

Guideline Document: How to Apply For a Groundwater Take Consent



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1.0 Introduction

Layers of rock and sediment beneath the Horizons Region contain groundwater. In areas where this rock and sediment is sufficiently permeable the groundwater is accessed by thousands of bores. We use the groundwater for drinking water supply, irrigating our crops, supplying stock and servicing the needs of industry.

This document has been prepared by Pattle Delamore Partners Ltd to provide information on how to obtain a resource consent to take groundwater. The document provides guidance on:

- An introduction to groundwater bores
- When you need a consent to take groundwater

- Estimating how much water you require
- Confirming whether groundwater is likely to be available for a new water permit
- Drilling the bore and permits required
- Pump testing: permits required, designing the test and analysing the data
- Preparing the consent application and how to assess the effects on neighbouring bores

Contact details for the Horizons groundwater team are provided at the end of the booklet should you require further information. Another Horizons booklet that you may find useful is on the Groundwater Take Consent Review Process.

2.0 Introduction to Groundwater Takes

An aquifer is an underground layer of water-bearing permeable rock or sediment (e.g. gravel or sand) from which groundwater can be extracted using a bore.

Groundwater bores are drilled down into the aquifer. A bore pump is usually required to lift groundwater from an aquifer to the surface. However, in some places in our Region, the groundwater pressure is high enough for the groundwater to rise up to the surface and flow freely from the bore (if the bore is uncapped or when in use). These are called free flowing artesian bores.

When you pump a bore, the water level (or pressure) in the aquifer surrounding the bore reduces. This may result in a reduction in water level at a neighbouring bore. This may also result in a reduction in the natural flow in streams and lakes. In coastal areas, seawater can make its way into freshwater aquifers as a result of groundwater pumping, making them unsuitable for use. The potential effects of any proposed take will need to be assessed to support an application for a resource consent to take groundwater.

3.0 When Do You Need a Consent to Take Groundwater?

In our Region if you wish to take groundwater at a rate of more than 50m³/day per property you will need a resource consent. 50m³/day is equivalent to 50,000 litres per day.

The potential effects of any new takes greater than 50m³/day need to be assessed before we will grant the consent. This is to ensure that we can manage the effects appropriately and protect our environment for future generations to enjoy. When we are deciding

whether to grant a new resource consent, we must seek to avoid or mitigate adverse effects on the environment and other lawful activities, such as existing surface and groundwater takes. For example, you will need to consider whether your new take will affect the ability of your neighbours to take water from their bores. Our Evaluation of Consent Application booklet is available on our website which has more information on the evaluation process for consent applications.

4.0 Estimating How Much Water You Need

Before you submit the consent application to take groundwater you will need to estimate how much water you need and decide how it will be used. The amount of water required is likely to vary throughout the year. For example, you may only need to take water to irrigate crops over the summer months.

You should estimate the maximum quantity you need to pump from the bore at any one time, the maximum quantity you require per day, and the total volume you need over a year. For irrigation takes, those maximums can represent the volume of water required up to a 1 in 10 year dry period.

When we evaluate your consent application, we will check that the quantity of water you've asked for is reasonable, and that the water will be used efficiently. We recommend that you provide as much detail as possible on how the water will be used. For large, complex, or new takes you may need to seek advice from a specialist consultant to help provide this information.

Policy 5-12 of the One Plan gives guidance on what we consider to be a reasonable need for different types of activities:

- Up to 300 litres per person per day for domestic needs

- Up to 70 litres per animal per day for drinking water (sheep have smaller requirements than cows)
- Up to 70 litres per animal per day for dairy shed washdown

If the water is to be used for irrigation, a map of the proposed irrigation area should be included in your resource consent application together with details of the crop, soil and irrigator type.

We assess applications for irrigation assuming an irrigation application efficiency of 80% (even if the actual system being used has a lower application efficiency) or on the basis of a higher efficiency if this is planned.

In our Region, industry based tools are used to estimate how much water you are likely to need for irrigation. We apply a standard methodology to ensure that all resource consents for irrigation are assessed in a consistent manner. We recommend that you request a water demand estimate for your location and use this to support your consent application. Generally there is no cost for this service if your query is straightforward.

We need to make sure that we don't allow people to take too much water if it is not reasonably required or will not be used efficiently.



5.0 Allocation Limits

We have set allocation limits for groundwater and surface water bodies in our Region in order to help us manage the combined effects of all takes within a catchment. We have divided our Region into groundwater management zones and for each of these we have set a total annual allocable volume.

The One Plan states that the total amount of groundwater taken from a groundwater management zone must not exceed this volume. Schedule D in the One Plan gives a map of the zones and the total allocable volumes.

Similarly, Schedule C of the One Plan presents the allocation limits for surface water bodies. All groundwater takes ultimately result in an equivalent reduction in surface water flows (including coastal discharge) in the long term. If there is potential for

your groundwater take to cause a medium or higher reduction in stream flow, the groundwater take will be included in the surface water allocation regime.

We recommend that before preparing your consent application or drilling a bore you should contact us to confirm whether there is allocation remaining for new takes in your area.

This should cover both groundwater and surface water allocation. In some areas, where there are known issues from cumulative groundwater pumping, such as adverse depletion effects on flows in rivers and streams, or existing well interference issues, we may recommend that no further groundwater be allocated, even if current allocation is less than a set allocation limit.

6.0 Drilling a New Bore

Before you drill a bore, you will need to obtain a permit to drill and construct a groundwater bore. You can find the application form on our website. You will need to provide a map showing (as a minimum):

- The proposed bore site
- The geographical location of the property
- The position of any existing bores on the property
- The location of three bores not on your property nearest to the proposed bore
- Any waterways within 500m of the proposed bore

Please contact us to obtain details of existing bores and groundwater takes in the area surrounding

your property. New bores must be constructed and managed in accordance with Policy 16-4 in the One Plan and there is an info sheet on our website called Information for Well Owners which describes our bore log, water quality and aquifer testing requirements.

We recommend that you use an experienced and qualified driller to construct the bore. They should construct the bore in accordance with the NZS 4411:2001 Environmental Standard for Drilling of Soil and Rock. Contact the groundwater team at **groundwater@horizons.govt.nz** or on freephone **0508 800 800** for a list of local well drillers.



7.0 Testing a Bore

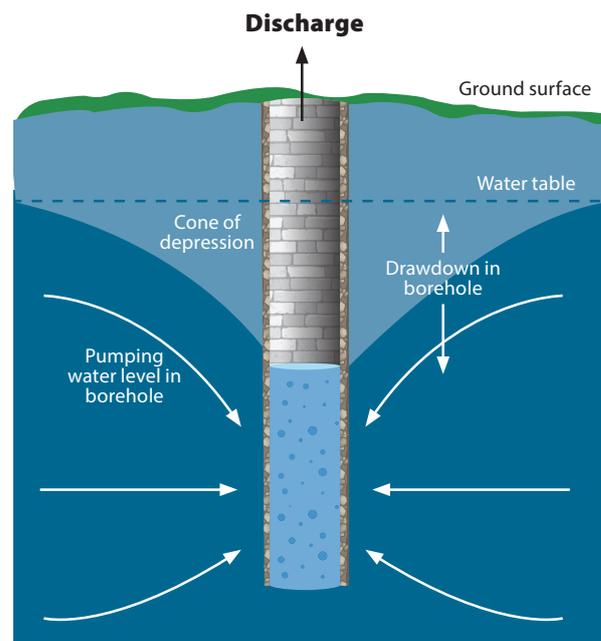
7.1 WHY DO WE TEST BORES?

Aquifer tests, often called pumping tests, are carried out to determine how much groundwater can be taken from a bore and to provide information on the potential effects of a new groundwater take, for example on neighbouring bores or stream flow. Your consent application to take groundwater must include details of pumping tests.

Two types of tests are normally undertaken:

- A step test is used to assess how much water can be taken from a bore and its performance. The test involves pumping the bore at a low rate and then increasing the pumping rate in steps. While the bore is being pumped, the water level is measured in the bore itself.
- A constant rate test is undertaken to provide information on the aquifer properties and the potential effects of the new take, for example on neighbouring bores and streams. The bore is pumped at a constant rate and water levels are measured in the pumping bore and also in neighbouring monitoring bores. The results are used to predict the potential effects of the proposed take on all bores, not just those monitored during the test.

For artesian bores that flow without the need for a pump, the bore can be tested by letting the bore flow at the set rate and measuring the change in head



as if pumping. Under Rule 16-4 in our One Plan, bore and groundwater testing is a permitted activity that does not require a resource consent, subject to various conditions, in particular that we should be notified in writing at least five working days before the start of the test, that the rate of take does not exceed 60L/s and that the duration of the test does not exceed seven days.

Further information on aquifer tests can be found on our website in the document called Pumping Test Guidelines for Horizons Regional Council.

7.2 PLANNING THE CONSTANT RATE TEST

Getting started

When planning the constant rate test it is useful to think about the purpose of the test, what you expect the effects from pumping the bore might be, and how you are going to analyse the data. Careful planning of the test is important to ensure that the test provides sufficient information to support the consent application. We recommend that you engage a suitably qualified person to complete the testing for you.

During the test, it is important to measure the pumping rate, the groundwater levels in the test bore and neighbouring bores, and barometric pressure.

After pumping stops the groundwater levels should continue to be monitored until the water levels have recovered to the pre-test level. The results can then be analysed to determine the aquifer properties and subsequently used to predict the effects of the new take.



There is no set time for how long the bore should be pumped for during the test, but it should be long enough to determine the effects of the proposed take. As a minimum, a 24 hour test is generally required, but longer tests may be needed for large takes such as community supplies, or in situations where it may take longer to observe a response in neighbouring bores or determine the effects of pumping.

Monitoring bores

Before starting the test you will need to identify appropriate monitoring bores. We generally recommend that you monitor two bores, in addition to the pumping bore, but more may be required to fully determine the effects of the take.

You will need to select appropriate monitoring bores based on their location and depth and whether they are in the same aquifer as the pumping bore. It is useful to monitor at least one bore in the same aquifer as the pumping bore, and may be helpful to monitor bores in a shallower aquifer, if available.



This helps provide information on the connection between shallow and deep aquifers, and also the potential for reduction in stream flows.

We can provide information on neighbouring bores from our database, but you will need to visit the owners of the bores to confirm if they can be monitored during the test.

The monitoring bores should not be pumped during the test and should also be switched off beforehand to give enough time for the water levels to stabilise. If there are other bores pumping nearby that might affect the results of the test these should also ideally be switched off prior to, and during, the test.

In practice, this may not be possible or you may find that the nearest bores cannot be monitored. If this is the case you should try to find suitable monitoring alternatives or, for example, consider undertaking the test during winter when less pumping for irrigation occurs.

You should check with us before starting the test and fully document the consultation within your consent application.

Stream depletion

Groundwater takes can intercept water that would normally make its way into surface waterways such as rivers and lakes, or increase natural recharge from these waterways. This can lead to what is known as stream depletion, where flow in rivers or streams, or water levels in lakes can reduce due to groundwater use.

The pumping test is important to help us identify the appropriate management approach, such as whether we need to impose consent conditions to protect stream flows.

We don't normally require stream flow to be monitored during a pumping test. This is because it is very difficult to monitor stream flows accurately enough to clearly see the effect of pumping and eliminate other factors affecting the stream flow such as rainfall. When undertaken and analysed correctly, the results of groundwater monitoring during a pumping test are normally sufficient to assess the magnitude of a surface water depletion effect for the consent application. However, in some situations, stream flow measurements during the test may also be helpful.



7.3 ANALYSIS OF TEST RESULTS

There are a variety of analytical equations and numerical modelling packages that can be used to analyse the drawdown response observed during a pumping test. These need to be selected based on the aquifer setting and the type of response observed. Generally it is best to start with a simple analytical method, and then add complexity if required and if there is enough information to do so.

8.0 Preparing the Consent Application

8.1 WHAT TO INCLUDE IN YOUR APPLICATION

The Resource Management Act (RMA) specifies the information that must be included in a consent application, particularly Schedule 4 of the RMA. For a consent to take groundwater, part of these requirements includes a technical evaluation of the effects arising from the proposed abstraction. When making decisions on resource consent applications we must seek to avoid or mitigate any adverse effects on other lawful activities, such as existing surface and groundwater takes; and to minimise depletion of flow in surface waterways (streams, lakes and wetlands) or the occurrence of saltwater intrusion.

You (or your consultant) should prepare a technical report to accompany the application form to take groundwater. The technical report should include the following information as a minimum:

- Description of how much water is required and how it will be used. We recommend that you also include a short description of the positive effects of the new take, for example increased crop yields as a result of irrigation.
- Details of the bore including depth, diameter, construction details and geological log.

- Description of the local hydrogeological setting, including details of nearby bores and takes and streams, description of the aquifer.
- Details of the pumping test(s) including the data analysis undertaken and the estimated aquifer properties. Assessment of effects of the proposed take.
- Details of any consultation undertaken, for example with neighbours or the council.

The level of detail and scale of effort required varies. The larger the take, or if there is greater potential for adverse effects, the more detail we will require. The assessment of environmental effects (AEE) should include an assessment of the following as a minimum:

- Estimation of the potential drawdown effects on neighbouring groundwater takes and bores (not limited to those monitored during the pump test).

- Estimation of the potential reduction in stream flows (stream depletion effects). We will manage these effects through additional consent conditions if required. You do not normally need to assess effects on individual surface water takes.
- The potential for the take to cause saltwater intrusion into coastal aquifers (if the bore is within 5km of the coast).
- Potential effects on lakes or wetlands.
- Cumulative effects of the proposed water take.
- Effects on the overall groundwater resource.

Specific information on how to assess effects on neighbouring bores is included in the following section.

8.2 ASSESSING EFFECTS ON NEIGHBOURING BORES



The effects of your proposed take on groundwater levels in neighbouring bores needs to be assessed. Each pumping bore will draw water from the surrounding aquifer, resulting in a drop in pressure in a confined aquifer, or a reduction in the water table in an unconfined aquifer. This is known as the drawdown or 'interference effect', where it has a measureable effect on other bores.

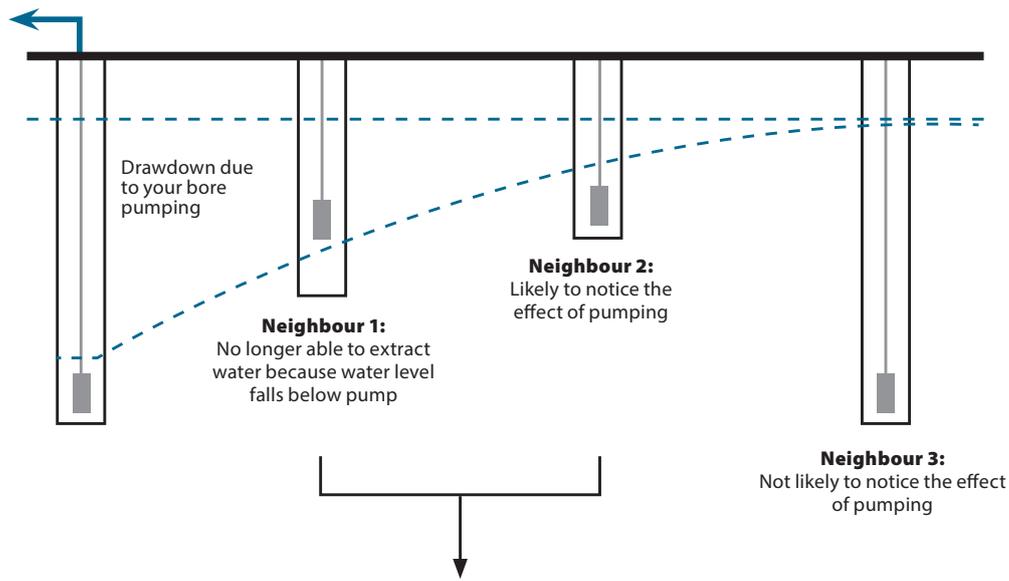
You should estimate the potential drawdown interference effect on neighbouring bores (e.g. metres of drawdown) and consider whether the effect is likely

to be noticeable. In general, if the water level in a neighbour's bore is well above their pump then their bore will be less sensitive to changes in the water level caused by your bore pumping.

Although the effect may not prevent the owner from drawing water from the bore, the effect may be noticeable and may cause a change in the operation, and potentially increase pumping costs. However, if the water level in a bore falls below the pump intake, then the owner won't be able to extract water.

The diagram below illustrates this example:

YOUR BORE



Recommend consulting with these neighbours. May also require formal notification of your application

In your consent application, when assessing the significance of potential drawdown interference effects, you should consider factors including the water levels (including natural seasonal variations), total bore depth, casing depth, pump depth and the existing “self-induced” effects of pumping.

Generally you should look at the effect of a new take relative to the “available drawdown” and how much drawdown the neighbouring bores are likely to require (i.e. their own self-induced drawdown).

- The available drawdown is the difference between the low static water level (what might be observed in a dry year) and the depth at which the pump cannot produce the desired yield.
- The self-induced drawdown is how much drawdown they observe in their bore caused by their own pumping.

In the following example the “available drawdown” is 30m and the self-induced drawdown is 20m. A drawdown interference effect of say, 6m on that available drawdown is likely to be noticed and may adversely affect their bore operation depending on their existing self-induced drawdown. However, if the bore was much deeper (say 200m) or the drawdown interference effect was smaller, the effect might not be noticed.

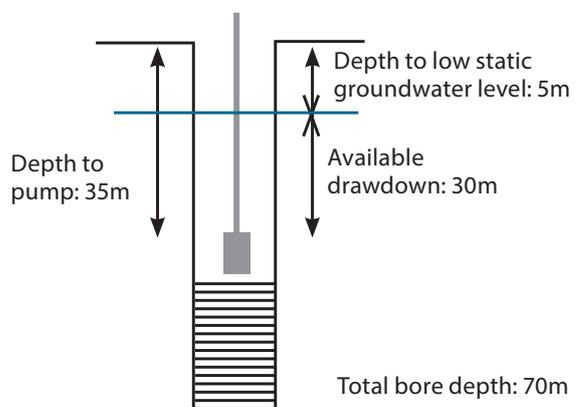
In areas where there are already a number of groundwater abstractions, the cumulative drawdown

effects of these takes, in combination with your take, need to be considered.

Your AEE should describe whether you think the potential effects are likely to be significant or not. For example you might describe a drawdown effect on a neighbouring bore as:

- “Less than minor” if the effect is not likely to be noticed by a neighbouring bore owner.
- “Minor” or “more than minor” if the drawdown effect could be noticed and would potentially lead to an adverse effect on the bore operation.

If the drawdown effect is significant then you might want to consider any actions you can take to mitigate the effect.



8.3 CONSULTATION

If you think there is the potential for an adverse effect on a neighbouring bore, i.e. if you think your neighbour might notice the effect of your pumping, we recommend that you consult with them prior to submitting the consent application.

If you are able to obtain written approval for the potential effects of your proposed groundwater take you may avoid the requirement for notification of the resource consent. More information on this process is given in the Evaluation of Consent Applications to Take Groundwater booklet, available on our website.

9.0 Summary of the Information we can provide

Before preparing your consent application we recommend that you contact us to obtain the following information:

- Confirm whether groundwater and surface water allocation is available in your location.
- Details of existing bores and takes in the area surrounding your proposed take.

We can also assist by providing guidance around the quantity of water you are likely to require for stock water or irrigation.

We can normally provide this information free of charge unless the application is for an unusually large or complex take. Information about these costs can be found in our Annual Plan on our website.

10.0 Further Information

For further information, contact the groundwater team at groundwater@horizons.govt.nz or on freephone **0508 800 800**.

Notes

A series of horizontal dotted lines for taking notes.



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