

THE ONTARIO DRAINAGE ACT AND THE MUNICIPAL ENGINEER (USE OF THE LATEST TECHNOLOGY)

Presented by:

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NOVEMBER 20, 2024



WHAT'S A MUNICIPAL DRAIN?

FACTSHEET



AGRICULTURAL
ENGINEERING

ORDER NO. 01-059

AUGUST 2001

AGDEX 752



Ontario Ministry of Agriculture,
Food and Rural Affairs

SO, WHAT'S A MUNICIPAL DRAIN?

S. Vander Veen

Perhaps you've just purchased property, and been told by your municipality that you are assessed into a municipal drain. Perhaps you have owned a property for a couple of years and have recently discovered that you are located in the watershed of a municipal drain. You're probably wondering, what does this mean? How does it affect me? What will it cost?

PHYSICALLY, WHAT IS A MUNICIPAL DRAIN?

Physically, a municipal drain is simply a drainage system. Most municipal drains are either ditches or closed systems such as pipes or tiles buried in the ground. They can also include structures such as dykes or berms, pumping stations, buffer strips, grassed waterways, storm water detention ponds, culverts and bridges. Even some creeks and small rivers are now considered to be municipal drains. Municipal drains are primarily located in rural agricultural areas of the province.

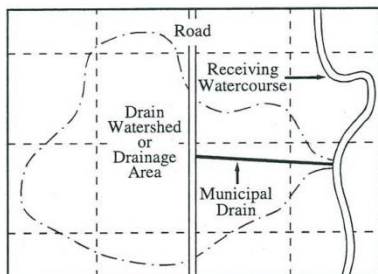


FIGURE 1. Plan of a Municipal Drain

THE PURPOSE OF MUNICIPAL DRAINS

Municipal drains have been a fixture of rural Ontario's infrastructure since the 1800's. Most municipal drains were constructed to improve the drainage of agricultural land by serving as the discharge point for private agricultural tile drainage systems. However, they also remove excess water collected by roadside ditches, residential lots, churches, schools, industrial lands, commercial lands and any other properties in rural areas. They are a vital component of the local infrastructure.

Without them, many areas of the province would be subjected to regular flooding, reduced production from agricultural land and increased public health risks.

WHY IS IT CALLED A "MUNICIPAL DRAIN"?

There are many, many drainage ditches and buried pipes in the province, but not all of them are "municipal drains". So what distinguishes a municipal drain?

Municipal drains are created under the authority of the *Drainage Act*. There are 3 key elements of a municipal drain:

1) **Community project** — Landowners who need to solve a drainage problem may submit a prescribed petition under the *Drainage Act* to their local municipality, requesting the establishment of a municipal drain. If certain criteria are met, the municipality appoints an engineer who prepares a report, identifying the proposed solution to the problem and how the costs will be shared. There are various meetings where landowners in the watershed of the municipal drain can voice their desires and concerns. There are also several appeal stages where they can voice their objections. So, the end result of the process is a "communally accepted" project.

2) **Legal Existence** — After all appeals have been heard and dealt with, the municipality passes a by-law, adopting the engineer's report. The municipality then has the authority and the responsibility to construct the project. The cost of the work is assessed to the lands in the watershed in the same ratios as contained within the engineer's report. So for a ditch or a pipe to be a municipal drain, there must be a by-law adopting an engineer's report.

3) **Municipal Infrastructure** — Once a municipal drain has been constructed under the authority of a by-law, it becomes part of that municipality's infrastructure. The local municipality, through its drainage superintendent, is responsible for repairing and maintaining the municipal drain. In certain circumstances, the municipality can be held liable for damages for not maintaining these drains.

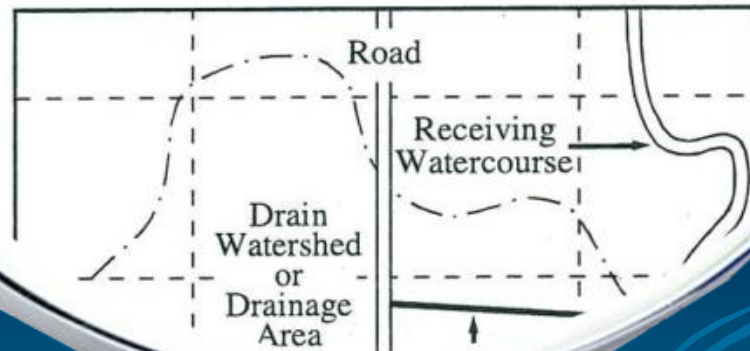


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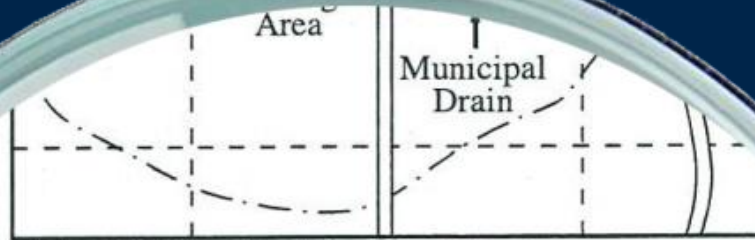


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BRINGING THE RESOURCES

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Existence — After all appeals...



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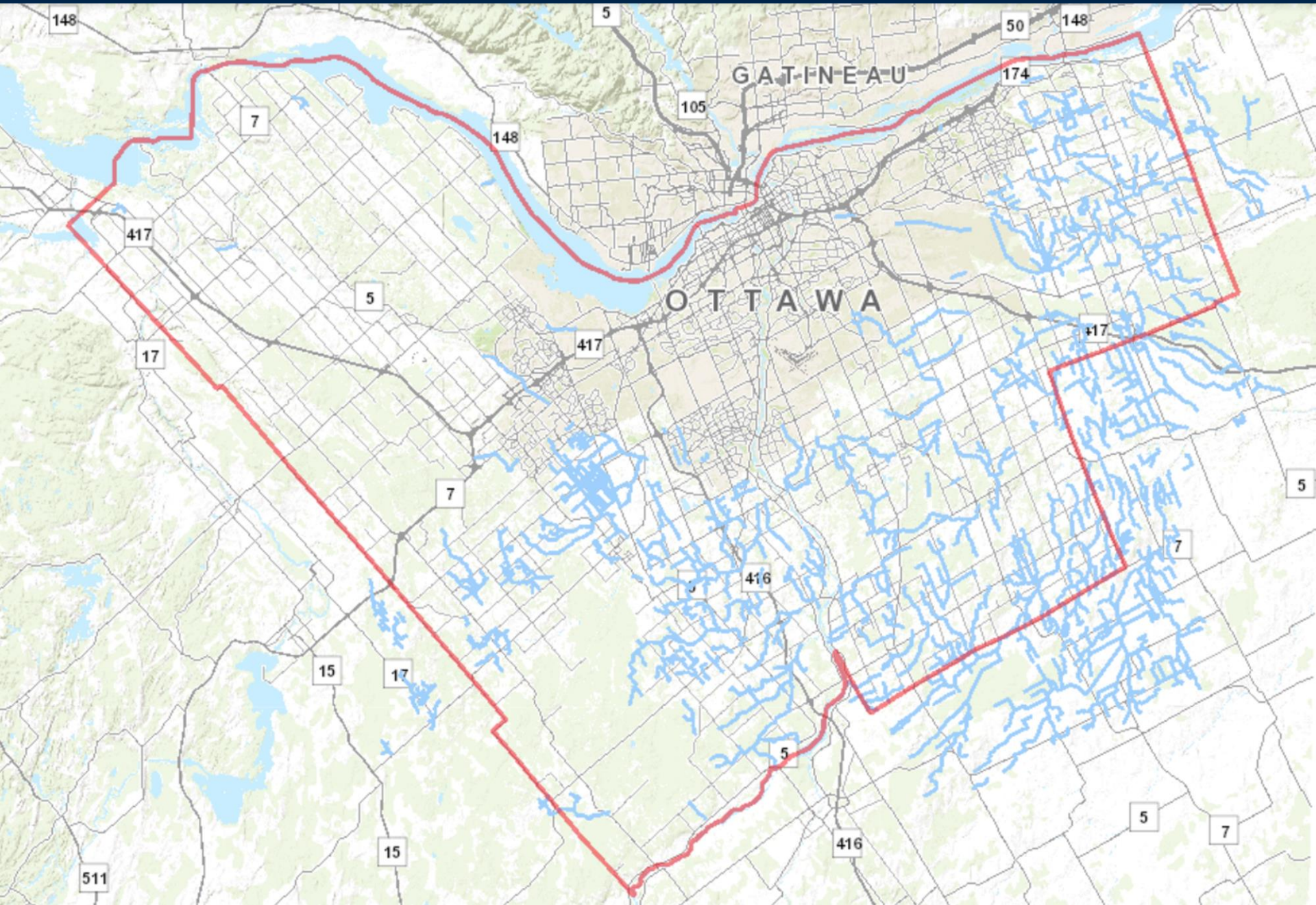
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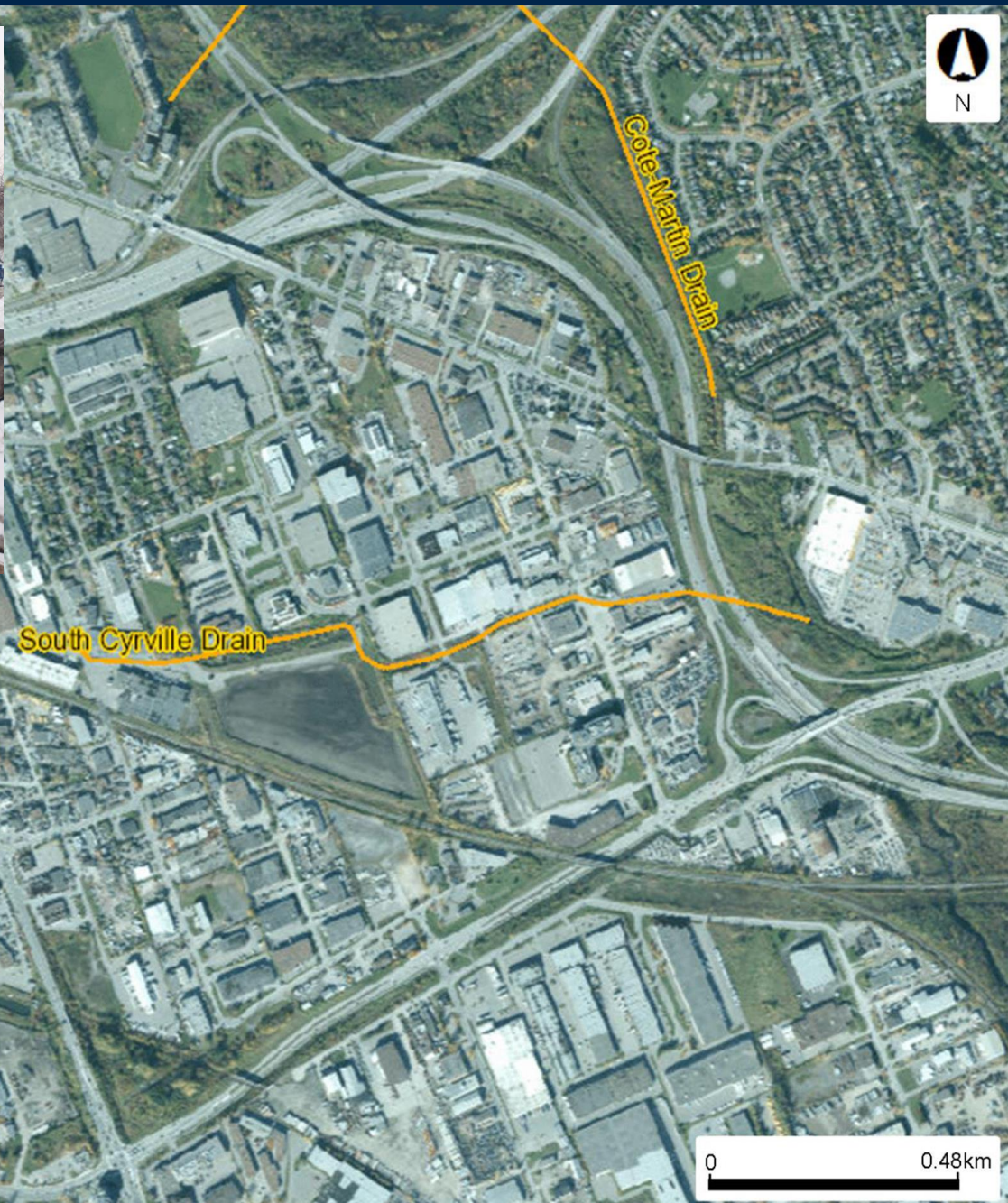
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WHERE ARE THESE MUNICIPAL DRAINS?



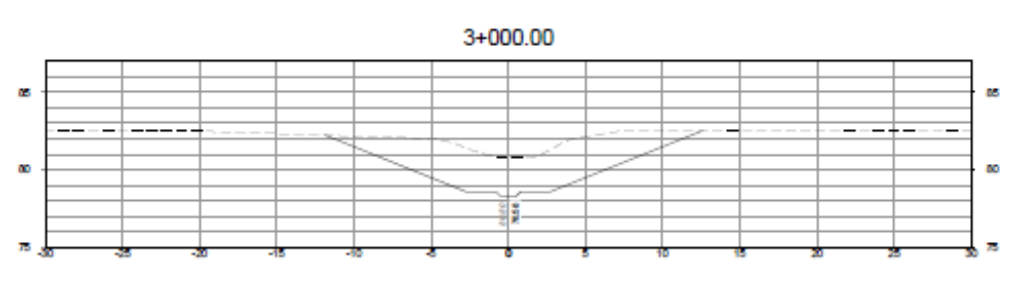
ARE MUNICIPAL DRAINS IN URBAN AREAS?



WHAT ABOUT RURAL?



THE TRANSITION (WHERE THEY IMPACT THE MUNICIPAL ENGINEER MOST)



HOW DO I FIND OUR MUNICIPAL DRAINS?

www.lioapplications.lrc.gov.on.ca/AgMaps/Index.html

OR

CONTACT YOUR DRAINAGE SUPERINTENDENT



BENEFITS OF GOOD DRAINAGE

- Legal outlet
- Reduced risk of flooding
- Reduced risk of crop damage
- Earlier access to fields
- Ability to tile drain



BENEFITS OF GOOD DRAINAGE



<http://www.tractorbynet.com/forums/owning-operating/133039-tractor-stuck-bangor-pa-3.html>



DRAINS AND THE MUNICIPAL ENGINEER

- Municipal Drains interact with the Municipal Planning under the following considerations:
 - Subdivisions/Severances/Site Plans
 - Roads and Utilities
 - Low Impact Development
 - Legacy Retrofit
 - User Pay Infrastructure



DRAINS AND THE MUNICIPAL ENGINEER

- Any proposed work under the Planning Act that would result in modification under the following considerations require additional review:
 - Change in the Drainage Area.
 - Change in Lot Parcels.
 - Change in land use.
 - Change in runoff volumes
 - Change in flow times (duration of flow, erosion events, etc.)



CREATIVE USE AND MODERN IMPLEMENTATION

Definition of a “Drainage Works” under the Ontario Drainage Act:

- “drainage works” includes a drain constructed by any means, including the improving of a natural watercourse, and includes works necessary to regulate the water table or water level within or on any lands or to regulate the level of the waters of a drain, reservoir, lake or pond, and includes a dam, embankment, wall, protective works or any combination thereof.



CREATIVE USE AND MODERN IMPLEMENTATION

- **Low-impact development (LID) -- A land planning and engineering design approach to manage stormwater runoff as part of green infrastructure.**
- **LID emphasizes conservation and use of on-site natural features to protect water quality. This approach implements engineered small-scale hydrologic controls to replicate the pre-development hydrologic regime of watersheds through infiltrating, filtering, storing, evaporating, and detaining runoff close to its source.**



CREATIVE USE AND MODERN IMPLEMENTATION

Richard H. Fulton Complex Parking Lot
Nashville, TN



CREATIVE USE AND MODERN IMPLEMENTATION



CREATIVE USE AND MODERN IMPLEMENTATION

- Legacy Retrofit – the art of solving your most frequently annoying drainage issues (for which you have no jurisdiction or control over)... and getting them all to pay for it!
- Implement rear yard swales or storm sewers in existing development using the Drainage Act.
- User pay systems



CREATIVE USE AND MODERN IMPLEMENTATION



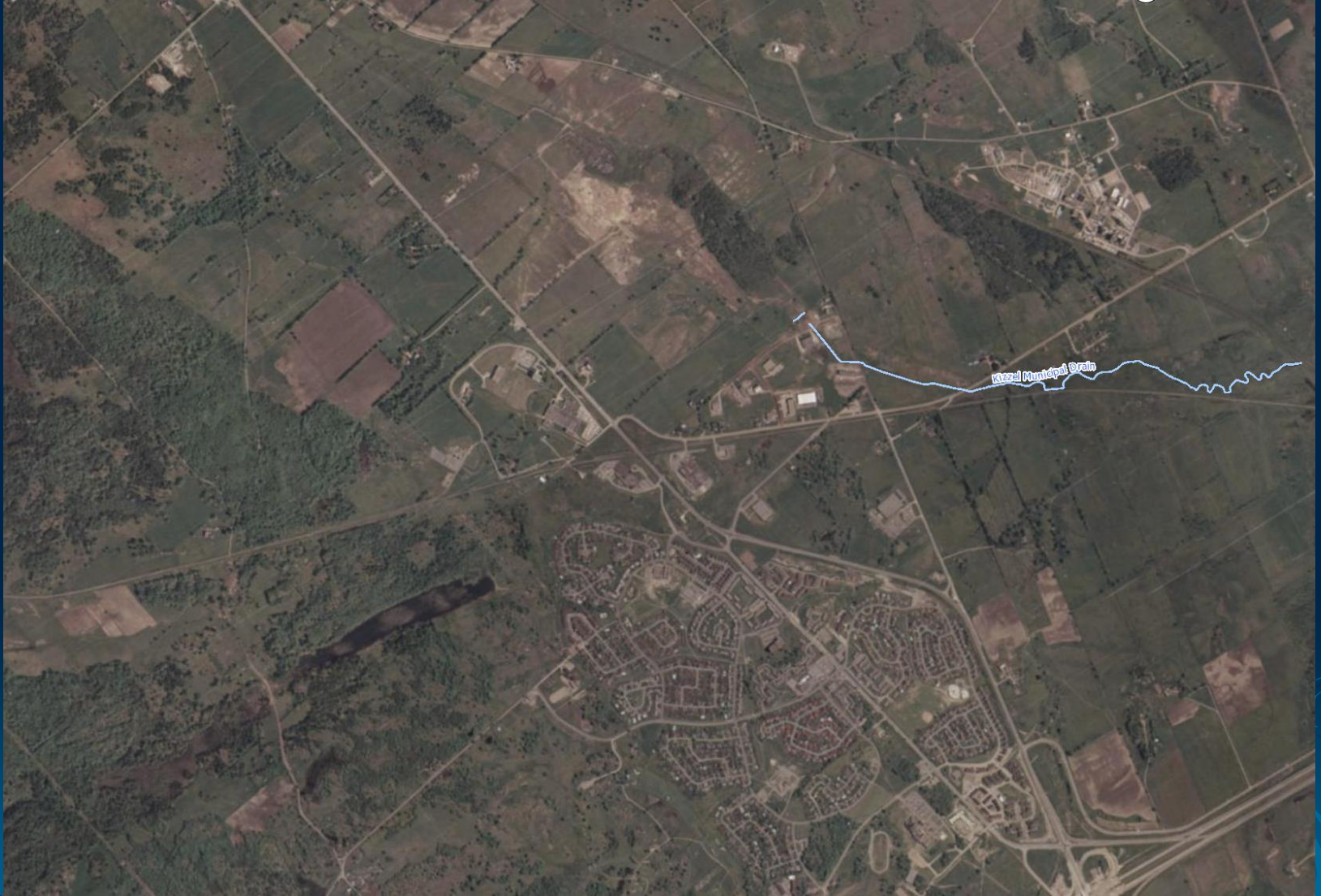
REDIT (r/DIY) --Willow root blocking water drainage - any ideas that don't involve re-grading the entire yard?

CREATIVE USE AND MODERN IMPLEMENTATION

- **New infrastructure with a user pay system?**
- **Example – a Storm Water Management pond in a rural estate-lot subdivision in a smaller municipality without the tax-base to support maintenance of such systems in the long-run.**
- **Typically constructed as a development requirement but then handed off to the municipality to maintain.**
- **Under the Drainage Act, all properties that contribute flow to the system can be assessed for construction and maintenance.**



THEN vs. NOW



THEN vs. NOW



ENGINEERING DESIGN PROCESS

Hydrologic Analysis

- Catchment delineation
- Hydrology design parameters
- Design events
- Peak flows

Hydraulic Analysis

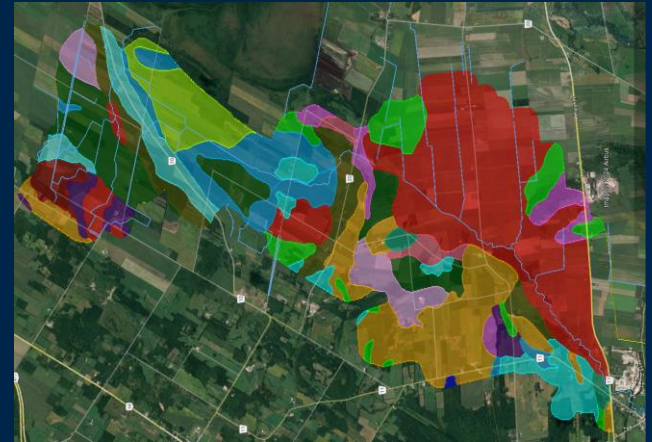
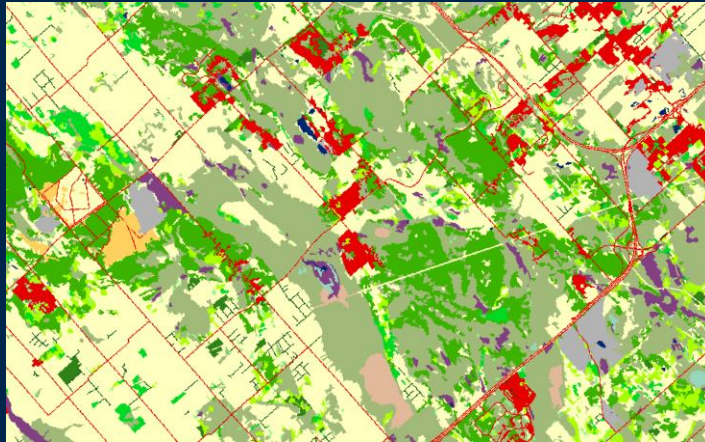
- Channel profile
- Channel cross sections
- Crossings and Structures



DESIGN & DATA

- **Gathering Data**

- Elevation
- Land use
- Soil type

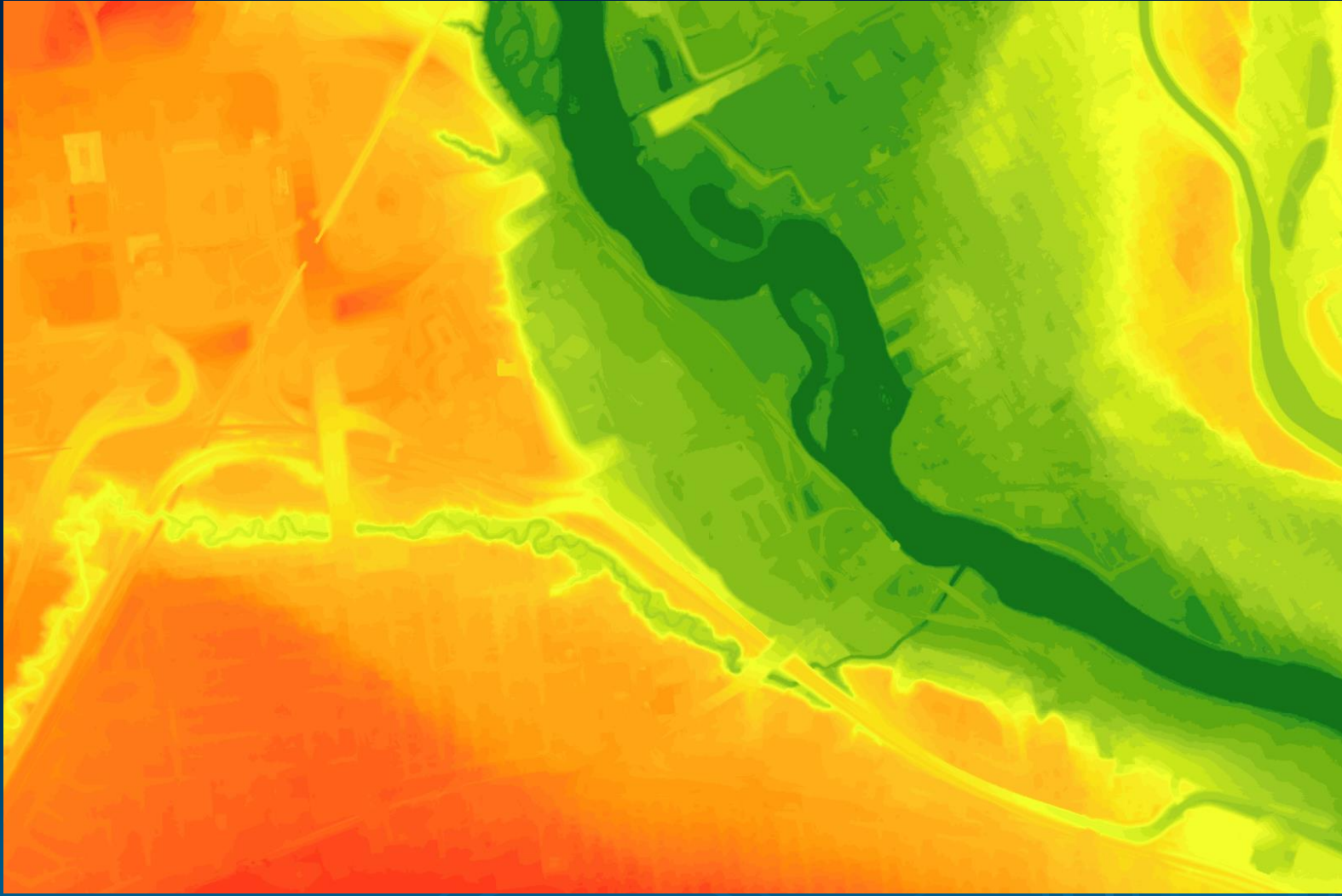


- **Data Sources**

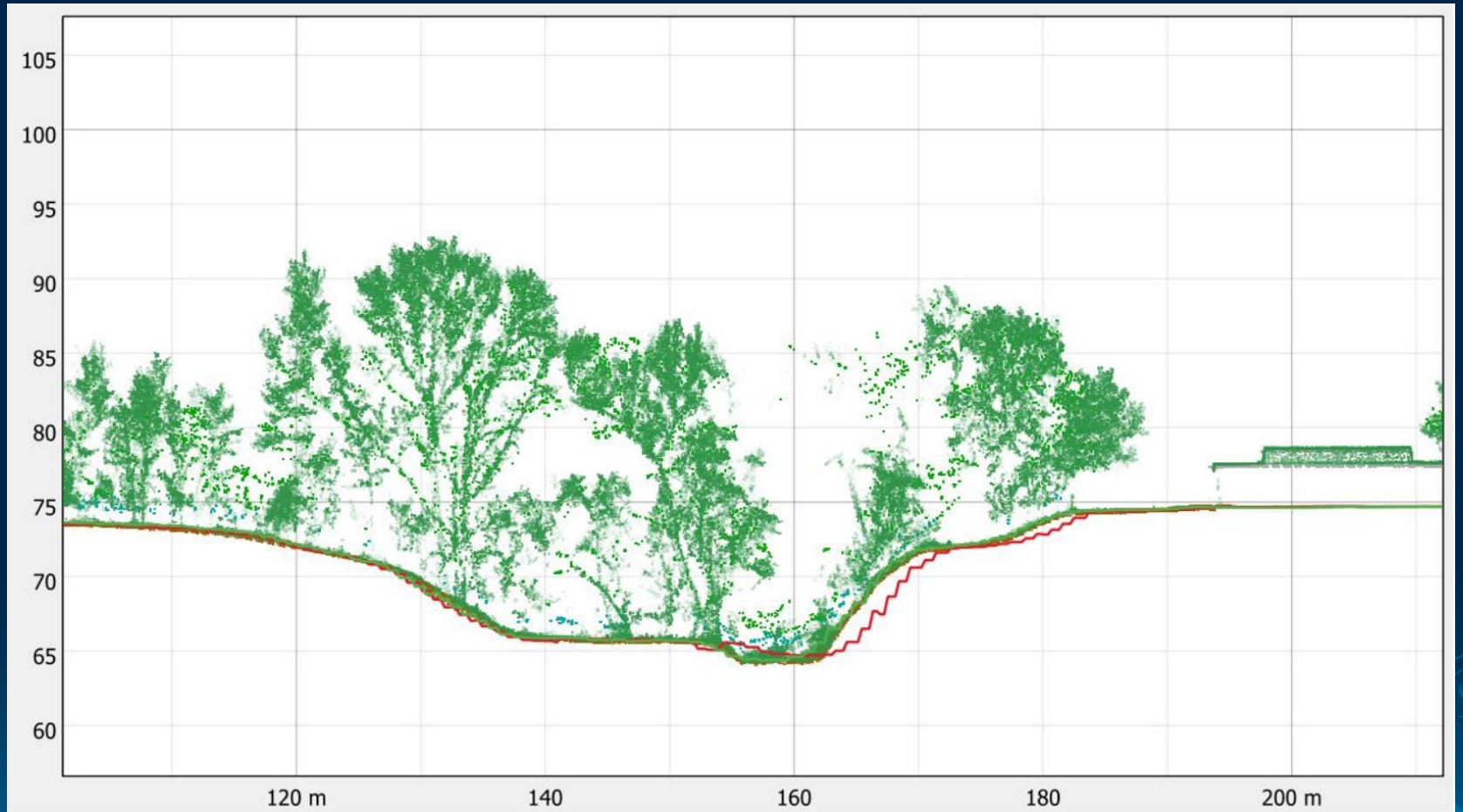
- Government of Canada (<https://search.open.canada.ca/opendata/>)
- Ontario GeoHub (<https://geohub.lio.gov.on.ca/>)
- Local Conservation Authority



DESIGN & DATA



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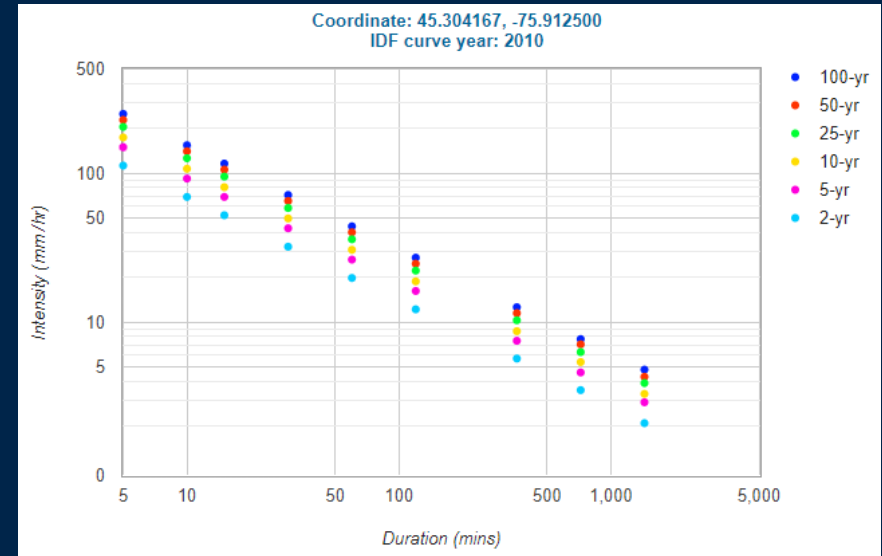
DESIGN & DATA

■ Design Storms & Return Periods

- Chicago
- SCS Type II
- Historical Events

■ Rainfall Data

- IDF Curves (https://idfcures.mto.gov.on.ca/map_acquisition.shtml)
- Local Conservation Authority
- Municipal Gauges



DESIGN TOOLS

■ Processing Data

- Calculating design parameters

■ Hydrologic Modelling

- Rational Method
- SWMHYMO/OTTHYMO

■ Hydraulic Modelling

- Manning's Equation
- HEC-RAS



DESIGN TOOLS

■ SWMM Modelling

- EPA SWMM, PCSWMM, XPSWMM
- Stormwater Features
 - SWM Ponds
 - Inlet and outlet controls
 - LID Measures
- 1D and 2D capabilities



QUESTIONS?

