Severn Sound Environmental Association



Working With Farmers to Protect Municipal Drinking Water in Tiny Township, Severn Sound

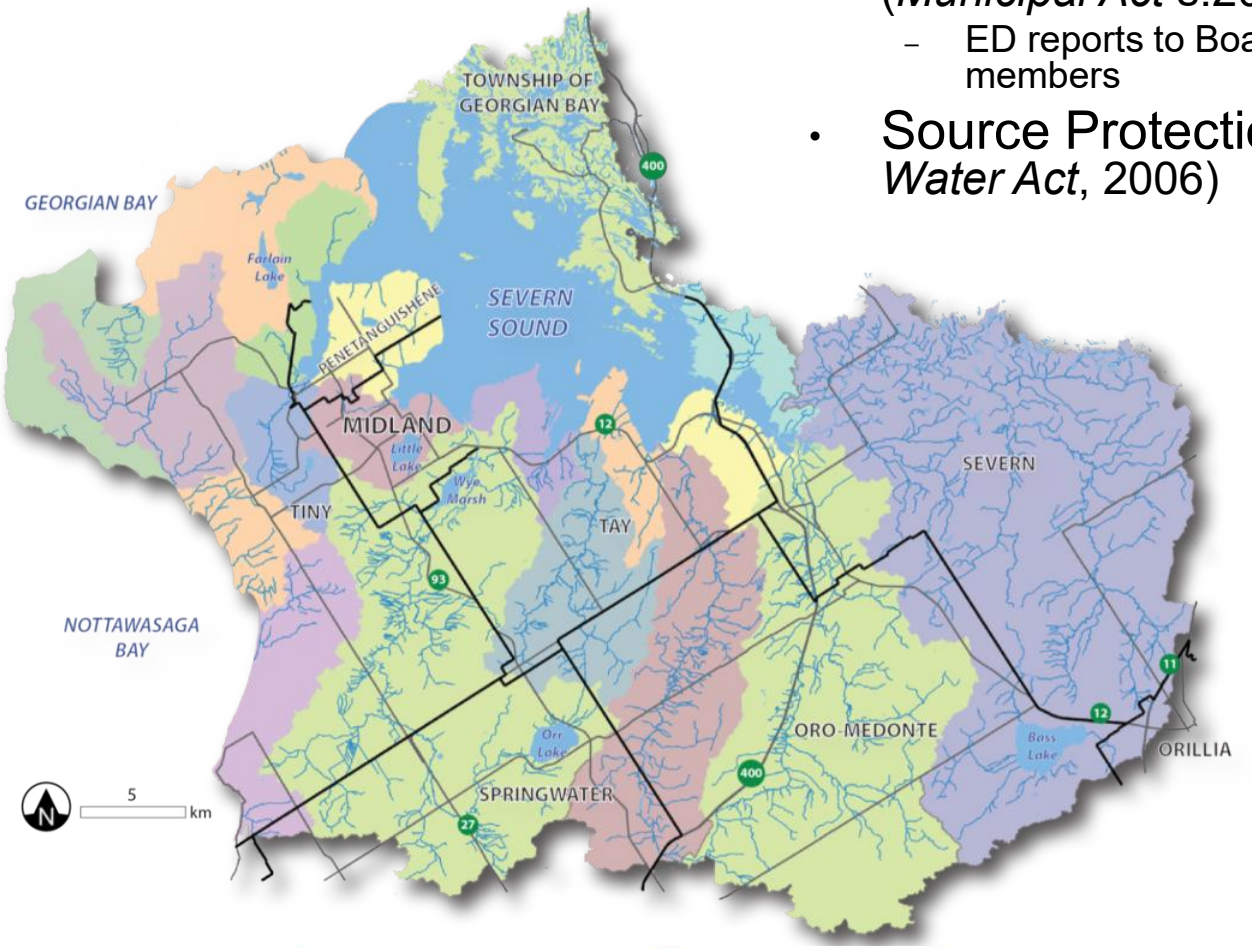
Melissa Carruthers - November 19th, 2019
Latornell Conservation Symposium

Outline

- Who and where is SSEA
- What is the Drinking Water Source Protection program
- Overview of a study done on the investigation of sources of nitrate impacting a municipal system
- Key outcomes of the study
- Impacts the study had on farmers and best management practices
- Risk Management Approach for residential properties

What is the Severn Sound Environmental Association (SSEA)?

- 2009 - Joint Municipal Service Board (*Municipal Act* s.202)
  - ED reports to Board representing 8 Municipal members
- Source Protection Authority (Ont. *Clean Water Act*, 2006)



Community Based Mission:

To sustain environmental quality & ensure continued protection through implementing a legacy of wise stewardship of Severn Sound and its tributaries.

DRINKING WATER
SOURCE PROTECTION
South Georgian Bay Lake Simcoe Region

What is Drinking Water Source Protection?

- Legislated, Multi barrier approach to protect municipal drinking water from overuse and contaminations
  - Province of Ontario Legislation
  - Protecting Quantity and Quality
  - First Principle - concept of prevention in the safeguarding of our drinking water for our communities and our health.
  - Source Protection Committee (SPC)
    - local/regional representatives including Agriculture, Municipal, STP operators etc.
  - Source Protection Authority (SPA) – inspect, review, enforce
    - SSEA is SPA, has the RMO RMI for the watershed, appointed by the Municipalities
  - WE/Region/SPA are charged with long term solution

The purpose of the Clean Water Act, 2006 is to protect existing and future sources of drinking water.

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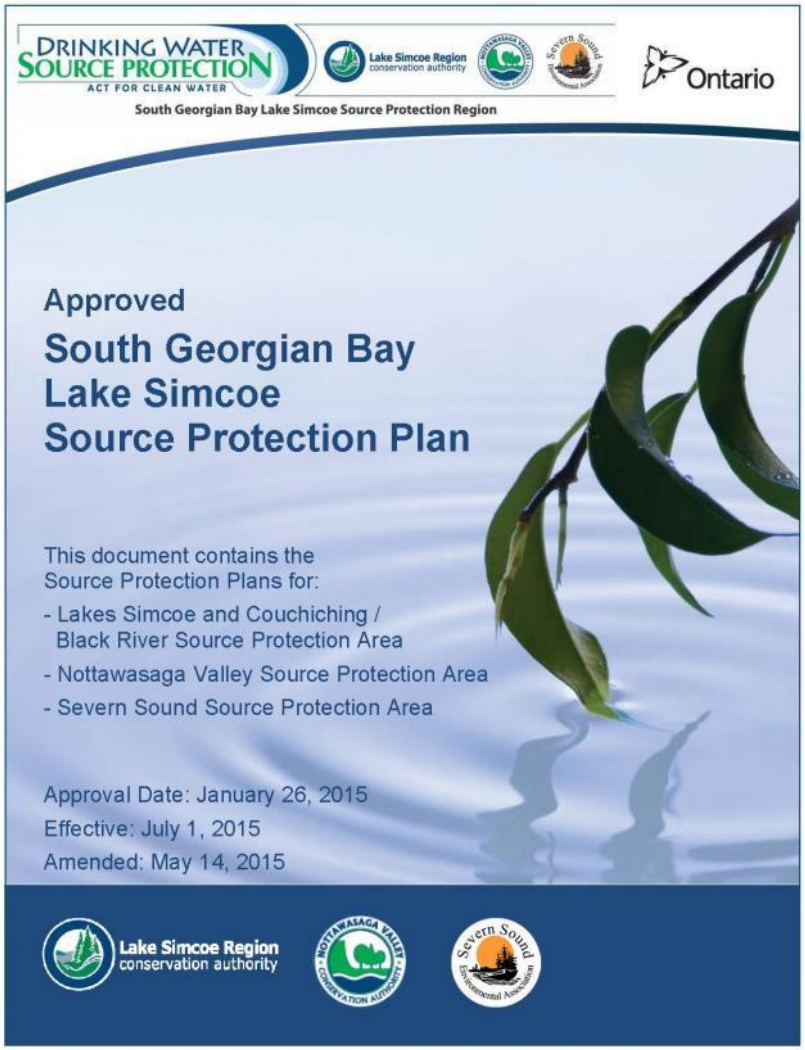
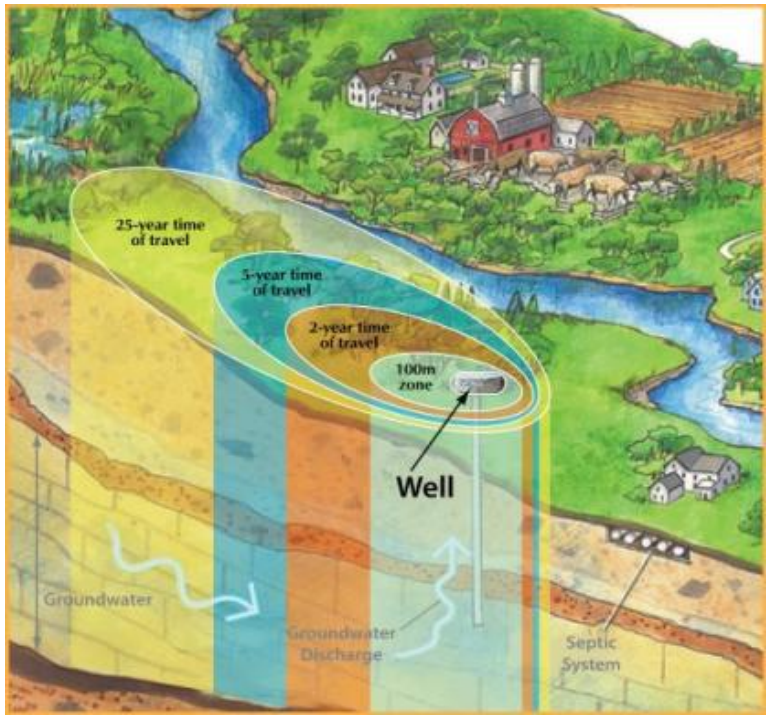
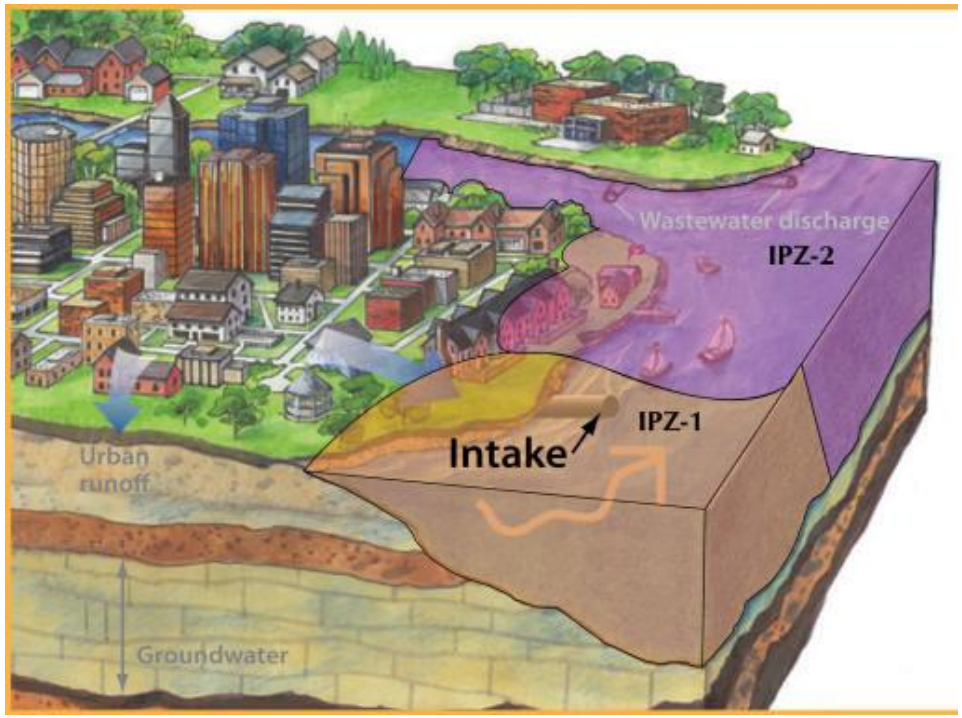
Drinking Water Source Protection



Vulnerable Areas



Wellhead Protection Areas (WHPA)

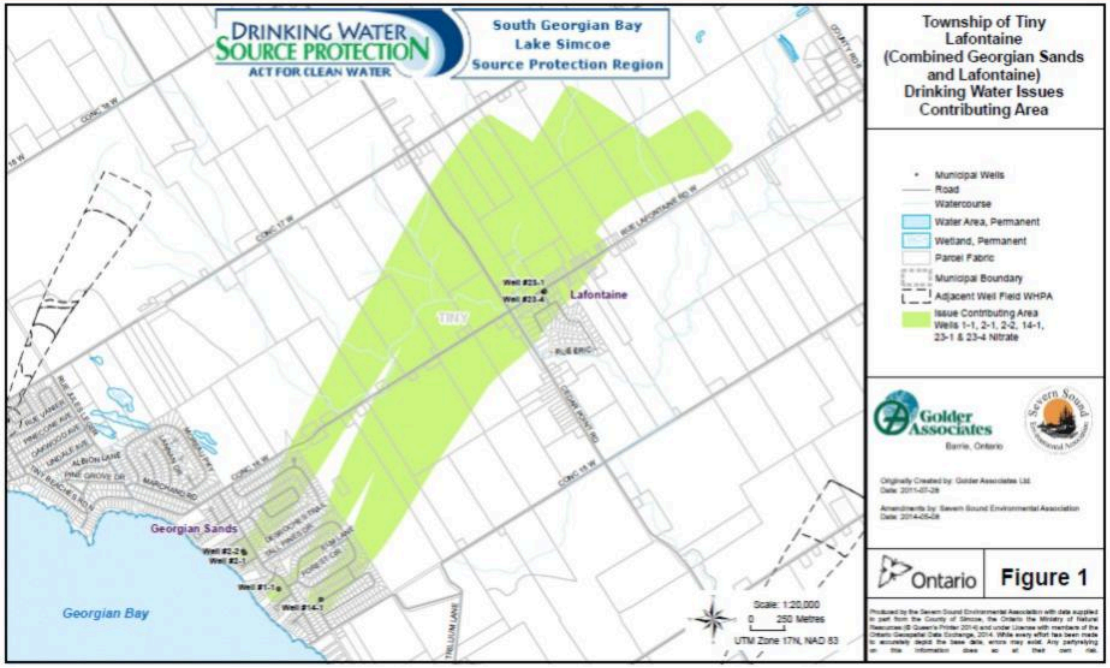


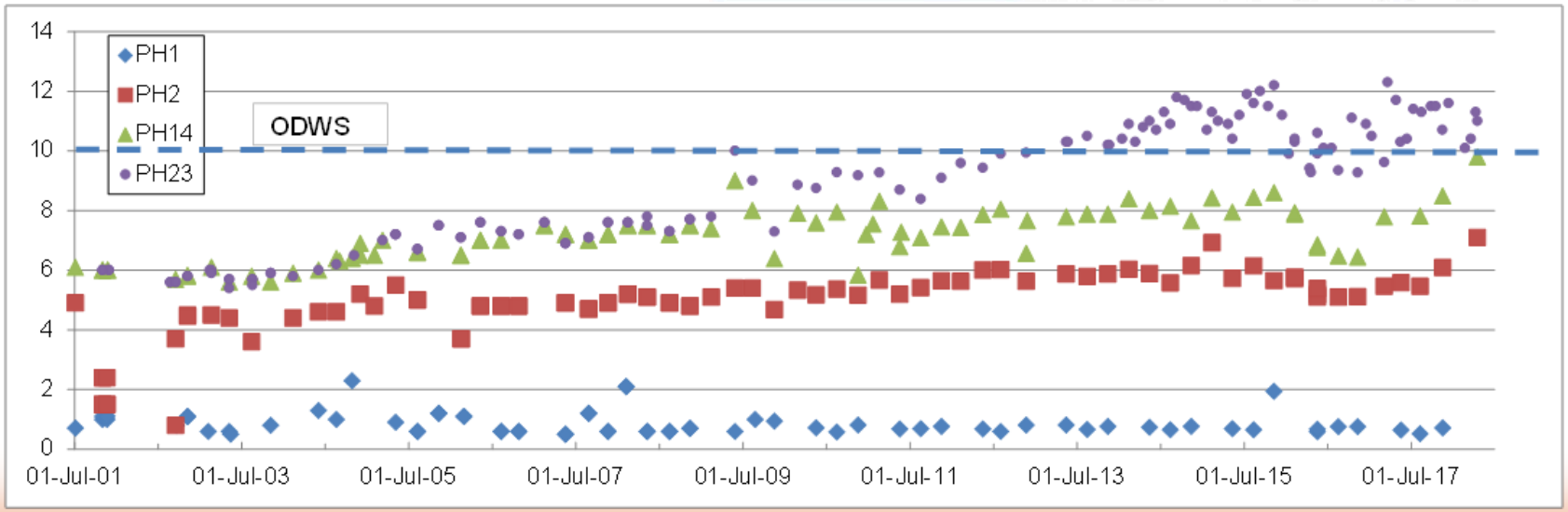
Intake Protection Zones (IPZ)

Problem

1. Nitrate issue in municipal drinking water system.

2. Where is the nitrate coming from?





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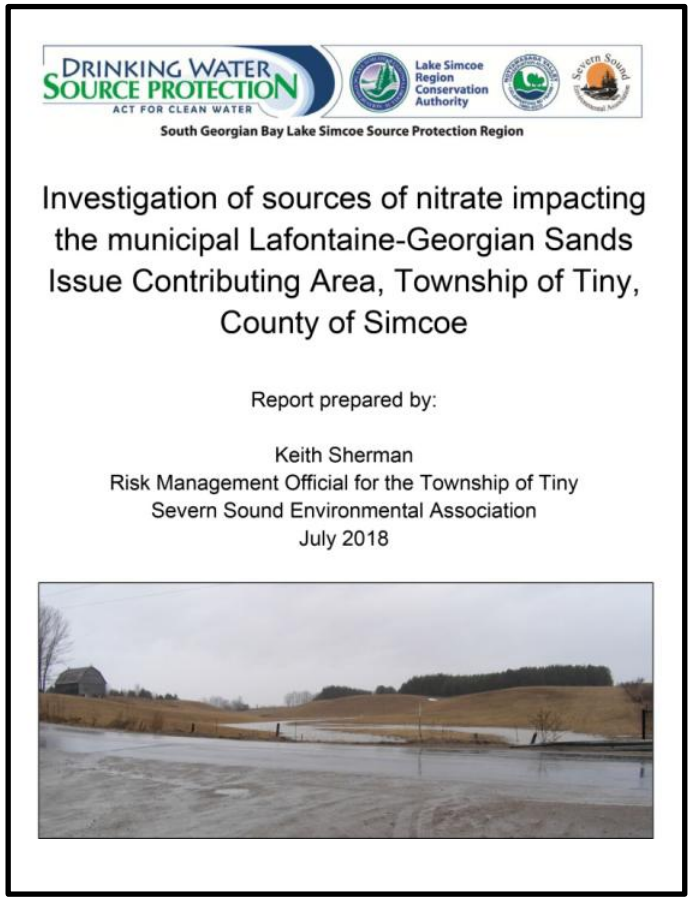
Study

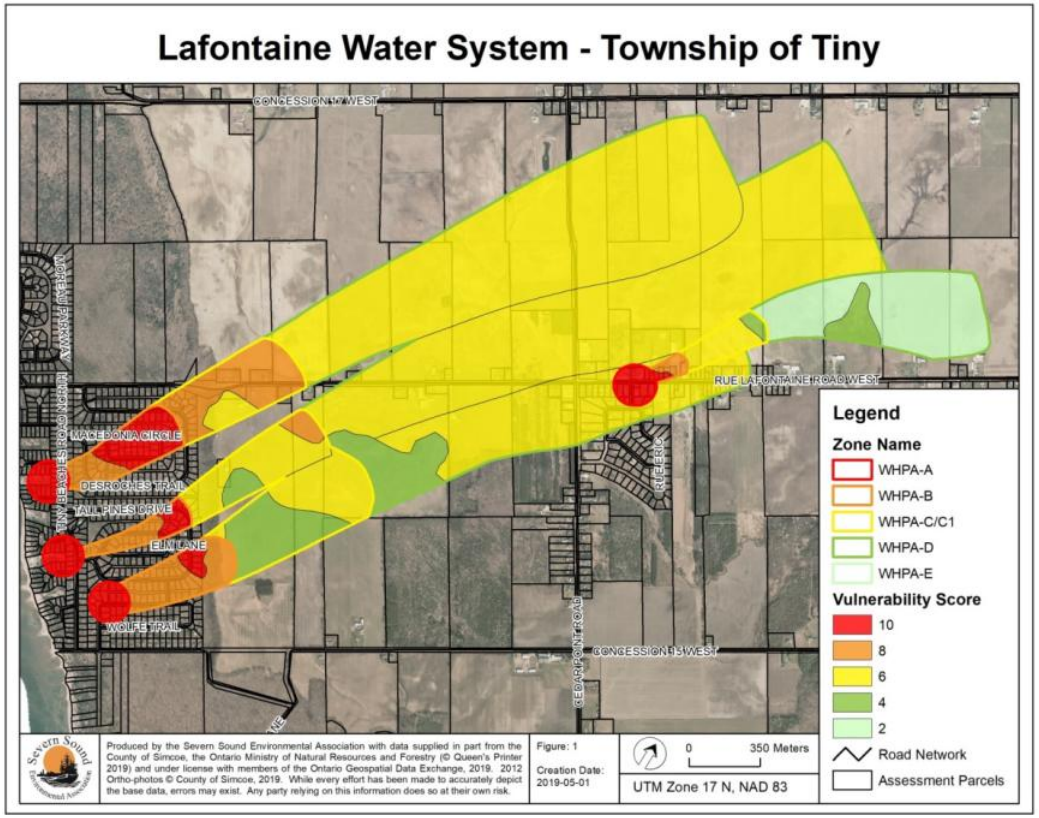


Objectives of ICA studies:

- To update current trend in raw water at the Lafontaine(LA) and Georgian Sands(GS) wellfields
- To estimate the residual nitrate available to the groundwater from agricultural fields in the ICA
- To determine the origin of the nitrate concentration in the ICA
- To model the surface and groundwater interaction between the municipal wells and the land surface in the ICA and vicinity
- To estimate the expected time of travel from surface to production well for the LA and GS wells
- To recommend best management practices (BMPs) that could contribute to reduction in nitrate concentrations in groundwater supplies

Study Area


DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
South Georgian Bay Lake Simcoe Source Protection Region
Study area
CHRISTIAN ISLAND
GEORGIAN BAY
MIDLAND
TINY
SPRINGWATER
Severn Sound Watershed
Nottawasaga Valley Watershed
Municipal Supply Well in Township of Tiny
WHPA-A (100m)
WHPA-B (2 years time of travel)
WHPA-C (5 years time of travel)
WHPA-C1 (10 years time of travel)
WHPA-D (25 years time of travel)
SWP Watershed Region
Upper Tier Municipality
Lower Tier Municipality
Drinking Water System Vulnerable Areas in Township of Tiny
Ontario
Figure 13-1


Lafontaine Water System - Township of Tiny
CONCESSION 6 WEST
RUE LAFONTAINE ROAD WEST
MACEDONIA CIRCLE
DESROCHES TRAIL
ALLPINES DRIVE
ELM LANE
WOLFE TRAIL
CONCESSION 5 WEST
CEDAR POINT ROAD
Legend
Zone Name
WHPA-A
WHPA-B
WHPA-C/C1
WHPA-D
WHPA-E
Vulnerability Score
10
8
6
4
2
Road Network
Assessment Parcels
Produced by the Severn Sound Environmental Association with data supplied in part from the County of Simcoe, the Ontario Ministry of Natural Resources and Forestry (© Queen's Printer 2019) and under license with members of the Ontario Geospatial Data Exchange, 2019. 2012 Ortho-photos © County of Simcoe, 2019. While every effort has been made to accurately depict the base data, errors may exist. Any party relying on this information does so at their own risk.
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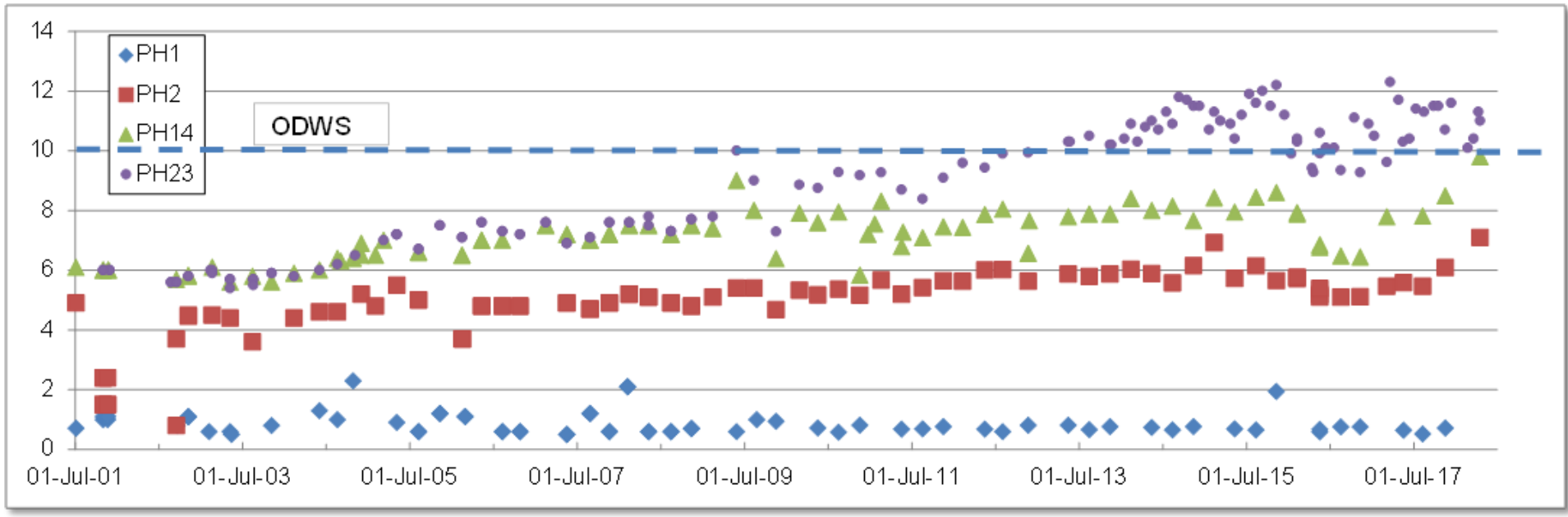
0
350 Meters
UTM Zone 17 N, NAD 83

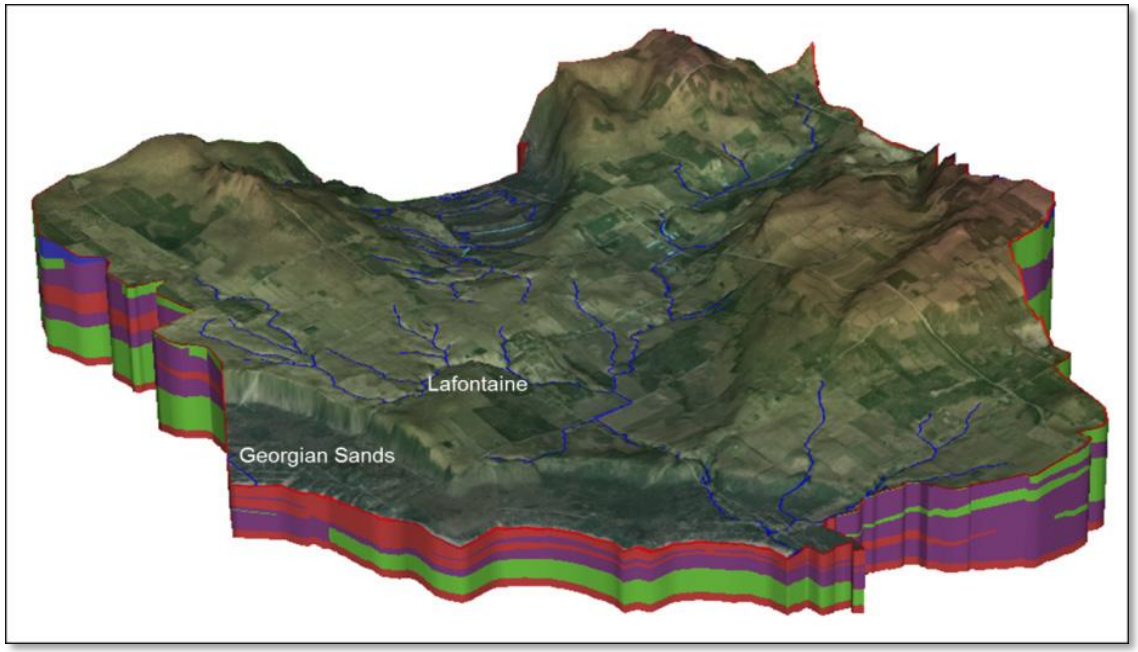
Components of the Study

- Monitoring of trends in nitrate concentration in production wells



Components of the Study (continued)

- Integrated groundwater-surface water model (Golder Associates Ltd.)



Started with previous Tier 3 Water Budget Assessment and refined used the groundwater model FEFLOW and the surface water model MIKE SHE

Components of the Study (continued)

- Nitrogen balance on affected croplands by CCA (Andy Van Niekerk)

- Interviews were done with 9 farmers with crop rotations and inputs for the growing years of 2013-2015 were entered into the NMAN3 software.
- The area of cropland accounted for approximately 2177 acres (881 ha)
- The NMAN3 nitrogen balances were used to calculate an average loss to the groundwater on a per field basis

Components of the Study (continued)

- Survey of private wells
- Sampling of selected wells for basic chemistry including nitrate concentration, isotope ratios and sweeteners (analysis by Environment Canada-University of Waterloo research lab)

Outcomes

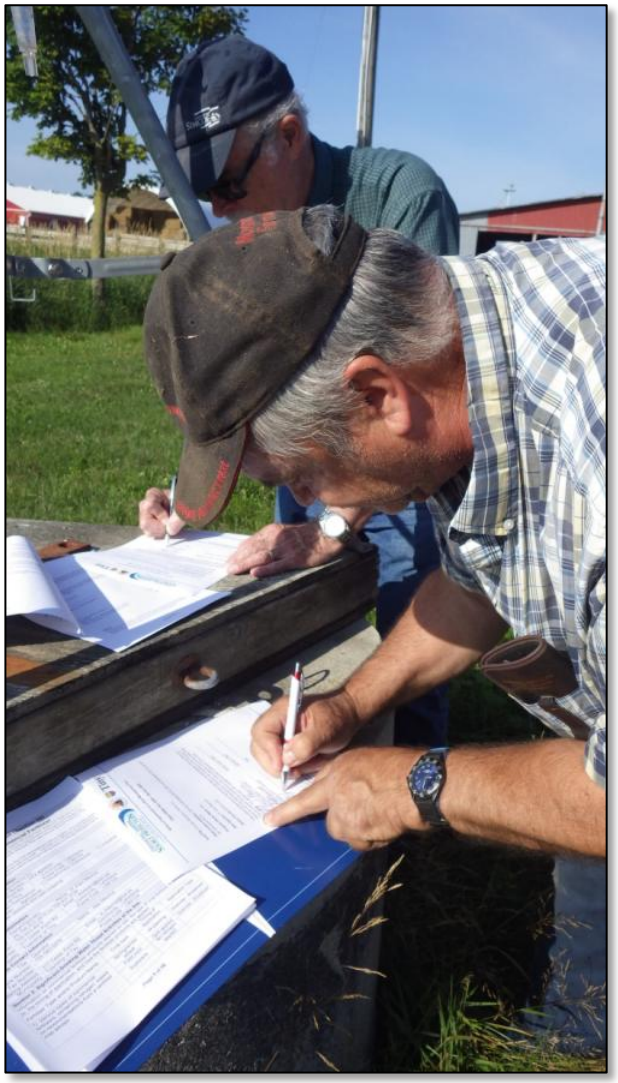
- Trends in nitrate levels in production wells continue to rise
- 4 residential wells had levels >10 mg/L
- 80% of the study area represents agricultural fields
- Isotope/sweetener analysis showed “major source of the groundwater nitrate is likely nitrified synthetic fertilizers”, “Septics are not a major nutrient source in study area”
- Could take anywhere from 17-38 years for runoff from the surface to enter the production well screen

TRAVEL TIMES

WELL	DRILL DATE (PARTICLE RELEASE DATE)	TIME FOR FIRST PARTICLE TO REACH SURFACE (YEARS)	TIME TO ACHIEVE QUASI-STEADY STATE CAPTURE ZONE (YEARS)
GS 2-1 / 2-2	Sep-69	17	38
GS 1-1	Jun-75	31	35
GS 14-1	Jun-75	24	30
LF 23-1 / 23-4	Nov-77	10	17

What It Means to Local Farmers

- Risk Management Plans will be negotiated with local farmers
- 8 farmers in total affected
- 1 Plan currently signed, 3 others in draft
- Risk Management measures to include
  - Maintaining and calibrating equipment
  - Crop rotations
  - Using variable rate application
  - Following 4Rs principals (right place, right product, at the right rate at the right time)
  - More stringent record keeping
  - Factors around, type, how and when fertilizer is applied
  - Soil testing
  - Using a certified crop advisor



What It Means to Residential Properties

- Prohibition letter included the following:
  - Background information on nitrate issue in municipal system
  - Health impacts of nitrate
  - Specified a date for when commercial fertilizer containing nitrogen can not be used
- FAQ document with the following (and more)
  - Suggested alternatives to commercial fertilizer
  - Why the property is being impacted
  - DWSP background
  - Consequences of non-compliance

- Tracking Sheet for property maintenance to assist with inspections to ensure compliance in future
- An invitation to an Open House to learn more and speak to various organizations

What It Means to Residents (continued)

- Prohibition letter was sent out by registered mail in early August
- Open House was held on August 24 with the following in attendance:
  - SSEA as local SPA and RMO for Township
  - Township Council, Mayor and Deputy Mayor (Chair of SSEA)
  - Simcoe Muskoka District Health Unit
  - Township staff
  - Local farmer with a signed Risk Management Plan
  - Barrie MECP office provided groundwater model to be used for education and outreach purposes

Thank-you!

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