Safe Water Program Update: Well Water Research Project and WISE

To:	Chair and Members of the Board of Health
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Prepared By:	Lise Trotz-Williams, Epidemiologist Patty Montague, Health Promotion Specialist
Approved By:	Christopher Beveridge, Director Health Protection
Submitted By & Signature:	*Original signed document on file.* _____ **Dr. Nicola J. Mercer, MD, MBA, MPH, FRCPC** **Medical Officer of Health & CEO**

Recommendations

It is recommended that the Board of Health:

1. Receive this report for information.

Key Points

- The development and launch of Wellington-Dufferin-Guelph Public Health's (WDGPH) **W**eb-based, **I**nteractive **S**ystem for **E**vidence-based decision making (WISE) have been on hold (since December 2020) in order to focus resources on pandemic response.
- Research to identify factors associated with an increased risk of bacterial contamination in private driving wells has continued.
- Results from this collaborative study may be used to identify private drinking water wells in Wellington-Dufferin-Guelph (WDG) that may be at an increased

risk of bacteriological contamination. The WISE system could then be used to generate automated, and tailored, alerts or reminders for more frequent testing for those wells.

Discussion

Overview

Because of staff reassignment to COVID-19 IMS duties in early 2020, the development and launching of WISE has been put on hold until appropriate staff can be dedicated to this effort, post-pandemic response.[1] However, work on identifying factors associated with an increased risk of bacterial contamination in private driving wells has continued. This research is being conducted in collaboration with the University of Guelph as a Master's project in the Department of Mathematics and Statistics. Identified factors will be used to identify wells in Wellington-Dufferin-Guelph (WDG) registered in WISE that are likely to be a higher risk of contamination, and these wells will be targeted with education and alerts to encourage increased testing. For ease of operation, higher risk well identification and the generation of alerts will be accomplished within the WISE system.

Research Progress: Identification of Risk Factors for Contamination of Private Wells

The research on risk factors comprises three phases. In the first phase, which was recently completed (December 2021). Well-owner responses to a survey on private well characteristics conducted in 2018-2019 were examined, in conjunction with laboratory test results available for 376 of those wells for the same period, with the objective of identifying well characteristics statistically associated with an increased risk of contamination. Several statistical models were run on the data, each being assessed for soundness based on various statistical parameters. Results from the top ten models showed a consistent association between the risk of bacterial contamination and the age of a well, with older wells generally having a higher risk of contamination. Other factors that showed an association with risk of contamination in the best four models were: use of a well water treatment system, season of year (with the risk being lowest in the winter) and presence of a potential source of contamination within fifty feet of the well. These factors have all been previously reported in the literature as affecting the

risk of well contamination, and the results of the phase 1 study therefore confirm that these factors also apply in WDG.

In phase 2 of the collaborative research project (planned for Winter 2022), meteorological data such as precipitation, along with geological and land-use data, will be examined for associations with the risk of contamination of the 376 wells for which bacteriological testing data are available for the past few years. In the third and final phase, the results of phases 1 and 2 will be used to investigate the combined influence of well characteristics, geological, land use and precipitation on the risk of bacterial contamination. For example, a well that might be relatively poorly constructed may be at lower risk of contamination if situated in less porous soil than a similar well in more porous soil or fractured bedrock.

Application of Research Results

Upon completion of all phases of this project, currently scheduled for late spring or early summer 2022, the factors found to be most influential on the risk of contamination of WDG wells will be used to identify wells in the region, that have registered in WISE and provided answers to the well characteristic questions at registration, that are at a statistically higher risk of bacteriological contamination due to exposure to those factors. Those wells can then be targeted for owner education or more frequent reminders to test, especially after weather events that are associated with increased risk of contamination. The use of the results in this way will allow the Safe Water program at Public Health to serve private well owners in WDG more effectively and to better protect residents consuming water from private wells from the risk of water-borne illness.

Conclusion

Results from this collaborative study may be used to identify private drinking water wells in WDG that may be at an increased risk of bacteriological contamination. The WISE system could then be used to generate automated alerts or reminders for more frequent testing for those wells, including after significant weather events such as heavy rain.

Ontario Public Health Standard

Safe Water Program Standard.

2020 WDGPH Strategic Direction(s)

☒ **Service Delivery**: We will provide our programs and services in a flexible, modern and accessible manner, and will ensure they reflect the immediate needs of our Clients and our role in the broader sector.

☒ **System Transformation**: We will equip the Agency for change in all aspects of our work so that we are ready for transformational system change when the time comes.

☒ **Knowledge Transfer**: We will ensure that our decision-making and policy development efforts are informed by meaningful health data at all times.

Health Equity

WDGPH will use the results from this and previous well water research along with information collected in WISE to inform interventions that reduce disparities in well water testing and promote safe drinking water for all residents that rely on private well water. Health equity considerations will also be included in the application of these results to targeted education and recommendations for testing, to ensure that all well owners have equal access to these interventions.

References

1. Wellington-Dufferin-Guelph Public Health. HBOH report - BH.01.DEC0220.R18 Well Water Research Project and Program Update [Internet]. 2020 December 2. [cited 2021 Dec 22] Available from: https://wdgpublichealth.ca/sites/default/files/file-attachments/BOH/bh.01.dec0220.r18_-_well_water_research_project_program_update.pdf

Appendices

N/A