

4. Schedule of the allocation and restriction regime for groundwater

This schedule sets out restrictions that apply to the taking of groundwater from certain aquifers in Otago.

Schedule 4A identifies maximum allocation limits for the taking of groundwater from aquifers identified in the C-series maps, in accordance with Policy 6.4.10A2(a) of this Plan. Schedule 4B identifies water levels at which the taking of groundwater will be restricted in accordance with Policy 6.4.10A1(b) of this Plan. Schedule 4C identifies matters to be considered when making additions to these schedules through a plan change.

4A Maximum allocation limits for groundwater takes from aquifers

Aquifer Name	Map Reference	Maximum Allocation Limit (million cubic metres per year)
Cromwell Terrace Aquifer	C7	4
North Otago Volcanic Aquifer	C15, C16, C17 & C18	7

4B Restrictions for groundwater takes

4B.1 Restriction levels for groundwater takes

Schedule 4B.1 identifies water levels at which the taking of groundwater will be restricted, and identifies the nature of the restriction, in terms of a reduction in the take of water authorised by water permits.

The aquifer maximum height refers to the historic record of the water level or pressure head after the recharge season. Note that the areas over which the restrictions apply are shown on Maps D1-D4.

Aquifer See Maps D1–D4	Aquifer Reference Bore See Maps D1–D4	Aquifer maximum height (metres above datum)	Restriction levels (metres above datum)		
			25% restriction or response in terms of Council recognised rationing regime*	50% restriction	100% restriction
North Otago Volcanic	Websters Well	130.8	126.0	125.5	125.0
Lower Taieri – West	Momona Bore	101.24	100	99.5	99
Lower Taieri – East	Harleys Well, Piezo. 2	112.5	110.5	110.0	109.5
Ettrick Basin	Cemetery Bore	172.29	170.29	169.79	169.29
Roxburgh Basin (Coal Creek Terrace)	White-Hall Bore	189.5	188	187.8	187.5

* When the aquifer reaches this level there shall be either a 25% restriction or a water allocation committee, appointed by the Otago Regional Council, will implement a protocol to take all practical steps to curb the decline in the aquifer level so as to avoid a 50% restriction. If there is no water allocation committee or the water allocation committee does not use a protocol approved by the Council, the 25% water restriction

SCHEDULE 4: ALLOCATION AND RESTRICTION REGIME
FOR GROUNDWATER

will apply.

4B.2 Restrictions for Cromwell Terrace Aquifer

There shall be no takes from the Cromwell Terrace Aquifer for irrigation purposes between 1 May and 31 August inclusive in each year.

Because the Cromwell Terrace Aquifer is hydraulically connected to Lake Dunstan, other restrictions may be imposed on resource consents to take water, to help maintain lake levels.

4C **Schedule of matters to be considered when setting maximum allocation limits and restriction levels for aquifers**

Maximum allocation limits and restriction levels for aquifers in Schedules 4A and 4B give effect to the objectives and policies in this Plan. Additional aquifers are added through the plan change process following scientific investigation and consultation with the community and affected parties. The lists in 4C.1 and 4C.2 identify matters to which consideration will be given when setting these volumes and levels. The lists are not exhaustive and consideration will be given to these and any other relevant matters. Restriction levels may not be needed for all aquifers.

4C.1 When setting maximum allocation limits in Schedule 4A for an aquifer, consideration will be given to the following matters:

- (a) Physical properties of the aquifer;
- (b) The amount and characteristics of recharge to the aquifer;
- (c) Interaction with other aquifers;
- (d) Interaction with surface water bodies and their values;
- (e) The potential for contamination (including seawater intrusion);
- (f) The effects of taking groundwater on the aquifer (including results of computer modelling, where available);
- (g) Demand for water and existing water uses, including community water supplies;
- (h) Environmental, social, cultural, recreational and economic benefits of taking and using water; and
- (i) Any other relevant matter in giving effect to Part 2 of the Resource Management Act.

4C.2 When setting restriction levels in Schedule 4B for an aquifer, consideration will be given to the following matters:

- (a) Physical properties of the aquifer;
- (b) Variance of groundwater levels in the aquifer;
- (c) The amount and characteristics of recharge to the aquifer;
- (d) The proposed or existing maximum allocation limit;
- (e) Interaction with surface water bodies and their values;
- (f) Any actual or potential effect of drawdown on groundwater quality; and

SCHEDULE 4: ALLOCATION AND RESTRICTION REGIME
FOR GROUNDWATER

- (g) The environmental, social, cultural and economic effects of the restriction level on existing users of groundwater from the aquifer.

Note: For aquifers not included in Schedule 4A, refer to Policy 6.4.10A2(b) for determining a maximum allocation limit.

4D Matters to be considered in calculating mean annual recharge

For any aquifer not included in Schedule 4A the setting of the maximum allocation limit will involve calculating the mean annual recharge of the aquifer (see Policy 6.4.10.A2(b)). The mean annual recharge is a statistical value based on the past climate, aquifer hydrology, soil properties, irrigation practice and other factors with direct influence over groundwater recharge.

This schedule sets out the matters to which consideration will be given when calculating the mean annual recharge of an aquifer.

4D.1 Sources of aquifer recharge

Sources of aquifer recharge may include:

- (a) Land surface recharge due to rainfall excess.
- (b) Land surface recharge due to irrigation excess, which should be based on the application of irrigation at an efficient rate.
- (c) Land surface recharge due to intermittent runoff flowing over the land surface.
- (d) Surface water recharge due to river infiltration.
- (e) Surface water recharge due to wetland, pond or lake infiltration.
- (f) Through-flow from any other aquifer.

The mean annual recharge can arise from a single recharge source or a combination of recharge sources, in which case the mean annual recharge is based on the combined recharge from all relevant sources.

4D.2 Methods for calculating aquifer recharge

Methods for calculating aquifer recharge from various recharge sources may include:

- (a) Daily soil moisture balance for the calculation of land surface recharge.
- (b) Daily soil moisture balance for calculation of irrigation recharge.
- (c) Differences between surface water flows measured at different flow monitoring sites for the determination of bed infiltration passing to an aquifer.
- (d) Direct measurement of land surface recharge using subsoil measuring devices such as lysimeters.
- (e) Calibrated recharge estimation using unsaturated zone matric potential or saturated zone water table height fluctuation.
- (f) Environmental tracers such as isotopes (radioactive or stable) and conservative anions.
- (g) Groundwater computer modelling, especially where calibration and parameter estimation can be used to constrain initial estimates of surface water contributions and land surface recharge.