

Town of Caledon

Supplemental Aggregate Resources Policy Study

Hydrogeology Considerations

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ENVIRONMENTAL AND WATER RESOURCE CONSULTANTS

Overview

1. **Christopher Neville profile**
2. **Questions for the hydrogeologist**

Christopher Neville profile

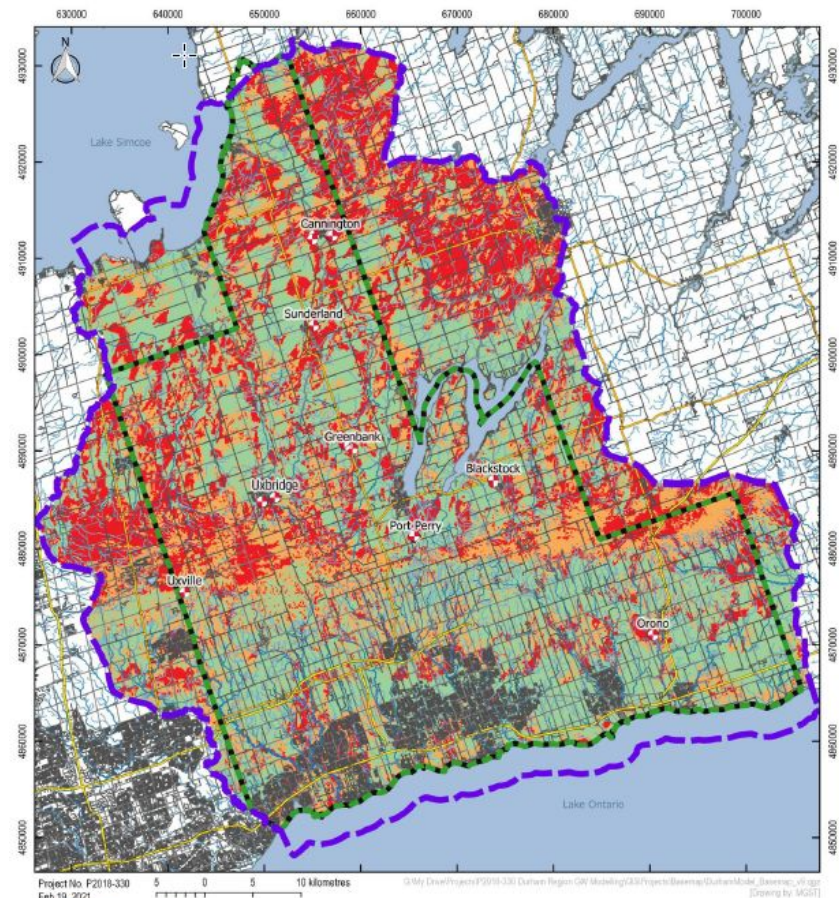
- Professional engineer with advanced training in hydrogeology
- 35 years of professional practice in hydrogeology
- Expertise in the interpretation of data and the analysis of groundwater flow
- Extensive experience in the development and protection of groundwater resources
- Extensive experience in impact assessments for quarries: Nelson (Burlington), Tremaine Road, Acton, Duntroon, Flamborough, Milton-Dufferin, and Nelson again

Questions for the hydrogeologist

1. Highly Vulnerable Aquifers

How much “natural” protection do the aquifers have?

Vulnerability is assessed in terms of groundwater travel time from the ground surface to the aquifer.



**Groundwater Modelling Update To Meet
Source Protection Requirements**
REGION OF DURHAM

LEGEND

- Lakes
- Watercourses
- Durham 2019 Study Area
- Municipal Boundary
- Municipal Supply Well

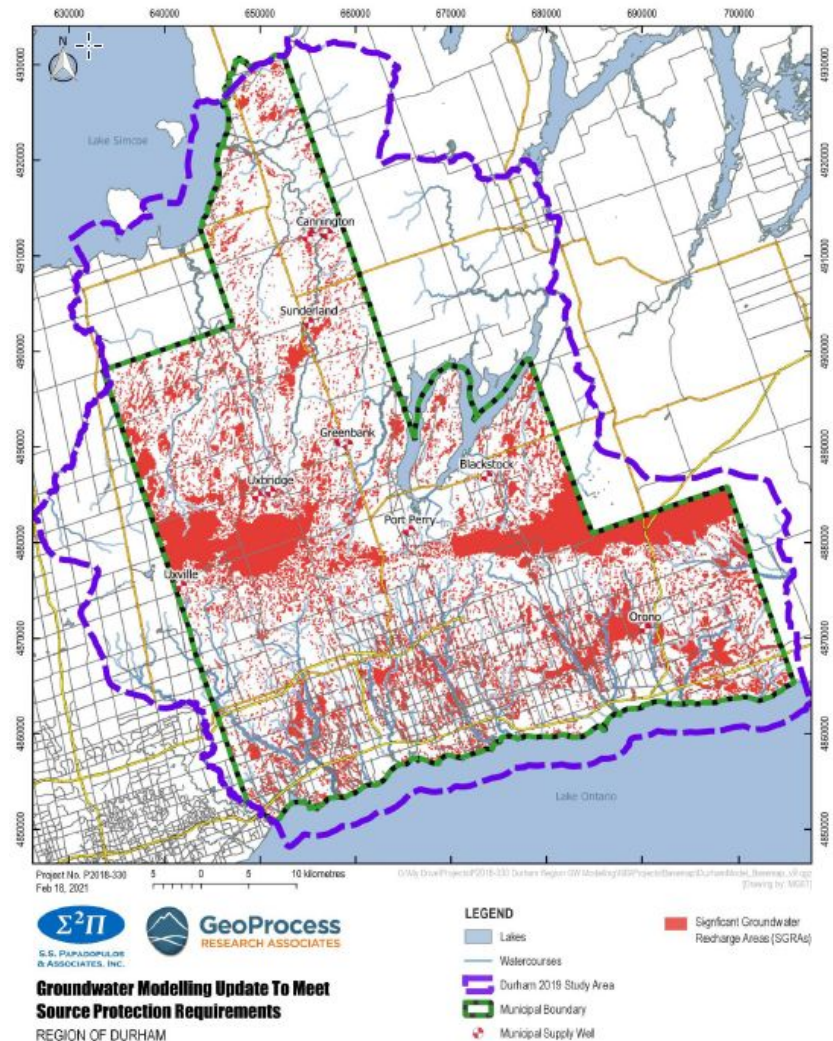
- Aquifer Vulnerability
(SAAT = UZAT + WAAT)**
- Low
 - Moderate
 - High

Questions for the hydrogeologist

2. Significant Recharge Areas

Where do the aquifers obtain most of their recharge?

According to Technical Rule 44(a), A Significant Recharge Area is an area over which the annual recharge exceeds the regional average by 15%.



Questions for the hydrogeologist

3. High discharge areas

This concept is not referred to in the Source Water Protection regulations of the Clean Water Act, but ...

It is generally accepted in Ontario that proposed groundwater takings should not exceed 10% of the estimated groundwater discharge to streams (that is, 10% of the estimated stream baseflow).

Questions for the hydrogeologist

4. Seeps and springs

I am not aware of any specific regulations related to the protection of seeps and springs, but ...

The necessary steps in assessing a proposal include:

- Identifying the groundwater resources that may potentially be affected;
- Identifying the potential impact to those resources in the resources are not protected; and
- Establishing the mitigation measures to ensure that the resources are protected.

Questions for the hydrogeologist

5. Infiltration trenches

Infiltration trenches are not different in concept from recharge wells. Provided they are designed properly, monitored and maintained, they are an established and effective way of getting water back in the ground.

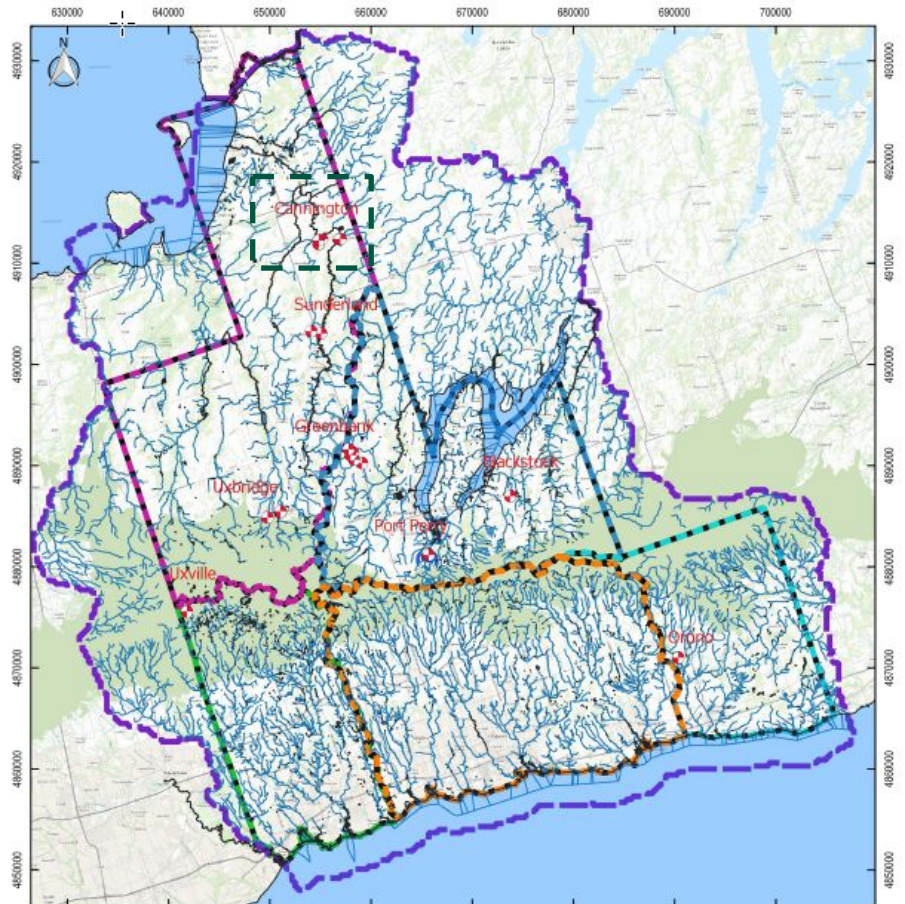
Where land access is available, infiltration trenches have the advantage of having more predictable performance than recharge wells.

Questions for the hydrogeologist

6. Wellhead protection areas

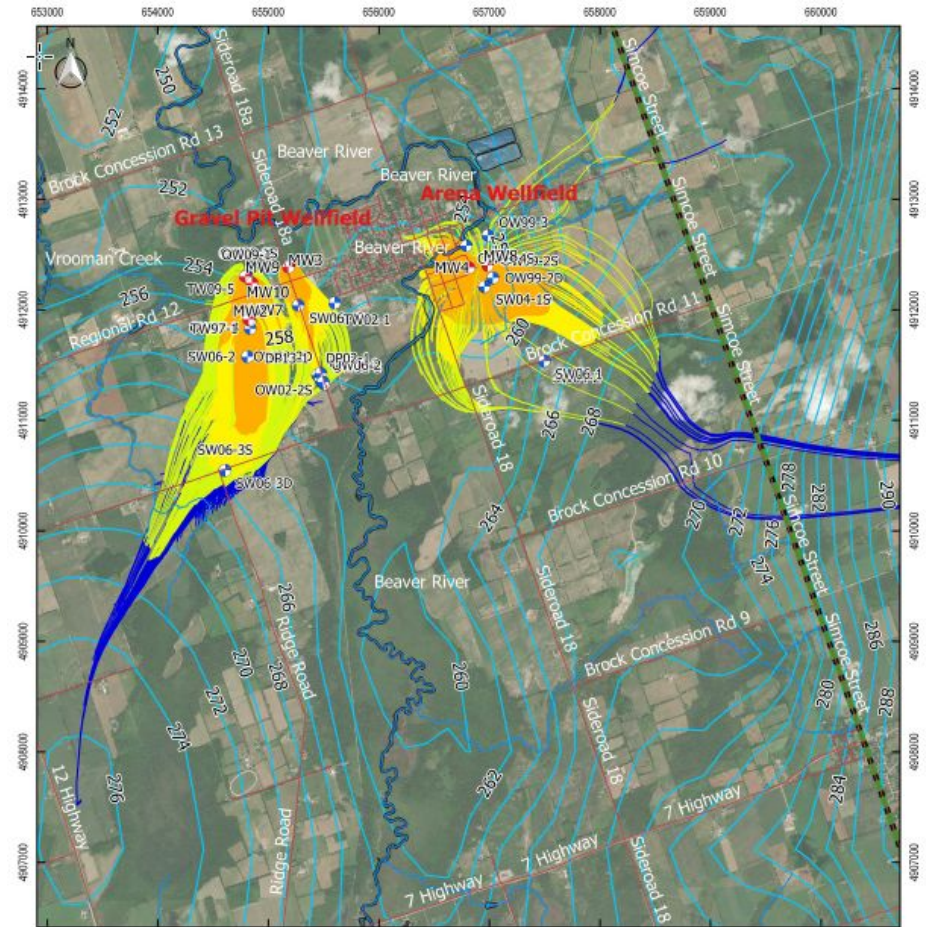
Where does the water pumped from a municipal production well come from?

Example:
Durham Region well fields



Cannington, Durham Region

Wellhead protection areas are delineated based on groundwater travel times to production wells (2 years, 5 years, 25 years).



Groundwater Modelling Update To Meet Source Protection Requirements
REGION OF DURHAM

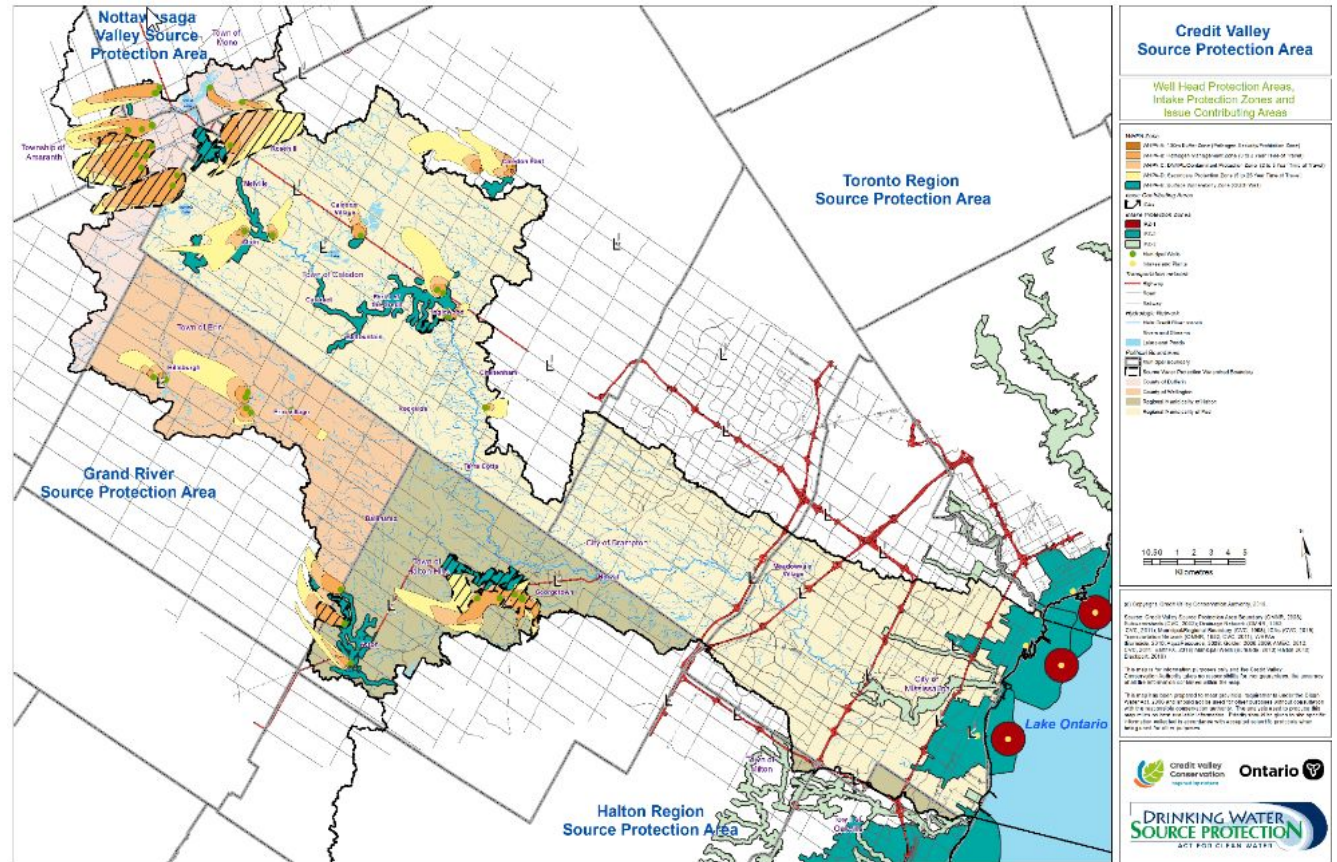
LEGEND

- Municipal Production Wells
- Municipal Monitoring Wells
- Municipal Boundary
- Streams and Rivers
- Road Network
- Water Bodies
- Simulated Water Levels in Bedrock (mas)
- 2-Year Time of Travel
- 5-Year Time of Travel
- 25-Year Time of Travel
- Tracking to Termination

Questions for the hydrogeologist

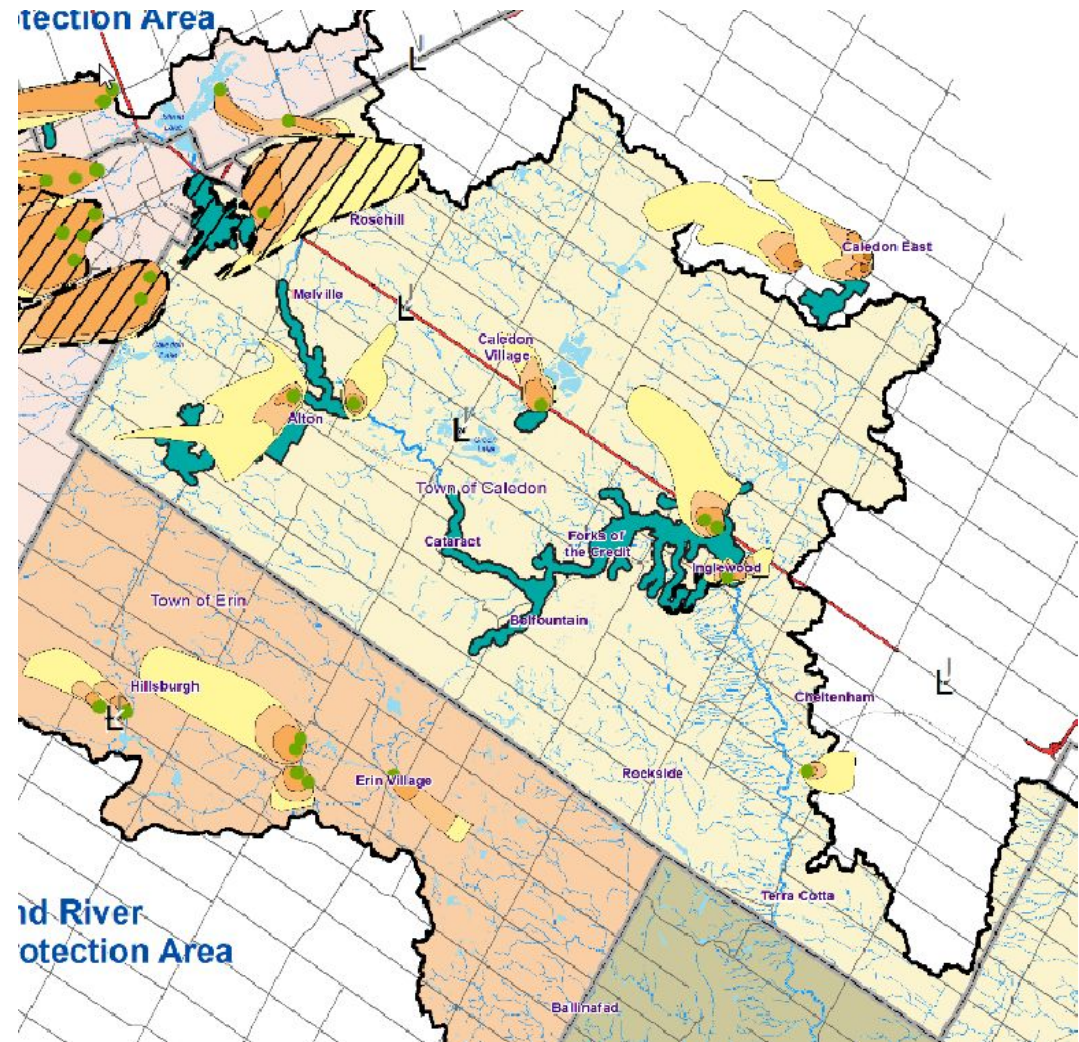
6. Wellhead protection areas (2)

How might this relate to Caledon and aggregate extraction?



Aggregate extraction within:

- a WHPA is a direct threat to water quality.
- within the area of a Highly Vulnerable Aquifer is a potential threat to water quality.
- within a Significant Recharge Area is a threat to long-term security of supply.



Key considerations in groundwater impact assessments

- Identification of the groundwater resources that must be protected
- Understanding of existing conditions (baseline)
- Threats to the groundwater resources
- Design elements that eliminate threats
- Mitigation measures
- Demonstration of feasibility of mitigation measures
- Adaptive Management Plan
 - Monitoring
 - Triggers for mitigation measures
 - Closure