

Private and Public Water and Wastewater Infrastructure Management



ONTARIO
AGRICULTURAL COLLEGE

SCHOOL OF ENVIRONMENTAL DESIGN
AND RURAL DEVELOPMENT

Dr. John FitzGibbon, Professor
Cameron Curran, MSc Candidate
Taylor West, MSc Candidate
Brandon Eidner, MSc Candidate

Research Team

John FitzGibbon, Professor,
University of Guelph

Cameron Curran, MSc (Planning)
Student, University of Guelph

Taylor West, MSc (Planning)
Student, University of Guelph

Brandon Eidner, MSc (Planning)
Student, University of Guelph

Presentation Overview

Introduction

Laws Surrounding Water and Wastewater Infrastructure

Best Practice Development for Onsite Wastewater (Septic) System Reinspection Programs


Water Well Legislation in Ontario

Next steps



Introduction

- Challenges exist with respect to the management and sustainability of private rural onsite water and wastewater systems
- Septic and water systems are important personal investments which require attention for long term sustainability
- Principal Authorities (Conservation Authorities, Municipalities, and Health Units) deliver septic reinspection programs where mandated
- Opportunities exist for collaborative management for long term sustainability of these systems



Laws Surrounding Water and Wastewater Infrastructure

Brandon Eidner, MSc Candidate
School of Environmental Design and Rural Development
University of Guelph



Who is Responsible for Water?

- The responsibility of the quality and standards of drinking water is shared between the federal, provincial, territorial and municipal governments.
- The federal government's role is to lead in the development of research and science to ensure that the quality of water treated at the municipal level facilities are up to date and have been established as a safe basis for drinking water quality

Who is Responsible for Water?

- The day-to-day responsibility of the quality and standards of drinking water, ensuring that it is safe for the public such as, best treatment practices, lies in the hands of the provincial and territorial governments
- The majority of the responsibilities are delegated from the federal and provincial governments to the municipalities, and those day-to-day responsibilities include:
 - The treatment of water and
 - The distribution of water



Who is Responsible for Waste Water?

- In Ontario, on-site sewage systems are regulated by the Building Code Act, 1992 and the Building Code Regulation (Ontario Regulation 315/10).
- The enforcement of the Building Code Act and Regulation is carried out by Principal Authorities (Municipalities, Conservation Authorities and Health Units), who are typically responsible for:
 - The treatment of wastewater in urban areas or
 - The inspection of septic systems in rural areas, if applicable.
- Municipalities may, through an agreement, give the responsibility for regulating septic systems to Conservation Authorities or upper-tier municipalities

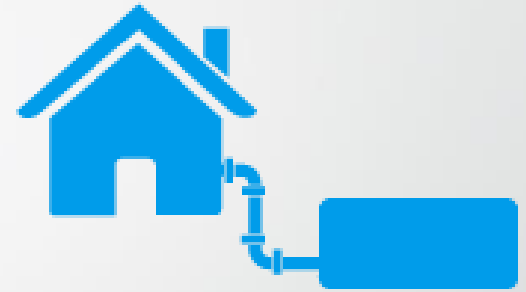


Amendment of Ontario's Building Code Act, 1992

- Ontario's Building Code (Ontario Regulation 350/06) was amended recently to include mandatory on-site sewage system inspection programs
 - Enforced by local municipalities (Ministry of Municipal Affairs and Housing, 2011).
- The area in which the mandatory inspection program occurs includes:
 - Along the shorelines of Lake Simcoe and
 - Vulnerable locations within source protection areas such as, wells and/or aquifers (Town of Midland, 2012).



Examples of Current By-Laws in place for Septic Systems and/or Wells



- Halton Hills - By-law No. 2016-0030 - Mandatory Sewage Systems Maintenance
- Municipality of Dysart et al. - By-law No. 2017-101 - Septic Re-Inspection
- Township of Springwater - By-law No. 2015-034 - Septic System Re-Inspection Program
- Town of Caledon - By-law No. BL-2015-XXX-090 - A by-law to implement a sewage system maintenance inspection program
- Township of Selwyn - Resolution No. 2017- 237 - Discretionary Septic Inspection By-law
- Township of Wainflet - By-law No. 001-2012 - By-law for the regulation of private on-site sewage systems
- Township of Midland - By-law No. 2005-51 - Sewage System Maintenance Inspection Program
- Township of Algonquin Highlands - By-law No. 2018-35 - Septic Re-inspection Program
- Town of Milton - By-Law No. 123-2011 - Amended to include the Sewage System Maintenance Inspection Program
- Tay Valley Township - By-law No. 2012-009 - Sewage System Maintenance Inspection Programs
- Town of Bracebridge - Property Standards By-law - Discretionary Sewage System Maintenance Inspection Program



Summary

- The provided list does not include all re-inspection programs out there, it acts as an example of existing programs
 - There may be many more municipalities who have these by-laws and/or programs in place, including states within the United States as well.
- It appears that mandatory septic inspections are recognized as an important action in legislation in Ontario and it is becoming more frequent for municipalities in Ontario to develop these By-laws.

With support from:



Best Practice Development for Onsite Wastewater System (Septic) Reinspection Programs: MSc Thesis

Cameron Curran, MSc Candidate
School of Environmental Design and Rural Development
University of Guelph

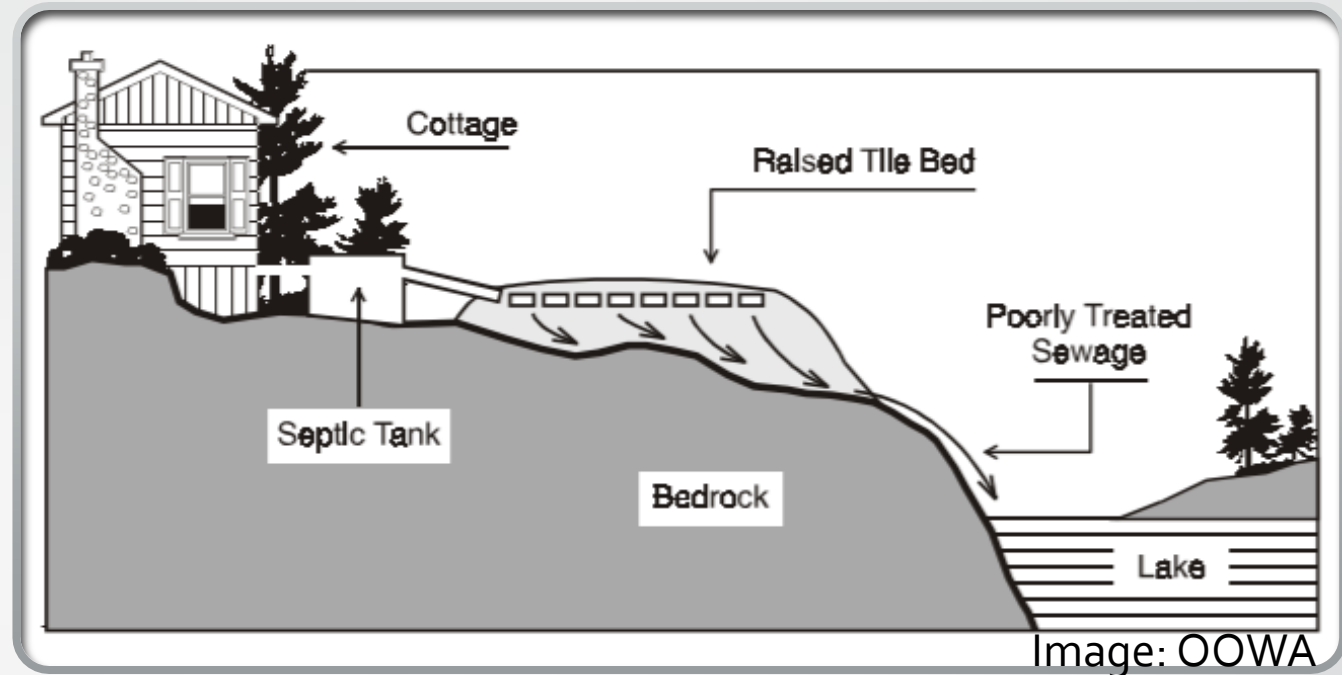
Background

- Clean Water Act (2006) mandated Source Water Protection Areas
- 2012 Ontario Building Code (O.Reg 315/10) states that mandatory septic reinspections must occur within 100m of Lake Simcoe surface waters and all provincial source protection areas
- Septic reinspection programs are managed differently across Ontario and abroad



Background

- Phase I and Phase II inspections contribute to groundwater protection
 - Implications for Human and environmental health
- Principal Authorities and private septic system owners play a vital role in program success





Background

- As a whole, in Ontario, there is a need for best practice development of:
 - The septic reinspection process
 - Maintenance guidelines and system owner education tools
 - Recordkeeping management
- Many examples in Ontario and the Great Lakes Basin to look towards for current methods and knowledge gaps

Lake Simcoe Watershed

- Central Ontario, flows into Georgian Bay
- Lake Simcoe Protection Act, (2008)
 - Protect, Conserve, Restore
- Impacted by human activities
- Lake Simcoe Protection Plan (2009)
 - Addresses degraded water quality due to excess nutrients entering the water



Project Objective

- Improve the capacity for Principal Authorities, within environmentally vulnerable areas, to adopt provincially-standardized best practices for septic reinspections
 - Lake Simcoe Watershed

Research Goals

- Assess level of awareness of home or system owner regarding their onsite septic system
 - Are current onsite septic system reinspection programs effective
- Identify reinspection program administrators' perceptions of intra-provincial program support
- Propose a best practice, collaboration-based framework for septic reinspections in Ontario
- Determine an efficient method for the storage of reinspection data (recordkeeping)



Research Phases

1. Jurisdictional Scan

- Ongoing
- What is being done and where?
- Build project network

2. Semi-structured interviews

- Winter 2019: with private system owners and program administrators

- Assess Awareness

3. Community and Industry Workshops

- Winter/ Spring 2019

4. Final Reports

- Spring 2019

Septic Reinspections in Ontario

- Reinspections are mandated in Section 8.9, Division B, Ontario Building Code
 - Every 5 years
 - Third-party certificates of compliance may also be acquired to meet requirements
- Principal Authorities are responsible for conducting inspections occur for:
 - Areas within 100m of Lake Simcoe shoreline, tributaries, rivers and ponds
 - Source Water Protection areas within the Province
- Two types of effective inspections
 - Phase I -- Non-intrusive
 - Phase II -- Intrusive

Phase I Reinspections (Ontario)

- Non-intrusive
 - Avoids disturbance to the system as a whole
- Identify information pertaining to the septic system
 - Field sketch or map of system
 - Inventory of system features including inside and outside dwelling
 - Source of water supply
 - Potential volume of effluent leaving septic system

Phase I Reinspections (Ontario)

- Discussion of current homeowner practices
 - Effluent filter
 - Tank pumping
- Phase I may be sufficient for establishing compliance results
 - If not, intrusive, Phase II assessment is required

Phase II Reinspections (Ontario)

- Required when Phase I reinspections fails
- Includes the examination of the following (examples):
 - ✓ Measurements pertaining to the sludge layer
 - ✓ Physical condition of the inlet and outlet
 - ✓ Condition of the effluent filter
 - ✓ Distribution boxes, leaching beds, dosing tanks, pumps
 - ✓ And more...
- Consider buffers to: environmental features; wells and water intakes; ponding; trees and vegetation
- In-home plumbing and other system features can be evaluated to determine deficiencies



Phase II Reinspections (Ontario)

- Intrusive inspection of
 - Dwelling plumbing
 - Septic tank
 - Leaching bed
- In-home plumbing and other system features can be evaluated to determine deficiencies
 - Ontario Building Code requirements

Other Programs:

Minnesota Pollution Control Agency, U.S.A.

- Compliance-based inspection process for existing sewage treatment systems
- Major Criteria
 - Impact on Public health
 - Tank Integrity
 - “Other” – Maintenance practices; descriptions of threats
 - Soil Separation
 - Status of Operating Permit: Is the system compliant with local nutrient management BMPs
- If a system fails, it must be upgraded, replaced or discontinued within 10 months of inspection*

Other Programs:

- **Town of Innisfil**
- **Township of Oro Medonte**
- **Township of Ramara**
- **Tiny Township**
- **Haliburton County**
 - Algonquin highlands
 - Dysart et al
 - Highlands East
 - Minden Hills

Summary

- There is a need for improved record keeping and knowledge sharing from the Provincial level to ensure program success for the future
- Continue to communicate with relevant Principal Authorities
- Semi-structured interviews to gain insights from stakeholders
- Community and industry workshops
 - Proof of concept
 - Feedback for final best practice document
- Final reports and sharing



Water Well Legislation in Ontario

Taylor West, MSc Candidate
School of Environmental Design and Rural Development
University of Guelph

Background

- 13% of Canada's population uses private systems to get their water
- This number is 9% in Ontario
- What legislation has Ontario put forward to protect water security?

Current Ontario Legislation

- Ontario Water Resource Act
 - Regulation 903 / Wells Regulation
- Environmental Protection Act
- Safe Drinking Water Act
- Health Protection and Promotion Act



Different Actors in Well Maintenance

- Owner
 - Legal obligation to properly care for the well
 - Owners and family (unpaid) are exempt from obtaining licenses
- Well Contractor
 - Construct, alter, or extend existing wells
 - Must register with Provincial Government
- Well Technician
 - Construct, upgrade, or repair existing wells
 - Five categories of technicians



Well Maintenance

- Most common form of contamination is rainfall runoff or other foreign materials
- Note changes to water color, taste, odor
- Ensure no potential contamination are resting on well-head
- Examine structural weaknesses on well caps
- Well entrances should be 40cm above surface, with slope away from entrance
- Pumps should show no signs of noise, or abnormal behavior
- Well abandonment should be conducted by a well technician
- Test water annually at a minimum
- Physically inspect well annually at a minimum
- Create mounds around well-head to protect from flooding



Methods of Well Testing

- Step Testing
 - Short term functionality tests for municipal wells
 - Examines functionality, chemical precipitates, and biomass of well
 - Step tests with a decline of 20-40% are suggested to be rehabilitated
- Video Inspection
 - Performed every 1-5 years
 - Examines structural integrity of the well
- Prioritization Matrix
 - Variables include age, chloride, rate of change, and number of rehabilitations
 - Can be used by municipalities to screen their population



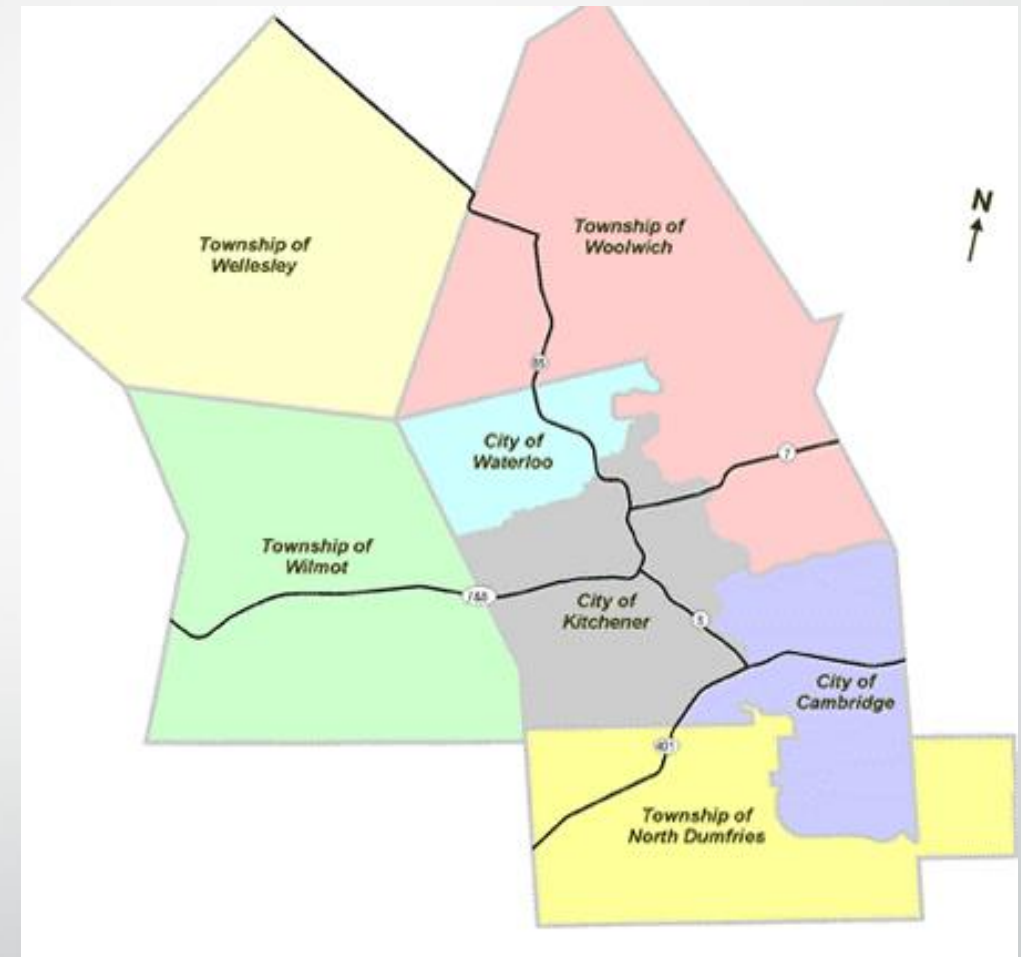
Wellhead Protection Management – Multiple Barrier Approach

- Critical for environmental stewardship and public health
- Strategies for risk management surrounding wellhead and casting
- Municipalities are suggested to visit wells and help owners develop strategies
 - Help identify best practices
 - Inform of dangers to water supply
 - Provide information on well management and care
 - Provide calendar for water testing
 - Community empowerment through positive frame



Case Study – Region of Waterloo

- Developed successful resource management strategies and policies
- Promoted a mixture of voluntary and regulatory goals on its citizens
- Enforced local municipalities to follow rules
- Conducted a policy analysis and filled its gaps
- Individualized policies to target urban and rural populations
- Financial incentives for farmers to conduct an environmental farm plan
 - 131 farms have gone through the plan and improved groundwater sustainability



Who Will Plan/Manage Private Wells?

- There are currently three options
 - Conservation Authority
 - Ministry of Health and Long-term Care
 - Municipality

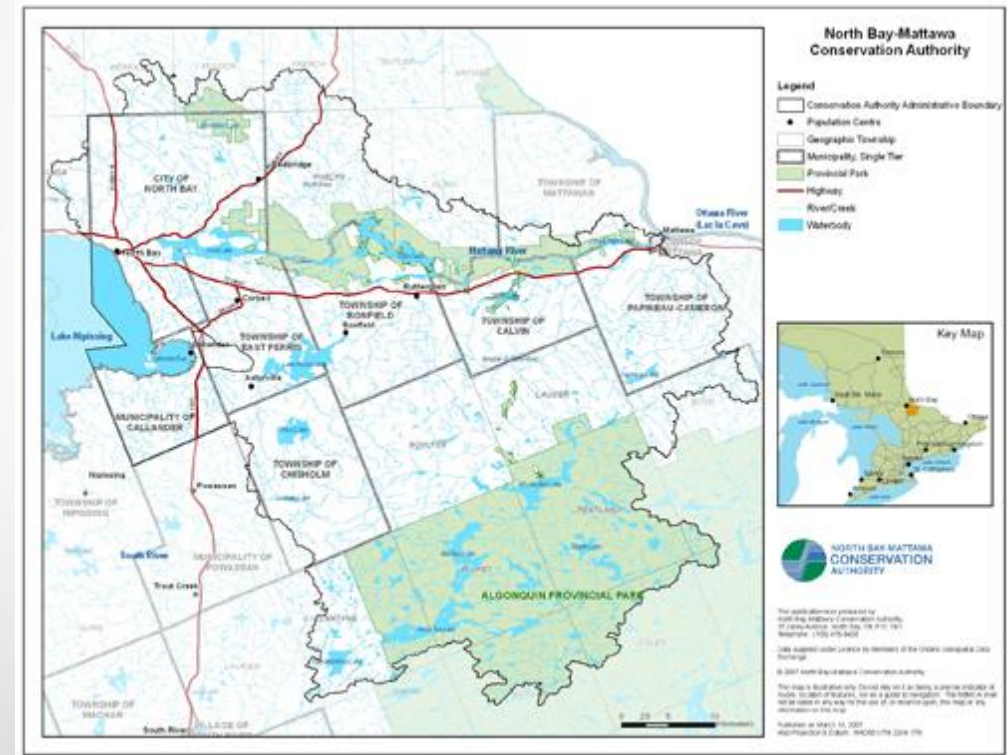


Case for Conservation Authority

Possibility	Pros	Cons
OMHLTC	<ul style="list-style-type: none">- Has technical experience- Regulatory body	<ul style="list-style-type: none">- Little ability to tackle whole system- Not funded to target all rural areas
Municipal	<ul style="list-style-type: none">- Local understanding of municipal wells- Experience in local development process and history of region	<ul style="list-style-type: none">- Must acquire expertise to conduct proper inspections

Case Study: North-Bay Mattawa Conservation Authority

- Actively monitoring water resources through the Drinking Water Source Protection Initiative
 - Determine the effect of changing climate on groundwater resources
 - Annual testing of well sites
 - Examines trends to ensure land use planning sustainability
 - Town of Mattawa and Municipality of Powassan groundwater mapping
- Developed a Source Protection Plan to target municipal drinking water sources
 - Development of Wellhead Protection Areas and Intake Protection Zones
 - Water budget analysis



Case Study: North-Bay Mattawa Conservation Authority



- Policy Tools to Implement Source Water Protection
 - Land use Planning, Prescribed Instruments, Incentives, Education, Specified Actions
- Implementation
 - Municipal implementation on drinking water sources
 - Designation from multiple authorities

Summary:

There are currently many laws surrounding well water maintenance

Each law has a regulatory body

Each law and regulatory body do not properly address private wells

Three paths to address this gap



Conclusion

- Understanding the significance of human and environmental health is vital to ensuring programs are taken seriously
- Relationship exists between rural septic systems and water wells
 - Human and environmental health
- Collaborative management between conservation authorities and municipalities is important

Thank you



ONTARIO
AGRICULTURAL COLLEGE

SCHOOL OF ENVIRONMENTAL DESIGN
AND RURAL DEVELOPMENT

<https://www.uoguelph.ca/sedrd/>