

Village of Madoc Drinking Water Source - System Summary

Drinking Water from a Municipal Well

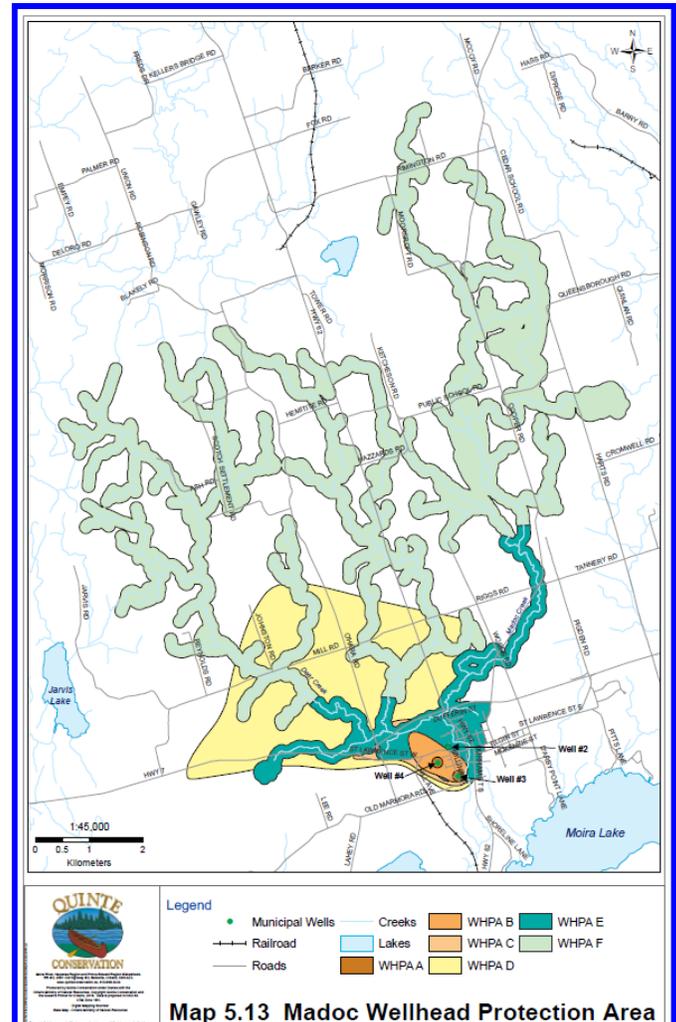
Groundwater is the source of drinking water for the Village of Madoc in the northern portion of the Municipality of Centre Hastings. The Village, with about 1,500 residents sits along the southern fringe of the Canadian Shield. There is a mix of commercial, residential, open space, and industrial land use in the Village and beyond are agricultural lands and undeveloped areas along with some commercial, residential, and industrial land use including active mining operations. Water supply to the village is provided by two wells and sewage disposal is by municipally owned sewage lagoons at the south end of the community. Well numbers 2 (commonly referred to as the Whytock well) and 3 (commonly referred to as the Rollins Well) were used for supply to the Village at the time the Assessment Report was prepared. Due to insufficient yield and natural water quality problems with Well number 2, Well number 4 was installed as a replacement and Well number 2 was decommissioned. Both wells 3 and 4 are near Deer Creek and are considered Groundwater Under the Direct Influence of surface water or 'GUDI' wells. Well number 3 was drilled in 2006 to a depth of 49 metres. Well number 4 was drilled in 2016 into a Precambrian bedrock aquifer to a depth of 81.6 metres.

Vulnerable Areas

Through the science of the Assessment Report, (available at www.quintesourcewater.ca) zones were mapped that show which areas surrounding the wells are most vulnerable to pollution and contamination. These are called Wellhead Protection Areas (WHPAs) and include the land above and below ground where land use activities could affect the quality of water flowing toward the well. The location and size of a WHPA is determined in part by the direction the groundwater moves, the speed/rate it moves, and the volume of water that is pumped from the wells. There are six zones of vulnerability:

- **WHPA A** is a 100 metre radius around the well.
 - **WHPA B** is the zone in which it would take a contaminant 2 years or less to reach the well; the two year time of travel zone.
 - **WHPA C** is the 5 year time of travel zone.
 - **WHPA D** is the 25 year time of travel zone.
- WHPAs E & F** are defined where a surface water body may influence the well.
- **WHPA E** is the zone in which a contaminant could travel, in 2 hours or less, from a surface water body to the well.
 - **WHPA F** is the area that contributes water to the surface water body affecting the well.

These zones were revised and approved in 2019 to incorporate the addition of Well number 4 and removal of Well number 2 within the municipality's drinking water system.



Vulnerability Scores

Vulnerability scores help to quantify how vulnerable the drinking water source is to contamination. Scores are calculated based on the ground conditions around the well, taking into account how contaminants might move. An area with a higher vulnerability score is more likely to allow contaminants from that area to reach the wells. The vulnerability score of the highest concern is 10. The vulnerability scores for the Madoc wells are: **WHPA A & B = 10, WHPA C = 8, WHPA D = 6, WHPA E = 8.1.** No score is assigned to WHPA F as this zone is only used to identify potential water quality threat issues.

Drinking Water Issues

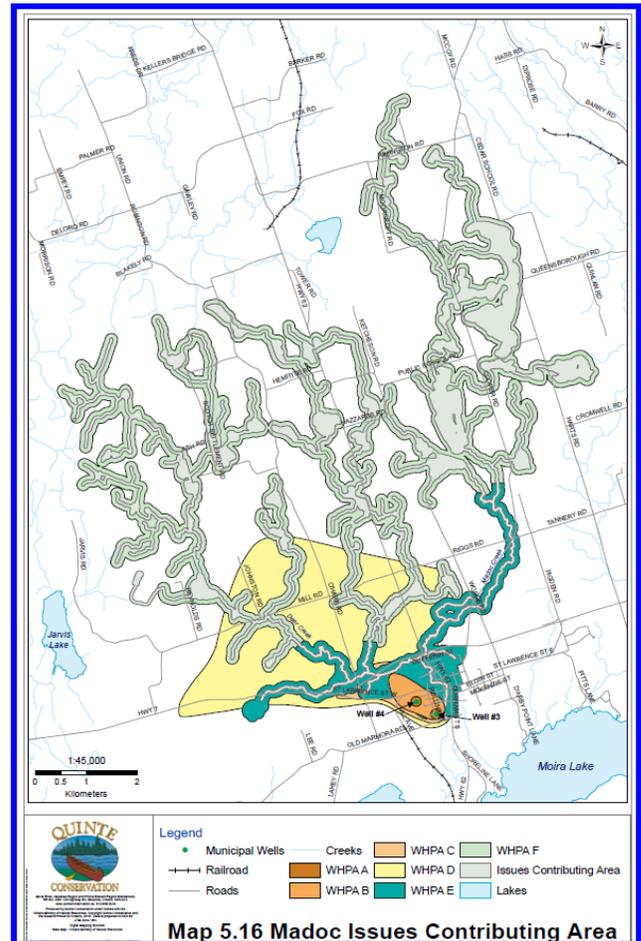
Drinking water issues are chemicals or bacteria in the untreated water that exceed allowable values. The raw water quality data that represent conditions at the Madoc wells was screened to identify issues in the source water. A 4-step screening process identified that *E. coli*, Total Coliform and Organic Nitrogen are issues for the Madoc well supply. Since the three parameters have both natural and human sources, a more in depth study, particularly in the WHPA F, was required to track these sources of contamination. This work was undertaken in 2013. This resulted the identification of an 'issues contributing area', a 30 metre setback zone along Deer and Madoc Creeks, within the WHPA E and F, (see map, right). Within this area 14 significant threats from septic systems and 44 from agricultural operations were identified.

Drinking Water Threats

Threats to the drinking water source within the WHPAs were evaluated. These threats are based on the categories prescribed by the Ministry of the Environment, Conservation and Parks. Threats were inventoried by field observations, air photos and satellite images, existing databases and landowner contact. The threats were then ranked as significant, moderate or low. The updated Wellhead Protection Area resulted in the removal of 29 threats on the landscape due to the smaller size of the zone and a shift to the west, away from the core business area. One or more of 10 significant threat types were identified on 35 parcels of land. Of this total 42 significant threats are associated with groundwater vulnerability based threats, and 19 are associated with surface water vulnerability based threats. Identified threat types to the Madoc wells are:

- application of agricultural source material to land (manure)
- handling and storage of fuels (heating oil and agricultural)
- storage of agricultural source material
- use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard
- residential and commercial septic systems
- municipal sanitary sewers
- application of commercial fertilizer to land
- storage or handling of DNAPLs (dense non-aqueous phase liquid: examples are: solvents, paint thinners, antifreeze, creosote etc.)
- application of pesticide to land on areas greater than 1 hectare
- waste disposal site (storage of waste oil)

No threats have been identified based on the presence of any past land uses or pre-existing conditions. Moderate and low threats are shown in tables in the Assessment Report.



Note: The Village of Madoc wells are located within the Municipality of Centre Hastings and several of the vulnerable areas for the wells extend into the adjacent municipality, the Township of Madoc.

Source Protection Plans

The Approved Quinte Region Source Protection Plan includes policies, developed by the Source Protection Committee in consultation with the local community. The 63 policies in the plan address the drinking water threats identified in the science-based Assessment Report. The Assessment Report, identified the vulnerable areas surrounding the 11 municipal drinking water sources in the Quinte Region and ranked the threats as significant, moderate or low.

The source protection planning process is governed by the *Clean Water Act, 2006* and directed and funded by the Ontario Ministry of the Environment, Conservation and Parks. The Quinte Region Source Protection Plan comes into effect January 1, 2015. **The effective date for policies within the amended wellhead protection area is September 16, 2019.**

For more information, including the complete Assessment Report and the Source Protection Plan, visit:

www.quintesourcewater.ca



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