Evaluating the influence of lawn care practices on the headwaters of a suburban watershed

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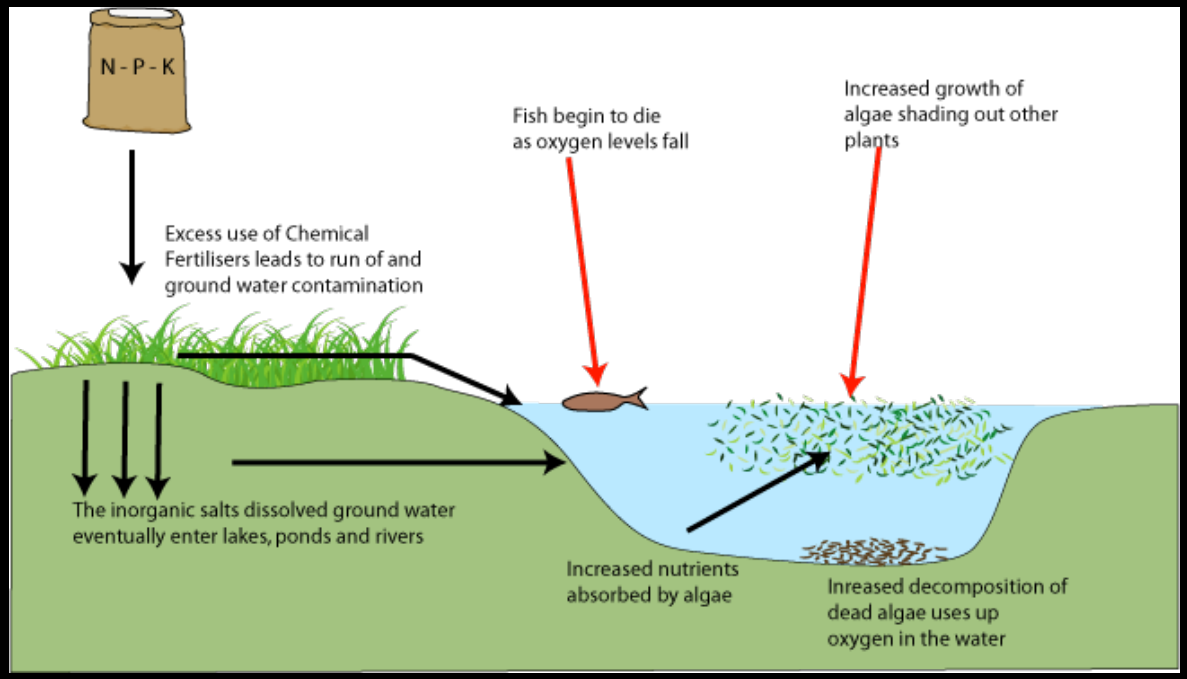
Background

- Limited knowledge of the impacts of residential fertilizer on stream quality
- 2% of the US covered in lawns = 40 million acres

(Milesi et al., 2005)

Excess Nutrient Impacts

- 40 to 60% of nitrogen fertilizer applied to lawns makes its way to water resources (US EPA, 2015)
- Eutrophication: loss of Oxygen →fish kills → loss of biodiversity



Excess Sediment Impacts

- Sources
  - Runoff from impervious surfaces
  - Runoff from lawns
- Impacts
  - Increased downstream bank erosion and stream turbidity

West Mill Creek Park, Lower Merion Township, PA

Why Does Narbrook Park Matter?

- Forms a headwater tributary of the East Branch of Indian Creek (EBIC)
- A total maximum daily load (TMDL) designation for sediment has been designated for the EBIC
- The community offers and ideal location to assess streamwater impacts and showcase success stories

Source: Google Earth

Source: Lower Merion Township Storm Sewer System and Outfalls Map

Project Overview

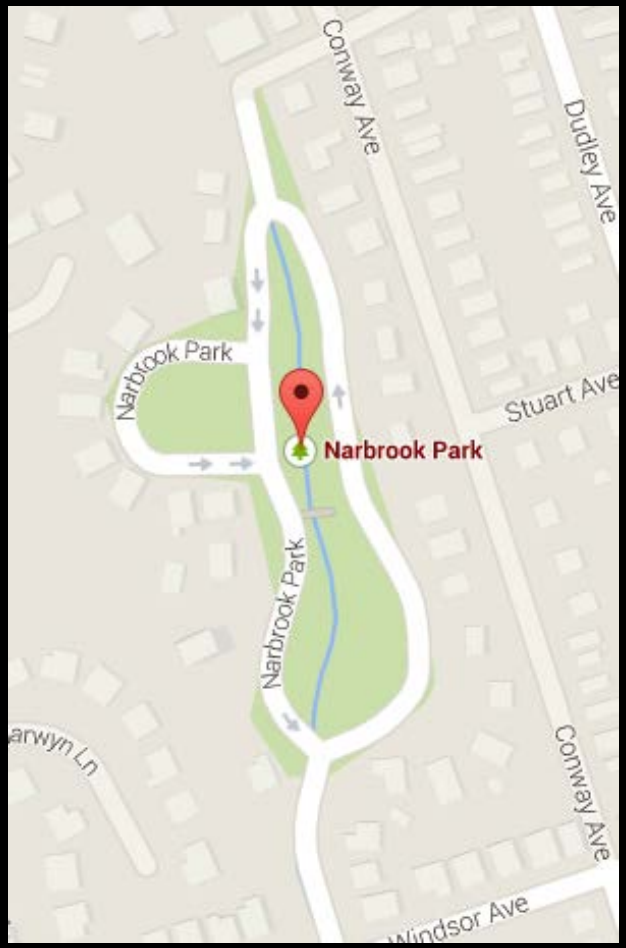
1. Survey the Narbrook Park community with respect to their historical fertilizer application practices as well as attitudes towards lawn care practices

2. Collect soil cores from their lawns for nutrient analysis

3. Conduct monthly sampling of a headwater stream running through the community

Survey Results

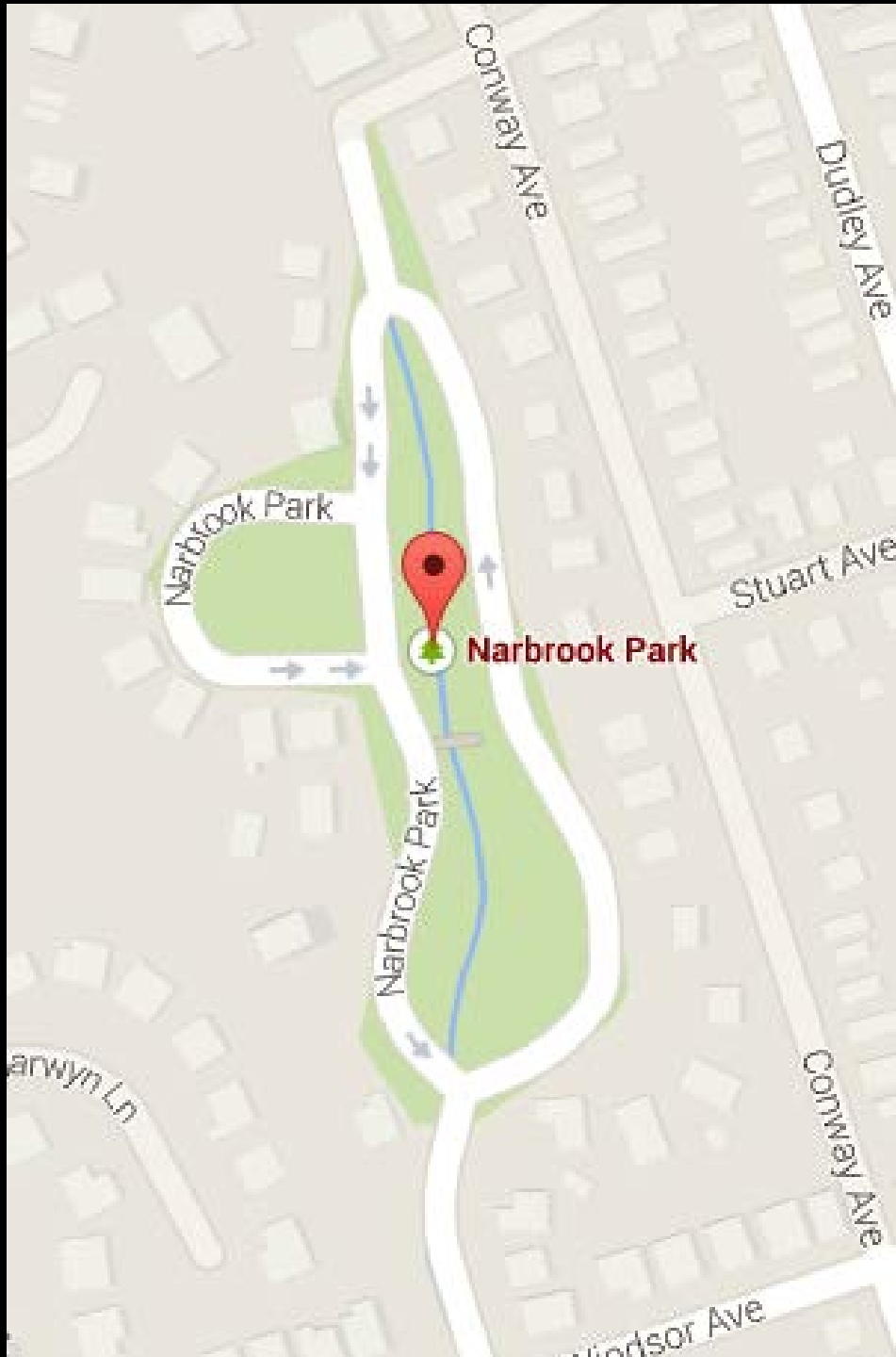
- 19 out of 35 residences responded to the survey
- 5 respondents indicated the use of fertilizer



- Appearance of the EBIC (5.6/10)
- Health of the EBIC (4.8/10)

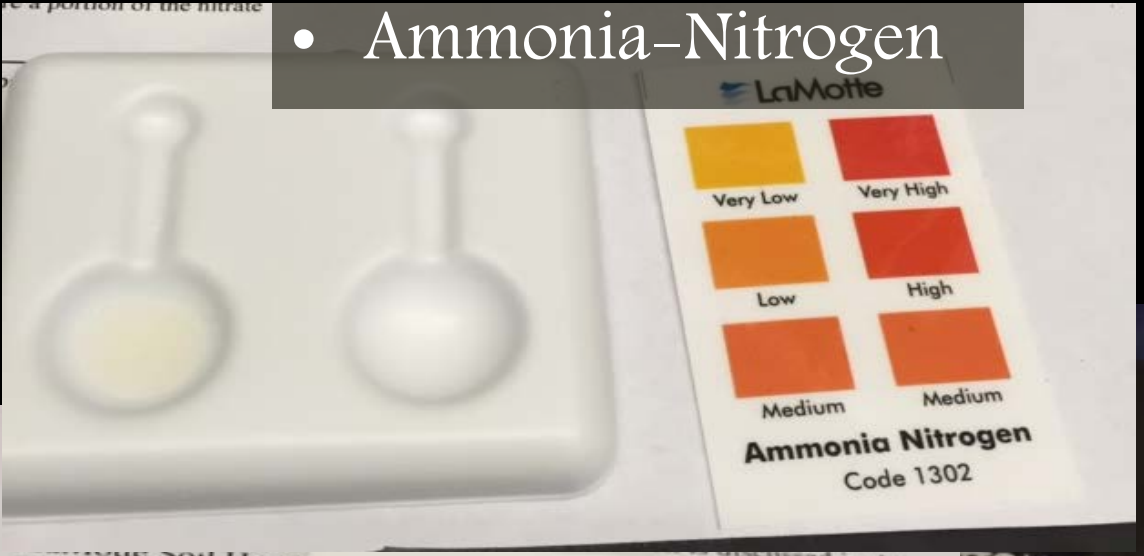
Soil Cores

- 13 lawns and common areas were cored
- 10 cores from each lawn and segment of common green

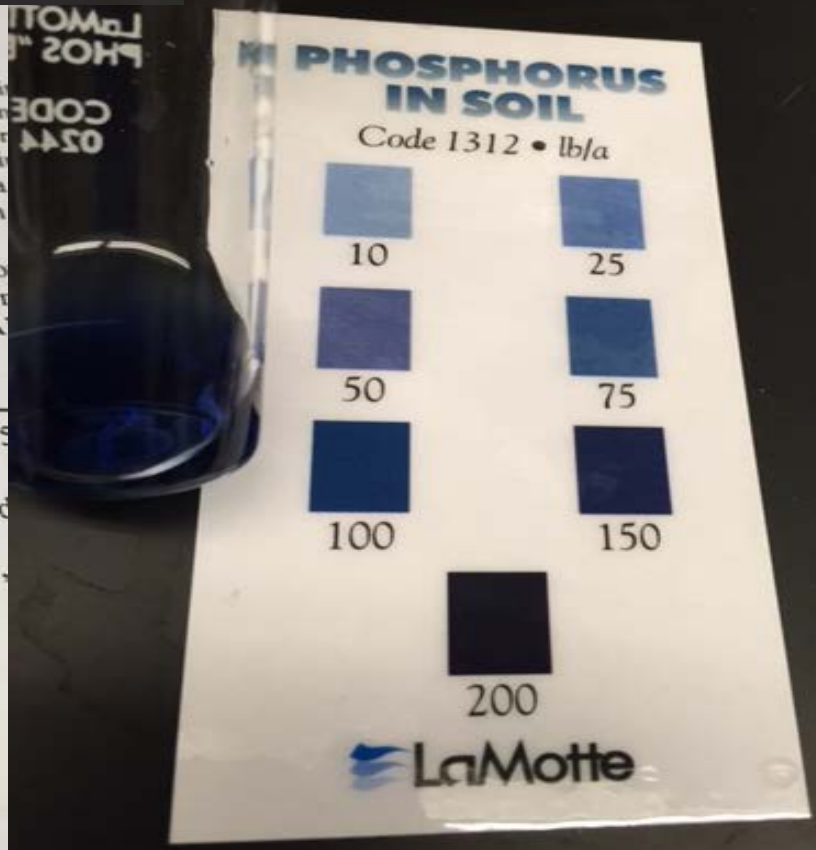


Soil Tests

- Ammonia-Nitrogen



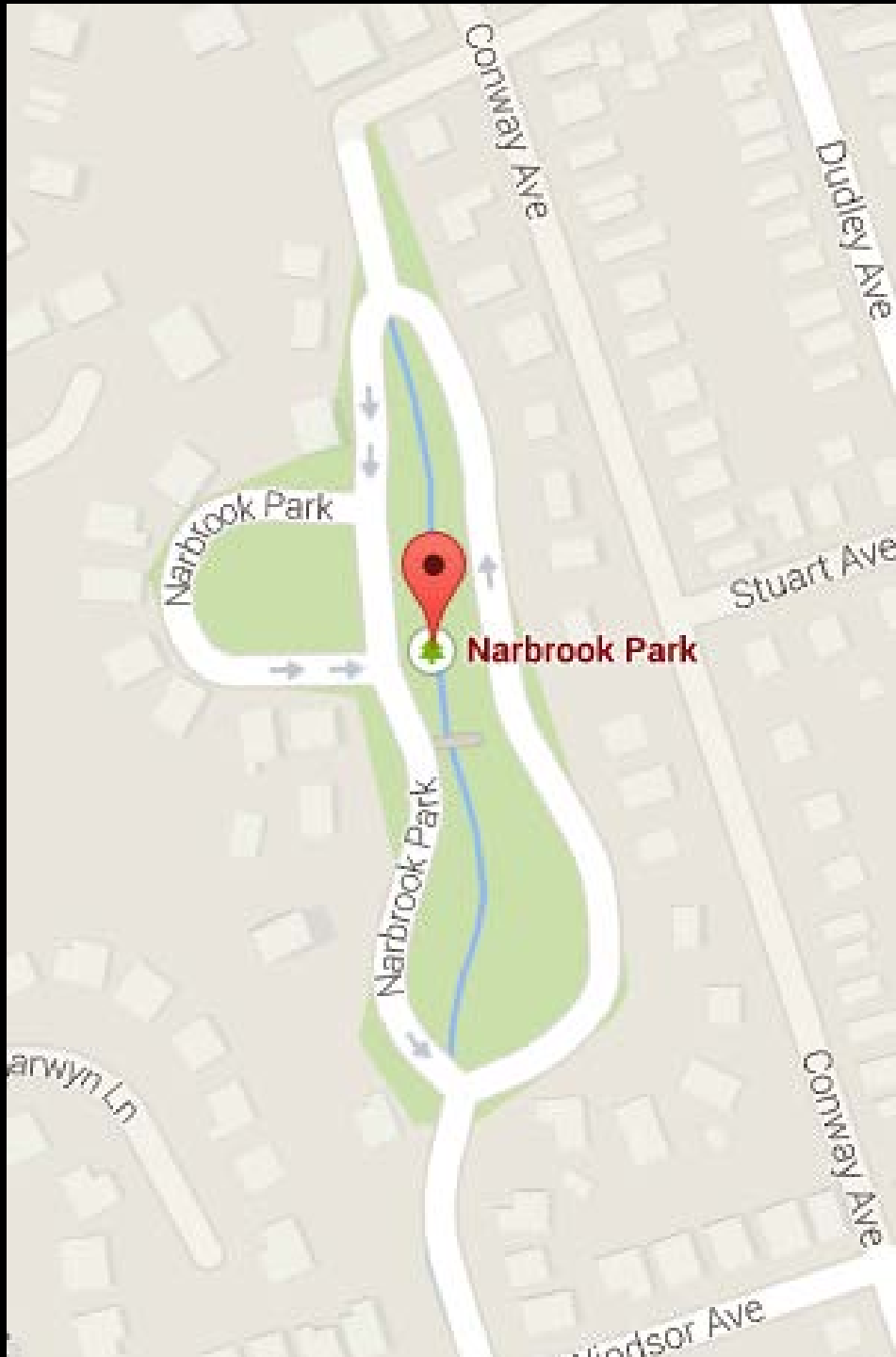
- Phosphorous

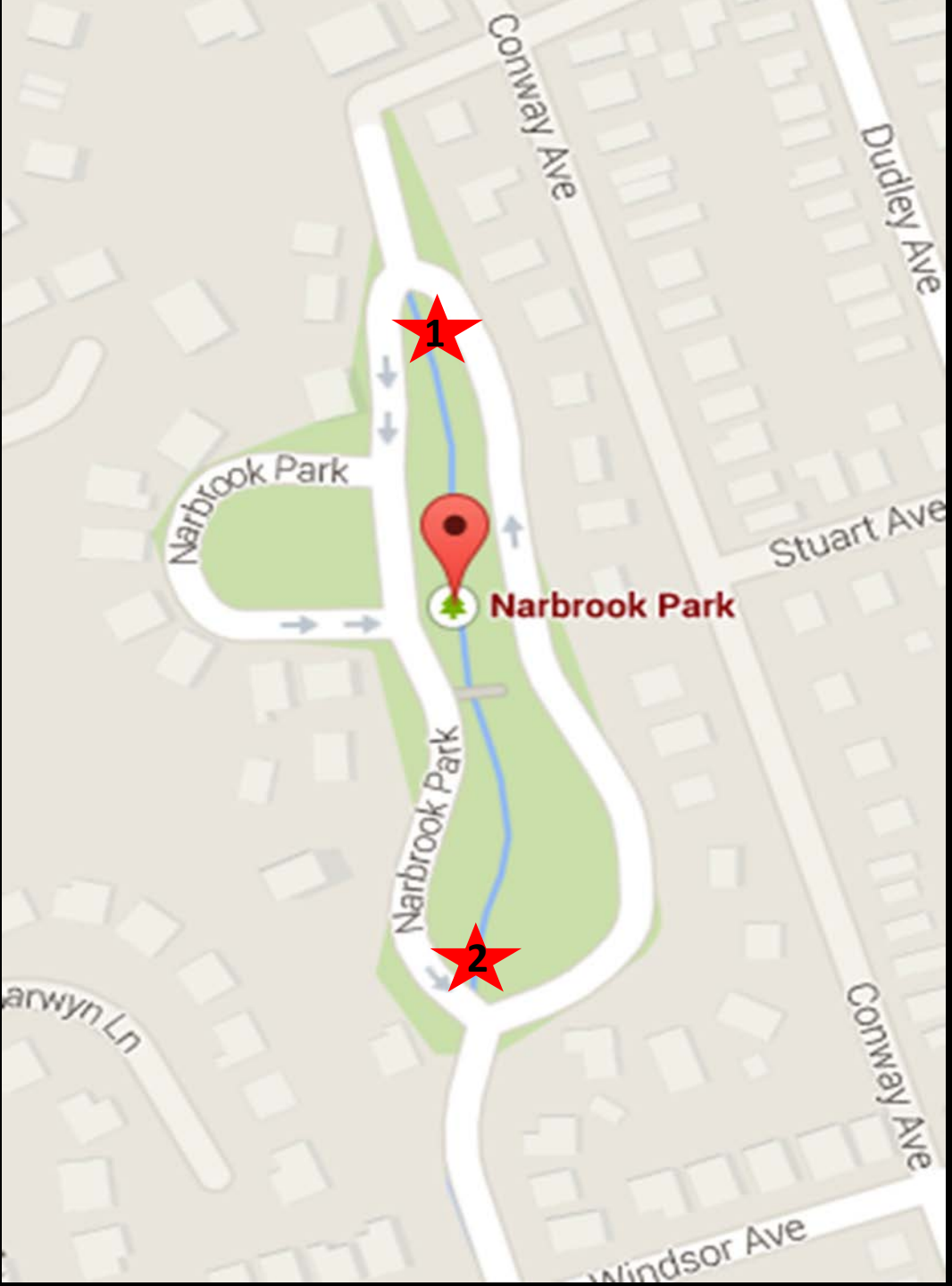


- Nitrate-Nitrogen

Soil Results

- 7 lawns with “elevated” nutrients
- Both sides of the common area exhibited elevated nutrients
- The hill area was not elevated





Water Sampling

- Nitrate
- Road salts
- Total suspended solids
- Discharge

Average and range of NO_3 yields for Narbrook Park and other headwater watersheds

Location	Average NO_3 yields ($mg/d/m^2$)	Range of NO_3 yields ($mg/d/m^2$)
Narbrook Park (baseflow)	40.6	10.3 – 136
Narbrook Park (storm)	163	156 – 170
Other locales		
Hubbard Brook Forest (Hubbard Brook, NY)[1]	16.1	0.39 – 71.5
Agricultural Streams (Indiana)[2]	711	4.3 – 2600

[1]Bernhardt et al. (2002)

[2]Bernot et al. (2006)

Conclusion

- Limited amount of Narbrook park residents apply fertilizer

- Introduction of a riparian buffer would likely improve stream quality (Sweeney and Newbold, 2014)

Ashbridge Memorial Park
Credit: LMC

Acknowledgements

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