

Protection Starts at the Source



WHERE AREAS AROUND YOUR MUNICIPAL WELL ARE VULNERABLE...

WHERE ACTIVITIES HAVE THE POTENTIAL TO HARM YOUR COMMUNITY'S DRINKING WATER...

LOCAL PLANS HELP ENSURE PROPER MANAGEMENT WILL REDUCE RISKS.

A Multi-Barrier Approach to Protect Your Drinking Water Sources

The multi-barrier approach creates several barriers of protection for the water you and your neighbours drink. It starts with **drinking water protection at the source**. This preventive approach, for human health, includes **monitoring** and **distribution** and three Ts:

THREE Ts:

- Treatment
- Testing
- Training

ASSESSMENT REPORTS SHOW:

- Where the municipal wellheads and intakes were vulnerable
- How vulnerable they are, and what types of chemicals, pathogens and bacteria, and activities (such as septic systems; fuel storage; pesticide application) could pose risks to drinking water sources in vulnerable areas.

How is vulnerability of different areas measured?

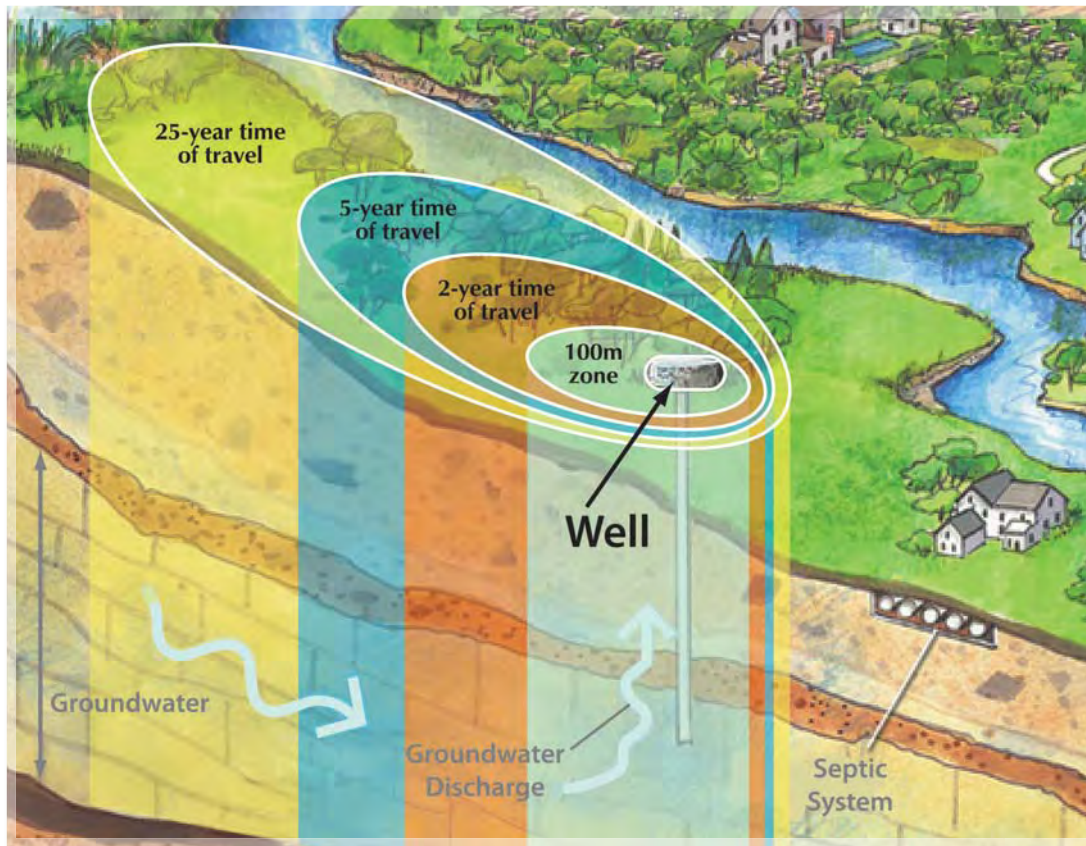
An aquifer is an underground area of porous, permeable soil or rock – almost like a sponge – that has enough water inside it to support a well. Shallow aquifers exist in the overburden, the sedimentary rock and soil above bedrock. Bedrock aquifers are found in the bedrock itself, under overburden. A water-bearing layer (or several layers) of rock or sediment capable of yielding supplies of water; typically consists of unconsolidated deposits of sandstone, limestone or granite, and can be classified as confined, unconfined or perched. The water in an aquifer is called groundwater. An aquifer vulnerability index shows, using

numbers, the intrinsic or inherent vulnerability of underground water sources (aquifers) and their susceptibility to contamination by measuring the thickness of overlying layers and how easily it allows water to flow (how 'porous' it is and how 'permeable'.) The AVI is a numerical indicator of an aquifer's intrinsic or inherent vulnerability to contamination expressed as a function of the thickness and permeability of overlying layers. Wellhead protection areas (WHPAs) are divided into rings called time-of-travel zones. The innermost zone is a 100-metre circle. The other zones are set at times of travel of two years, five years, 10 years, and 25 years.



Visit sourcewaterinfo.on.ca for more information.

Where are municipal wells vulnerable to contamination?



WHERE CAN ACTIVITIES POSE GREATEST RISK TO MUNICIPAL DRINKING WATER?

- Wells draw water from underground.
- Water fills cracks in bedrock or spaces between grains of sand, gravel, or dirt.
- Water from rain and melting snow soaks into the ground. This replenishes or recharges these underground aquifers.
- Sometimes, the travelling water also carries pollutants. It can take years, or even decades, for water to reach a well. The speed depends on the what kind of soil and bedrock is there.
- There may also be direct pathways to the aquifer, such as an old well.

WHAT IS VULNERABILITY?

Vulnerability describes how easily a municipal well or intake can become polluted with a contaminant. If an activity is happening close to a well, the well may be vulnerable. The type of soil or ground may make a well more vulnerable to the travel of pollution. Pathogens including bacteria, and chemicals, can harm human health. That is one of the reasons we need to manage activities around municipal wells – especially where those wells are vulnerable.

To determine the vulnerability score for a well, researchers answer the questions, 'How quickly does water move horizontally through the aquifer to the well?' and 'How quickly does water move vertically from the surface down to the aquifer?' (This is called 'intrinsic vulnerability'.) The answers to the two questions are combined to come up with vulnerability scores on a 10-point scale for all the land within wellhead protection areas for every well. For example:

- A score of 8 or 10 for an area with high vulnerability
- A score of 6 for moderate vulnerability
- A score of 4 for low vulnerability

WHAT ARE VULNERABLE AREAS?

Vulnerable areas under the *Ontario Clean Water Act, 2006* are:

- Significant groundwater recharge area (SGRA)
- Highly vulnerable aquifer (HVA)
- Surface water intake protection zone (IPZ)
- Municipal wellhead protection area (WHPA)

A land-use activity, if not properly managed, can become a significant threat to drinking water sources. These activities – such as septic systems or home heating oil storage or pesticide application – can be significant in the most vulnerable areas around a municipal well:

- Within 100 metres of a municipal well (Wellhead protection area A or Zone A)
- Two-year time-of-travel area (Zone B)
- Five-year time-of-travel area (Zone C)

What is time of travel?

Time of travel is an estimate of the time it takes a particle of water to move in the saturated zone from a specific point in an aquifer into the well or intake. 'Time of travel' means:

- (A) The length of time for groundwater to travel a specified horizontal distance in the saturated zone, and
- (B) The length of time that is required for surface water to travel a specified distance within a surface water body.

The amount of land in this Zone B is determined by a variety of factors such as the way the land rises or falls, the amount of water being pumped, the type of aquifer, the type of soil surrounding the well, and the direction and speed that groundwater travels. All of these factors help to determine how long it takes water to move underground to the well and how much land around the wellhead needs protection.

WHY WAS THE 100-METRE WELLHEAD RADIUS CHOSEN?

The Ontario Ministry of the Environment (MOE) asked a Technical Experts Committee (TEC) to provide advice on science and technical issues to be considered for the development of drinking water source protection plans.

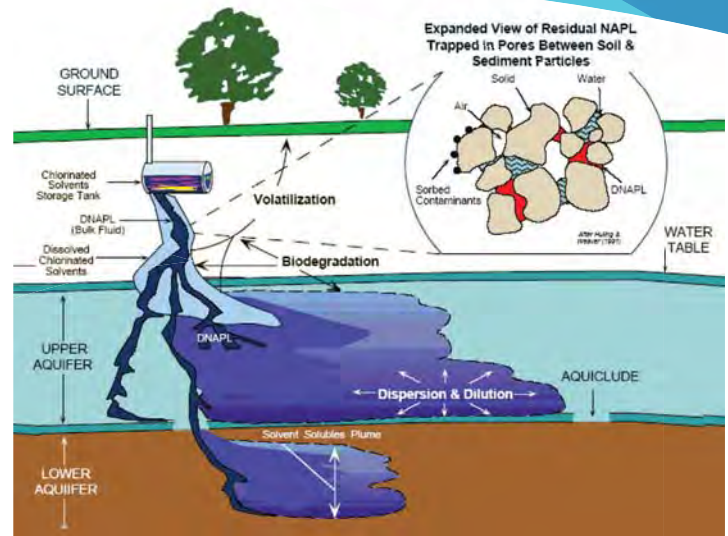
The TEC consisted of experts specializing in a range of areas, including biology, groundwater, microbiology, risk assessment and risk management, and environmental policy. Experts on the committee included members from academia, conservation authorities, conservation organizations, First Nations, the federal government, and municipal governments and departments.

The Technical Experts Committee released their recommendation in 'Watershed-Based Source Protection Planning. Science Based Decision-making for Protecting Ontario's Drinking Water Resources: A Threats Assessment Framework.' (2004) A sub-committee was created to assess the issue of pathogens. The sub-committee carried out an extensive review of the literature, conducted in-depth consultations with international experts, and held a workshop to obtain additional information from experts in the field.

The sub-committee recommended that two pathogen management zones be delineated:

- 1) A wellhead protection area, 100 metres around a municipal well
- 2) A two-year time-of-travel zone

The 100-metre zone was identified to recognize the uncertainty in the subsurface zone that is expected to provide some mitigation to pathogen transport. Over short distances, it is impossible to provide a detailed-enough characterization to the hydrogeological setting to assess the potential for pathogen travel. The 100-metre zone is consistent with best practices in other jurisdictions and is consistent with other provincial legislation.



Dense non-aqueous phase liquids (DNAPLs) are usually toxic, heavier than water, and are expensive or even impossible to remove from a drinking water source. That's why we all have to make sure they don't reach our water sources. Storage of more than 25 litres of DNAPLs is a significant drinking water threat in the wellhead protection area A (within 100 metres of the municipal well); wellhead protection area B (two-year time-of-travel zone); and wellhead protection area C (five-year time-of-travel zone).

HOW WAS THE TWO-YEAR TIME-OF-TRAVEL ZONE DETERMINED?

The Technical Expert Committee's Pathogen Subcommittee determined the two-year Time-of-Travel (TOT) area for groundwater. The two-year time-of-travel area (Zone B) or zone was chosen following extensive review of scientific literature on pathogen survival and transport, as well as consultation with international experts in this field of study. The group determined that sources of pathogen contamination within this zone have a high potential to adversely affect water sources. This group was particularly concerned about highly vulnerable areas within this two-year area.

Similar to the chemical hazard rating, the pathogen hazard rating was created without taking into account management strategies or treatment associated with each land-use activity. Management measures or practices can change from year to year and property to property or business to business or farm to farm or home to home. As well, the effectiveness of many practices can change from season to season. As a result of these variations, the intrinsic risk (independent of management measures or practices) was considered when determining the hazard rating for each land-use activity.

Management is not considered in the assessment of potential risk but it is factored in by the source protection committee through source protection planning policies and risk management plans. The 21 prescribed activities can pose threats to community drinking water, in certain vulnerable areas and in certain quantities or circumstances, if not properly managed. That's why the good management you do is so important.

How do you know the level of hazard to drinking water?

Not all threats are equal. The danger posed by particular chemicals or pathogens (including bacteria such as deadly *E. coli* O157:H7) as depends on several factors including the amount, its toxicity and how it behaves in the environment. The Ontario Ministry of the Environment and Climate Change has identified many materials that could contaminate water. It has assigned a hazard rating to each using a 10-point scale based on the nature of the material and how it is used or stored. The level of hazard, combined with the circumstances present which determine the likelihood of that hazard reaching a water source, help determine whether a threat is a significant drinking water threat.

HAZARD RATING FACTORS FOR CHEMICALS ARE:

- Toxicity
- Environmental fate
- Quantity
- Release to environment
- Type of vulnerable area (groundwater or surface water)



HAZARD RATING FACTORS FOR PATHOGENS ARE:

- Frequency of association with pathogens
- Release to environment
- Type of vulnerable area (groundwater or surface water)

Where do planning policies apply?

Your local source protection committee, for the Maitland Valley and Ausable Bayfield source protection areas, has worked since 2007 to create effective, practical plans to protect your community's drinking water sources. Those plans are now approved and staff look forward to working with you. The policies with must-conform-to legal effect, such as risk management plans or prohibition, in the Ausable Bayfield Maitland Valley Source Protection Region, apply mostly to properties within 100 metres of a municipal well or in the most vulnerable parts of the two-year time-of-travel area. Some legal-effect policies also apply to some properties in the five-year time-of-travel area in the case of dense non-aqueous phase liquids (DNAPLs). Call us, email us, or visit our website to find out more.

Who has to follow source protection plan policies?

Some people living or working in vulnerable areas may need to do risk management plans. Call our staff to find out more. Prohibition of some activities also apply in some areas. In terms of existing land uses, management solutions are able to reduce risks to drinking water in most cases. Persons engaged in activities, such as property owners and tenants, may have already received a letter if they have a potential significant drinking water threat.

Call our staff if you have questions about planning policies, vulnerability, or how to reduce risk to water.



The vast majority of the people in the Maitland Valley and Ausable Bayfield source protection areas are not required to comply with plan policies. However, everyone is encouraged to read the source protection plans and do what they can to reduce risk to drinking water sources.



Thank you for all you do to protect drinking water sources!

For more information we invite you to contact your local source protection region or area:



AUSABLE BAYFIELD MAITLAND VALLEY DRINKING WATER SOURCE PROTECTION REGION

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Maitland Valley Source Protection Area: 519-335-3557

Ausable Bayfield Source Protection Area: 519-235-2610

