



Drinking water in our region includes groundwater from municipal and private wells. Treated surface water from Lake Huron is also a source of drinking water for many local hamlets, villages and towns.

Groundwater moves through soil and bedrock into aquifers, which are underground formations that carry water downward or horizontally. Since it is hard to see these structures underground, we can only infer the source of water for individual monitoring wells. The flow of water underground does not relate to watershed boundaries at the surface so grades were assigned to each monitoring well instead of each subwatershed.

The Provincial Groundwater Monitoring Network (PGMN) is a partnership program between the Ontario Ministry of the Environment, Conservation and Parks and conservation authorities. Groundwater level

and water quality information for Ontario's key aquifers is collected through the PGMN. Many aquifers exist throughout our area and some being quite localized. It is important to monitor private drinking water wells regularly even if a nearby monitoring well meets drinking water standards. For this report, two indicators were used to assess groundwater quality: nitrate (in the forms of nitrate and nitrite) and chloride.

Concentrations of nitrate may reflect local geological conditions. In addition, runoff from fertilizer and manure applications and faulty septic systems can contribute to increased concentrations of nitrate.

The Ontario Drinking Water Quality Standard (ODWQS) for nitrate (nitrate and nitrite) is 10 mg/L. Concentrations above this standard can potentially cause a harmful condition in infants less than six months old (Ontario Ministry of Health and Long-Term Care 2018).

High chloride concentrations can occur naturally, which can be related to the type of rock in contact with the water. High chloride concentrations can also come from human sources, such as road salt. Sodium chloride (salt) in drinking water is generally not considered harmful for consumption but water may have a salty taste at concentrations above 200 mg/L (Health Canada 2008).

Methods

Sampling and water chemistry analysis occurred once per year at 14 PGMN monitoring wells (Map 7). Most but not all subwatersheds have at least one monitoring well within their boundaries. Conservation Ontario (2022) recommends using the 75th percentile concentrations of nitrate and chloride over a minimum of a ten-year period. Given the sensitivity of the drinking water resource, ABCA used

the maximum concentrations of nitrate or chloride instead of the 75th percentile. Two grading categories were used, with a monitoring well receiving either an 'A grade' or 'Less than A grade' (Table 6). We hope this reporting approach informs people of issues that may impact their own wells near a monitoring well.

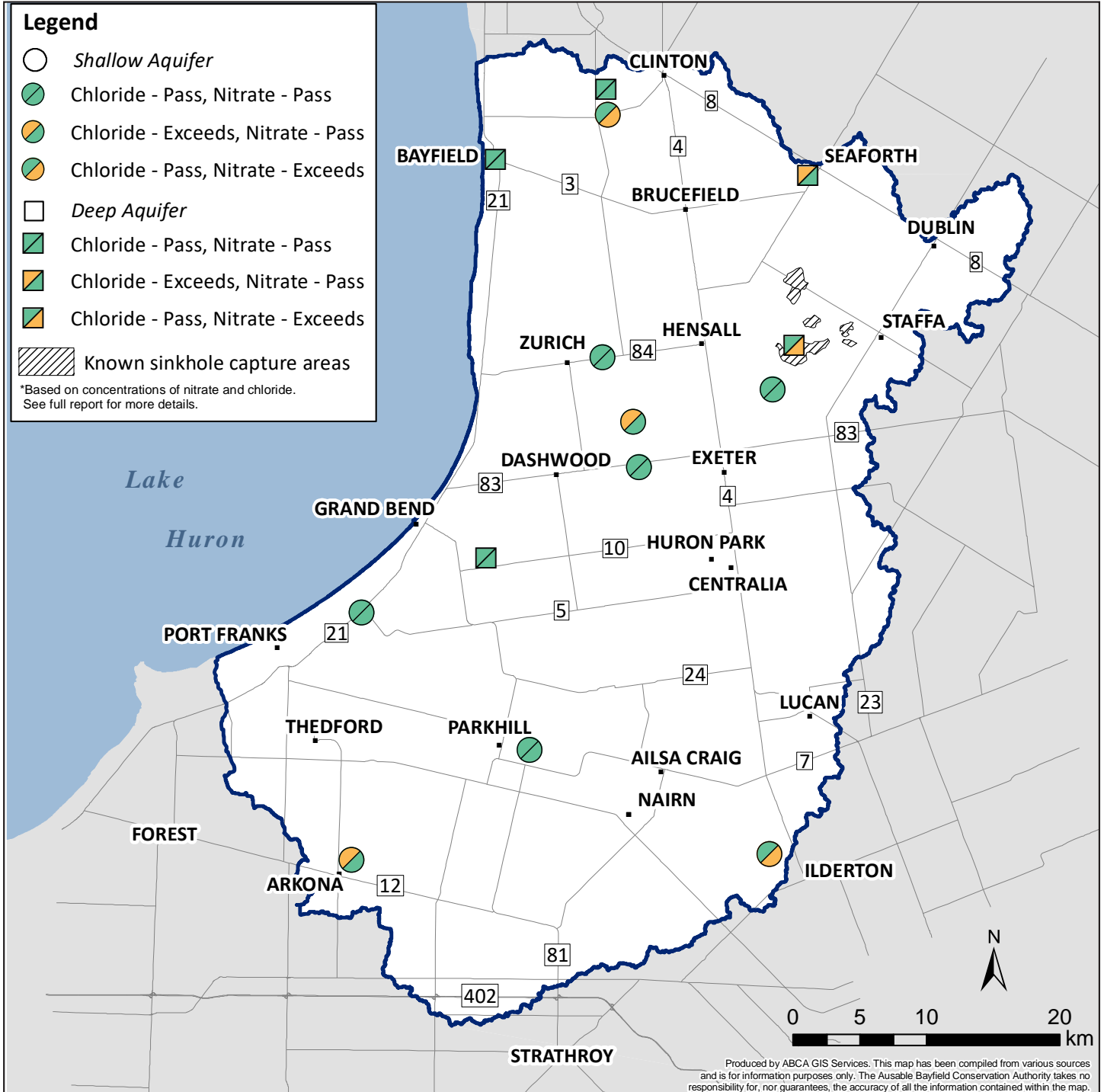
Results - Nitrate

Although three wells received a 'less than A grade' due to concentrations of nitrate, most of the provincial monitoring wells came close to the detection limit (0.05 mg/L) most of the time (Map 7). The concentrations of nitrate at the well near Staffa ranged from 6 to 9 mg/L over the period of record (2007-2021). It is likely that high concentrations of nitrate in this well are a result of surface water contamination through nearby sinkholes. The TR9 shallow well, near Clinton, exceeded the ODWQS for nitrate six times over the fifteen-year period, indicating potential surface water contamination (Table 7). Concentrations of nitrate at the Nairn well were not close to the ODWQS, but they were above the barely detectable concentrations of nitrate found at most monitoring wells.

Table 6. Groundwater quality indicator scoring and grading for monitoring wells (adapted from Conservation Ontario 2017).

Nitrate* (mg/L)	Chloride (mg/L)	Grade
0-2.5	0-62.5	A
2.6-5.0	62.6-125.0	Less than A
5.7-7.5	125.1-187.5	Less than A
7.6-10.0	187.6-250.0	Less than A
>10.0	>250.0	Less than A

*Nitrate = Concentrations of nitrogen that are in the form of nitrate and nitrite.



Map 7: Groundwater quality conditions at the 14 provincial monitoring wells in the Ausable Bayfield Conservation Authority area.

Table 7. Groundwater monitoring wells in the Ausable Bayfield Conservation Authority (ABCA) area that received a 'less than A grade' for nitrate or chloride concentrations.

Well Name (Nearest Urban Area)	Type of Well	Indicator with 'less than an A grade'	Maximum Concentration between 2007-2021	Standard or Guideline
Sinkhole (Staffa)	Deep	Nitrate	9.7 mg/L	10.0 mg/L
TR9 (Clinton)	Shallow	Nitrate	18.3 mg/L	10.0 mg/L
Nairn (Nairn)	Shallow	Nitrate	4.6 mg/L	10.0 mg/L
Seaforth	Deep	Chloride	363.0 mg/L	250.0 mg/L
Rock Glen	Shallow	Chloride	90.0 mg/L	250.0 mg/L
Parkhill (Parkhill)	Shallow	Chloride	84.8 mg/L	250.0 mg/L
Hay 2 (Exeter)	Shallow	Chloride	93.5 mg/L	250.0 mg/L

Results – Chloride

The Rock Glen well near Arkona had chloride concentrations that ranged from 70 to 90 mg/L from 2007 to 2021. These values were typically higher than what was observed at the other monitoring wells (i.e., close to 10 mg/L). The Parkhill well also received a 'less than A grade' for a chloride reading of 85 mg/L in 2011. The Seaforth well exceeded the guideline five times over the 15-year period, with four of the five exceedances occurring in the past five years. A well near Exeter, in the Black Creek subwatershed, received its first 'less than A grade' for a chloride concentration of 93.5 mg/L in 2020. Two out of the six wells that did not receive an 'A grade' are deep bedrock wells (Table 7), demonstrating that deep wells are not precluded from contamination.

Improving Groundwater Quality

Groundwater is expensive and difficult (if not impossible) to clean up, so prevention of contamination in the first place is

far preferable to clean up. While some industrial and agricultural activities have the potential to contaminate groundwater if not properly managed, households are also an important source of potential groundwater contamination (Environment and Climate Change Canada 2017). Properly maintaining wellheads and reducing nutrient inputs into surface water limits the potential for contaminants to reach groundwater sources.

Groundwater from wells is the municipal drinking water source in Brucefield, Clinton, Seaforth, Zurich, and Varna. Learn about your municipal well or intake: www.sourcewaterinfo.on.ca

If you have a private well, remember to test your drinking water in spring and autumn. For resources about water testing and well protection tips visit:

www.ogwa.ca/well_water_testing.php

Visit abca.ca for more information on water well stewardship. Grants may be available to help upgrade or decommission wells.