A photograph of a pond with lily pads and a forested background under a blue sky with clouds. The pond is filled with green lily pads and some white flowers. The background is a dense line of green trees. The sky is blue with scattered white clouds. The text is overlaid on the image.

Westminster Ponds/Pond Mills ESA Study

Biological and Physical Attributes of
an Urban Wildlife Refuge

Study Team

- North-South Environmental Inc. (Terrestrial Biology)
- Schollen and Company Inc.
- Hutchinson Environmental Sciences Ltd. (Aquatic Ecology and Water Quality)
- Norbert M Woerns (Hydrology)
- Others: the City, previous studies, local naturalists

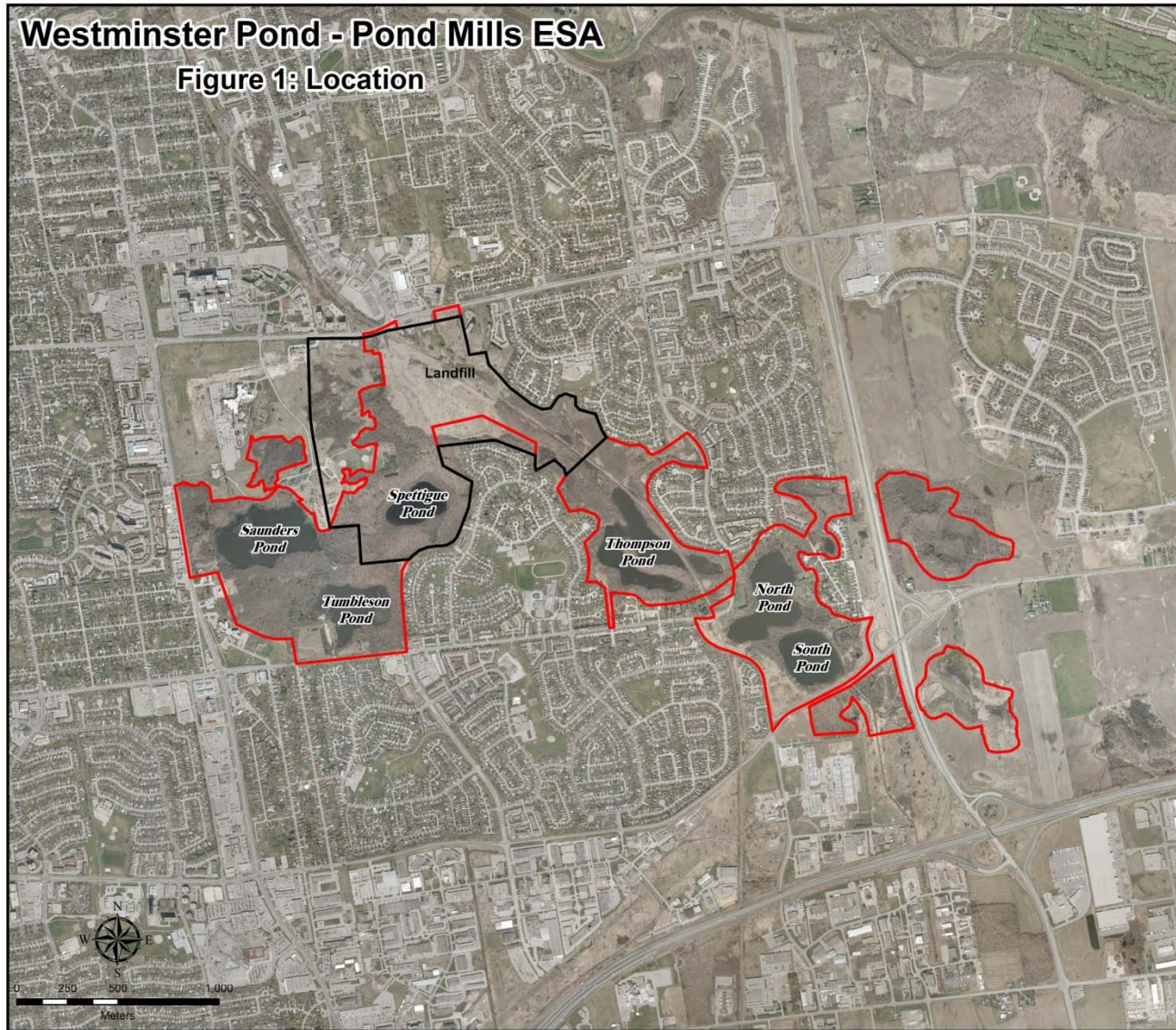
Five Components

- Terrestrial Biology
- Aquatic Biology
- Water Quality
- Hydrology
- Invasive Species





Westminster Pond - Pond Mills ESA

Figure 1: Location



Legend

-  Preliminary Study Area
-  Westminister Ponds ESA



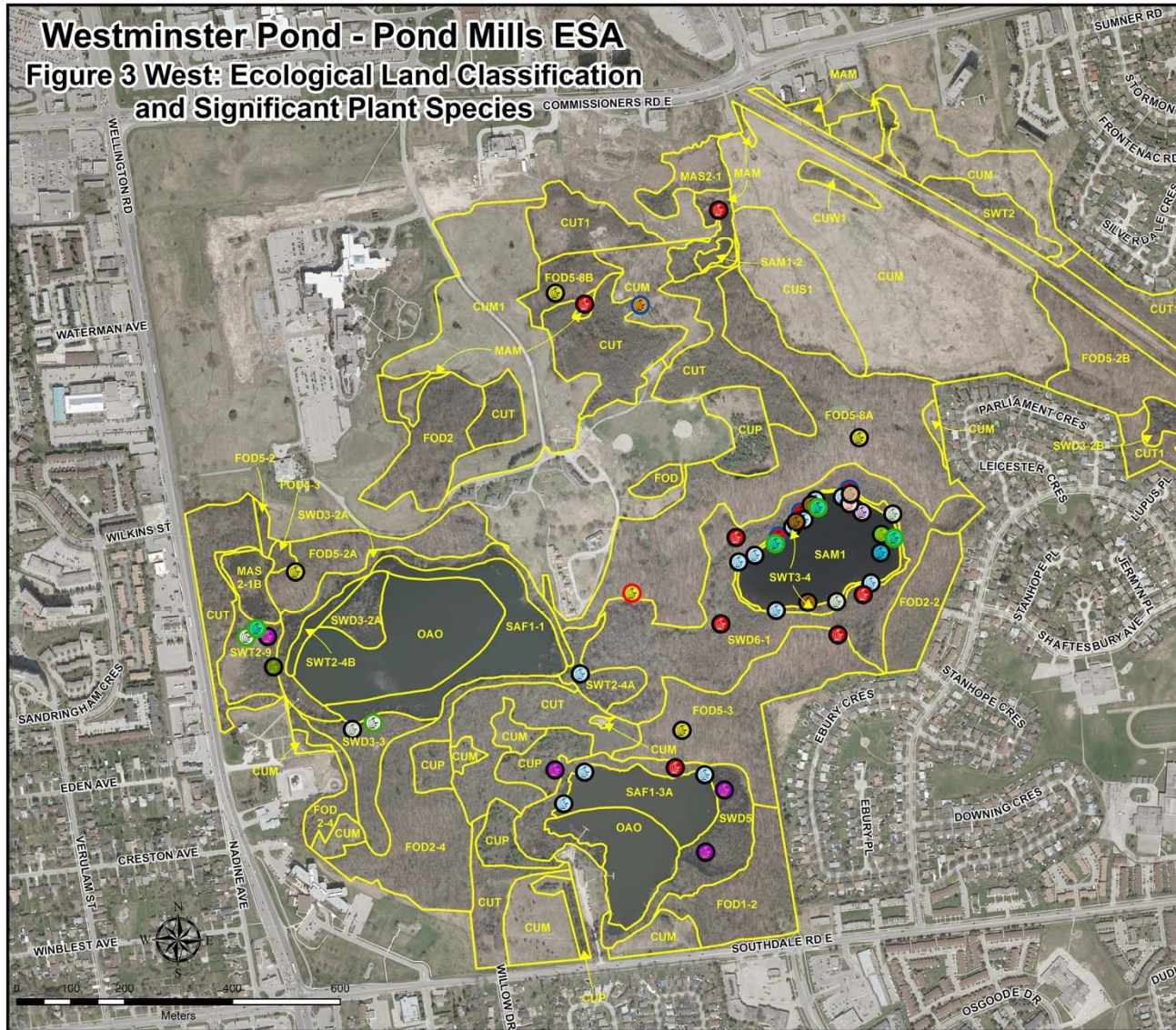
North-South Environmental Inc.
Specialists in Sustainable Landscape Planning



July 30, 2013

Westminster Pond - Pond Mills ESA

Figure 3 West: Ecological Land Classification and Significant Plant Species



- ### Legend
- Provincially/Federally Rare**
 - Eastern Flowering Dogwood
 - Provincially Rare**
 - Field Thistle
 - Regionally/Locally Rare**
 - Flatstem Pondweed
 - Floating Pondweed
 - Frosted Hawthorn
 - Hairy Honeysuckle
 - Leatherleaf
 - Poison Sumac
 - Red-tinged Bulrush
 - Richardson's Pondweed
 - Schuette's Hawthorn
 - Slender Pondweed
 - Stiff Marsh Bedstraw
 - Swamp Beggarticks
 - Swamp Loosestrife
 - Sweetflag
 - Three-fruited Sedge
 - Water Willow
 - Watershield
 - Ecological Land Classification





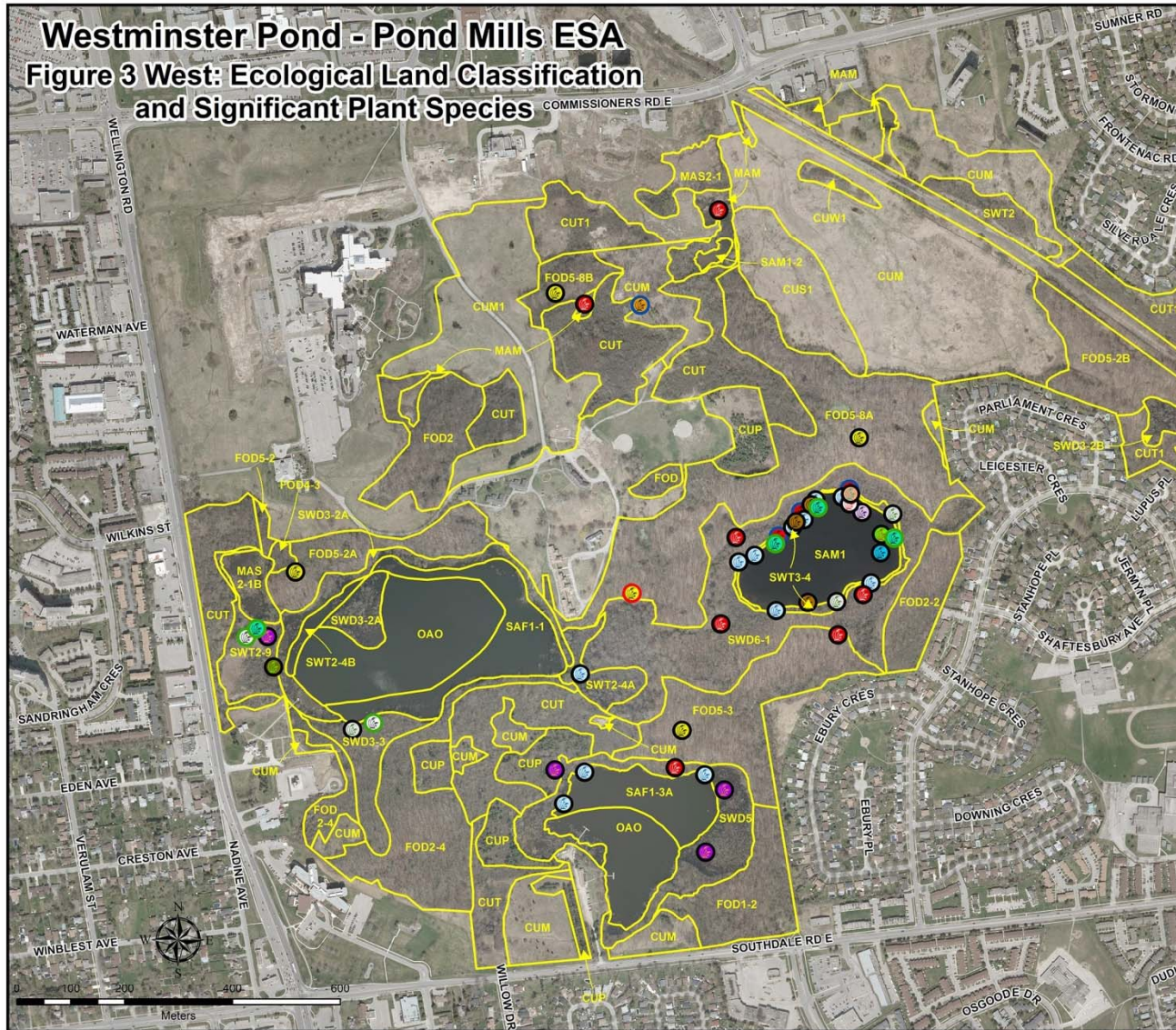






Westminster Pond - Pond Mills ESA

Figure 3 West: Ecological Land Classification and Significant Plant Species



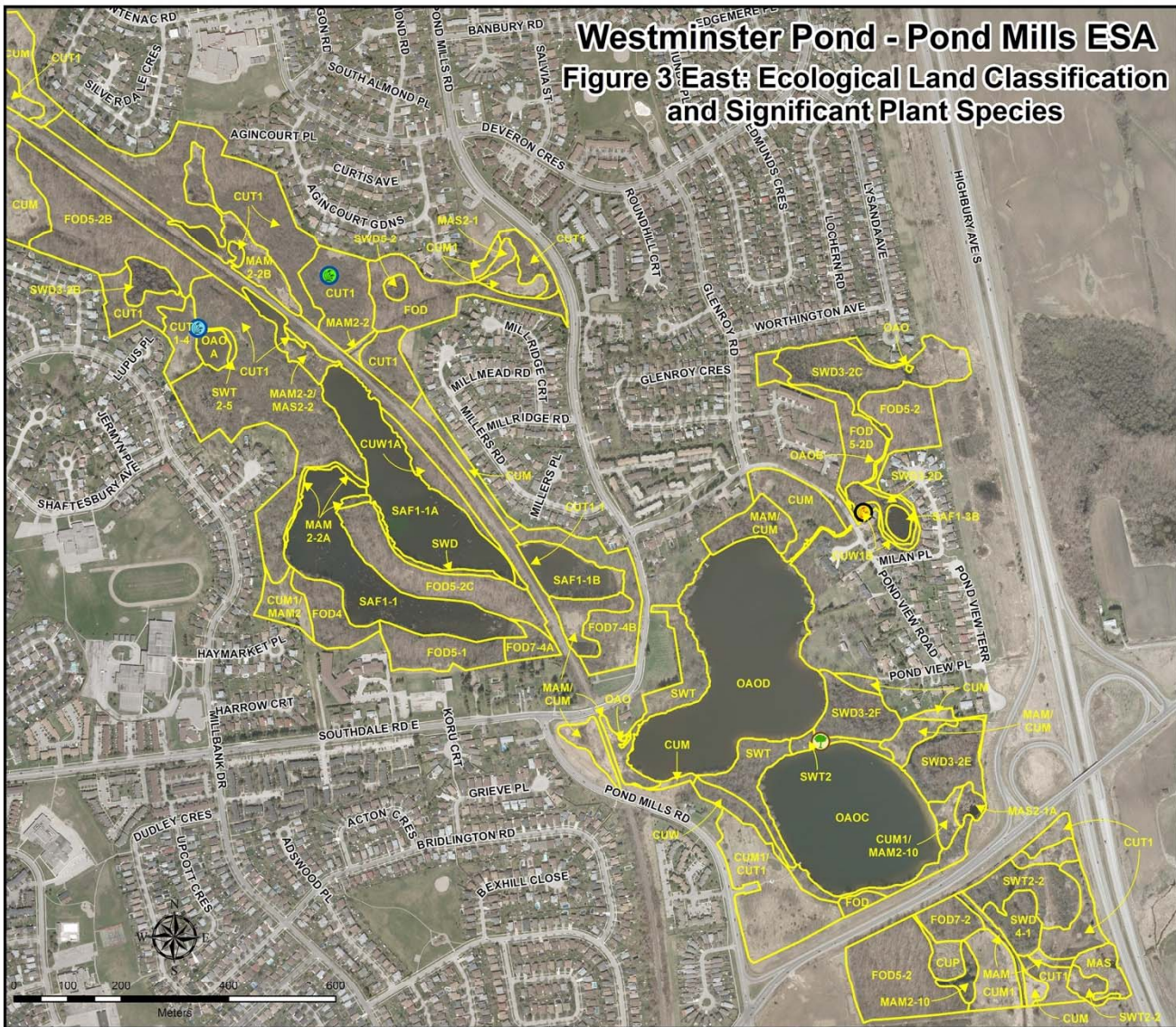
- ### Legend
- Provincially/Federally Rare**
 - Eastern Flowering Dogwood
 - Provincially Rare**
 - Field Thistle
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 - Richardson's Pondweed
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 - Slender Pondweed
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 - Swamp Beggarticks
 - Swamp Loosestrife
 - Sweetflag
 - Three-fruited Sedge
 - Water Willow
 - Watershield
 - Ecological Land Classification





Westminster Pond - Pond Mills ESA

Figure 3 East: Ecological Land Classification and Significant Plant Species



- Legend**
- Provincially/Federally Endangered**
 - Butternut
 - Regionally/Locally Rare**
 - Common Evening-Primrose
 - Frosted Hawthorn
 - Schuette's Hawthorn
 - Ecological Land Classification

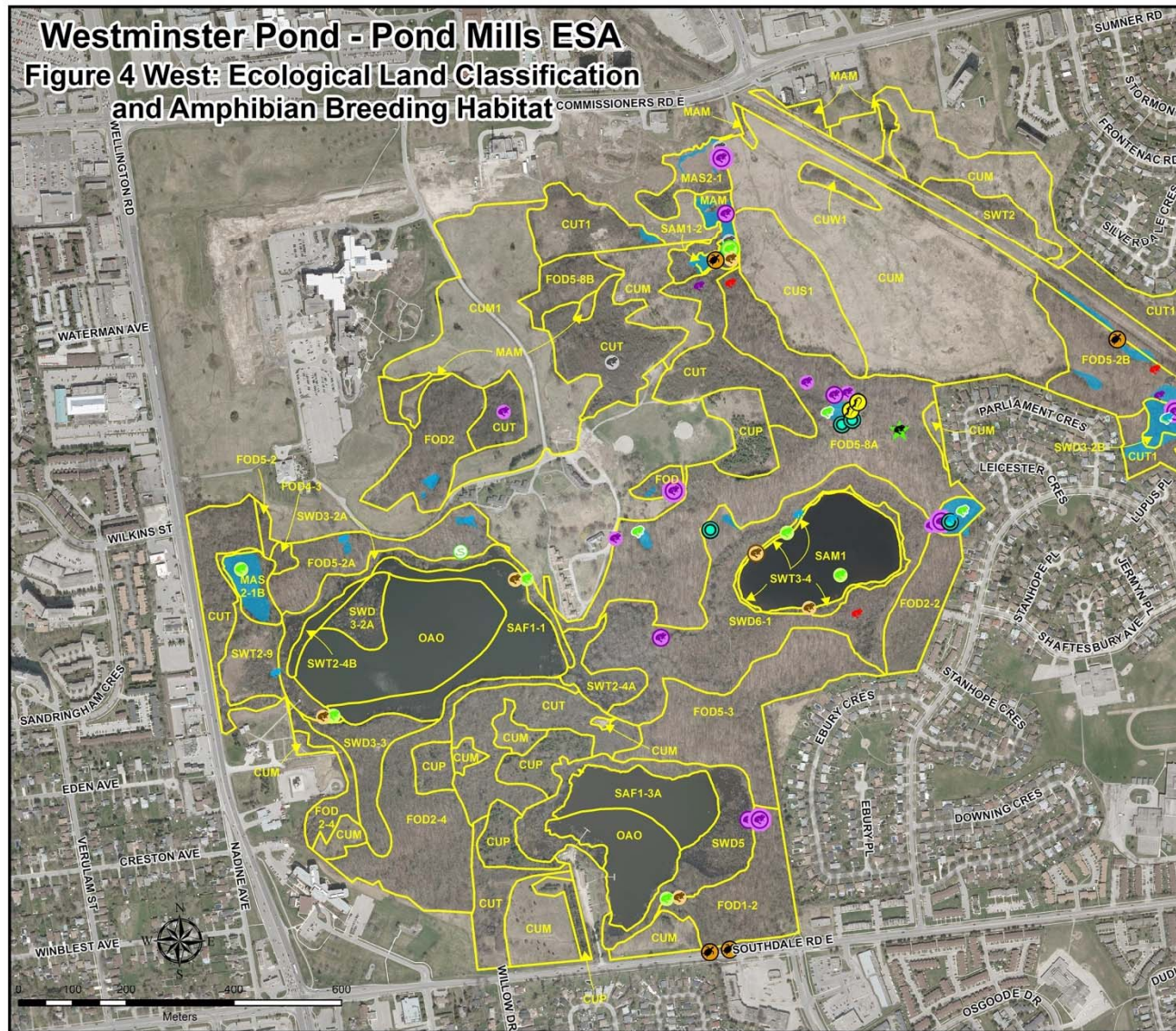






Westminster Pond - Pond Mills ESA

Figure 4 West: Ecological Land Classification and Amphibian Breeding Habitat

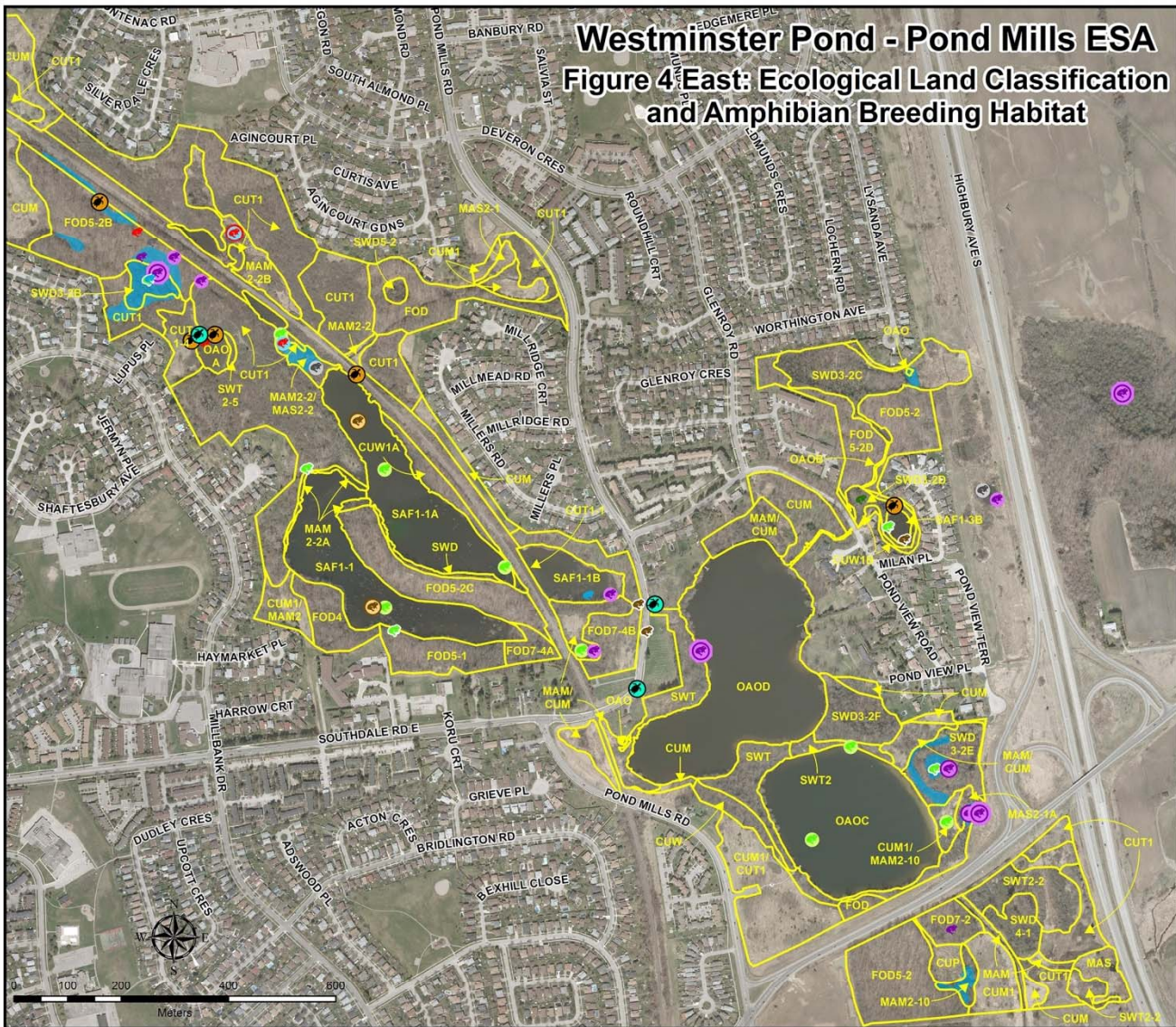


- ### Legend
- #### Amphibian Locations
- American Toad
 - American Toad - Code 1
 - American Toad - Code 2
 - Bullfrog
 - Bullfrog - Code 1
 - Bullfrog - Code 2
 - Green Frog
 - Green Frog - Code 1
 - Green Frog - Code 2
 - Gray Treefrog
 - Gray Treefrog - Code 1
 - Northern Leopard Frog
 - Spring Peeper
 - Spring Peeper - Code 1
 - Spring Peeper - Code 2
 - Spring Peeper - Code 3
 - Wood Frog
 - Spermatophores
 - Spotted Salamander - Male
 - Painted Turtle
 - Snapping Turtle
- #### Snakes
- Eastern Gartersnake
 - Amphibian Breeding Habitat
 - Ecological Land Classification
 - Area of Vernal Pooling



Westminster Pond - Pond Mills ESA

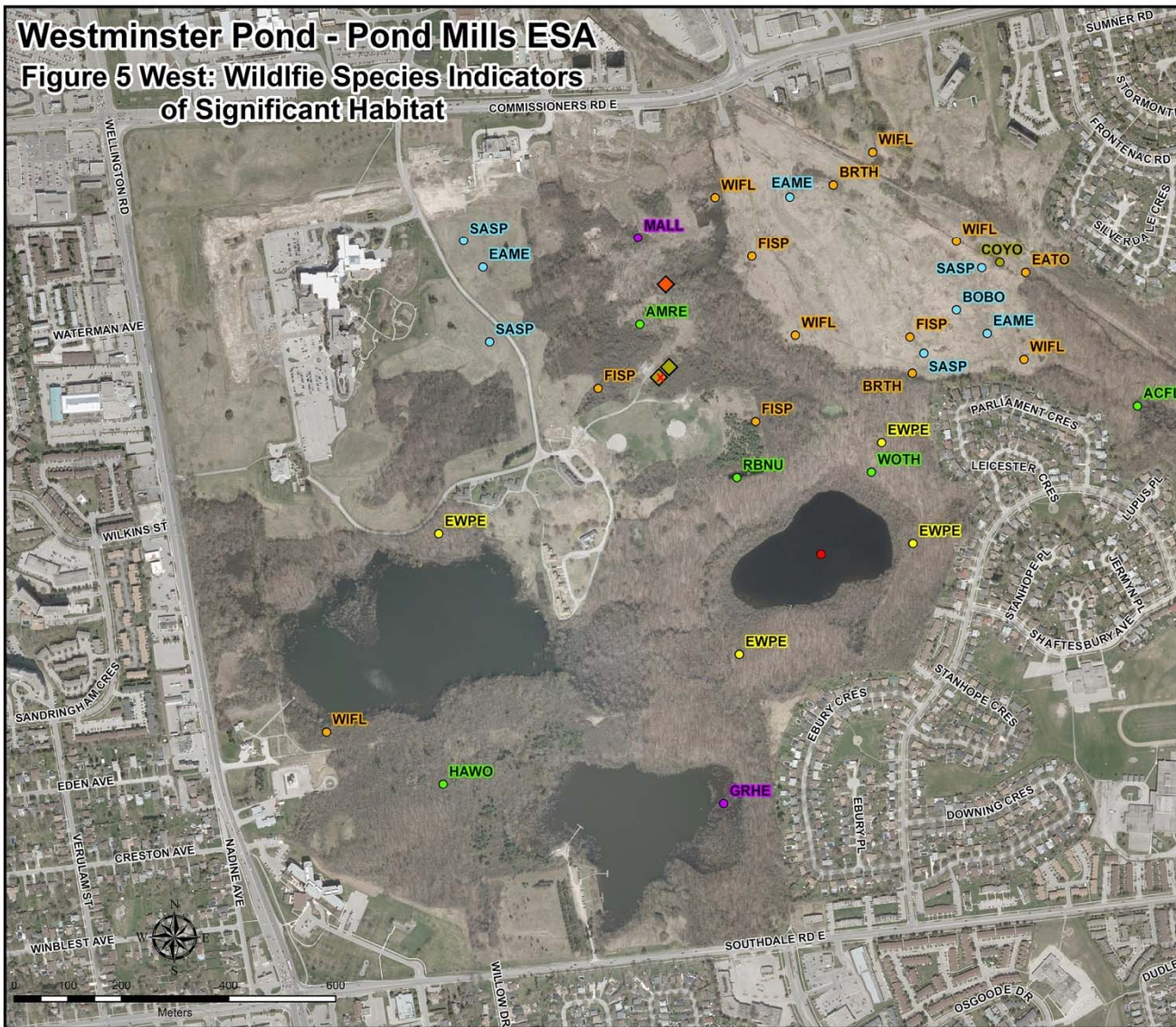
Figure 4 East: Ecological Land Classification and Amphibian Breeding Habitat



- ### Legend
- Amphibian Locations**
- American Toad
 - American Toad - Code 1
 - American Toad - Code 2
 - Bullfrog
 - Bullfrog - Code 1
 - Bullfrog - Code 2
 - Green Frog
 - Green Frog - Code 1
 - Green Frog - Code 2
 - Gray Treefrog
 - Gray Treefrog - Code 1
 - Northern Leopard Frog
 - Spring Peeper
 - Spring Peeper - Code 1
 - Spring Peeper - Code 2
 - Spring Peeper - Code 3
 - Wood Frog
 - SpERMATOPHORES
 - Spotted Salamander - Male
 - Painted Turtle
 - Snapping Turtle
- Snakes**
- Eastern Gartersnake
 - Amphibian Breeding Habitat
 - Ecological Land Classification
 - Areas of Vernal Pooling

Westminster Pond - Pond Mills ESA

Figure 5 West: Wildlife Species Indicators of Significant Habitat



Legend

Species of Special Concern

- EWPE - Eastern Wood-Pewee (Federal Species of Special Concern)
- Giant Swallowtail

Woodland Area-Sensitive/Forest Interior Habitat Indicators

- ACFL - Acadian Flycatcher (Federally/Provincially Endangered)
- AMRE - American Redstart
- BGGN - Blue-gray Gnatcatcher
- BTGW - Black-throated Green Warbler
- HAWO - Hairy Woodpecker
- MAWA - Magnolia Warbler
- MOWA - Mourning Warbler
- RBNU - Red-breasted Nuthatch
- WOTH - Wood Thrush (Federally Threatened)

Open Country Breeding Bird Indicators

- BOBO - Bobolink (Federally/Provincially Threatened)
- EAME - Eastern Meadowlark (Federally/Provincially Threatened)
- SASP - Savannah Sparrow

Thicket Habitat Indicators

- BRTH - Brown Thrasher
- EATO - Eastern Towhee
- FISP - Field Sparrow
- WIFL - Willow Flycatcher

Marsh and Waterfowl Habitat Indicators

- GRHE - Green Heron
- MALL - Mallard

Target Mammal Species

- COYO, Coyote
- Coyote (?) Burrow
- Burrow, Abandoned
- Fox Den Site
- Great Blue Heron Nest
- Beaver Dam

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Westminster Pond - Pond Mills ESA

Figure 5 East: Wildlife Species Indicators of Significant Habitat



Legend

Species of Special Concern

- EWPE - Eastern Wood-Pewee (Federal Species of Special Concern)
- Giant Swallowtail

Woodland Area-Sensitive/Forest Interior Habitat Indicators

- ACFL - Acadian Flycatcher (Federally/Provincially Endangered)
- AMRE - American Redstart
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- FISP - Field Sparrow
- WIFL - Willow Flycatcher

Marsh and Waterfowl Habitat Indicators

- GRHE - Green Heron
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Target Mammal Species

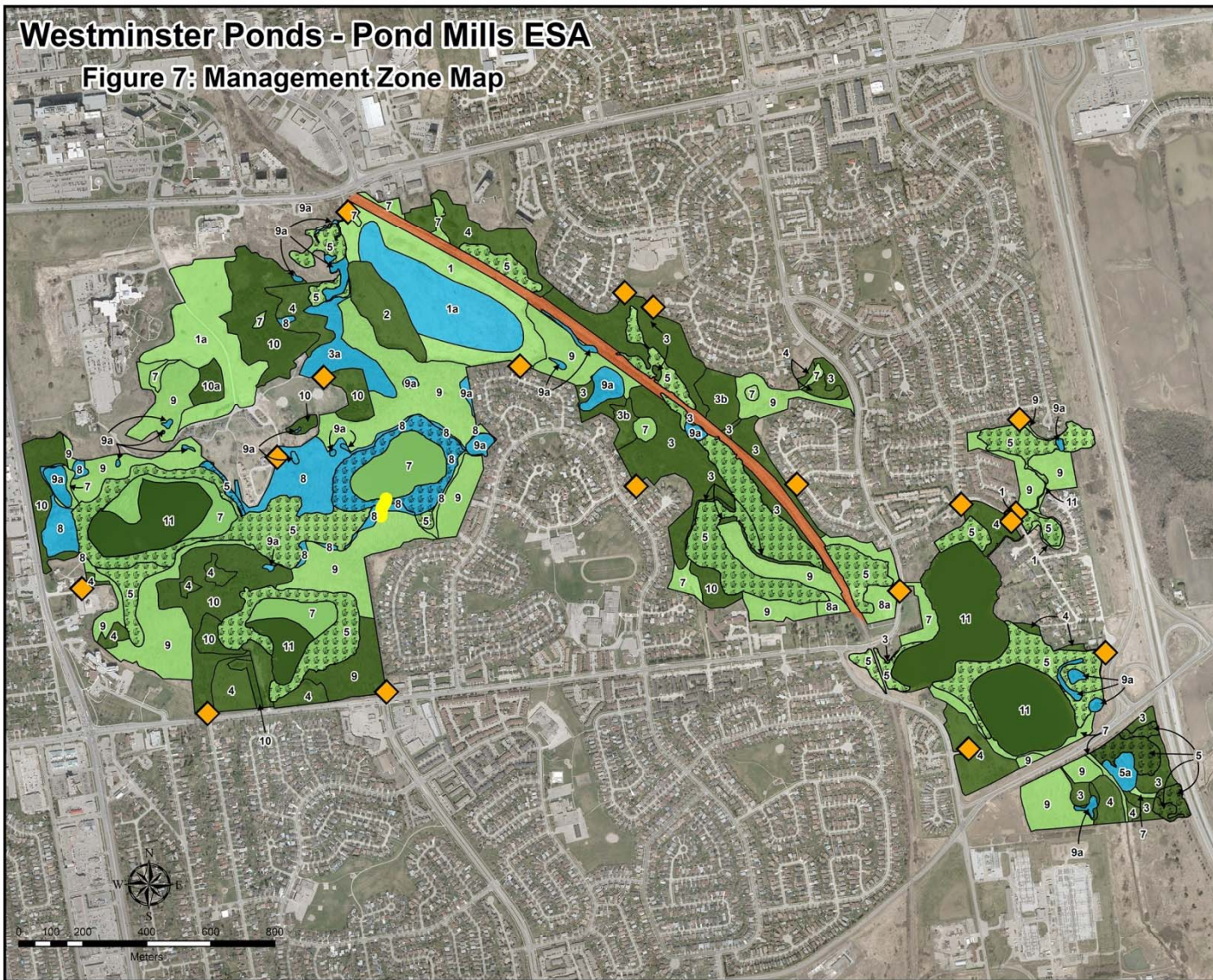
- COYO, Coyote
- Coyote (?) Burrow
- Burrow, Abandoned
- Fox Den Site
- Great Blue Heron Nest
- Beaver Dam

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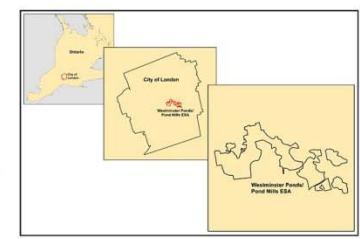
Figure 7: Management Zone Map



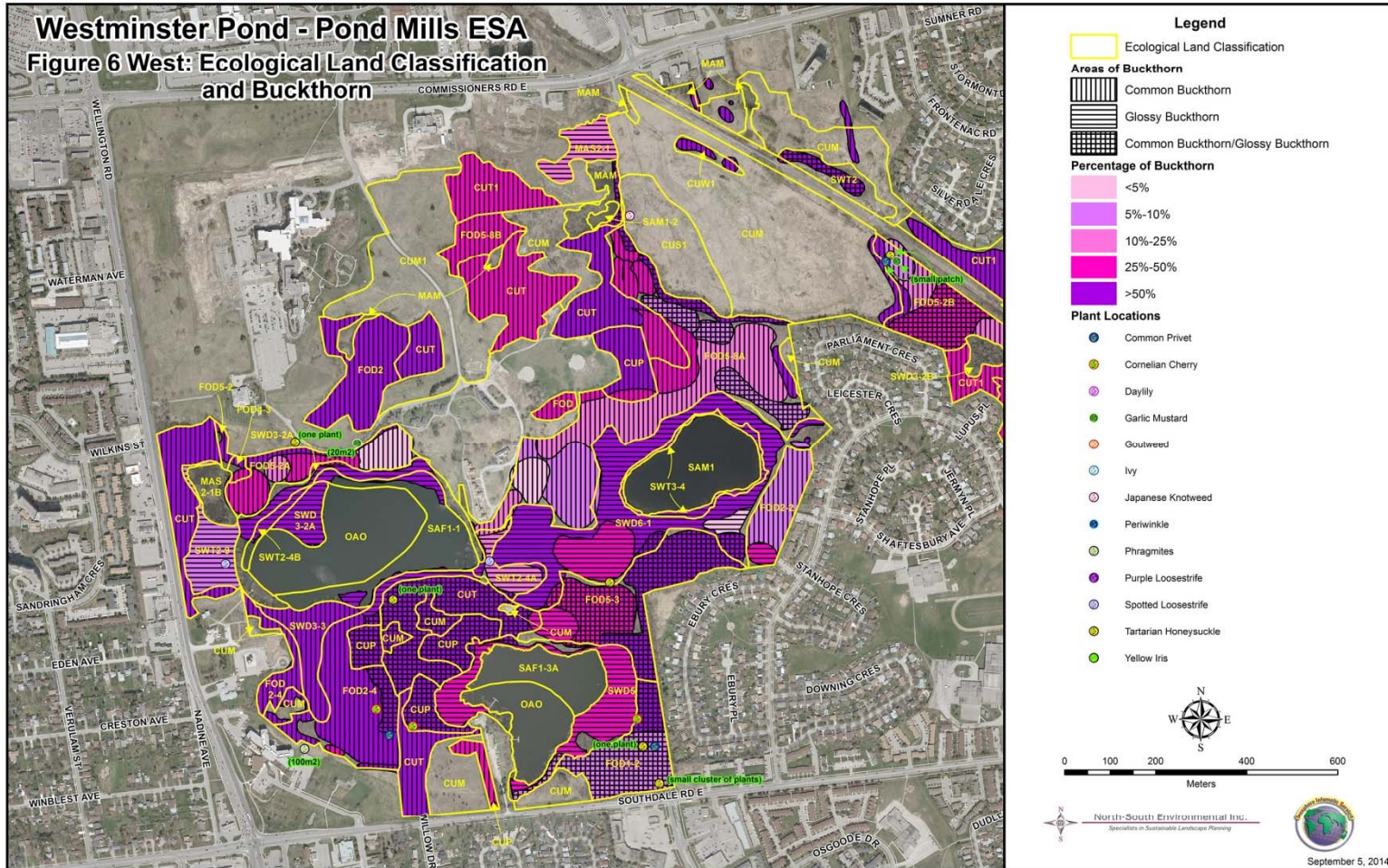
Legend

- Nature Reserve Zone
- Natural Area Zone 1
- Natural Area Zone 2
- PSW
- Zoning*
- Special Features Overlay
- Utility Overlay
- Access Zones

*Note:
Zoning numbers refer to polygons for which zoning criteria are discussed in the text



Non-native Invasive Species Management



Hydrology

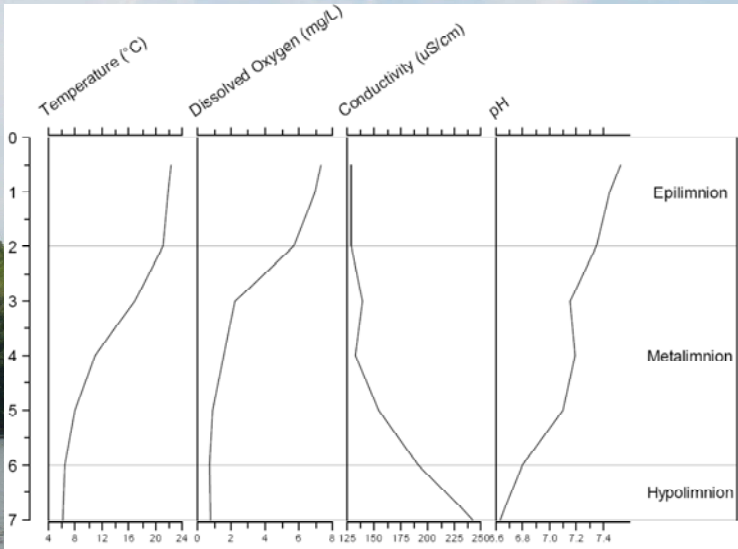


Water Quality and Aquatic Ecology

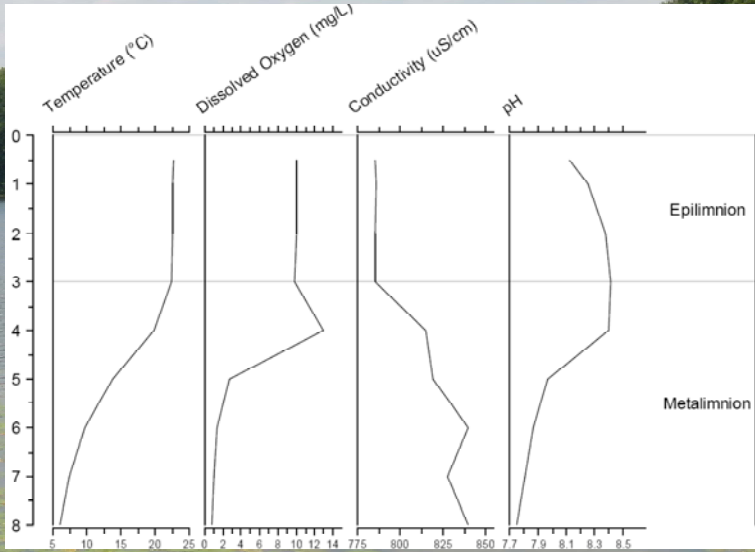


1. Characterization of the existing water quality and ecology of the ponds based on a single monitoring event at three of the ponds (South Pond, Saunders Pond and Spettigue Pond). Monitoring included physical, chemical and biological parameters including fisheries and fish habitat at the height of the growing season when potential for anoxia and internal phosphorus loading is maximized, and
2. An assessment of water quality changes over time at the three ponds based on:
 - Comparisons of measured water quality in 1980 and in 2013, and
 - a detailed paleolimnological analysis of Saunders Pond and a 'top-bottom' approach for Spettigue and South ponds to assess changes since pre-European settlement using diatoms as biological indicators.
3. Recommendations for future monitoring and management of the ponds.

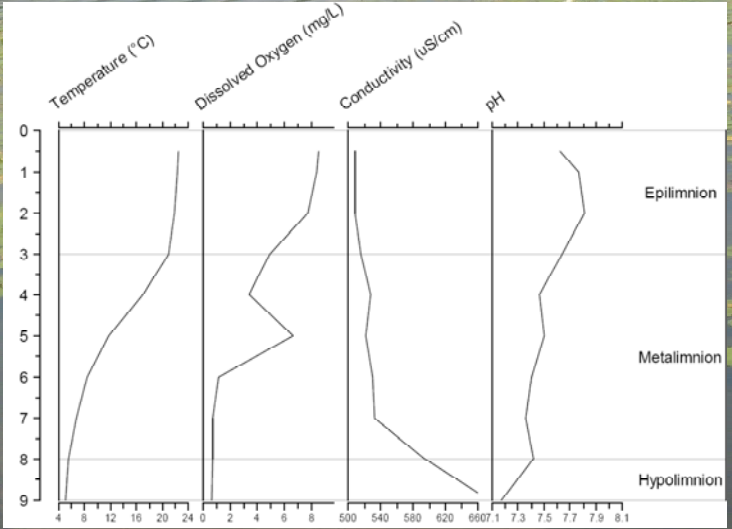
Temperature, dissolved oxygen, conductivity and pH profiles



Spettigue Pond



South Pond



Saunders Pond

Contributions from others like you

