

## **Baseline Water Quality in Private Drinking Water Wells on the Avalon Peninsula of Newfoundland**

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### **Background:**

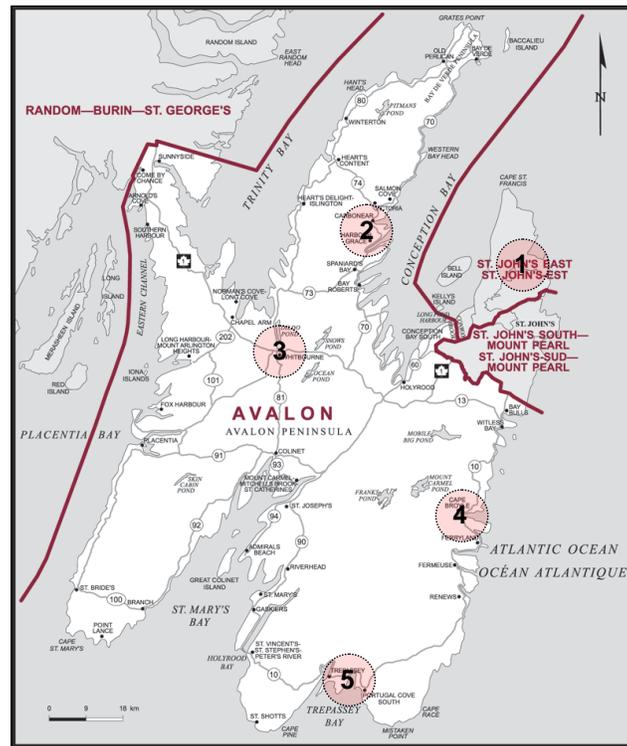
Private water wells are generally the well owner's responsibility. However, residents need to be fully aware of best management practices for private wells for the sake of their health and the state of groundwater quality. Baseline water quality data from private wells provides a valuable source of information regarding provincial groundwater resources – a vital source of drinking water for the province, given that approximately 30% of Newfoundland & Labrador residents depend on groundwater.

After a recent study conducted throughout seven rural communities on the west coast of Newfoundland, it was found that some private groundwater wells had gone untested for more than 30 years, many of which yielded water quality results in excess of Canadian drinking water quality guideline (CDWQG) standards (Sarkar et al., 2012). Notably, these wells are the only source of drinking water available for most residents in rural communities across the province. Therefore, it is necessary to develop and implement a reconnaissance study relating to the state of provincial groundwater resources and the quality of drinking water from private wells.

### **Scope of Proposed Research:**

With the exception of bacteriological water quality testing, it is believed that very few well owners across the province are testing their drinking water for other forms of contamination (i.e., physical parameters, major ions, nutrients, and metals). Private groundwater supplies need to be evaluated in order to assess current drinking water quality and to protect both existing and future wells from potential contamination. This reconnaissance study will assess baseline water quality in private drinking supplies and will take bedrock geology and demand for groundwater resources into consideration.

Drinking water samples will be collected from five regions situated in the same hydrogeologic setting across the Avalon Peninsula of Newfoundland, with each region consisting of two communities (see Fig. 1 and Table 1). Notably, Region 1 (towns of Torbay and Flatrock) has had a long history of habitation and residents of the northeast Avalon have always relied on groundwater from wells (both dug and drilled) as their supply of drinking water. Communities on the northeast Avalon are currently experiencing rapid population growth and expansion, particularly in areas within commuting distance to St. John's. The towns of Torbay and Flatrock were specifically chosen for investigation as they have a large combined population (8,854 residents) and are quickly expanding as a result of their close proximity to St. John's, with an average population increase of 18.9% from 2006 to 2011 (Statistics Canada, 2011 Census Profile). The majority of these developments are for unserviced lots, where groundwater from private wells is the main source of water supply. To date, there has been no systemic data collection to address the baseline water quality of these supplies, nor has the effect of increased density and water-use demands been evaluated.



**Figure 1:** The five regions selected for baseline water quality investigation (located within the same hydrogeologic setting) on the Avalon Peninsula of Newfoundland.

The selection of wells to be sampled from all five regions will be further constrained by locating wells within the same hydrogeologic setting, and overlying the same bedrock formations. Bedrock Hydrostratigraphic Unit 1 (Low to Moderate Water Yield – Late Neoproterozoic Siltstone and Shale Strata) from the report “Hydrogeology of Eastern Newfoundland” (AMEC, 2012, In-press) will be used to delineate the sampling areas within these five regions. Both drilled and dug private wells will be identified and sampled for the full-suite of drinking water parameters, including bacteria (e.g., total coliforms, *E. coli*), physical parameters, major ions, nutrients, and metals. Sampling will occur both in the summer and fall in order to evaluate seasonal variations in water quality from these supplies. In order for the results of this study to be statistically significant, it is best to sample wells located in a similar hydrogeologic setting, as well as distribute samples according to population and, hence, demand. A minimum of 100 samples would be required; therefore, 128 drinking water samples distributed according to the test conditions are adequate. Table 1 shows the distribution of sample numbers and sampling seasons.

Region	Communities	Population	% Total <sub>Pop</sub>	Season	Well Type	# Samples
1	Torbay and Flatrock	8,854	45.1	Summer	Drilled Dug	10 10
				Fall	Drilled Dug	10 10
2	Harbour Grace and Carbonear	7,870	40.1	Summer	Drilled Dug	8 8
				Fall	Drilled Dug	8 8
3	Whitbourne and Blaketown	1,427	7.3	Summer	Drilled Dug	6 6
				Fall	Drilled Dug	6 6
4	Cape Broyle and Calvert	761	3.9	Summer	Drilled Dug	4 4
				Fall	Drilled Dug	4 4
5	Portugal Cove South and Trepassey	730	3.7	Summer	Drilled Dug	4 4
				Fall	Drilled Dug	4 4
<b>Totals:</b>		<b>19,642</b>	<b>100.0</b>			<b>128</b>

**Table 1:** Total number of water samples that will be taken and analyzed for bacteriological, organic, and inorganic parameters of public health importance.

Homeowners will be provided with a detailed summary of the quality of their drinking water as sample results become available. In the event of unsatisfactory results (i.e., one or more water chemistry parameters exceed CDWQG standards), homeowners will be contacted by an environmental health officer and a recommendation will be made as to what can be done to improve drinking water quality. Once all sample results have been obtained (both summer and fall) and all water chemistry data has been compiled and analyzed, a project summary report will be written to highlight the findings. This summary report will not contain the names, addresses, or any other form of private information of any homeowners for confidentiality purposes. Following completion of the Avalon Peninsula, it is anticipated that the scope of this project will be expanded to incorporate other areas of the province (i.e., Central Newfoundland, Western Newfoundland, and Labrador) in order to develop a more complete understanding of the state of provincial groundwater resources and the quality of drinking water from private wells. This will involve indentifying both drilled and dug private wells located in similar hydrogeologic settings in different regions and communities across the province.

**Summary:**

*WHO:* Residents of the Avalon Peninsula of Newfoundland who depend on private groundwater wells as their source of drinking water.

*WHAT:* Drinking water quality of drilled and dug private water wells.

*WHERE:* The Avalon Peninsula of the island portion of the province (with particular emphasis on the northeast Avalon as it has a high density of groundwater wells and the highest current demand for the resource).

*WHEN:* Water well sampling will take place during the summer and fall of 2013.

*WHY:* Glean a greater knowledge of the quality of groundwater resources being used for private drinking water consumption in the province.

*HOW:* Analyze water samples for physical and chemical parameters with human health implications through a laboratory accredited by the Canadian Association for Environmental Analytical Laboratories.

**Contact information:**

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