

**Proposed Plan Change 4C  
(Groundwater management:  
Cromwell Terrace Aquifer)**

**Section 32 Evaluation Report**

**Regional  
Plan: Water  
for Otago**

*This Section 32 Report should be read in conjunction with the Consultation Draft of  
Proposed Plan Change 4C (Groundwater management: Cromwell Terrace Aquifer) to the Regional  
Plan: Water for Otago.*

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## Abbreviations used in this report

Clutha	Clutha River/Mata-Au
Council	Otago Regional Council
Mm <sup>3</sup> /yr	Million cubic metres per year
NPSFM	National Policy Statement for Freshwater Management 2011
Proposed plan change / plan change	Proposed Plan Change 4C (Groundwater management for the Cromwell Terrace Aquifer)
RMA	Resource Management Act 1991
Water Plan	Regional Plan: Water for Otago (as at 1 May 2014)

Under the operative Water Plan, a “*maximum allocation volume*” was established for every aquifer in Otago. The “*maximum allocation volume*” defines the volume of water that is available for taking from an aquifer in the Water Plan. This quantity is a “maximum allocation limit” in terms of the National Policy Statement on Freshwater Management. Plan Change 4B (Groundwater Allocation), which was notified on 17 May 2014, proposes to replace the term “*maximum allocation volume*” with the term “*maximum allocation limit*”.

This report will use the term “*maximum allocation limit*” when referring to the volume of water that is available for taking from an aquifer in the Water Plan.

## 1. Introduction

Proposed Plan Change 4C (Groundwater management: Cromwell Terrace Aquifer) builds on existing provisions of the operative Regional Plan: Water for Otago (Water Plan) for managing groundwater by setting a maximum allocation limit for the Cromwell Terrace Aquifer.

This report assesses the appropriateness of Proposed Plan Change 4C, as required by Section 32 of the RMA, and should be read in conjunction with the proposed plan change.

## 2. Background

### 2.1 The NPS Freshwater Management 2011

The National Policy Statement for Freshwater Management 2011 (NPSFM) requires Council to prevent the over-allocation of groundwater resources, by establishing environmental levels for all aquifers in the region and making sure the freshwater objectives within the Water Plan give effect to the NPSFM objectives.

The Water Plan Objectives give effect to the NPSFM by recognising the need to provide for the water needs of Otago’s communities and industries, while maintaining long term groundwater levels and water storage in the region’s aquifers. The Water Plan achieves this by establishing maximum allocation limits for groundwater resources and, where considered appropriate, setting aquifer restriction levels.

### 2.2 Groundwater management and allocation under the Water Plan

The maximum allocation limit defines the volume of water that can be taken annually from an aquifer by consents. When the combined yearly volume of consented takes equals the aquifer’s maximum allocation limit, the aquifer is considered fully allocated and consents for new groundwater takes can no longer be granted.

The maximum allocation limit is set to maintain long term groundwater levels and avoid aquifer compaction. The maximum allocation limit for specified aquifers is set in Schedule 4A of the Water Plan. When no volume is set in Schedule 4A, the maximum allocation limit is determined as 50% of the mean annual recharge of the aquifer.

In addition, for some aquifers, restriction levels have been set in Schedule 4B of the Water Plan. These control the taking of groundwater during extended periods of low recharge.

### 3. Cromwell Terrace Aquifer

#### 3.1. Current management regime and allocation

No maximum allocation limit in Schedule 4A has been set for the Cromwell Terrace Aquifer. Therefore, the maximum allocation limit for this aquifer is currently determined by the default as 50% of mean annual recharge or 1.2 Mm<sup>3</sup>/yr. The combined annual volume of groundwater allocated in existing resource consents is estimated to be around 1.7 Mm<sup>3</sup>/yr and no further groundwater can be allocated from the aquifer.

No restriction levels for this aquifer are currently set in Schedule 4B of the Water Plan.

#### 3.2. Aquifer hydrology

In 2012 ORC carried out a review of the Cromwell Terrace Aquifer's hydrology and monitoring data. The study report concludes that the aquifer is currently receiving a modest volume of infiltration from irrigation, rainfall and inflow from the Kawarau arm of Lake Dunstan and discharging the bulk of any excess back into the Lake as groundwater seepage.

Groundwater modelling shows that the aquifer is in dynamic equilibrium with Lake Dunstan and compensates for increased groundwater extraction with increased infiltration of lake water. Therefore, the study report suggests that it is appropriate to set a tailored maximum allocation limit of 4 Mm<sup>3</sup>/yr in Schedule 4A.

The 2012 study report also recommends setting aquifer restriction levels. Some stakeholders advocating for a precautionary approach to the management of the aquifer, have expressed a preference for a change to the Water Plan provisions to that effect. However, further investigation has shown that the setting of aquifer restriction levels is not necessary, as the risk of water table decline and permanent aquifer damage (e.g. aquifer compaction) is negligible.

Drawdown effects are not expected to occur for the following reasons:

1. The aquifer's high transmissivity and permeability allow groundwater levels to be consistently maintained across the aquifer; and
2. Under Contact Energy Ltd's current consent to dam the Clutha River at Clyde Dam, the operating level of Lake Dunstan must be maintained between 193.5 m above datum and 194.5 m above datum based on a 3 hour rolling average.<sup>[1]</sup>

The potential of localised or generalised water table decline is further mitigated in the following manner through the consent decision process:

1. Under the provisions of Schedule 5B of the Water Plan Council can adequately address the potential for localised water table decline and ensure that existing groundwater takes in areas of high demand are not being affected by bore interference.

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<sup>[1]</sup> Consent No: 2001.385.V2 – Water permit to dam the Clutha River approximately 1.5 kilometres upstream from Clyde

2. Under the operative Water Plan provisions Council can also place conditions that restrict the taking of water during periods of low surface flows in the Upper Clutha catchment on any permit for a water take with a high degree of hydraulic connection to the Clutha or Kawarau Rivers (stream depletion effect of 5 litres per second or more). These consent conditions will assist with easing the pressure from water abstraction on the Cromwell Terrace Aquifer and connected surface waters bodies during periods of low recharge.

Despite the existence of large number of bores located across the aquifer, there are currently no known issues with generalised or localised water table decline. The setting of an aquifer restriction level would therefore only be recommended under the following circumstances:

1. A change to Contact Energy Ltd's obligation to maintain the operating level of Lake Dunstan must be maintained between 193.5 m above datum and 194.5 m above datum; or
2. Reliable information indicating a generalised or localised water table decline.

### 3.3. Important uses and values

Through stakeholder consultation, critical review of publications and further research the following values and uses were identified as being important to the local and wider community:

- ***Availability of water for taking***

Twenty-two groundwater takes from the aquifer have been granted consent under the RMA, 19 of which are managed as groundwater takes and 3 of which are managed as surface water due to their proximity to Lake Dunstan.

Consented groundwater takes provide for the irrigation of about 100 ha on the terrace, most of which has been developed as orchards and vineyards. Other activities reliant on consented groundwater takes include bottled water for export, frost fighting and supply to a community water scheme.

In addition to these consented groundwater takes, approximately 40 bores are also operating under permitted activity rules, supplying domestic water and stock water to properties on the terrace.

Groundwater supply on the Cromwell Terrace currently meets local demand. However, feedback from local community members indicates there is scope for further expansion of the land under irrigation, while changing market conditions could also drive the conversion of land into productive uses that require higher irrigation inputs. Stakeholder consultation indicates that there is general support for increasing the availability of more groundwater for a variety of uses on the Terrace as long as there would be no adverse impact on existing uses or known values supported by the Cromwell Terrace Aquifer.

- ***Hydro-electricity generation on the Clutha***

The Cromwell Terrace Aquifer is characterised by a strong hydrological connection to the Clutha and Kawarau arms of Lake Dunstan. Lake Dunstan plays an important role in Contact Energy Ltd's hydro-electricity generation scheme on the Clutha, which generates 3,750 gigawatt-hours (GWh) of electricity per annum (nearly 9% of the New Zealand's annual generation). The lake levels are managed by Contact Energy Ltd to ensure constant water supply to the hydro-electric power stations at Clyde and Roxburgh.

- ***Natural, cultural and recreational values***

No natural, cultural or recreational values are known to be dependant on the groundwater resources of the Cromwell Terrace.

Lake Dunstan is widely recognised as an important recreational asset and various features in the surrounding area are well-known for their aesthetic and amenity values. Schedules 1A and 1D of the Water Plan also identify various ecosystem values and cultural values that are associated with nearby surface water bodies, such as the Low Burn, the Kawarau River and the Clutha River/Mata-Au (Clutha). However, flow/lake levels in these surface water bodies are not significantly influenced by inflows from the aquifer, nor are they susceptible to any significant surface flow loss due to water infiltration to the aquifer.

## 4. Section 32 evaluation

Section 32 of the RMA requires the consideration of alternatives and an assessment of the costs and benefits of adopting any objective, policy, rule, or method in the Water Plan. The following sections discuss the costs and benefits of the options considered and provide a detailed analysis of the preferred option.

### 4.1. Options overview

The following options were considered in developing the proposed plan change:

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

Option 1 describes the current situation. This option relies on the "default" maximum allocation limit provided for by the Water Plan.

#### **OPTION 2: ADOPT A TAILORED GROUNDWATER MANAGEMENT REGIME**

Option 2 proposes to set a maximum allocation limit of 4 Mm<sup>3</sup>/yr in the Water Plan.

#### **OPTION 3: MANAGE GROUNDWATER TAKES AS SURFACE WATER TAKES**

Option 3 proposes to identify the Cromwell Terrace Aquifer in Schedule 2C of the Water Plan and seeks to manage all groundwater takes from the aquifer as surface water takes from the Kawarau River.

## 4.2. Analysis of Options

Table 1 summarises the costs and benefits of the three options described above.

<b>Option 1</b>	<b>Maintain the status quo</b>
<b>BENEFITS:</b>	<ul style="list-style-type: none"> <li>• <b>Financial benefit</b> - No plan change required.</li> </ul>
<b>COSTS/RISKS:</b>	<ul style="list-style-type: none"> <li>• <b>Social &amp; Economic Cost</b>– Does not allow for the further allocation of groundwater through resource consents and seeks to reduce the current allocation. This may result in the local community being unable to capitalise on future economic opportunities and improve their wellbeing. The productive use of land is restricted by the limited availability of groundwater and the need to supply water from alternative sources may increase water supply infrastructure costs.</li> <li>• <b>No benefit for natural, cultural or recreational values</b> – Despite its restrictive nature, option 1 is not expected to have any tangible benefit for the natural or cultural values present on the terrace or any values associated with nearby surface water bodies.</li> <li>• <b>Lack of clarity and certainty</b> – Using 50% of mean annual recharge as a measure to calculate the maximum allocation limit may fail to provide certainty, because of the risk in inconsistencies in calculating the mean annual recharge.</li> </ul>
<b>EVALUATION SUMMARY</b>	No scope exists for further growth in economic sectors and activities reliant on the availability of groundwater and allocation from the aquifer is likely to be reduced over time as consents are renewed.

<b>Option 2</b>	<b>Adopt a tailored groundwater management regime</b>
<b>BENEFITS:</b>	<ul style="list-style-type: none"> <li>• <b>Social &amp; Economic Benefit</b> – Allows for further groundwater to be allocated from the aquifer. The local community is in a better position to pursue economic opportunities as the further allocation of locally available groundwater enables more productive land-uses to occur and minimises the cost of water transport infrastructure. Likely spin-off effects for the local and wider community include job creation in the local primary sector and ancillary industries.</li> <li>• <b>Greater clarity and certainty for plan users</b> – Having the maximum allocation limit stated in the Water Plan, provides more clarity and greater certainty by making the maximum allocation limit less susceptible to challenge.</li> <li>• <b>Promotes efficient resource use</b> – The recommended maximum allocation limit allows for various types of irrigation-dependant land-uses to take place on the terrace, provided the irrigation water is efficiently applied.</li> </ul>
<b>COSTS/RISKS:</b>	<ul style="list-style-type: none"> <li>• <b>Financial cost</b> - Plan change required.</li> </ul>
<b>EVALUATION SUMMARY</b>	This option allows the local community to provide for their wellbeing, while scope exists for further growth in economic sectors and activities reliant on the availability of groundwater on the Cromwell Terrace.

Option 3	Manage groundwater takes as surface water takes
<b>BENEFITS:</b>	<ul style="list-style-type: none"> <li>• <b>Social &amp; Economic Benefit</b> – Allows for further water from the aquifer to be allocated as surface water from the Kawarau River. The local community can pursue economic opportunities as further allocation of locally available groundwater enables more productive land-uses to occur and minimises the cost of water transport infrastructure.</li> </ul>
<b>COSTS/RISKS:</b>	<ul style="list-style-type: none"> <li>• <b>Financial cost</b> - Plan change required.</li> <li>• <b>Limited clarity and certainty for plan users</b> – The aquifer would be subject to a more complex management regime than under Option 2. Plan users need to be aware of management regime and allocation status of connected surface water bodies under the Water Plan, in order to understand how the Cromwell Terrace Aquifer is being managed.</li> </ul> <p>Although the Water Plan currently states that no allocation limit or minimum flow apply to takes from the main stem of the Kawarau River, future changes to the management of this river may change how water from the aquifer is being allocated.</p>
<b>EVALUATION SUMMARY</b>	This option allows the local community to provide for their wellbeing and enables future growth, but is more difficult to administer.

### 4.3. Recommendation

*Option 2 - Adopt a tailored groundwater management regime* is recommended for the following reasons:

- Option 2 is an appropriate and effective way of better achieving the objectives of the Water Plan and those outlined in the NPSFM.
- By taking into account local conditions Option 2 should bring about a positive impact on the diverse social and economic values supported with the Cromwell Terrace Aquifer, while avoiding any adverse impact on the aquifer’s long term health.
- Option 2 provides the greatest level of clarity and certainty for plan users and ensures consistency in plan administration.
- There is currently no need for setting aquifer restriction levels in Schedule 4B of the Water Plan, as there are currently no known issues with generalised or localised water table decline and the water levels of Lake Dunstan, the aquifer’s dominant recharge source, are artificially maintained and only vary by up to one metre. The risk of existing groundwater takes being affected by bore interference in localised areas of high demand can be appropriately dealt with by Council by considering Schedule 5B of the Water Plan when new applications to take groundwater are received. This may result in limits being placed through consent conditions on new groundwater permits.



Council will continue monitoring groundwater levels across the aquifer and initiate a new future plan change to set aquifer restriction levels if further monitoring data would indicate a water table decline.

## 5. Consultation

Prior to preparing Proposed Plan Change 4C, a public workshop was organised in Cromwell on 18 March 2014. During the workshop Council staff presented local community members and interest groups with recent aquifer study results and discussed with them various options for the future management of the Cromwell Terrace Aquifer.

A Consultation Draft was released for comments on 7 June 2014. Five comments were received by 23 June 2014 and were summarised for ORC Committee Report 2014/0903.

The option of setting a tailored maximum allocation limit of 4 Mm<sup>3</sup>/yr in Schedule 4A of the Water Plan was widely endorsed by the people attending the workshop, as well as those that made comment on the Consultation Draft.

Feedback received during these processes also indicates that surety of supply for existing takes is a key concern. While some community members expressed support for setting restriction levels, others acknowledged that there were no known issues with water table decline and advised that further investigation is required before a monitoring bore is installed and restriction levels are included in Schedule 4B of the Water Plan.

## 6. Conclusion

The purpose of the RMA is to promote the sustainable management of natural and physical resources. It is considered that Proposed Plan Change 4C (Groundwater management: Cromwell Terrace Aquifer) enables the ORC to better manage the groundwater resources of the Cromwell Terrace, now and for the future.

This report identifies that the preferred option is to undertake Option 2: Adopt a tailored groundwater management regime. This option meets the requirements of Section 32 of the Resource Management Act 1991, being an efficient means to achieve the improved, more focused management of groundwater takes from the Cromwell Terrace Aquifer with the greatest benefit, and insignificant risk.

## 7. Supporting information

National Policy Statement on Freshwater Management 2011

Resource Management Act 1991

ORC, Regional Plan: Water for Otago

ORC Reports to Committee or Council:

- 2012/0759: Groundwater Allocation of the Cromwell Terrace Aquifer, Central Otago
- 2014/0760: Proposed Plan Change 4C (Groundwater management: Cromwell Terrace Aquifer) - Consultation
- 2014/0903: Notification of Proposed Plan Change 4C (Groundwater management: Cromwell Terrace Aquifer)

ORC Technical Report:

- Cromwell Terrace Aquifer Study, 2012

Other material:

- ORC, Cromwell Aquifer Draft Information Sheet, 2014
- ORC, Cromwell Terrace Aquifer (Presentation to community meeting), 2014 (Available online [www.orc.govt.nz](http://www.orc.govt.nz))
- Consent No: 2001.385.V2 – Water permit to dam the Clutha River approximately 1.5 kilometres upstream from Clyde