

**Section 32 Report  
Consideration of alternatives,  
benefits and costs**

**Proposed Plan Change 4A  
(Groundwater and  
North Otago Volcanic Aquifer)**

**Regional  
Plan: Water  
for Otago**

*This Section 32 Report should be read in conjunction with Proposed Plan Change 4A  
(Groundwater and North Otago Volcanic Aquifer) to the Regional Plan: Water for Otago.*



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## **Abbreviations used in this report**

ORC	Otago Regional Council
Proposed plan change	Proposed Plan Change 4A (Groundwater and North Otago Volcanic Aquifer) to the Regional Plan: Water for Otago
Proposed plan change 1C	Proposed Plan Change 1C (Water Allocation and Use) to the Regional Plan: Water for Otago
Proposed plan change 4A	Proposed Plan Change 4A (Groundwater and North Otago Volcanic Aquifer) to the Regional Plan: Water for Otago
RMA	Resource Management Act 1991
Water Plan	Regional Plan: Water for Otago

## 1 Introduction

This report assesses proposed plan change 4A to the Water Plan as required by Section 32 of the RMA, and should be read in conjunction with the proposed plan change. Proposed plan change 4A seeks to improve management of Otago's groundwater, and sets a maximum allocation limit for the North Otago Volcanic Aquifer.

## 2 Background

The Water Plan was made operative on 1 January 2004. Proposed plan change 1C<sup>1</sup> to the Water Plan integrates surface water and groundwater management, and limits groundwater takes within a maximum allocation volume.

The initial focus of proposed plan change 4A was management of the North Otago Volcanic Aquifer. A technical report "*North Otago Volcanic Aquifer Study*" (dated 10 July 2008) details the aquifer and its management, and recommends extending aquifer boundaries, setting a maximum allocation volume, establishing a seawater intrusion management area, and amending restriction levels.

The proposed plan change has been extended to provide further guidance on managing groundwater and to address some other groundwater matters, which have implications across Otago.

## 3 Identification of issues and analysis of options

Section 32 of the RMA requires evaluation of a plan change.

(3) *An evaluation must examine -*

(a) *the extent to which each objective is the most appropriate way to achieve the purpose of this Act; and*

(b) *whether, having regard to their efficiency and effectiveness, the policies, rules, or other methods are the most appropriate for achieving the objectives.*

(4) *... An evaluation must take into account -*

(a) *the benefits and costs of policies, rules, or other methods; and*

(b) *the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the policies, rules, or other methods.*

This evaluation is set out below. Groundwater management issues are identified with a summary of benefits and costs for alternative options, and an assessment of how the recommended option is appropriate.

### 3.1 North Otago Volcanic Aquifer

#### 3.1.1 Extent of the North Otago Volcanic Aquifer

There are a number of geological formations in North Otago that function as a single, distinct hydrological unit (including tuff, limestone, basalt, siltstone and diatomite). The current

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<sup>1</sup> Proposed Plan Change 1C (Water Allocation and Use) was notified on 20 December 2008. Council's decisions were released on 10 April 2010 and appeals have been lodged. Those appeals should not have any significant effect on proposed plan change 4A. Where appeals may affect plan provisions they have been noted.

mapped extent of the North Otago Volcanic Aquifer (Map C10) should reflect this unit to ensure groundwater from those formations is managed sustainably. Note that two geological formations within this unit (the Deborah and Waiareka Aquifers) are currently managed separately (see the recommendations in section 3.1.2).

**OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: Difficulty calculating the maximum allocation volume under Policy 6.4.10A and Rule 12.2.3.2A.

**OPTION 2: EXTEND THE BOUNDARIES OF THE NORTH OTAGO VOLCANIC AQUIFER**

Benefits: Recognition of shared groundwater flow between connected geological formations allows for sustainable aquifer management.

Costs: Administrative cost of transferring consents to new aquifer.

**Recommend Option 2**

Extending aquifer boundaries on the Water Plan C-series maps is the most appropriate way of achieving sustainable management of interconnected groundwater in the volcanic formation in this part of North Otago:

- While in isolation it will have limited effectiveness, it will be very effective in conjunction with other recommendations in this report (particularly those discussed in sections 3.1.2 and 3.1.3). This is an efficient option as it will achieve the objective with the greatest benefit and least cost.
- This is a low risk option as the boundaries of the geological formations are well-documented and there is evidence groundwater is interconnected.

**3.1.2 Management of the Deborah and Waiareka Aquifers**

Currently a portion of the North Otago Volcanic Aquifer is split into two management zones (Map D2 of the Water Plan). Those in the Deborah Aquifer are subject to restriction levels at Webster's well, while those in the Waiareka Aquifer are subject to restriction levels in Isbister's well. There are a number of geological formations in North Otago that function as a single, distinct hydrological unit, including the "Deborah" and "Waiareka" aquifers. In conjunction with the recommendation in section 3.1.1 to map this formation as a single unit, these aquifers should be managed as a single unit. The restriction level's at Webster's well would be used to manage all consented takes from the North Otago Volcanic Aquifer.

**OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: Doesn't recognise that these aquifers function as a single, distinct hydrological unit.

**OPTION 2: REPLACE MANAGEMENT OF THE DEBORAH AND WAIAREKA AQUIFERS WITH THE WIDER NORTH OTAGO VOLCANIC AQUIFER**

Benefits: Recognises their function as a single, distinct hydrological unit.

Restriction levels imposed on a wider area, sustains aquifer in entirety.

Costs: Restriction levels imposed on a wider area, affects more takes.

Administrative and implementation costs.

## **Recommend Option 2**

Managing these aquifers as a single unit is the most appropriate way of achieving sustainable management. It is both effective and efficient as these units function as a distinct hydrological unit. This is a low risk option as the boundaries of the geological formations are well-documented and there is evidence groundwater is interconnected.

### **3.1.3 Setting a maximum allocation volume for the North Otago Volcanic Aquifer**

The Water Plan limits the taking of groundwater to within a maximum allocation volume, which is the greater of:

- that listed in Schedule 4A, or that consented on 10 April 2010; or
- half of an aquifer's mean annual recharge, or that consented on 10 April 2010.

The technical recommendation<sup>2</sup> is to set a maximum allocation volume of 7 Mm<sup>3</sup>/year (for the entire aquifer with extended boundaries, see section 3.1.1), which considers physical properties of the aquifer, enables further taking within mean annual recharge, while providing for stream outflows and protection against seawater intrusion. However, the RMA requires consideration of wider matters, such as the social and economic benefits of taking and using water.

When setting an appropriate maximum allocation volume, regard must be given to existing consented take from the aquifer (how existing consented take is calculated is also an issue, addressed in section 3.2.2). If a worst-case scenario is assumed, current consents could take 6.2 Mm<sup>3</sup>/year from the aquifer. If a "balanced" approach is assumed, take would be about 4 Mm<sup>3</sup>/year. Further studies suggest only 30% of consented groundwater may be taken, which is about 1.2 Mm<sup>3</sup>/year. The uncertainty around taking arises from older consents where limits were not always imposed, nor metering required. Community consultation highlights concerns that the aquifer cannot sustain current taking, however, the inability to fully exercise a consent can be caused by shallow or poorly constructed bores, and sometimes by interference effects from other bores.

The objective of setting a maximum allocation volume in the North Otago Volcanic Aquifer is to enable taking of groundwater from that aquifer, while protecting the aquifer and connected water bodies.

#### **OPTION 1: MAINTAIN THE STATUS QUO**

If a maximum allocation volume is not set in Schedule 4A, for the North Otago Volcanic Aquifer it defaults to half of its mean annual recharge, which is about 10 Mm<sup>3</sup>/year (for the entire aquifer, based on extended new aquifer boundaries).

Benefits: No plan change required.

Allows consideration of new groundwater take applications, leading to local economic benefits.

Costs: Goes against technical recommendations.

Doesn't address community concerns the aquifer is not able to sustain current taking.

Could lead to an adverse effect on the aquifer and connected water bodies.

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<sup>2</sup> "North Otago Volcanic Aquifer Study" 10 July 2008

OPTION 2: SET ALLOCATION VOLUME AT 7 MM<sup>3</sup>/YEAR (TECHNICAL RECOMMENDATION)

Benefits: Allows consideration of new groundwater take applications, leading to local economic benefits.

Based on the technical recommendation.

Costs: Could lead to unanticipated adverse effects on groundwater users and the aquifer.

Community has indicated a preference for a precautionary approach.  
Administrative and implementation costs.

OPTION 3: SET ALLOCATION VOLUME AT 4 MM<sup>3</sup>/YEAR (ESTIMATED CONSENTED VOLUME)

Benefits: Is a precautionary approach.

May limit effects on all existing groundwater users to those currently experienced or naturally occurring.

Costs: May unnecessarily restrict new groundwater takes as it is unlikely much (if any) water will become available to new consent holders until all existing consent holders have their consents renewed.

Doesn't take into account technical recommendations.  
Administrative and implementation costs.

OPTION 4: SET MANAGEMENT ZONES WITHIN THE AQUIFER, IN ADDITION TO OPTION 2 OR 3

Benefits: Existing consent holders in high pressure areas afforded additional protection.

Consent holders could self-restrict their takes to avoid aquifer restriction levels being breached more easily.

Costs: No strong scientific basis for creation of management zones.

Consent process already provides for consideration of adverse effects of a new take on existing groundwater users.

Cost of monitoring localised drawdown and recharge.  
Administrative and implementation costs.

OPTION 5: SET ALLOCATION VOLUME AT 5 MM<sup>3</sup>/YEAR

Benefits: Precautionary approach, balancing community concerns the aquifer cannot sustain current consented volumes, and technical recommendation.

Allows new groundwater takes if existing consented take calculated using a "balanced" approach (see section 3.2.2).

Costs: If existing consented take calculated on a worst-case basis (see section 3.2.2) no new applications for groundwater takes can be considered until existing consents are replaced, which may be unnecessarily restrictive.

Administrative and implementation costs.

### **Recommend Option 5**

Setting a maximum allocation volume in Schedule 4A is appropriate to enable sustainable groundwater taking from the North Otago Volcanic Aquifer, as the default maximum allocation volume of half of its mean annual recharge is considered too great to maintain the values of the aquifer. A volume of 5 Mm<sup>3</sup>/year is appropriate as it balances community concerns and technical recommendations:

- It is likely to be an effective and efficient option, as it will enable some new groundwater takes, and provide for existing groundwater takes, while interference effects between bores continue to be looked at on a case-by-case basis during the consent process. The

community is supportive of a precautionary approach, and aquifer properties will be provided for.

- There is moderate risk in setting it at 5 Mm<sup>3</sup>/year, as there is uncertainty in the actual take of current consents, and a small margin-of-error in the scientific assumptions. The risk to the aquifer of not setting a maximum allocation volume in Schedule 4A is high.

## 3.2 Groundwater management framework

### 3.2.1 Setting maximum allocation volumes and restriction levels

The Water Plan provides for maximum allocation volumes to be set, and for takes from some aquifers to reduce or cease when restriction levels are reached, but it does not provide any guidance on setting those volumes and levels. The matters to which regard is given should be stated in the Water Plan to provide transparency and certainty to the process.

#### OPTION 1: MAINTAIN THE STATUS QUO

Benefits: No plan change required.

The maximum allocation volume and/or restriction level will be fully examined for every aquifer for which they are proposed.

Costs: Continued lack of transparency and certainty of process for the community, and no community mandate.

#### OPTION 2: ADD A NEW SCHEDULE OF MATTERS TO BE CONSIDERED WHEN SETTING MAXIMUM ALLOCATION VOLUMES AND RESTRICTION LEVELS

Benefits: Transparency and certainty of process for the community, and a community mandate.

Consistency with Schedule 2D for surface water bodies (matters to be considered when setting primary allocation limits and minimum flows).

Costs: Perceived reduction in process flexibility.

Could create an expectation that restriction levels will be set for all aquifers in conjunction with a maximum allocation volume.

### Recommend Option 2

Adding a new schedule of matters to be considered when setting maximum allocation volumes and restriction levels is the most appropriate way of providing transparency and certainty to the process:

- It will be effective as the community will have buy-in to the matters listed.
- This is an efficient option as the benefits outweigh the costs, which are minor. The costs identified can be addressed by not making matters considered exclusive, and by clearly stating restriction levels will not be set for all aquifers (also see section 3.2.3).
- This is a low risk option if the discretion to consider other matters is retained, and some matters must be considered under the RMA.

### 3.2.2 Calculation of consented groundwater take

The Water Plan provides no guidance regarding how the “consented maximum annual take” of an aquifer is calculated. While most recently granted consents have an annual restriction, many older consents have no such limits, and may only be limited through instantaneous, daily, weekly or monthly take. One option is to assume a worst-case scenario – that all consents are exercised 365 days a year, however, this is not a reasonable assumption to make. Most consents to take and use groundwater are for irrigation, which typically occurs over an

8 month period, with the greatest volume being used at the height of summer. An aquifer's function as water storage negates the need to pump to surface storage facilities. In addition, the Environment Court, in Lynton Dairy Limited (Decision C108/2005) was critical of allocation being assessed using worst-case scenario.

Clear guidance is required in the Water Plan to ensure the consented maximum annual take of an aquifer is calculated consistently.

**OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: Inconsistency and uncertainty when calculating consented maximum annual take of an aquifer.

**OPTION 2: PROVIDE FOR WORST-CASE EXERCISE OF EXISTING CONSENTS**

Benefits: A conservative approach that would protect the aquifer should consent holders fully exercise their consents.

Costs: Unlikely that the worst-case scenario occurs.  
May unnecessarily restrict consideration of new groundwater take applications.  
Ignores criticism of this method by the Environment Court.  
Administrative and implementation costs.

**OPTION 3: PROVIDE FOR A BALANCED APPROACH REGARDING EXERCISE OF EXISTING CONSENTS**

Benefits: Allows for new groundwater takes to be considered where the aquifer is able to support them.

A balanced approach better reflects actual taking from the aquifer.  
Aligns with Environment Court decision.

Costs: Potential to over-allocate an aquifer if existing consent holders seeking replacement consents have exercised maximum take and can use that water efficiently.  
Administrative and implementation costs.

**Recommend Option 3**

Providing a method for calculating consented maximum annual take making reasonable assumptions regarding the use of that water is an appropriate means of ensuring consistency:

- It is likely to be effective as the Environment Court supports such an approach.
- It will be efficient in avoiding inconsistency in the calculation process.
- The risk of assuming worst-case taking is that new applications may be unnecessarily restricted, where they are unlikely to adversely affect the aquifer, and the risk that these consents are exercised to their consented maximum is low.

**3.2.3 Purpose and use of restriction levels**

The Water Plan provides for groundwater takes to decrease or cease when restriction levels are breached. It also identifies why restriction levels have been set in listed aquifers without a policy regarding the purpose and use of restriction levels (a similar policy exists for minimum flows (6.4.3)). If this new policy is introduced, there is no need to identify the aquifer specific management objectives and environmental results described in Schedule 4B.

OPTION 1: MAINTAIN THE STATUS QUO

Benefits: No plan change required.

The purpose and use of restriction levels (already in existence) is not open for debate.

Costs: If setting restriction levels in other aquifers, or in additional monitoring wells in an aquifer already subject to a restriction level, there is no clear guidance in the Water Plan about their purpose or use.

OPTION 2: PROVIDE GUIDANCE ON THE PURPOSE AND USE OF RESTRICTION LEVELS

Benefits: The purpose and use of restriction levels is transparent and certain.

Costs: Administrative and implementation costs.

**Recommend Option 2**

Providing guidance on the purpose and use of restriction levels is appropriate to provide policy context for existing practice, and achieve Objective 6.3.2A (to maintain long term groundwater levels and water storage in Otago's aquifers). There is no risk providing such guidance as there is sufficient information to act.

**3.2.4 Consideration of the effects of take on an aquifer's properties**

Restriction levels and maximum allocation volumes (particularly when individually considered and set in Schedule 4A) can protect the physical properties of an aquifer, such as how much water it is able to hold, and how easily that water can flow through the aquifer. However, not all aquifers have restriction levels, and while the default maximum allocation volume of half an aquifer's mean annual recharge should generally provide protection for the aquifer, the ORC should retain the right to consider the effect of each individual take on the properties of the aquifer. While it is an objective to maintain long term groundwater levels and water storage (6.3.2A), and policy to avoid aquifer compression (6.4.10A) the right to consider the effects of taking on the aquifer is not retained under the current list of matters to which discretion has been restricted in Rule 12.2.3.4.

OPTION 1: MAINTAIN THE STATUS QUO

Benefits: No plan change required.

Costs: There is no ability to consider the effects of any take (as a restricted discretionary activity) on the physical properties of the aquifer.

OPTION 2: ADD "EFFECTS OF TAKE ON THE PROPERTIES OF AN AQUIFER, MAXIMUM ALLOCATION VOLUME, AND MEAN ANNUAL RECHARGE" TO THE LIST OF RESTRICTED DISCRETIONS

Benefits: Allows the effects of any take (as a restricted discretionary activity) on the physical properties of the aquifer to be considered, and conditions to be imposed to avoid those effects.

Costs: Administrative and implementation costs.

**Recommend Option 2**

Adding the effects of a take on the properties of an aquifer to the list of restricted discretions is appropriate to achieve Objective 6.3.2A, and an effective and efficient means of implementing Policy 6.4.10A(d). There is sufficient information to act.

### **3.2.5 Managing takes where there is risk of aquifer contamination**

#### **(A) Avoiding aquifer contamination**

The Water Plan enables groundwater to be taken provided contamination of groundwater or surface water is avoided (6.4.10A(c)), but is not explicit in describing how aquifer contamination will be avoided. This should be stated in the Water Plan to provide transparency and certainty to groundwater management.

##### **OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: Aquifer contamination would be addressed on a case-by-case basis with no community mandate for the approach.

##### **OPTION 2: PROVIDE GUIDANCE ON HOW AQUIFER CONTAMINATION WILL BE AVOIDED**

Benefits: Consistent approach, with community mandate, transparent, certain. Greater likelihood of success in avoiding aquifer contamination.

Costs: Administrative and implementation costs.

#### **Recommend Option 2**

Providing guidance to how aquifer contamination will be avoided is an appropriate means of providing transparency and certainty to groundwater management. There is no risk in acting as there is sufficient information.

#### **(B) Identifying seawater intrusion risk zones**

Assessment of some aquifers shows zones with increased potential for seawater intrusion if groundwater was to fall below a certain level. Where such zones have been identified they should be shown on the Water Plan Maps, so potential groundwater takers are aware of the increased risk when taking in that area.

##### **OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: The risk of seawater intrusion would be assessed on a case-by-case basis. Consent applicants may not be aware of the risk until an application to take groundwater is made.

##### **OPTION 2: MAP AREAS OF AQUIFERS AT INCREASED RISK OF SEAWATER INTRUSION**

Benefits: Consent applicants more likely to be aware of the risk before making an application to take groundwater.

Costs: Administrative and implementation costs.

#### **Recommend Option 2**

Mapping areas of aquifers where groundwater takes may increase the risk of seawater intrusion is an appropriate means of highlighting the risk to consent applicants. This is a low-risk option, as for certain aquifers there is sufficient information to map such areas.

### **3.3 Community groundwater supplies**

#### **3.3.1 Community groundwater supplies and restriction levels**

As the result of integrating surface water and groundwater management in proposed plan change 1C, a new controlled activity rule (12.2.2A.1) was included for groundwater taken for

community supply. It reflects a similar rule for surface water, where identified takes are not subject to minimum flows (12.1.3.1). Accordingly, there is no control to require a groundwater take for community supply to be subject to a restriction level. Minimum flows and restriction levels do not perform the same function, therefore to protect an aquifer from over-depletion consideration must be given to imposing a restriction level on any consented groundwater take.

**OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Community supplies identified in Schedule 3B could be exempt from restriction levels.

Costs: Damage to the properties of the aquifer.

Potential adverse effects on groundwater quality.

**OPTION 2: ADD RESTRICTION LEVELS TO THE MATTERS OF COUNCIL CONTROL IN RULE 12.2.2A.1**

Benefits: Protects the properties of the aquifer, and water quality in the aquifer, during dry periods.

Costs: Community supplies identified in Schedule 3B must observe restriction levels.

Administrative and implementation costs.

**Recommend Option 2**

The ability to require observance of a restriction level on a community supply identified in Schedule 3B is appropriate to achieve Objective 6.3.2A (to maintain long term groundwater levels and water storage in Otago's aquifers). There is a moderate risk to an aquifer's properties if such takes are not subject to a restriction level.

**3.3.2 Connected groundwater takes for community supply and minimum flows**

Under proposed plan change 1C, groundwater takes from within 100 m of a connected surface water body are allocated as surface water, subject to a minimum flow (Policy 6.4.1A). Policy 6.4.8 and Rule 12.1.3.1 provides for surface water takes for community supply listed in Schedule 1B to be exempt from minimum flows. While Rule 12.2.2A.1, for groundwater takes and "connected groundwater" takes for community supply listed in Schedule 3B, does not list minimum flow as a matter for which control is exercised, there is no exemption of those takes in Policy 6.4.8. The inconsistency between the policy and the rule needs addressing.

**OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: There is inconsistency between the policy and the rule.

**OPTION 2: INCLUDE CONNECTED GROUNDWATER TAKES FOR COMMUNITY SUPPLY IN SCHEDULE 3B FROM MINIMUM FLOW REQUIREMENTS (IN POLICY 6.4.8)**

Benefits: Provides consistency between the policy and the rule.

Costs: Administrative and implementation costs.

## **Recommend Option 2**

Including connected groundwater takes for community supply listed in Schedule 3B as exempt from minimum flows in Policy 6.4.8 is appropriate to provide consistency with Rule 12.2.2A.1. The benefits outweigh the costs, and there is sufficient information to act.

### **3.3.3 Groundwater takes for community water supply**

Upon notification of the original Water Plan on 28 February 1998, existing community water supplies were identified, given controlled activity status and were exempted from minimum flow provisions. Schedule 3B lists aquifers with groundwater takes for community supply. There have been two additional groundwater takes identified, in use prior to 28 February 1998, being:

- Mosgiel's take from the borefield within the East Taieri Aquifer; and
- The Clydevale-Pomahaka take from gravels adjacent to Clutha River/Mata-Au, up to the volume authorised as at 28 February 1998 by the two consents this take replaced..

In addition, there are takes identified in the Schedule that are no longer in use. These should be removed.

#### **OPTION 1: MAINTAIN THE STATUS QUO**

Benefits: No plan change required.

Costs: Community groundwater supplies overlooked during preparation of the Water Plan in 1998 are not recognised, and are therefore not a controlled activity under Rule 12.2.2A.1, which is an inconsistent approach with other identified community supplies in existence prior to 28 February 1998.

#### **OPTION 2: ADD FURTHER PRE 28 FEBRUARY 1998 COMMUNITY SUPPLIES TO SCHEDULE 3B AND DELETE THOSE NO LONGER IN USE**

Benefits: Recognises significant and long-standing community supplies, which were overlooked during preparation of the Water Plan in 1998.

Water supplies no longer used removed from list.

Costs: Administrative and implementation costs.

## **Recommend Option 2**

It is appropriate to recognise significant and long-standing community supplies in Schedule 3B which were overlooked during preparation of the original Water Plan, and to update the Schedule by removing water supplies no longer in use. The benefits outweigh the costs, and there is sufficient information to act.

### **3.4 Groundwater volumes taken as a permitted activity**

#### **3.4.1 Simplify permitted activity rules for taking groundwater**

The Water Plan provides for the permitted taking of groundwater, but those rules are unnecessarily complicated with the rate and volume of take limited depending on the aquifer from which water is taken.

With the exception of groundwater takes adjacent to the lower Clutha and lower Waitaki (for which 50 m<sup>3</sup>/day can be taken), takes are limited to either 10, 25 or 30 m<sup>3</sup>/day (Rule 12.2.2.2). The effects on aquifers from taking these different daily volumes are almost

immeasurable. Many permitted surface water takes are for 25 m<sup>3</sup>/day. The instantaneous rate at which these daily volumes of groundwater are taken is not considered to be a significant issue.

Permitted activity rules should be consistent and simple, and conditions included only where they are necessary to control adverse effects.

**OPTION 1: MAINTAIN THE STATUS QUO**

- Benefits: No plan change required.  
Permitted activity rates and volumes not open to debate.
- Costs: Rules are difficult to read.  
No technical basis to restrict volumes inconsistently between aquifers.  
People may be unnecessarily restricted in permitted taking of water.

**OPTION 2: SIMPLIFY AND STREAMLINE PERMITTED ACTIVITY RULES FOR TAKING GROUNDWATER TO 25 OR 50 M<sup>3</sup>/DAY AND REMOVE ALL RESTRICTIONS ON RATE OF TAKE**

- Benefits: Easier to understand the permitted activity rules.  
Consistency between surface water and groundwater volumes.  
Conditions of permitted take limited to those that are important.  
The instantaneous rate of take may adversely affect a nearby groundwater user, but rules already require no adverse effects on other water users.
- Costs: Permitted activity volumes opened for debate.  
New restrictions on those currently taking 30 m<sup>3</sup>/day.  
Administrative and implementation costs.

**Recommend Option 2**

Amending the permitted take to 25 m<sup>3</sup>/day for all aquifers (excluding part of the Lower Waitaki Plains Aquifer and Inch Clutha Gravel) is the most appropriate way of streamlining and simplifying the permitted activity rules. It will be effective because it limits the take volume to one of two options, and is consistent with permitted surface water volumes. It will be efficient as the benefits outweigh the costs. Groundwater modelling shows there is only low risk to aquifers where the volume of take is increased from 10 to 25 m<sup>3</sup>/day. However, there may be takes in some aquifers at 30 m<sup>3</sup> /day, currently permitted, that would then require a resource consent.

**3.5 Roxburgh Basin Aquifer**

**3.5.1 Correct Roxburgh Basin Aquifer restriction level datum**

Schedule 4B of the Water Plan identifies restriction levels for the Roxburgh Basin Aquifer (Coal Creek Terrace), the datum for which is 4.023 m above mean sea level datum. Mean sea level is the datum used for all other restriction levels in Schedule 4B, and the Roxburgh Basin Aquifer levels should be corrected accordingly. This amendment will not result in any operational change to consent holders.

OPTION 1: MAINTAIN THE STATUS QUO

Benefits: No plan change required.

Costs: May be confusion regarding the restriction level datum, as the Water Plan does not highlight it is not mean sea level, nor provide any reason it is 4.023 m above mean sea level.

OPTION 2: CORRECT DATUM FOR ROXBURGH BASIN AQUIFER RESTRICTION LEVELS TO MEAN SEA LEVEL

Benefits: All restriction levels in Schedule 4B are set to a common datum of mean sea level.

Costs: Administrative and implementation costs.

**Recommend Option 2**

Correcting restriction level datum for the Roxburgh Basin Aquifer to mean sea level is appropriate to provide consistency between aquifers. There is no risk providing such guidance as there is sufficient information to act.

**3.6 Consequential amendments from proposed plan change 1C**

The Council decision on proposed plan change 1C removed the restriction level for the Papakaio Aquifer from Schedule 4. This was because the Enfield bore is no longer operational, and no replacement bore is proposed. As a consequence of this, amendments are required to remove the Papakaio Aquifer and Enfield monitoring bore from Map D1 (the D-series maps show take restriction levels and monitoring bores). The boundaries of the Papakaio Aquifer need to be shown in the C-series maps (which show aquifer boundaries). Reference to Map D1 needs to be amended in Policies 6.4.10D and 6.4.10E, and Rules 14.2.1.1 and 14.2.2.1, accordingly.

Proposed plan change 1C removed the term “annual renewable yield” from a policy in the Water Plan, and subsequently this needs removal from the glossary.

**4 Consultation**

Prior to creation of draft proposed plan change 4A, two public workshops were held in Kakanui with consent holders and other interested parties. Approximately 40 people attended the workshop on 9 September 2009 and 60 attended the workshop on 30 March 2010. ORC Resource Scientists presented the findings of their technical report entitled “*North Otago Volcanic Aquifer Study*” at the first meeting and discussions focussed on aquifer recharge, monitoring wells, the possibility of smaller aquifer management zones, and the effect of maximum allocation volumes. At the second meeting aquifer recharge and existing consented take issues were clarified, and the policy options for a proposed plan change were presented.

Proposed plan change 4A was distributed for consultation in accordance with Clause 3 of the First Schedule of the RMA in June 2010. Responses were received from Clutha District Council, Dunedin City Council and Environment Canterbury.

## 5 Conclusion

The purpose of the RMA is to promote the sustainable management of natural and physical resources. It is considered that each of the recommended changes to the Water Plan will improve the management of groundwater in Otago.

## 6 Reference material

- *ORC Reports to committee or Council:*
  - 2008/337: North Otago Volcanic Aquifer Study, 10 July 2008
  - 2009/087: Proposed Change to the Regional Plan: Water for Otago - North Otago Volcanic Aquifer and Bore Construction, 23 February 2009
  - 2010/1505: Consultation Draft of Proposed Plan Change 4A (Groundwater and North Otago Volcanic Aquifer) to the Regional Plan: Water for Otago, 25 May 2010
  
- *ORC Technical Report:*
  - “North Otago Volcanic Aquifer Study” December 2008