

City of Kawartha Lakes

Sanitary Sewer Collection Systems

July 28, 2020



What is a Sanitary Sewer Collection System?

- Sanitary sewers, or wastewater pipelines, transport wastewater from homes and businesses to a centralized treatment plant
- The sanitary sewer system contains sewer laterals that connect individual buildings to main sewer pipelines.



Types of Sewers

- Sanitary Sewers - carry all the effluent from toilets, showers and sinks to the wastewater treatment plant
- Storm sewers carry rainwater to the lake / river / creek / ponding area
- Combined sewers- carry both to the wastewater treatment plant
- CKL responsible for ~54.5 km of sanitary sewer piping in 6 wastewater systems

Sanitary Sewer Pipes

- Most sewers are gravity fed
- Minimum allowed flow velocity in the pipe is 2.0 ft/s or .67 m/s
- Grade and alignment are therefore critical with sewers
- Systems designed to allow a small amount of I&I at 0.26L/sec/ha.

Typically made from:

- PVC
- Vitrified Clay
- Asbestos Cement
- Concrete

Maintenance

- Annual cleaning
 - Typically done with a hydraulic flusher that blasts high pressure water through the pipes to remove sediment build up and blockages
- Manhole Repairs
 - Grouting, parging, modoloc, frame and cover replacements, rain bladder installs
- CCTV Inspections
 - Performed in known problem areas or in advance of reconstruction projects



Repairs

- Less common than watermain repairs
- Smoke testing can indicate cross connections
- Often requires costly inspection CCTV equipment to determine extent of issues
- Requires complete excavation



Common issues with Sanitary Sewers

- Infiltration and inflow
- Identification of leaks
 - Usually only camera areas once the general location is determined due to expense
- Illegal connections by private home owners
 - Roof downspout connection, sump pump connections
- Blockages – from both improper usage and outside environment (i.e. roots)

Inflow and Infiltration

- MECP guidelines (based on OPS 410 and ASTM C969M) does not allow infiltration in collection system design to be in excess of 0.0375 liters/millimeter diameter/100 meters of sewer pipe/ hour
- CKL's infiltration factor is set at 0.26L/sec/Ha (MECP Design)
- MECP notes that approximately 15-20% of wastewater treated at WPCP comes from I&I
 - 1 L/s of I&I can represent a cost of \$95,000 per year to the average municipality (Norton Engineering, 2017)



Inflow and Infiltration



What is I&I?



Infiltration



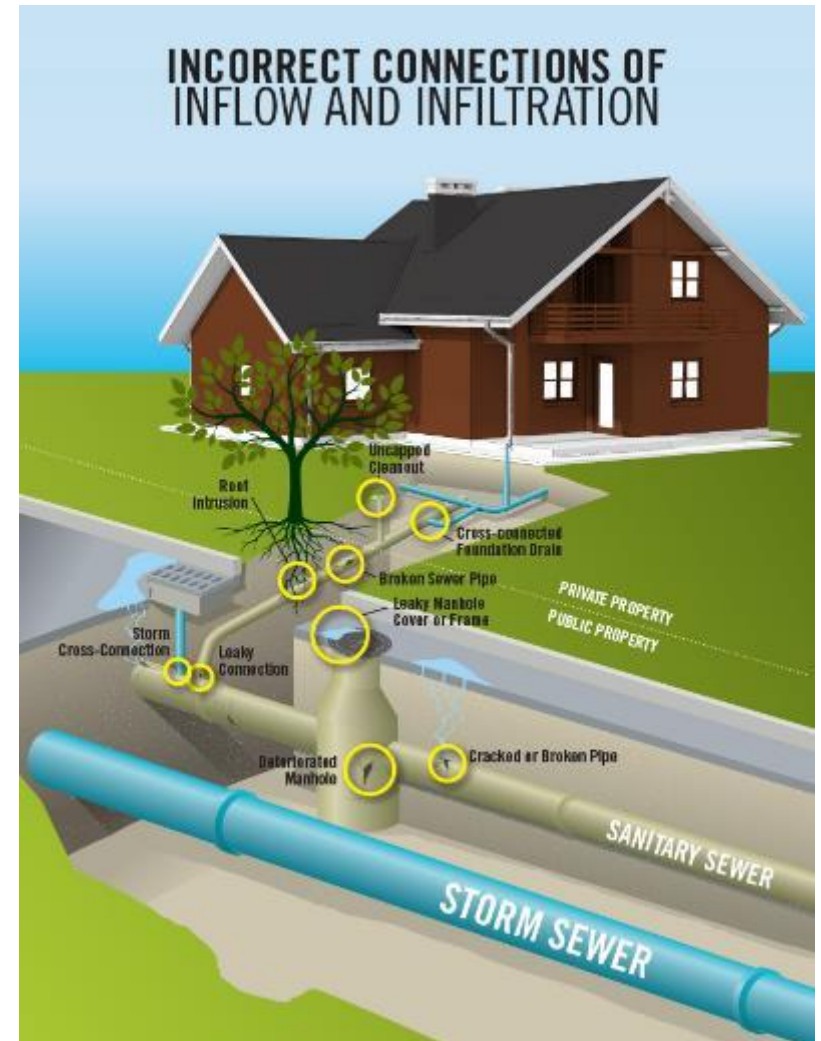
Inflow

Infiltration:

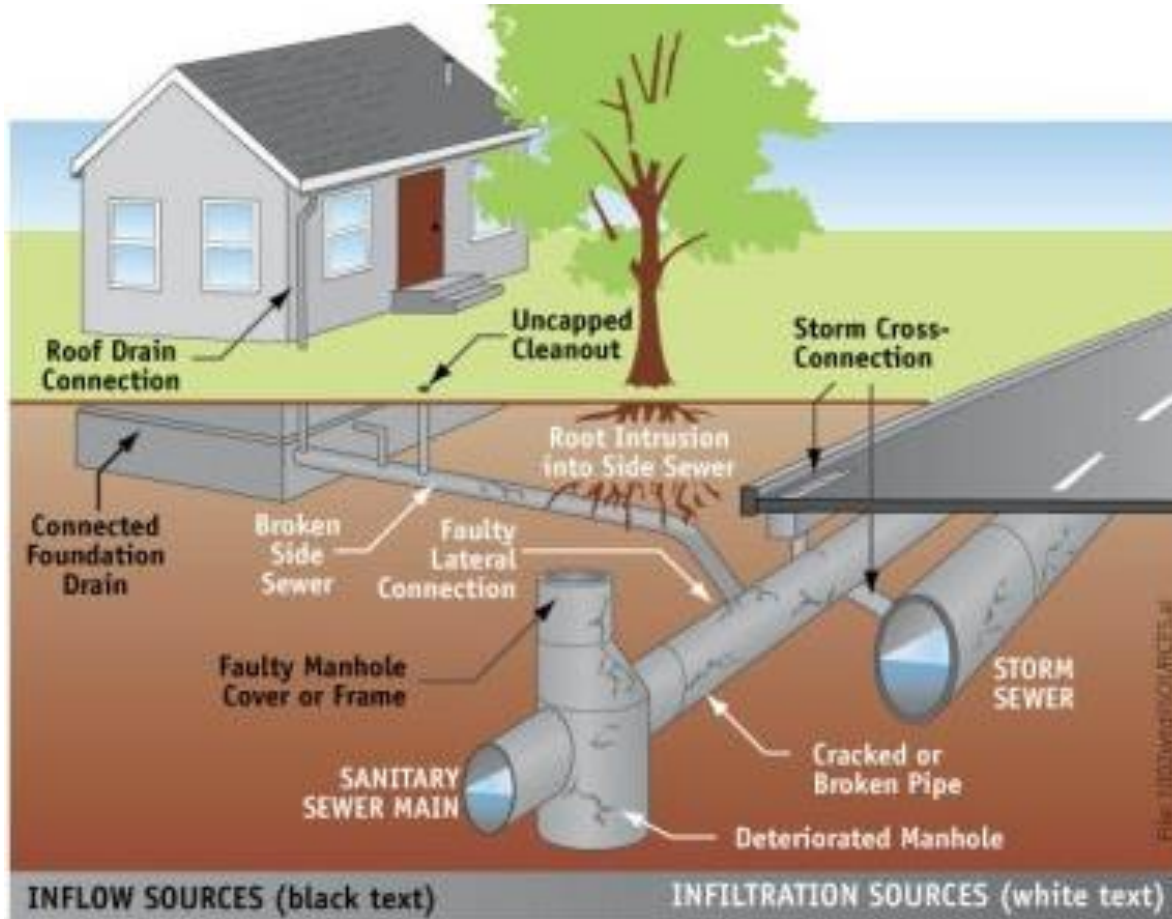
Groundwater that enters through holes and cracks in manholes, laterals and sewer pipes.

Inflow:

Water from rainfall or snow melt that enters the sewage system through direct sources such as yard, roof and downspouts, cross-connections with storm drains, foundation drains, and manhole covers.



Sources of I&I...



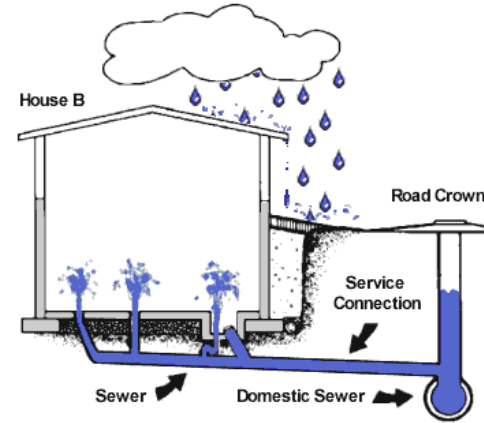
Cracks/breakages



Blockages – build ups

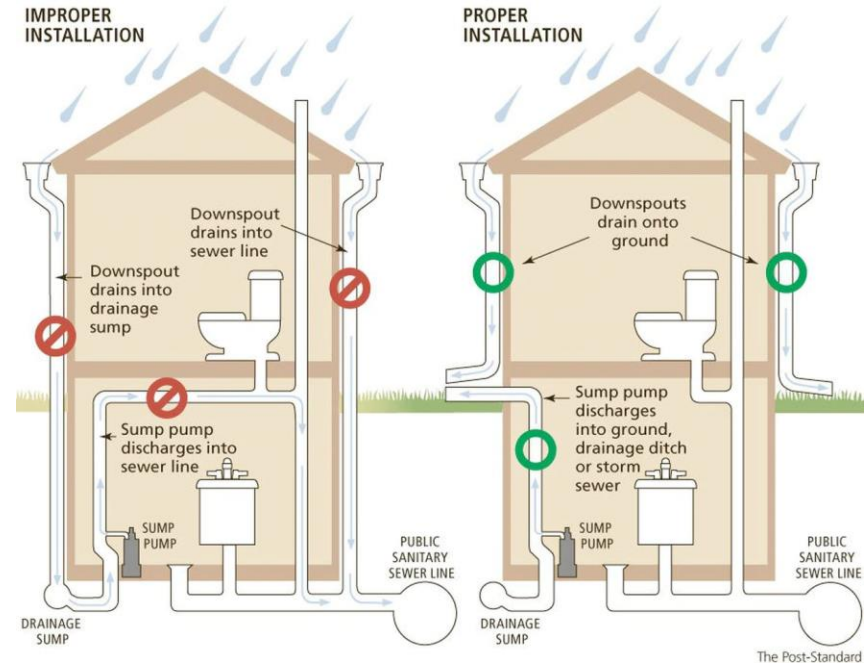


Which leads to sewer surcharging...



Illegal connections

- Illegal roof drains, sump pumps, and foundation drains connected to the City's sanitary sewer system can overload the collection mains
- Also sends groundwater to the wastewater treatment plant, consuming expensive wastewater treatment capacity



Sewer Use By-Law

2016-006 “A By-law to Establish Management and Use of Sewer Works”

- Is a regulatory strategy aimed at reducing contaminants to the sewer system by dealing with waste at its source.
 - Protects the health and safety of residents, the integrity of infrastructure and the wastewater treatment process, and the quality of biosolids and plant effluent discharged to the environment.
 - Also serves as a mechanism to ensure that steps are being taken to maintain the City’s compliance with environmental legislation such as the Fisheries Act, Ontario Water Resources Act and the Environmental Protection Act.
- The Sewer Use By-Law provides the legal framework necessary to achieve these goals by delineating what types of matter may or may not be discharged to the sewage works and how. It contains general prohibitions, restrictions, discharge limits, and specifies conditions for the discharge of certain materials

Responsibilities

- Defined in Sections 6 & 7 of by-law but essentially:
 - CKL is responsible for maintaining the sewer main and lateral from main to property line in accordance with applicable Acts and Regulations.
 - homeowner is responsible from property line to house including all costs related to maintenance, replacements, relocations, inspection tees, access points, and all internal plumbing.
 - As well as ensuring their effluent meets parameter limits as defined in Table 1 of by-law
 - homeowner also responsible for initial costs of installation of lateral from main to property line

Fines and Enforcement of By-law

- Fine structure:
 - Residential fines - up to \$5,000 for 1st offence, \$10,000 for repeated.
 - Corporation - \$25,000 for 1st offence, \$50,000 for repeated
- The City prefers to work with residents and industry to reduce the pollutant loadings and illegal connections through voluntary and negotiated compliance. This might include such things as the establishment of monitoring programs, discharge agreements, compliance programs and best management practices.
- Enforceable by every municipal law enforcement officer, the Chief Building Official and every Building Inspector under S.10.08 of Bylaw and in accordance with Municipal Act, 2001.

Identifying illegal connections

Creating a Disconnect Program:

- Survey individual buildings to discover where connections to storm drains exist
- Inspect sewer lines with television equipment to visually identify all physical connections (when cost makes sense)
- Compare the results of the field tests and the video inspection with the known connections on the map. Suspicious areas should be further investigated.
- Remove and test sediment from the catch basins or equivalent structures.
- Inspect connections in question to determine whether they should be connected to the storm drain system or to the sanitary sewer. Use methods of identification such as dye testing, visual inspection, smoke testing, or flow monitoring

Implementation of such a program will require additional resources from Engineering Department and will require a further investigation to determine practicality

Awareness is key

Also important to raise public awareness as many properties do not even realize they have illegal connections. Education programs to make residents aware of the issues to look for could be beneficial.

- Promote rain barrel usage to reduce water entering collection system
- Repairing and/or removing down spout connections that appear to enter the ground
- Having qualified plumbers inspect basements sump pump connection

Cost challenges

- Sewer main installation varies greatly depending on the size required.
 - 450 mm sewer main costs ~\$850.00 per meter
 - 1350 mm sewer main costs \$1570.00 per meter
- Maintenance holes and catch basin installations costs \$9,800 - \$26,000/ea depending on size
- These cost estimates are individual items included as part of an overall road reconstruction project. Other work such as removals, road granular material, asphalt restoration, concrete works and any other mobilization/demobilization, insurance, traffic control etc. would be in addition to the prices included above.

Challenges continued

- 100 mm lateral off of main costs approximately \$463.30 per meter to install on municipal side as part of a reconstruction project
- If a storm sewer system exists within the roadway, costs for storm lateral installation from main to property line is approx. \$15,000-\$25,000 depending on specific site conditions, length, amount of restoration
- Homeowners would be responsible for costs of installation from property line to house. Additional plumbing work may also be required.

Questions & Feedback

