

MEMORANDUM

To: Amber Smith
From: Amir Levy
Date: 7th June 2024
Re: Bore drilling regulation

Name	Role	Date Completed
Amir Levy	Author	07/06/2024
Sam Yeo	Internal Reviewer	25/10/2023
Brydon Hughes	External Reviewer	24/11/2023

Introduction

Groundwater contamination is a serious risk that can result in significant adverse health, environmental, and economic effects. Contamination of groundwater can result from land use activities (i.e., point and diffuse source discharges) as well as the drilling and use of bores to access groundwater. It is therefore important to ensure that bores are maintained to a high standard in order to reduce the risk of groundwater contamination.

The quality of drilling and bore construction may also impact the pressure integrity of semi-confined or confined aquifers if vertical leakage between separate aquifers can occur in or around the well casing. Otago also has a documented history of inappropriate bore development and subsequent abandonment of bores due to chemically aggressive groundwater which adversely affect the integrity of the bore casing. Specific controls and policies for drilling in confined aquifers were set out in ORC's Regional Plan: Water (RPW). However, these were not implemented by ORC and some have been repealed from the RPW.

These risks to groundwater can be reduced by appropriate siting, construction (both of the bore and the borehead), and maintenance of bores, exercised through ORC's controls on land use activities. This paper summarises the current planning provisions for managing land use related to bores in the RPW and their limitations. It also investigates methods used by other regional councils to address these issues. Suggestions for improving land use activities related to bores in the proposed Land and Water Regional Plan (pLWRP) are then provided, although we do recognise that some of the proposed details still need further refining.

Current RPW provisions

The RPW includes an objective (9.3.3) to maintain the quality of Otago's groundwater. The potential contamination of groundwater due to land use and poor bore construction, operation, and maintenance is described in issues 9.2.3 and 9.2.4 of the RPW. These risks are addressed in the following policies:

- Policy 9.4.14 requires appropriate siting, construction, and operation of new groundwater bores to prevent contaminants from entering the aquifer and prevent aquifer cross contamination (i.e., mixing of water from different aquifers).
- Policy 9.4.17 requires new holes to be appropriately sealed to prevent contaminants from entering any aquifer.

Rules regarding the drilling of bores are found in Chapter 14 (Land Use) of the RPW. The excavation, drilling, or other land disturbance for the purpose of creating a bore is a Controlled activity (Rule 14.1.1.1). ORC restricts its control to the following aspects of the application:

- (a) The location of the bore including its relationship to other bores and other activities
- (b) The planned depth of the bore
- (c) The management of the bore head and maintenance of the bore
- (d) The nature of the bore
- (e) The method of drilling or excavation
- (f) The duration of the resource consent
- (g) The information and monitoring requirements
- (h) Any bond; and
- (i) The review of conditions of the resource consent

Drilling land for a purpose other than bore installation is covered in Rule 14.2.1. This is considered Permitted activity (PA) if the drilling does not occur over aquifers marked in the C-series maps and the hole is filled/sealed on completion of work to prevent contaminants entering the hole (Rule 14.2.1.1). Drilling over an aquifer marked in the C-series map, apart than for the purpose of drilling a bore, is classified as a Controlled activity (Rule 14.2.2.1). The ORC can exercise control over similar matters as those for bore drilling. However, when drilling over a C-series aquifer ORC can also consider the potential for groundwater contamination (Rule 14.2.2.1, [a]).

Limitations of the current framework

A review of the RPW's bore management provisions by the Groundwater Science team highlighted several issues:

- Poor bore security is common across Otago, increasing the risk of groundwater contamination. However, although the RPW contains some good policies for addressing poor bore security and the associated risks of groundwater contamination (e.g. 9.4.14 and 9.4.17), it lacks explicit rules for enforcing proper bore construction, completion, prevention of aquifer cross contamination (i.e., mixing of water from different aquifers), maintenance, security, and decommissioning. Issues with this lack of rules were also raised by the Compliance/Consents

teams, who cannot address insecure bores unless specific consent conditions (which will not be attached to every bore, especially those operating as Permitted activity) are breached.

- Question whether the current status of bore drilling being a Controlled activity is the most suitable approach. Nevertheless, there are additional relevant matters (e.g., contamination potential) that ORC should exercise control over in addition to those specified in the RPW.
- The rules in the RPW regarding drilling (14.1 and 14.2), particularly for a purpose other than drilling a bore, are not clear, especially for users without a technical background.
- The RPW only has a definition in the glossary for bores that are used for taking groundwater. However, this definition excludes bores used for other purposes such as geotechnical investigations or piezometers (monitoring bores used to monitor water levels and/or collect water samples). Although the abstracted volumes from these are very small, contaminants can still enter groundwater through them. Therefore, they should also be managed under bore security rules.

What do other councils do?

To improve bore management in the pLWRP, regional plans from other councils were reviewed. Of these, the approaches of Environment Canterbury (ECan) and Environment Southland (ES) were deemed most applicable to Otago. The following points were noted:

Both councils have a different approach to ORC, with substantially more explicit rules regarding bore construction, security, maintenance, and decommissioning. ECan also has a more lenient activity classification for bore drilling (i.e. Permitted activity) than ORC's Controlled activity status, as long as some conditions are met. Under the ES Plan, for bore drilling to be a Controlled rather than Discretionary activity (i.e., the more lenient classification) the bore design and headworks must prevent the infiltration of contaminants and the uncontrolled discharge or leakage of water to the ground surface or between aquifers (Rule 53). Bores also need to comply with the NZ Drilling Standards and for bores supplying water from an unconfined aquifer the screen must fully penetrate the aquifer.

If applicants cannot meet these, the activities are then classified as the stricter Discretionary activity status (for ES). When bore drilling is considered Discretionary activity, ES can exercise control over more issues than ORC, including:

- The proximity of the bore to surface water;
- Potential contamination sources and existing bores;
- The design and depth of the bore or well;
- The method of drilling or excavation;
- The design and management of the bore head;
- The use, maintenance and decommissioning of the bore or well;
- Information and monitoring requirements; and
- Adoption and implementation of an Accidental Discovery Protocol

Under the ES plan, the use, maintenance, and decommissioning of bores is considered Permitted activity if the following conditions are met: The bore or well design and headworks prevent:(1) the infiltration of contaminants; and (2) the uncontrolled discharge or leakage of water to the ground surface or between aquifers. When these activities fail to meet these requirements, they are classified as Discretionary.

ECan also has a similar approach to ES, where activities related to the installation, maintenance, and use of bores that meet certain requirements for bore construction and security (e.g., prevention of screening more than one aquifer to avoid cross-connection, minimum screen depth, submission of bore details, location, and geological log to the council) fall under less stringent classification (Rule 5.103). The ECan bore security rules also have specific requirements regarding bore caps and sealing. Monitoring bores also have specific requirements regarding bore security (capping, concrete apron around the bore head, sealing) and submission of information to the council in the ECan plan (Rule 5.104).

ECan also has an accredited Bore Installation Programme (BIP) where bores installed by accredited drillers can take place as a Permitted activity. The requirements for drillers under the BIP include pre-drilling investigation for various potential issues (e.g., contaminated sites, Rūnanga Sensitive Areas and archaeological sites, flood/drainage works, existing abstraction and monitoring bores, springs), following the drilling standards and cultural protocols, and submission of bore information to the council when completed. Further information regarding the BIP can be found in <https://www.ecan.govt.nz/do-it-online/resource-consents/crc-bore-installers-programme/>.

However, it is important to note that the pre-drilling background information is available and accessible from the ECan site, which is usually not the case for ORC, where the databases are less up to date.

Proposed changes for the pLWRP

- Include definitions in the LWRP that will enable ORC to manage the activities it wishes to such as all structures for investigating, monitoring, abstracting and discharging to ground (e.g., bores, piezometers, geotechnical bores) and exclude or have separate rules as needed.
- Have explicit rules regarding proper bore construction, use, security, and decommissioning. It is also important to note that the Groundwater Science team, alongside Compliance and Consents, have revised the ORC consent conditions for bore drilling. These revisions include specific details, hence the rules in the pLWRP can be relatively generic, similar to those of ES. As a bare minimum, all bores should comply with the New Zealand Drilling Standards NZS:4411 or any standard that supersedes it. However, the above changes should substantially improve bore security in Otago.
- Add the following matters of consideration for Controlled activities:
 - The proximity of the bore to surface water;
 - Potential contamination sources and existing bores;
 - The design & management of the bore headworks, casing, depth, and screen (including construction materials). This includes specifying using corrosion-resistant casing material in areas of Otago with known artesian groundwater conditions such as the Papakaio aquifer, lower Taieri, and deep bores in the Maniototo Tertiary aquifer;
 - The use, maintenance and decommissioning of the bore or well;
 - Adoption and implementation of an Accidental Discovery Protocol and cultural sensitive sites; and
 - Any other considerations
- Determine whether Controlled activity is the best activity status for bore drilling – should it always be granted? This should be discussed with Consents and Compliance.
- Include definitions for bores and piezometers in the pLWRP. Piezometers should have security requirements similar to bores in order to prevent groundwater contamination. There should

also be a requirement that any information obtained following the drilling of piezometers (e.g. bore logs, depth to water) is supplied to ORC.

- In the future, ORC should aim to establish an approved drillers programme (similar to ECan's BIP), which would also improve efficiencies as drillers will directly upload bore information into the ORC/WellsNZ (national wells database). However, this requires extensive background work of establishing, training, auditing, and providing online information which is likely to be beyond the scope of the pLWRP. Nevertheless, the ORC should aim to have a BIP in the future.

References

Environment Canterbury (2018). *Canterbury Land and Water Plan volume 1*. Accessed online August 2021. <https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-land-and-water-regional-plan/canterbury-land-and-water-regional-plan/>

Environment Canterbury (2021). Bore Installer Programme. Accessed online October 2021. <https://www.ecan.govt.nz/do-it-online/resource-consents/crc-bore-installers-programme/>

Environment Southland (2018). Southland Water and Land Plan. Accessed online August 2021. <https://www.es.govt.nz/about-us/plans-and-strategies/regional-plans/proposed-southland-water-and-land-plan>

Otago Regional Council (2004). Regional Plan: Water. Accessed online August 2021. https://www.orc.govt.nz/media/10040/regional-plan_water-for-otago-updated-to-1-june-2021-final-17-june.pdf