



September 15, 2021

2651

Jayden Shelton  
Resources Information Technician  
Sasugeen Conservation  
1078 Bruce Road 12  
Formosa, ON N0G 1W0

Clinton Stredwick  
Municipal Planner  
Township of Southgate  
185667 Grey County Road 9  
Dundalk, ON N0C 1B0

Dear Mr. Shelton and Mr. Stredwick,

**Re: Part Lot 21, Concession 1, Former Township of Egremont, Grey County  
Environmental Impact Study**

Natural Resource Solutions Inc. was retained by Mrs. Barbara Crummer to prepare an update to an EIS for a single lot development at the above-noted address. NRSI previously prepared an EIS for the development of a single house in the south west corner of this property in 2007 for Mr. Sid Guy, the landowner at the time. The EIS was approved and the landowner proceeded with some clearing for the house, but it was not built.

Mrs. Crummer wishes to have a single lot severed at this same location, which she will purchase from the current landowner (Mr. Falladown) and then move forward with constructing a house. The remainder of the lands will continue to be owned by the current landowner (Mr. Falladown). This letter report provides an update to the previous EIS based on 2021 field work and updated background information.

A brief Terms of Reference for this EIS was provided by email to the Township of Southgate and the Saugeen Valley Conservation Authority (SVCA) for review and was approved in August 2021. It is understood that this EIS is to address the proposed severed lot as well as a building envelope on the retained lands. This EIS outlines the existing conditions, discusses the significance and sensitivity of the wetlands on-site and provides an analysis of potential impacts based on the development of a house on the proposed lot and the retained lands.

## **Introduction**

The subject property is approximately 34.5ha as shown on Map 1, and is primarily wetland, being part of the Letterbreen Bog provincially significant wetland. In the Schedules of the Grey County and Township of Southgate Official Plans and the Township Zoning Bylaw (2009), much of the property is shown as Wetland or Provincially Significant Wetland. A small area is excluded from the wetland at the southwest corner, while the uplands at the eastern end of the property are shown as agricultural (Grey County 2019, Township of Southgate 2009 and 2020).

The Official Plans of the County and the Township state that an EIS is required when development is proposed adjacent to provincially significant wetlands:

*“No development or site alteration shall be permitted on adjacent lands located within 120 metres of an identified Provincially Significant Wetland (PSW), unless the proposed method of avoiding or mitigating the potential impacts, of such development on the adjacent resource is satisfactory to the Township of Southgate and/or other responsible approval authority, as demonstrated through the preparation of an Environmental Impact Study (EIS), prepared in accordance with the terms of reference in Section 6.5.8 below.”* (Section 6.1.2 Township of Southgate).

The Saugeen Valley Conservation Authority (SVCA) regulates the whole of the subject property due to the presence of provincially significant wetlands and lands within the area of interference of the wetland (within 120m) as per Ontario Regulation 169-06 (2013). Development and alteration is generally not permitted within wetlands or the area of interference unless it can be shown that the proposal can proceed without impacting the wetland. The SVCA provides policies for when an EIS is required and what it should address in its Environmental Regulations and Planning Policies Manual (SVCA 2018).

## **Methods**

The natural features on the subject property were characterized through background information and field survey data. Background information was collected from the SVCA, Natural Heritage Information Centre (NHIC) online database and the wildlife atlases. Biologists visited the property on June 17 and July 14, 2021 to update the field data from 2007 which included site visits on May 17, June 26, August 31 and October 4, 2007. These visits focused on the area of the proposed house, the southwest corner of the property as well as the uplands at the eastern edge of the property as a building envelope for the retained lands. Vegetation communities were mapped and described, the wetland boundary was flagged and an inventory of wildlife and plants was undertaken, including an early morning visit on June 26 to document nesting birds.

## **Findings**

### Soils and Physiography

The property is relatively level with the wetland occupying the low lying lands over much of the property. The land rises to the east, where upland vegetation and agricultural lands are found. A slight rise is found in the south west corner, which may have been created by fill during road construction historically.

Soil investigations in the south west corner found a 20cm layer of sandy loam over 30+cm of sand with small gravel. A hand held dutch soil auger was used, which could not penetrate deeper than 50cm due to the presence of gravel. In 2017, the landowner subsequently dug a test pit, finding 30cm sandy loam over >1m sand and gravel. Within the wetland, organic soils were found extending over 1m in depth.

### Vascular Plants

A total of 81 species of vascular plants were observed in the area of the proposed house/building envelope and the adjacent wetland. A list of these species is appended to this letter. No significant species of plants are known from the background information, and none were observed during the field work.

### Vegetation Communities

The vegetation communities on the property were determined based on the Ecological Land Classification System for Southern Ontario (Lee et al 1998) and area described below and shown on Figure 2.

#### FOC4-1 Fresh-Moist White Cedar Coniferous Forest

A small area in the southwest corner of the property consists of upland coniferous forest dominated by white cedar and also tamarack. Trees were roughly 10 to 25cm in diameter, with dense regeneration of young cedars. The trees form a dense canopy, blocking out sunlight, resulting in very little groundcover. The previous landowner cleared an area for the approved house and septic, and this area is currently occupied by open meadow with herbaceous plants including avens, dandelion, enchanter's nightshade, tall buttercup and blue violet. A driveway entrance is present from Sideroad 10. Soils are sandy loam over sand and gravel, possibly fill.

In the southeast corner of the property, there is a rounded hill abutting the east property boundary. This area is forested with white cedar and balsam fire as well as tamarack. The easternmost part of this polygon was previously an open area as can be seen in older air photos (2005) and has been regenerating with tamarack and black cherry as well as a few other species such as white elm and hawthorn. Along the eastern edge, trees are widely spaced and range from 10-24 cm in diameter approximately. Groundcover is herbaceous plants such as smooth brome grass, Canada goldenrod, timothy and smooth bedstraw. A driveway entrance had been constructed here in the past and clear areas are present which could accommodate a building envelope.

#### SWC4-2 Tamarack Organic Coniferous Swamp

The majority of the wetland as was investigated for this project is a coniferous swamp dominated by tamarack and white cedar. Willow shrubs, red osier dogwood, winterberry, meadowsweet and bittersweet nightshade form a dense shrub layer. The wetland evaluation identified this area as tall shrub swamp, dominated by cedar and tamarack. Over the time since the wetland evaluation was completed, the cedar and tamarack have grown from shrub height to tree height and is now considered a coniferous swamp. The ground is saturated and spongy with mosses, sedges and ferns. Soils are deep organic, consisting of >100 cm of peat.

### Wildlife

Background data on wildlife species known from the study area has been compiled with the observations of wildlife observed on the subject property. Lists of wildlife species are appended to this letter.

A total of 35 species of birds were observed on the subject property between the two studies (2007 and 2021), with almost all species being observed in suitable habitat during the nesting period. Other wildlife species observed included raccoon, chipmunk, white-tailed deer, groundhog, skunk, midland painted turtle, green frog and leopard frog. The wetland data record indicates that the wetland provides habitat for fish spawning and rearing and furbearers such as raccoon, beaver, mink and fox. The wetland is locally significant for providing winter deer habitat.

A number of significant wildlife species including Species At Risk (SAR) are known from the data in the wildlife atlases including birds - Eastern Meadowlark, Bobolink, Bank

Swallow, Barn Swallow and Wood Thrush; turtles – snapping turtle and midland painted turtle; and mammals – bat species (*Myotis lucifugus*, *M. septentrionalis* and *Perimyotis subflavus*), woodland vole and American badger. The only significant wildlife species observed on-site is the midland painted turtle which is designated Special Concern in Canada (COSEWIC 2021). This species was observed in the open water body of Mud Lake. The wetland on-site provides suitable habitat for some of these significant species including the bats, midland painted turtle and snapping turtle.

### **Significance and Sensitivity**

The Letterbreen Bog wetland is provincially significant and will be sensitive to potential impacts of development. The wetland contains treed swamp, open water and marsh communities as well as an area of bog. Bog wetlands are uncommon in southern Ontario and the treed tamarack bog found in the wetland is rare in both southern Grey County and Southern Ontario. Bogs develop under specific conditions which create a peat-accumulating wetland, raised above the water table, which relies on precipitation only for water and nutrients. Bogs are characterized by acidic conditions and develop plant communities which are specialized for this habitat, such as sphagnum mosses.

The wetland has been disrupted by the construction of Highway 6 through the middle of it, as well as other side roads. Current land uses and potential development of the lands around the wetland are also a threat. Any activity which can disrupt the surface water and groundwater flows to the wetland may cause negative impacts to the wetland.

The wetland boundary in the southwest corner was flagged by NRSI in 2007 and was reviewed and updated in 2021. The boundary was surveyed by NRSI using a Trimble R10 GPS pole and is shown on Map 2. The wetland boundary in the southeast part of the property was investigated in 2007 and 2021, but was not flagged due to the separation distance available for a building envelope. The wetland boundary has not changed significantly since 2007 and is similar to that shown on mapping available from the MNRF (NHIC 2021).

### **Proposed Development**

The future landowner (Mrs. Crummer) wishes to sever a lot for the purpose of constructing a single house with associated driveway, well and septic system. In order to do this, it is necessary to show a suitable building envelope on the retained lands as well. Given the extent of wetland on this property, there are only two potential locations for a house; the proposed lot at the southwest corner of the property, adjacent to Highway 6, and the southeast corner of the property, off of Southgate Road 10. The previously approved layout from 2007 is satisfactory to Mrs. Crummer and she wishes to proceed with this design. This layout is shown on Map 4 and has not changed.

Map 5 shows the potential layout for a house and septic bed on the retained lands. This sketch utilizes the same house and septic footprint as the severed lot, for convenience. It is expected that any future development on this location may prepare a different concept, however there is ample room to accommodate this.

The layout of the proposed severed lot was prepared knowing the significance and sensitivity of the adjacent wetland, and the house was designed with as little impact as possible. It is modest in size (2,000 sq.ft.), no basement, limited clearing and grading for the driveway and lawn area, and includes an advanced septic treatment system which takes up very little area. The septic system is known as the Waterloo BioFilter System

which requires roughly an area of 20m x 14m and was approved for use in Ontario by the Building Materials Evaluation Commission in 1999. A brochure on this system is appended to this report.

### **Buffers**

Since the proposed development on the proposed lot and the retained lands each consist of a single house, with limited potential for impacts, a buffer of 15m from the wetland has been recommended.

### **Impact Analysis**

All features of the development on the proposed lot have been located within the development envelope. The house, driveway and well have been located more than 15m away from the wetland, with the septic system more than 20m from the wetland. There will be no direct impact to the wetlands on the property, and the 15-20m buffer will prevent or minimize any potential indirect impacts to the wetland.

On the proposed lot, the house, driveway, septic system and well will be located in the upland area, using the existing cleared opening and removing a few more trees. The septic system has been located on the west side of the lot, farther from the wetland. Some additional upland white cedar may need to be removed. The existing driveway entrance will be used.

On the retained lands, the house, driveway, well and septic system will be located in the upland area, making use of the existing open meadow area. A few additional trees may need to be cleared to allow for flexibility in the house design and location. This building site provides ample separation from the wetland boundary, well over 15m, and likely 30m depending on the future design. The existing driveway entrance will be used and may require some upgrades.

Potential indirect impacts due to the development of the proposed lot, or the retained lands could arise from the following:

- erosion of soils from the site during construction
- septic system impacts
- human induced impacts

The following are recommended measures to mitigate the possibility of the indirect impacts:

- To avoid impacts to nesting birds and wildlife, any tree cutting should be scheduled outside of the peak nesting season (late May to early July) and preferably should occur in the fall-winter to protect wildlife,
- A sediment control fence should be installed at the limit of the work area throughout the construction period, until bare soils have been stabilized, to prevent sediment-laden runoff from entering the wetland during rain events,
- On the proposed lot, the septic system has been located as far away as possible from the wetland, (approximately 20m from the wetland boundary) on the west side of the lot. The retained lands have ample room for a septic bed while providing a setback to the wetland.
- Landscaped areas should be minimized and not encroach into the natural areas. Construction of pools, patios, decks and sheds should be within the development envelope.

- Use of lawn and garden chemicals should be reduced or eliminated,
- Any landscape plantings should make use of native species suitable for the site. Care should be taken to avoid aggressive non-native species (such as Norway maple, lily-of-the-valley, periwinkle, goutweed, etc.) which can spread into natural areas and out-compete native flora,
- Grass clippings, yard waste and rubbish should not be dumped in the natural areas.

### Summary

The subject property is dominated by wetlands of the Letterbreen Bog provincially significant wetland. The severance of a single lot has been proposed and this EIS provides an update to the feasibility and potential impacts of developing a single house on this lot, as well as on the retained portion of the lands. The proposed location of the lot and its layout is the most feasible based on accessibility. A development envelope has been recommended using a 15m buffer from the wetland boundary. The proposed house, driveway, well and septic system has been designed to minimize potential impacts to the wetland by limiting clearing, grading and building and septic size. The retained lands have a suitable building envelope with ample space for a house and amenities while providing a buffer to the wetland. Recommendations are provided to assist in avoiding any potential indirect impacts which could arise during construction and residency.

I trust that this is satisfactory. If you have any questions, please do not hesitate to contact me.

Sincerely,  
Natural Resource Solutions Inc.



M. Elaine Gosnell, B.Sc., P. Biol.  
Senior Wetland and Terrestrial Biologist

### References

Grey County. 2019. County of Grey Official Plan Schedule A Land Use Types Map 2.

Saugeen Valley Conservation Authority. 2013. O. Reg. 169/06: Saugeen Valley Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.

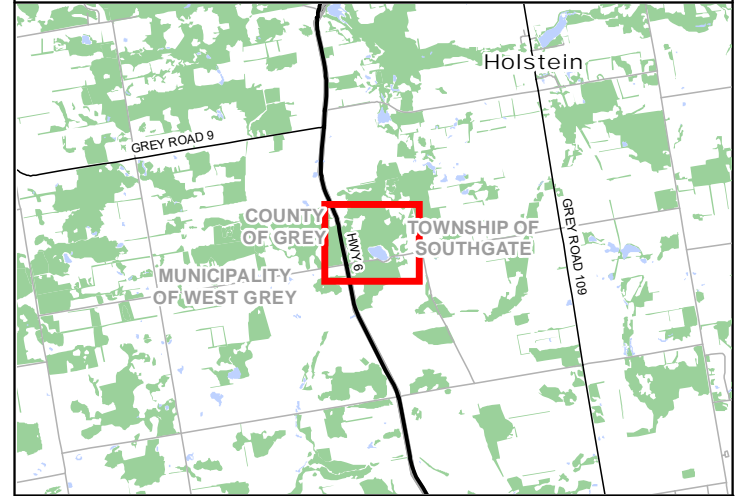
Saugeen Valley Conservation Authority. 2018. Environmental Planning and Regulations Policies Manual. May 16, 2017, Amended October 16, 2018.

Township of Southgate. 2009. Township of Southgate. The amalgamated Townships of Proton and Egremont and the Village of Dundalk Official Plan.








Township of Southgate. 2020. Zoning By-law 19-2002. As amended. Office Consolidation June 2020.

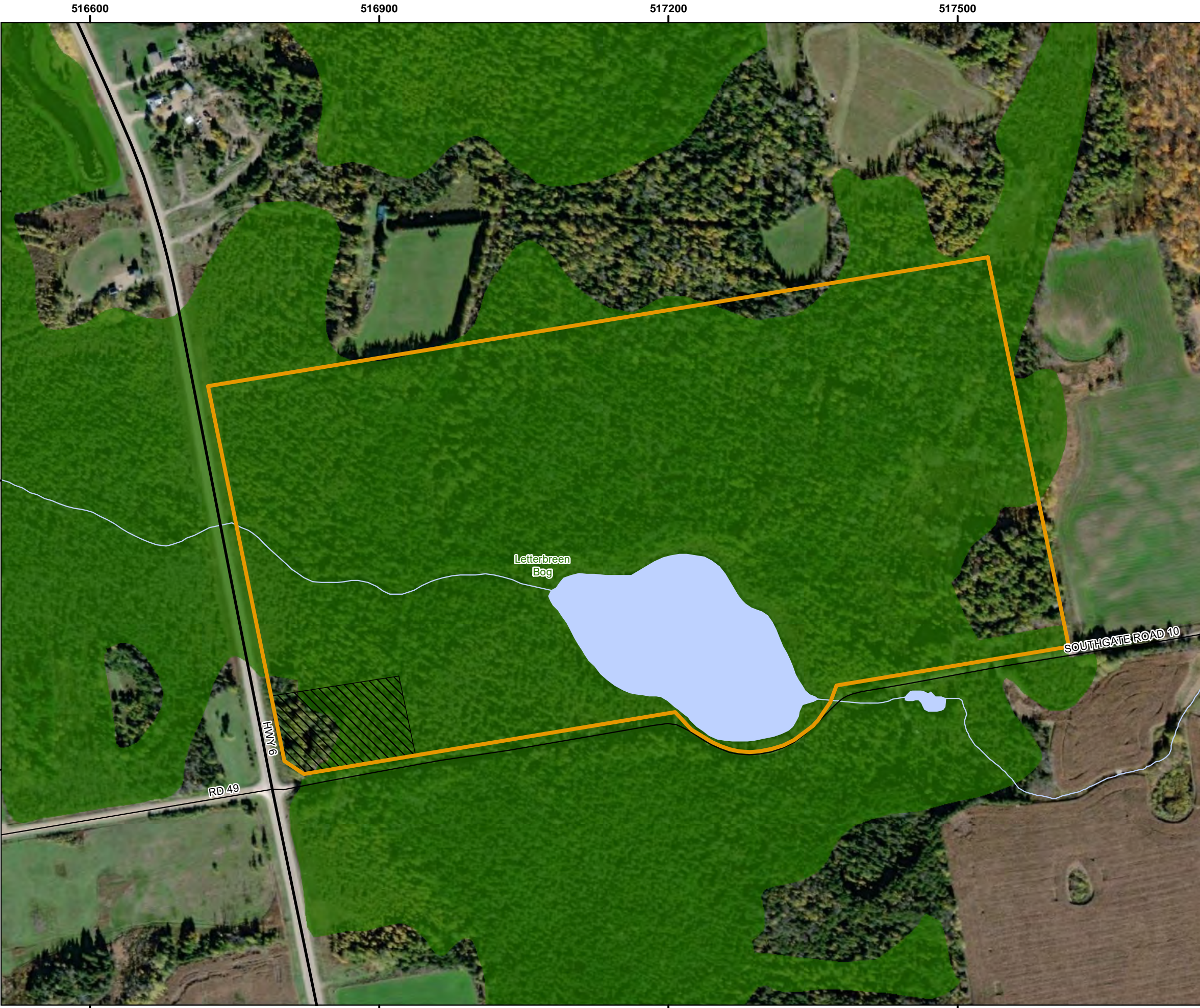


# Falladown Severance EIS Subject Property



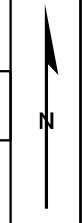
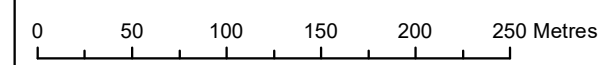
### Legend

-  Subject Property Boundary
-  Proposed Severance
-  Highway
-  Secondary Road
-  Permanent Watercourse
-  Water Body
-  Provincially Significant Wetland (PSW)



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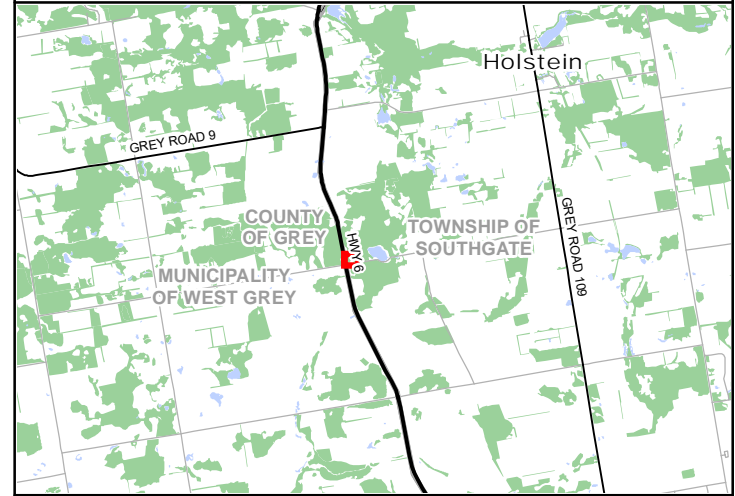
Project: xxxx Date: July 16, 2021	NAD83 - UTM Zone 17 Size: 11x17" 1:4,000
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516800 516840 516880 516920

# Falldown Severance EIS Existing Conditions - Proposed Lot



4875800  
4875760  
4875720  
4875680

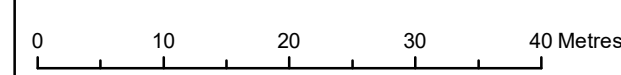
4875800  
4875760  
4875720  
4875680

- Legend**
- Subject Property Boundary
  - Proposed Severance
  - Wetland Boundary
  - Wetland Boundary Buffer (15 m)
  - Ecological Land Classification (ELC)
    - (CUM1) Old Field Cultural Meadow
    - (FOC4-1) Fresh-Moist White Cedar Coniferous Forest
    - (SWC4-2) Tamarack Organic Coniferous Swamp Type



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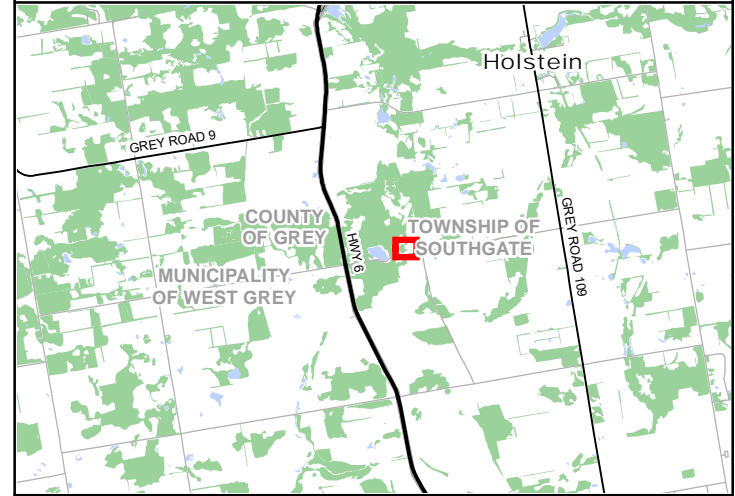
Project: 2651 Date: September 23, 2021	NAD83 - UTM Zone 17 Size: 11x17" 1:600
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**Map 3**  
**Falladown Severance EIS**  
**Existing Conditions - Retained Lands**



- Legend**
- Subject Property Boundary
  - Wetland Boundary
  - Wetland Boundary Buffer (15 m)
  - Ecological Land Classification (ELC)
- (CUM1) Old Field Cultural Meadow  
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type  
(H) Hedgerow  
(SWC4-2) Tamarack Organic Coniferous Swamp

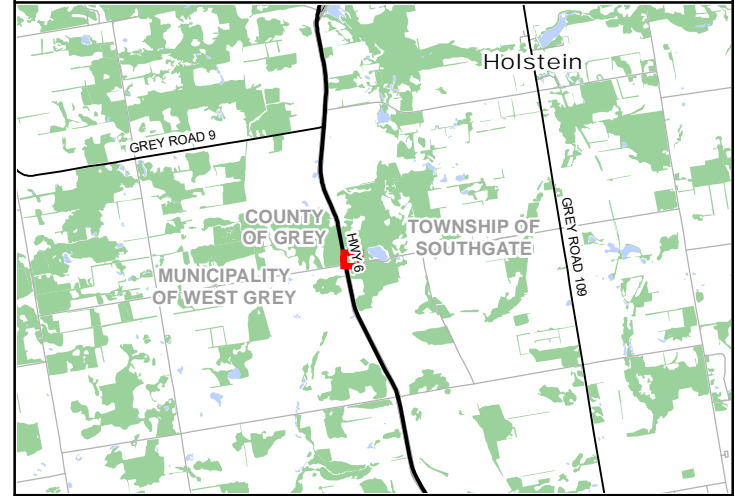


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Project: 2651 Date: September 23, 2021	NAD83 - UTM Zone 17 Size: 11x17" 1:900



# Falladown Severance EIS Proposed Development



- Legend**
- Subject Property Boundary
  - Proposed Severance
  - Proposed Building
  - Wetland Boundary
  - Wetland Boundary Buffer (15 m)
  - Ecological Land Classification (ELC)
    - (CUM1) Old Field Cultural Meadow
    - (FOC4-1) Fresh-Moist White Cedar Coniferous Forest
    - (SWC4-2) Tamarack Organic Coniferous Swamp Type



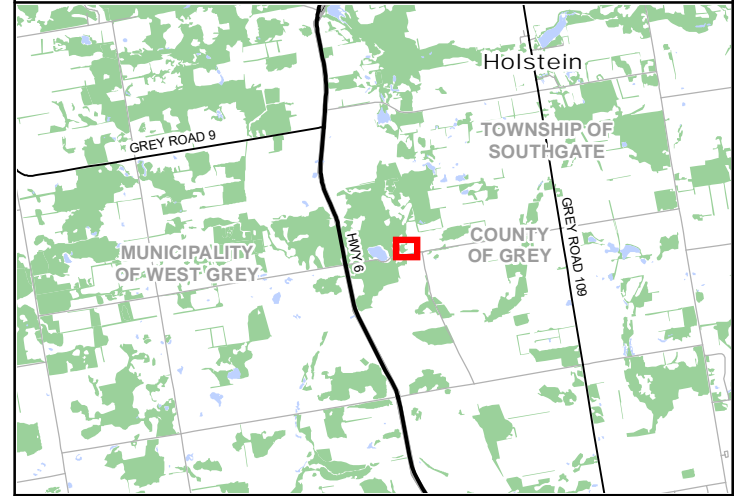
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Project: 2651 Date: October 7, 2021	NAD83 - UTM Zone 17 Size: 11x17" 1:700	



517500 517560 517620 517680

# Falladown Severance EIS Proposed Development



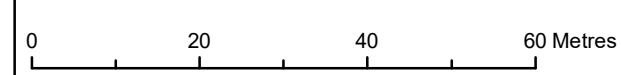
4876000  
4875940  
4875880  
4875820

- Legend**
- Subject Property Boundary
  - Proposed Building
  - Wetland Boundary
  - Wetland Boundary Buffer (15 m)
  - Ecological Land Classification (ELC)
  - (CUM1) Old Field Cultural Meadow
  - (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
  - (H) Hedgerow
  - (SWC4-2) Tamarack Organic Coniferous Swamp



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Project: 2651 Date: October 8, 2021	NAD83 - UTM Zone 17 Size: 11x17" 1:900
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517500 517560 517620 517680



Plant Species Reported from the Study Area - Falladown EIS (Project #2651)

Scientific Name	Common Name	CC Oldham et al. 1998	CW Oldham et al. 1998	SRANK MNRFP 2020a	SARO MNRFP 2020a	COSEWIC Government of Canada	SARA Government of Canada	SARA Schedule	Grey County OSFN 2010	iNaturalist iNaturalist 2021	NRSI 2007	NRSI Total Observed	NRSI 2021 Upland	NRSI 2021 Wetland
<b>Pteridophytes</b>	<b>Ferns &amp; Allies</b>													
<b>Dennstaedtiaceae</b>	<b>Bracken Fern Family</b>													
<i>Pteridium aquilinum</i>	Bracken Fern	2	3	S5								X	X	
<b>Dryopteridaceae</b>	<b>Wood Fern Family</b>													
<i>Onoclea sensibilis</i>	Sensitive Fern	4	-3	S5							X	X	X	X
<b>Equisetaceae</b>	<b>Horsetail Family</b>													
<i>Equisetum hyemale</i>	Common Scouring-rush	2	0	S5							X	X		
<i>Equisetum pratense</i>	Meadow Horsetail	8	-3	S5								X		X
<b>Thelypteridaceae</b>	<b>Beech Fern Family</b>													
<i>Thelypteris palustris</i>	Marsh Fern	5	-3	S5							X	X		
<b>Gymnosperms</b>	<b>Conifers</b>													
<b>Cupressaceae</b>	<b>Cypress Family</b>													
<i>Thuja occidentalis</i>	Eastern White Cedar	4	-3	S5							X	X	X	X
<b>Pinaceae</b>	<b>Pine Family</b>													
<i>Abies balsamea</i>	Balsam Fir	5	-3	S5							X	X	X	X
<i>Larix laricina</i>	Tamarack	7	-3	S5							X	X	X	X
<i>Picea mariana</i>	Black Spruce	8	-3	S5								X		X
<b>Dicotyledons</b>	<b>Dicots</b>													
<b>Aceraceae</b>	<b>Maple Family</b>													
<i>Acer rubrum</i>	Red Maple	4	0	S5							X	X		
<i>Acer saccharinum</i>	Silver Maple	5	-3	S5								X	X	X
<b>Apiaceae</b>	<b>Carrot or Parsley Family</b>													
<i>Cicuta bulbifera</i>	Bulb-bearing Water-hemlock	5	-5	S5								X		
<i>Daucus carota</i>	Wild Carrot	0	5	SE5							X	X	X	
<b>Aquifoliaceae</b>	<b>Holly Family</b>													
<i>Ilex verticillata</i>	Common Winterberry	5	-3	S5							X	X		
<b>Asclepiadaceae</b>	<b>Milkweed Family</b>													
<i>Asclepias syriaca</i>	Common Milkweed	0	5	S5							X	X	X	
<b>Asteraceae</b>	<b>Composite or Aster Family</b>													
<i>Antennaria neglecta</i>	Field Pussytoes	3	5	S5							X	X		
<i>Arctium minus</i>	Common Burdock	0	3	SE5							X	X		
<i>Carduus acanthoides</i>	Spiny Plumeless Thistle	0	5	SE5								X	X	
<i>Cirsium vulgare</i>	Bull Thistle	0	3	SE5							X	X		
<i>Erigeron annuus</i>	Annual Fleabane	0	3	S5								X	X	
<i>Erigeron canadensis</i>	Canada Horseweed	0	3	S5							X	X		
<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	1	-3	S5						X				
<i>Eupatorium perfoliatum</i>	Common Boneset	2	-3	S5							X	X		
<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	3	-5	S5							X	X		X
<i>Leucanthemum vulgare</i>	Oxeye Daisy	0	5	SE5							X	X	X	
<i>Onopordum acanthium ssp. acanthium</i>	Scotch Thistle	0	5	SE4								X	X	
<i>Rudbeckia hirta</i>	Black-eyed Susan	0	3	S5								X	X	
<i>Solidago canadensis</i>	Canada Goldenrod	1	3	S5							X	X	X	
<i>Solidago patula</i>	Round-leaved Goldenrod	8	-5	S4							X	X		
<i>Solidago uliginosa</i>	Bog Goldenrod	9	-5	S5						X				
<i>Taraxacum officinale</i>	Common Dandelion	0	3	SE5							X	X	X	
<i>Tragopogon pratensis</i>	Meadow Goat's-beard	0	5	SE5							X	X		
<i>Tussilago farfara</i>	Colt's-foot	0	3	SE5								X	X	
<b>Balsaminaceae</b>	<b>Touch-me-not Family</b>													
<i>Impatiens capensis</i>	Spotted Jewelweed	4	-3	S5								X		X
<i>Impatiens pallida</i>	Pale Jewelweed	7	-3	S4							X	X		
<b>Campanulaceae</b>	<b>Bellflower Family</b>													
<i>Campanula aparinoides</i>	Marsh Bellflower	7	-5	S5										
<b>Caprifoliaceae</b>	<b>Honeysuckle Family</b>													
<i>Viburnum lentago</i>	Nannyberry	4	0	S5								X		X
<b>Caryophyllaceae</b>	<b>Pink Family</b>													
<i>Silene vulgaris</i>	Bladder Campion	0	5	SE5							X	X	X	
<b>Clusiaceae</b>	<b>St. John's-wort Family</b>													
<i>Hypericum perforatum</i>	Common St. John's-wort	0	5	SE5								X	X	





<i>Alisma triviale</i>	Northern Water-plantain	1	-5	S5						X				
<b>Cyperaceae</b>	<b>Sedge Family</b>													
<i>Carex crinita</i>	Fringed Sedge	6	-5	S5						X				
<i>Carex flava</i>	Yellow Sedge	5	-5	S5						X		X	X	X
<i>Carex gracillima</i>	Graceful Sedge	4	3	S5								X	X	
<i>Carex intumescens</i>	Bladder Sedge	6	-3	S5								X		X
<i>Carex pseudocyperus</i>	Cyperus-like Sedge	6	-5	S5						X				
<i>Carex stricta</i>	Tussock Sedge	4	-5	S5						X	X	X		X
<i>Scirpus atrovirens</i>	Dark-green Bulrush	3	-5	S5								X		X
<b>Iridaceae</b>	<b>Iris Family</b>													
<i>Iris versicolor</i>	Harlequin Blue Flag	5	-5	S5							X	X		
<b>Liliaceae</b>	<b>Lily Family</b>													
<i>Allium tricoccum</i>	Wild Leek	7	3	S4						X				
<b>Orchidaceae</b>	<b>Orchid Family</b>													
<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper	5	0	S5								X	X	
<i>Epipactis helleborine</i>	Eastern Helleborine	0	3	SE5							X	X	X	
<b>Poaceae</b>	<b>Grass Family</b>													
<i>Bromus inermis</i>	Smooth Brome	0	5	SE5								X	X	
<i>Phalaris arundinacea</i>	Reed Canary Grass	0	-3	S5							X	X		
<i>Phleum pratense</i>	Common Timothy	0	3	SE5							X	X	X	
<b>Typhaceae</b>	<b>Cattail Family</b>													
<i>Typha angustifolia</i>	Narrow-leaved Cattail	0	-5	SE5								X		X
<i>Typha latifolia</i>	Broad-leaved Cattail	1	-5	S5							X	X		
<b>Total</b>										<b>20</b>	<b>52</b>	<b>81</b>	<b>43</b>	<b>23</b>

\*NHIC Atlas Squares: Square #

**References**

Oldham, M.J., W.D. Bakowsky and D.A. Sutherland. 1995. Floristic quality assessment for southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.  
 Oldham, M.J., W.D. Bakowsky and D.A. Sutherland. 1995. Floristic quality assessment for southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.  
 Ministry of Natural Resources and Forestry (MNRF). 2020a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2020-01-17. Available: <https://www.ontario.ca/page/get-natural-heritage-information>  
 Government of Canada. 2020. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2020-11-04. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>  
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 iNaturalist (2021). iNaturalist Observations. Available from: <https://bit.ly/3z9YbGI> [17 August 2021].



Bird Species Reported from the Study Area - Falladown EIS (Project #2651)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	NRSI 2007	NRSI 2021	OBBA*
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021			Cadman et al. 2007
<b>Anatidae</b>	<b>Ducks, Geese &amp; Swans</b>								
<i>Aix sponsa</i>	Wood Duck	S5B, S3N							CO
<i>Anas platyrhynchos</i>	Mallard	S5							CO
<i>Branta canadensis</i>	Canada Goose	S5							CO
<i>Lophodytes cucullatus</i>	Hooded Merganser	S5							PO
<b>Phasianidae</b>	<b>Partridges, Grouse &amp; Turkeys</b>								
<i>Bonasa umbellus</i>	Ruffed Grouse	S5							CO
<i>Meleagris gallopavo</i>	Wild Turkey	S5							PO
<b>Podicipediformes</b>	<b>Grebes</b>								
<i>Podilymbus podiceps</i>	Pied-billed Grebe	S4B, S2N							PO
<b>Columbidae</b>	<b>Pigeons &amp; Doves</b>								
<i>Columba livia</i>	Rock Pigeon	SNA							CO
<i>Zenaida macroura</i>	Mourning Dove	S5					X	PO	CO
<b>Cuculiformes</b>	<b>Cuckoos &amp; Anis</b>								
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	S4B							PO
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	S4S5B							PO
<b>Trochilidae</b>	<b>Hummingbirds</b>								
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	S5B							PR
<b>Rallidae</b>	<b>Rails, Gallinules &amp; Coots</b>								
<i>Rallus limicola</i>	Virginia Rail	S4S5B							PO
<b>Charadriidae</b>	<b>Plovers &amp; Lapwings</b>								
<i>Charadrius vociferus</i>	Killdeer	S4B							CO
<b>Scolopacidae</b>	<b>Sandpipers &amp; Allies</b>								
<i>Actitis macularia</i>	Spotted Sandpiper	S5B							PO
<i>Bartramia longicauda</i>	Upland Sandpiper	S2B							PR
<i>Scolopax minor</i>	American Woodcock	S4B							PO
<b>Ardeidae</b>	<b>Hérons &amp; Bitterns</b>								
<i>Ardea herodias</i>	Great Blue Heron	S4							PO
<i>Butorides virescens</i>	Green Heron	S4B						PO	PO
<b>Cathartidae</b>	<b>Vultures</b>								
<i>Cathartes aura</i>	Turkey Vulture	S5B, S3N							CO
<b>Pandionidae</b>	<b>Osprey</b>								
<i>Pandion haliaetus</i>	Osprey	S5B							PR
<b>Accipitridae</b>	<b>Hawks, Kites, Eagles &amp; Allies</b>								
<i>Buteo jamaicensis</i>	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule	PO		CO
<i>Circus hudsonius</i>	Northern Harrier	S5B, S4N	NAR	NAR	NS	No schedule	PO		PR
<b>Strigidae</b>	<b>Typical Owls</b>								
<i>Bubo virginianus</i>	Great Horned Owl	S4							PO
<i>Megascops asio</i>	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule			PR
<b>Alcedinidae</b>	<b>Kingfishers</b>								
<i>Megaceryle alcyon</i>	Belted Kingfisher	S5B, S4N					X		CO
<b>Picidae</b>	<b>Woodpeckers</b>								
<i>Colaptes auratus</i>	Northern Flicker	S5						PO	CO
<i>Dryobates pubescens</i>	Downy Woodpecker	S5						PO	PO
<i>Dryobates villosus</i>	Hairy Woodpecker	S5							PO
<i>Dryocopus pileatus</i>	Pileated Woodpecker	S5						PO	CO
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	S5							PO
<b>Falconidae</b>	<b>Caracaras &amp; Falcons</b>								
<i>Falco sparverius</i>	American Kestrel	S4							CO
<b>Tyrannidae</b>	<b>Tyrant Flycatchers</b>								
<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1			PR
<i>Empidonax alnorum</i>	Alder Flycatcher	S5B							PR
<i>Empidonax minimus</i>	Least Flycatcher	S5B							PR
<i>Empidonax traillii</i>	Willow Flycatcher	S4B							PO

<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher	SNA					PO		
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	S5B							PR
<i>Sayornis phoebe</i>	Eastern Phoebe	S5B							CO
<i>Tyrannus tyrannus</i>	Eastern Kingbird	S4B					PO	PO	CO
<b>Vireonidae</b>	<b>Vireos</b>								
<i>Vireo gilvus</i>	Warbling Vireo	S5B							CO
<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B							CO
<b>Corvidae</b>	<b>Crows &amp; Jays</b>								
<i>Corvus brachyrhynchos</i>	American Crow	S5					PO		CO
<i>Corvus corax</i>	Common Raven	S5							PR
<i>Cyanocitta cristata</i>	Blue Jay	S5					PO	PO	CO
<b>Alaudidae</b>	<b>Larks</b>								
<i>Eremophila alpestris</i>	Horned Lark	S4							CO
<b>Hirundinidae</b>	<b>Swallows</b>								
<i>Hirundo rustica</i>	Barn Swallow	S4B	THR	SC	T	Schedule 1	PO		CO
<i>Riparia riparia</i>	Bank Swallow	S4B	THR	T	T	Schedule 1			CO
<i>Tachycineta bicolor</i>	Tree Swallow	S4S5B							CO
<b>Paridae</b>	<b>Chickadees &amp; Titmice</b>								
<i>Poecile atricapillus</i>	Black-capped Chickadee	S5						PO	CO
<b>Sittidae</b>	<b>Nuthatches</b>								
<i>Sitta canadensis</i>	Red-breasted Nuthatch	S5					PO	PO	PO
<i>Sitta carolinensis</i>	White-breasted Nuthatch	S5					PO	PO	CO
<b>Certhiidae</b>	<b>Creepers</b>								
<i>Certhia americana</i>	Brown Creeper	S5							CO
<b>Troglodytidae</b>	<b>Wrens</b>								
<i>Troglodytes aedon</i>	House Wren	S5B					X		CO
<i>Troglodytes hiemalis</i>	Winter Wren	S5B, S4N							CO
<b>Turdidae</b>	<b>Thrushes</b>								
<i>Catharus fuscescens</i>	Veery	S5B							PR
<i>Hylocichla mustelina</i>	Wood Thrush	S4B	SC	T	T	Schedule 1			PR
<i>Sialia sialis</i>	Eastern Bluebird	S5B, S4N	NAR	NAR	NS	No schedule			CO
<i>Turdus migratorius</i>	American Robin	S5					PO	PO	CO
<b>Mimidae</b>	<b>Mockingbirds, Thrashers &amp; Allies</b>								
<i>Dumetella carolinensis</i>	Gray Catbird	S5B, S3N					PO	PO	CO
<i>Toxostoma rufum</i>	Brown Thrasher	S4B							CO
<b>Sturnidae</b>	<b>Starlings</b>								
<i>Sturnus vulgaris</i>	European Starling	SNA							CO
<b>Bombycillidae</b>	<b>Waxwings</b>								
<i>Bombycilla cedrorum</i>	Cedar Waxwing	S5						PO	CO
<b>Passeridae</b>	<b>Old World Sparrows</b>								
<i>Passer domesticus</i>	House Sparrow	SNA							CO
<b>Fringillidae</b>	<b>Finches &amp; Allies</b>								
<i>Haemorhous mexicanus</i>	House Finch	SNA							CO
<i>Haemorhous purpureus</i>	Purple Finch	S5							PR
<i>Spinus tristis</i>	American Goldfinch	S5					PO	PO	PR
<b>Emberizidae</b>	<b>New World Sparrows &amp; Allies</b>								
<i>Melospiza georgiana</i>	Swamp Sparrow	S5B, S4N					PO	PO	PR
<i>Melospiza melodia</i>	Song Sparrow	S5					PR		PR
<i>Passerculus sandwichensis</i>	Savannah Sparrow	S5B, S3N					PO		PR
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	S4B, S3N							PR
<i>Spizella passerina</i>	Chipping Sparrow	S5B, S3N					PO		CO
<i>Spizella pusilla</i>	Field Sparrow	S4B, S3N							PR
<i>Zonotrichia albicollis</i>	White-throated Sparrow	S5					PO	PO	CO
<b>Icteridae</b>	<b>Troupials &amp; Allies</b>								
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	S5					PO	PO	CO
<i>Dolichonyx oryzivorus</i>	Bobolink	S4B	THR	T	T	Schedule 1			PR
<i>Icterus galbula</i>	Baltimore Oriole	S4B							CO
<i>Molothrus ater</i>	Brown-headed Cowbird	S5					PO		CO
<i>Quiscalus quiscula</i>	Common Grackle	S5							CO
<i>Sturnella magna</i>	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1	PO		CO

<b>Parulidae</b>	<b>Wood Warblers</b>								
<i>Geothlypis philadelphia</i>	Mourning Warbler	S5B							PR
<i>Geothlypis trichas</i>	Common Yellowthroat	S5B, S3N					CO	PO	CO
<i>Leiostyris alpestris</i>	Nashville Warbler	S5B							PR
<i>Mniotilta varia</i>	Black-and-white Warbler	S5B						PO	PR
<i>Parkesia noveboracensis</i>	Northern Waterthrush	S5B							PO
<i>Seiurus aurocapilla</i>	Ovenbird	S5B							PR
<i>Setophaga coronata</i>	Yellow-rumped Warbler	S5B, S4N					PO		PR
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	S5B							PO
<i>Setophaga petechia</i>	Yellow Warbler	S5B					PO		CO
<i>Setophaga ruticilla</i>	American Redstart	S5B							CO
<i>Setophaga virens</i>	Black-throated Green Warbler	S5B							PR
<b>Cardinalidae</b>	<b>Cardinals, Grosbeaks &amp; Allies</b>								
<i>Cardinalis cardinalis</i>	Northern Cardinal	S5					PO	PO	CO
<i>Passerina cyanea</i>	Indigo Bunting	S5B					PO	PO	CO
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	S5B							CO
<i>Piranga olivacea</i>	Scarlet Tanager	S5B							PR
<b>Total</b>							<b>28</b>	<b>21</b>	<b>94</b>

\*OBBA Atlas Squares: Square # 17NJ17

\*\*No NHIC Atlas data

#### **References**

Ministry of Natural Resources and Forestry (MNR). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: <https://www.ontario.ca/page/get-natural-heritage-information>  
 Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>



Mammal Species Reported from the Study Area - Falladown EIS (Project #2651)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Mammal Atlas	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Dobbyn 1994	NRSI Results from 2021
<b>Didelphimorphia</b>	<b>Opossums</b>							
<i>Didelphis virginiana</i>	Virginia Opossum	S4					X	
<b>Eulipotyphla</b>	<b>Shrews, Moles, Hedgehogs, and Allies</b>							
<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	S5					X	
<i>Condylura cristata</i>	Star-nosed Mole	S5					X	
<i>Parascalops breweri</i>	Hairy-tailed Mole	S4					X	
<i>Sorex cinereus</i>	Masked Shrew	S5					X	
<i>Sorex fumeus</i>	Smoky Shrew	S5					X	
<i>Sorex palustris</i>	Water Shrew	S5					X	
<b>Chiroptera</b>	<b>Bats</b>							
<i>Eptesicus fuscus</i>	Big Brown Bat	S4					X	
<i>Lasiorycteris noctivagans</i>	Silver-haired Bat	S4					X	
<i>Lasiurus borealis</i>	Eastern Red Bat	S4					X	
<i>Lasiurus cinereus</i>	Hoary Bat	S4					X	
<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END				X	
<i>Myotis lucifugus</i>	Little Brown Myotis	S3	END	E	E	Schedule 1	X	
<i>Myotis septentrionalis</i>	Northern Myotis	S3	END	E	E	Schedule 1	X	
<i>Perimyotis subflavus</i>	Tri-colored Bat	S3?	END	E	E	Schedule 1	X	
<b>Lagomorpha</b>	<b>Rabbits and Hares</b>							
<i>Lepus americanus</i>	Snowshoe Hare	S5					X	
<i>Lepus europaeus</i>	European Hare	SNA					X	
<i>Sylvilagus floridanus</i>	Eastern Cottontail	S5					X	
<b>Rodentia</b>	<b>Rodents</b>							
<i>Castor canadensis</i>	Beaver	S5					X	
<i>Erethizon dorsatum</i>	Porcupine	S5					X	
<i>Glaucomys sabrinus</i>	Northern Flying Squirrel	S5					X	
<i>Marmota monax</i>	Woodchuck	S5					X	
<i>Microtus pennsylvanicus</i>	Meadow Vole	S5					X	
<i>Microtus pinetorum</i>	Woodland Vole	S3?	SC	SC	SC	Schedule 1	X	
<i>Mus musculus</i>	House Mouse	SNA					X	
<i>Napaeozapus insignis</i>	Woodland Jumping Mouse	S5					X	
<i>Ondatra zibethicus</i>	Muskrat	S5					X	
<i>Peromyscus leucopus</i>	White-footed Mouse	S5					X	
<i>Peromyscus maniculatus</i>	Deer Mouse	S5					X	
<i>Rattus norvegicus</i>	Norway Rat	SNA					X	
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel	S5					X	
<i>Synaptomys cooperi</i>	Southern Bog Lemming	S4					X	
<i>Tamias striatus</i>	Eastern Chipmunk	S5					X	X
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	S5					X	X
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	S5					X	
<b>Canidae</b>	<b>Canines</b>							
<i>Canis latrans</i>	Coyote	S5					X	
<i>Vulpes vulpes</i>	Red Fox	S5					X	
<b>Felidae</b>	<b>Felines</b>							
<i>Lynx rufus</i>	Bobcat	S4					X	
<b>Mephitidae</b>	<b>Skunks and Stink Badgers</b>							
<i>Mephitis mephitis</i>	Striped Skunk	S5					X	
<b>Mustelidae</b>	<b>Weasels and Allies</b>							
<i>Mustela erminea</i>	Ermine	S5					X	
<i>Mustela frenata</i>	Long-tailed Weasel	S4					X	
<i>Neovison vison</i>	American Mink	S4					X	
<i>Taxidea taxus jacksoni</i>	American Badger (Southwestern Ontario)	S1	END	E	E	Schedule 1	X	
<b>Procyonidae</b>	<b>Raccoons and Allies</b>							
<i>Procyon lotor</i>	Northern Raccoon	S5					X	X
<b>Ursidae</b>	<b>Bears</b>							
<i>Ursus americanus</i>	American Black Bear	S5	NAR	NAR	NS	No schedule	X	
<b>Artiodactyla</b>	<b>Deer and Bison</b>							
<i>Odocoileus virginianus</i>	White-tailed Deer	S5					X	X
<b>Total</b>							<b>46</b>	<b>4</b>

\*Mammal Atlas Square Numbers: Square #NU

\*\*No NHIC Atlas data found

**References**

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: <https://www.ontario.ca/page/get-natural-heritage-information>  
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 Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Reptile and Amphibian Species Reported from the Study Area - Falladown EIS (Project #2651)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	NRSI 2007	ORAA*
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021		Ontario Nature 2019
<b>Turtles</b>								
<i>Chelydra serpentina</i>	Snapping Turtle	S4	SC	SC	SC	Schedule 1		X
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	S4		SC	SC	Schedule 1	X	X
<b>Snakes</b>								
<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake	S5						X
<b>Salamanders</b>								
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	S5						X
<b>Frogs and Toads</b>								
<i>Anaxyrus americanus</i>	American Toad	S5						X
<i>Hyla versicolor</i>	Gray Treefrog	S5						X
<i>Pseudacris crucifer</i>	Spring Peeper	S5						X
<i>Lithobates catesbeianus</i>	American Bullfrog	S4						X
<i>Lithobates clamitans</i>	Green Frog	S5					X	X
<i>Lithobates palustris</i>	Pickereel Frog	S4	NAR	NAR	NS	No schedule		X
<i>Lithobates pipiens</i>	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	X	X
<i>Lithobates sylvaticus</i>	Wood Frog	S5						X
<b>Total</b>							<b>3</b>	<b>12</b>

\*ORAA Atlas Squares: Square #17NJ17

\*\*No NHIC Atlas data

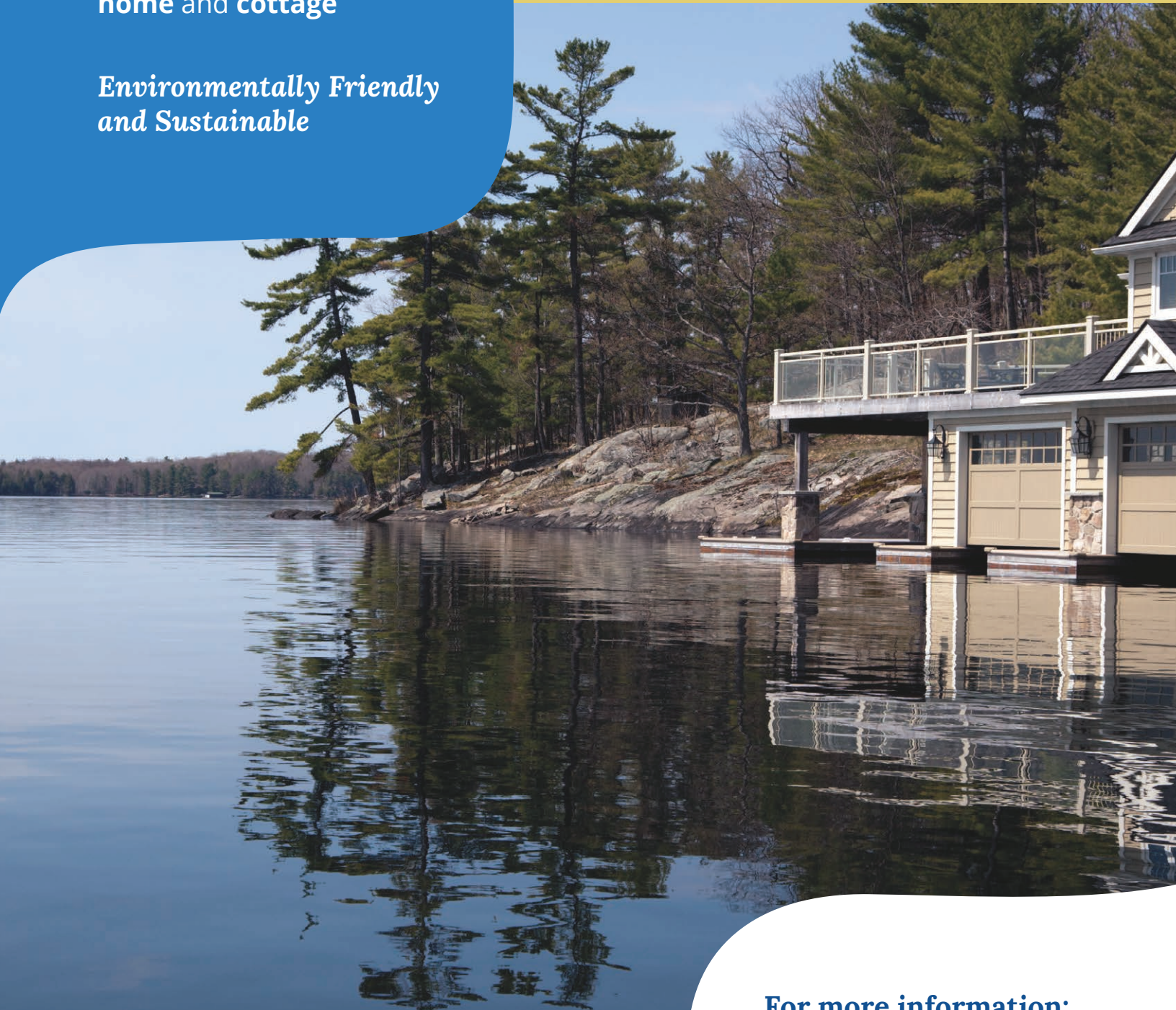
**References**

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: <https://www.ontario.ca/page/get-natural-heritage-information>  
 Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>

# Advanced Septic Systems

The ideal solution for your  
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[info@waterloo-biofilter.com](mailto:info@waterloo-biofilter.com)





# The Waterloo Advantage

**Waterloo Biofilter Systems Inc.** is a Canadian-owned and operated company that has for over 20 years developed, designed, manufactured, and maintained advanced onsite wastewater treatment systems.

We are committed to helping protect the environment with technology focused on high quality treatment, low energy usage, and system robustness.



UNIVERSITY OF  
**WATERLOO**

The patented Waterloo Biofilter system was developed at the University of Waterloo's Centre for Groundwater Research.



## Permanent Filter Medium

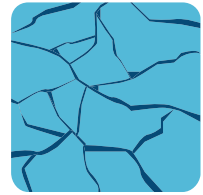
The key to the Waterloo Biofilter system is the absorbent foam filter medium that has been optimized to physically filter and biologically treat sewage. This filter medium is warranted for 20 years and will likely last generations.



### A Waterloo is designed to perform on difficult sites



Small or Remote Lots



Bedrock or Clay Soils



High Watertable



Environmentally Sensitive Areas

*The environmentally friendly choice*

### Step 1

Wastewater is collected and distributed over the Waterloo foam filter medium.



### Step 2

Wastewater slowly trickles down through the foam pieces where natural occurring bacteria remove contaminants.



### Step 3

After passing through the foam, the treated water is put back into the environment.





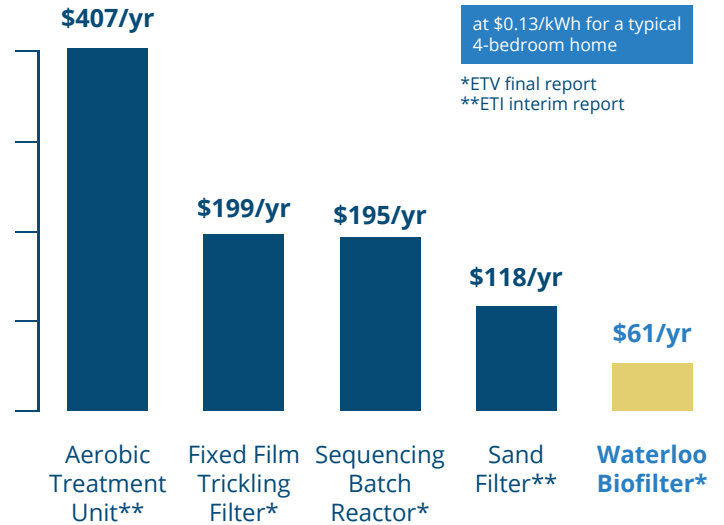
## Low Energy, Low Operating Cost

Waterloo Biofilters use very little energy; up to **85% less** power than aeration technologies using air compressors. In the long-term we have the lowest operating costs.

*Few moving parts*

*Less energy use*

*No noisy air compressor*



## Nitrogen Removal

Standard Waterloo systems remove up to **50-65% total nitrogen**, helping to reduce nitrate levels in groundwater and protect surface waters. With the **WaterNOx-LS™** system add-on, up to **95% TN removal** can be achieved passively and cost-effectively.



## Phosphorous Removal

With the **Waterloo EC-P™** system add-on, greater than **95% total phosphorus** can be removed – helping protect surface waters from blue-green algae and lake eutrophication. Compact and low energy, the Waterloo EC-P™ permanently removes phosphorus without chemicals or additional sludge production.



## Small Footprint

A Waterloo is discrete and minimizes raised mounding and tree removal. A variety of product configurations are available to suit your unique site conditions and personal tastes.



## Seasonal Performance

Whether for seasonal or year-round use, the Waterloo is designed to withstand extreme cold temperatures and can easily handle variable flow rates.



**Made in Canada**  
**Tough Enough for Canada**



# Residential Products



**Waterloo Shed Biofilters** are spray foam insulated for winter operation, clad in attractive composite siding, and roofed with 50-year shingles. Shed Biofilters are compact and require only a single pump to operate.



**Waterloo Flat Bed Biofilters** are constructed of strong yet lightweight fibreglass shells. Flat Bed Biofilters easily blend in with landscaping and require only a single pump to operate.



**Waterloo Basket Biofilters** are constructed of a rigid steel mesh coated for corrosion protection. Basket Biofilters are placed in a below-ground concrete tank and are ideal for larger homes or increased nitrogen removal.



**Waterloo HDPE Tank Biofilters** are constructed using very durable below-ground high-density polyethylene tanks. HDPE Tank Biofilters are ideal for difficult access sites and increased nitrogen removal.

## Proved and Approved

The Waterloo Biofilter has been thoroughly tested and proven effective by numerous 3<sup>rd</sup> party verification programs. We pride ourselves on the high treatment levels our technology consistently demonstrates.

## Is yours a Waterloo?

### CAN/BNQ Certification

	Median Concentration	Percent Removal
cBOD <sub>5</sub>	4 mg/L	98%
TSS	4 mg/L	> 98%
Fecal Coliforms	17,900 cfu/100mL	> 99%

### ETV Verification

	Median Concentration	Percent Removal
cBOD <sub>5</sub>	7 mg/L	96%
TSS	5 mg/L	97%
Total Nitrogen	13 mg/L	65%