land-surface recharge. As more irrigation develops the area over which this greater recharge occurs will increase and therefore recharge will increase. Variation 4, by setting the allocation limits in the plan, will mean that changes of this nature only be included by further variation or change to the plan.

(l) While the inter-relationship between surface and groundwater is recognised surface and groundwater regimes are being managed separately. The stream depletion effect of groundwater takes are being managed in relation to both. The concern raised was that the cumulative effect of groundwater takes and in some cases increasing efficiency of some irrigation schemes is decreasing the flow in lowland streams, and affecting reliability of supply. For those currently taking surface water there is no simple ability to transfer the take across to the groundwater zone. This is more of a concern where the groundwater zone is fully allocated. This concern was recognised but Variation 4 has not resolved this.

(m) There are now 30 groundwater allocation zones. In the process of reviewing zones in the South Canterbury area one zone has been divided into three. Variation 4 will bring these additional zones into the NRRP. This could happen in other areas as more work is done. Amended zones could be brought into Schedule WQN4 or Schedule WQN3 by variation or change.

(n) There is a programme set out in the LTCCP for bringing groundwater allocation zones into Schedule WQN3. That shows the following:

Christchurch - West Melton	- 2009/10
Ashburton River	- 2009/10
Rakaia - Selwyn	- 2010/11
Waimakariri - Selwyn	- 2010/11
Valetta	- 2013/14
Waipara	- 2013/14
Mayfield - Hinds	- 2015/16
Orari - Opihi	- 2015/16

Variation 4 will not bring any allocation regimes into Schedule WQN3.

(o) The groundwater allocation regimes that are set in Schedule WQN3 may or may not allocate more water. And whether they do or don't they may include other components such as restrictions which affect reliability of supply. The status quo approach in the NRRP was developed anticipating that it was precautionary. It is accepted that this may not always prove the case. The need for a programme to restore the Rakaia Selwyn lowland streams indicates pressure in that groundwater zone that may require a reduction of groundwater takes - at least in some years. There is a need to develop better understanding of the groundwater resource including the nature of the discharges to determine allocation limits that are sustainable. Variation 4 is providing that water permits may be reviewed in areas where there are adverse effects arising due to the cumulative effect of groundwater takes.

(p) The development of groundwater allocation regimes particularly where these are to be brought into Schedule WQN3 will involve consultation with the communities affected. This is a requirement of RMA where there is a change to a Plan. In preparing Variation 4 ECan has undertaken a consultation program across the region.

(q) ECan will work with all parties, and in particular groundwater scientists, to develop better understanding of groundwater resources and processes, to achieve sustainable management of groundwater.

3.6 Additional information

Supporting information

Morgan, M. Bidwell, V. Bright, J. and McIndoe, I. 2002 Canterbury Strategic Water Study. Lincoln Environmental Report No. 4557/1, Lincoln University.

Lowry T., Bright, J., Robb, C., White, P., Cameron, S., Close, M. 2001: Groundwater Resource Management: Information Gaps Analysis. Report No. 4482/1. Prepared for the Ministry for the Environment.

Lowry T., Bright, J. 2002: Draft Guideline for Groundwater Allocation Management. Prepared for the Ministry and Agriculture and Fisheries and the Ministry for the Environment.

Bidwell, V. 2003: Groundwater Management Tools: Analytical Procedure and Case Studies. MAF Technical Paper No: 2003/06

Technical reports and memos

Aitchison-Earl, P., Scott, D., Sanders, R. January 2004: Groundwater Allocation Limits. Environment Canterbury unpublished report U04/02.

Scott, D. March 2004: Groundwater Allocation and Schedule WQN4. Environment Canterbury unpublished report U04/12.

Scott, D. September 2004: Groundwater Allocation Limits: land-based recharge estimates. Environment Canterbury unpublished report U04/97.

Thorley, M., Ettema, M. April 2007: Review of allocation limits for the South Canterbury Downlands. Environment Canterbury unpublished report U07/09.

Aqualinc October 2005: Groundwater Allocation for the Waipara Groundwater Zone. Report No L05261/1 Report prepared for Environment Canterbury (U05/87).

Aqualinc October 2006: Groundwater Allocation for the Waipara Groundwater Zone. Addendum to Report No L05261/1.

Gabites, S., Williams, H. 11 April 2007: Memo. Selwyn-Waimakariri Groundwater Allocation Zone.

Smith, M. 16 April 2007: Memo Mayfield-Hinds/Valetta Groundwater Zone Boundary Changes.

Aitchison-Earl, P., Scott D. 8 June 2006: Application of Stream Depletion in assessing amount allocated from Groundwater Blocks

Comparison of proposed option with alternative options

Note alternative options were also assessed in the s32 report to Variation 1.

No alternative allocation strategies were proposed in the consultation meetings. There was criticism of the consequences of the approach being taken. This depended to a degree on the status of the zones being discussed. Where allocation blocks were fully allocated there was criticism of the limit that this might impose on new applicants. While it was accepted that resource consent applications can still be made, there were concerns that the applicant(s) would need to provide the technical support to demonstrate that more water can be allocated. However there was also an acknowledgement that setting limits helps protect the reliability of supply for existing water permit holders, and prevents the further decline of rivers and streams that are sustained by groundwater.

Alternatives are to:

1. Do nothing and retain the approach currently set out in the proposed NRRP.
2. Set allocation limits in Schedule WQN3 and allocate no more water once the allocation limit has been reached.

Options	Advantages	Disadvantages
<p>Do nothing would leave the proposed NRRP as it stands. The method for determining and implementing allocation limits would remain unchanged.</p>	<p>There would be no plan variation, and therefore no complications of having a variation running alongside the original Chapter 5 provisions; No additional costs of running a variation process; It would mean ECan would need to continue with the WAG and WAP process to determine the allocation limits, and it would maintain the ability to continually revise allocation limits as more information becomes available including as more water is allocated.</p>	<p>Allocation limits will not be set in the plan and there will be continuing uncertainty about the allocation limits; This uncertainty has the potential to lessen the effectiveness of having allocation limits and adhering to these; This leads to continuing uncertainty as to outcomes from consent hearings; The other changes proposed are generally steps which will improve the implementation of the allocation regimes. To do nothing will prevent these improvements, or delay them till the NRRP Variation 1 process (and even then some may not have been identified by submissions); Existing users have no ability to be involved in decisions that may affect their reliability of supply; There is no formal right or process to participate or to question the numbers approved by the WAG/WAP process other than via the consent process.</p>
<p>Incorporating allocation limits into Schedule WQN3. This will mean allocation limits are set in the one schedule and any application to take water from a fully allocated resource would be a prohibited activity. The Schedule WQN4 and the two step initial and final approaches would be removed.</p>	<p>This would add more certainty to the management of groundwater allocation in that once an allocation limit is reached no more water could be applied for or consents issued to take water – once the Plan is operative. (With the exception of takes for individual or community stock or drinking water purposes); If further investigation leads to a change in the understanding of what can be allocated the plan can be changed; It will give a reasonable degree of protection to existing groundwater takes and these water permit holders would have the opportunity to be involved in any change. If a Variation is made related changes will be able to be included to improve implementation of groundwater allocation regimes.</p>	<p>This removes the ability to quickly adjust the allocation limit that is set, as a plan change would be required; It prevents any further access to water once the allocation limit is reached, unless new information indicates that the plan should be changed (with the exception of takes for individual or community stock or drinking water purposes); The approach infers a greater degree of understanding of the groundwater resource than is currently held. It would be difficult to defend a limit that prohibits further takes that is established using the approaches applied to date; It may be at odds with current case law relating to prohibited activities; Takes in excess of the limit will be prevented from applying and demonstrating that water is available due to better knowledge of the resource. A plan change would have to be initiated to amend the allocation limits.</p>
<p>Incorporate allocation limits into Schedule WQN4. This means allocation limits are set in the plan but there is provision for applications to be made to take water in excess of these limits if it can be demonstrated that this is appropriate.</p>	<p>This provides certain allocation limits for each groundwater zone. Consent holders, applicants and other interested parties will know clearly what the limits are and where they stand. This places clear limits on groundwater allocation now but recognises that with further investigation, analysis and consultation a more sophisticated allocation regime can be developed and brought into Schedule WQN3 of Chapter 5 in due course. There will be less debate about the allocation limits that are being</p>	<p>Makes it more difficult to adjust allocation limits if more information becomes available. A Plan variation or change will need to be made when there is sufficient new information and understanding to justify the change. The Variation process will add a cost to the NRRP development process and each subsequent Plan change will be more costly than the status quo approach.</p>

	<p>administered.</p> <p>Allocation limits will not be able to change without a change to the plan. Water permit holders and other interested parties would have the opportunity to be involved in any change.</p> <p>This approach does not prevent consideration of applications to take water even though the allocation block is full, but applicants will need to demonstrate that further allocation will not compromise environmental values or reliability of supply of existing water permit holders.</p> <p>If a Variation is made related changes will be able to be included to improve implementation of groundwater allocation regimes.</p>	
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The inclusion of allocation limits in Schedule WQN4 is the preferred approach. The current best alternative is to leave the plan as it stands with the formula in the NRRP and the groundwater allocation limits sitting outside the NRRP.



















Inclusion of allocation limits in Schedule WQN4 would not prohibit an application from being made, but as a non complying activity, would require robust testing against the relevant objectives of the resource consent application(s) including any new information. It also provides greater certainty for implementation purposes. The allocation limits approach has been developing over the past three years as the proposed NRRP has been implemented. The development that has occurred over that time has led to better understanding of the matters that need to be considered in establishing allocation limits and in determining the amounts that are allocated from each zone, and it has led to some refinement of this approach. This has been applied in determining the allocation limits for inclusion in Schedule WQN4 and is included in some of the proposed changes for determining the effective allocation from each zone.

Effectiveness	Efficiency	Benefits	Costs	Uncertainty
<p>High</p> <p>The listing of limits in the plan makes implementation more certain.</p> <p>Allocation limits need to be set to sustainably manage the groundwater resource.</p> <p>Limits will apply immediately.</p> <p>The transition from the status quo will be simple.</p> <p>The status quo approach has proven to be less effective than desired.</p>	<p>High</p> <p>The determination of limits has occurred through the initial implementation of the NRRP.</p> <p>Limits set in the NRRP will provide greater certainty.</p> <p>Implementation will be easier once allocation limits are set.</p>	<p>Environmental - moderate</p> <p>Allocation regimes for groundwater are intended to be a tool for managing the cumulative effects of abstraction on the environment. This approach of setting limits in Schedule WQN4 provides a clear, manageable and defensible limit. Further monitoring and refinement of management leading to inclusion of more detailed groundwater allocation regimes in</p>	<p>Environmental - moderate</p> <p>Water will be allocated and there will be effects on the environment. The approach aims to be precautionary but this may not always be the case.</p> <p>There will be a need for continued monitoring to assess the effects are within the environmental results anticipated.</p> <p>Intervention may be required in addition to the use of allocation limits to fix restrictions</p>	<p>Low /moderate</p> <p>Groundwater science is limited. Taking a precautionary approach may restrict some access to water that may prove to be available with further research and understanding.</p> <p>However there are effects showing up in lowland streams and some zones may prove to be over allocated.</p> <p>The uncertainty of resource</p>













Under the status quo there is room for argument over the limit each time a consent is lodged.		Schedule WQN3 is anticipated	on water takes. This may take time and may be disputed.	availability means there is a risk that aspects of this allocation strategy will need to change in time affecting water permit holders.
		<p>Social/economic – high.</p> <p>This approach provides reasonable certainty and security for existing water permit holders. Indicates where water is available because it is within the limits. Requires more rigorous assessment of effects on the environment and other consent holders if the allocation limit has been reached and more water is sought from the zone.</p>	<p>Social/economic Low /moderate</p> <p>There will be different impacts. All permit holders, both existing and any new entrants, will have greater security of supply once the limit is reached. This is because it will be difficult for new applicants to be granted water unless they can demonstrate that there will be no more than minor effects on existing abstractors. Less likely that existing permit holders will have to incur costs defending their reliability of supply.</p> <p>Where allocation limits are full under Schedule WQN4 there will be ability to apply for water but there will be a cost to demonstrate that it is able to be allocated.</p> <p>There will be no more costs associated with implementation, than are already anticipated with the status quo approach.</p>	<p>By remaining with the status quo, or having no allocation limits, there is potential to aggravate environmental, social and economic problems of groundwater management, more so than by incorporating this variation.</p>

ECan Website record of allocation status of groundwater allocation zones.

Since Variation 1 was notified ECan has been maintaining a data base that has been displayed on its website (www.ecan.govt.nz) recording the allocation limits, the effective allocation and the allocation status that has been determined for each groundwater allocation zone. The page below was downloaded on 26 April 2007.

Zone	Allocation Limit (million m3/yr)	Basis of Calculation	Effective Allocation (million m3/yr)				Zone Status	
			<u>Issued</u>	<u>Decided</u>	<u>In Process</u>	Total	Current & Decided	In Process
Ashburton River	69.5	1st order	68.96	0.00	12.02	80.98	 99%	 117%
Ashburton-Lyndhurst	126.6	2nd order	126.83	0.00	6.55	133.38	 100%	 105.4%
Ashley	29.4	2nd order	15.57	0.00	0.00	15.57	 53%	 53%
Chertsey	112.4	2nd order	116.73	0.37	10.29	127.39	 104%	 113%
Culverden	109.2	1st order	29.18	0.00	1.83	31.01	 27%	 28%
Cust	56.3	2nd order	14.45	0.00	2.79	17.25	 26%	 31%
Eyre	81.3	1st order	60.29	0.00	5.35	65.64	 74%	 81%
Fairlie	37.0	2nd order	3.08	0.00	0.00	3.08	 8%	 8%
Hakataramea	26.7	1st order	0.65	0.00	0.27	0.92	 2%	 3%

Hanmer	16	1st order	1.95	0.71	0.00	2.66	<input type="checkbox"/> 17%	<input type="checkbox"/> 17%
Kaikoura Kowhai	19.2	1st order*	1.80	0.00	0.00	1.80	<input type="checkbox"/> 9%	<input type="checkbox"/> 9%
Kaikoura_Mt Fyffe	10.1	1st order*	3.79	0.00	0.00	3.79	<input type="checkbox"/> 37%	<input type="checkbox"/> 37%
Kowai	17.4	2nd order	5.60	0.00	0.50	6.10	<input type="checkbox"/> 32%	<input type="checkbox"/> 35%
Levels Plain	32.9	2nd order	20.92	0.51	2.05	23.47	<input type="checkbox"/> 65%	<input type="checkbox"/> 71%
Loburn Fan	40.8	2nd order	0.78	0.00	0.00	0.78	<input type="checkbox"/> 2%	<input type="checkbox"/> 2%
MacKenzie	346.2	1st order	4.48	1.05	5.42	10.95	<input type="checkbox"/> 2%	<input type="checkbox"/> 3%
Makikihi	15.9	2nd order	9.98	1.14	4.42	15.54	<input type="checkbox"/> 70%	<input checked="" type="checkbox"/> 98%
Mayfield- Hinds	136.1	2nd order	102.96	0.37	8.01	111.34	<input type="checkbox"/> 76%	<input checked="" type="checkbox"/> 82%
Orari-Opihi	71.1	1st order*	68.06	0.00	1.66	70.06	<input checked="" type="checkbox"/> 96%	<input checked="" type="checkbox"/> 99%
Otaio	10.4	2nd order	3.19	0.00	0.19	3.38	<input type="checkbox"/> 31%	<input type="checkbox"/> 33%
Pareora	19.7	2nd order	13.75	0.00	1.41	15.16	<input type="checkbox"/> 70%	<input type="checkbox"/> 77%
Parnassus	12.8	1st order	5.68	0.00	0.00	5.68	<input type="checkbox"/> 44%	<input type="checkbox"/> 44%
Rakaia- Selwyn	215	2nd order	223.83	0.17	22.62	246.63	<input checked="" type="checkbox"/> 104%	<input checked="" type="checkbox"/> 115%

Rangitata-Orton	42.5	2nd order	44.27	0.00	2.85	47.12	 104%	 111%
Selwyn-Waimakariri	131.9	1st order*	132.83	0.03	18.94	151.81	 101%	 115%
Valetta	108.5	2nd order	113.29	1.53	31.71	146.54	 106%	 135%
Waihao-Wainono	25.6	2nd order	13.25	0.00	0.97	14.22	 52%	 56%
Waipara	10.7	2nd order, revised recharge zone	7.65	0.00	3.12	10.78	 72%	 101%
Waitaki	35.5	1st order	12.73	0.00	16.64	29.37	 36%	 83%

Please note:

indicates that the figures are currently being calculated.

1st order* indicates that the allocation limit is based on a 1st order approach plus additional information.

Issued means granted consents outside any appeal or objection period.

Decided means granted consents in the objection or appeal period, and consents that have been objected to or appealed.

In process means applications for which no decision has yet been made.

In relation to Table 4, the references to first and second order approaches are references to the approaches that were set out in Schedule WQN4 (a) and (b). These were as follows:

Second order approach

determine the annual series of land-surface recharge over the period of record;
the interim allocation block is 50% of the annual average land-surface recharge including the recharge component contributed by intermittent streams.

First Order approach:

if there is insufficient data to allow determination of annual land-surface recharge:

- (i) determine the annual rainfall series from available information;
the interim allocation block is 15% of the average annual rainfall.

The first and second order approaches are being removed from Chapter 5 Schedule WQN4 with this variation and are being replaced with the actual allocation limits that have been determined for each of these zones. However most of the allocation limits use one or other of these methods and remain the same as set out in Table 4 above. In reviewing the groundwater allocation limits in South Canterbury, and also the Selwyn-Waimakairiri groundwater allocation zones, the determination of these limits has included consideration of the interactions between groundwater and surface water, and this has led to adjustments in the limits that had been previously derived by following the first or second order approaches. Detail of these reviews are provided in report U07/09 (South Canterbury groundwater allocation zones) and memo by Gabites and Williams 11 April 2007 (Selwyn Waimakariri groundwater allocation zone).

The groundwater allocation limits or groundwater allocation zones that will change with this variation are shown in Table 5 below.

Changes proposed to allocation limits and/or zones currently administered, and reasons for these changes.

Variation 4 makes the following changes to the groundwater allocation limits and/or zones that have been determined and recorded on the website.

Current Groundwater Zone and allocation limit (million m ³ /yr)		New Groundwater Zone and allocation limit (million m ³ /yr)		Effective allocation status (%)		Basis of calculation.
				Issued and decided	Issued, decided and in process	
Waipara	10.7	Waipara	10.7	72	99	50% of the land-surface recharge.
Reasons for change: Changed boundary.						
Selwyn-Waimakariri	131.9	Selwyn-Waimak..	121.3	109	126	50% of the land-surface recharge less ground-water recharge to protect lowland streams.
Reasons for change: Revised estimate of land surface recharge and groundwater contribution to the lowland streams in this zone.						
Valetta	108.5	Valetta	96.6	111	142	50% of the land-surface recharge.
Reasons for change: Changed boundary.						
Mayfield-Hinds	136.1	Mayfield-Hinds	148.0	74	80	50% of the land-surface recharge.
Reasons for change: Changed boundary.						
Pareora	19.7	Pareora	9.38	74	85.2	50% of the land-

						surface recharge.	
Reasons for change: Changed boundary and revised estimate of land surface recharge.							
Otaio	10.4	Otaio	3.95	52.0	55.7	50% of the land-surface recharge less groundwater recharge to protect Otaio lowland flow.	
Reasons for change: Changed boundary and revised estimate of land surface recharge and groundwater contribution to the lower Otaio River.							
Makikihi	15.9	Makikihi	18.05	55.3	83.9	50% of the land-surface recharge plus surface water recharge to groundwater.	
Reasons for change: Changed boundary and revised estimate of land-surface recharge plus surface water recharge from the Makikihi.							
Waihao Wainono	-	25.6	Hook	2.49	124.1	156.3	50% of the land-surface recharge less groundwater recharge to protect Hook lowland flow.
			Waimate	8.18	78.3	78.3	50% of the land-surface recharge plus surface water recharge to groundwater.
			Waihao	7.73	43.9	46.0	50% of the land-surface recharge.
Reasons for change: Changed boundary and divided into 3 discrete zones based on catchments of rivers with different provisions for land-surface, surface water and groundwater recharge in each zone.							
Waitaki	35.5	Whitneys Creek	15.44	0.6	0.6	50% of the land-surface recharge.	
Reasons for change: Changed boundary. Part of the Waitaki zone outside the area of the WCWARP. Rest of Waitaki GWAZ deleted as ground water is allocated via the WCWARP.							
Hakataramea	26.7						
Reasons for change: Hakataramea GWAZ deleted as ground water is allocated via the WCWARP.							
MacKenzie	346.2						
Reasons for change: MacKenzie GWAZ deleted as ground water is allocated via the WCWARP							

(vi) Opportunity to comment on s 32 evaluation.

This s32 evaluation is prepared in accordance with the RMA and is considered to provide an appropriate evaluation of the options. This may be challenged as part of the submissions made to the variations detailed in Part 2 of this report. RMA s32A provides that a challenge to an objective, policy, rule or other method on the ground that section 32 has not been complied with may be made only in a submission under schedule 1.