



Harnessing the Power of LiDAR - Next-Gen Overland Flow Mapping for the City of London



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Outline

1. Background
2. Goals and Objectives
3. Methodology and Tools
4. Case Studies
5. Uses and Next Steps

Background

- 1950-1980's, development lacked flood control or overland flow management
- Drainage systems designed for up to 5-year storm event
- By 1990s, MECP implemented SWM controls
- Climate Change projections



Stoney Creek Flood Control Facility, London, ON

Evolution of SWM Practices

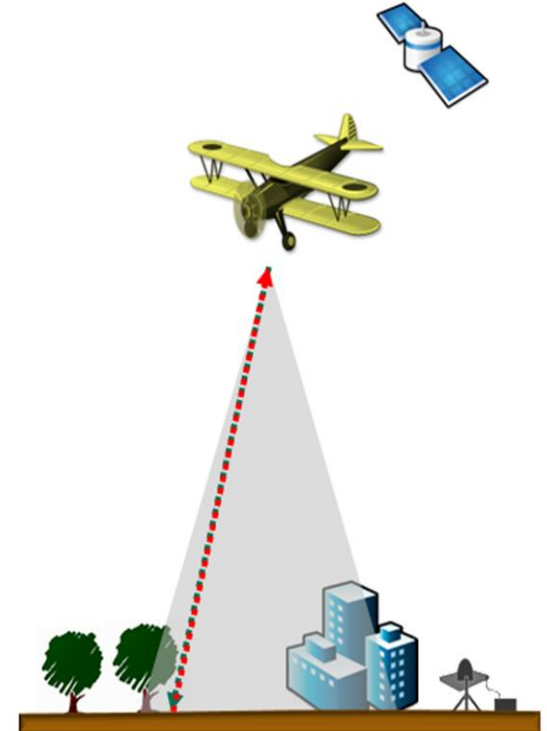


Flood Risk Management Projects: Overland Flow mapping



What is LIDAR?

- LIDAR stands for **L**ight **D**etection and **R**anging
- Optical remote-sensing technique
- Cost-effective alternative to traditional surveying techniques.
- Hydrologically enforced



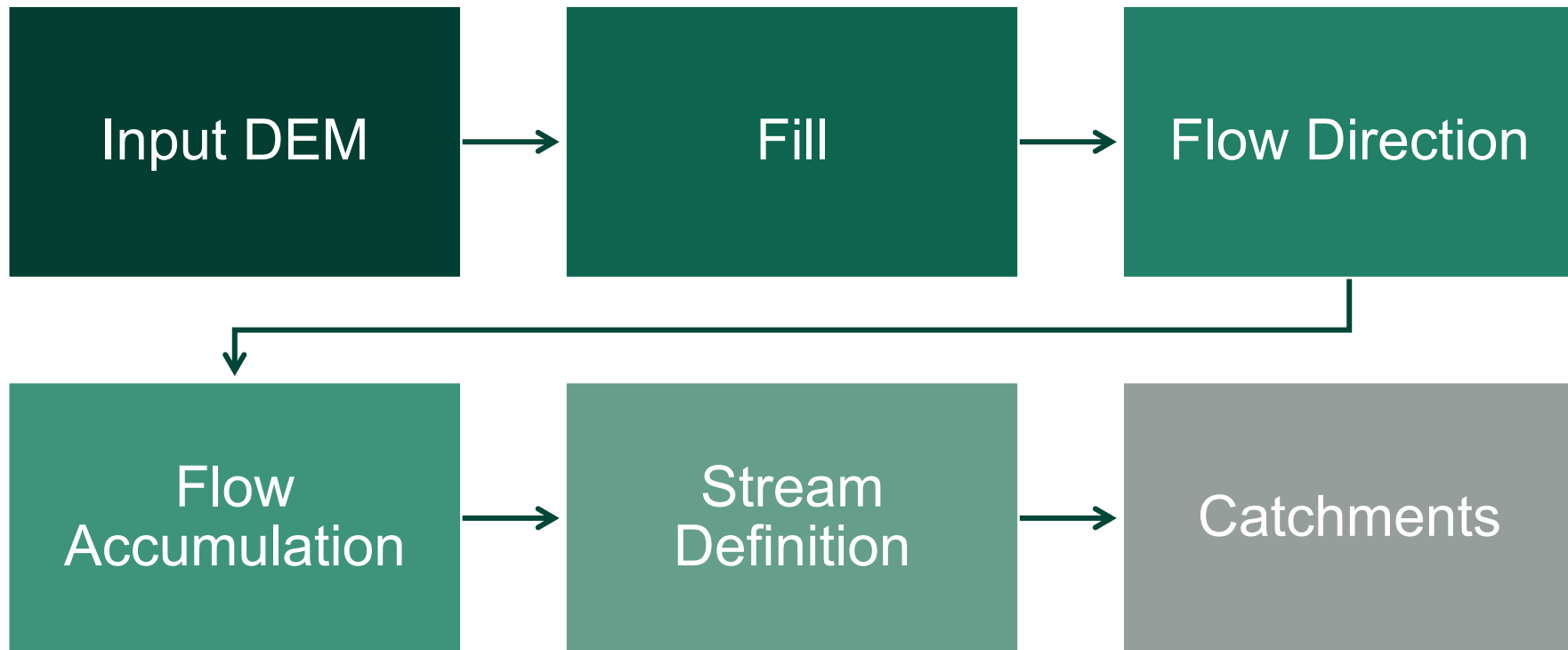
Paul, 2018



Goals and Objectives

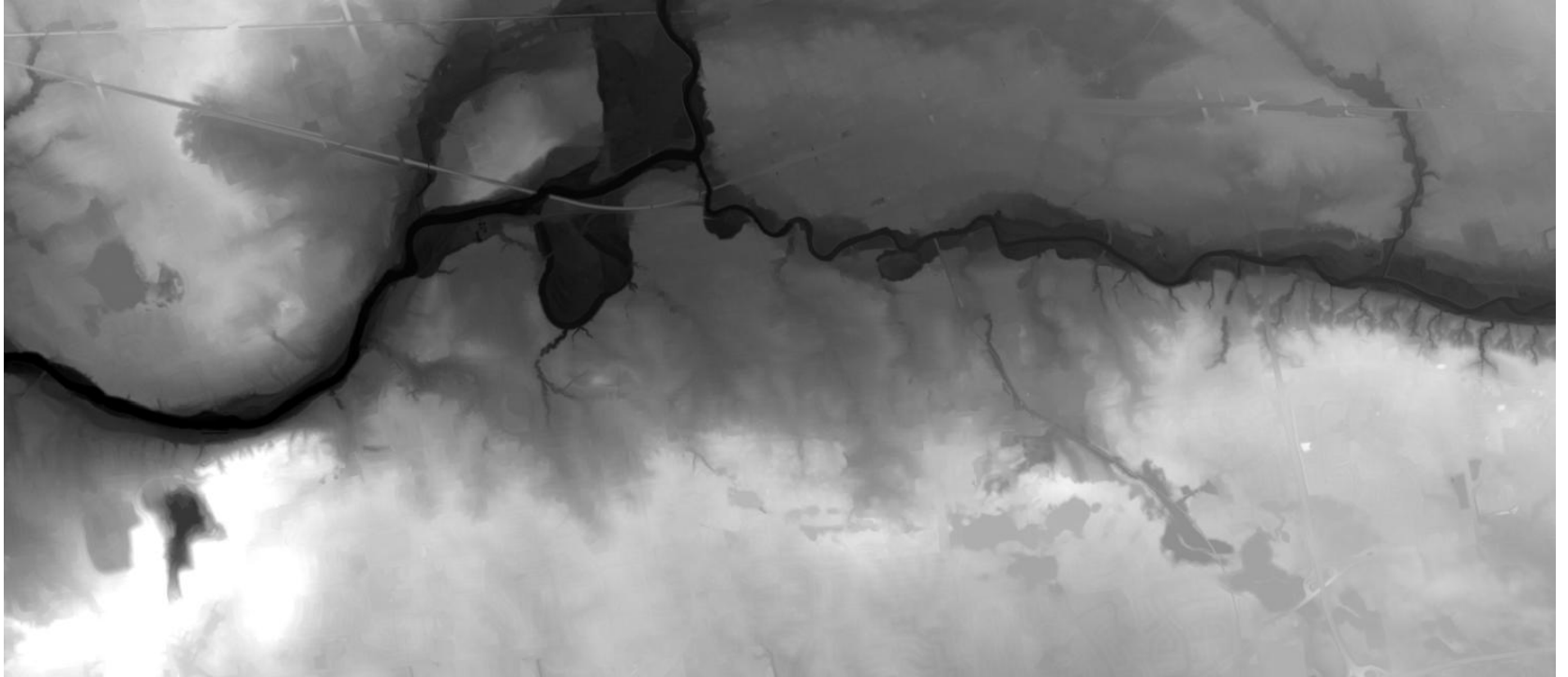
1. Identify overland flow pathways across the City of London.
2. Identify causes of flooding (City vs. Private vs. Outdated Standards)
3. Support surface flooding program and other departments
4. Identify infrastructure improvements

Methodology



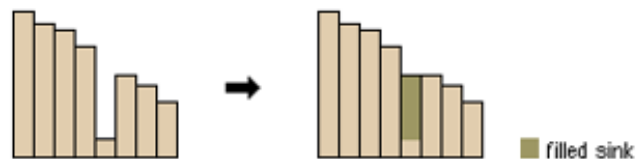


Input LiDAR

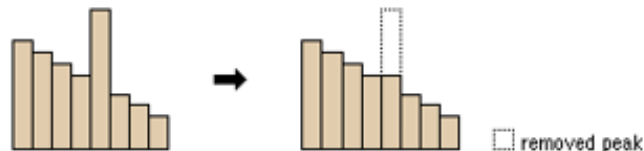


Fill

- Removes small imperfections in the data by filling sinks in a surface raster
- Completed at a series of 5 intervals
 - 0.3m, 0.5m, 0.75m, 1.0m, 2.0m



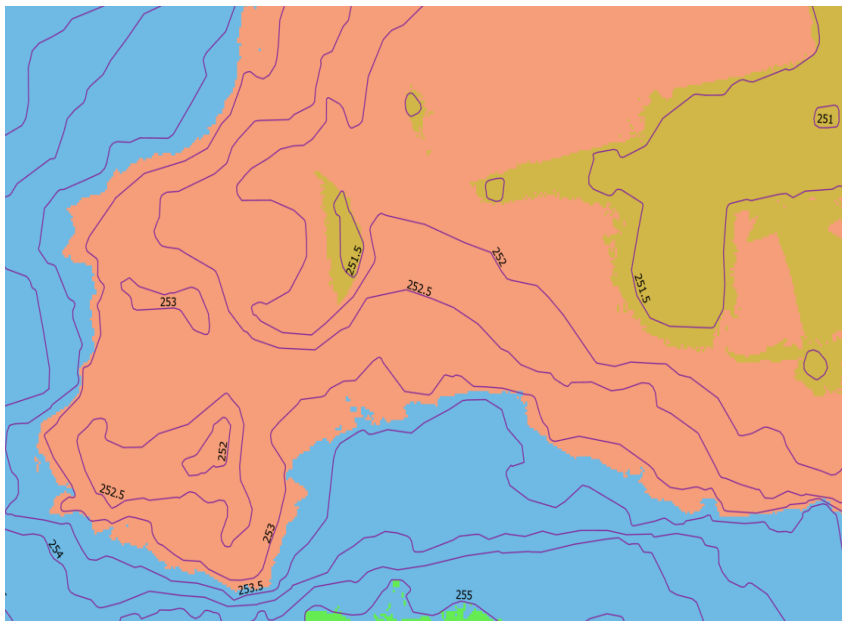
Profile view of a sink before and after running Fill



Profile view of a peak before and after running Fill

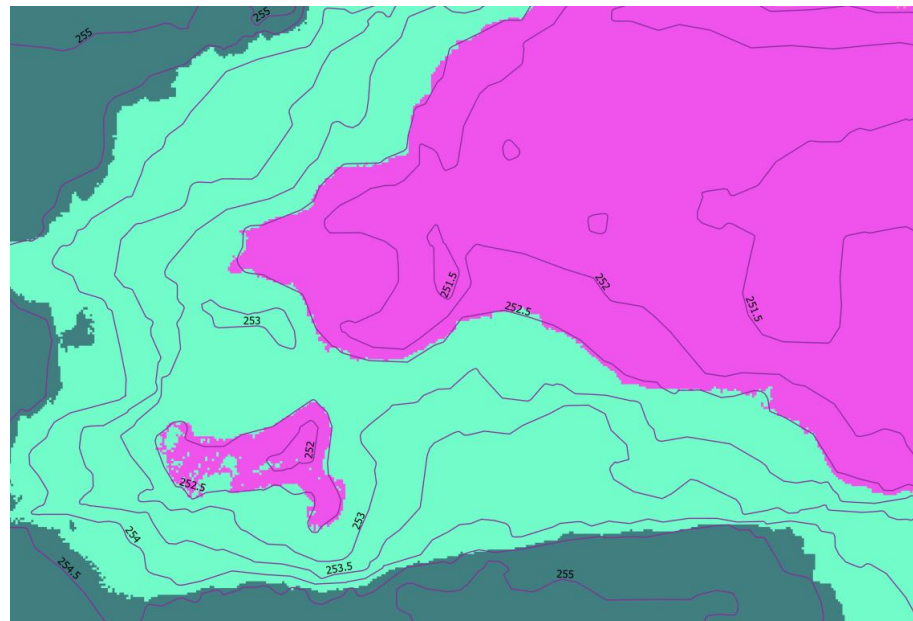
Esri, 2025

Example Fill



Pre-filled DEM

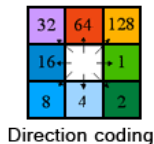
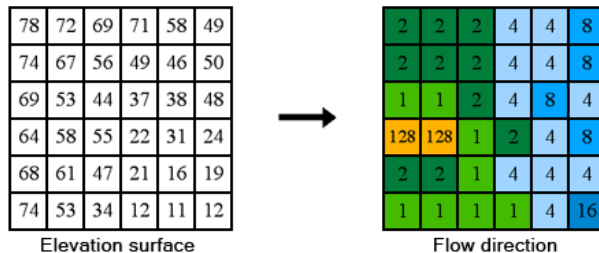
london.ca



Post-filled DEM

Flow Direction

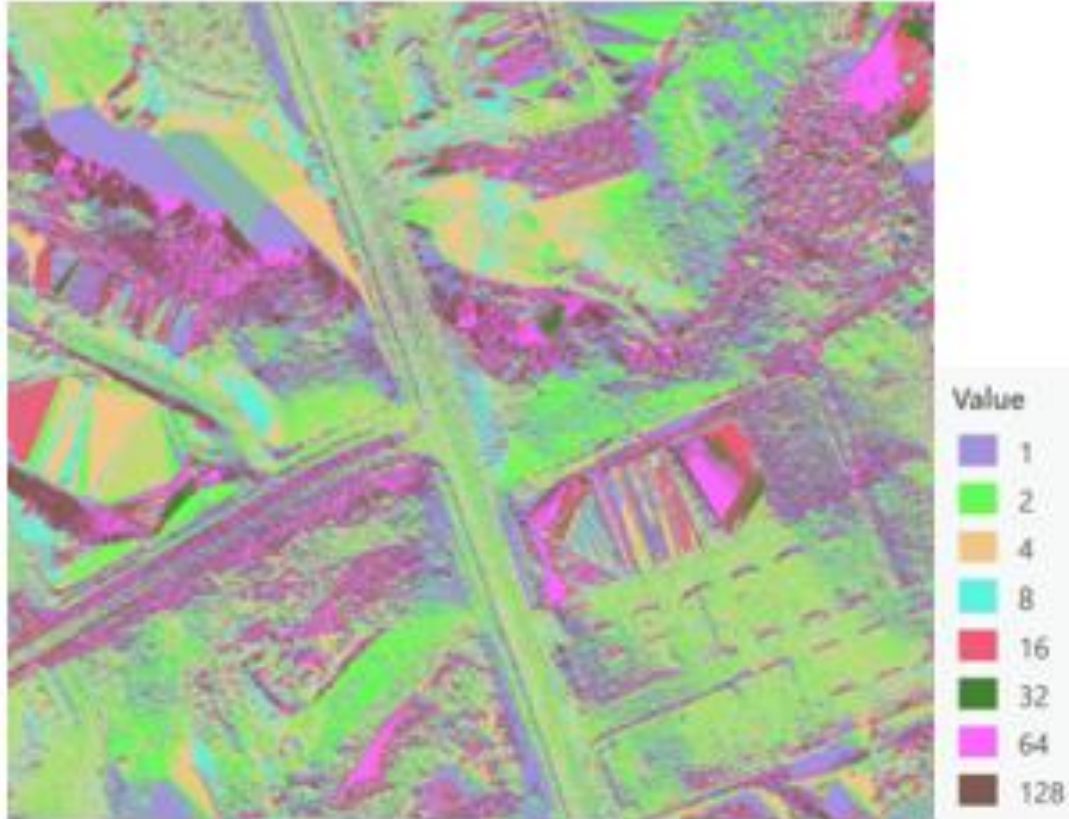
- Creates a raster of flow direction from each cell to downstream slope neighbor



Esri, 2025

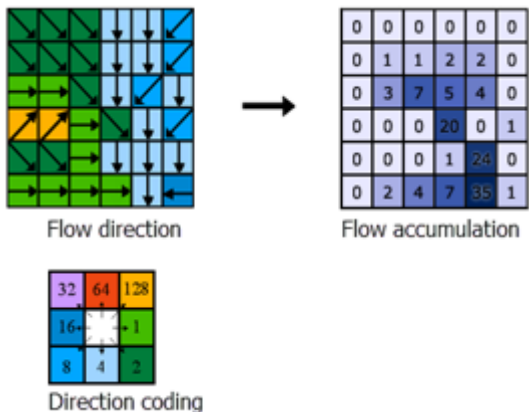
Coding of the Direction of Flow

Flow Direction



Flow Accumulation

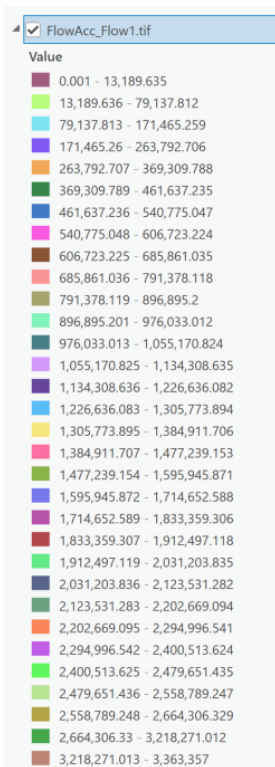
- Creates a raster of flow direction from each cell to downstream slope neighbor



Esri, 2025

Flow accumulation weighted cells

Flow Accumulation



Stream Definition

- Generates a stream raster from an input surface raster
- Flow accumulation value of 100 or greater



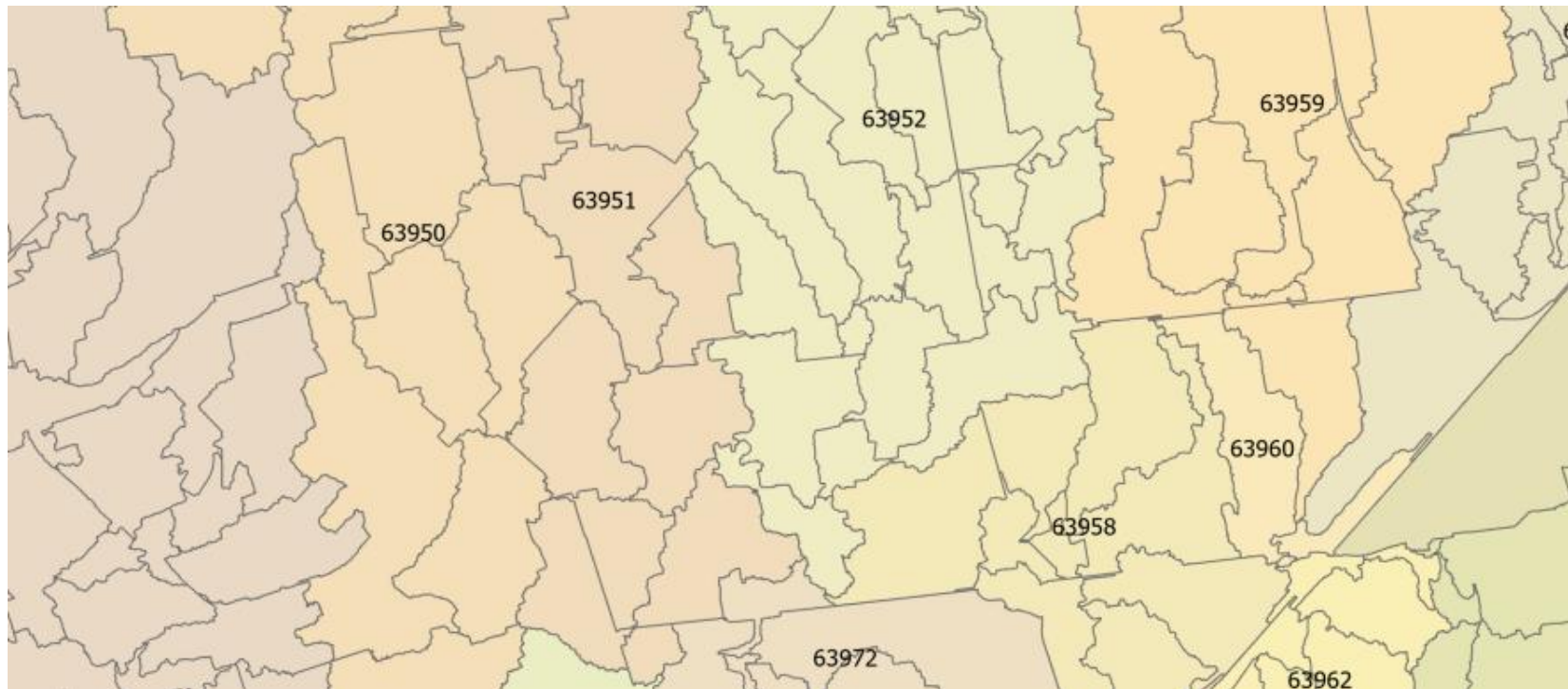
Stream Raster

Stream to Feature



Drainage Lines

Catchments





Validation Case Studies

1. Lack of Erosion and Sediment Controls
2. Historic Flooding
3. Rear yard flow obstructions
4. Lot Severances

Improper ES&C



Historic Flooding - 1



Historic Flooding - 2



Rear Yard Flow Obstructions



Lot Severances



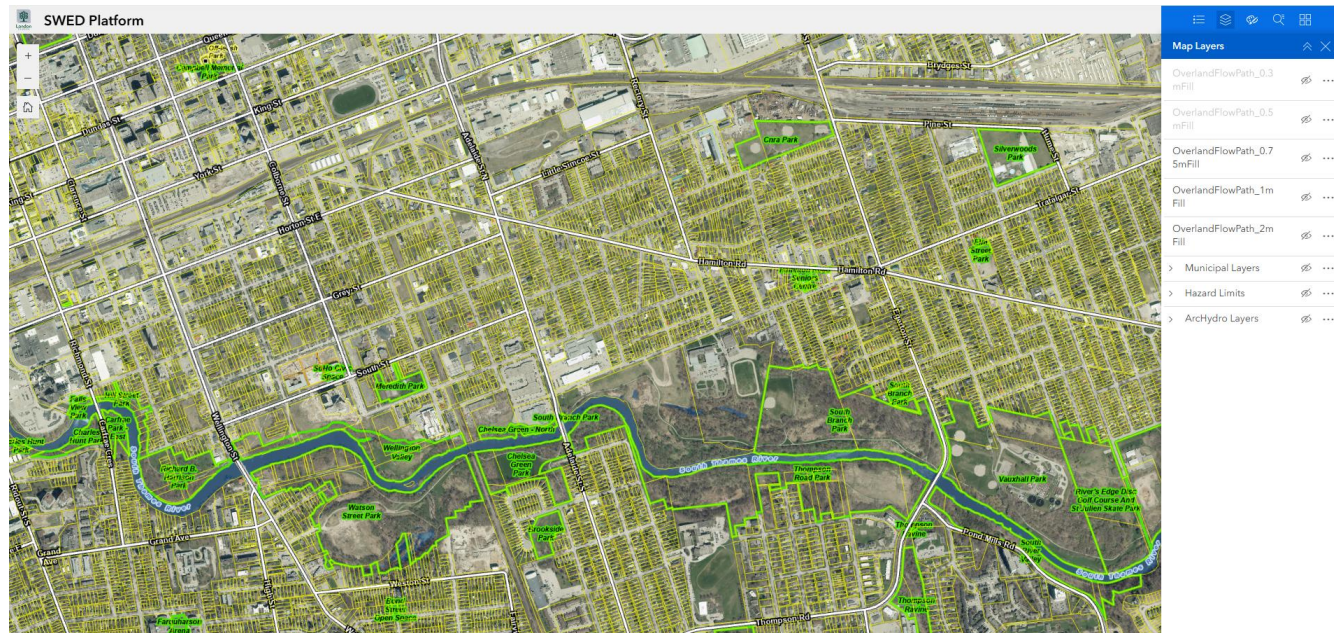


Uses and Next Steps

- Support City's Minor Surface Flooding Program
- Site Plan/ Subdivision Plan
- Infrastructure Improvements/ Potential Solutions
- Verification
- Annual LiDAR acquisition

Online GIS Platform

- Hosted online
- Sharable across corporation





Questions?

