OOWA's Guidance Document Series:
Inspection of Onsite Systems

Produced by the OOWA Onsite Technical Committee

Version 1.0
BP 04: Inspections of Onsite Systems

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1.0 Overview & Intent

The intent of this best practice document is to provide onsite system inspectors with a uniform baseline of activities, definitions and processes in order to streamline and standardize professional practices.

This document builds on the Ontario Building Code Appendix Note (See 2011 OBC Appendix Note, Section 8.1 of this document) so that system inspections at the time of property transfer could have a basic standard of activities that would align with municipal re-inspection programs.

Industry has indicated that the development of a baseline for the minimum requirements for professional inspectors is necessary in order to work toward the standardization of professional services. In this way consumers can expect the level of quality of service and reliability of information provided they depend on to make their purchasing decisions.

The Walkerton Inquiry (link and citation here) did recommend that all septic systems be inspected as a part of a property transfer. This recommendation has yet to be officially implemented, however a standardization of professional practice will ease the transition of this requirement into a codified reality. We hope that this document also benefits municipalities conducting or interested in conducting discretionary or mandatory re-inspection programs.

It has also been established that the professional inspector needs to have an understanding of past building code editions and other regulatory approvals, a firm understanding of design principals, an understanding of the current building code, an understanding of construction practices, and field experience with various soil types and system designs.

This is not entry level work and is it our aim to have this best practice document help inform existing professionals, standardize practice and guide future inspectors.

It should be noted that there are several types of treatment systems that could be inspected as a part of an inspection process, however this document is intended for guidance of standard system inspections. Detailed instructions or recommendations for Advanced Treatment Units are outside the scope of this document and will be covered in a future OOWA best practice document. The inspector is encouraged to contact the specific treatment manufacturer for information as required.

The value and importance of comprehensive inspections at time of property transfer cannot be understated. The potential change of property ownership provides an opportunity for all components to be identified, verified and functionally assessed. Transition of ownership is a unique and valuable opportunity to identify a system's components and their condition, in order that this valuable infrastructure can be maintained, and repaired or replaced if need be. This process also allows for the new owner to receive an education and understanding of how the system works, and ensure that it will function and perform to protect their property value and health.

1.1 Types of Inspections

1. Pre-listing inspection (due diligence by vendor)
2. Property transaction (vendor obligation)
3. Property transaction (purchaser due diligence)
4. Homeowner maintenance plan
5. Municipal mandatory inspection program for water protection
6. Renovation permit: capacity/condition assessment*
7. Forensic assessment for Order to Comply*

*These types of inspections would typically require additional investigation/information above and beyond the scope of this best practices document (e.g. extensive excavation, soil & hydrological analysis, P. Eng. involvement)

1.2 Existing Provincial Guideline

Refer to Appendix 8.1 – 2011 OBC Maintenance Inspection Protocol

2.0 Levels of Inspection

Inspection Categories	
Inspection Level	**Task Inclusion Descriptions**
Level 1	• Dwelling and Use Research Findings • Visual Inspection • Locate & Access to Septic Tank • Load Test • Dye Test
Level 2	• Dwelling and Use Research Findings • Visual Inspection • Locate & Access to Septic Tank • Load Test • Dye Test • Sewer Camera Inspection
Level 3	• Dwelling and Use Research Findings • Visual Inspection • Locate & Access to Septic Tank • Load Test • Dye Test • Sewer Camera Inspection • Soil Inspection • Excavate Cross Section

2.1 Inspection Activities: Inspection Category Breakdown

Activity	Level 1	Level 2	Level 3
Research*	X	X	X
Research (Document Review)*	X	X	X
Type of Occupancy and Use	X	X	X
Source(s) of Water	X	X	X
Volume Generated	X	X	X
Use of Household Devices	X	X	X
System Class	X	X	X
System Components	X	X	X
System Type	X	X	X
System Location	X	X	X
System Layout	X	X	X
Setback/Clearance Distances	X	X	X
Groundwater Level*	X	X	X
Size & Material of Septic Tank	X	X	X
Condition of Septic Tank*	X	X	X
Frequency of Pumpout*	X	X	X
Frequency of Cleaning (PC or DB or Effluent Filter)	X	X	X
Indications of Failure*	X	X	X
Sampling History*	X	X	X
Sludge and Scum Accumulation	X	X	X
Working Capacity	X	X	X
Condition of Inlet Baffle	X	X	X
Condition of Outlet Baffle	X	X	X
Condition of Effluent Filter	X	X	X
Operational Malfunction History*	X	X	X
Hydraulic Loading	X	X	X

2.1 Inspection Activities: Inspection Category Breakdown Continued

Activity	Level 1	Level 2	Level 3
Evaluation of In-home Plumbing Connections	X	X	X
Daily Flow Rate	X	X	X
Leak Detection*	X	X	X
Camera Inspection		X	X
Interview with Potential Buyer	X	X	X
Delivery of Education Materials	X	X	X
Operation and Maintenance Plan*	X	X	X
Recommendations for Upgrades	X	X	X
Pump-out*			
Locates*		X	X
Dye Test*	X	X	X
Excavating: Shovels vs. Equip			X
Soil Inspection			X
Soil Mapping	X	X	X
Reporting	X	X	X

Please note that all asterisked items are defined further in this document.
Please see next document sections for definitions and details.

3.0 Inspection Procedures

For each of the three inspection levels (Level 1, Level 2, Level 3), the tasks and procedures identified should always be considered a minimum for that particular level of inspection. An inspector may choose to conduct additional tasks and procedures as deemed appropriate or necessary to complete the inspection. The following sections provide definitions and descriptions for each level of inspection.

3.1 General Terms & Definitions

Groundwater Level
The top surface of a free standing body of water in the ground. When applied to a sewage system, groundwater means water below the surface of the ground that occupies a zone of the earth's mantle that is saturated with water.

Groundwater Table
Means the elevation of the upper surface of the groundwater existing in the area of the sewage system.

Hydraulic Load Test
Determine the volume of water necessary to put to the system to provide an accurate representation of peak flow conditions. In order to calculate the volume of water required, the daily design sewage flow must first be obtained, determined by the number of bedrooms, total finished above grade floor area and number of fixture units. Please refer to Section 3.3 for procedure.

Leak Detection
Relates to leaks to household fixtures (i.e. interior to the dwelling) that create additional flow to the sewage system (i.e. leaking toilets, water condition equipment such as water softeners or reverse osmosis equipment).

Locates
Any excavation that requires equipment requires utility locates prior to digging. For precautionary reasons the inspector should also consider locates even for hand excavation by shovel.

Setback or Clearance Distance
A straight line distance between parts of the septic sewage system and distinct property features to which the system being referred to must not encroach. The minimum distances are prescribed in the Ontario Building Code, and other local requirements may dictate additional setbacks.

General soil lithology native to area within which an inspection is taking place, as documented in published soils mapping (available on the Ontario Ministry of Agriculture and Rural Affairs website).

Type of Occupancy & Use
Determine the original design of the building (i.e., single family dwelling, multi-unit, commercial, etc) as well as the current use (from owner or agent) and any plans for change of use and/or significant renovations from the buyer.

Sources of Water
Identify current water supply (i.e., municipal, drilled well, dug well, point well, lake intake, cistern, etc) and determine distance of water supply to septic system components in accordance with setback distance requirements.

Research Findings
Documenting the results of any background review (i.e. current and/or historical information) conducted to help inform the inspection process. Information regarding the dwelling should be documented, including the number of bedrooms, bathrooms and square footage. Research could also include such items as current permits, historical permits, records of maintenance/ repair, information regarding the past, present, or current occupancy or use of the home, renovations that may have been completed, etc. This could also include notes on a more general background document review, such as soil and geological mapping and reports, groundwater studies, local well records, etc.

Interview with Potential Buyer:
Discussion with client whether onsite or by telephone to gather important details about their intended use for the property, including occupancy, changes to the property, renovations, additions, that they may be considering as a part of their purchase.

Condition of Septic Tank:
The visual inspection of the accessible components of the septic tank including the lids and risers and structural components visible from grade.

Size & Material of Tank:
Size is an estimate based on a visual inspection unless research documents provide insight into the potential size. Still a visual inspection of the size and material of a septic tank. The materials of the risers and the lids and the structural components of the tank as well as the baffles, shields and filters.

System Class
Refers to the class of system as defined by the Ontario Building Code:

System Class	System Description
Class 1	A chemical toilet, an incinerating toilet, a recirculating toilet, a self-contained portable toilet and all forms of privy including a portable privy, an earth pit privy, a pail privy, a privy vault and a composting toilet system.
Class 2	Grey water system that treats sanitary sewage of domestic origin that is derived from fixtures other than sanitary units.
Class 3	Cess pool
Class 4	Leaching bed system
Class 5	A system that requires or uses a holding tank for the retention of hauled sewage at the site where it is produced prior to its collection by a hauled sewage system.

System Components
Refers to the class of system as defined by the Ontario Building Code:

System Class	System Description
Treatment Unit	Portion of the system that provides some level of treatment of the sewage prior to discharge into the leaching bed, usually includes a septic tank and may include additional advanced treatment units.
Pump Chamber	A chamber housing a pump to convey sewage or effluent from one portion of the system to another, which may be required to overcome an elevation difference, or may be for dosing of a treatment unit or leaching bed.
Controls	If required, a control panel and alarm system related to the mechanical components of the system such as pump chambers and treatment units.
Leaching Bed	The leaching bed is the component of the system that receives effluent from a septic tank or treatment unit and disperses it into the subsurface soil using a distribution system that may include piping, stone, chambers, etc. Other common names for this part of the system would include a dispersal bed, filter bed, soil absorption system, area bed and tile bed.

3.3 Level 1

Visual Inspection

Consists of a complete visual inspection of all components of the system. This would typically include opening the septic tank inlet and outlet to observe the size, type and material of the tank, its condition, make note of inlet and outlet baffles or lack thereof, make note of any obvious deficiencies, measure sludge and scum levels. Pump chambers should also be opened and inspected to document the size, type and material of the chamber, document condition of chamber and equipment, confirm pump and alarms are operational. A visual inspection of the leaching bed would include a non-invasive inspection to identify any soft, spongy or wet areas, evidence of areas that may have been subject to past breakout of effluent, uneven vegetation growth patterns, etc.

Septic Tank Visual Inspection (Cover)

- be aware of the structural integrity during excavation (deteriorated tanks could collapse if you step on them)
- cement, plastic, fiberglass (is it an approved tank?)
- handles (broken or rotting away); suggest risers to correct issue
- slab covers usually indicate an older system (older systems have a greater chance of Biomat buildup)
- condition of cover - cracks, deterioration, root infiltration
- check for indications of leaks around the edges of cover (discolouration would show overflow)
- check underside of cover to confirm any high water levels (underside of lid should be clean)
- covers with clean out pipes are inadequate for proper clean outs - pumpers cannot properly clean septic tanks with this little access (clean out pipes are acceptable for a holding tank); suggest risers to correct issue
- # of covers usually indicate the type of tank
  - large slab shows the tank is old
  - 1 small square cover usually indicates a 1 compartment tank
  - 2 small square covers usually indicates a 2 compartment tank

Septic Tank Visual Inspection (Risers)

- properly secured lid
- no stripped screws
- water tight
- no leak marks on the inside of the riser

Septic Tank Visual Inspection (Interior of Tank)

- Check levels in the tank (normal levels = below the inlet pipe and level with the bottom of the outlet pipe)
- Confirm sizing of the tank
  - does it meet requirements?
  - have there been any additional bedrooms/bathrooms added to the plan since the installation of the system
- Condition of centre wall (check for deterioration)
- Should be CSA B66 approved

Septic Tank Visual Inspection (Baffles)

- Are Inlet/Outlet baffles in place? (If not replace with PVC baffles and if possible baffle filter)
- Condition of Inlet/Outlet baffles
- Type of Inlet/Outlet baffles (cement, PVC, Plastic, Steel, Cast Iron or other)
- Is there a baffle filter? If not, can one be installed?
- Are there any roots infiltrating the baffles or growing in the tank?
- Is there any indication of a high-water mark or high sludge level on the baffle? (this would indicate a backup has occurred)
- Use a sewer camera to check inlet and outlet pipes for standing effluent, sags and obstructions

3.3 Level 1

Working Capacity/Volume

- Probe out tank dimensions (harder to do with oval shaped and plastic tanks)
- Measure interior length and width of tank
- Measure height of tank from bottom to top of liquid level/bottom of outlet pipe
- Multiply L x W x H (or πr2 x H) to determine approximate working capacity of tank
- Compare volume to calculated daily design flow to determine sizing appropriateness

Locate & Access to Septic Tanks, Chambers and Distribution Network

Using an insulated T-handled probe, push the probe down through the soil gently over the area where the tank is expected to be buried. Common methods to locate a buried tank when there is no provided information:

- draw an imaginary line from the main vent stack leaving the roof
- locate where the main sewer lines leaves through the foundation wall and then probe the area outside (remove the clean-out port, if accessible, and use a camera snake/locator tool)
- look for areas where the grass cover is more sparse/dry
- look for subtle depressions in the ground where it appears there have been previous excavations
- many tanks are located between 1.5m to 3m from the foundation of the house though others can be up to 30m away depending on the installation

Once the location of the tank is confirmed, probe out the dimensions of the tank to get an idea of its configuration and to help minimize the excavation efforts over the access port(s).

Load (Hydraulic) Test

It is reasonable to assume most households experience two high flow periods over the course of an average day – one in the morning and one in the evening. The goal of the inspection process is to simulate conditions as they would occur during a typical peak flow period. We have chosen a sliding scale approach to try an accurately quantify the water use in a household based on the calculated daily design flow which applies as follows:

If the daily design flow is less than (<) 2700 L/day, load the system with 30% of the daily flow.
If the daily design flow is between 2700 and 3700 L/day, load the system with 20% of the daily flow.
If the daily design flow is greater than (>) 3700 L/day, load the system with 15% of the daily flow.

Based on the time of day the inspection takes place, it can be reasonably assumed the system has experienced some measure of loading, or alternatively, if the dwelling has been vacant for a period of time, the septic system may have experienced very little use. Depending on any additional information supplied by the homeowner/client, it would be up to the discretion of the inspector to modify his or her loading calculation, as long as a justification for doing so is documented.

The recommended technique to conduct the loading test would be to open a fixture inside the house or use a garden hose connected to an outside tap. If an outside tap is selected, the hose should be inserted inside the inlet baffle to minimize the turbulence created within the tank and simulate normal operating conditions. In situations where the septic tank has recently been pumped out, the loading test would be best performed by inserting a garden hose into the outlet pipe of the tank.

In all cases, the flow of water must be measured in order to monitor the volume being discharged to the leaching field. This can be done with a flow metering device or with a chronometer and graduated container.

3.3 Level 1

If a mechanical pump chamber or siphon chamber is downstream of the tank, the drawdown volume of the pump/siphon cycle should be calculated and then multiplied by the number of cycles necessary in order to reach the desired flow volume.

During the loading test, the inspector should be observing the liquid level in the septic tank to note any elevation which would indicate a restriction of flow within the system as well as the surface conditions on and around the leaching field for any notable wet areas or surface breakouts. The degree of saturation within the distribution pipes should also be monitored to report on the loss in hydraulic capacity.
*Note: a tracer dye test should always be conducted in conjunction with a hydraulic loading test

Dye Test
The purpose of the dye test is to help confirm the fixture connections to and through the WTS as well as easily identify any obvious signs of malfunction such as surface breakouts or dye collecting into a sump pit.

Using an environmentally friendly fluorescent tracer dye (powder or tablets), flush down one or more drains to verify proper fixture connections. You may also wish to put a small amount of dye directly into the outlet pipe leaving the septic tank or into a pump chamber to more expediently get dye into the leaching field.
Having at least two colours of dye is recommended if trying to differentiate flows from various locations.

Soil Mapping :
General soil lithology native to area within which an inspection is taking place, as documented in published soils mapping (available on the Ontario Ministry of Agriculture and Rural Affairs website).

3.4 Level 2

A Level 2 Inspection would include all tasks listed in Level 1, plus the following additional tasks and procedures:

Camera Inspection
An inspection of the inside of the sewer pipe with a camera connected to a video screen, to allow for visual recording of condition of the inside of the pipe.

Equipment Required:
Sewer Camera: having recording capability to take pictures and video is important so that you can provide visual report to client. Camera with 25mm self levelling head and sonde is ideal.
Detector to locate sonde and position of camera in pipe.
Hand Shovel, Hacksaw, Sharp knife, Spare 100mm diameter and 75mm diameter PVC pipe, PVC glue
100mm and 75mm Fernco rubber PVC to PVC pipe couplers, PVC glue on coupler
Rags, Fresh water, Nylon string, Spray paint

Procedure:
Tie string to camera head. Insert camera through outlet baffle of septic tank and advance camera through distribution pipe to header. You may encounter sections of pipe in which the camera is under water due to a belly in the pipe. Record locations.

In systems that include a pump chamber insert camera at the distribution box or leaching bed header. Advance camera through header. Pull string and advance camera to facilitate getting camera around corners. Follow camera on the ground surface with sonde detector. Mark location of tees and elbows with paint. Mark locations of obstructions on surface with paint. Obstructions can include roots, rocks, poles etc.
When camera cannot get around corner at a tee dig hole to expose pipe.

Place excavated material in neat piles separating topsoil from sand and clean stone. Carefully cut hole in top of pipe. Insert camera in hole and continue inspection. Repair pipe with coupler or PVC pipe patch.

Backfill hole carefully replacing material as excavated. Insert camera through inlet baffle and investigate pipe from septic tank back to house. Prepare sketch of piping inspected.

3.5 Level 3

A Level 3 Inspection would include all tasks listed in Level 2, plus the following additional tasks and procedures:

Soil Inspection
Inspection of the topsoil, clean stone, and sand found in an effluent dispersal bed. Inspection should identify depth of each layer, condition of each layer, presence or lack of biomat, effluent and roots, depth to bedrock if within 900mm from bottom of trench

Soil Excavation
Equipment Required: Hand shovel, plastic tarp, plastic sealable sample bags

Procedure:

- Locate pipe laterals in leaching bed using probe or other means.
- Remove sod and topsoil from excavation area.
- Stockpile all materials separately.
- Remove sand layer and take note of depth, colour and condition whether it is wet or dry.
- May find a geotextile layer on top of clean stone. Carefully cut material.
- Remove clean stone to top of pipe. Check for sand migration in to stone layer and moisture condition.
- Remove clean stone from under pipe and take note of effluent level if present, presence of biomat, sand or roots.
- Check perforations in pipe to see if they are blocked or located at the 4 and 8 o'clock positions.
- Excavate sand beneath the clean stone. Take note of liquid level, presence of biomat. If sand is black and sticky this may indicate a problem.
- Take sample of sand.
- Take note of lateral pipe position with respect to high ground water table, bedrock and native soil layer where leaching bed is constructed of imported leaching bed sand.
- Place material in excavation matching layers exposed. Replace geotextile over clean stone.

4.0 Other Considerations

4.1 Tools & Equipment

Personal Protective Equipment (All Levels)
- Variety of gloves (nitrile, leather, etc)
- Steel toe boots
- Eye protection
- Disinfecting wipes
- Eye wash
- Sunscreen

Level I
- Digital camera/smartphone
- T-handled probe
- Various shovels (for cutting and scooping)
- Power drill/hand tools
- Rake(s)
- Tarp(s)
- Lifting/Towing straps
- Pickaxe
- Large wrecking/pry bar
- Fluorescent Tracer dye (powder or tablets) – two colours
- 50 -100ft garden hose
- Sludge Sampler for solids measurements
- Digital Amp meter/power tester for control panels and pumps
- Measuring tape/tape reel
- Marking flags
- Flushable transmitters
- Graduated bucket to calculate flow volume
- Metal detector
- Extension cord
- Propane torch

Level II
- All Level I equipment
- Sewer Inspection Camera

Level III
- All Level I & II equipment
- Hole saw kit
- Couplers to repair drilled out inspection ports in headers/distribution pipes

4.2 Safety Considerations

- Recommend two-mans teams to offset excavation activities
- Be aware of confined space situations resulting from deep excavations, access risers or pump chambers
- While excavating, be aware of any nearby buried electrical or water lines
- Do not leave unsecured tank hatched unattended
- Always wear gloves when touching equipment that may have been in contact with sewage
- Keep antibacterial wipes handy and a first-aid kit in your vehicle

5.0 Reporting

Preparation of a comprehensive inspection report will serve to document the details of the inspection. The report should document what was observed, as well as anything that could not be observed and why. Background information regarding the property, the dwelling, past or present use, is also beneficial to add context to the information in the report. Items that should be considered as part of a report are discussed in the sections below.

The format of a report can be determined by the individual inspector; however, it is recommended that the report be structured in a way which clearly communicates the findings and conclusions of the inspection, using language that can be clearly understood by the average homeowner. The use of tables is encouraged to help categorize and clarify information, along with photographs to provide a visual.

References to the applicable sections of Part 8 of the Ontario Building Code are helpful to support any required or recommended work (e.g. maintenance, upgrades, etc.) on the system.

Primary Information

This section should document the pertinent details regarding:

- Client name and contact information
- Location/address of subject property
- Date and time of inspection
- Intent/reason for inspection (e.g. due diligence, mandatory re-inspection, property transaction, etc.)

Client & Property Background Information:

A section describing the property background may include such things as:

- Reference to historical permit documents or drawings
- Dwelling information (e.g. number of bedrooms, fixtures, square footage, etc.)
- Year round or seasonal dwelling
- Number of occupants
- If the inspection is for a property transaction, consider both historical and proposed occupancy
- Any repairs or replacement of components
- Pumpout records
- Sampling records
- Other pertinent background information obtained from previous reports or documentation

5.0 Reporting (Continued)

System Information:

A detailed description of the system should include information on the components of the system, their physical location, and their condition at the time of the inspection.

- Class of System (e.g. Class 4, 5, ATU, etc.)
- System components (e.g. identify type and size of tanks, type of bed, etc.)
- Type of leaching bed
- Estimated age of system
- Identify minimum separation distances from system components to structures property lines and water sources
- Calculated daily design sanitary sewage flow for building (relative to tank and field size, if obtainable)
- Comment on construction and condition of individual system components (tanks, chambers, leaching field) listing any deficiencies and vulnerabilities
- Comment on overall condition and performance of system with respect to section 8.9 (operation and maintenance) of the Ontario Building Code
- Include any work which would be required to bring the system into compliance with section 8.9

Other Information

The inspector should use their discretion in deciding what other information may be helpful to include in a report. This could include such items as:

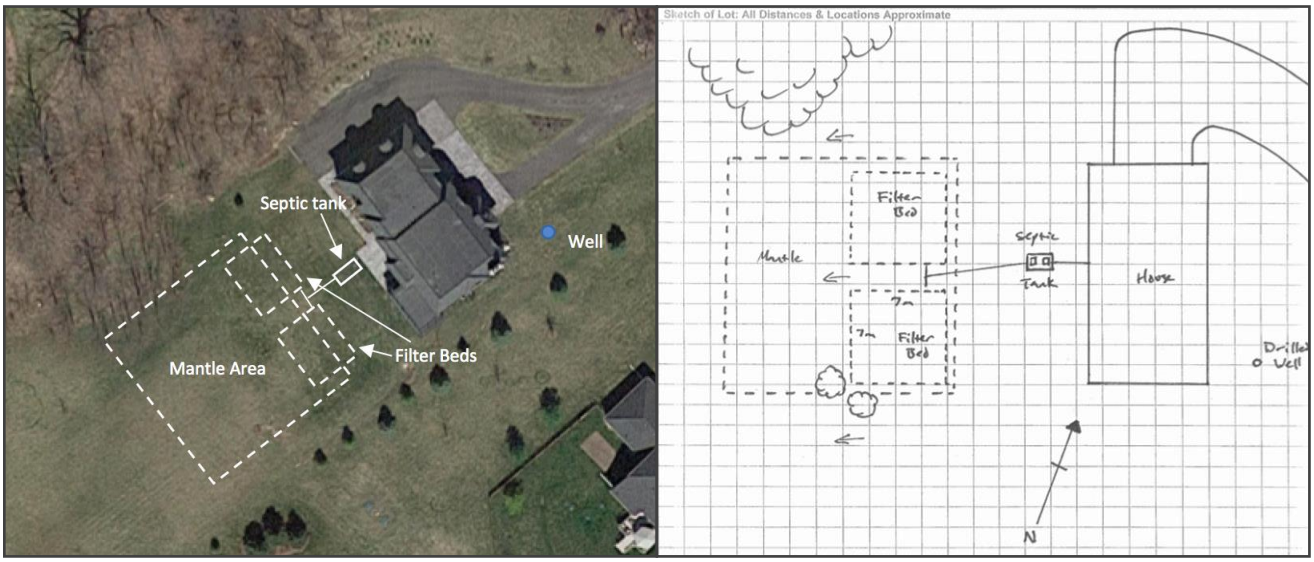
- Colour photographs of system components (especially deficiencies)
- Map or diagram of system showing relative location and sizing
- Recommendations for upgrades to improve system function and/or performance
- Approximate order of magnitude cost estimates for upgrades
- Comments on siting, drainage, soil characteristics
- Comments on all sources of water being discharged to system (e.g. sumps, water treatment equipment backwash)
- Applicable published information for the homeowner, such as brochures or other specific user manuals or documentation (e.g. Septic Smart brochure)
- Operation and maintenance plan

Limitations

A report should always contain a Limitations and Warranty section, to identify any limitations or constraints and to help protect the inspector against items that would not be reasonably identifiable using generally accepted inspection protocols.

6.1 Case Study #1

System in Substantial Compliance Inspection
Background Information
Reason for Inspection: Property Transaction Approximate age of system: 5 years Past/current occupancy: 2 Proposed Occupancy: 3-5
Observations: Newer system installation (~5 years old), Watertight risers to grade over both tank access ports Effluent level in tank appropriate (no evidence of previously elevated levels) Two (2) effluent filters installed at tank outlet Gravity discharge to twin filter beds Good grading around beds to direct surface water away Camera inspection of outlet pipe clean and free of significant sludge/solids No elevation of liquid level in tank or in pipe during tracer dye & loading test
Recommendations: - Monitor solids accumulation in septic tank - Clean effluent filters on routine schedule - Sign maintenance agreement with service provider

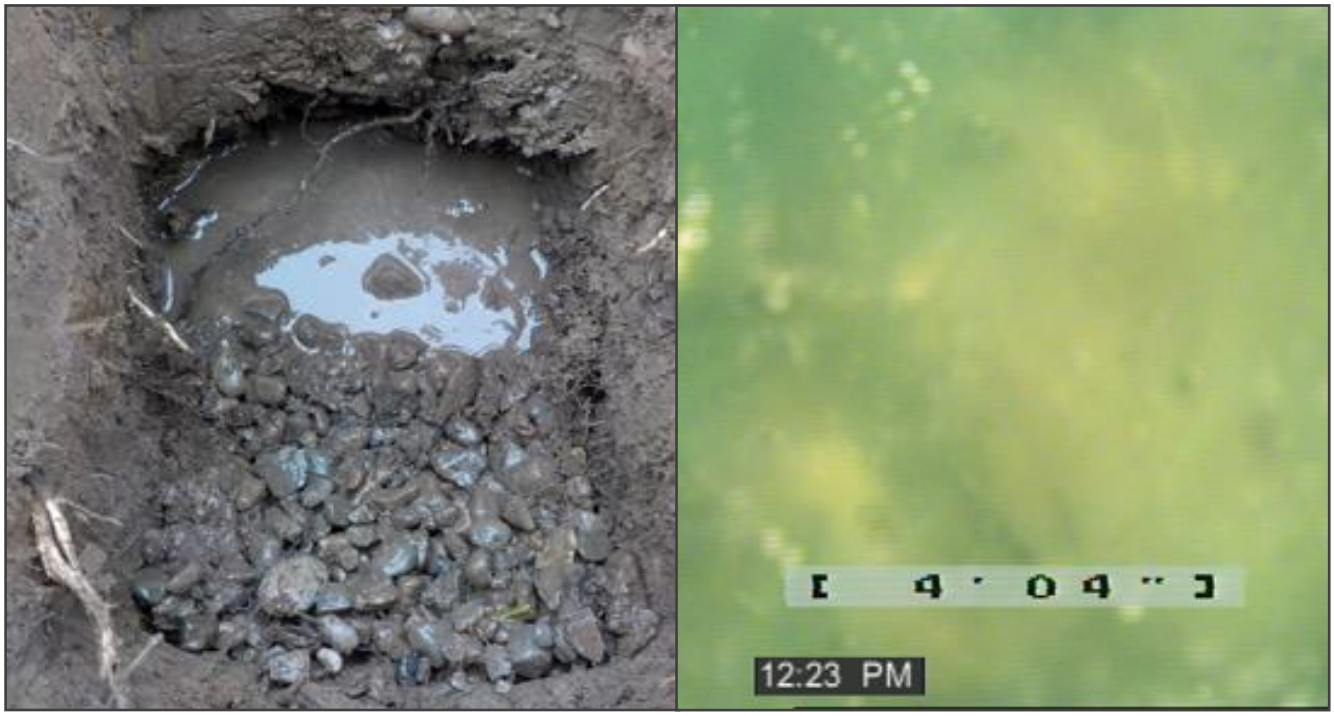


6.1 Case Study #1 Photos

6.2 Case Study #2

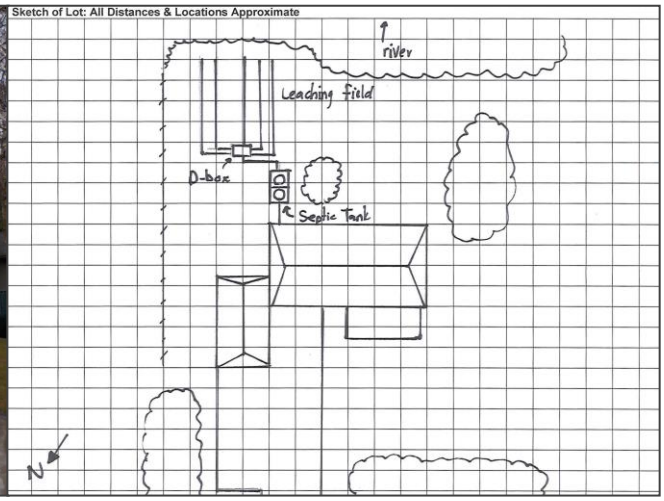
Failed System Inspection
Background Information
Region: Peel County Reason for Inspection: Property Transaction Approximate age of system (years): 45 Past occupancy: 2 Full-time
Observations: Homeowner had not experienced any indications of septic system failure. Leaching field saturated as shown by test pit excavation into a single absorption trench. Discharge pipe saturated as shown by sewer camera inspection. Green tracer dye visible. Green tracer dye visible within drainage swale on property border, indicating discharge of untreated sewage to the ground surface.
Outcomes: System replacement has since occurred.

6.2 Case Study #2 Photos



6.3 Case Study #3

'Tricky' System Inspection
Background Information
Cause of inspection: Property Transaction Approximate age of system (years): 25-30 Past occupancy: 2, full-time Current or proposed occupancy: Seasonal cottage – shared between two families
Observations: This inspection was conducted for the potential purchaser of property, and was previously advised by her agent and homeowner that an inspection was not necessary as the municipality had completed a mandatory re-inspection two years prior and there were no issues. A report was provided for review. During the inspection, the septic tank concrete was noted to be significantly deteriorated presenting a health and safety risk. The camera inspection of the outlet pipe leaving the tank identified a small concrete distribution box which none of the parties were aware of. The distribution box was uncovered and lid was removed. The concrete of the box was substantially deteriorated and was full of sludge, impeding the flow of effluent to several of the distribution lateral lines. A camera inspection of each line, along with a tracer dye and loading test showed that the majority of effluent was discharging to only 2 of the 6 total lines. This was setting the system up for hydraulic overload and premature failure even though to the untrained eye, no "obvious" indications of malfunction or failure would be evident without a camera inspection.
Recommendations: - Proactively replace the septic tank and distribution box - Mechanically flush the distribution laterals and treat with a biological remediation product



6.2 Case Study #3 Photos

7.1 Defect Recognition & Variable Conditions

The following are some examples of defects in system component conditions that may be encountered during inspection. It is important that component defects are recognized and appropriately communicated and reported to the client.

7.1 Defect Recognition & Variable Conditions (continued)

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The following are some examples of defects in system component conditions that may be encountered during inspection. It is important that component defects are recognized and appropriately communicated and reported to the client.

7.2 Acceptable Conditions

The following are some examples of acceptable conditions you will encounter during inspection. It is important to communicate the value of acceptable conditions to your client.

8.1 2011 OBC Maintenance Inspection Protocol

On-Site Sewage System Maintenance Inspections

March 2011

Building and Development Branch
Ministry of Municipal Affairs and Housing

Introduction

The *Building Code Act, 1992* and Building Code (Ontario Regulation 350/06) regulate the design, construction and renovation of treatment systems which are located wholly on the property which they serve (i.e. "on-site") and have a design sewage capacity of 10,000 litres/day or less.[1] Such systems typically provide treatment for smaller buildings such as houses, cottages and small businesses.

Enforcement of the on-site sewage provisions of the *Building Code Act, 1992* and Building Code is the responsibility of local enforcement bodies, or "principal authorities", – the municipality, the board of health or the conservation authority, depending on the location within Ontario.

Ontario's Building Code (Ontario Regulation 350/06) was recently amended to establish and govern mandatory on-site sewage system maintenance inspection programs, to be administered in certain areas by local enforcement bodies. The recent amendments to the Building Code also govern discretionary on-site sewage system maintenance inspection programs established by local enforcement bodies.

The Ministry of Municipal Affairs and Housing, in consultation with the Ministry of the Environment, has developed this document for principal authorities to provide information and highlight certain issues respecting inspections undertaken in connection with on-site sewage system maintenance inspections programs.

> Note: This document has been prepared for explanatory purposes only and does not form part of the regulations, and is not intended to provide legal or other professional advice. Persons requiring such advice should consult their legal or professional advisors.

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[1] "sewage system" is defined in Article 1.4.1.2. of Division A of the Building Code (Ontario Regulation. 350/06) as follows:

Sewage system means,

(a) a chemical toilet, an incinerating toilet, a recirculating toilet, a self-contained portable toilet and all forms of privy including a *portable privy*, an *earth pit privy*, a *pail privy*, a *privy vault* and a composting toilet system,

(b) a *greywater* system,

(c) a cesspool,

(d) a *leaching bed* system, or

(e) a system that requires or uses a *holding tank* for the retention of *hauled sewage* at the site where it is produced before its collection by a *hauled sewage system*,

where these,

(f) have a *design capacity* of 10,000 litres per day or less,

(g) have, in total, a *design capacity* of 10,000 litres per day or less, where more than one of these are located on a lot or parcel of land, and

(h) are located wholly within the boundaries of the lot or parcel of land on which is located the *building* or *buildings* they serve.

Authority for Inspections

Sewage system maintenance inspections are generally intended to determine whether a sewage system is in substantial compliance with the operation and maintenance requirements outlined in Section 8.9. of Division B or, in the case of discretionary programs, with the requirements enforced by the program. These inspections are undertaken by inspectors appointed by Principal Authorities in respect of maintenance inspection programs:

- Required under Article 1.10.2.3. of Division C of the Building Code ("Mandatory Programs"); and
- Established by Principal Authorities under by-laws, resolutions or regulations under clause 7(1)(b.1) of the *Building Code Act, 1992* ("Discretionary Programs").

Identification of Sewage System Maintenance Inspection Program Areas and Sewage System Inventory

As a first step, Principal Authorities will need to identify areas that would be subject to Mandatory Programs (these areas are set out in Article 1.10.2.3. of Division C of the Building Code) and, where applicable, Discretionary Programs.

As a next step, Principal Authorities will need to identify existing sewage systems located within areas subject to Mandatory Programs and Discretionary Programs. These sewage systems may be identified by reviewing:

a) Assessment reports, in consultation with the local source protection authority, to identify septic systems identified as part of the assessment report threat enumeration;
b) Permit applications submitted under the *Building Code Act, 1992*;
c) Certificates of approval or use permits issued under the Environmental Protection Act;
d) Orders issued under the *Building Code Act, 1992*;
e) Records of problems and complaints;
f) Water use records;
g) Maintenance inspection reports (for systems that require the existence of a service agreement as a condition of use, or for systems previously inspected by the Principal Authority);
h) Lists of properties with residential or other uses not serviced by sewage works administered by the Ministry of the Environment [or municipal services]; and/or
i) Field surveys.

Inspection Notification

Mandatory inspection programs require that all systems be inspected every five years. In doing so, Principal Authorities may choose to prioritize areas for inspection based on:

- Proximity to a municipal residential drinking water well or surface water intake as identified in the local assessment report;
- Known groundwater or surface water contamination related to sewage;

- Previous drinking water issues at a well or intake that may be related to sewage, as identified in the local assessment report;
- Age of on-site sewage system;
- Systems without records.

Principal Authorities may find it helpful to notify property owners of the intention to inspect their property. Such notifications may include notice of:

a) Any applicable fees to be charged;
b) Procedural information;
c) Whether the Principal Authority accepts third-party certificates as an alternative to conducting an inspection and, if so, requesting owners to notify the Principal Authority if they have retained a third party for this purpose;
d) A contact name within the Principal Authority, and
e) The legislative authority for the inspection program.

It may be helpful to send such notifications well in advance of the inspection to give the opportunity for the property owner (or representative) to be on site on the day of the inspection and to gather information and records which may assist in the inspection, and also to give the property owner the opportunity to undertake remedial work prior to the inspection.

Where the Principal Authority has determined that it will accept third-party certificates as an alternative to conducting an inspection, the Principal Authority should provide sufficient time:

a) for the property owner to consider retaining a person qualified to sign such a certificate;
b) if a person is retained, for the person to inspect the sewage system; and
c) for any necessary remedial work to be carried out where this will be necessary before the person may sign the certificate.

Inspections

Maintenance Inspections - Overview

These guidelines provided in this document set out a progressive audit approach to maintenance inspections for sewage systems, as with most inspections under the *Building Code Act, 1992.* Under this approach, initial inspections are designed to be non-intrusive tests and will generally avoid significant disturbance to the system and to the surrounding soil area. Where concerns are identified, more tests may follow.

A Phase I maintenance inspection may be sufficient to establish compliance with Section 8.9. of the Building Code or with the standards enforced under a Discretionary program. A follow-up Phase II inspection (described below) is required where the Phase I inspection indicates a defect or failure of the system.

Phase I – Maintenance Inspections

Inspections generally begin with a review of available material, including material collected in the identification phase, and reports from previous inspections.

The purpose of Phase I maintenance inspections is to:

a) Obtain the most recent information on the system, as well as the size of the building and the number of fixtures and bedrooms that it is servicing;
b) Locate the sewage system's components;
c) Identify any obvious or outward signs of malfunction or failure; and
d) Identify systems that are at risk of malfunction or failure.

Phase I maintenance inspections generally avoid significant disturbance to the system and the surrounding soil area. During the course of a Phase I maintenance inspection, the inspector would normally identify:

a) The type of occupancy to determine the source and type of the sanitary sewage;
b) The source of water supply (municipal, well, lake, etc);
c) The approximate volume of sewage generated;
d) The use of special devices such as garbage grinders or water softeners;
e) The general nature of the system (class, components, type, layout, etc);
f) The location of the system's components with respect to wells, surface water, and other environmental features;
g) The approximate level of ground water: This may be achieved by
    i. reviewing local maps and records of ground water elevation observed on site or nearby properties, including the local assessment report, if available;
    ii. Observing the conditions of the septic tank and the distribution box for indications of ground water infiltration;
    iii. Observing the elevation of nearby water body, or evidence of ground water infiltration in other subsurface structures; or
    iv. The use of hand augering;
h) The size, material and the condition of the septic tank, or the holding tank;
i) The frequency of tank pump-out and the last time the tank was cleaned;
j) Any indication of sewage system failure, including:
    i. Evidence of backup of effluent;
    ii. Signs of hydraulic failure (breakout of sewage, wetting conditions in the leaching bed area);
    iii. Condition of surface vegetation; and
    iv. Odour problems;
k) Documentation of previous effluent sampling test results where required (i.e., under Article 8.9.2.4. of the Building Code).

Phase II – Follow-Up Maintenance Inspections

It may be appropriate to undertake more intensive follow-up maintenance inspections where:

a) The Phase I maintenance inspection has identified that the septic system is at risk of future malfunction or failure, or
b) The Phase I inspection detected a malfunction or failure, but did not reveal the reason (e.g., location or nature) of malfunction or failure.

Phase II inspections will be familiar to Principal Authorities in terms of usual Building Code enforcement activities (i.e., investigation of potentially failing sewage systems, inspections due to neighbour complaints). These inspections may typically include examinations of the following elements:

a) The depth of the sludge layer and the distance from the top of the sludge layer and the outlet tee;
b) The thickness of the scum layers;
c) The distance between the bottom of the scum/grease layer and the bottom of the outlet tee;
d) The distance between the top of the scum layer and the top of the outlet tee;
e) The physical condition of the inlet and outlet; and
f) The condition of the effluent filter, if utilized.

For sewage systems utilizing treatment units, Phase II inspections may also include a review of:

a) The existence of a maintenance agreement and the date of latest servicing;
b) The test results of a new round of effluent sampling (if otherwise required by the Building Code, or by an authorization issued by the BMEC); and
c) Operational problems or system malfunction before or, at the time of inspection.

Where used in sewage systems, distribution boxes, dosing tanks and pumps may be inspected to determine their condition and functionality.

Phase II inspections of leaching beds may also consider:

a) Clearance distances to environmental features, wells and surface water intakes;
b) Soil type and its permeability;
c) Additional sources of hydraulic loading (e.g. surface discharge, roof drains);
d) Evidence of ponding;
e) Encroachments into the leaching bed area (e.g. building additions, patios, driveways, pools); and
f) Trees and deep rooting shrubs in the vicinity of the bed.

Blockages in the leaching bed and pollution sources may be identified by measures including:

a) Evaluation of in-home plumbing and estimates of water usage;
b) Conducting a leak diagnostics;

c) Conducting a flow trial;
d) Conducting a dye tracing test; or
e) Excavating a cross section of the leaching bed.

Inspection Reports

Principal Authorities may wish to maintain documentation in respect of maintenance inspections, which could include the following information:

a) Identification of the property attended;
b) Identification of any information collected as part of the inspection;
c) Status of deficiencies noted in previous inspections;
d) Deficiencies identified during the current visit;
e) The legislative authority for the inspection program; and
f) Enforcement action taken.