

Groundwater Vulnerability Forum Summary

Date: March 27th, 2017
Time: 1:30 – 4:00 pm
Location: Outdoor Center at the Little Cataraqi Conservation Area

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Appendix 1: Summary of Regional Groundwater Recommendations and Priority Ranking

Attendance

Forty-nine people, including presenters and organizers, were present at the forum representing the following groups:

- Cataraqui Region Conservation Authority
- Cataraqui Source Protection Authority
- Cataraqui Source Protection Committee
- Citizens
- City of Brockville
- City of Kingston
- City of Ottawa
- Dillon Consulting Limited
- Kingston, Frontenac and Lennon & Addington Public Health
- L&A Stewardship Council / Friends of Napanee
- Leeds, Grenville and Lanark District Health Unit
- Loyalist Township
- Memorial University
- Ontario Ministry of the Environment and Climate Change
- Public Health Ontario
- Queen's University
- Rideau Valley Conservation Authority
- South Nation Conservation
- Toronto and Region Conservation Authority
- Township of Elizabethtown-Kitley
- Township of Leeds and the Thousand Islands Environmental Committee
- Trent Conservation Coalition

Purpose

The intent of the Groundwater Vulnerability Forum was to bring researchers, municipal advisors, and decision-makers together to discuss groundwater protection in highly vulnerable areas. The session highlighted:

- (1) Municipal and regional groundwater studies in the Cataraqui Source Protection Area that identify areas of groundwater vulnerability,
- (2) Ongoing research at Queen's University in shallow bedrock aquifers,
- (3) Bacteriological research findings by Public Health Ontario with Queen's University,
- (4) Groundwater management in Ontario lead by the Ministry of the Environment and Climate Change,
- (5) The Cataraqui Region Groundwater Vulnerability Assessment Guideline, and
- (6) Considerations for protection measures.

Presentations

Forum presentations outlined the vulnerability, research, and current management of groundwater in Ontario. Key messages and actions from the presentations are outlined below.

(1) [Our Vulnerable Groundwater](#) - Katrina Furlanetto, Cataraqui Region Conservation Authority

At least six independent municipal or regional studies conducted between 1990-2011 throughout the Cataraqui Source Protection Area concluded that groundwater is highly vulnerable to contamination and / or requires increased protection from sources of contamination due to the thin to absent soils, fractured bedrock, karst features, and relatively high water table.

An increased level of protection is recommended in areas of high groundwater vulnerability.

(2) [Groundwater Vulnerability Research in Shallow Bedrock Aquifers](#) - Stephanie Wright, Queen's University

Research includes characterizing groundwater flow and transport in monitoring wells constructed in three distinct field settings located at the Kenny Field Station, Tay River and Kingsford, as well as exploring the attenuation of seasonal isotopic signals (Oxygen and Hydrogen) to determine the effective use of these elements as indicators for specific groundwater settings

Preliminary conclusions indicate wells are responding to precipitation events at depth and there is significant attenuation of the isotope tracers. Further work will include collecting and analyzing additional samples, and numerical modelling to simulate flow in fractured bedrock settings.

(3) [Bacterial Contamination Hotspots](#) - Kamila Pagoda and Sophie Felleiter, Public Health Ontario with Queen's University

There are three regions of increased relative risk of *E. coli* contamination (hotspots) in southern Ontario private wells: (1) Kingston/Belleville, (2) Grey/Bruce region, and (3) Niagara/Hamilton. Sources of *E. coli* include livestock and septic systems. In the Kingston / Belleville area, the majority of *E. coli* is from human sources.

It was found that *E. coli* does not greatly discriminate the overall microbial community; therefore, an alternative indicator to *E. coli* for tracking fecal contamination in wells may be warranted. *Bacteriodes* is a candidate due to specific markers that discriminate variation in the microbial community at the Family taxonomic level.

(4) [Groundwater Management in Ontario](#) - Peter Taylor and Greg Faaren, Ministry of the Environment and Climate Change)

Ontario Regulation 903 (Wells Regulation) and the related section of the *Ontario Water Resources Act* are under review. Additionally, internal review of the land use compatibility guidelines is underway.

D-series protocols (1990s) are being reviewed and consolidated into 2 documents: (1) land use compatibility (D-1,2,4,6) and (2) water and wastewater servicing (D-5). Updates include the current planning framework and source water protection requirements.

To date the Ministry has initiated the internal review of the land use compatibility guidelines.

No specific timeline has been determined for review and completion of the above documents.

(5) [Groundwater Vulnerability Assessment Guideline](#) - Holly Evans, Cataraqui Region Conservation Authority (CRCA)

To support the [Cataraqui Source Protection Plan](#) CRCA staff identified feasible risk management measures to consider including in development approvals. A guideline for karst and aquifer vulnerability was also produced to assess the inherent vulnerability of groundwater at the property scale in the Cataraqui Source Protection Area

The [guideline](#) has two parts: (1) the main guideline that moves through a flowchart decision matrix and (2) a supporting document that provides supplementary information. Both are available on the cleanwatercataraqui.ca website.

Groundwater Protection Priorities

Groundwater protection recommendations from municipal and regional groundwater studies in the Cataraqui Source Protection Area were reviewed by CRCA staff, consolidated and organized into five major themes:

- (1) Data and monitoring
- (2) Development
- (3) Education
- (4) Incentives
- (5) Well and Septic

To determine priorities for groundwater management in areas of high groundwater vulnerability, participants at the forum were asked to rank action recommendations on posters around the room within these five major themes using red and blue dot stickers. All the posted recommendations are listed in **Appendix 1**.

At registration, all participants received 8 dots, 4 red (high priority / act now) and 4 blue (low priority / remove from consideration) numbered 1-3 with the fourth left blank, as well as comment cards. Placing a red-1 on a recommendation indicated the highest priority for discussion, while placing a blue-1 indicated the least priority for further action.

Out of the 49 participants, 94 dots (24%), and 5 comment cards were recorded. The majority of dots were high priority, inferring additional groundwater management action is required. Well and septic system actions were ranked the highest, followed by development, education, incentives, and data and monitoring (**Figure 1**).

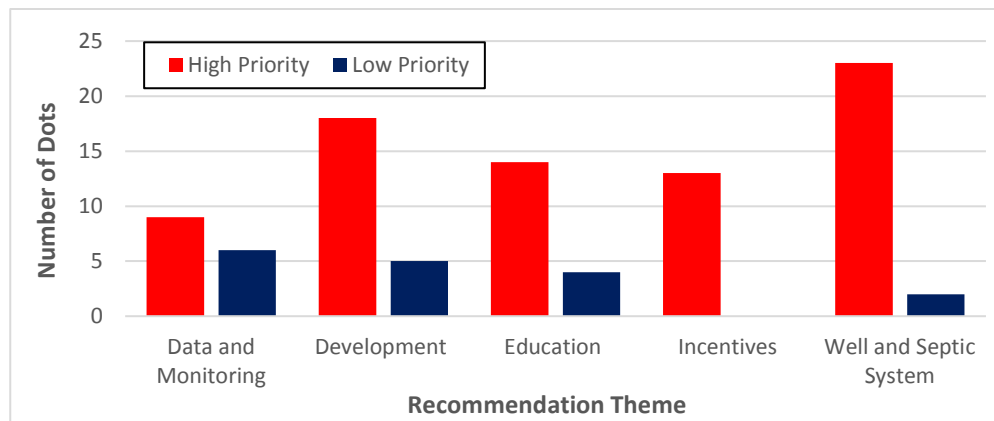


Figure 1: Summary of priority dots placed on each regional recommendation theme

Out of 30 total recommendations, three received the highest priority for further action:

1. Update D-series procedures to account specifically for sensitive groundwater areas.
2. Create a Groundwater Protection Plan for rural residents including education on water usage, well maintenance and inspections, operation of water well supply systems, water quality testing, treatment, transport pathways, and contaminant reduction. Through the comment cards, it was suggested that a Well Aware-type program be revitalized to improve education and outreach of well information.
3. Provide financial incentives to un-serviced areas to reduce the risk to groundwater quality from transport pathways (i.e. sub-standard or abandoned wells, old fuel storages and septic systems).

Within each recommendation theme, multiple action statements were ranked. The following figures show the results from participant feedback.

Under development recommendations, updating the D-series procedures to account for areas of sensitive groundwater received the highest priority (**Figure 2**).

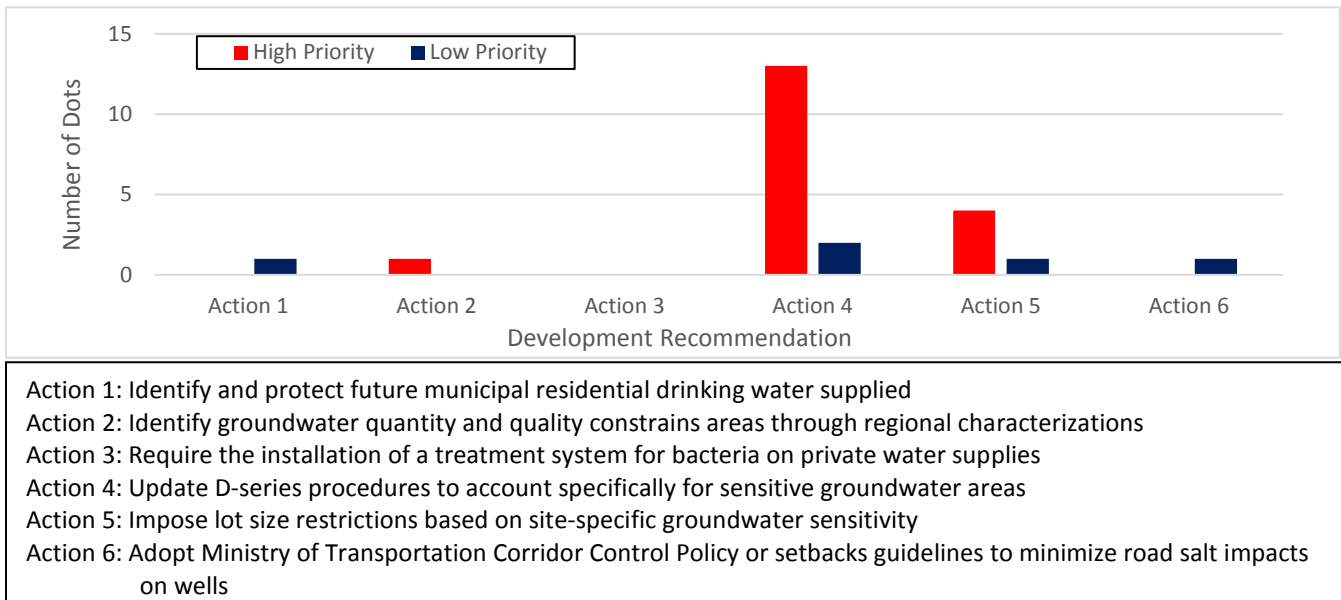
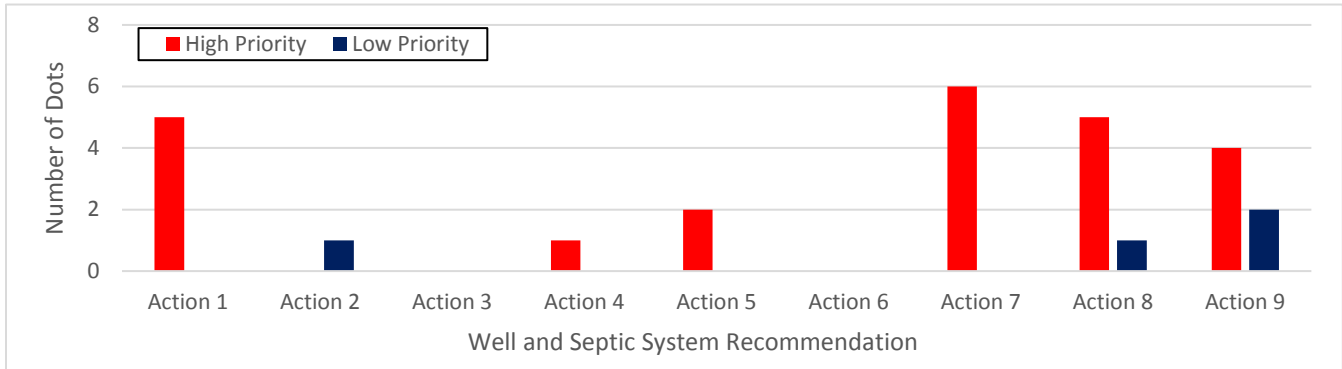


Figure 2: Priority ranking for proposed development recommendations

For well and septic system recommendations, identifying and properly decommissioning unused wells had the highest management priority followed by enhancing well construction standards in sensitive areas (**Figure 3**).

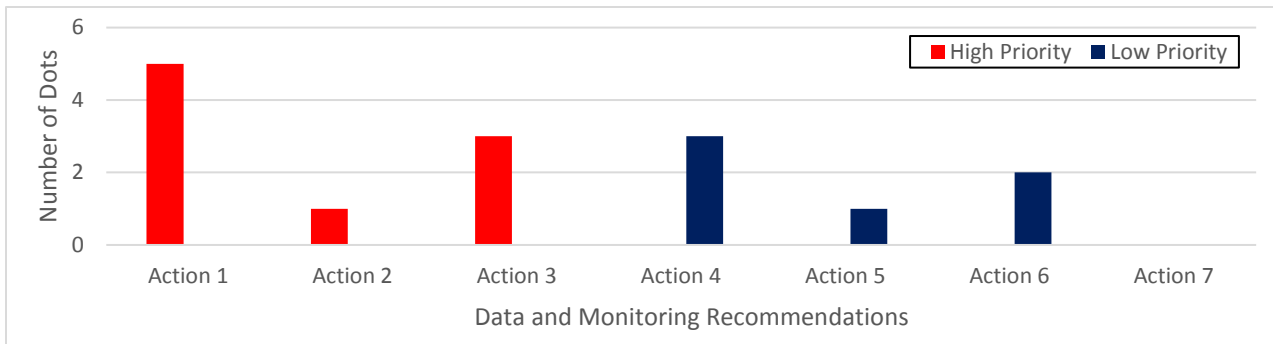


- Action 1: Enhance well construction standards in sensitive groundwater areas
- Action 2: Develop site-specific septic sewage disposal standards
- Action 3: Increase required pilot testing prior to new sewage treatment system technology approval
- Action 4: Establish variable well and sewage system minimum separations reflective of groundwater sensitivity
- Action 5: Submit bacteriological and chemical water sample results with water well record
- Action 6: Prohibit chipped, blasted, and dug wells in Plans of Subdivision
- Action 7: Properly decommission (plug) unused wells
- Action 8: Require mandatory inspections of wells and sewage disposal systems at time of property transaction
- Action 9: Enhance Regulation 903 compliance in vulnerable areas

Figure 3: Priority ranking for proposed well and septic system recommendations

Additional comments were provided for Action 8. As the age of well and septic systems vary, inspections at the time of property transactions were suggested only for highly sensitive areas. Alternatively, well inspections were suggested at the time of construction (similar to sewage systems), as well integrity was viewed as more important compared to sewage compliance.

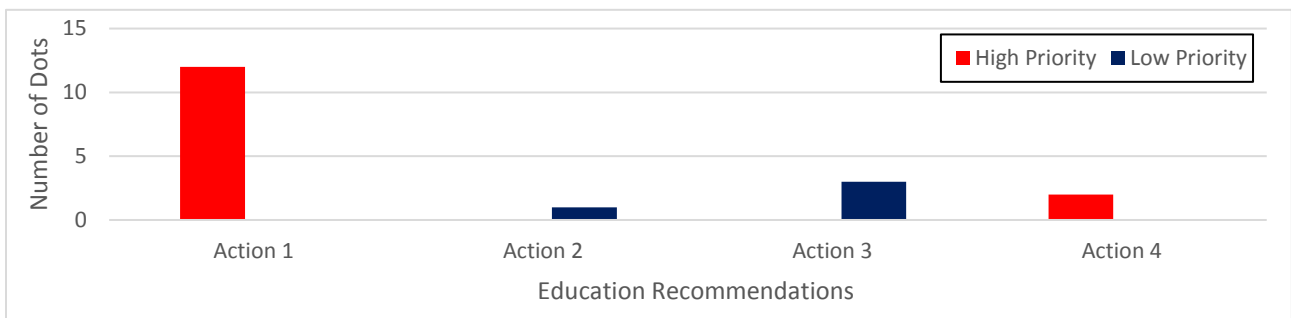
Out of the seven data and monitoring recommendations, four were ranked as low management priority (**Figure 4**). However, it should be noted that actions about furthering research and groundwater data management in areas of vulnerability, such as establishing a centralized georeferenced groundwater data portal, were viewed as important areas for further exploration.



- Action 1: Establish a centralized georeferenced groundwater data portal
- Action 2: Conduct research on karst limestone and fractured bedrock
- Action 3: Improve soil data in wellhead protection areas
- Action 4: Explore the relationship between surface water and groundwater
- Action 5: Increase regional groundwater monitoring
- Action 6: Fill data gaps for basic aquifer characterization
- Action 7: Prioritize water quality testing per bedrock unit / predominant land use

Figure 4: Priority ranking for proposed well and septic system recommendations

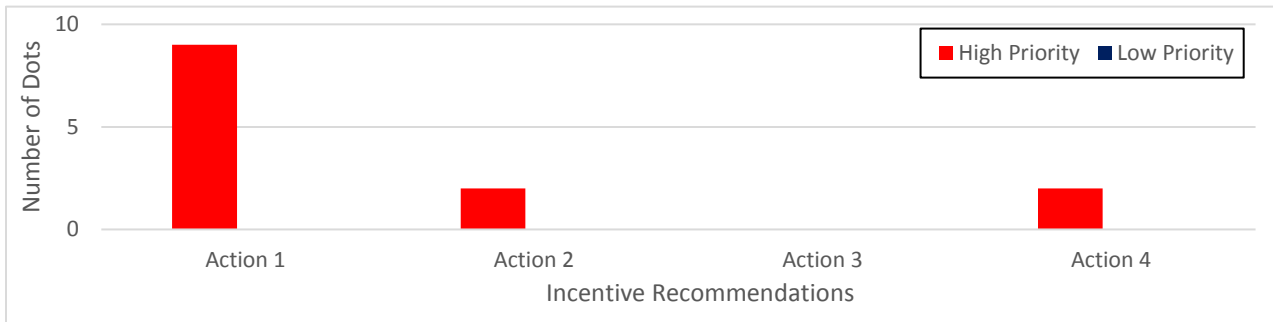
Groundwater education was identified as high priority for areas of high vulnerability, specifically regarding the creation of groundwater protection plans for rural residents (Figure 5). A template document including information on water usage, well maintenance, well inspections, operation, water quality testing and treatment was suggested for improved outreach, with the addition of revitalizing a Well Aware program to include a broader audience. Further, it was noted that well and septic workshops can reach a greater number of people per hours of effort.



- Action 1: Create Groundwater Protection Plans for rural residents (water use, well maintenance, well inspections, operation of water well supply system, water quality testing, treatment, transport pathways and reduction of potential contaminants)
- Action 2: Establish a centralized education resource portal for groundwater protection
- Action 3: Provide Ministry-lead municipal staff and Councillor groundwater management sessions
- Action 4: Revitalize a Well Aware-Type Program

Figure 5: Priority ranking for proposed education recommendations

Incentive programs received a high priority management ranking for actions such as increasing well testing in areas of concern and un-serviced areas, as well as upgrading older wells (Figure 6). Further discussion is required to identify funding sources and delivery agents.



Action 1: Provide financial incentives to un-serviced areas to reduce the risk to groundwater quality from transport pathways
 Action 2: Prioritize incentives for upgrading wells constructed prior to 1974
 Action 3: Subsidize water quality treatment systems in high-risk areas
 Action 4: Fund residential well water testing in gap areas / areas of concern

Figure 6: Priority ranking for proposed incentive recommendations

Facilitated Discussion Summary

Based on results from the prioritization exercise described above, a discussion was held for further insight on the group’s perspective regarding the high priority ranked recommendations. The discussion focussed on five main topics: (1) well inspections and education, (2) further research, (3) Ontario well regulation and standards, (4) septic system inspections, and (5) D-series guidelines.

Well Inspection and Education

A geoscientist at the City of Ottawa noted that inspections are of greater importance compared to well and septic standards, as compliance is often not checked. This includes inspections conducted by well drillers. At the moment, there are no regular well construction compliance inspections across the Province. Participants discussed the possibility a well compliance program similar to that of North Grenville (i.e. inspections at various stages of well construction).

As a potential solution, the group proposed education measures for well drillers to provide information on what to look for when drilling a well. It was mentioned that a program such as Well Aware, no longer in operation due to funding, may be a good solution for both homeowner and driller education. It was suggested that local organizations, municipalities, and health units should consider partnerships to include this type of education program in their work plans, as funding for this type of initiative is currently outside the scope of the source protection program.

A Rideau Valley Conservation Authority geoscientist noted that partnering with other groups to host well seminar workshops can be accomplished at affordable rates. The challenge is often attendance; however, it was suggested that this type of event is encouraged over individual homeowner door-to-door outreach based on cost efficiency and outreach numbers. This type of workshop should be considered for developing a groundwater management template for residents.

Public Health Ontario is developing a pilot project to commence summer 2017, pending grant approvals, to work with a First Nations community to enhance current Western scientific knowledge on groundwater with traditional knowledge. In addition, it was noted there is a possibility of creating of a smartphone application to host the

information on wells and groundwater education, as well as provide encouragement for well testing, timelines, and additional resources.

Further Research

Public Health Ontario is interested to investigate whether suspected water quality impacts correlate to scientific observations and is looking for partnerships

A representative from the Lennox and Addington Stewardship Council and the Friends of Napanee raised the question of organizations releasing holdings to the public and providing all rights and materials to a host association for education and outreach. There may be an opportunity for partnering with the Friends of Napanee and Stewardship Council for an educational workshop if data is available and consolidated.

Ontario Well Regulation and Standards

Regulation 903 amendments were discussed with Ministry of the Environment and Climate Change staff. Minimal progress has been made on the document due to scheduling conflicts. However, it was noted discussions on the amendments have been ongoing for quite awhile. To provide additional comments for consideration, an online public comment period and targeted stakeholder engagement groups are planned for later in 2017.

MOECC staff noted dug wells will remain required for specific geological areas where deeper drilled wells provide unpotable water (e.g. high concentrations of salt and sulphur).

Ministry of the Environment and Climate Change staff noted that more research is needed to determine if fundamental changes are needed for the for the Regulation 903 amendments (e.g. well and septic system separation distances, well casing lengths).

Septic System Inspections

The representative from the Township of Leeds and the Thousand Islands Environment Committee inquired about leaking septic systems and re-inspections not being mandated across the Province. A local health unit septic system inspector commented that the *Clean Water Act* does not have the authority to address this requirement. Rather, municipalities should take responsibility through attaining Council cooperation and agreement to establish programs.

D-series Guidelines

Throughout the discussion, there were several comments about the timeline for review of the D-series guidelines, especially D-5-4 (Individual On-site Sewage Systems: Water Quality Impact Risk Assessment) and D-5-5 (Private Wells: Water Supply Assessment). The group noted that efforts should be made to contact local Members of Provincial Parliament and municipal councils members to emphasize the importance of these changes in a timely manner.

Next Steps

Forum participants are encouraged to continue the groundwater protection dialogue by contacting fellow forum participants and identifying ways that each organization can contribute.

Based on input received during the forum the following is a list of actions toward improved groundwater protection in the Cataraqui Source Protection, and in some cases, the Province of Ontario.

- (1) Explore the possibility of hosting a well and septic workshop with Lennox and Addington Stewardship Council and Friends of Napanee
- (2) Meet with Public Health Ontario and others to explore potential project partnership and data sharing collaboration
- (3) Develop a model letter to the Ontario Ministry of Environment and Climate Change, Members of Provincial Parliament, etc. for stakeholders to submit regarding prioritization of the D-series protocols and Regulation 903 amendments
- (4) Develop a discussion paper including Groundwater Vulnerability Forum outcomes, a literature review of supportive groundwater research in vulnerable areas, consultation with staff from other highly vulnerable areas in Ontario (i.e. Niagara and Bruce Peninsula) to collaborate on management priorities, research initiatives, and best practices for improved groundwater management

Where applicable and appropriate outcomes from the above actions will be circulated and made available on the cleanwatercattaraugui.ca website.

Thank you for your interest in attending the Groundwater Vulnerability Forum. If you are interested to participate in the development of any of the work listed above or should you have any questions, please send an email to Holly Evans at hevans@crca.ca.

We look forward to working with you on this important topic.

Appendix 1: Summary of Regional Groundwater Recommendations and Priority Ranking

Development Recommendations	Red¹	Blue²
Identify and protect future municipal residential drinking water supplies (e.g. land purchase, official plans, zoning)	0	1
Identify groundwater quantity and quality constraint areas through regional characterizations (testing and analysis)	1	0
Require the installation of a treatment system for bacteria on private water supplies	0	0
Update D-series procedures to account specifically for sensitive groundwater areas	13	2
Impose lot size restrictions based on site-specific groundwater sensitivity	4	1
Adopt Ministry of Transportation Corridor Control Policy for setback guidelines to minimize road salt impacts on wells	0	1
Well and Septic System Recommendations		
Enhance well construction standards in sensitive groundwater areas (provincial or municipal by-laws)	5	0
Develop site-specific septic sewage disposal standards	0	1
Increase required pilot testing prior to new sewage treatment system technology approval	0	0
Establish variable well and sewage system minimum separations reflective of groundwater sensitivity	1	0
Submit bacteriological and chemical water sample results with water well record	2	0
Prohibit chipped, blasted and dug well in Plans of Subdivision	0	0
Properly decommission (plug) unused wells	6	0
Require mandatory inspections of wells and sewage disposal systems at time of property transaction	5	1
Enhance Regulation 903 compliance in vulnerable areas	4	2
Data and Monitoring Recommendations		
Establish a centralized georeferenced groundwater data portal	5	0
Conduct research on karst limestone and fractured bedrock	1	0
Improve soil data in WHPAs (make-up, depth etc.)	3	0
Explore the relationship between surface water and groundwater	0	3
Increase regional groundwater monitoring	0	1
Fill data gaps for basic aquifer characterization	0	2
Prioritize water quality testing per bedrock unit / predominant land use	0	0
Education Recommendations		
Create Groundwater Protection Plan for rural residents (water use, well maintenance, well inspections, operation of water well supply system, water quality testing, treatment, transport pathways and reduce threat of potential contaminants.	12	0
Establish a centralized education resource portal for groundwater protection	0	1
Provide Ministry-lead municipal staff and Councillor groundwater management sessions	0	3
Revitalize a Well Aware-Type Program	2	0
Incentive Recommendations		
Provide financial incentives to unserved areas to reduce the risk to groundwater quality from transport pathways (i.e. sub-standard or abandoned wells, old fuel storages and septic systems)	9	0
Prioritize incentives for upgrading wells constructed prior to 1974	2	0
Subsidize water quality treatment systems in high-risk areas	0	0
Fund residential well water testing in gap areas / areas of concern	2	0

¹ The red dots were intended to indicate recommendations that should be acted on before others

² The blue dots were intended to indicate recommendations that don't require further consideration