

## **APPENDIX 4**

### **PROJECT SCOPING REPORT**

# SWALEY DRAIN

## SCOPING STUDY REPORT



File No. 16-387

March 27, 2018



**K. SMART ASSOCIATES LIMITED**

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## SWALEY DRAIN

## SCOPING STUDY

## TOWNSHIP OF SPRINGWATER

### THE INITIAL APPOINTMENT

The Township of Springwater, in December 2016, received a written request to pursue outlet improvements to the Swaley Drain.

At the February 15, 2017 Council meeting, the Township retained Kenn Smart, P.Eng. of K. Smart Associates Limited as a Drainage Engineer (hereafter called the “Engineer”) to conduct (Project) Scoping work on the Swaley Drain for the purpose of reporting back to Council with recommendations to move forward.

### ENGINEER’S UNDERSTANDING OF THE EXISTING SWALEY DRAIN

Prior to any man made/drain construction on the Swaley Drain (or its predecessor), it is believed the channel existed as the Swaley Creek and that the Swaley Creek connected to the Muskrat Creek which continued on to the Nottawasaga River.

From data provided, it is evident the Swaley Drain was initially constructed pursuant to a report of Mr. Gaviller, CE, PLS dated May 1898. At that time, it was called the Swaley Creek Drainage. This report provided for work from the southeast terminus of the Ninth Line Award Drain in the Swaley Creek (in Lot 7, Concession 8) downstream to a location three quarters of the way across Lot 10, Concession 11. A drawing prepared by the Engineer in 1901 is included in **Appendix 1**. The upper portion of channel was to have a 3’ bottom, 3’ depth and 10’ top, and the downstream part was to have a 4’ bottom, 3.5’ depth and 12’ top (all imperial measurements at that time).

Five other reportings were prepared by Mr. Gaviller, from June 1898 to October 1901. The last of these (September and October 1901 Reports) provided for improvements to Muskrat Creek which was noted as the natural outlet for the Swaley Creek Drainage. The work in the Muskrat Creek included improving the channel upstream of the Nottawasaga for 500’ with a 20’ top, 10’ bottom and 3’ depth, and then removing scattered obstructions in the Muskrat Creek up to the Eleventh Line, with some deepening of the Muskrat Creek where needed. As well, the Swaley Creek Drainage was extended upstream to Lot 3, Concession

8 from the original 1898 head of the drain in Lot 7. The upstream extension was to have a 5' top, 3' bottom and 3' depth.

Of note, shortly after this further Swaley Creek Drainage work, in year 1903 the Tracey Davis Award Drain was constructed with two open ditch components, one on the north, and one on the south, boundary of Lot 7, Concession 11 running from Muskrat Creek upstream to the Eleventh Line.

It is understood that in 1930 a further report on the Swaley Creek Drainage was prepared by A. Cavana, OLS, starting at the Nottawasaga River and continuing to the top end in Lot 3, Concession 8. The Engineer at that time proposed to provide a new outlet using the route of a government ditch, dug in the 1929 depression year (now known as the Downey Drain) from the River to the 12<sup>th</sup> Line and from there to construct a new channel, between the 11<sup>th</sup> and 12<sup>th</sup> Lines, to join to the Swaley Creek Drainage, as constructed by the initial 1898 report. The new outlet channel work was proposed in lieu of relying on the Muskrat Creek. However, municipal letters in the file indicate the 1930 report was not proceeded with and that other ditch work instead was done by agreement. It appears one component of the agreement work may have been to construct a new ditch (referred to as the Coleman Ditch<sup>(a)</sup> by some residents) parallel to part of the Muskrat Creek so that the components of the Tracey Davis Drain were taken by a manmade channel to the government ditch.

There is a 1940's era letter in the file that quoted the Engineer at the time, when asked, advising that the 1900's era work done on Muskrat Creek from the River to the 11<sup>th</sup>-12<sup>th</sup> Line area was, or was similar to, an award drain and that the Municipality could not, by itself, initiate repair work on it.

The next report that was implemented on the Swaley Creek Drainage was by E. Rawson, PE, dated July 1948. This report provided for work on the channel from the area of the 11<sup>th</sup> Line to the top end. The channel was to be deepened and widened but drawings that would show the extent of widening and deepening are not available.

Two other sets of documents on the Swaley Creek Drainage were made available for review:

- The first of these is dated January 1970 and was an Engineer's Report prepared by Ainley and Associates, pursuant to the Drainage Act, to revise the drain's maintenance schedule. This report contains the applicable schedule to bill out any new maintenance activities on the Swaley Drain. The name given to the drain was then Swaley Creek Municipal Drain.
- The second set of reportings pertain only to maintenance of the Swaley Drain and were dated 2001. It appears the 2001 reportings provided for maintenance on the Swaley Drain from the Eleventh Line to its top end. The drain name used in 2001 was Swaley Drain.

<sup>(a)</sup> *The Engineer believes this ditch may have also been called the Cavana Ditch.*

It was noted by a December 2016 Drainage Superintendent Report to Council, that the Swaley Drain had had work done on its outlet in 1990. It is believed the work done was primarily a cleanout of the lower end of the existing channel but no details are available.

Based on the reviewed reports, it appears the Swaley Creek Drainage as reported on in 1898 to 1901, excluding the Muskrat Creek work done in 1901 downstream of the 11<sup>th</sup> Line, is 7500m± (25,000'±) in length and has a watershed of 2670± ac (1080± ha). The 1930 profile showed 25'± of fall from the 11<sup>th</sup> Line to the top end (most of which fall is in Concession 8).

One other piece of information made available and related to the Swaley Drain, is a profile based on a survey done in December 2013 by an Ontario Land Surveyor from Barrie (Betts). This survey extended from the Downey Drain in the area of the old Tracey Davis Award/Coleman ditch, southerly/southeasterly to the Swaley Drain at the 11<sup>th</sup> Line and then along the Swaley Drain to the 9<sup>th</sup> Line. The profile indicates that:

- a) From the 9<sup>th</sup> Line to the 10<sup>th</sup> Line (County Road 28 upstream), there is a 1.2m drop in water level, 1.1m drop in ditch bottom with 0.1 to 0.3m of sediments in the channel. The length of channel in this interval is 1,500m±.
- b) From the 10<sup>th</sup> Line to the 11<sup>th</sup> Line (1500m±), there is a 0.4m drop in water level, 1.2m drop in ditch bottom with 0.2 to 0.5m of sediments in the channel. The drop in the water level all occurred in the 600m downstream of the 10<sup>th</sup> Line and from there downstream it was level.
- c) From the Swaley Drain terminus at the 11<sup>th</sup> Line to the Downey Drain at the 12<sup>th</sup> Line (2600m±), there is a 1.6m drop in water level (generally uniformly) and 1.4m difference in the bottoms at the two locations. It is assumed the downstream bottom and water level surveyed was in the Downey Drain.

With respect to the Downey Drain, it was reported on in September 1960 by D. Weir, PE. His report provided for incorporation and improvements both of the north portions of the Tracey Davis Award Drain dug in 1903 and also of the government ditch dug across Concessions 12 and 13 in the depression years. The Engineer's drawings said the Downey Drain ditch was to have a 3' bottom with 1.5:1 side slopes. The watershed was noted to be 1015± acres. No profile or evidence of grades/fall was on the data supplied.

It is unknown why the Downey Drain which incorporated the government ditch paralleling the Muskrat channel and which outletted the Coleman/Cavana ditch (dug in the 1930's) which also paralleled the Muskrat Creek did not include the Swaley Drain in its watershed since the Muskrat Creek was the outlet of the Swaley Drain. It remains evident that the Muskrat Creek does have overflow drainage to the Downey Drain.

**Appendix 2** to this document contains an aerial to show the relative locations of the watercourses referred to.

## **ENGINEER'S UNDERSTANDING OF EVENTS LEADING TO HIS RETENTION TO DO A SCOPING PROJECT**

The Engineer has been advised there were discussions between the Township, one or more landowners in the Swaley Drain watershed and the Nottawasaga Valley Conservation Authority (NVCA) prior to and after the Betts survey in 2013/2014. It is believed the Township advised the landowners that it would be necessary for a petition pursuant to the Drainage Act to be filed if any improvement along the route of the Bett's survey were to be pursued. However, no decisions to further study or work on the Swaley Drain were implemented at that time.

A document exists in the Township files containing the minutes of discussions on October 28, 2016 between the Township and NVCA re drainage into the Minesing Wetlands. The Swaley Drain was discussed in Part 2 of the minutes and a general discussion re drainage into the wetlands was in Part 3 of the minutes. Both the questions of the Township and the answers of the NVCA are included.

2. *What assistance can the NVCA provide to the Township to reinstate the Swaley Drain outlet into the Muskrat which over the years has disappeared because of silt and overgrowth?*

**Response:** *Any proposed works on the Muskrat Creek should be completed by the Municipal Drainage Engineer and be supported by other required qualified professionals (ecologists/biologists) as part of the Municipal Drain under the Drainage Act. The Municipal Drainage Engineer should assess, but not limited to, the following:*

- *Determine the need for the proposed works;*
- *Outline environmental impacts including impacts to the internationally significant Minesing Wetland;*
- *Develop a plan for how to construct it and how it would be maintained as part of the drain; and*
- *Secure appropriate landowner permissions.*

*NVCA staff previously met with the landowner and the Township staff in 2014 and had preliminary discussions on this proposal. NVCA staff would assist through further pre-consultation with the Municipal Drainage Engineer and other noted required qualified professionals.*

3. *Any other ideas to preserve further damage to quality of Minesing Wetlands where the Black, Willow and Swaley enter.*

**Response:** *NVCA staff would be pleased to work with Springwater Township to further discuss and explore opportunities to further protect and enhance the Minesing Wetland and associated watercourses. In this regard, the recent forest decline report for Minesing recommends acceptance of hydrological change as the new "normal" and focus on reforestation of higher land (previously farmed) to maintain floodplain forest cover/connections. Examples of this approach include the Memorial Forest and reforestation on Parker property.*

A petition pursuant to the Drainage Act was filed by Bill Haight (an owner of over 130 acres of land in the Swaley Drain watershed) and by one other landowner in the period of October/November 2016. The petition stated the Swaley Drain outlet is blocked and the Swaley should be cleaned.

Also a Request for Drain Improvement (as per Section 78(1) of the Drainage Act) was submitted by Mr. Haight on November 10, 2016 requesting that the course of the drainage works (Swaley) be changed and that a new outlet be provided.

It is this Engineer's understanding the Township deemed the Section 78 Request to be the applicable document to be proceeded with and notice was subsequently sent to the NVCA advising that the Municipality may be appointing an Engineer to act on the Section 78 Request.

On February 3, 2017 the NVCA replied to the Township, acknowledging the Township's intention to appoint a Drainage Engineer on the Swaley Drain and indicated they understood the proposed work may involve 4 to 5 km of "new drain" generally along the route of the old historical channel (the Muskrat Creek). To paraphrase, the NVCA advised as follows:

- a) The work would lie within the internationally significantly Minesing Wetlands (a PSW and an ANSI)
- b) A study of need, feasibility and benefit to support the project should be undertaken prior to embarking on detailed engineering/environmental study.
- c) Expensive environmental studies would no doubt be necessary including an extensive natural heritage study from the Swaley Drain down to the Downey's confluence in the River.

*To quote, the NVA advised as follows:*

- a) *The work scope of the environmental study would tentatively include:*
  - *Three season vegetation community inventories in all vegetation communities – including invasive plant surveys (i.e. Phragmites)*
  - *Full amphibian breeding surveys at a number of points (early spring/mid spring/late spring surveys); other herp (turtle) surveys*
  - *Forest and marsh breeding bird surveys*
  - *Fish community surveys (proximal to historic walleye spawning area-see potstudy area attachment); likely pike spawning area; other (long-nosed gar?)*
  - *Dragonfly/Odonate surveys*
  - *Other Species at Risk surveys (to be determined likely with input from MNRF)*
- b) *All the surveys would likely have to be multi day surveys.*
- c) *Assessment of field data, integration with other studies (i.e. engineering/hydrologic), working through data/analyses with stakeholders would require significant effort/capacity.*

- d) *Development of mitigation to minimize impacts during construction and long-term operation would require substantial effort – this may include design elements to minimize future maintenance needs. Habitat offsetting may need to be considered.*
- e) *That MNR and NVCA own lands in the study area and there would be need to consider implications of this.*
- f) *The creation of a new municipal drain (or extension of existing) could trigger a site specific review of the project by DFO.*
- g) *If plans proceed, there may be significant concern raised from local environmental/naturalist groups – given international significance of Minesing Wetlands, this concern may extend to provincial/national interest groups.*
- h) *From an engineering perspective, the Swaley Drain presently extends into the Minesing Wetland. The Minesing receives the runoff from a watershed of over 2,500 square kilometers (250,000 ha). The outlet of the Minesing is controlled by a natural landform at Highway 26 which regulates the discharges and backs the water up forming a lake within the wetland. This flooding causes a significant backwater on the Swaley Drain which will limit the drains effectiveness during flooding periods. From the GIS digital elevation mapping (which was attached) there is a reasonable grade on the Swaley Drain down to the existing end of the drain. Downstream there is very little grade to work with. This low grade will limit the effectiveness of any extension which may only function during times the Minesing is not flooded.*
- i) *In addition, the upstream watershed has very sandy erodible soils. Any municipal drain extension will be a settling area for sediment moving down the system which will result in a high level of costly maintenance. There is also a concern with the soils in the area of the extension. As this area is well within the wetland the soils will cause the area to be difficult to access. NVCA advised that the Township may have to construct a road through the wetland to provide access for heavy machinery. There are many challenges to overcome and these need to be carefully evaluated before committing to a drain extension*

When the Township approached the undersigned Engineer re accepting an appointment pursuant to Section 78 of the Drainage Act, the undersigned replied on February 9, 2017, after considering the 2016 and 2017 communication between NVCA and the Township, to the effect that (Project) Scoping Work should be undertaken prior to any appointment being made pursuant to the Drainage Act.

The main activities suggested by the undersigned to be included in a Scoping Study were listed as:

- a) Work Items
  1. To meet with the Township, review aeriels, review existing knowledge of the drain, review what the landowners wish, review what can be seen in the field, discuss farm values in the area and discuss possible options.
  2. Produce aeriels, etc. at different time periods going back to the 1940's if possible to understand the changes, if any, of water levels with time.

3. Meet with NVCA to discuss what options there may be, what position NVCA may take on each, etc.
4. Talk to the landowner who submitted the request for work.
5. Meet with other landowners affected to discuss if there is a project that could be implemented to give some relief and at a cost beneficial point of view.
6. Meet with all stakeholders, and hopefully make a decision if there should be a Drainage Act appointment that is deemed appropriate.

This reply led to the appointment on February 15, 2017 to do the Scoping Study.

### **DOCUMENTS OBTAINED/PROVIDED AND REVIEWED SUBSEQUENT TO APPOINTMENT TO DO A SCOPING STUDY**

The following lists the documents provided/obtained:

- May, 1898 – Swaley Creek Drainage Report (M. Gaviller)
- June 1900 to October 1901 Six reports on the Swaley Creek Drainage (by M. Gaviller). Report 6 was the Report that provided for construction in the Muskrat Creek at its outlet into the River and at scattered locations up to the main Swaley outlet near the 12th Concession Road allowance.
- 1903 – Tracey Davis Award & Tracey Williams Award Reports
- 1930 – Swaley Creek Drainage Report by Mr. Cavana, P. Eng. but no construction occurred due to expense. (Only the drawings were in the file.) Alternative ditch solution agreed on by ratepayers but poorly executed (see 1945 Clerks letter)
- 1945 – Clerk's notes/report on Swaley Creek Municipal Drain discussions and activity
- 1945/1946 – Clerk reports on difficulty in obtaining a new Drainage Engineer
- July, 1948 – Swaley Creek Municipal Drain Report (E. O. Rawson) that provided for repairing the drain from the 11<sup>th</sup> Concession upstream
- 1961 – Downey Drain Report (D. H. Weir)
- 1965 – Giffen Drain Report (Ainley and Associates)
- 1967 – NVCA Willow Creek Inspection Report
- 1968 – Minesing Swamp Drainage Report
- Nov 1970 – Willow Creek Drainage Study
- Jan 1970 – Swaley Creek Drain Section 65 Report (Ainley & Associates)
- Jan 1975 – Reeve and Clerk write to R. Moriyama with respect to the soon to be released Minesing Swamp Master Plan.
- March 1975 – Draft Master Plan for Minesing Swamp (R. Moriyama)
- Dec 2001 – Willow Creek Sub Watershed Plan
- May 2001 – R. J. Burnside notice to NVCA of Swaley Creek Drain Maintenance
- July 2003 – R. J. Burnside proposal to construct sediment traps on Willow Creek
- Mar 2007 – Simcoe County Road 28 Reconstruction As-Constructed drawings (Burnside)
- 2013 – Bett's Survey of water and sediments from Ninth Line to George Johnston Road to end of Swaley and on to Downey Drain
- 2014 – 60 Years of Forest Change in Minesing (by NVCA)
- Nov 2016 – Correspondence between NVCA and Springwater
- Dec 2016 – Drainage Superintendent's Report to Springwater Council
- Feb 2017 – Correspondence NVCA and Springwater

## **MEETINGS CONDUCTED SUBSEQUENT TO APPOINTMENT TO DO A SCOPING STUDY**

The following is a chronological list of the meetings, conference calls and site visits conducted by the Engineer since being retained for the Scoping Study work:

- February 24, 2017 – 2 meetings:
  - Morning – W. Gilroy, H. Parker, Township and review of Swaley Drain in Conc. 10
  - Noon – B. Haight and other upstream owners
- March 7
  - Meeting with R. Downey, H. Parker, W. Gilroy re Downey Drain
- April 18
  - NVCA meeting
- May 4
  - Simcoe County, Springwater Township, B. Haight
  - Springwater Township, R. Downey for possible site review (not done due to wetness)
- May 23
  - NVCA, MNRF, Riverstone Environmental and review of Swaley Drain in Concession 10
  - Walk along part of Tracey Davis Drain from the 11<sup>th</sup> Concession downstream to area of Muskrat
- May 31
  - Meeting with Senior Township staff prior to M. Archer's retirement
- October 3
  - Conference call with Township re future scoping meeting
- October 11
  - Scoping meeting in Minesing to which most Swaley and Downey landowners were invited, together with affected agencies
- October 13
  - Meeting with senior NVCA staff
- November 15, 2017
  - Call and email to MNRF (follow up correspondence occurred also)
- February 6, 2018
  - Conference call with NVCA staff
- February 23, 2018
  - Presentation to NVCA Board of Directors

Landowners and others attending at one or more of the meetings conducted prior to the watershed-wide scoping meeting on October 11, 2017:

- Mark Archer (Township of Springwater, Former Director of Public Works)
- Steve Buchanan (Township of Springwater, Drainage Superintendent)
- Will Gilroy (landowner)
- Harold Parker (landowner)
- Walter Priest (landowner)
- Bill Haight (landowner)
- Thomas Duncan (landowner)
- Janet Duncan (landowner)
- Henry VanderWielen (landowner)

- Mathew Priest (landowner)
- Larry Camack (landowner)
- Merlin Camack (landowner)
- Ross Downey (landowner)
- Other – Paul Murphy of Simcoe County

Owners attending the final scoping meeting October 11, 2017 (based on sign-in sheets)

- Erin Wilson
- Don Priest
- Paul Neals
- Allan Wilson
- Simon Seif
- Terry Walton
- Harold Parker
- Gerri Priest
- Matt Priest
- Larry Camack
- Bill Haight
- Rob Parker
- Merlin & Debbie Camack
- Adam Parker
- Bernard Mayer
- Ryan Downey
- Walter Priest
- Mark Priest

#### **AERIALS AND PHOTOGRAPHY REVIEWED**

- Swaley 1989 mosaic (Simcoe County Mapping) – to assist in showing Muskrat, Willow, Tracey Davis routes)
- Willow, Swaley and Downey 2016 overall watershed mosaic (VuMap)
- Swaley 1954-2016 (Simcoe County Aerial Mapping)
- 2014 Downey, Muskrat, Swaley and Willow (Google)
- Willow 1954-2016 (Simcoe County Aerial Mapping) lower, mid and upper (a, b and c respectively)
- Black Creek 1954-2016 (Simcoe County Aerial Mapping)
- NVCA photos of Muskrat Creek near outlet to Nottawasaga River (taken by Dave Featherstone on April 25, 2017)
- NVCA photos of Muskrat Creek near outlet to Nottawasaga River (taken by Dave Featherstone on May 1, 2017)

- Springwater Township photos of Willow Creek flooding at Simcoe County Road 28 (George Johnston Road) (taken by Mark Archer on May 3, 2017)
- Private drone photography/video (by Will Gilroy on February 28, 2017)

### **MINESING WETLANDS**

A summary of the Engineer's understanding of the Minesing Wetlands based on review of the documents listed is included in **Appendix 3**.

### **WILLOW CREEK**

A summary of the Engineer's understanding of the Willow Creek based on review of the documents listed is included in **Appendix 4**. Recommendations re future work pertaining to Willow Creek are contained in the "Recommendations" section of this Report.

### **SURVEY WORK UNDERTAKEN**

The only existing surveys available in the files are profiles of the 1930 report of Cavana and the 2013/2014 survey by the OLS (Betts).

A limited Global Positioning System (GPS) survey of tile outlet, water and channel bottom elevations in the Swaley and Willow channels immediately upstream and downstream of County Road 28 was undertaken in March 2017 by staff of the Engineer to determine the extent of submergence of tile outlets in that area. Updates of these elevations in the area of the County Road were done on a couple of other occasions in the summer and fall of 2017 (in part by Township staff).

A drone (i.e. Unmanned Aerial Vehicle or UAV) elevation survey was undertaken by Bosys Technologies in August/September, 2017 to obtain approximate elevations of water levels in the Nottawasaga River, the Downey Drain, the historic route of the Muskrat and of the Swaley Drain at 20± locations. As well, elevations were taken in 3 or 4 locations along a route that could be followed if the Swaley Drain and Coleman ditch were to be joined.

In October 2017 another drone flight was undertaken. This was done as a corridor flight (i.e. continuous data) to obtain the elevation at 14 specific locations but also gathering data between each location.

This flight started about 200m west of where the Swaley drain terminates and went in a northwesterly direction for about 1500m generally following the historic route of the 1954 Muskrat Creek Drain.

In November 2017 K. Smart Associates completed a GPS ground survey at approximately where the 1954 Muskrat Creek Drain outlets into the Nottawasaga River. Ground and water elevations were obtained in the River and for about 450m easterly to a ponded location in the Muskrat channel in the wetlands. A water level was also obtained in the River at the Downey drain outlets.

In December 2017, another GPS survey was undertaken by K. Smart Associates at the location where the Swaley Drain terminates. Ground and water levels were collected for about 320m in a westerly direction from the end of the Swaley Drain, then for 220m in a southeasterly direction and then for 270m± northeasterly back to the end of the Swaley Drain or the point of commencement. At this time water and invert elevations were also taken at the Gilroy Outlet.

In February 2018, K. Smart staff completed an additional GPS survey along a part of the Downey Drain. Several water level and ditch bottom elevations were obtained at its outlet into the Nottawasaga River and at four points in an upstream 2400m length. Water level and ground elevations were also obtained at a common point from the November survey in the ponded location of the Muskrat channel.

An overview of the elevations secured by surveys are shown on **Appendix 5** to this report. A summary of some of the elevations<sup>(b)</sup> recorded would be:

- Nottawasaga River level at Downey outlet	180.84 ±
- Nottawasaga River level at Muskrat outlet	181.24 ±
- Top of levee elevation on East bank of River	182.24 ±
- Water level in ponded area of Muskrat 450m± east of River	181.35 ±
- Water level in Downey Drain north of this ponded area	181.00 ±
- Water level in Muskrat near Coleman Ditch	181.39 ±
- Water level in Coleman ditch further upstream	181.81
- Water level in Downey at outlet of Coleman Ditch	181.00
- Water level in Muskrat 800m downstream of Swaley	181.92 ±
- Water level in Muskrat 300m downstream of Swaley	182.53
- Water level in Swaley where it now terminates	182.89
- Ditch level in Swaley where it now terminates	181.80 ±
- Water level in Swaley at Gilroy 250mm pipe outlet	183.00
- Invert of Gilroy tile outlet	182.53
- Water level in Swaley at George Johnston Road (GJR)	
- West side	183.15
- East side	183.34
- Invert of 200mm pipe outlet serving Haight property on east side of GJR	183.14
- Ground/water level at edge of bush (west side) in Lots 7 to 9, Concession 11	183.50 ±
- Ground elevation at edge of bush (east side) in Lots 7 to 9, Concession 10	186.00 ±

<sup>(b)</sup> *The various elevations listed and shown were taken at different time periods and by different methods. Refer to Drawing in **Appendix 5**.*

## **DRAINAGE NEED/PROBLEMS ALONG SWALEY DRAIN BASED ON INPUT FROM OWNERS AND FROM ENGINEER'S OBSERVATIONS**

The Swaley Drain was designed to serve over 1,000 hectares (2,600 acres) of land. The drain is an open channel as has been discussed and commences near the line between Lots 3 and 4, Concession 8 and flows southerly and then westerly across Highway 26, to and across County Road 28 and terminates west of the unopened 11<sup>th</sup> Line of the former Vespra Township. Historically the drain outletted to the Muskrat Creek which in turn outlets to the Nottawasaga River. Although scattered improvements to the Muskrat Creek were made in the early 1900's pursuant to an Engineer's recommendation to better the outlet of the Swaley, the improvement work was not included in a report that could be applied for maintenance purposes.

All owners in the watershed of the Swaley Drain rely on the channel to remove surface waters along the course of the channel so adjacent lands can be cultivated, and also rely on the channel to provide an outlet for subsurface or other tributary drainage so other lands owned and more removed from the channel can be cultivated. Drainage is necessary to have productive farming operations on the soils encountered in this watershed.

Historically, it is understood, the drain would function such that it would be flooded across the lands west of County Road 28 and just upstream due to the high water levels of the Nottawasaga River in the spring, but once water levels associated with the river flooding would recede, the waters in the Swaley channel would drain out to the level where the channel would provide an acceptable outlet for tile drainage and allow adjacent lands to be worked over the full length of the drain.

The situation that exists now based on input from the owners and from Engineer observations is that after the flood levels of the Nottawasaga have receded, the obstructions or poor condition of the Muskrat Creek channel downstream does not allow the water levels in the lower lengths of the Swaley (downstream of Highway 26) to lower to their historic levels. Input from the downstream landowners has indicated that long term water levels in the Swaley Drain in the last 10 years are at times up to 600mm (24") higher than they previously existed. A 250mm dia. tile on the Gilroy farm has been monitored in 2017 and water levels were found to be 200mm± above it after spring floods receded.

It is believed tile outlets in the Swaley Drain upstream of George Johnston Road in Concessions 9 & 10 are similarly affected. One outlet upstream of George Johnston Road was measured and was found to have water above its top also. An owner further upstream indicated his tile are submerged.

When tile drainage systems are not functioning as designed, this has the effect of not allowing the fields to drain as they should, fields become wetter, and crop planting, cultivation and harvesting are impacted. Eventually the lower lying tiles will silt in.

The Muskrat Creek outlet for the Swaley Drain has always had minimal grade, a meandering route and perhaps has always had a less than desirable outlet into the Nottawasaga River. Now no doubt due to a combination of factors:

- sediments that have accumulated in the channel near the Swaley outlet
- grasses that have built up on the marshlands with the loss of tree cover (it has been noted that the invasive species Mannagrass is predominant now in this part of the wetlands)
- possibly higher levels in the Nottawasaga due to fallen tree blockages
- the development of a sediment levee that exists along the River at the outlet of Muskrat Creek

the Muskrat Creek does not provide drainage as required for the Swaley Drain properties west of Highway 26.

The upper end properties, i.e. those upstream of Highway 26, indicate that the water levels in the Swaley Drain are still low enough for their tile outlets as long as the Swaley in a good state of repair. This is no doubt associated with the abundant grade or fall available in the channel once upstream of the impacts of the Muskrat.

The “control” of water levels in the Swaley upstream of Highway 26 is believed to be the Highway 26 crossing itself.

#### **DRAINAGE JUSTIFICATION/BENEFITS**

Any drainage works undertaken to address a need or problem in a drainage system should be evaluated from a cost benefit perspective.

Studies in the 1970's/1980's indicated that yields from lands that are not tile drained (either no tile or ineffective tile) versus lands that are tile drained are reduced to such an extent that there is negative financial difference in the area of \$60/acre/year. This is an older number and the value is no doubt greater now. One landowner in the Swaley Drain watershed estimated that the figure could be \$80 to \$100/acre/year.

It is estimated that there are approximately 400 arable/cultivable acres in the Swaley Drain watershed between Highway 26 and the downstream end of the Swaley Drain that could be affected by the continuous high water levels in the Swaley. These are the acres where the impact will worsen with time if tile drains silt in and if fields are continuously wetted.

If there is an impact of even \$60/acre/year on 400 arable acres, this could be a financial impact of \$25,000± per year. This is substantially less than the value of the land itself. If the value of the land is in the magnitude of \$10,000 per acre, the value of the 400 acres affected could be in the magnitude of \$4 million.

In addition to the physical value that may be lost due to crop yields, there is also the legal aspects of the inability of a drain to serve. When a drain is constructed, both the upstream and the downstream owners (all parties assessed) acquire the right to outlet their waters into the drain. Both the upstream and downstream owners expect the drain to then remove the waters that outlet into the channel, so all landowners (upstream and downstream) can cultivate their lands. If only the upstream owners remain served due to blocked conditions in the lower part of the drain, then the drain becomes dysfunctional and instead of serving

all lands as originally intended, only the upstream lands are served, while the downstream owners' condition is worsened by continuous and perhaps even improved upstream drainage with no corresponding downstream improvement and actually with a downstream deterioration.

The Drainage Act does recognize this possibility and allows for the payment to the affected downstream owners of "allowances for insufficient outlet" if, or once, a new report of an Engineer is prepared. In the Swaley Drain if such a report had to be prepared, the amount for insufficient outlet could be the capital amount to generate interest equal to the annual loss of the \$60/acre for lands that can no longer be served. This capital amount applying a simplified calculation and a 4% interest rate could be  $60 \times 400 / 0.04 = \$600,000\pm$ . This would be a direct assessment to the watershed and/or to the parties the Engineer deemed that should be assessed for payment of the insufficient outlet, if indeed the decision were made to compensate downstream owners versus trying to secure or to resecure an outlet so their lands drain.

If a drainage watershed deteriorates to the point where the upstream owners do not wish to be responsible for paying their share of insufficient outlet, or for paying their share of constructing an improved outlet, and if the downstream owners no longer have drainage on their property, there could be a decision to legally abandon the drain. This could have a very detrimental effect because then the upstream owners lose their legal right to outlet their collected water onto downstream lands, the channel that is abandoned could be allowed to naturally fill in which could in turn then have an impact on upstream subsurface drainage, on roads and on any other infrastructure components served. Basically surface flooding in low areas may return to some properties as existed before the drain was first built. It certainly would not be a desirable situation to have any part of the drain legally abandoned.

In this Engineer's opinion, there will be other benefits if the Swaley Drain has its outlet restored. These include:

- a) If the Swaley waters, and also the Muskrat waters recover their ability, to continue to their natural outlet, such will assist in lowering or removing a portion of the excess waters that are accumulating in the Minesing Wetlands. The Report on the 60 Years of Forest Change in the Minesing indicates that hydrologic conditions are contributing to the significant loss and that an improved outlet for the Swaley Drain may lower water levels in the Minesing to a certain extent. This writer's view of the current terminus of the Swaley Drain, of the area of the Tracey Davis Drain and of the adjacent Muskrat Creek confirms that there are substantial standing waters in the channels that do exist even after the flood waters have receded. Any works that would allow a component of the watershed such as the Muskrat to have its waters better continue to its outlet (the Nottawasaga River) in post spring flooding conditions as was occurring previously would be considered a benefit to the remaining wooded areas of the wetlands without being a detriment to the non-wooded area.
- b) Any drainage works that does allow for more continuous flow of waters in the channel should reduce the overall sediment build up in a channel. Any better movement of

waters in the Muskrat channel at the Nottawasaga or possible Downey Drain outlets would reduce the build-up of sediment in the Muskrat. It is not felt that sediment build-ups in the Swaley Drain are a significant problem in recent years<sup>(c)</sup>, since it is noted that the sediments that were found to exist in the Swaley Drain by the Betts survey in 2013/2014 identified only 200 to 500mm of sediment in a channel that had been last cleaned approximately 12 to 13 years earlier. However, it would be still desirable to keep the downstream part of the Swaley Drain channel deeper than any connected Muskrat channel, or to even develop a sediment pond area to continue to provide a collection area for those sediments that do get carried in the Swaley Drain.

- c) If some works could be undertaken without major effort or impact that would allow the Muskrat Creek route to better function so that it could serve as the outlet for the Swaley Drain, such work also has the potential of reducing, to a degree, the drainage into the Downey Drain from the wetlands to its south after River flood water impacts have receded. It is known that the previous Tracey Davis Drain which initially outletted into the Muskrat Creek was redirected into a government ditch perhaps in or around 1930, and this government ditch is now the Downey Drain<sup>(d)</sup>. It is also evident that there exist other small channels that allow overflow waters from the Muskrat Creek route to enter into the Downey Drain across Concession 12. Thus if the Muskrat Creek route could better function, it may have the impacts of reducing post flood condition runoff into the Downey and thus could be a benefit to the Downey Drain. It is not however expected that there is a significant observable flow into the Downey from the wetlands to the south after the impact of River flooding recedes and this benefit is not expected to be substantial.

### POTENTIAL PROJECTS

Given that there is a need to restore/create, in whole or in part, an outlet for the Swaley Drain, various potential projects have been examined during the course of this Scoping Study.

The following considerations were given in all project evaluations:

- a) Projects to be examined should have costs as low as possible and should have as low an impact on the Minesing wetlands as possible.
- (c) *It is believed that when a temporary connection between Willow Creek and the Swaley Drain was constructed many years ago, sediments were then introduced into the Swaley Drain and such accumulated near its current terminus.*
- (d) *It is suggested that since this government ditch parallels the route of the old Muskrat Creek and since the Muskrat, even in the 1930's, may not have been able to serve its function that the "ditch dug by the government" may have indeed been done as a replacement to the Muskrat Creek.*

- b) Desirably projects should attempt to restore, follow and/or parallel the historic Muskrat Creek outlet route wherever work is to be considered.
- c) If possible, use of the Downey Drain should be minimized. But if use is to be made of it, the costing should allow for enlarging it where necessary and the assessment of the costs should be primarily to the parties newly served. New future maintenance schedules would also be necessary.
- d) An activity that should be considered in any list of projects is one that an impacted landowner initially suggested, and is work that would address the existence of a sediment levee along the River (that prevents direct discharge of the Muskrat waters) and that would address the angle of connection of the Muskrat to the River if the levee were removed.

Four projects have been developed and costed and are presented in this Scoping Study Report.

The first two are the initial ones developed and versions of them were presented at the October 2017 Scoping Meeting. The first could be described to be the “Larger Project” and the second to be the “Initial Smaller Project”.

The third one which is an expansion of the larger project with full usage of part of the Downey Drain for outlet is for information only and has not been presented at any scoping meeting. It is called the “Larger Project Plus Enlarged Downey Drain”.

The fourth one is a modification of the Smaller Project presented at the October scoping meeting to recognize the evident conclusions of the scoping meeting that a smaller project be implemented, to reflect the post-scoping meeting input of the NVCA that the Authority will ask for minimal disturbance to the wetland and to reflect the results of further field surveys performed after the scoping meeting. This fourth project is the one suggested by this Scoping Study that may best address the concerns by providing perhaps acceptable lowering of the Swaley water levels, by being acceptable from an environmental perspective and by having lower costs. It is called “Revised Smaller Project”.

The four projects can be described as follows:

**Project 1 – The Larger Project**

The larger project was first developed in April/May 2017, was revised after the drone survey, was presented at the October Scoping Meeting and was revised slightly after the field surveys in November and December.

The larger project identified would:

- a) Address the Muskrat outlet concerns at the River,
- b) Involve a new connector ditch between the Swaley Drain and what is known as the Coleman ditch in order to replace the need for the Muskrat to serve the Swaley across Lots 8 and 9, Concessions 11 and 12,

- c) Involve a short length cross-connection of the Coleman ditch to the Muskrat in the east part of Lot 7, Concession 12, and
- d) Provide for a repair of the Downey Drain from the Ronald Road allowance /Giffen Drain junction downstream to the River over a length of 750m.

Some of the details of the larger project components follow.

#### Muskrat Outlet Work Component

Based on landowner input, photography provided by NVCA, aerial reviews and surveys by the Engineer's staff, it has been concluded that the historic outlet of the Muskrat Creek to the River is now blocked by a sediment levee that exists along the east side of the River. This sediment levee is approximately 0.9m higher than the observed post flood water level in the Muskrat 400 to 500m east of the River where ponding exists in the Muskrat course due to downstream sediments. The man-made channel that was excavated in the 1900's east of the River to give the Muskrat a better outlet is still evident through the wooded area and it shows evidence of a sediment build up in it.

It appears that the waters in the Muskrat east of the River that pond, overflow to the north to the Downey Drain. The waters in the Muskrat east of the River where ponded because of sediments are at an elevation of  $0.1\text{m}\pm$  above the River levels. But as said, there is a levee that is  $0.9\text{m}\pm$  higher blocking any direct discharge. Surveys found, by comparison, that the ponded level in the Muskrat is  $0.4\text{m}\pm$  minimum above the Downey.

It has been concluded also that even if the sediment levee did not exist, the Muskrat, using the man-made channel outlet that exists, would discharge into the River at an unacceptable angle. Desirably a tributary watercourse should outlet to an outlet watercourse at a flat angle or at the outside of a bend such that the flow in the smaller watercourse is "drawn out" by the flow in the outlet watercourse to move with the larger channel's flow. In the case of the Muskrat, its current outlet, if not already filled in, would discharge against the flow of the River rather than discharge with the River flow.

The outlet of the Muskrat into the River could be improved by joining the River  $50\text{m}\pm$  north of the current filled in location at an outside bend in the River and by ensuring the sediment levee is removed at the discharge location.<sup>(e)</sup>

Together with these two items of work (removal of levee and shifting of outlet location), the Muskrat outlet channel should be improved upstream of the River junction so that the channel intercepts the area of ponding in the Muskrat at a location  $500\text{m}\pm$  east of the River. The channel route to follow to the area of the ponding should follow the historic route of the Muskrat as much as possible to lessen the disturbance to the woodlot through which it passes. It appears that the construction work in this 500m stretch should be along firmer ground as evident from the deciduous woodlot that exists and the better ability to walk in this area.

<sup>(e)</sup> *Alternatively, the outlet of the Muskrat could be improved by joining it by means of a small channel to the Downey Drain to the north.*

With regard to the above three considerations, a potential work plan and project was initially developed in the summer of 2017. This work plan was modified prior to the October 2017 scoping meeting and was then further modified prior to the NVCA Board meeting in February 2018.

An examination of the River made by the Engineer's staff using a boat from Edenvale to the Muskrat location noted few blockages in the River downstream of the Downey Drain but noted numerous areas of fallen trees between the Downey Drain and the historic Muskrat outlet location. Water levels were surveyed and it was noted there is a rise in river levels of 400mm± between the Downey and the Muskrat locations. Rippling river flows were noted downstream of some of the blockages. If these blockages were removed in part or in full, some lowering of river levels in the area of the Muskrat should result (100 to 150mm). These blockages should be removable using chainsaws by workers within small boats.

It is possible that the Muskrat outlet and river debris removal work described by itself **may** have an impact of allowing the Muskrat to function closer to how it originally functioned and thus lower the levels in the Muskrat at the Swaley Drain (post River flood conditions) at a location of some 3000m upstream. It is suspected however that due to the build up of mannagrasses in the route of the Muskrat over time and no doubt with the deposition of some sediments, especially closer to the Swaley, that the Muskrat levels will not drop to the extent required at the Swaley, even with its outlet being improved at the River.

If the River levels could be lowered by 150mm by removing fallen tree blockages and if the sediment levee removal is undertaken to allow Muskrat levels to equal River levels, the most that could result is a lowering of the Muskrat levels by 300mm east of the River.<sup>(f)</sup> Even if this lowering eventually allowed the Muskrat levels at the Swaley to lower by 300mm, additional lowering of Swaley water levels would be needed if water levels were to be lowered below tile inverts in the Swaley.

And it may be overly optimistic to expect a 300mm of lowering in the Muskrat water level at the ponding area east of the River to translate to a 300mm lowering of the Muskrat water level at the Swaley.

Access to the work area for the Muskrat outlet improvement could be off the Ronald Road allowance, across the Downey and south to the channel.

Access, working area and maintenance considerations are discussed in more detail for all work projects in the Feasibility of Construction section of this report.

<sup>(f)</sup> *If the Muskrat from the ponded area near its outlet were taken north to the Downey, a lowering of perhaps 300mm minimum in the Muskrat could result.*

### Connector Ditch Components

For the reason that any lowering of Muskrat levels at its outlet may not translate to a similar lowering of Muskrat levels near the Swaley terminus, additional project work and costing was developed to include another but more substantial works involving the Muskrat. Specifically for the Larger Project, a second component for study purposes was developed involving a shallow channel to replace the Muskrat over its north/south portion in Lots 8 and 9, Concessions 11 and 12. This would be the portion that extends from the existing Swaley outlet near the 11<sup>th</sup> Line road allowance at the Lot 9-10 boundary to the area where the old Tracey Davis Award Drain originally outletted into the Muskrat and where it now outlets into what is known as the Coleman/ Cavana ditch (a ditch that parallels the old Muskrat in Lot 7) and that runs north to outlet into the Downey Drain.

A shallow channel, if done, to replace this north/south part of the Muskrat in Lot 8 & 9 should be done with as minimal environmental damage and cost as possible. It is suggested that a new channel could be constructed to the east of the route of the Muskrat and west of, but adjacent to, the bush that exists on the higher lands east of the Minesing low area. If done, such should have a lesser impact on the main wetlands of the Minesing, should also better serve the wooded area that remains, should offer slightly higher lands at least in the south portions to facilitate both ease of construction and maintenance, and should have a lesser length of construction.

It was determined from the drone survey in the summer of 2017 that the water level elevation at the junction of the Tracy Davis Award Drain and Coleman/Cavana ditch was approximately one (1) metre lower than the Swaley water level at its terminus two kilometres± to the south. This Coleman ditch outlets to the Downey Drain to the north and its water level drops by 0.8m (800mm) from the Tracy Davis junction to the Downey junction (again based on drone surveys).

The drone survey elevation indicated that the water level in the Coleman ditch could be higher (by 400mm±) than the levels in the adjacent Muskrat.

For this reason, it would be proposed that the excavator also construct a short channel (50m±) at the time to cross connect the Muskrat and Coleman. This would allow any waters in, including those brought to the Coleman ditch to outlet in part to the Muskrat with its improved outlet at the River.

Thus if a connector ditch were excavated over a length of 2000 metres from the Coleman ditch south to the Swaley Drain, and if the water profile in it had a 0.03% grade like other flowing channels<sup>(9)</sup> through the Minesing, then the lowering of the Swaley level could be expected to be 400mm minimum without doing any improvement in the Coleman ditch. If the 800mm drop in water levels in the 600m length of Coleman ditch between the Tracy Davis and Downey Drain junctions were reduced by a small cleanout of the Coleman ditch, and/or were reduced by the connection to the Muskrat channel, the Coleman elevation at

(9) *Water levels in channel with no flow are noticeably flat (witness Downey Drain elevations when secured)*

the connector outlet could be lowered easily by 200mm to give, with the 400mm lowering discussed by the connector alone, a 600mm drop at the Swaley. This would allow water levels in the Swaley to drop below tile inverts in Concession 10.

A negative finding of the drone survey however was that it became evident a connector ditch along the bush edge would have to traverse grounds that are 1.5m± higher than the low grounds of the wetlands over at least half of the 2000 metre length. This would make a connector ditch, that may be 750mm deep if kept in the wetlands, over 2 metres in portions along the bush edge. This would increase the excavation in the deep areas to over 10 cubic metres per metre as compared to possibly 2 to 3 cubic metres per metre in the lower lying wetland area.

It was estimated it could take over 30 working days to excavate the connector channel if kept close to the bush. The one advantage of excavating a deep channel is that ample materials become available to construct a maintenance working area along the channel.

The connector channel from the Swaley north to the Tracey Davis Award/Coleman ditch, if done, could be constructed as, and considered as, a relief channel to the Swaley Drain. It would be taken off of the side of the Swaley upstream of its existing outlet. Thus it would not have the high flows directed into it in peak runoff conditions in the Swaley.

This would mean that the existing terminus of the Swaley Drain channel would remain with its existing discharge point into the Minesing Wetlands. Thus in heavy flow conditions, and at those times when the Minesing wetlands are not flooded by the River itself, the main flow in the Swaley would initially continue westerly into the wetlands. Only after flood waters receded would the performance of the relief channel be evident by providing further lowering of the Swaley waters.

The access for the connector work would be expected to be off the unopened Glengarry Landing Road Allowance (12<sup>th</sup> Line), across the Downey with a temporary pipe crossing, and then south to the start of the work area. Access could alternatively be fully from the Swaley Drain.

Access, working area and maintenance considerations are discussed in more detail in the Feasibility of Construction section of this report.

#### Downey Drain Repair Component

If a connector ditch were constructed from the Coleman ditch to the Swaley Drain and even with a cross-connection between the Coleman and the Muskrat, it would be appropriate that the Downey Drain across Concessions 12 & 13 (750m± in length) at least be repaired<sup>(h)</sup>. This could be done at the same time as the works to improve the outlet of the Muskrat.

<sup>(h)</sup> *A review of this channel by snowshoe in February 2018 noted numerous areas of fallen trees in this apart of the Downey although such did not appear to be raising water levels, no doubt in part due to little to no flow.*

The repair work on this portion of the Downey Drain would involve brushing a corridor alongside it so an excavator could travel along it, and then remove the fallen trees or debris that exist in it. It is not suspected that there are substantial sediment build ups in this part of the Downey but if such were encountered, such could be removed at the same time.

The assessment of the costs of this 750m of Downey work would have to be carefully considered. It is suggested that perhaps the Swaley Drain watershed should participate substantially in these costs, given that there has been in the past some waters from the Swaley Drain finding their way to the Downey Drain and even with an attempt to restore the Muskrat to the ability that it can better serve the Swaley, there could be waters from the Swaley that enter into the Downey from the Coleman ditch. Any contribution of costs would acknowledge this situation.

This work area would be accessed directly from the Ronald Road allowance with a crossing of the Giffen Drain.

**Appendix 6** contains a description of the work and the estimate of costs for this Larger Project.

This project together with an estimate of its costs was presented at the October Scoping Meeting.

### **Project 2 – Initial Smaller Project**

The “Initial Smaller Project” developed and presented at the Scoping Meeting in October addressed:

- a) The Muskrat outlet concerns at the River as already described herein (excluding any work in the River)
- b) An extension of the Swaley Drain for 700m further into the wetlands in lieu of doing the “connector channel” of the Larger Project.

With respect to details of the Initial Smaller Project the following is offered:

#### **a) Re Muskrat Outlet Work Component**

All the considerations, descriptions of work and costings as set out for this component of work in the Larger Project section, apply to this component of work in the Initial Smaller Project.

The relocation of the Muskrat outlet by 50m to the north, the removal of the sediment levee along the east bank of the River at the new Muskrat outlet, the cleanout improvement of the man-made Muskrat channel and the natural watercourse as necessary for 500m east of the River to the ponding location, the access, and the temporary pipe crossing of the Downey for access would all be as described for the Larger Project.

**b) The Swaley Outlet Work Component**

The initial drone survey work indicated that the water levels along the old Muskrat route at a location 700m± downstream of the existing Swaley Drain terminus was 0.9m± lower than the water level in the Swaley.

Based on this, a project component was developed to excavate a small channel (2m± wide, 750mm deep) as a downstream continuation of the Swaley.

Access would be off the existing Swaley spoil berm and excavation of the new extension would be from mats.<sup>(i)</sup> Initial costing assumed that either the excavated material would be spread thinly in with grasses or would be left as a spoil berm along the new channel.

This initial lower cost project also provided for a sediment pond (50m± x 50m±) to be excavated at the end of the existing Swaley Drain plus provided for a bottom cleanout of the Swaley Drain upstream to George Johnston Road.

The costing for both components i.e. the Muskrat outlet improvement and the Swaley Drain outlet improvement are also shown in **Appendix 6**.

This project and its costs were also presented at the October Scoping Meeting.

**Project 3 – Larger Project Plus Widened Downey Drain**

After the Larger Project was developed and costed, the decision was made by the Engineer, for information purposes, to expand the scope of work for the Larger Project to include more work in the Downey Drain and to create a separate hypothetical project known as the Larger Project Plus Widened Downey Drain.

The work that was added from the basic Larger Project was to provide for a 2m widening of the Downey Drain throughout from its junction with the Coleman Ditch downstream to the River.

In addition to a widening of the Downey Drain, the Coleman Ditch would also be widened (and deepened perhaps somewhat).

A hydrology analysis was not made to identify that such a widening (2± metres) may indeed be necessary. However since a new connector channel bringing additional waters to the Coleman ditch, and thus to the Downey, would be 2 metres wide such was the basis of considering a 2m widening of the Downey. If ever such a project were to proceed, more of a hydrological/hydraulic analysis would be necessary.

<sup>(i)</sup> *Mats are heavy wood working platforms customarily used to support excavating equipment in soft soils.*

Any widening of the Downey Drain would be in addition to the work costed out in the 750m of improvements in the Downey included as part of the basic larger project downstream of the Giffen Drain (Ronald Road).

Costing assumed that some additional clearing would be necessary alongside the Downey and that all newly excavated materials would be levelled on site.

**Appendix 6** contains details of this project.

As is evident in **Appendix 6**, the Larger Project Plus Widened Downey Drain would increase the costs of the Larger Project by \$110,000 to a total of \$495,000.

This project would however provide a continuous and designed outlet for the Swaley all the way to the River and is perhaps what should have been done many years ago.

It would be expected substantial political and environmental obstacles would be encountered if such a project were considered. Also the favourable cost benefit ratio is reduced.

This undertaking if done is considered so substantial that if such were to be pursued, the work should be initiated by petition (Section 4 of the Drainage Act) rather than by requesting an improvement (Section 78 of the Drainage Act).

Such petition may be difficult to secure.

For all these reasons, this project although costed has not been presented as an option to consider.

#### **Project 4 – Revised Smaller Project**

At the October Scoping Meeting (to which most landowners in the Swaley and Downey Drain watersheds together with other stakeholders were invited) the consensus was that a Smaller Project rather than a Larger Project should be pursued.

After the October Scoping Meeting, a further meeting was convened with senior NVCA staff to discuss the work going forward. The outcome of this NVCA meeting was that:

- a) The smaller project rather than the larger project would create less concerns to the Authority and would have a greater chance of receiving approval.
- b) More surveys should be undertaken to determine if the extent of work downstream of the Swaley could be even further reduced.
- c) The proposed work should be discussed with OMAFRA and MNRF staff.

Two items of survey work were subsequently actually undertaken - one at the Swaley terminus and one at the Muskrat outlet.

At the Swaley outlet, a survey by GPS was possible for 400m downstream in a northwesterly direction and for 300m in a westerly direction (and the two were linked for verification). It was found that Muskrat levels were 300 to 350mm lower than Swaley levels at these 300 to 400m downstream locations.

The survey findings at the Muskrat are discussed in the next section.

*i) Further Survey at the Swaley Terminus*

The lower Muskrat level (350mm) was in the westerly direction and at the distance of 300m. This location is in the more original route of the Muskrat (as evident from 1954 aerials and as evident from aerial drone work) and appears more linked to the downstream Muskrat route.

The conclusion was formed that it may only be possible to lower levels in the Swaley Drain by 350mm unless perhaps 400 to 500 metres of more downstream work on the Muskrat route were undertaken. This suggestion that more lowering may be possible if the work in the Muskrat is continued further downstream, is based on the drone survey work. A GPS survey would be desirable but difficult to confirm this. (Midwinter survey work on snowshoes would be necessary.)

By comparison and as described by the “Larger Project” it would be possible to lower Swaley levels by 600mm if the connector ditch were constructed and joined to the Coleman ditch and if the Coleman ditch had a small cleanout to the Downey (and possibly west to the historic Muskrat) so that its levels were lowered by 200mm.

However, the cost to do the larger project is estimated at \$385,000 versus \$187,000 to do the revised smaller project. Also there is a greater possibility of environmental approval not being received for the Larger Project.

There is also the possibility that the work at the Muskrat outlet (described next) may lower the Muskrat level to provide a cumulative lowering greater than 350mm at the Swaley, east of the River.

*ii) Further Survey at the Muskrat Outlet*

The second item of surveying completed after the October meetings noted that there was approximately a 400mm of drop in Nottawasaga River levels between the Downey and Muskrat outlet locations. The boat travel between the two locations identified areas of fallen tree blockages in the River<sup>(i)</sup> and rippling of the River water at the blockages

Indicating some ponding at each blockage. It is felt that if a removal of at least the central portions of the fallen tree blockage areas were attended to, the River levels could be perhaps lowered by 100 to 150mm at the Muskrat location.

<sup>(i)</sup> *There were no similar blockages noted in the River downstream of the Downey Drain to Highway 26 at Edenvale.*

Perhaps this area of blockages in the River between the Downey and Muskrat is a historic area of blockages and such may have contributed to the decision to initiate the government ditch work (now the Downey Drain) in the 1930's starting further downstream in the River past the area of the Muskrat outlet.

It is known that the NVCA and perhaps the Township, have been involved in an annual review of the River to remove such blockages.

If indeed the River levels can be lowered by even 100mm at the Muskrat and if the sediment levee is removed, the Muskrat levels may be lowered by an accumulated 200mm at the end of the 500m± cleanout length recommended as part of Muskrat outlet improvements.

If this result can be transferred throughout the Muskrat up to the Swaley then potentially a 500mm lowering at the Swaley could result from this Revised Smaller Project including the removal of debris areas in the River by NVCA/Township personnel.

Two other comments can be made. Firstly, with just the 350mm lowering of the Swaley levels at its outlet combined with a drainage superintendent program cleanout of the Swaley up to George Johnston Road, a lowering of water levels of 400mm at the Gilroy tile outlet should result. This would lower the water to within 70mm (3") of the tile invert. These dimensions are based on surveys in November/December 2017. A similar but slightly greater lowering of levels of the Swaley should result at George Johnston Road.

Secondly it has been noted that Downey Drain levels north of the Muskrat ponding area (500m east of River) may be 400mm lower than the ponding area. A decision could be made to improve the Muskrat outlet by going 450m± north to the Downey rather than going west to the River as described and costed. However, the need for blockage removal and perhaps channel improvement in the Downey between the Giffen Drain and the River would need to be addressed, and certainly the Downey Drain assessment schedule would need revisions. The possibility of using the Downey rather than the River could be revisited if a Preliminary Report were authorized. But at this time, the Revised Lower Cost Project assumes the River is used as the outlet and that debris removal in the River occurs (as part of the yearly maintenance of the River).

## **PROJECT COST ESTIMATES**

The cost estimates for the four projects described, as already stated, are to be found in **Appendix 6**.

## **FEASIBILITY OF PROJECTS**

The previous sections have identified the need for an improvement to the outlet of the Swaley Drain and have identified possible works that could be constructed.

However, the construction works that have been discussed should also be evaluated from a feasibility perspective with respect to ease of construction and maintenance, with respect to

expected impacts on the Minessing wetlands, and also with respect to the ability to pay the costs that are incurred.

a) Feasibility of Construction and Future Maintenance

For construction to be feasible, there has to be a reasonable access to the work activities, then there has to be a reasonable working corridor along the work activity, and lastly the soils have to be “reasonable” to work with.

To access the existing outlet of the Swaley Drain, the spoil berm that exists along the north side of the channel can be easily used (by even trucks) together with use of Gilroy’s farm lane from George Johnston Road back to the channel.

To access the Muskrat outlet work at the River, discussions have indicated that access should be available using the spoil berm in the unopened Ronald Road allowance to the south of the Giffen Drain with a crossing of the Downey Drain east of the intersection of the Giffen and Downey Drains.

The costing for a crossing of the Downey Drain was prepared on the basis that a heavy gauge steel pipe culvert would be acquired and would become part of the drainage works. This culvert would be left in a secure non channel location at most times and would only be moved to and placed in the Downey Drain channel when crossing of the channel for construction or maintenance were necessary.

To access any connector work further upstream (near the Coleman/Cavana ditch, Downey, Tracey Davis Award and Muskrat confluences), if ever done, travel off of Ronald Road and then south along the 12<sup>th</sup> Concession Road allowance (unopened Glengarry Landing Road South) to the Downey with a similar temporary pipe crossing of the Downey is suggested. It is possible access could be fully obtained from the south from the Swaley Drain heading north but it may be desirable to also access from the north and to even clean the Coleman/Cavana ditch where paralleled by the access to better allow construction work in the connector from the south.

To reach the work areas south of the Downey Drain, whether it is at the Muskrat Outlet work area or at the Coleman ditch work area for a connection, it is suggested excavation equipment would have to travel along mats after crossing the Downey.

To reach the Muskrat outlet work area, it is anticipated to be necessary to mat the 300m± distance to the route of the Muskrat, and then to mat along the Muskrat area outside of the deciduous bush but hopefully to work without mats along the existing route of the Muskrat within the deciduous woodlot. Should a maintenance berm/corridor be deemed desirable and/or necessary, such would be created as to be described re the connector work from the Swaley to the Tracey Davis.

To reach the Coleman ditch/Tracy Davis junction, it is anticipated it would be necessary to mat from the Downey Drain crossing and then along the new connector southerly to the Swaley.

Wherever excavation work is undertaken, a decision would be necessary re disposal of spoil and/or construction of temporary and/or permanent paralleling spoil banks/berms.

Input into this decision will initially come from the environmental study and preliminary report study and then later will come once the nature of the excavated soils is better determined.

Where the excavated channel will be shallow ( $750\text{mm}\pm$ ) and not overly wide ( $2\text{m}\pm$ ), the spoil could be levelled in with adjacent grasses provided it is deemed acceptable from an environmental perspective. If so done, the excavator would have to mat back out to the access point after finishing the channel work.

Alternatively, if a spoil berm is to be temporarily constructed alongside the new channel during excavation (versus spreading the materials thinly in the grasses), perhaps some overdigging of the channel would be necessary to obtain sufficient suitable material to construct a travelable berm. Then as the excavator is returning, the berm materials would be excavated out and loaded onto track mounted low bearing pressure haul vehicles.

If a spoil berm as described is to be constructed and left for future maintenance, then the excavator would walk back out on the berm. This is the type of construction that exists on the Swaley and Downey Drains and is what would be recommended if a new connector (as described herein) along the bush line were pursued. Where a spoil berm is left permanently it may be found desirable to both overdig the channel and the footprint of the berm so that more silts/clays are placed in the berm and the overdug organics along the berm route are placed on the overdug channel.

There are no soil test holes in the wetlands that this Engineer is aware of but it can be suspected that reasonable soils exist below the upper organics where work is proposed. The Engineer has walked out to the Coleman Ditch and his staff have "walked" (with hip waders) along the reduced length route where work is now proposed at the Swaley Drain outlet and also out to the ponded area on the Muskrat route  $500\text{mm}\pm$  east of the River.

Certainly the original construction of the Tracy Davis, Coleman, Downey, Swaley and even the Muskrat outlet channels have endured for substantial periods of time. County soils mapping indicates marly clay and/or sandy loam soil types exist adjacent to the muck soils which suggests such could be found below the organics. The Contractor of the Holland Marsh Canal Project (28 km of canal excavation in organic/peat soils) walked to the sites of the Coleman and Swaley outlet ditches and stated construction work is entirely possible, but mats would be necessary. He estimated 500' (150m) of new channel (750mm deep) could be excavated in a day and at a cost of \$2,500/day excluding any hauling out of materials. Where work was necessary without mats costs would be less.

If no spoil berm is left after construction is completed, future maintenance would also have to occur by “matting” of the cleanout excavation length in the same fashion as the channel was constructed.

If a spoil berm is left for future maintenance, periodic yet reinstatable, swales through the berm may be necessary to equalize drainage on either side of the berm.

It will be important that whatever works are constructed, whether it be an improvement to the Muskrat at the River, or whether it be a connector channel between the old Tracey Davis Drain/Coleman Ditch<sup>(k)</sup> and the Swaley and/or whether it be a downstream continuation of the Swaley Drain, that these works become part of the Swaley Drain system for future maintenance purposes. Also even the Coleman Ditch should be incorporated if the connector ditch were constructed.<sup>(k)</sup> All should be incorporated as the Swaley Drain Outlet Works, and any Report should provide how maintenance is to be undertaken on these channels once constructed.

b) *Feasibility of Minimal Damage to the Minesing Wetlands*

Any work will be preceded by an environmental impact study.

It is suspected that even if the work activities included the downstream improvements of the Muskrat at the Nottawasaga, plus a connector channel along the edge of the deciduous tree line generally from the Coleman/Tracey Davis ditch to the Swaley ditch, that the impacts by construction to the wetlands would be substantially reduced compared to those impacts involving construction in or alongside the old Muskrat route throughout between the Swaley and the River. If the connector ditch were not built and the Swaley were only extended further into the wetlands, the impacts on the wetlands would be even more reduced.

Any environmental study will have to identify plants, fisheries, wildfowl, turtles, insects, etc. that may exist and that may be affected by the project. The study would also have to identify what works of mitigation could be implemented to improve the habitat that remains. The study should also identify the possible advantage to the wetlands in having residual water levels lowered.

In this regard, the environmental sub-consultant who has served in the Holland Marsh Canal project was asked to prepare a Draft Terms of Reference for an environmental study to address potential channel construction in the Minesing wetlands. This consultant reviewed previous correspondence from NVCA, reviewed the potential construction projects identified by the Engineer, and met with

<sup>(k)</sup> *This Scoping Report is not recommending this connector ditch be pursued by any follow up Drainage Act Report that may be authorized.*

representatives of NVCA and MNRF. He prepared a Draft Terms of Reference for a study along a larger project corridor extending from the Swaley Drain to the Coleman Ditch to the Downey Drain and on to the River. This corridor would be associated with a “Larger Project”. The Draft Terms of Reference were acceptable to both MNRF and NVCA staff and is included in **Appendix 7**.

It is anticipated that the draft terms of reference as included here in **Appendix 7** can be reduced for a reduced construction project as in a “Smaller Project”.

Expectation that environmental issues can be satisfactorily addressed should be determined before any construction occurs. For this reason, this Scoping Report recommends that the next step, if construction work is to be pursued after this scoping study is submitted, should involve, what is called by the Drainage Act, a Preliminary Report and the actual environmental impact study should be undertaken as part of the Preliminary Report work.

**c) Feasibility of Costs Being Distributed**

To evaluate if the costs that would result from a project and that would be assessed and paid, following the procedures of the Drainage Act, are reasonable, it is first necessary to decide on which estimate of costs should be analyzed. Different projects have been shown in **Appendix 6** and it was decided costs for a Larger Project should be selected for the feasibility analysis.

The cost figure of \$300,000 was selected firstly since the initial Larger Project costing was in this magnitude (until it was determined the connector would involve more excavation), since it is now a cost between the Larger and Smaller project costs and since it facilitates prorating any other cost figure.

It is evident that in all cost estimates, there are sums to allow for firstly the construction estimate, to allow then for the land allowances that have to be paid pursuant to the Drainage Act to those properties on which work is occurring, to allow for the expected costs of the environmental impact study that is undertaken, to allow for possible costs of environmental features that may have to be built into the project, to allow for the costs of the engineering to complete the reports required under the Drainage Act, and to allow for the costs of the supervision services during construction with respect to layout, inspection, finalization, and lastly to allow for municipal costs involved with temporary financing, net HST costs, etc.

Some of the considerations that were given to determine how the costs should be distributed and how the ability to pay may be addressed follows. For ease of review these are set forth in tabular form.

- Normally when an existing municipal drain has its outlet improved, extended or altered, the existing maintenance schedule of the report would apply. The last maintenance schedule prepared for the Swaley Drain was in 1970. This would normally be the applicable schedule to use.

- On this project, it is however felt that the existing schedule as it is should not be used unless it has some modifications for a combination of reasons (the existing schedule is contained in **Appendix 8**).
- Firstly any works that are involved to improve the outlet of the Swaley have been made necessary not just by the Swaley Drain watershed. The degradation of the natural Muskrat Creek outlet over time has no doubt been a combination of flood levels in the Nottawasaga with perhaps some build-up of sediments associated with it, but probably just as much due to the loss of the bush cover in the Minesing due to higher water levels and the resulting spread of grasses (manna) which restrict flows.
- Secondly the Willow Creek overflowing is no doubt also contributing to higher water levels in this part of the wetlands, to the loss of the bush lands, to the growth of the grasses and to the possible deposition of sediments, especially in Concessions 10 & 11. The Willow Creek and other tributaries to the Minesing in this area are serving existing urban lands and will do so more in the future.
- It is not practical to make an assessment of costs to the watershed of the Nottawasaga River and it is not practical to make an assessment of costs to the Willow Creek watershed. However, it is felt that the flood levels that occur in the Minesing Wetlands have, no matter how initiated, led to the destruction of the bush area in the swamp, and thus to the growth of grasses in the swamp, plus sediment deposition into various channels and areas in the wetlands, including at the Muskrat Creek outlet and the Swaley Drain outlet. The costs to address these components should not be assessed alone to the Swaley Drain watershed. The costs should be assessed to a much broader area but it is difficult to do this through the Drainage Act. It is the undersigned's opinion at this time that the method of assessment/cost distribution to be adopted in any Engineering Report should be to have a greater component of the costs of any outlet work assessed to the Township of Springwater.
- The Township of Springwater may be in the best position to attempt to obtain additional funding from "others" to recognize the share that should be attributable to the River and Willow flooding.
- There should also be a component of costs to the Minesing Wetlands itself. Many of the lands in the wetlands are shown to be owned by the Nottawasaga Valley Conservation Authority and others by the Ministry of Natural Resources and Forestry. Preliminary work indicates that the ratio of NVCA lands to MNR lands may be 70:30.
- It is felt that if the works that have been described are implemented to improve the Swaley and Muskrat outlets, that there will be benefits to the Wetlands, even though impractical to quantify, due to:
  - Better preservation of the remaining deciduous bush that exists as a result of some lowering of water levels and better provision for upstream flows across components of the wetlands
  - Reduction of the quantity of sediments that may be deposited in the wetlands at the Swaley Drain and/or Muskrat Creek outlets
- For this reason, it is the undersigned's suggestion that a certain percentage of the costs of the work be also assessed to the Minesing wetlands. For now the assessments are shown to be to the Nottawasaga Valley Conservation Authority

and also to the Ministry of Natural Resources and Forestry and perhaps even to others.

- The existing schedule for the Swaley Drain should be modified such that there is a higher component of the costs assessed to the County of Simcoe. This is in recognition of the fact that the works that would be constructed on the Swaley Drain will ultimately have a significant improvement to County Road 28. Lower water levels in the Swaley Drain at the County Road would be a significant benefit to the County. Should the lower end of the Swaley Drain not be improved, should it either be abandoned as a Drainage Act project or become un-maintained, the impacts to the County Road and its drainage system will be compounded. For this reason, an additional proportion of the costs should be shown to be levied to the County.
- It is also felt that the County, like the Township, may be in a position to access outside funding for any works that are undertaken.
- The further change that should be made from the 1970 schedule is to recognize that the maintenance schedule for the Swaley Drain did not assign percentages of maintenance to the properties immediately downstream of County Road 28 to the same extent as to the properties upstream. It is felt that those properties on the west side of County Road 28 within the Swaley Drain watershed upstream of the current terminus will have an improved outlet as a result of this project and should be assessed in the same proportion as those lands on the upstream side.

Accordingly, the existing 1970 Schedule of the Swaley Drain has been extended in **Appendix 8** to show the distribution of costs for a \$300,000 project. **Appendix 8** notes the percentages assessed in the original 1970 schedule as well as the possible revised percentages for a \$300,000 project used to establish the distribution.

It should be noted that any properties that have the farm property class tax rate will be eligible for a 1/3 municipal grant. Those properties that are expected to be eligible for such have been noted with an asterisk, and their share of the project costs could be reduced by 1/3. There has been no attempt at this time to confirm this eligibility. This possible grant has been recognized in determining the “net” cost distribution.

To possibly make the project more feasible to some landowners, it is suggested that Council could consider a means of payment similar to what was undertaken on a project in the Holland Marsh area. There those landowners who had high assessments and the Municipality came to an agreement that the costs to be assessed to the properties would be paid back over a period of 40 years and at a prescribed interest rate, with the ability to prepay those costs should the owners wish to do so at any time. This could make the costs more easily managed where desired.

A straight debenture program could also be considered by the Municipality where the costs are debentured over a set period. The Municipality could supply advice on either approach.

As is evident from data in **Appendix 8**, if a \$300,000 project were implemented, and if a 100 acre property had the farm property class tax rate, the net costs that could be assessed to that property, as a one-time charge could be \$3,000 to \$4,000. If the costs were distributed over an extended time frame, the annual costs could be determined dependant on the duration of financing and the interest rate applicable.

As an example, if a \$10,000 net assessment (this could be a total for 3 farms with the Farm Tax Rate) were spread over a 25 year payment period with an interest rate of 4%, it is possible using an approximate calculation only, that the annual amount to be paid would be \$600±. This is considered a reasonable cost to ensure that a drainage system can continue to legally and physically serve all properties in its watershed and avoid the situation of greater deterioration and/or of legal abandonment.

A project with a cost less than \$300,000 would have proportionally smaller costs.

## **SUMMARY**

Considering what has been viewed, heard and what is known, the undersigned Engineer recommends that works be initiated to improve the outlet of Swaley Drain pursuant to the Drainage Act but that such works should be carefully implemented so costs are controlled and so that environmental impacts are pre-determined and minimized.

From a construction perspective, it is recommended that there be works to improve the outlet of the Muskrat Creek at the Nottawasaga River (or at the Downey Drain) together with works to improve the outlet of the Swaley Drain into the old channel of the Muskrat Creek a minimum of 300m± downstream of the existing termination of the Swaley Drain.

It is also recommended that the on-going River maintenance undertaken by agreement between the Township and the Municipality continue.

It is recommended that the project scoping study be accepted by the Township and that an Engineer be appointed pursuant to Section 78 of the Drainage Act to commence the next step in the process. It is recommended that the appointment to the Engineer pursuant to Section 78 should initially be only for a Preliminary Report. It is further recommended that the environmental impact work to be undertaken should be completed as part of the Preliminary Report. The Engineer in the Preliminary Report stage should update/confirm elevations secured during this Scoping Study, should attempt to secure more GPS type of elevations further downstream from the existing Swaley terminus, should update the survey of the Swaley Drain and tile outlets into it upstream to Highway 26 and should review the current watershed of the Swaley Drain.

The Preliminary Report should also attend to some soils probing to confirm the type of soils that could be encountered and to confirm the expected ease of constructability. Also the Preliminary Report could finalize access provisions.

Lastly, the Preliminary Report could address what additional work should be considered in the future by either a future/phased construction contract or by a separate future report with a separate future construction contract, should the work to be initially recommended be found insufficient. As an example, perhaps the Preliminary Report could examine the impacts of extending the Swaley Drain further downstream than the 300mm and/or of joining the Muskrat to the Coleman ditch at one location in Lot 7, Concession 12 together with a cleanout of the Coleman Ditch to the Downey Drain. Perhaps if the Muskrat outlet is improved into the River, a further analysis could be made of providing it a future and further outlet to the Downey Drain in addition. The Preliminary Report could also examine the option of going further downstream at the Swaley outlet initially in lieu of doing the work at the Muskrat outlet.

If and once a Preliminary Report including the Environmental Study is prepared, and is accepted by Council and the Conservation Authority, then an appointment to do a Final Report should follow.

The recommendation of this Engineer re initiating a separate scoping study on the Willow Creek is included in **Appendix 4**.

#### **OPTIONS AVAILABLE TO COUNCIL**

Notwithstanding that the undersigned recommends that action be initiated under the Drainage Act, the undersigned has to recognize that the works to improve the outlet of the Swaley Drain will not only have a physical and an environmental aspect, but will also have a political aspect.

It is recognized that there may be initial reluctance by some landowners in the Swaley Drain to participate in a project with the magnitude of costs forecast and there may be reluctance of the Municipality itself to participate in a project with such costs.

There may be reluctance in the Downey Drain watershed to see the Swaley Drain outlet improved notwithstanding that the initial recommended work may perhaps reduce waters that could drain to the Downey Drain. The concern of the Downey Drain owners may be that other options discussed could add waters to the Downey Drain.

There may be concerns that even the Lower Cost Project has high costs, and that it may not initially provide the lowering of the Swaley waters desired.

When the Municipality receives this Scoping Report, they will have the following options:

- Reject the Scoping Report and do no further work in regards to it
- Acknowledge the Scoping Report, but require more scoping to be done in a second phase.
- Accept the Scoping Report and appoint an Engineer pursuant to Section 78 of the Act as recommended by this Scoping Report
- Acknowledge the Scoping Study, but determine that for works to be initiated there will have to be a petition submitted by owners in the Swaley Drain watershed, whether it is a petition of the majority of the owners of that area that is most

adversely affected west of Highway 26, or whether it is a petition by the majority of the whole of the Swaley Drain.

It has to be pointed out that there is no obligation of a Municipality to initiate works of improving an outlet of an existing Municipal Drain. The Municipality is only obligated under the Act to maintain the existing drain to the specifications by which it was constructed.

The Act does however **allow** the Municipality, pursuant to Section 78 and where the Municipality deems it advisable, to appoint an Engineer to improve or alter the outlet together with other activities on the drain. This is set out in Section 78(1) of the Act which reads as follows (underlining added by the undersigned):

*78. (1) If a drainage works has been constructed under a by-law passed under this Act or any predecessor of this Act, and the council of the municipality that is responsible for maintaining and repairing the drainage works considers it appropriate to undertake one or more of the projects listed in subsection (1.1) for the better use, maintenance or repair of the drainage works or of lands or roads, the municipality may undertake and complete the project in accordance with the report of an engineer appointed by it and without the petition required by section 4. 2010, c. 16, Sched. 1, s. 2 (27).*

**Projects**

*(1.1) The projects referred to in subsection (1) are:*

- 1. Changing the course of the drainage works.*
- 2. Making a new outlet for the whole or any part of the drainage works.*
- 3. Constructing a tile drain under the bed of the whole or any part of the drainage works.*
- 4. Constructing, reconstructing or extending embankments, walls, dykes, dams, reservoirs, bridges, pumping stations or other protective works in connection with the drainage works.*
- 5. Otherwise improving, extending to an outlet or altering the drainage works.*
- 6. Covering all or part of the drainage works.*
- 7. Consolidating two or more drainage works. 2010, c. 16, Sched. 1, s. 2 (27).*

It must be stressed that the use of Section 78 is not mandatory. It is a decision that Council can make.

Even use of Section 79 of the Act where owners can compel Municipalities to repair a Municipal Drain would only be applicable to forcing the Municipality to repair the Swaley Drain to the specifications applicable and such would not involve any work downstream of the current terminus of the Swaley Drain. There is no obligation pursuant to Section 79 to force the Municipality to initiate works, by itself, to improve the outlet provided by the original report.

This Engineer does however believe that the Municipality should act under Section 78 firstly because an improved outlet is required and secondly so that it is not necessary for one portion of the watershed to petition the works perhaps to the disagreement of the remaining part of the watershed. This is perhaps an area where the Municipality should elect to initiate the project. But as indicated, such is not mandatory, and the Municipality may ultimately elect to determine how it wishes to act.

**CONSEQUENCES OF PROCEEDING PURSUANT TO SECTION 78 WHERE ENVIRONMENTAL APPRAISAL ONCE COMPLETED IS NOT ACCEPTED AND PRECLUDES FURTHER ACTIVITY BEING UNDERTAKEN**

In the, hopefully, unlikely situation where the environmental study that is undertaken, as recommended by this Scoping Study, is not acceptable and the project is then in the position where environmental approvals to construct cannot be obtained, then the project may have to be concluded or substantially modified at the Preliminary Report stage.

When a Preliminary Report is concluded and not proceeded with, then the party that initiated the Preliminary Report would be responsible for the costs but with a 1/3 grant applied. In other words, if the Municipality were to initiate the Section 78 Preliminary Report and then elected not to proceed to a Final Report, the Municipality could be responsible for two thirds of the costs of the Preliminary Report.

There have been opinions issued within the Drainage industry that where a Section 78 report is undertaken for the betterment of the drain and for reasons beyond those of the party(ies) that initiated the Preliminary Report, the project does not proceed, the costs of the Preliminary Report can be assessable in full or in part to the watershed of the municipal drain itself. This is a consideration that could be explored further, if the situation so required.

The Engineer would however have the options, if the Preliminary Report was initiated and completed and if it became evident that the costs to address the requirements of the environmental study are impractical or impossible, and/or that environmental approval will not be granted, to indicate in the Preliminary Report, that the "costs" of continuing with a construction project are not practical and that proceedings be initiated to move from the Preliminary Report to a Section 40 Report to terminate proceedings or to a Final Report pursuant to Section 78 (with consideration of Section 32) to pay out insufficient outlet allowances. As part of such considerations, the Engineer could address the totals of the costs incurred to date, the future report costs and/or the amounts for insufficient outlet that should be paid. The Preliminary Report could even indicate the general range of assessments to be involved and parties to be assessed if a Section 40 Report were prepared to terminate proceedings or if a final Section 78 Report were to be made to provide for payments related to insufficient outlet.

Also, the Preliminary Report could discuss the costs and implications of abandonment of the Swaley Drain or parts of such, if such should be an evident course of action.

All of which is respectfully submitted.

K. A. Smart, P. Eng.

mw



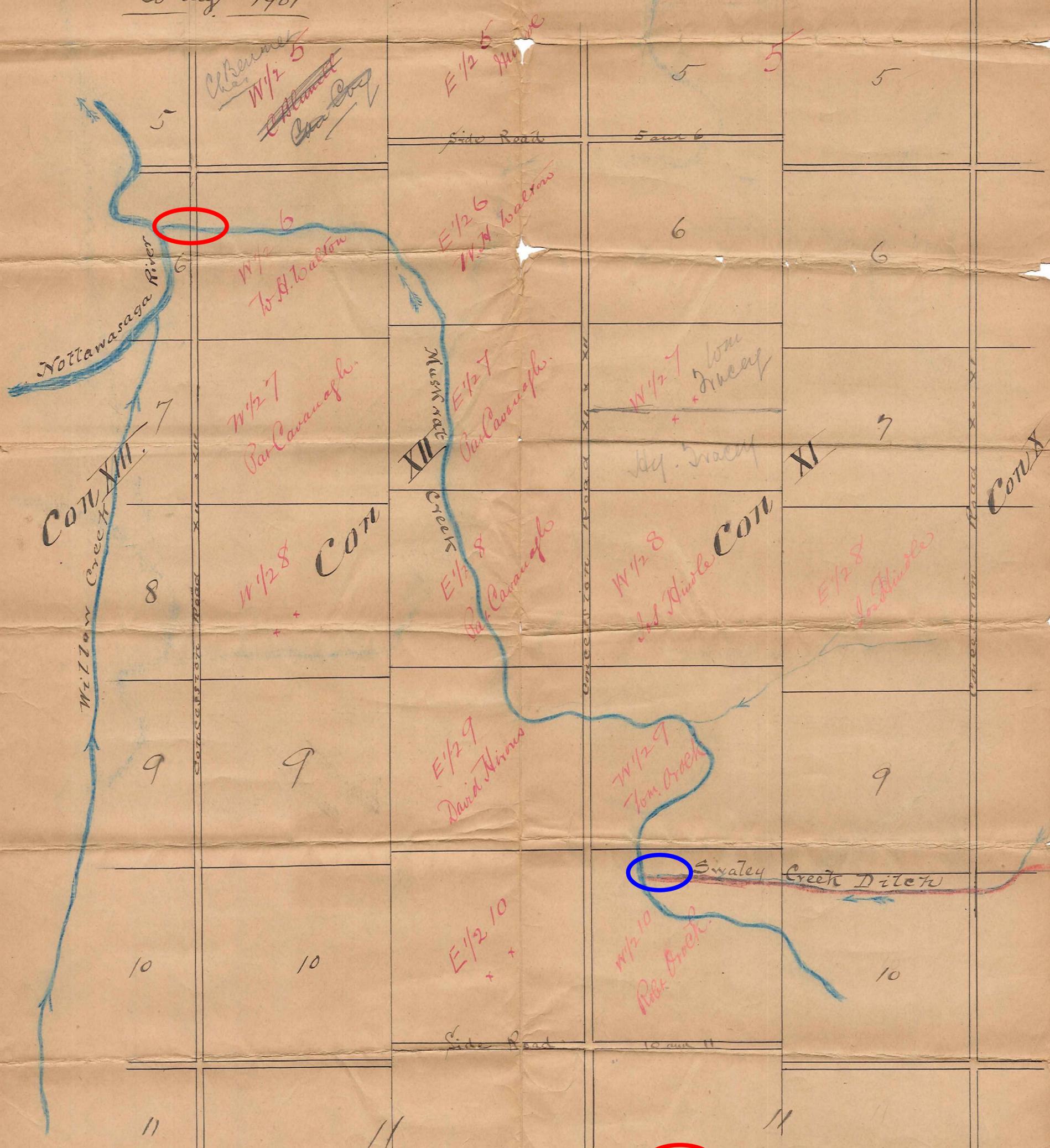
# **APPENDIX 1**

## **1901 DRAWING**

Swaley Creek Drainage  
Township of Vespra.

Muskrat Creek outlet  
Assessment Plan.

M. Gavillet et al.  
Collingwood Ont. Surveyors  
30<sup>th</sup> Aug<sup>st</sup> 1901



Scale 10 chs to One Inch.

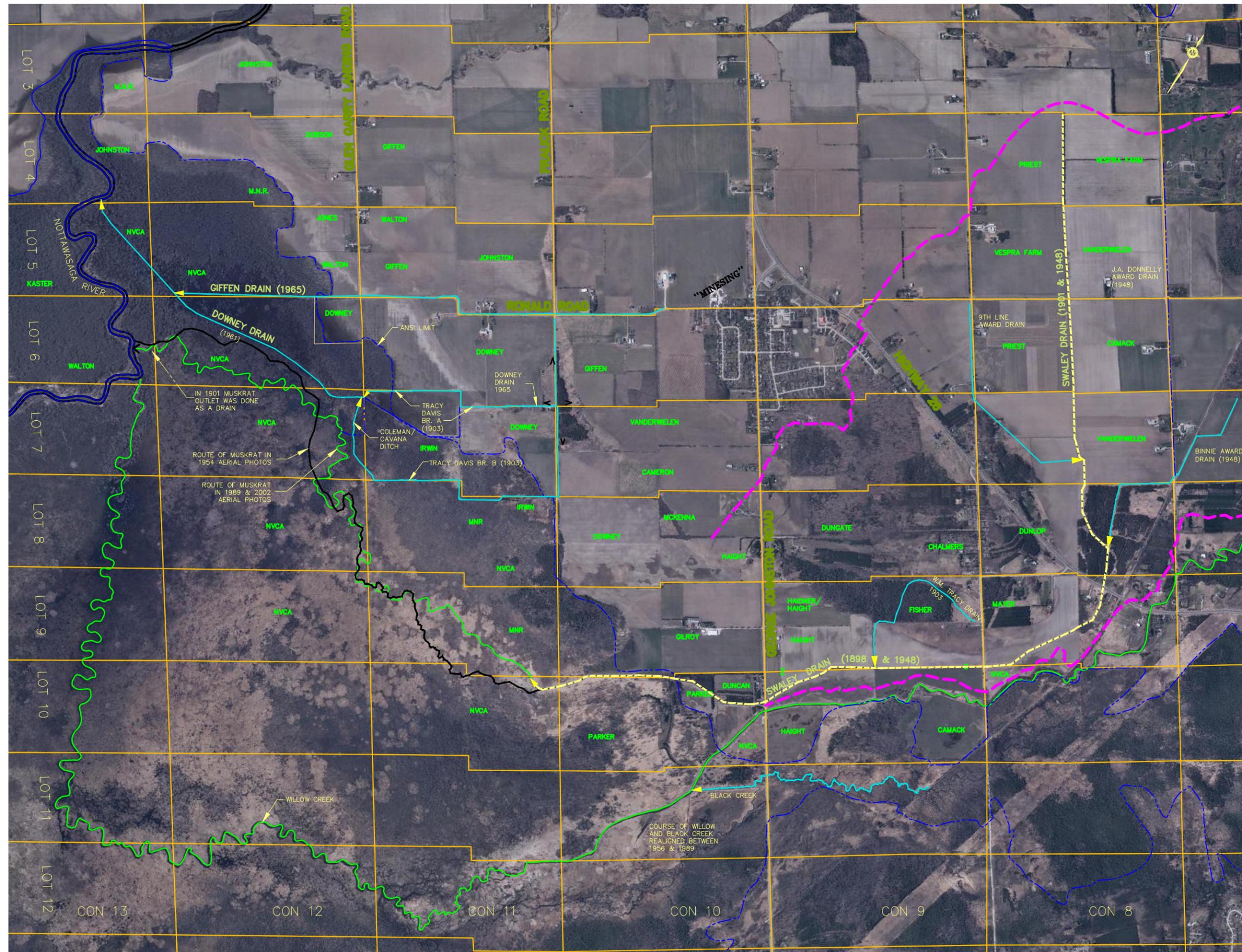
- MUSKRAT OUTLET IMPROVED IN 1900's
- SWALEY OUTLET IN 1900's

## **APPENDIX 2**

### **AERIAL DRAWING SHOWING WATERCOURSE LOCATIONS**

# APPENDIX 2

## AERIAL DRAWING SHOWING WATERCOURSE LOCATIONS



**PLAN LEGEND**

- NATURAL WATERCOURSE
- MUNICIPAL DRAIN
- WATERSHED BOUNDARY
- WETLAND BOUNDARY

DESIGNED BY: K.A.S.	SCALE 0 200 400 PLAN 1:12,500
CHECKED BY: K.A.S.	
DRAWN BY: D.C.P.	
CHECKED BY: K.A.S.	
<b>SWALEY DRAIN</b>	
COUNTY OF SIMCOE TOWNSHIP OF SPRINGWATER	
<b>AERIAL OF OVERALL DRAINAGE</b> APR. 2017	
<b>K. SMART ASSOCIATES LIMITED</b> CONSULTING ENGINEERS AND PLANNERS KITCHENER SUDBURY	REVISED:
	JOB NUMBER: <b>16-387</b>
	DRAWING <b>1 OF 2</b>

# **APPENDIX 3**

**RE**

# **MINESING WETLANDS**



### APPENDIX 3

#### THE MINESING WETLANDS

Documents reviewed that specifically discuss the Minesing Wetlands are:

- *Council's Report to Draft Master Plan for Minesing Swamp*, January 17, 1975
- *Draft Master Plan for Minesing Swamp*, March 1975
- *60 Years of Forest Change in Minesing Wetlands*, May 2014

Other documents that discuss conditions in the Minesing Swamp in the vicinity of the Swaley Drain are:

- *Willow Creek Drainage Study*, November 1970
- *Willow Creek Sub Watershed Plan*, December 2001

Some of the items noted from these reports are:

- The Minesing Swamp/Wetlands is a 15,000 acre (6000 hectare) area of land generally lying east of Highway 90, south of Highway 26, north of Simcoe County Road 10 and west of Simcoe County Road 28
- Historically the area was part of glacial Lake Algonquin and was created with the retreat of the Wisconsin Glacier 10,000 to 12,000 years ago.
- The area was again flooded 4000 to 5000 years associated with high levels in Georgian Bay/Lake Huron.
- The improved connection of Lake Huron to Lake Erie (St. Clair area) has lowered water levels in Georgian Bay/lake Huron.
- The watershed draining to the Minesing is 250,000 hectares.
- A 1970's Council opinion contained in or referred to by one of the documents was that:
  - a) Thousands of acres of bush lands in the Swamp are being destroyed by flooding of Willow Creek
  - b) Preservation of (habitat for) human life should be as or more important than preservation of (habitat for) wildlife in the swamp.
- The Draft Master Plan for Minesing Swamp in 1975, contained the following comments (in italics) re the drainage ditches entering the Minesing Wetlands/Swamp:

*A number of drainage works have been constructed in the swamp to improve agricultural lands. Some of these drains, for example, the Swailey (s.i.c.) Drain, Downey Drain, Giffen Drain, Arnham Drain, the drain west of the Mad River and running parallel to it, and the drain in Lot 4, Concession 14 outletting in the Nottawasaga River, must be maintained (by the appropriate authority) if their removal*

*would either introduce greater changes to the swamp environment than they presently cause, or reduce the benefit to property beyond the swamp boundary.*

*Corrective drainage measures may be needed at some future date to prevent catastrophic change in the swamp. The extensive flooding caused by recent alterations to the hydrology of Willow Creek and the Swailey Drain is an excellent case in point. Given the extent of the affected area and its botanical significance, it may be desirable to restore the stream flow to its normal watercourse and install sediment traps outside the swamp boundary. But this problem and others like it will not be solved in the swamp alone. This fact is reflected in the scope of the recently proposed study of the Willow Creek watershed. The solutions will involve many agencies besides the Swamp Management, including the local Township Council, the Conservation Authority, the Province (through the Drainage Referee) and possibly, the Government of Canada (through ARDA). The crucial point is: future decisions to intervene in hydrological systems must be based on the best information, and be made only when the biological consequences of corrective action on the swamp have been simulated and fully assessed in terms of benefits and disbenefits under the Drainage Act.*

- The Forest Change Study in 2014 by the NVCA noted in its executive summary (in italics):

*Forest decline was determined through analysis of a series of airphotos and orthoimagery available from 1953 to 2012. In 1953, forest cover in the Minesing Wetlands (core/study area) was estimated at 4,400 ha: about 70% of the core wetland landscape. This forest included approximately 3,000 ha of deciduous forest, which was dominant in the bottomland and lowland areas, along levees and on the periphery of the wetland. A mixed coniferous swamp covered an area greater than 1,400 ha along the base of the Algonquin Bluffs in the southeastern portion of the core wetland.*

*Between 1953 and 2013, 1,860 ha of deciduous forest cover was lost. Though partially offset by 240 ha of forest gain via regeneration (220 ha deciduous forest, 20 ha coniferous forest), this represent a 37% net decline in total forest cover and a loss of more than 56% of total deciduous cover during this time period. An analysis of historical reports prepared for and by the Ministry of Natural resources showed that the main tree species lost was Silver Maple (Moriyama, 1974; AAA Consultant, 1977; MNR, 1979). Extensive emergent marsh and thicket swamp communities have replaced deciduous forest cover.*

*These observed changes in deciduous forest cover prompted an investigation into what could have caused such a significant decline in the last sixty years. Cumulative impacts from subwatershed-scale and local land clearing and drainage combined with*

*subsequent impacts associated with Hurricane hazel and Dutch Elm disease are linked to changes in the hydrology of the wetland (longer and more variable periods of inundation) and responsible for a shift in dominant ecosystem type from deciduous swamp forests to open marsh and swamp thickets. Innovative watershed planning is needed to ensure that future growth does not compound existing hydrological impacts. Continued wise stewardship on rural lands is also needed to control sediment loadings to watercourses tributary to the Minesing Wetlands.*

- Of note in the 2014 study are comments related to:
  - Longer and more varied periods of inundation of the wetlands.
  - By allowing the Swaley Drain water to better reach the Nottawasaga, such would assist in reducing (even though marginally) the longer and more varied period of inundation
  - The desirability of controlling sediment loadings to watercourses tributary to the wetlands. (This will be discussed in **Appendix 4** re the Willow Creek.)
  
- Natural heritage features in the Minesing Wetlands which would be in the area of the Swaley Drain are also discussed by a Willow Creek report referred to in **Appendix 4**.

**APPENDIX 4**

**RE**

**WILLOW CREEK**



## APPENDIX 4

### THE WILLOW CREEK

A discussion of the Willow Creek is necessary when any considerations are given to the Swaley Drain.

Willow Creek serves a 30,700± hectare watershed (by comparison, the Swaley watershed is 1,150 ha.±). It extends from the Nottawasaga River to and beyond Little Lake with a length of 45 km. There is a total fall of in excess of 150 metres from its upper reaches to the River.

The Willow Creek is not entirely a natural watercourse in its lower reaches across Concessions 9 and 10. (Portions upstream of Concessions 9 and 10 have not been reviewed in any detail at this time.). Articles reviewed indicate that some man made improvements to the Willow occurred in or around 1950. The 1950's work is believed to have been from County Road 28 downstream across the east half of Lots 10 and 11, Concession 10. Aerials obtained for the Willow Creek in the area of Concessions 10, 11 and 12 Vespra and for the years of 1954 and 1989 indicate that between these two years, at some specific time, a substantial further man made reconstruction of the Willow Creek occurred. This later work occurred across the balance of Concession 10 and into Concession 11 and upstream across the W1/2 Lot 10, Concession 9. Black Creek was also reconstructed in this area presumably at the same time.

The writer has been advised that two further construction type of projects were constructed in the Willow Creek downstream of County Road 28 in the period of 1975 to 2005± in an attempt to address sediment accumulations. Firstly, in the 1970's it is believed two substantial "finger shaped" sediment collection areas were excavated off of the Willow. Then later in the early 2000's sediment pooling areas in the bottom of the Willow were excavated. It is believed both sediment collection features were abandoned due to the logistics of disposal of the sediments collected.

Willow Creek approaches the Minesing Wetlands at approximately the same location across County Road 28 as the Swaley Drain. The Willow Creek traverses a length of in excess of 9 km (measured along the route of the creek not along the actual centre of all the meanders of the channel which would be a far greater distance) from County Road 28 to the River. The combination of the Swaley Drain and Muskrat Creek by comparison traverses a length (again measured along the route not along the meanders) of approximately 5.5± km to the River.

Where the Willow crosses County Road 28 its water level and channel bottom are 1.0 and 0.5m± higher respectively than the equivalents in the Swaley Drain. This difference in water level is certainly understandable with the greater flow path from the River to the County Road and if equivalent flat gradients existed. (Note: 9 – 5.5 = 3.5 km and @ 0.03% fall (along route not meanders) is 1m±.)

It is readily evident that although Willow Creek crosses the County Road 80m± south of the Swaley Drain, and that it ultimately discharges into the River only 200m± south of the historic discharge of the Muskrat Creek remnants into the River, it is in much of its length a distance of 2 to 2.5 km away from the Swaley/Muskrat route. (The Downey Drain outlets into the River 1,500m± north of the Muskrat outlet.)

Four documents that have been made available for the undersigned to review are:

- *Willow Creek Drainage Study*, November 1970
- *Master Plan for Minesing Swamp (Draft)*, March 1975 and follow up letter
- *Willow Creek Sub Watershed Plan*, December 2001
- *60 Years of Forest Change in the Minesing*, May 2014

The Willow Creek Drainage Study in 1970 (believed to be by the former Ministry of Lands and Forests) commented on the severe silting in the creek and the known problems of breaking banks at locations and flooding into the Swaley. The Report identified then the concern with flooding caused by the Willow. Among options listed as being available to address the causes or the effects of the flooding were to:

- Excavate portions of the Willow and Swaley to return them to their original condition when they serviced the farmlands
- Construction of new channels to replace those silted
- Combining the Willow and Swaley with a man-made channel to the River
- Construct a dyke to serve part of the area
- Purchase of the flooded farms

The Report identified the need for in-depth field surveys and cost analyses.

A background study in 1968 entitled Report on the Inspection of the Minesing Swamp Drainage System in Vespra Township by the Ontario Department of Agriculture and Food was contained as an appendix in the 1970 Report. This Ag and Food Dept study in its concluding pages noted;

*Leave the 3 streams (Black, Willow, Muskrat) to meander as they are and the area will gradually become more suited to wildlife. At the same time to protect the farmers, Downie (s.i.c.) drain will have to be widened and deepened to carry excess summer flow, as well as continue the cleaning of the Swailey (s.i.c.) drain until a sufficient outlet is reached.*

*Should the present swamp pasture land and the many thousands of acres of woodland be improved then there is the possibility of diverting the Black and Willow Creek into the Swailey Creek on the west of the road in Concession 10. The Swailey Creek would then have to be properly deepened and widened in order to carry the excess summer flow. Even though the diversion be carried out, the entire marsh would continue to be flooded during the spring freshet, due to the inability of the Nottawasaga to carry the spring flood waters.*

In 1975, in a Report/Letter by Vespra Council to the author of the 1975 Study "Master Plan for Minesing Swamp", it was noted that;

- The Minesing Swamp floods annually because of the Nottawasaga River but has little lasting damage
- Flooding by the Willow however has caused loss of bushland in the Minesing and has affected existing municipal drains
- The Willow should have some cleaning from the river to the road allowance between concession 11 and 12 and should be cleaned, with attached sediment basins, from there to the road between concessions 8 and 9
- The Minesing Master Plan should acknowledge the Willow Creek condition to minimize further worsening of destruction of farm lands

The draft Master Plan for Minesing Swamp with a date of March 1975 is the only published version of the Master Plan this writer has had access to.

The contents of page 81 of this March 1975 Study discussing the maintenance of the ditches in the Minesing Swamp have already herein been referred to and included in the appendix re the Minesing Wetlands.

One section on the said page 81 refers specifically to studies in the Willow Creek watershed where it states;

*But this problem and others like it will not be solved in the swamp alone. This fact is reflected in the scope of the recently proposed study of the Willow Creek watershed. The solutions will involve many agencies besides the Swamp Management, including the local Township Council, the Conservation Authority, the Province (through the Drainage Referee) and possibly, the Government of Canada (through ARDA). The crucial point is: future decisions to intervene in hydrological systems must be based on the best information, and be made only when the biological consequences of corrective action on the swamp have been simulated and fully assessed in terms of benefits and disbenefits under the Drainage Act.*

The Willow Creek Subwatershed Plan Report 2001 by the NVCA

- Talks of the soils in the Willow Creek watershed being 75% well drained soils and sandy loam while imperfectly drained loams, sandy loams, silty loams, clay loams

- and muck constitute the balance. It notes some of the silty clays are excellent agricultural soils.
- Notes that 90% of its watershed is agriculture or rural and that the largest built up areas in the watershed are lands within the City of Barrie, Midhurst, Snow Valley, along the Highway 11 corridor, Centre Vespra and Craighurst.
  - Describes the natural heritage components of the Willow Creek watershed as;
    - a) The ANSI area of the Minesing Swamp
    - b) The warm water fish habitat of the Willow and Little Lake and the cold water habitat of the tributary Matheson Creek. It notes northern pike exist in the Willow downstream of County Rd. 28.
    - c) Providing groundwater recharge associated with headwater wetland.
    - d) Having one threatened species being the Eastern Mississauga Rattlesnake in the Minesing Swamp.
    - e) Having two vulnerable species (Cerulean Warbler and Spotted Turtle) in the swamp.
    - f) Having five listed rare plant species in the swamp
    - g) Having wetlands
    - h) Having wildlife habitat
    - i) Having woodlands
    - j) Having valley lands
  - provides criteria and recommendations for storm water management including that there be continued development of hydrologic modelling and that storm water management facilities be established by secondary plans or functional servicing plan studies.

The May 2014 NVCA Study on 60 years of Forest Change in the Minesing recommends that conservative watershed planning is required to address the potential cumulative impacts of urban growth pressure in the Minesing watershed to ensure that identified floodplain impacts are not exacerbated. This no doubt would apply to the Willow Creek.

This writer has been advised that various background studies have been undertaken on Willow Creek as part of development of the Midhurst Secondary Plan. These studies/papers had not yet been supplied for review to the undersigned nor have they been specifically requested since the study of the undersigned is with respect to the Swaley Drain.

However, based on a review of existing papers/studies related to the Willow Creek based on comments from landowners along the Willow Creek in the vicinity of County Road 28, and based on comments from NVCA staff at meetings with the undersigned, the undersigned recommends that a project scoping study of Willow Creek be undertaken, similar to this Swaley Drain study and by someone familiar with the Drainage Act.

The goal of a study would be to identify if the Willow Creek could be managed to the betterment of both the Minesing Wetlands and of the land uses upstream of the wetlands, if it were to become what is commonly known to be a Municipal Drain.

#### Use of the Drainage Act;

- Allows owners who may have construction work on their lands to be compensated and without purchase or easements
- Allows for environmental appraisals to be obtained
- Allows for dealing with agencies and road authorities and provides that increased costs because of utilities or roads be paid by the utility or the road
- Allows for considerable and direct contact with landowners
- Facilitates distribution and payment of costs
- Provides for future maintenance
- Customarily involves an experienced Drainage Engineer with a practical approach to resolving drainage related issues in difficult scenarios

The objectives of a study would be to identify the need for, and potential areas of, sediment collection, the need for routine channel maintenance, and even the need for areas of channel improvement, of the Willow across the wetlands to minimize flooding, the need for, and potential areas of, storm water management (possibly combined) to reduce Willow Creek flows to the capacity of the Creek's channel in the wetlands, and the need for, and potential areas of, upstream channel improvement such as would be accomplished by natural channel work to reduce severe sediment generation to maintain flows in the wetlands.

Water level determinations, channel measurements, gradient measurements, field walking reviews of the Creek from County Road 28 to Little Lake and aquatic reviews (canoe or equivalent) from County Road 28 to the River should be undertaken to note erosion locations, breakout locations (existing and potential), levee development, flow restriction locations, soil types, land use restrictions and other.

Drone surveys (both for aerial and topographic purposes) and mapping should be undertaken. Meetings with stakeholders and landowners should occur.

Preliminary hydrology/hydraulic analyses would be undertaken to better understand flow of Willow Creek waters throughout its course. Hydrologic input from NVCA as being further developed, should be an input. Measurements of channel sizes and crossings could be analyzed and be combined with local past experience to determine adequacies and could be used as calibration on any hydrologic/hydraulic modelling. This is work that a Drainage Engineer customarily undertakes.

A review of the natural heritage features, concerns and impacts would be a significant component discussion of a scoping study.

The study could then identify both construction type of projects and maintenance type of projects that could be considered through the Drainage Act or possibly through some other medium.

Such project scoping will have a significant cost and should be funded by a broad group of affected stakeholders – the Municipalities, the Environmental Agencies, the Province and even by the parties associated with new developments.

The study should review problems existing and to be addressed, and if possible - prior to major urban development proposals being implemented in the Willow Creek watershed.

Any scoping study in the Willow Creek should also include the Black Creek which is in part now a short man-made channel paralleling Willow Creek to its south from County Road 28 westerly for 400m±.

Even if the scoping study should conclude that the Willow Creek should not/could not become a municipal drain, perhaps the studies undertaken would assist in management of Willow Creek by others to the betterment of the wetlands and downstream landowners.

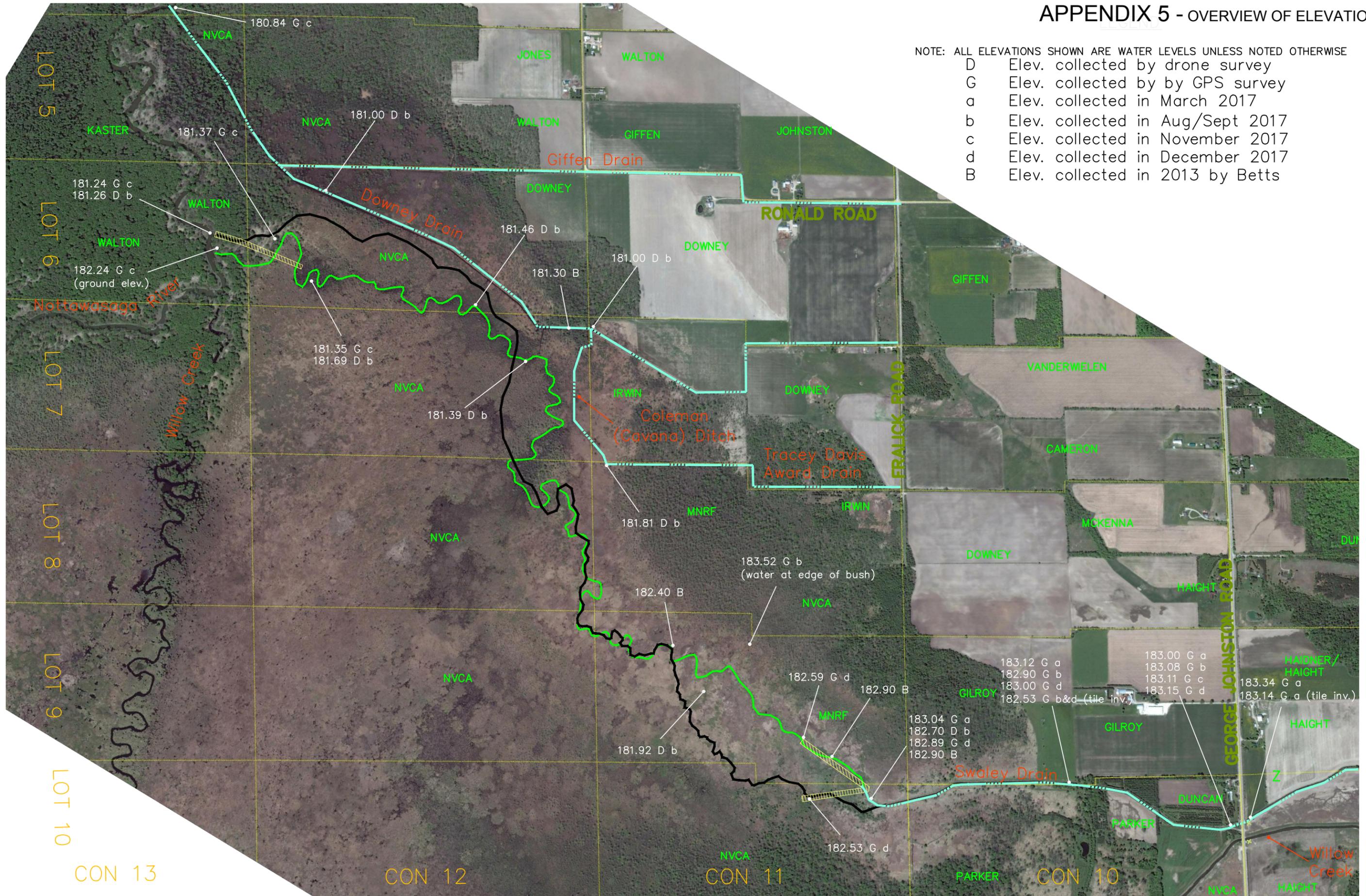
# **APPENDIX 5**

## **OVERVIEW OF ELEVATIONS**

# APPENDIX 5 - OVERVIEW OF ELEVATIONS

NOTE: ALL ELEVATIONS SHOWN ARE WATER LEVELS UNLESS NOTED OTHERWISE

- D Elev. collected by drone survey
- G Elev. collected by by GPS survey
- a Elev. collected in March 2017
- b Elev. collected in Aug/Sept 2017
- c Elev. collected in November 2017
- d Elev. collected in December 2017
- B Elev. collected in 2013 by Betts



# **APPENDIX 6**

**RE**

# **PROJECT COST ESTIMATES**



## APPENDIX 6

### PROJECT COST ESTIMATES \*

#### **A) Projects and Cost Estimates**

##### **a) Project 1 - Larger Project**

###### When Done

- Initially April/May 2017
- Updated September/October 2017

###### Survey Data Available

- Bett's survey
- KSAL's surveys in Swaley on both sides of George Johnston Road, at Gilroy tile outlet and at outlet of Swaley
- Drone survey of scattered elevations in River, Downey, Coleman, new connector, old Muskrat and Swaley

###### Miscellaneous Data Available

- Holland Marsh contractor input
- Photos by NVCA at Muskrat outlet
- Personal view of Coleman ditch, parts of Tracy Davis, adjacent Muskrat

###### Project Components

- Improve outlet of Muskrat into River
- Improve Muskrat channel for 500m east of River
- Brush and repair Downey in Concession 13
- Incorporate Coleman
- Do connector Coleman to Swaley
- Sediment pond at Swaley
- Cleanout Swaley

###### Project Cost Estimate

- Land allowances	\$ 15,000
- Mobilization and access (including pipe)	27,000
- Brush and repair Downey in Concession 13	8,000
- 500m of Muskrat improvement east of River	10,000
- 2000m new connector ditch (Coleman to Swaley)	90,000
- Sediment pond at Swaley	10,000
- Swaley cleanout	10,000
- Constructed environmental features	20,000
- Contingencies	10,000
- Environmental study	75,000
- Engineering Report costs	70,000
- Supervision and administration costs	40,000
TOTAL:	\$ 385,000

\* All cost estimates are estimates only. Such are subject to results of further survey work, design considerations and environmental inputs.

**b) Project 2 - Initial Lower Cost Project**Project Background and Timing

- Was prepared in August 2017 using all data available for costing of "Larger Project"

Project Components

- Improve outlet of Muskrat into River
- Improve Muskrat channel for 500m east of River
- Improve Muskrat for 700m downstream of Swaley
- Do a sediment pond at existing Swaley outlet (listed as optional)
- Clean existing Swaley channel up to George Johnston Road (optional also)

Project Cost Estimate

- Land allowances	\$ 6,500
- Mobilization and access (including pipe)	10,000 *
- Work at Muskrat outlet (the 500m)	10,000
- Work at Swaley outlet (the 700m)	15,000
- Constructed environmental features	10,000 *
- Sediment pond (Optional)	5,000
- Clean Swaley (Optional)	10,000
- Contingencies	3,500
- Environmental study costs	50,000
- Engineering Report costs	60,000
- Supervision and Administration costs	30,000
TOTAL:	\$ 210,000
<i>Total if options not done</i>	<i>\$ 195,000</i>

\* Missed in October tallying of costs

**c) Project 3 - Larger Project Plus Widened Downey Drain**Timing and Background

- Same as for Larger Project and Initial Smaller Project

Project Components

- Brush and widen Downey from the River to the junction with the Coleman Ditch
- Widen and deepen the Coleman Ditch
- Construct the new connector channel from Coleman to Swaley
- Sediment pond at existing Swaley outlet
- Cleanout the Swaley up to George Johnston Road

Project Cost Estimate

- Land allowances	\$ 25,000
- Mobilization and access (including pipe at crossings)	15,000
- Brush & widen Downey in Concession 13	30,000
- Widen Downey in Concession 12	25,000
- Deepen and widen Coleman	15,000
- 2000m connector Coleman to Swaley	90,000
- Larger sediment pond	25,000
- Clean/repair Swaley	10,000
- Constructed environmental features	20,000

- Contingencies	20,000
- Environmental study costs	80,000
- Engineering Report costs	80,000
- Supervision and administration costs	<u>60,000</u>
TOTAL:	\$ 495,000

**d) Project 4 - Revised Lower Cost Project**

When Done

- January/February, 2018

Additional Survey Data Available

- New GPS survey in River and at Muskrat outlet plus for 350m downstream of existing Swaley outlet

Miscellaneous Additional Data Available

- Results of Scoping Meeting in October 2017 (feedback from all owners) and results of presentation to NVCA staff in October
- Correspondence with OMAFRA and MNRF

Project Cost Estimate

- Land allowances	\$ 5,500
- Mobilization and access (including pipe)	12,000
- Work at Muskrat outlet (either into Downey or into River with debris removal)	12,000
- 300m of work at Swaley outlet	7,500
- Constructed environmental features	7,500
- Contingencies	2,500
- Environmental study costs	50,000
- Engineering Report costs	
- Preliminary	25,000
- Final	35,000
- Supervision and administration costs	<u>30,000</u>
TOTAL:	\$ 187,000 *

- \* *It is possible that if only the Swaley outlet work were done and if environmental and engineering studies were further reduced, the costs could be reduced by \$30,000± to \$35,000± but landowners would have to agree that a lowering of 350mm only in the Swaley water level is acceptable. It is recommended that if a project were to be done for the Swaley outlet work only, it should be a project that would allow phasing with the implementation of the Swaley work as Phase 1 and the Muskrat work as Phase 2 if and when determined necessary. In this case, the project cost estimate would not be reduced but in the event Phase 2 were not constructed, the final cost could be reduced by \$20,000±. Alternatively if a project were done for the Swaley outlet only, the project should allow for the Swaley outlet work to be continued further downstream initially to secure more lowering of water levels. Any sediment ponds costs or cleaning of the Swaley Drain would be additional or could be done pursuant to the Drainage Superintendent program.*

**APPENDIX 7**

**DRAFT TERMS OF REFERENCE  
FOR  
ENVIRONMENTAL STUDY**



# RIVERSTONE

ENVIRONMENTAL SOLUTIONS INC.

## APPENDIX 7 DRAFT TERMS OF REFERENCE FOR ENVIRONMENTAL STUDY

June 20, 2017  
RS#2017-068

**Ken Smart**

K Smart Associates  
via email: [ksmart@ksmart.ca](mailto:ksmart@ksmart.ca)

**SUBJECT: Scope of Field Studies—Swaley Drain Improvements Project, Minesing, ON**

Dear Ken:

RiverStone Environmental Solutions Inc. is pleased to provide a work plan to complete a natural heritage studies required to provide sufficient background information to inform project design and support agency approvals as part of the Swaley Drain Improvements Project in Minesing, ON. The complexity of the surveys required for this project are further complicated by the remote nature of the site and difficulties associated with accessing portions of the project area. As such, standard industry methods for completing the following surveys have been employed to the extent possible. RiverStone has adapted the industry standard protocols to address complications with the project site, while maintaining the level of rigor expected by the approval agencies.

Results of our background screening and information request from the Ministry of Natural Resources and Forestry (MNR) indicate that there is the potential for the following *Endangered* or *Threatened* species to be present, and to be potentially impacted by the proposed project:

- |                      |                                 |
|----------------------|---------------------------------|
| -Blanding's Turtle   | -Hine's Emerald Dragonfly       |
| -Spotted Turtle      | -Cerulean Warbler               |
| -Northern Myotis     | -Eastern Prairie Fringed-orchid |
| -Little Brown Myotis | -Least Bittern                  |

In addition to targeted surveys for Endangered or Threatened species, Nottawasaga Valley Conservation Authority (NVCA) has indicated that they would require surveys to provide data pertaining to:

- |                         |                              |
|-------------------------|------------------------------|
| -Anuran Surveys         | -Dragonfly/Damselfly Surveys |
| -Vascular Plant Surveys | -Fish Habitat Assessment     |

The following work plan outlines the scope of onsite assessments required to collect sufficient information to determine if these species are present within the project areas. This scope has been based on air photo interpretation. Should field work identify additional features/habitat of interest we will discuss any additional work with the project team as a change in scope.

### Turtle Surveys

Surveys for Blanding's Turtles and Spotted Turtles will be completed following the protocols outlined in OMNR (2014). Communities with the potential to function as habitat for these Turtles will be identified through air photo interpretation. Visual encounter surveys for basking Turtles will be completed during spring and early summer (i.e., between ice out and June 15<sup>th</sup>) and will occur between 0800–1700h. Surveys will only occur when air temperatures are >10°C and will target warm days following cool or inclement weather. A total of 5 survey days will be completed within a three-week period.

Visual encounter surveys for *Endangered* and *Threatened* turtles will be conducted in accordance with both the *Occurrence Survey Protocol for Blanding's Turtle (Emydoidea blandingii) in Ontario* (OMNR 2014) and the *Occurrence Survey Protocol for Spotted Turtle (Clemmys guttata) in Ontario* (OMNR 2013). Notwithstanding a few small methodological differences the Blanding's Turtle and Spotted Turtle protocols overlap considerably, allowing surveyors to complete both protocols at the same time. Both protocols involve conducting five (5) separate surveys spread out over a minimum three (3) week period between ice-out (i.e., April) and June 15 under appropriate weather conditions (e.g., generally sunny conditions, no rain). Although Spotted Turtle surveys can occur at temperatures of at least 6°C, all turtle visual encounter surveys will be completed when air temperatures were at least 10°C since this is a requirement of the Blanding's Turtle survey protocol. Where possible, surveys will be timed to target warm days following cool or inclement weather, which would increase the chances of encountering basking turtles. Vegetation communities and habitats, that are accessible, are located within proximity to the project area, and have potential to function as habitat (i.e., overwintering, basking, feeding) for *Endangered* and *Threatened* turtles will be targeted.

### **Northern Myotis and Little Brown Myotis**

Targeted surveys for bat Species at Risk will be conducted in forested portions of the project area, where tree removal is anticipated. Where tree removal is anticipated, a preliminary site visit will be completed to determine if suitable roosting trees (i.e., snag/cavity trees), are present. Acoustic surveys will be completed in June for a minimum of ten (10) nights in areas where tree removal is anticipated. Acoustic equipment will be deployed to target (a) trees identified for removal, and (b) suitable snag/cavity trees in proximity to areas of tree removal. Should Endangered bat species be detected during acoustic surveys, further consultation with MNRF will be required.

### **Breeding Bird Surveys**

Two rounds of breeding bird surveys will be conducted in accordance with the Ontario Breeding Bird Atlas (OBBA) protocol (Bird Studies Canada et al. 2001). Surveys will target forested portions of the project area between May 24–July 10. Each survey will be completed between dawn and 5 hours after dawn under suitable weather conditions (i.e., no rain, wind speed  $\leq 3$  on the Beaufort Wind Scale). Results of these surveys will include details pertaining to the breeding evidence, as per the OBBA, for each species observed (i.e., Observed, Possible Breeding, Probable Breeding, Confirmed Breeding).

Should there be potential for construction access to the project site to occur across farm fields, the breeding bird surveys will be expanded to include agricultural fields containing hay or similar crop (including fallow fields). Surveys on agricultural lands are intended to target Bobolink or Meadowlark and will only be completed if the potential for these habitats to be impacted is identified.

### **Least Bittern and Marsh Bird Surveys**

Surveys for Least Bittern (*Ixobrychus exilis*) and other Marsh Birds will be completed using acoustic monitoring equipment. Given the difficulties in accessing the project area, acoustic monitoring equipment will be employed to provide more data than surveys were conducted in accordance with the National Least Bittern Survey Protocol (Jobin et al. 2011) would produce. Typically, surveys for Least Bitterns involves the completion of three (3) surveys between approximately mid-May and mid-July from 30 minutes before sunrise to 10:00h. Each survey lasts thirteen (13) minutes, and consists of five (5) minutes of passive listening, five (5) minutes of broadcasted Least Bittern “coo” calls, followed by a further three (3) minutes of passive listening.

The *Marsh Monitoring Program for Surveying Marsh Birds* (Bird Studies Canada 2008) involves completing two (2) surveys between May 20 and July 5 at least 10 days apart during the morning or evening under appropriate weather conditions (i.e., no precipitation, good visibility, wind speed  $\leq 3$  on the Beaufort wind scale). Each survey lasts fifteen (15) minutes, and consists of five (5) minutes of passive listening, five (5) minutes of broadcasted calls (Least Bittern, Sora, Virginia Rail, Common Moorhen/American Coot, Pied-billed Grebe), followed by a second five (5) minutes of passive listening.

To survey for both Least Bittern and Marsh Birds, RiverStone would complete a total of three (3) surveys between mid-May and mid-July; however, each survey would consist of recording ambient sounds for a total of two (2) hours for three (3) consecutive days; this would result in a total of nine (9) survey hours per site. Daily and seasonal timing of recordings would be consistent with the National protocol.

### **Anuran Call Surveys**

Calling anuran surveys will be conducted using a modified version of the *Marsh Monitoring Program for Surveying Amphibians* (Bird Studies Canada 2009). This protocol involves the completion of three (3) surveys once per month between April and June from 30 minutes after sunset until approximately midnight. Appropriate weather conditions include no or very light precipitation and wind speed  $\leq 3$  on the Beaufort wind scale. As the project area is located within the central region (between the 43<sup>rd</sup> and 47<sup>th</sup> parallels), each survey must occur during the second half of the month (i.e., April 15-30, May 15-31, and June 15-30). Given difficulties and health and safety concerns with accessing the project site during the time of day required to complete anuran call surveys (i.e., evening/night), acoustic monitoring equipment will be used to record calling anurans at a number of monitoring sites. To increase the likelihood of recording all species of anurans present at a given site, a minimum of two (2) nights of recording will be completed at each monitoring site during each of the three (3) monthly surveys.

### **Vascular Plant Survey**

A vascular plant survey consisting of a comprehensive area search (“wandering transects”) will target accessible portions of the project area. Particular effort will be paid to areas with the greatest potential to support *Endangered*, *Threatened*, or provincially rare vascular plant species. A summary of all species encountered will be provided with nomenclature and common names for the recorded vascular plant species being generally consistent with the Southern Ontario Vascular Plant Species List (Bradley 2013). Targeted searches for Butternut (*Juglans cinerea*) will be completed in portions of the project area that are forested.

Vascular plant surveys will be completed in two (2) seasons, with the first occurring during early June, and the second survey being completed at the end of July or early August.

### **Dragonfly/Damselfly Surveys**

Surveys for Odonates (i.e., dragonflies and damselflies) will be completed using a comprehensive area search (“wandering transects”) targeting a cross section of the open (i.e., non-forested) ecological communities within the project area, where access can occur. As Hine’s Emerald Dragonflies (*Somatochlora hineana*) are known to occupy the Minesing Wetlands, targeted surveys will take place along the edge of thicket and forest habitats as this species typically is located within 100m of these edges. Three (3) visual encounter surveys will take place in July to target the mating season for Hine’s Emerald Dragonflies, when adults are highly active. During each survey, observations of crayfish burrows will be documented as well as these features represent a critical component of the Hine’s Emerald habitat.

Hine’s Emerald Dragonflies closely resemble the Clamp-tipped Emerald (*Somatochlora tenebrosa*) and requires close visual observation to confirm identification. As such, suitable approvals to complete these surveys will be obtained from MNRF (i.e., a B-Permit under the ESA) prior to commencing field work.

### **Fish Habitat Assessment**

The fish community within Swaley Drain and Downey Drain will be the focus of the fish community assessment for this project. Given the extensive nature of the inventory work historically completed on the Nottawasaga River, this feature will not be sampled. The fish community in the lower reaches of the Swaley Drain, where it meets the marsh communities of the Minesing Wetlands will be sampled using a backpack

electrofishing crew. Additionally, portions of the Downey Drain will be electro-fished. The goal of these surveys is to collect information pertaining to the fish species present in each of these drains. Sampling will occur in July to avoid spawning windows. Habitats will be characterized in the reaches where changes to the natural channels is proposed. These descriptions will be used to guide the creation of fish habitat in the sections of new channel, particularly at the outlet to the Nottawasaga River.

At this time, these are the primary field studies that have been deemed necessary to complete an assessment of impacts for the proposed changes to the municipal drainage and natural watercourses in the vicinity of the Minesing Swamp. These study descriptions have been forwarded to the MNRF and NVCA for comment, but have not been formally approved. To complete the surveys as set out above, provide a summary report detailing the methods and results of the surveys, and participate in a single meeting to present the findings are anticipated to be between \$64,000–67,000. This cost is inclusive of all professional fees and disbursements but exclusive of HST. This cost is in addition to the costs already incurred, which includes time to communicate with the engineers, MNRF and NVCA, meet onsite with the same group, review existing information on the natural features of the Minesing Swamp, including preliminary GIS mapping. Costs incurred to date total \$5132.32

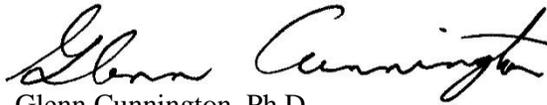
Should you have any questions please contact us at 705.645.9887 (office).

**RiverStone Environmental Solutions**

Per:



Al Shaw, M.Sc.  
Senior Ecologist/Principal



Glenn Cunningham, Ph.D.  
Ecologist / Species at Risk Specialist

**APPENDIX 8**

**TO SHOW**

**POSSIBLE**

**DISTRIBUTION**

**OF COSTS**

## APPENDIX 8

Original: December 1969  
 Revised for Draft Report: May 2017  
 Further Work: September 2017

SCHEDULE TO SHOW HOW \$300,000 COST COULD  
 BE ASSESSED USING AS A BASIS, THE  
 TOWNSHIP OF VESPRA  
 SWALEY CREEK MUNICIPAL DRAIN  
 1970 ASSESSMENT SCHEDULE  
 FOR MAINTENANCE PURPOSES  
**(REVISIONS TO THE ORIGINAL 1970 SCHEDULE TO GENERATE FINAL PERCENTAGES ARE IN BOLD)**

MOST OWNER NAMES HAVE NOT BEEN UPDATED

CON. NO.	LOT OR PART LOT	OWNER	AFFECTED ACRES	ORIGINAL 1970 PERCENTAGE AMOUNTS TOTAL	% TO USE IF 200%	TOTAL % TO USE (100%)	SHARE OF 300,000	LESS 1/3 GRANT (to be confirmed)	LESS ALLOW- ANCES	POSSIBLE NET ASSESSMENTS
<i>* Indicates Land Used for Agricultural Purposes.</i>										
6	1 to 5 inclusive Rd Between Con 6 & 7	County of Simcoe Twp of Vespra	250.00	5.25	5.25	2.63	7,876.18	0.00	0	7,876.18
			8.00	0.30	0.30	0.15	450.07	0.00	0	450.07
7	E ½ 3	L. & D. Wilson *	20.00	0.42	0.42	0.21	630.09	210.03	0	420.06
	E ½ 4	K. Phillips *	50.00	1.05	1.05	0.53	1,575.24	525.08	0	1,050.16
	Pt E ½ 5	T. Davidson *	95.00	2.00	2.00	1.00	3,000.45	1,000.15	0	2,000.30
	Pt E ½ 5	W. & O. Hankin	2.00	0.04	0.04	0.02	60.01	0.00	0	60.01
	E ½ 6	C. & M. Campbell *	25.00	0.40	0.40	0.20	600.09	200.03	0	400.06
	Pt W ½ 3	L. & D. Wilson *	10.00	0.36	0.36	0.18	540.08	180.03	0	360.05
	Pt W ½ 3	I. Barron & N. Donaldson	15.00	0.51	0.51	0.26	765.11	0.00	0	765.11

## APPENDIX 8

Original: December 1969  
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 Further Work: September 2017

CON. NO.	LOT OR PART LOT	OWNER	AFFECTED ACRES	ORIGINAL 1970 PERCENTAGE AMOUNTS TOTAL	% TO USE IF 200%	TOTAL % TO USE (100%)	SHARE OF 300,000	LESS 1/3 GRANT (to be confirmed)	LESS ALLOW- ANCES	POSSIBLE NET ASSESSMENTS
	W ½ 4	I. Barron & N. Donaldson	95.00	2.49	2.49	1.25	3,735.56	0.00	0	3,735.56
	Pt W ½ 5	Lemrac Holdings Ltd. *	96.50	2.51	2.51	1.26	3,765.56	1,255.19	0	2,510.37
	Pt W ½ 5	J. & E. Bell	3.50	0.11	0.11	0.06	165.02	0.00	0	165.02
	Rd Between Lots 5 & 6	Twp of Vespra	8.00	1.30	1.30	0.65	1,950.29	0.00	0	1,950.29
	W ½ 6 & Pt W ½ 7	J. Diceman *	70.00	2.20	2.20	1.10	3,300.50	1,100.17	0	2,200.33
	W ½ 7	W. & H. van Der Wielen *	25.00	1.02	1.02	0.51	1,530.23	510.08	0	1,020.15
	W ½ 8	M. Jones *	3.00	0.06	0.06	0.03	90.01	30.00	0	60.01
	Pt 4 to 7 incl.	C.N.R.	12.00	1.00	1.00	0.50	1,500.23	0.00	0	1,500.23
8	W 75 Acres N½ 3	L. & D. Wilson *	30.00	0.78	0.78	0.39	1,170.18	390.06	0	780.12
	Rd Between Lots 5 & 6	Twp of Vespra	7.00	1.30	1.30	0.65	1,950.29	0.00	0	1,950.29
	E ½ 5	N. Bartholomew *	100.00	3.95	3.95	1.98	5,925.89	1,975.30	0	3,950.59
	Pt W ½ 5	C. Priest *	99.70	3.15	3.15	1.58	4,725.71	1,575.24	0	3,150.47
	Pt W ½ 5	Bell Canada	0.03	0.09	0.09	0.05	135.02	0.00	0	135.02
	E ½ 6	I. Camack *	100.00	3.95	3.95	1.98	5,925.89	1,975.30	0	3,950.59
	NW ¼ 6	H. & G. Priest *	50.00	1.85	1.85	0.93	2,775.42	925.14	0	1,850.28
	SW ¼ 6	H. Priest *	50.00	1.85	1.85	0.93	2,775.42	925.14	0	1,850.28
7	Rd Between Con 7 & 8	Twp of Vespra	15.00	1.64	1.64	0.82	2,460.37	0.00	0	2,460.37
8	Pt 7	G. VanGennip *	116.00	4.28	4.28	2.14	6,420.96	2,140.32	0	4,280.64
	Pt 7	A. & H. Dekleyne *	75.00	2.64	2.64	1.32	3,960.59	1,320.20	0	2,640.39
	Pt 7	F. Taylor	5.00	0.10	0.10	0.05	150.02	0.00	0	150.02
	Pt 7	Twp of Vespra	1.50	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt 7	County of Simcoe	1.50	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt E ½ 8 & Pt E½ 9	H. Andrews *	74.00	2.90	2.90	1.45	4,350.65	1,450.22	0	2,900.43
	Pt W ½ 8	B. Davis	0.50	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 8	I Davis *	16.00	0.33	0.33	0.17	495.07	165.02	0	330.05
	Pt W ½ 8	B. Kuikman *	33.00	0.69	0.69	0.35	1,035.16	345.05	0	690.11
	Pt W ½ 8	W. Mayer *	45.00	1.21	1.21	0.61	1,815.27	605.09	0	1,210.18
	Pt W ½ 8	S. & B. Barry	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 8	W. & C. Van Veen	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 8	G. & H. Wissborn	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Rd Between Con 8 & 9	Twp of Vespra	3.00	0.10	0.10	0.05	150.02	0.00	0	150.02
	Pt E ½ 9	R. & F. Murray	2.00	0.12	0.12	0.06	180.03	0.00	0	180.03

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	Pt E ½ 9	N. Forster *	15.00	1.05	1.05	0.53	1,575.24	525.08	0	1,050.16
	W ½ 9 & W ½ 10	B. & C. Mayer *	109.00	3.35	3.35	1.68	5,025.75	1,675.25	0	3,350.50
	Highway No. 26	D.H.O.	9.00	2.20	2.20	1.10	3,300.50	0.00	0	3,300.50
	Rd Between Con 8 & 9	Twp of Vespra	16.00	1.15	1.15	0.58	1,725.26	0.00	0	1,725.26
9	E ½ 5	G. Adams *	30.00	1.27	1.27	0.64	1,905.29	635.10	0	1,270.19
	BLOCK "A", Reg. Pl 1357 and Pt W ½ of W ½ 6	Simcoe Co. Bd. Of Ed.	8.00	0.16	0.16	0.08	240.04	0.00	0	240.04
	Park Ave. Plan 1357	Twp of Vespra	1.00	0.02	0.02	0.01	30.00	0.00	0	30.00
	Huron Street	Twp of Vespra	2.00	0.08	0.08	0.04	120.02	0.00	0	120.02
	Pt W ½ of W ½ 6	Minesing Comm. Centre	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ of W ½ 6	N. Kennedy	3.00	0.06	0.06	0.03	90.01	0.00	0	90.01
	Pt W ½ of W ½ 6	C. Kennedy	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ of W ½ 6	W. & W. Downey *	5.00	0.10	0.10	0.05	150.02	50.01	0	100.01
	E ½ of W ½ 6 & Pt W ½ 6	H. & G. Adams *	61.00	1.28	1.28	0.64	1,920.29	640.10	0	1,280.19
	Pt Road between 5 & 6	Twp of Vespra	4.00	0.66	0.66	0.33	990.15	0.00	0	990.15
	Pt Road between 5 & 6	D.H.O.	1.00	0.10	0.10	0.05	150.02	0.00	0	150.02
	Pt E ½ 6	W., G. & H. Johnston *	68.00	1.42	1.42	0.71	2,130.32	710.11	0	1,420.21
	Pt E ½ 6 & Pt E ½ 7	J. & R. Pacello *	36.00	0.75	0.75	0.38	1,125.17	375.06	0	750.11
	Pt E ½ 6	V. Jackson	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt E ½ 6	C. Jackson	2.00	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 7	Frank Slack Estate	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 7	D. & M. Bennyworth	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 7	M. Lackie	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 7	V. Miller	2.00	0.04	0.04	0.02	60.01	0.00	0	60.01
	Pt W ½ 7	H. Parker *	53.00	1.11	1.11	0.56	1,665.25	555.08	0	1,110.17
	Pt W ½ 7	A. & M. Smith *	20.00	0.42	0.42	0.21	630.09	210.03	0	420.06
	Pt W ½ 7	C. March	20.00	0.42	0.42	0.21	630.09	0.00	0	630.09
	Pt E ½ 7	A. Knapp *	75.00	1.57	1.57	0.79	2,355.35	785.12	0	1,570.23
	Pt E ½ 7	H. Alford *	6.00	0.12	0.12	0.06	180.03	60.01	0	120.02
	Highway No. 26	D. H. O.	9.00	1.00	1.00	0.50	1,500.23	0.00	0	1,500.23
	Pt W ½ 8	C. Voiko *	50.00	1.05	1.05	0.53	1,575.24	525.08	0	1,050.16
	Pt W ½ 8	M. Hennebry	10.00	0.21	0.21	0.11	315.05	0.00	0	315.05
	Pt W ½ 8	R. Pearce *	40.00	0.84	0.84	0.42	1,260.19	420.06	0	840.13
	Pt E ½ 8	J. & H. Van Kooten *	20.00	0.42	0.42	0.21	630.09	210.03	0	420.06
	Pt E ½ 8	J. & R. Pacello *	30.00	0.63	0.63	0.32	945.14	315.05	0	630.09
	Pt E ½ 8 & Pt ½ 9	H. Bowen *	54.00	1.09	1.09	0.55	1,635.25	545.08	0	1,090.17
	Pt E ½ 8 & Pt 9	G. Bowen *	B	0.04	0.04	0.02	60.01	20.00	0	40.01
	W ½ 9 & 10	G. & B. Haight *	110.00	3.36	3.36	1.68	5,040.76	1,680.25	0	3,360.51
	Pt E ½ 9	J. Johnston *	46.00	0.96	0.96	0.48	1,440.22	480.07	0	960.15
	SE ¼ 9 & E ½ 10	W. & O. Mayer *	60.00	2.31	2.31	1.16	3,465.52	1,155.17	0	2,310.35
	Road between 9 & 10	County of Simcoe	14.00	<b>1.85</b>	<b>16.85</b>	8.43	25,293.79	0.00	0	25,293.79

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10	Pt N ½ 7	H. van Der Wielen * (new)	1.00	0.04	0.02	0.01	30.00	10.00	0	20.00
	Pt N ½ 7	W. & H. Lord (?)	B	0.04	0.04	0.02	60.01	0.00	0	60.01
	S ½ 7	Cameron & Dobson * (new)	6.00	0.04	0.12	0.06	180.03	60.01	0	120.02
	N ½ 8	McKenna * (new)	15.00	0.04	0.30	0.15	450.07	150.02	0	300.05
	Pt S ½ 8	Haight & Levigne * (new)	26.00	0.04	0.50	0.25	750.11	250.04	0	500.07
	9	W. Gilroy * (new)	110.00	1.55	3.20	1.60	4,800.72	1,600.24	1,000	2,200.48
	W ½ of E ½ 10	H. Parker * (new)	80.00	0.26	2.40	1.20	3,600.54	1,200.18	1,500	900.36
	NE ¼ of E ½ 10	Duncan * (new)	10.00	0.43	0.42	0.21	630.09	210.03	0	420.06
		Township of Vespra		6.25	66.25	33.11	99,344.90	0.00	0	99,344.90
		MNRF & NVCA		0.00	20.75	10.37	31,114.67	0.00	6,000	25,114.67
	Other			7.44 **	3.72	11,161.67	0.00	0	11,161.67	
Other Downey and Cavana Owners for Access (R. Downey, Irwin ?)						0.00	0.00	1,500	(1,500.00)	
TOTALS:				92.25	200.00	99.99	300,000.01	33,855.10	10,000	256,144.91

\* Indicates possible eligibility for one third grant

\*\* The original 1970 totals were to add to 100% but it appears there were deletions from the schedule in 1970±. The sum of 7.44 ("Other")

is the amount to be added to bring the schedule totals to 200% including the amounts for the additional 100%. A decision as to where the "other" will be moved will be necessary.  
 "B" indicates Building Lot (in 1970).

This schedule was prepared in order to modify most of the original percentages so their percentages of the 2017/2018 costs are reduced by 50%±. The process used was to add new percentages to additional parcels/parties to give a total of 200% and then to halve all percentages to give the total of 100%.

Most property owner names shown and agricultural designations have to be updated. Only on this Page 4 has there been an attempt to do any name updating.