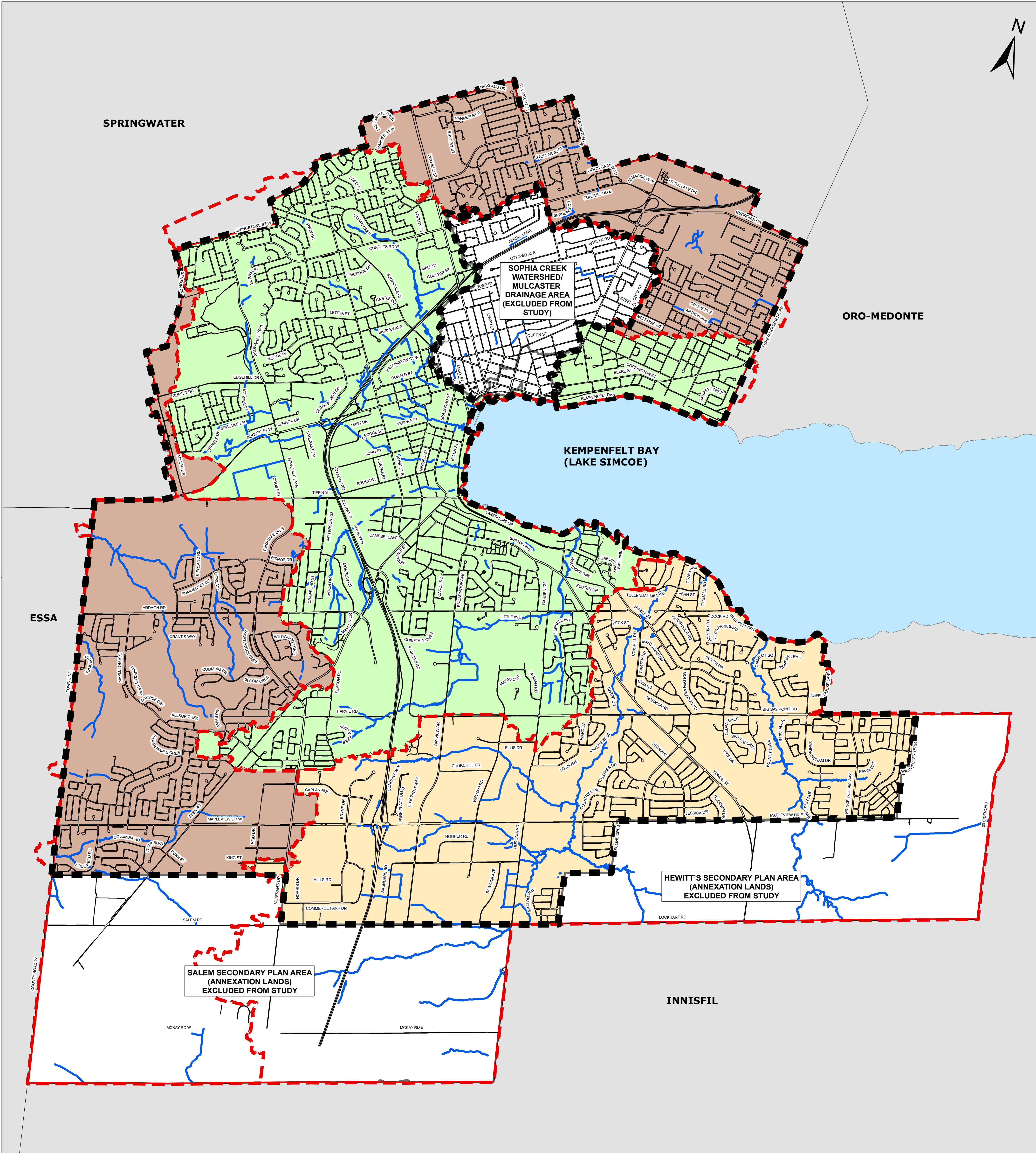


## Appendix A: Figures





**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

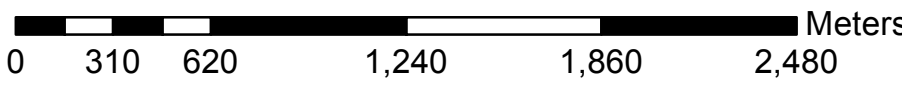
This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

- ROADS
- WATERCOURSES
- DRAINAGE STUDY AREA BOUNDARY
- OVERALL STUDY AREA
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- NVCA WATERSHED DRAINAGE STUDY AREA
- BARRIE CREEKS DRAINAGE STUDY AREA
- LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA
- MUNICIPAL BORDER



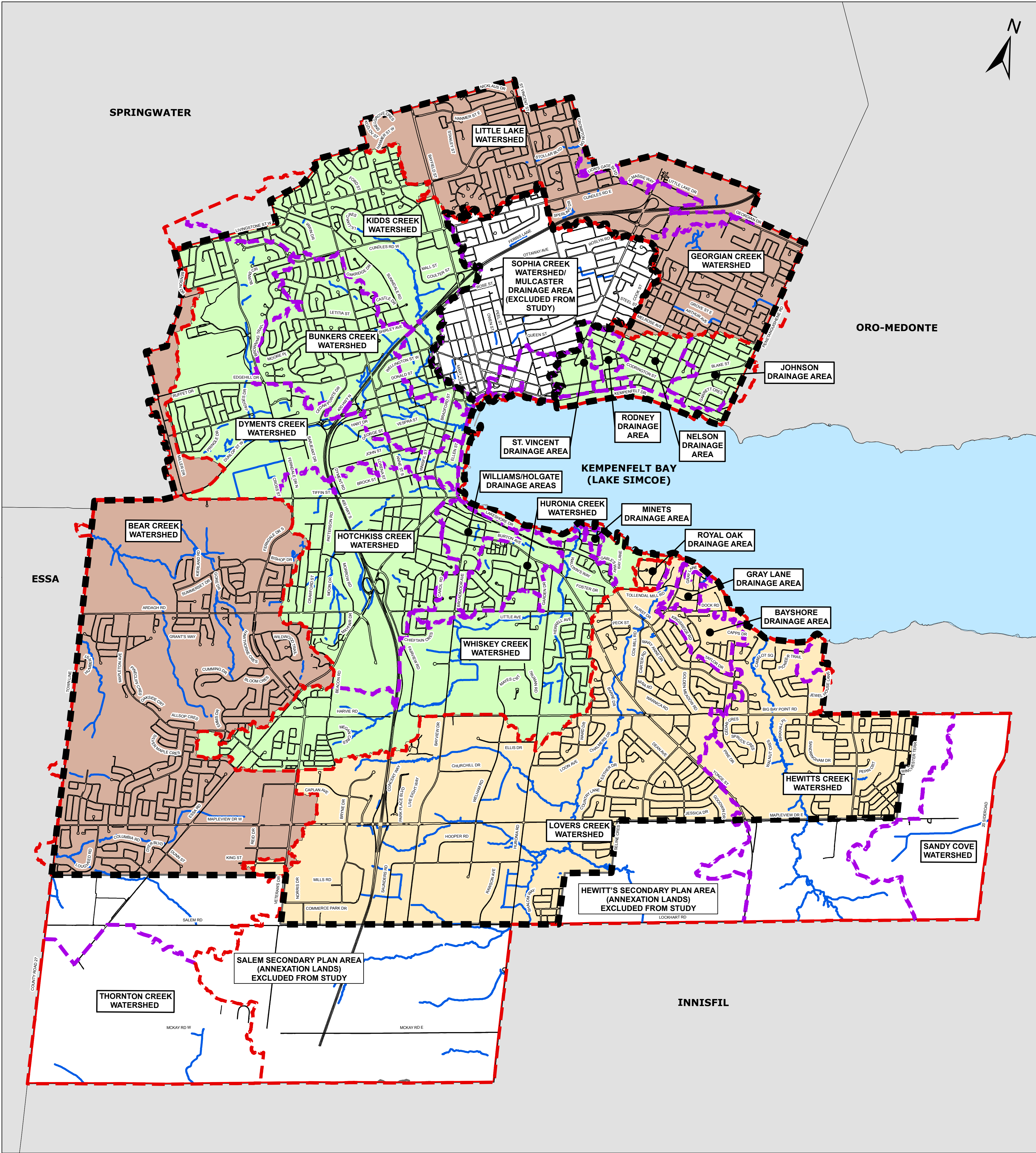
SCALE = 1:24,000



**DRAINAGE MASTER PLAN**

FIGURE 1 - STUDY AREA LOCATION PLAN





**Disclaimer**

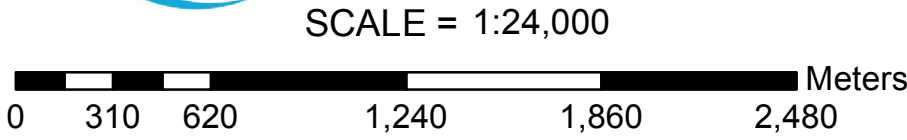
The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

- ROADS
- WATERCOURSES
- DRAINAGE STUDY AREA BOUNDARY
- WATERSHED BOUNDARY
- OVERALL STUDY AREA
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- ANNEXATION LANDS (EXCLUDED FROM STUDY)

- NVCA WATERSHED DRAINAGE STUDY AREA
- BARRIE CREEKS DRAINAGE STUDY AREA
- LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA
- MUNICIPAL BORDER



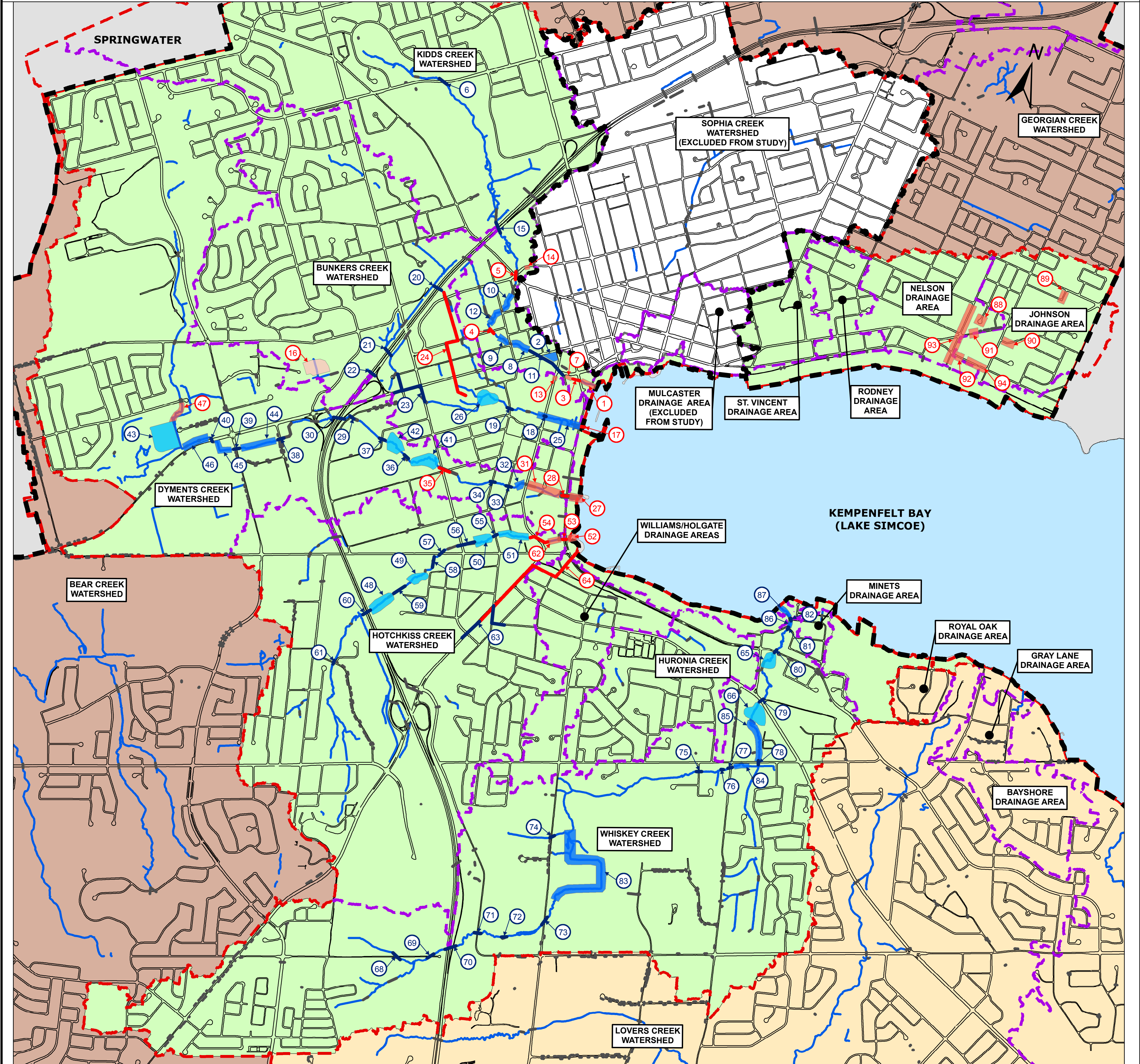
**DRAINAGE MASTER PLAN**

FIGURE 2 - WATERSHED/DRAINAGE AREA DELINEATION PLAN



<b>Kidd's Creek</b> 1 Floodway Conveyance Capacity Improvements (Regional Storm) 2 Conveyance Capacity Improvements (Regional Storm) 3 Toronto Street Culvert Improvements (1:100 year capacity) 4 Donald Street Culvert Improvements (1:100 year capacity) 5 Ross Street / Wellington Street Culvert Improvements (1:100 year capacity) 6 Cundles Road West Culvert Improvements (1:100 year capacity) 7 Toronto Street to Simcoe Street Channel Improvements (1:100 year capacity) 8 Dunlop Street to Eccles Street Channel Improvements (1:100 year capacity) 9 Channel Improvements Upstream of Eccles Street (1:100 year capacity) 10 Channel Improvements Upstream of Eccles Street North (1:100 year capacity) 11 Simcoe Street to Dunlop Street Culvert Improvements (1:100 year capacity) 12 Culvert Improvements Upstream of Eccles Street (1:100 year capacity) 13 Bradford Street Spill Containment Improvements 14 Ross Street Spill Containment Improvements 15 Highway 400 Spill Containment Improvements <b>Bunkers Creek</b> 16 New SWMF and Storm Sewer Diversion to SWMF 17 Lakeshore Drive Culvert Improvements (1:100 year capacity) 18 Bradford Street Culvert Improvements (1:100 year capacity) 19 Innisfil Street Culvert Improvements (1:100 year capacity) 20 Highway 400 North Branch Culvert Improvements (1:100 year capacity) 21 Highway 400 Central Branch Culvert Improvements (1:100 year capacity) 22 Highway 400 South Branch Culvert Improvements (1:100 year capacity) 23 Anne Street to Highway 400 Trunk Storm Sewer Improvements (1:100 year capacity) 24 North Branch Trunk Storm Sewer Improvements (1:100 year capacity) 25 Natural Watercourse Enhancements From Kempenfelt Bay to Bradford Street 26 Milligan's Pond Improvements			<b>Dyments Creek</b> 27 Floodway Conveyance Capacity Improvements (Regional Storm) 28 Lakeshore Drive Culvert Improvements (Regional storm capacity) 29 Hart Drive Culvert Improvements (Regional storm capacity) 30 Highway 400 Culvert Improvements (Regional storm capacity) 31 Floodway Conveyance Capacity Improvements (Regional Storm) 32 Floodway Conveyance Capacity Improvements (Regional Storm) 33 Sanford Street Culvert Improvements (1:100 year capacity) 34 Innisfil Street Culvert Improvements (1:100 year capacity) 35 Anne Street / John Street Culvert Improvements (1:100 year capacity) 36 Victoria Street Culvert Improvements (1:100 year capacity) 37 George Street Culvert Improvements (1:100 year capacity) 38 Sarjeant Street Culvert Improvements (1:100 year capacity) 39 Ferndale Drive North Culvert Improvements (1:100 year capacity) 40 Dunlop Street West Culvert Improvements (1:100 year capacity) 41 SWMF Retrofit 42 SWMF Retrofit 43 New SWMF 44 Ferndale Drive North to Sarjeant Drive Channel Improvements (1:100 year capacity) 45 Dunlop Street West to Ferndale Drive North Channel Improvements (1:100 year capacity) 46 Channel Improvements Upstream of Dunlop Street (1:100 year capacity) 47 Channel Improvements Downstream of Sproule Drive (1:100 year capacity) 95 Bradford Street Culvert Improvements (Regional Conveyance)			<b>Hotchkiss Creek</b> 48 New SWMF 49 New SWMF 50 New SWMF 51 SWMF Retrofit 52 Outlet Channel Improvements (1:100 year capacity) 53 Lakeshore Drive Culvert Improvements (1:100 year capacity) 54 Bradford Street Culvert Improvements (1:100 year capacity) 55 Innisfil Street Culvert Improvements (1:100 year capacity) 56 Anne Street Culvert Improvements (1:100 year capacity) 57 Tiffin Street Culvert Improvements (1:100 year capacity) 58 BCR Culvert Improvements (1:100 year capacity) 59 Wood Street Culvert Improvements (1:100 year capacity) 60 Highway 400 Culvert Improvements (1:100 year capacity) 61 Morrow Road Culvert Improvements (1:100 year capacity) 62 W.P.C.C. Channel Improvements (1:100 year capacity) 63 Essa Road Trunk Storm Sewer Improvements (1:100 year capacity) 64 Gowan Street Trunk Storm Sewer Improvements (1:100 year capacity)			<b>Whiskey Creek</b> 65 SWMF Retrofit 66 SWMF Retrofit 68 Harvie Road Culvert Improvements (1:100 year capacity) 69 Harvie Road Culvert Improvements (1:100 year capacity) 70 Highway 400 Culvert Improvements (1:100 year capacity) 71 Fairview Drive Culvert Improvements (1:100 year capacity) 72 BCR Culvert Improvements (1:100 year capacity) 73 Bayview Drive Culvert Improvements (1:100 year capacity) 74 Bayview Drive Culvert Improvements (1:100 year capacity) 75 McConkey Place Culvert Improvements (1:100 year capacity) 76 BCR Culvert Improvements (1:100 year capacity) 77 Huronia Road Culvert Improvements (1:100 year capacity) 78 Little Avenue Culvert Improvements (1:100 year capacity) 79 Yonge Street Culvert Improvements (1:100 year capacity) 80 Tollendal Mill Road Culvert Improvements (1:100 year capacity) 81 The Boulevard Culvert Improvements (1:100 year capacity) 82 Brennan Avenue Culvert Improvements (1:100 year capacity) 83 279 Bayview Drive Channel Improvements (1:100 year capacity) 84 Channel Improvements Downstream of Huronia Road (1:100 year capacity) 85 Little Avenue to Yonge Street Channel Improvements (1:100 year capacity) 86 The Boulevard to Brennan Avenue Channel Improvements (1:100 year capacity) 87 Brennan Avenue to Kempenfelt Bay Channel Improvements (1:100 year capacity) <b>Nelson &amp; Johnson Drainage Area</b> 88 Varden Crescent Drainage Issue Improvement Area 89 Oliver Street/Alexander Avenue Drainage Issue Improvement Area 90 Indian Arrow Road Near Johnson Street Drainage Issue Improvement Area 91 Blake Street Drainage Issue Improvement Area 92 36 Shanty Bay Road Drainage Issue Improvement Area 93 Puget Street Drainage Issue Improvement Area 94 Shanty Bay Road Drainage Issue Improvement Area		
--	--	--	--	--	--	---	--	--	--	--	--

NOTE: PROJECTS COMPLETED SINCE ADOPTION OF MASTER DRAINAGE PLANS ARE IDENTIFIED IN GREEN.



**REFERENCES**  
 Kidd's Creek Master Drainage Plan Class Environmental Assessment Report.  
 Oliver, Mangione, McCalla & Associates (2001).  
 Bunkers Creek Master Drainage Plan Update.  
 Giffels Associates Limited (2001).  
 Dyments Creek Master Drainage Plan Municipal Class Environmental Assessment.  
 The Jones Consulting Group (2004).  
 Dyments Creek Master Drainage Plan Municipal Class Environmental Assessment - Final Revisions  
 The City of Barrie (2006).  
 Hotchkiss Creek Master Drainage Plan Update Environmental Assessment Document.  
 R.G. Robinson and Associates Ltd. (2000).  
 Whiskey Creek Master Drainage Plan Update Environmental Assessment Document.  
 Aecom (2009).  
 Hydrologic & Hydraulic Modeling and Drainage Study for the Nelson & Johnson Drainage Areas.  
 Greenland International Consulting (2009).

**Disclaimer**  
 The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepted any responsibility to any third party who may rely upon this drawing.  
 This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**  

68

PROPOSED IMPROVEMENT ID#

17

IMPLEMENTED IMPROVEMENT ID#

ROADS

WATERCOURSES

CULVERTS

DRAINAGE STUDY AREA BOUNDARY

PROPOSED CULVERT/TRUNK SEWER IMPROVEMENTS

PROPOSED SWMF RETROFIT/CREATION

PROPOSED CHANNEL/GRADING IMPROVEMENTS

IMPLEMENTED CULVERT/TRUNK SEWER IMPROVEMENTS

IMPLEMENTED SWMF RETROFIT/CREATION

IMPLEMENTED CHANNEL/GRADING IMPROVEMENTS

OVERALL STUDY AREA

WATERSHED BOUNDARY

SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)

BARRIE CREEKS DRAINAGE STUDY AREA

NVCA WATERSHED DRAINAGE STUDY AREA

LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA

MUNICIPAL BORDER

TATHAM

ENGINEERING

Barrie

SCALE = 1:14,000

0

180

360

720

1,080

1,440

Meters

DRAINAGE MASTER PLAN

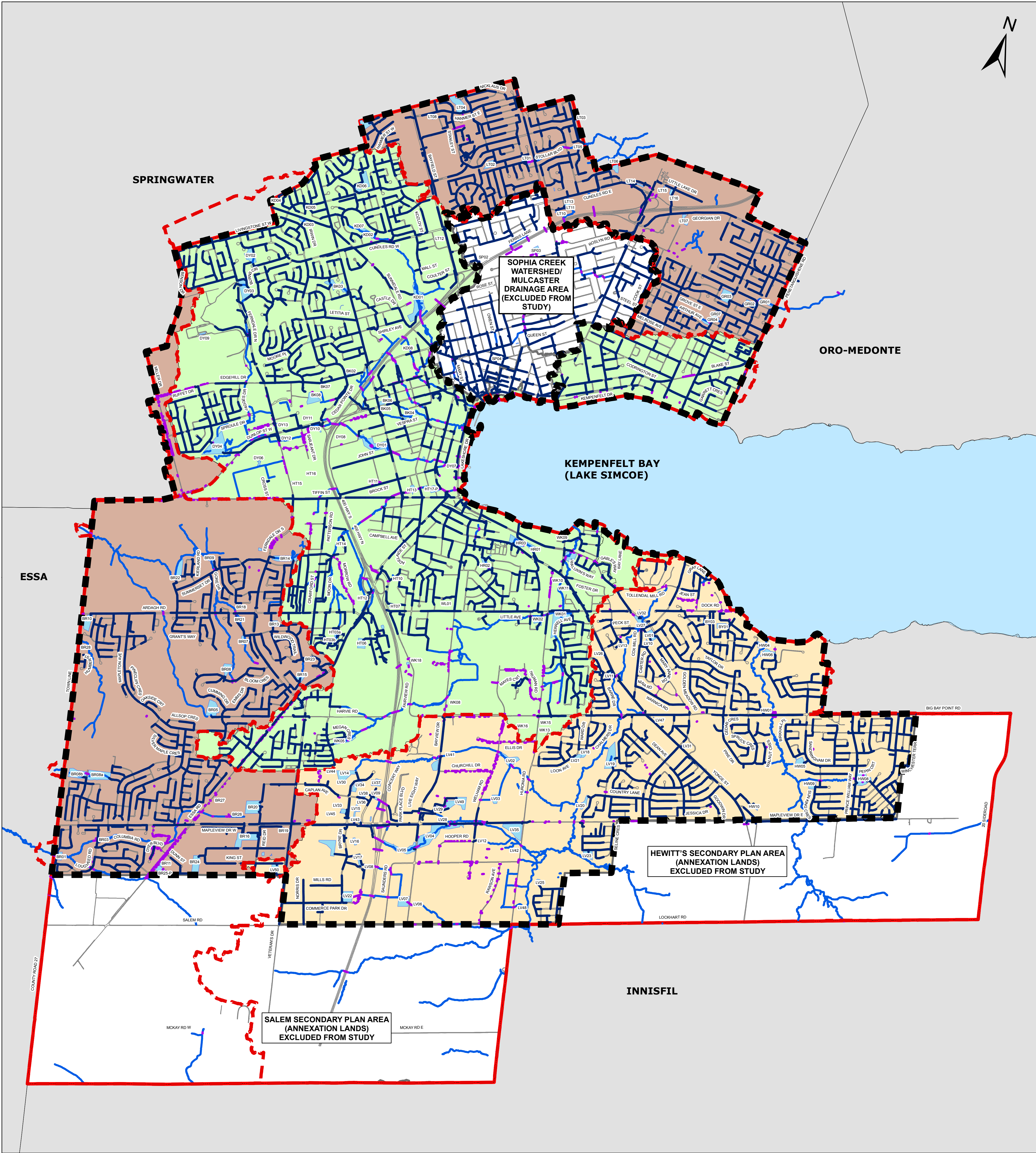
FIGURE 3 - PREVIOUS DRAINAGE IMPROVEMENT RECOMMENDATIONS FROM BACKGROUND MASTER DRAINAGE PLANS

DATE: MARCH 2019









**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

- CULVERTS
- EXISTING STORM SEWER
- ROADS
- WATERCOURSES
- OVERALL STUDY AREA
- DRAINAGE STUDY AREA BOUNDARY
- STORMWATER MANAGEMENT FACILITY (SWMF), ROOFTOP STORAGE, MECHANICAL DEVICES
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK AND MULCASTER DRAINAGE AREAS (EXCLUDED FROM STUDY)
- NVCA WATERSHED DRAINAGE STUDY AREA
- BARRIE CREEKS DRAINAGE STUDY AREA
- LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA
- MUNICIPAL BORDER



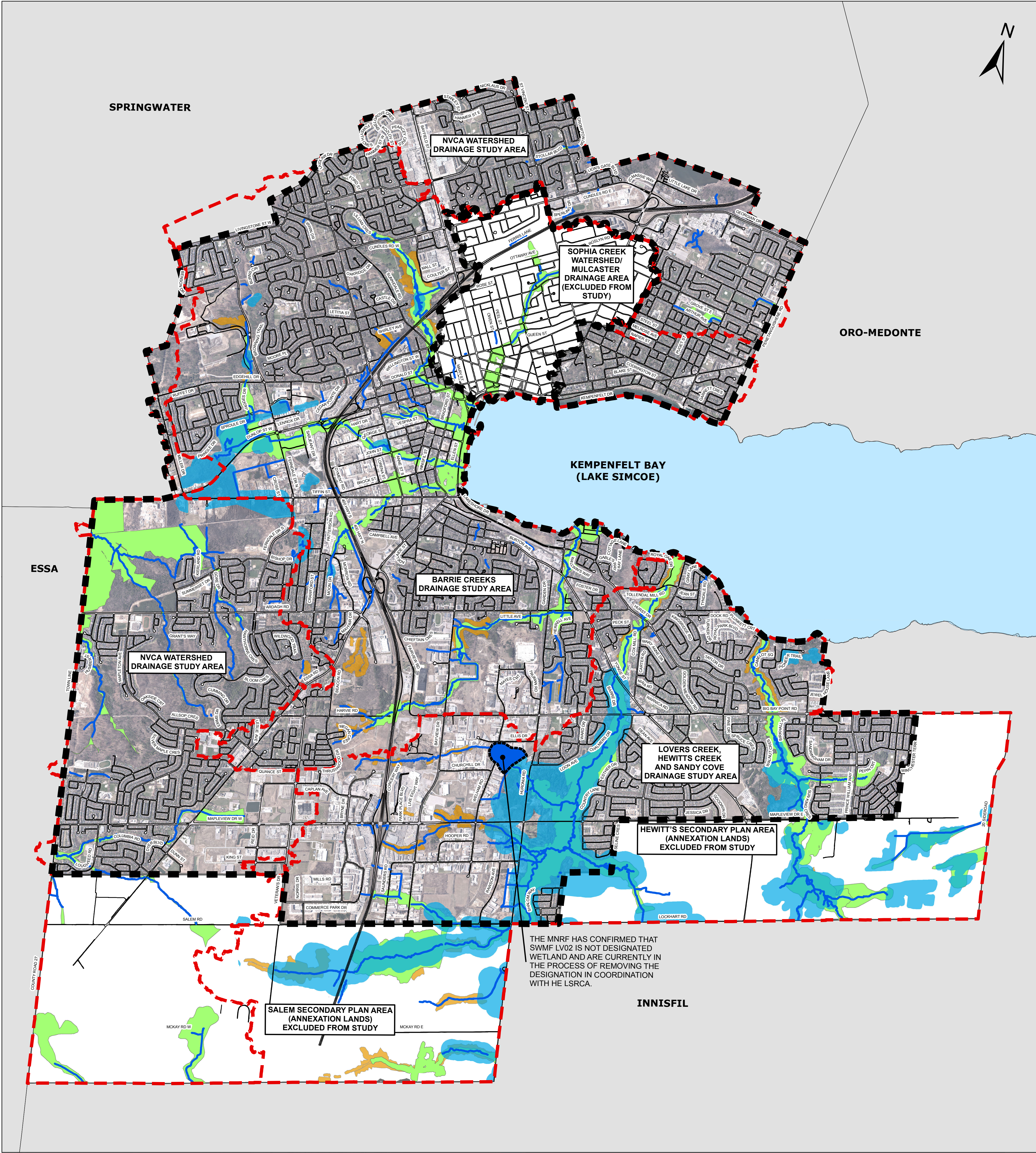
SCALE = 1:24,000

0 305 610 1,220 1,830 2,440 Meters

**DRAINAGE MASTER PLAN**

FIGURE 5 - EXISTING STORMWATER MANAGEMENT INFRASTRUCTURE PLAN





**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

- LEGEND**
- ROADS
  - WATERCOURSES
  - DRAINAGE STUDY AREA BOUNDARY
  - OVERALL STUDY AREA
  - WETLAND
  - EROSION HAZARD
  - FLOODPLAIN HAZARD
  - SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
  - ANNEXATION LANDS (EXCLUDED FROM STUDY)
  - MUNICIPAL BORDER

**TATHAM**  
ENGINEERING

**Barrie**

SCALE = 1:24,000

0 310 620 1,240 1,860 2,480 Meters

**DRAINAGE MASTER PLAN**

FIGURE 6 - NATURAL HAZARDS PLAN



LEVEL 1 RESOURCES ARE CRITICAL COMPONENTS OF THE NATURAL HERITAGE RECOURSE NETWORK WITHIN THE CITY INCLUDING:

- a) PROVINCIALLY SIGNIFICATE WETLANDS.
- b) NON-PROVINCIALY SIGNIFICANT WETLANDS GREATER THAN 0.5 HECTARES.
- c) SIGNIFICANT WOODLANDS GREATER THAN 10 HECTARES.
- d) SIGNIFICANT HABITAT OF ENDANGERED AND THREATENED SPECIES.
- e) WATERCOURSES, MINIMUM VEGETATION PROTECTION ZONES AND CONNECTIVITY LINKAGES.
- f) LANDS THROUGH THE SITE SPECIFIC PLANNING AND DEVELOPMENT PROCESS IDENTIFIED AS ENVIRONMENTAL PROTECTION.

LEVER 2 RESOURCES ARE SIGNIFICANT COMPONENTS OF THE NATURAL HERITAGE RESOURCE NETWORK WITHIN THE CITY INCLUDING:

- a) SIGNIFICANT VALLEYLANDS.
- b) PROVINCIALLY SIGNIFICANT LIFE SCIENCE ANSI.
- c) SIGNIFICANT WILDLIFE HABITAT, INCLUDING NOT LIMITED TO CORE WINTER DEER YARDS, COLONIAL WATER-BIRD NESTING SITES, RARE VEGETATION COMMUNITIES (i.e. TALL GRASS PRAIRIES), AND SIGNIFICANT AREAS OF VERNAL POOLS.
- d) WATERCOURSES, MINIMUM VEGETATION PROTECTION ZONES AND CONNECTIVITY LINKAGES.
- e) WOODLANDS GREATER THAN 4 HECTARES AND LESS THEN 10 HECTARES.

LEVEL 3 RESOURCES ARE SIGNIFICANT AND SUPPORTING COMPONENTS OF NATURAL HERITAGE RESOURCE NETWORK WITHIN THE CITY INCLUDING:

- a) REGIONALLY SIGNIFICANT LIFE SCIENCE ANSI.
- b) WOODLANDS GREATER THAN 0.5 HECTARES AND LESS THAN 4 HECTARES.
- c) WOODLANDS WITHIN 30 METRES OF A LEVEL 1 OR 2 FEATURE.
- d) CULTURAL THICKET OR CULTURAL MEADOW COMMUNITIES CONTIGUOUS WITH WOODLAND OR WETLAND PATCHES.
- e) CONNECTIVITY LINKAGES.

SPRINGWATER

NVCA WATERSHED  
DRAINAGE STUDY AREA

SOPHIA CREEK  
WATERSHED/  
MULCASTER  
DRAINAGE AREA  
(EXCLUDED FROM  
STUDY)

ORO-MEDONTE

KEMPENFELT BAY  
(LAKE SIMCOE)

ESSA

NVCA WATERSHED  
DRAINAGE STUDY AREA

BARRIE CREEKS  
DRAINAGE STUDY AREA

LOVERS CREEK,  
HEWITT'S CREEK  
AND SANDY COVE  
DRAINAGE STUDY AREA

HEWITT'S SECONDARY PLAN AREA  
(ANNEXATION LANDS)  
EXCLUDED FROM STUDY

INNISFIL

SALEM SECONDARY PLAN AREA  
(ANNEXATION LANDS)  
EXCLUDED FROM STUDY

#### Disclaimer

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing. This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

#### LEGEND

- ROADS
- WATERCOURSES
- DRAINAGE STUDY AREA BOUNDARY
- OVERALL STUDY AREA
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK AND MULCASTER DRAINAGE AREAS (EXCLUDED FROM STUDY)
- MUNICIPAL BORDER

#### NHS POLICY

- LEVEL 1
- LEVEL 1 WITH EXISTING DEVELOPMENT DESIGNATIONS SUBJECT TO 3.5.2.4 D
- LEVEL 2
- LEVEL 3
- NATURAL HERITAGE SYSTEM SALEM AND HEWITT'S SECONDARY PLAN AREA (ANNEXATION LANDS)

TATHAM  
ENGINEERING

Barrie

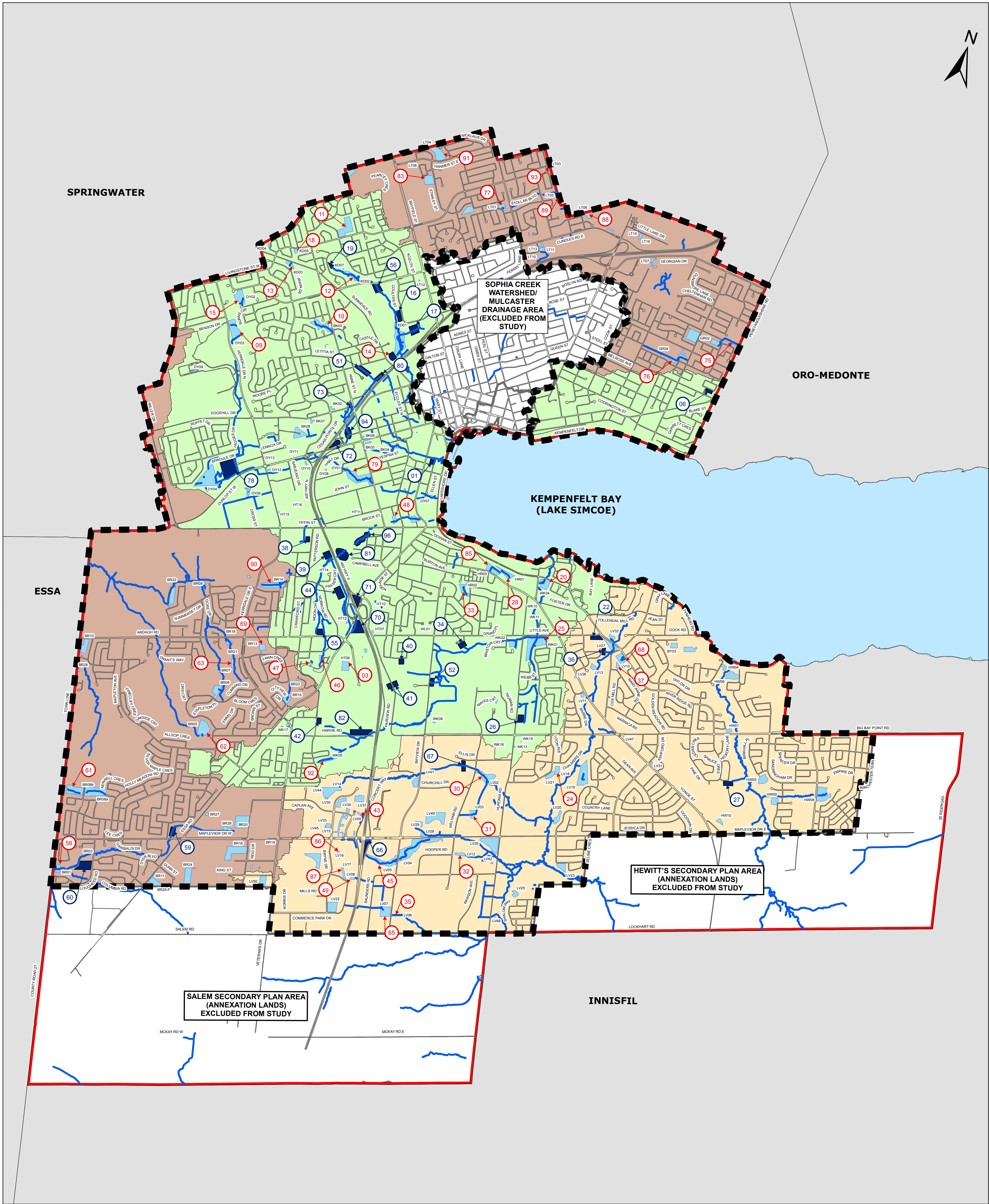
SCALE = 1:24,000

0 310 620 1,240 1,860 2,480 Meters

DRAINAGE MASTER PLAN  
FIGURE 7 - NATURAL HERITAGE PLAN

DATE: MARCH 2019





Disclaimer

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

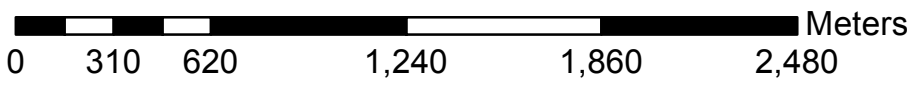
This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

LEGEND

- 30 EXISTING SWMF RETROFIT OPPORTUNITY (OPPORTUNITY ID)
- 67 PROPOSED SWMF (OPPORTUNITY ID)
- ROADS
- WATERCOURSE
- OVERALL STUDY AREA
- PROPOSED SWMF
- EXISTING SWMF
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- NVCA WATERSHED DRAINAGE STUDY AREA
- BARRIE CREEKS DRAINAGE STUDY AREA
- LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA
- MUNICIPAL BORDER



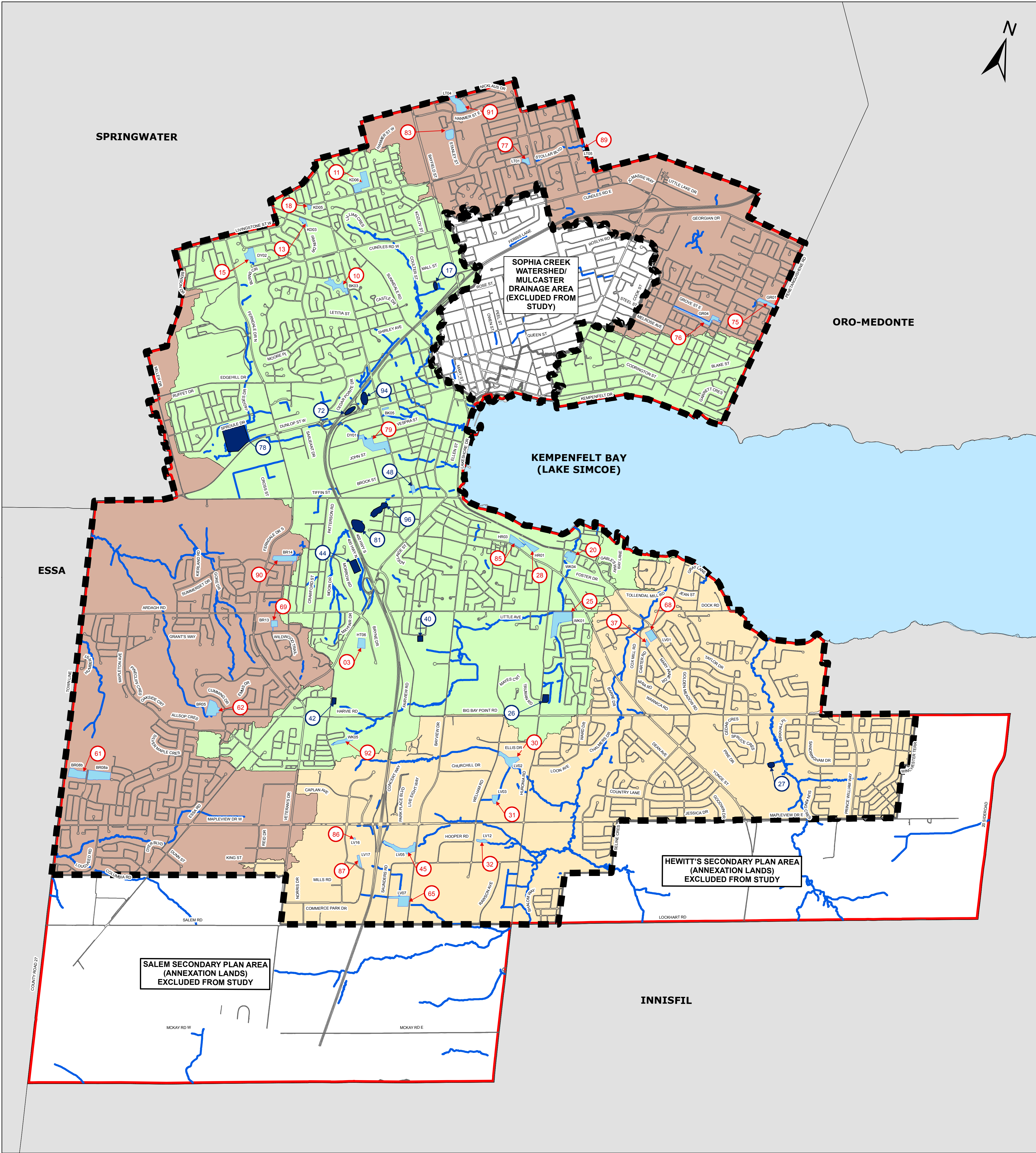
SCALE = 1:24,000



DRAINAGE MASTER PLAN

FIGURE 8 - SWMF RETROFIT/CREATION OPPORTUNITIES (PRE-SCREENING EVALUATION)





**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

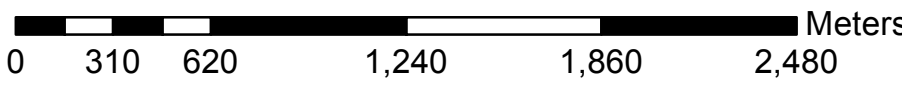
This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

- (30) EXISTING SWMF RETROFIT OPPORTUNITY (OPPORTUNITY ID)
- (67) PROPOSED SWMF CREATION OPPORTUNITY (OPPORTUNITY ID)
- ROADS
- WATERCOURSE
- OVERALL STUDY AREA
- PROPOSED SWMF
- EXISTING SWMF
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- NVCA WATERSHED DRAINAGE STUDY AREA
- BARRIE CREEKS DRAINAGE STUDY AREA
- LOVERS CREEK AND HEWITTS CREEK DRAINAGE STUDY AREA
- MUNICIPAL BORDER



SCALE = 1:24,000

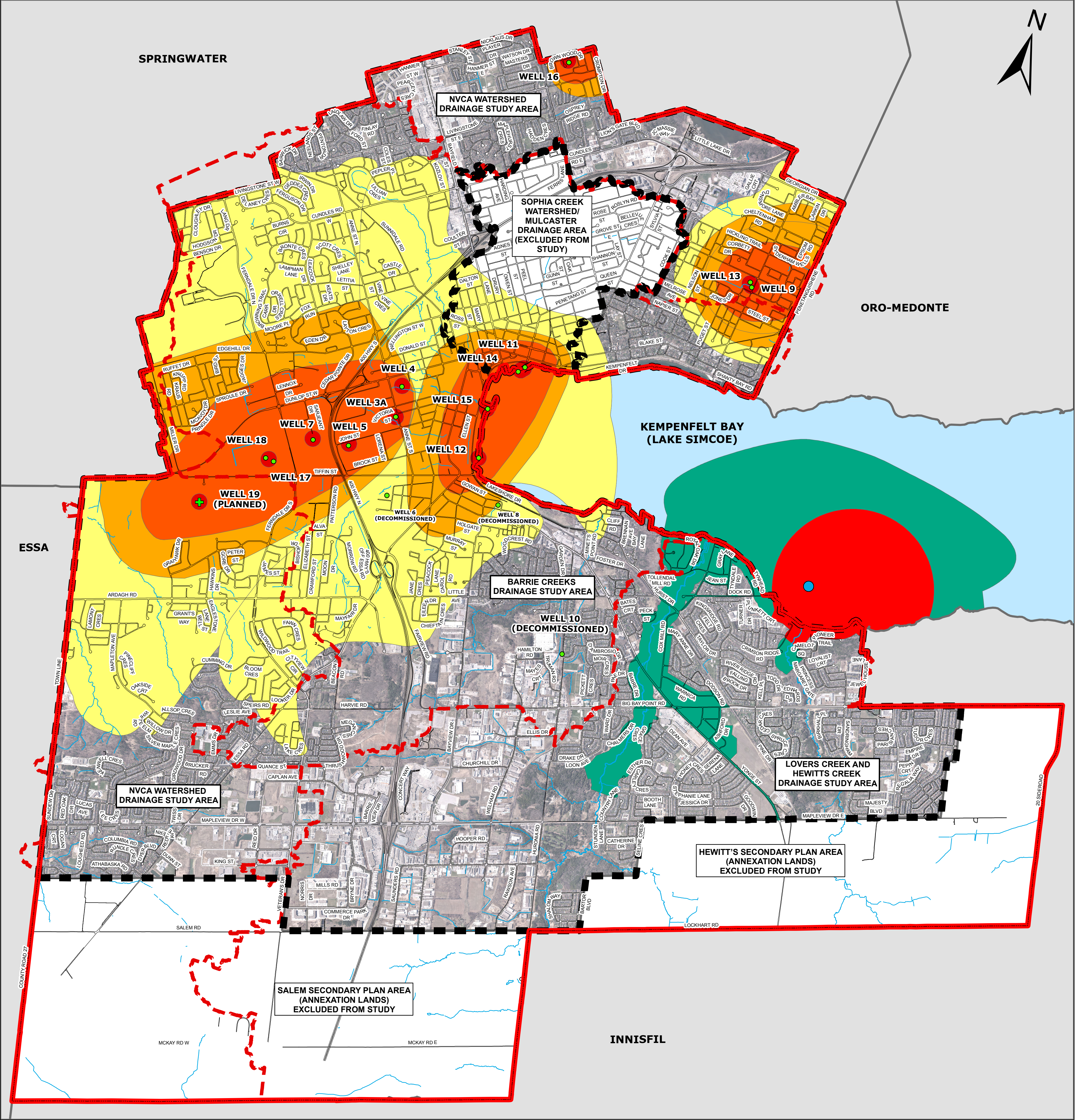


**DRAINAGE MASTER PLAN**

FIGURE 9 - SWMF RETROFIT/CREATION OPPORTUNITIES (TO BE EVALUATED)

DATE: MARCH 2019





Source: Approved Assessment Report: Lake Simcoe and Couchiching-Black River Source Protection Area Part 1. South Georgian Bay - Lake Simcoe Source Protection Committee (2011)

**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**Legend**

- ROADS
- WATERCOURSES
- DRAINAGE STUDY AREA BOUNDARY
- OVERALL STUDY AREA
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK AND MULCASTER DRAINAGE AREAS (EXCLUDED FROM STUDY)
- MUNICIPAL BOARDER
- INTAKE PROTECTION ZONE 1 (VULNERABILITY SCORE 8)
- INTAKE PROTECTION ZONE 2 (VULNERABILITY SCORE 6.4)
- WHPA
  - WHPA-A (100m RADIUS)
  - WHPA-B (2yr TIME OF TRAVEL)
  - WHPA-C (10yr TIME OF TRAVEL)
  - WHPA-D (25yr TIME OF TRAVEL)
- SURFACE WATER INTAKE (TYPE D)

TATHAM  
ENGINEERING

Barrie

SCALE = 1:24,000

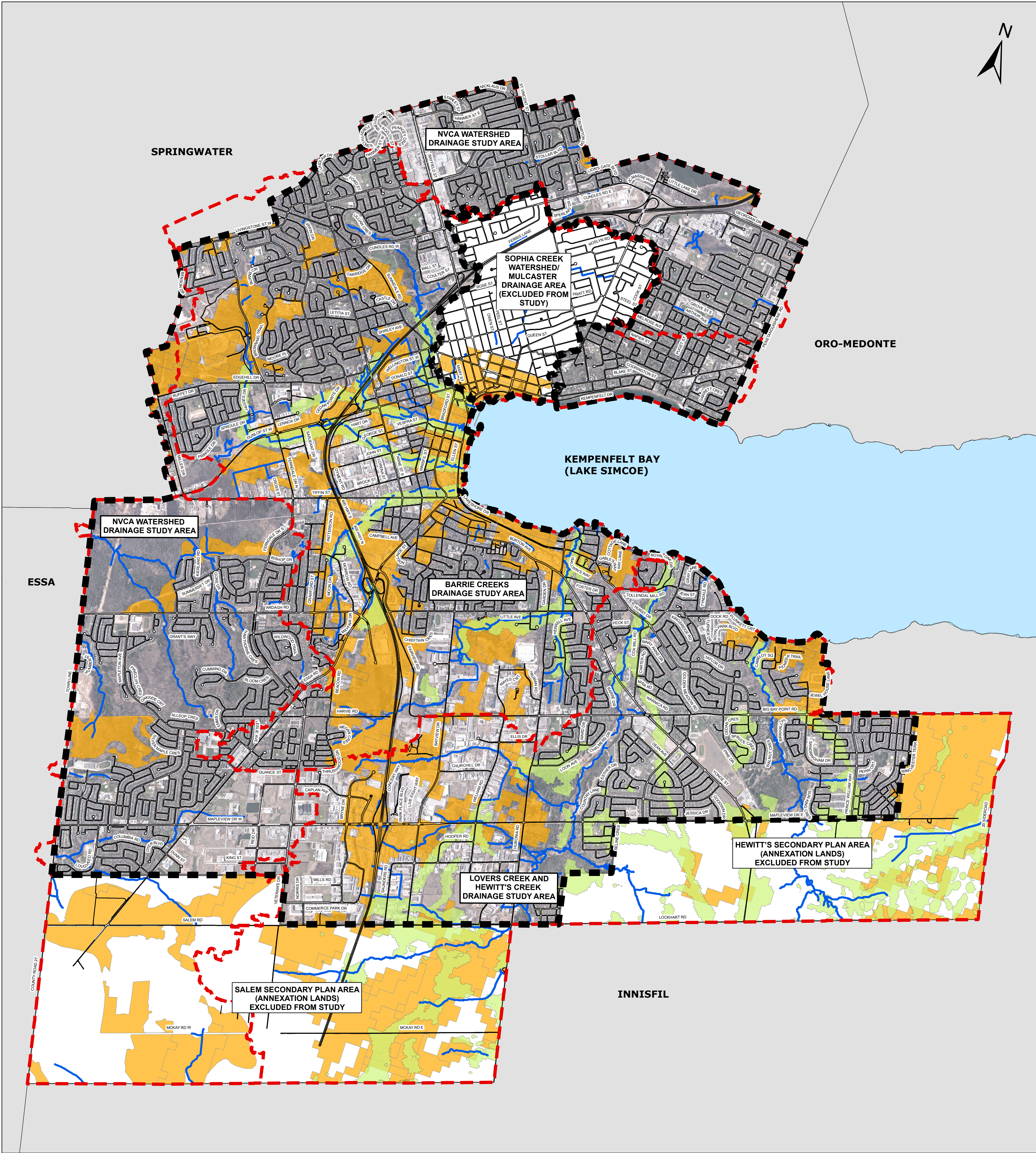
0 325 650 1,300 1,950 2,600 Meters

**DRAINAGE MASTER PLAN**

FIGURE 10 - KNOWN WELLHEAD PROTECTION AREA/INTAKE PROTECTION AREA PLAN

DATE: MARCH 2019





**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

- LEGEND**
- ROADS
  - WATERCOURSES
  - DRAINAGE STUDY AREA BOUNDARY
  - OVERALL STUDY AREA
  - SGRA (SIGNIFICANT GROUNDWATER RECHARGE AREAS)
  - ESGRA (ECOLOGICALLY SIGNIFICANT GROUNDWATER RECHARGE AREAS)
  - ANNEXATION LANDS (EXCLUDED FROM STUDY)
  - SOPHIA CREEK AND MULCASTER DRAINAGE AREAS (EXCLUDED FROM STUDY)
  - MUNICIPAL BORDER

**TATHAM ENGINEERING**

**Barrie**

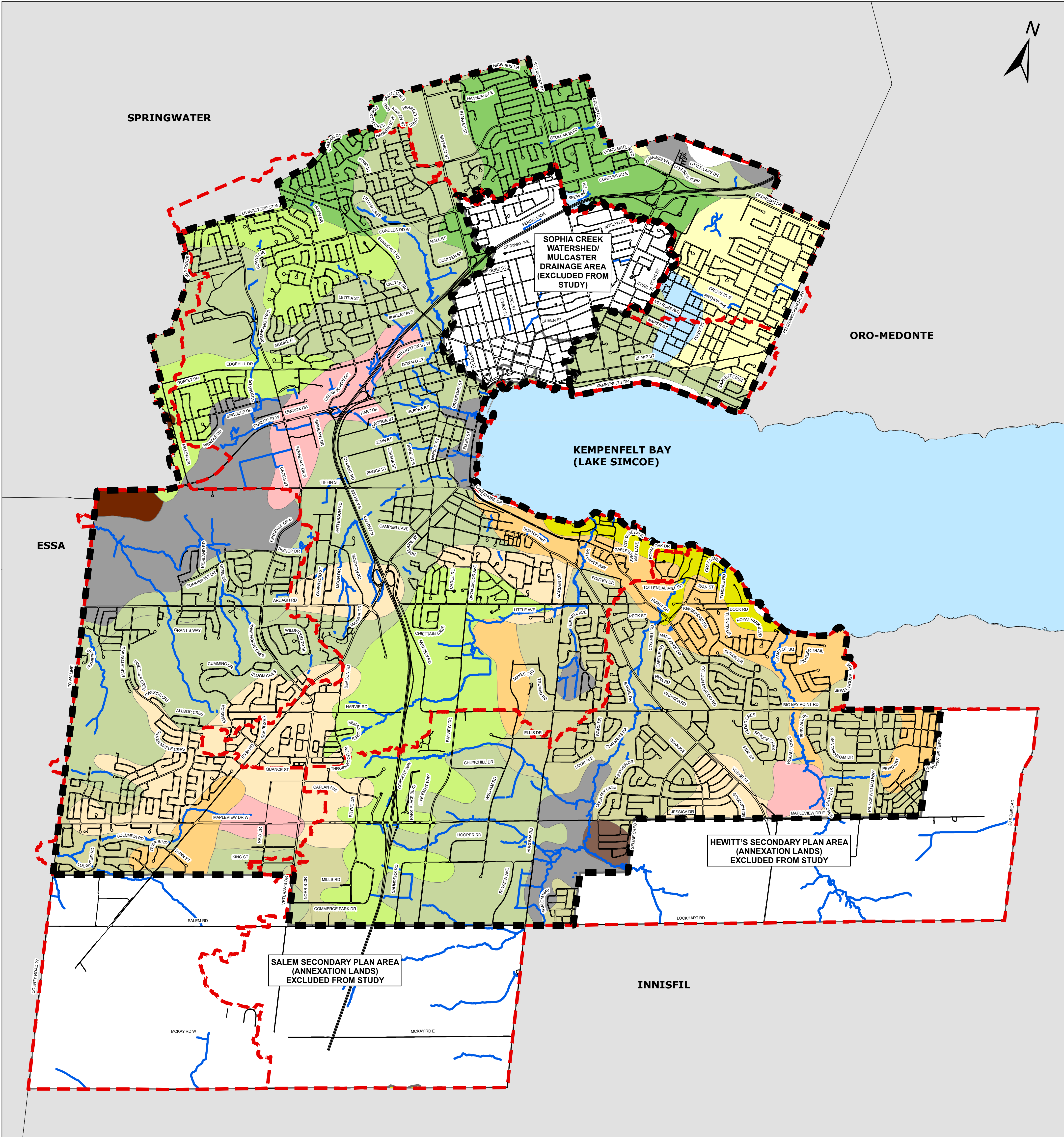
SCALE = 1:24,000

0 310 620 1,240 1,860 2,480 Meters

**DRAINAGE MASTER PLAN**

FIGURE 11 - GROUNDWATER RECHARGE AREA PLAN





**Disclaimer**

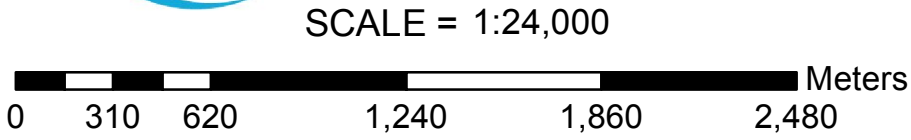
The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

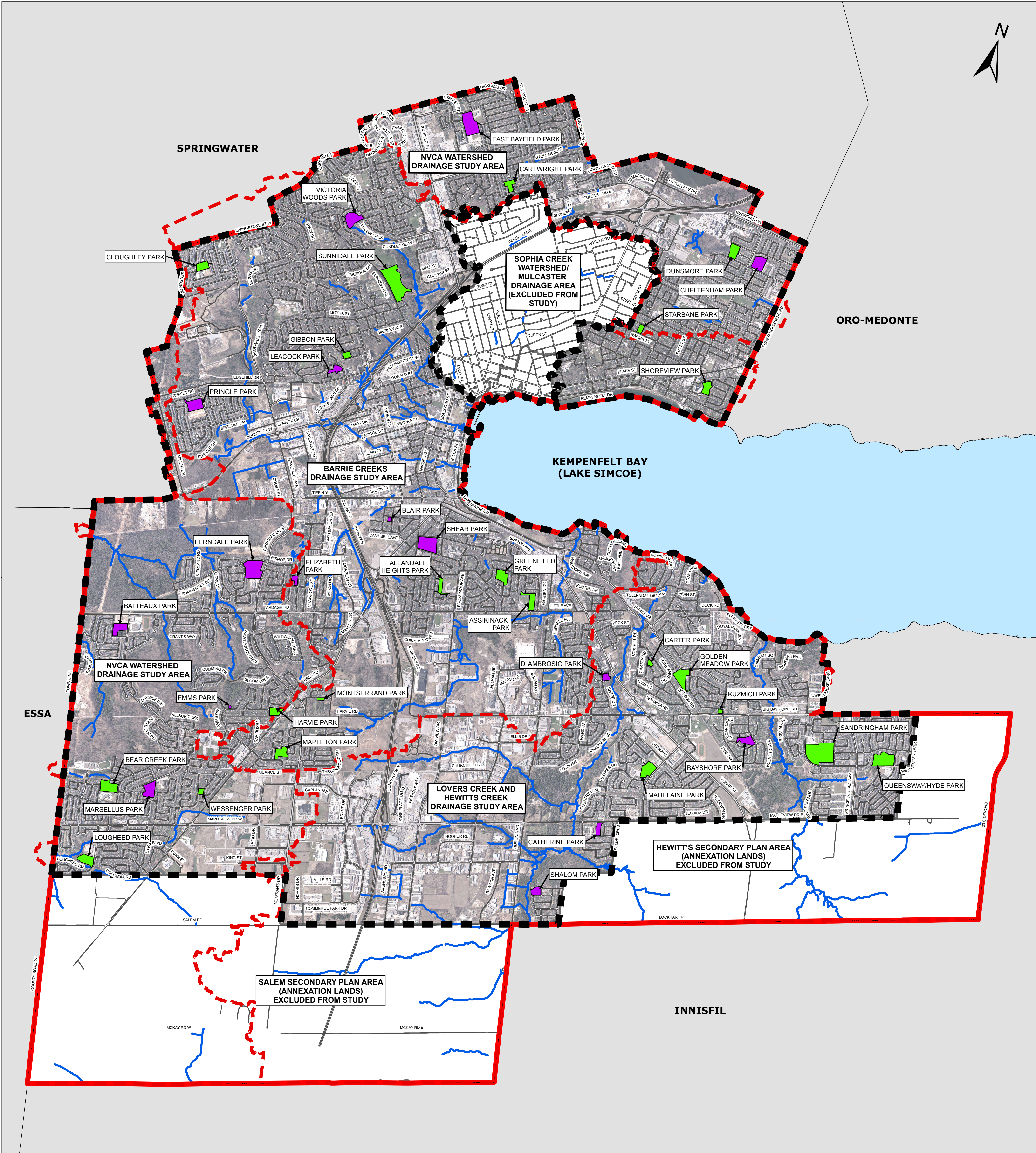
- ROADS
- WATERCOURSES
- DRAINAGE STUDY AREA BOUNDARY
- OVERALL STUDY AREA
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- MUNICIPAL BORDER
- HYDROLOGIC SOIL GROUPS**
  - Ans - ALLISTON SANDY LOAM (AB)
  - BI - BONDHEAD LOAM (B)
  - Bs - BONDHEAD SANDY LOAM (AB)

- Bs-b - BONDHEAD SANDY LOAM - STONY PHASE (AB)
- Bs-b - BONDHEAD SANDY LOAM - STONY PHASE (AB)
- Gsl - GRANBY SANDY LOAM
- Gul - GUERIN LOAM (B)
- M - MUCK (B)
- Shsc - SCHOMBERG SILTY CLAY LOAM (C)
- Smsc - SMITHFIELD SILTY CLAY LAOM
- Stsl - SARGENT GRAVELLY SANDY LOAM (A)
- Tis - TIOGA LOAMY SAND (A)
- Tis-b
- Tisl - TIOGA SANDY LOAM (A)
- Vasl - VASEY SANDY LOAM (AB)



**DRAINAGE MASTER PLAN**  
FIGURE 12 - HYDROLOGIC SOIL GROUPS PLAN





**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

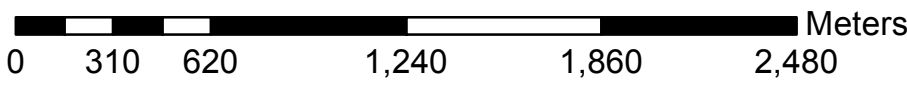
This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

**LEGEND**

- WATERCOURSE
- ROADS
- - - DRAINAGE STUDY AREA BOUNDARY
- OVERALL STUDY AREA
- PARKLAND CONSIDERED FOR CENTRALIZED LID AND RECOMMENDED FOR FURTHER CONSIDERATION
- PARKLAND CONSIDERED FOR CENTRALIZED LID AND ELIMINATED FOR FURTHER CONSIDERATION
- ANNEXATION LANDS (EXCLUDED FROM STUDY)
- SOPHIA CREEK WATERSHED AND MULCASTER DRAINAGE AREA (EXCLUDED FROM STUDY)
- MUNICIPAL BORDER



SCALE = 1:24,000

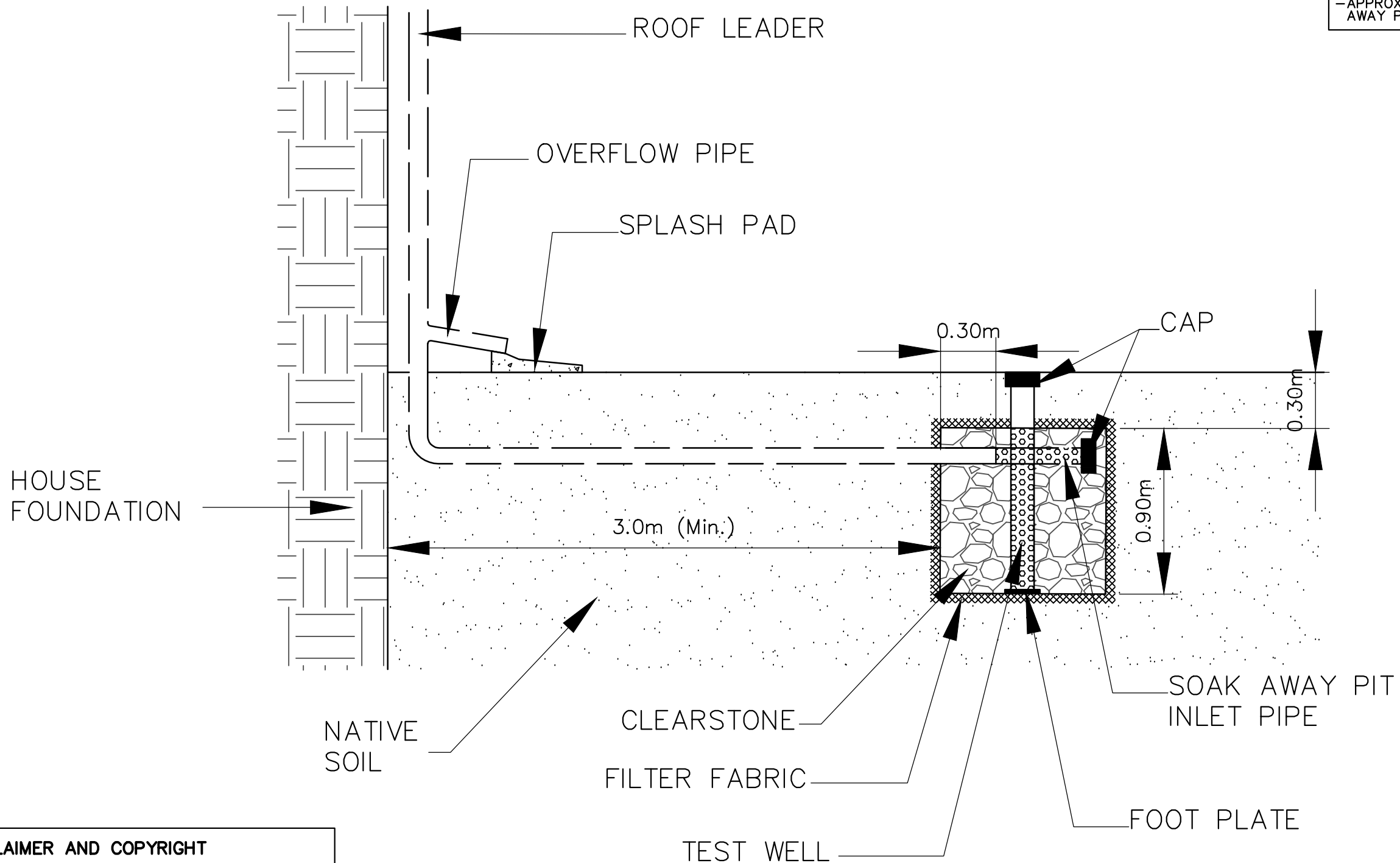


**DRAINAGE MASTER PLAN**

FIGURE 13 - CENTRALIZED LID OPPORTUNITIES (PRE-SCREENING EVALUATION)



117076\_FIG.15\_SOAK-AWAY-PIT.dwg; 20190329.0902:1000.00



#### NOTES

FOOT PRINT = 2 m X 2 m (4 SQ.m)  
POROSITY = 0.4 (GRAVEL)  
STORAGE VOLUME = 1.44 CU.m

LID USAGE – RESIDENTIAL AREAS  
–ASSUME 25% OF HOMES IMPLEMENT SOAKAWAY PIT  
–ASSUME 25% OF ROOFTOP DRAINS TO SOAKAWAY PIT  
–APPROX. 6.25% OF ROOFTOP WILL DRAIN TO SOAK  
AWAY PITS IN EACH SUBCATCHMENT

#### DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.



CITY OF BARRIE  
BARRIE DRAINAGE MASTER PLAN  
TYPICAL SOAKAWAY PIT DETAIL

DWG. No.  
**FIG. 14**

SCALE: 1:25

DRAWN: DEP

DATE: JUNE/18

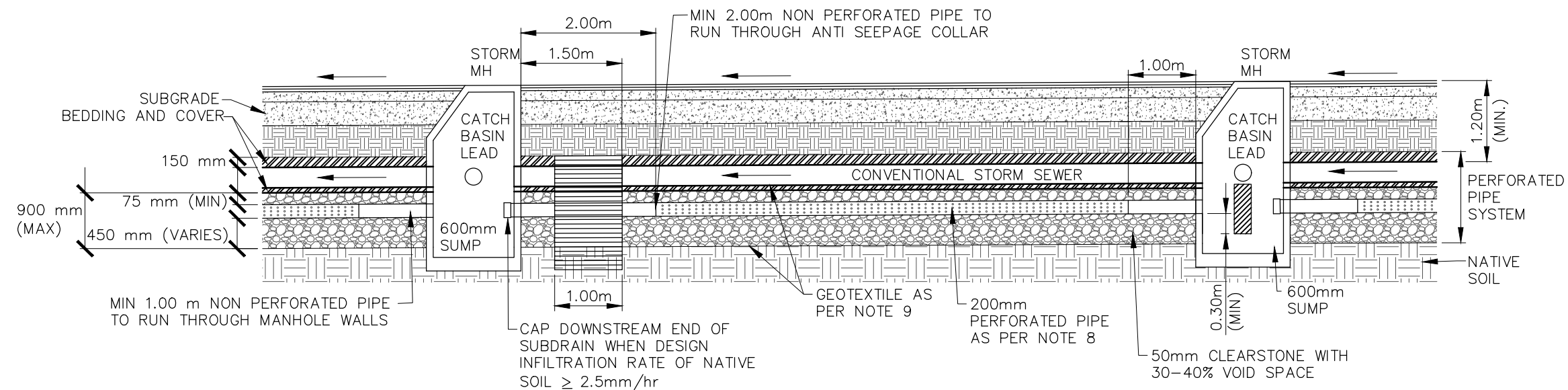
JOB NO. 117076



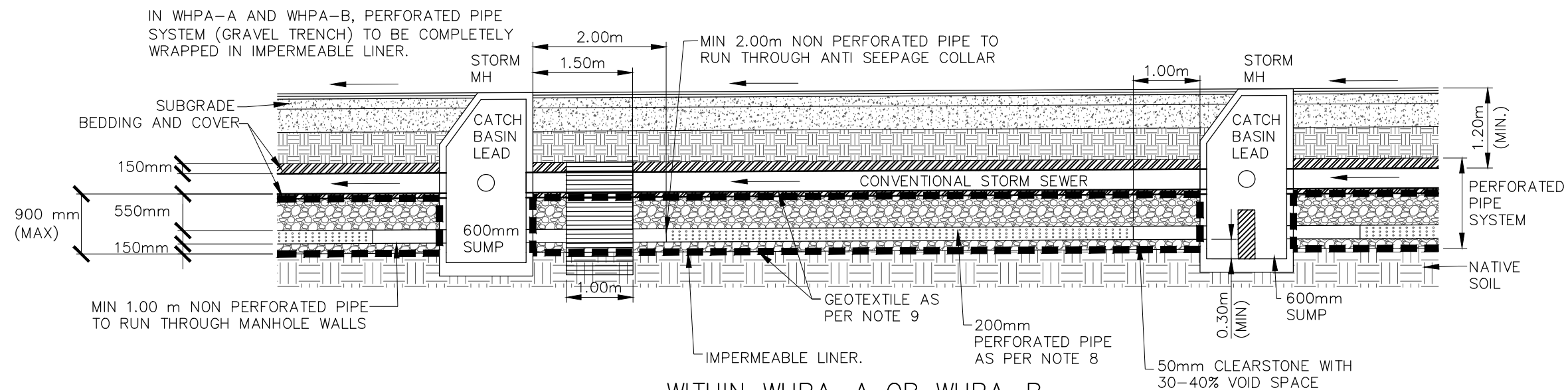




117076\_FIG.16B.dwg; 20190329.0905; 1000.00



### OUTSIDE WHPA-A OR WHPA-B



### WITHIN WHPA-A OR WHPA-B

#### NOTES:

1. STORMWATER CONVENTIONAL SYSTEM TO BE DESIGNED IN ACCORDANCE WITH THE CITY OF BARRIE STORM DRAINAGE MANUAL.
2. PERFORATED PIPES TO BE PLUGGED AT DOWNSTREAM END USING APPROPRIATE SIZED MECHANICAL PLUG OR EQUIVALENT. TEMP. PLUG TO BE INSTALLED UNTIL TRIBUTARY AREA IS STABILIZED.
3. GRAVEL BED AND INLET PIPE TO BE BELOW LOCAL FROST LINE AND BE INSTALLED IN RECTANGULAR EXCAVATIONS WITH A BOTTOM WIDTH MIN. 1.4m.
4. BAFFLE SHALL BE INSTALLED IN UPSTREAM MANHOLE PER MANUFACTURERS INSTRUCTIONS.
5. ANTI-SEEPAGE COLLARS SHALL BE INSTALLED ON ALL PERFORATED PIPES OR AS DIRECTED BY A GEOTECHNICAL ENGINEER.
6. FLOWS SHALL BE COLLECTED BY USE OF CONVENTIONAL CATCHBASINS COMPLETE WITH MINIMUM PRETREATMENT THE CITY OF BARRIE STORM DRAINAGE MANUAL.
7. BEARING CAPACITY OF INFILTRATION SOIL SHALL BE ASSESSED, AND INFILTRATION TRENCH DESIGNED SUCH THAT SETTLEMENT OF THE UNDERLYING SOILS DOES NOT NEGATIVELY AFFECT INFILTRATION RATES, OR RESULT IN SETTLEMENT & REDUCED LIFESPAN OF THE ROAD STRUCTURE ABOVE.
8. ALL PERFORATED PIPES TO BE SMOOTH WALLED MIN 200mm INSIDE DIA. CONTINUOUSLY PERFORATED TYPE SDR28 PVC PIPE, WITH 4X12 PERFORATIONS TO A MAXIMUM SPACING OF 150mm, WRAPPED WITH GEOTEXTILE SOCK PER OPSS 1860, CLASS II, NON-WOVEN NEEDLE PUNCHED OR WOVEN MONOFILAMENT AND COVERED WITH MIN. 75mm CLEAR STONE OVER PIPE.
9. GEOTEXTILE FABRIC PER OPSS 1860, CLASS II, NON-WOVEN NEEDLE PUNCHED OR WOVEN MONOFILAMENT TO BE INSTALLED AROUND ALL TRENCH FACILITIES WITH 300mm MIN. OVERLAP.
10. CATCHBASINS PER OPSD 705.010, TO HAVE 900mm SUMP AND MINIMUM PRETREATMENT, AS DEFINED IN THE CITY OF BARRIE DRAINAGE MANUAL.

#### DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.



**CITY OF BARRIE**  
**BARRIE DRAINAGE MASTER PLAN**  
**TYPICAL LINEAR LID DETAIL**

DWG. No.

**FIG. 15B**

SCALE: 1:75

DRAWN: DEP

DATE: JUNE/17

JOB NO. 117076



Disclaimer

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

GENERAL RECOMMENDATIONS

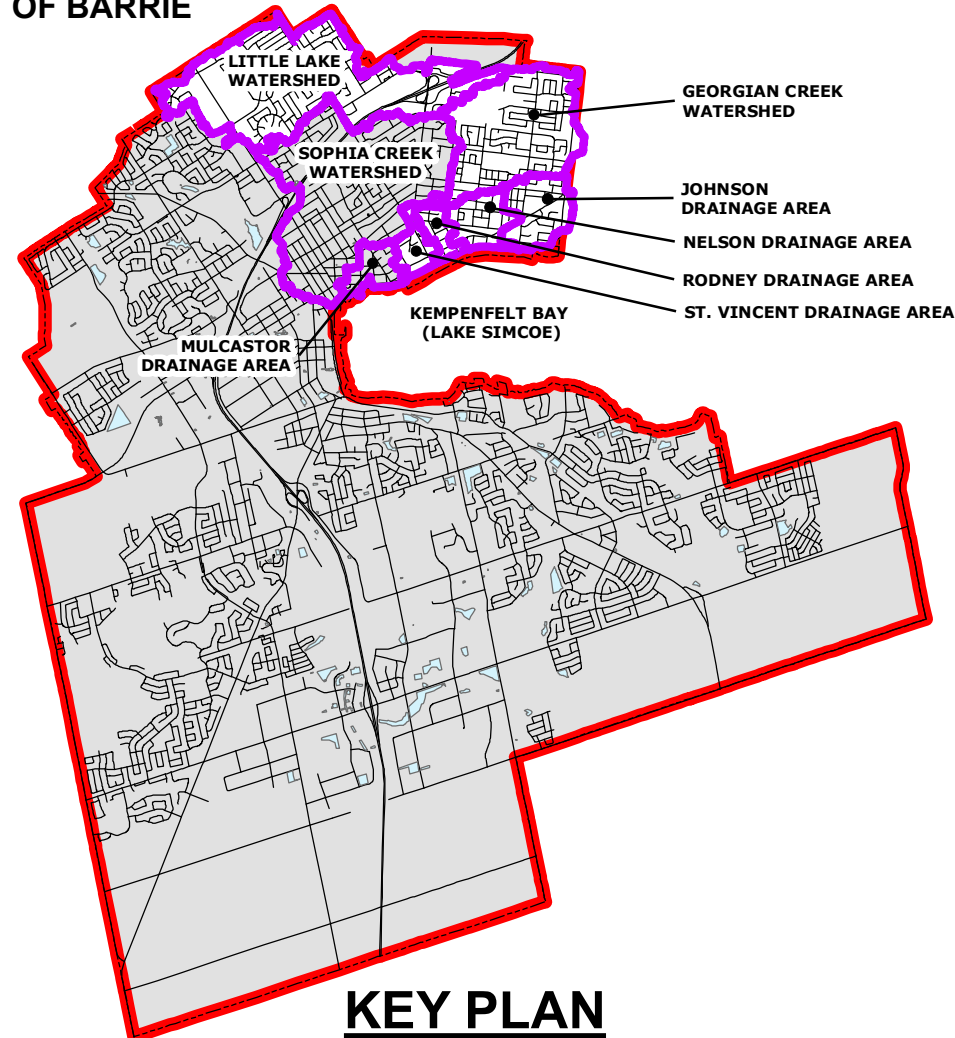
AS A GENERAL REQUIREMENT FOR ALL CAPITAL PROJECTS, IT IS RECOMMENDED THAT CONSIDERATION BE GIVEN TO UPSIZING LOCAL STORM SEWERS TO SATISFY CURRENT DESIGN STANDARDS AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. SIMILARLY, RELOCATING STORM SEWER TO THE MUNICIPAL ROAD ALLOWANCE SHOULD ALSO BE CONSIDERED AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. IT IS ALSO RECOMMENDED THAT THE STREETS IDENTIFIED AS BEING ABSENT OF A MINOR DRAINAGE SYSTEM THROUGHOUT THE STUDY AREA INCLUDE STORM SEWERS AS PART OF ROAD RECONSTRUCTION PROJECTS.

AS PART OF ROAD RECONSTRUCTION PROJECTS, MAJOR OVERLAND DEFICIENCIES ARE TO BE EVALUATED AND ADDRESSED WHERE FEASIBLE THROUGH OVERSIZING STORM SEWERS, ADJUSTING ROAD PROFILES/CROSS-SECTIONS OR OTHER MAJOR OVERLAND FLOW ROUTE IMPROVEMENTS.

IT IS RECOMMENDED THAT THE CITY PROACTIVELY ACQUIRE LANDS OR INTEREST THEREIN (EASEMENTS) OVER WATERCOURSES AND CULVERT CROSSINGS THROUGHOUT THE CITY WHERE IT IS IN THE CITY'S BEST INTEREST TO DO SO.

AS PART OF ROAD RECONSTRUCTION PROJECTS AND INTENSIFICATION PROJECTS ON LOCAL ROADS THROUGHOUT THE CITY, IT IS RECOMMENDED THAT THE CITY IMPLEMENT LINEAR LOW IMPACT DEVELOPMENT MEASURES SUCH AS PERFORATED PIPE SYSTEMS AND INFILTRATION TRENCHES TO PROMOTE INFILTRATION AND IMPROVE WATER QUALITY.

CITY OF BARRIE



KEY PLAN

LEGEND

- EXISTING STORM MAINTENANCE HOLE
- EXISTING STORM SEWER
- CULVERT
- DITCH
- WATERCOURSE
- ROAD
- RAILWAY
- PROPOSED WATERCOURSE IMPROVEMENTS
- PROPOSED TRUNK STORM SEWER IMPROVEMENTS
- PROPOSED CULVERT IMPROVEMENTS
- EXISTING SWMF
- PROPOSED SWMF RETROFIT/EXPANSION
- PARKLAND CONSIDERED FOR CENTRALIZED LID
- BUILDINGS
- WATERSHED/DRAINAGE AREA BOUNDARY
- MUNICIPAL BORDER
- EROSION SITE (BED AND BANK)
- 1 2 3 4 5 PROJECT No.

DEFICIENT CULVERTS / CROSSINGS

100 YEAR DESIGN STORM CAPACITY

139 PENETANGUISHENE ROAD

SWMF RETROFIT/CREATION

142 SWMF LT01

145 SWMF LTGM

WATERCOURSE IMPROVEMENTS

143 REACH LI-1 (STABILIZE EXISTING BANK EROSION/FAILURE)

TRUNK STORM SEWER IMPROVEMENTS

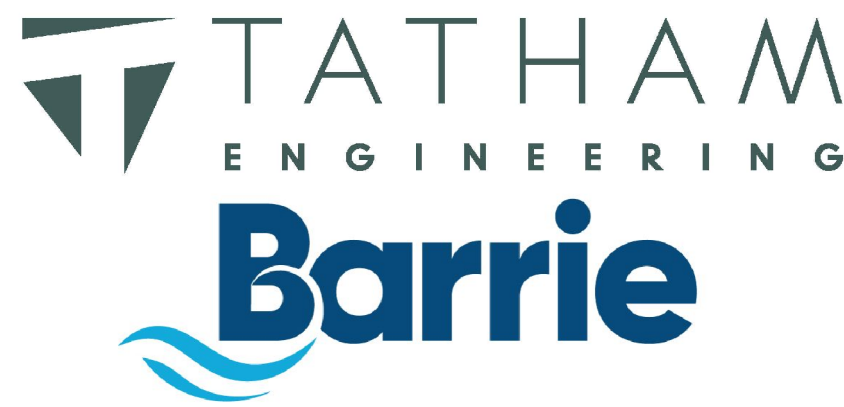
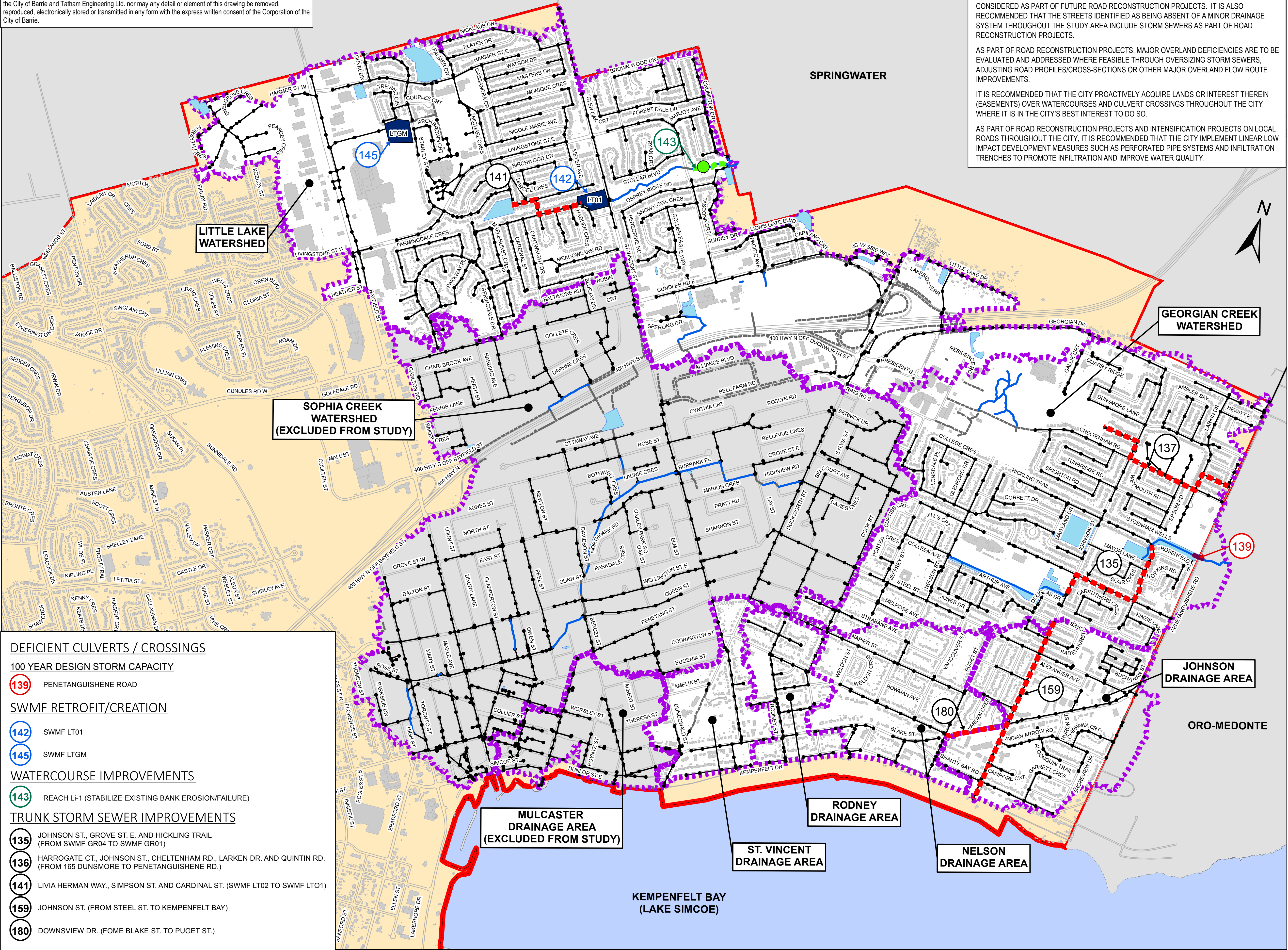
135 JOHNSON ST., GROVE ST. E. AND HICKLING TRAIL (FROM SWMF GR04 TO SWMF GR01)

136 HARROGATE CT., JOHNSON ST., CHELTENHAM RD., LARKEN DR. AND QUINTIN RD. (FROM 165 DUNSMORE TO PENETANGUISHENE RD.)

141 LIVIA HERMAN WAY, SIMPSON ST. AND CARDINAL ST. (SWMF LT02 TO SWMF LTO1)

159 JOHNSON ST. (FROM STEEL ST. TO KEMPENFELT BAY)

180 DOWNSVIEW DR. (FOME BLAKE ST. TO PUGET ST.)



SCALE = 1:10,000

0 125 250 500 750 1,000 Meters

DRAINAGE MASTER PLAN

GEORGIAN CREEK & LITTLE LAKE WATERSHEDS;

JOHNSON, NELSON, RODNEY  
& ST VINCENT DRAINAGE AREAS

FIGURE 22 - FINAL PREFERRED ALTERNATIVE SOLUTIONS

DATE: MARCH 2019



CULVERT IMPROVEMENTS

5	CUNDLES ROAD	50	FERNDALE DRIVE NORTH
8A	THOMSON STREET	52	SARJEANT DRIVE
9	WELLINGTON STREET	53	HIGHWAY 400 E/W-S AND N-E/W RAMPS
38	HIGHWAY 400	54	HIGHWAY 400
37	HIGHWAY 400	57	GEORGE STREET
36	HIGHWAY 400	169B	VICTORIA STREET
43	INNISFIL STREET	58B	ANNE STREET SOUTH AND JOHN STREET
44	COMMERCIAL PLAZA ENTRANCE ROAD	60	INNISFIL STREET
45	BRADFORD STREET	61	SANFORD STREET
182	DUNLOP STREET WEST	62	BRADFORD STREET
166	DUNLOP STREET WEST	55	HART DRIVE

SWMF RETROFIT/CREATION

31	SWMF BK03	3	SWMF KD03
1	SWMF KD06	170B	SWMF DY01
181	NEW SWMF	2	SWMF KD05
39	NEW SWMF	42	MILLIGAN'S POND

WATERCOURSE IMPROVEMENTS

4	REACH Ki-1 THROUGH Ki-2 (STABILIZE EXISTING BANK EROSION/FAILURE)
163	REACH Ki-8A (STABILIZE EXISTING BANK EROSION/FAILURE)
10	REACH Ki-10B THROUGH Ki-10C (STABILIZE EXISTING BANK EROSION/FAILURE)
34	REACH Bu-3 (STABILIZE BED AND BANK EROSION)
35	REACH Bu-7 (STABILIZE BED AND BANK EROSION)
41	REACHES Bu-11 & Bu-15 (TOE TREATMENT TO STABILIZE BANK SCOUR)
183	REACH Dy-2A (WATERCOURSE REALIGNMENT)
51	REACH Dy-2B (WATERCOURSE RE-GRADING/SHAPING)
56	REACH Dy-3 (DAYLIGHT WATERCOURSE)
59	REACH Dy-5 (TOE TREATMENT TO STABILIZE BACK SCOUR)
165	REACHES Ki-11 (DAYLIGHT WATERCOURSE)
167	REACHES Ki-11 (DAYLIGHT WATERCOURSE)
46	REACH Bu-16 (WATERCOURSE RE-GRADING/SHAPING)
63	REACH Dy-6 (WATERCOURSE RE-GRADING/SHAPING)
49	REACH Dy-1 (WATERCOURSE REALIGNMENT)
161	REACH Ki-4 THROUGH Ki-6 (STABILIZE EXISTING BANK EROSION/FAILURE)

TRUNK STORM SEWER IMPROVEMENTS

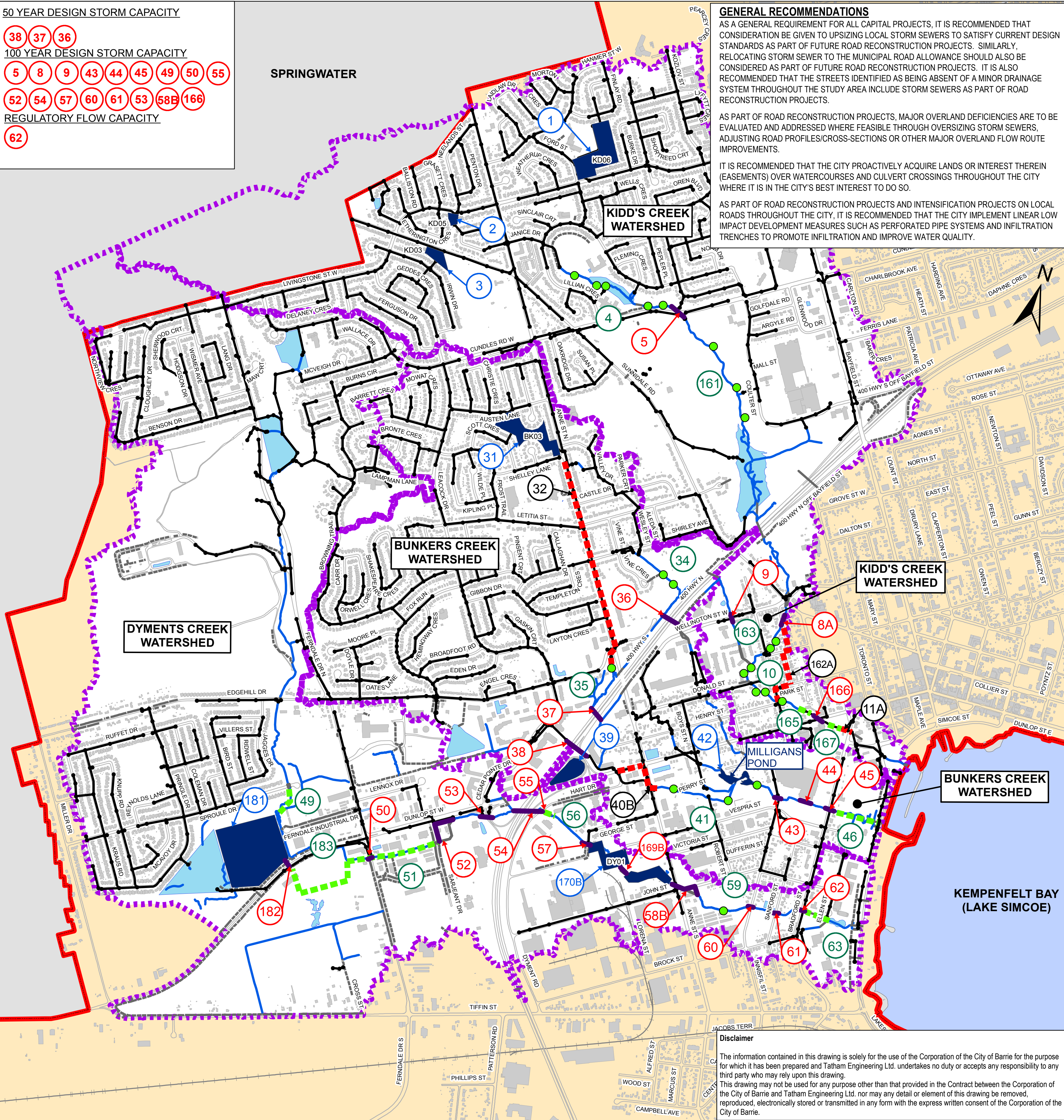
32	ANNE ST. N. (FROM SWMF BK03 TO EDGEHILL DR.)
40B	ANNE ST. S. (FROM DUNLOP ST. W. TO PERRY ST.)
162A	THOMSON ST., SOPHIA ST. W., FLORENCE ST. AND ECCLES ST. (FROM THOMPSON ST. TO ECCLES ST.)
11A	BRADFORD ST. (EXTENSION OF EXISTING TRUNK STORM SEWER)

50 YEAR DESIGN STORM CAPACITY

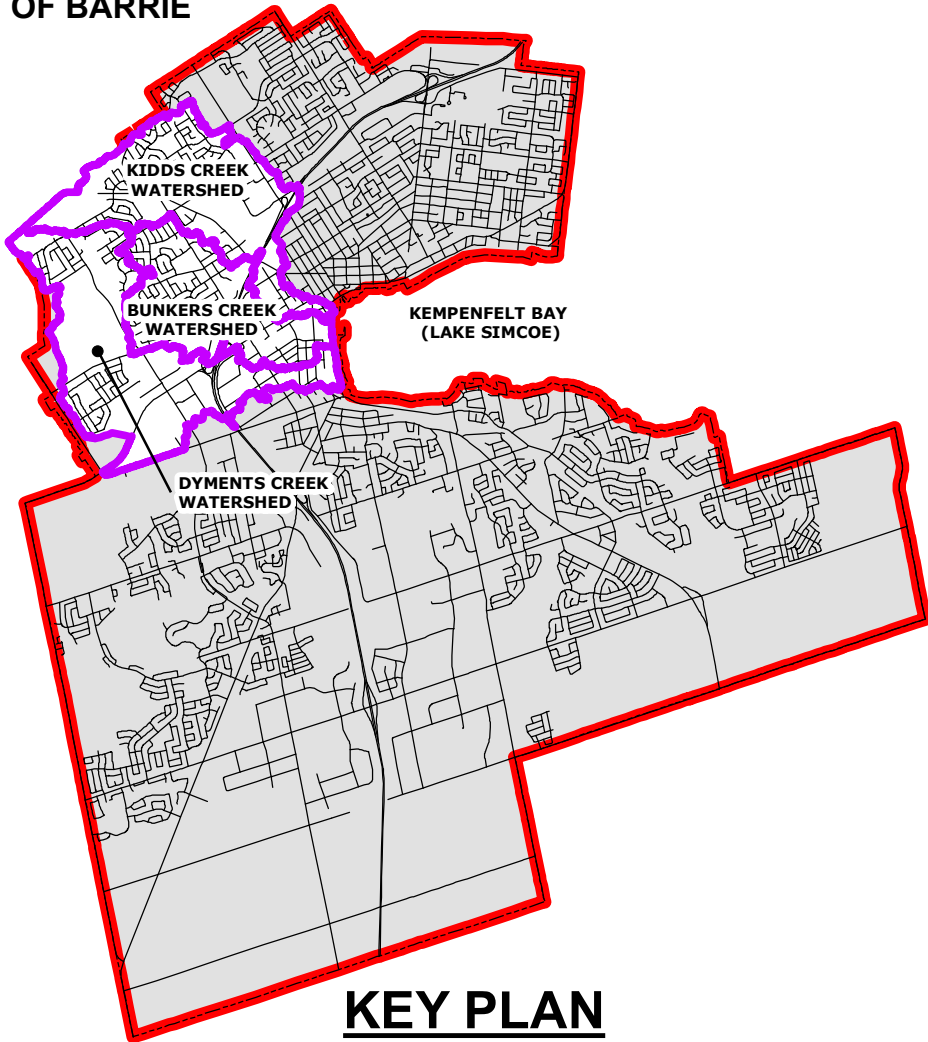
38	37	36
5	8	9
43	44	45
49	50	55
52	54	57
60	61	53
58B	166	
62		

REGULATORY FLOW CAPACITY

62
----



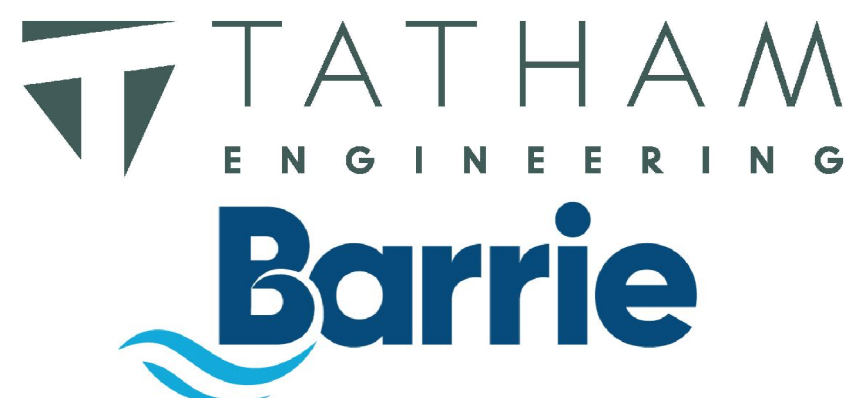
CITY OF BARRIE



KEY PLAN

LEGEND

- EXISTING STORM MAINTENANCE HOLE
- EXISTING STORM SEWER
- CULVERT
- DITCH
- WATERCOURSE
- ROADS
- RAILWAY
- PROPOSED TRUNK STORM SEWER IMPROVEMENTS
- PROPOSED WATERCOURSE IMPROVEMENTS
- PROPOSED CULVERT IMPROVEMENTS
- EXISTING SWMF
- PROPOSED SWMF RETROFIT/EXPANSION
- PARKLAND CONSIDERED FOR CENTRALIZED LID
- BUILDINGS
- WATERSHED/DRAINAGE AREA BOUNDARY
- MUNICIPAL BORDER
- EROSION SITE (BED AND BANK)
- PROJECT No.



SCALE = 1:10,000

0 125 250 500 750 1,000 Meters

DRAINAGE MASTER PLAN

BUNKERS CREEK, DYMENTS CREEK & KIDD'S CREEK WATERSHEDS

FIGURE 23 - FINAL PREFERRED ALTERNATIVE SOLUTIONS



68	HARVIE ROAD	174A	THE BOULEVARD
172A	HIGHWAY 400	176	BRENNAN AVENUE
71	FAIRVIEW ROAD	98	RAILWAY CROSSING
72	BAYVIEW DRIVE	99	LOCKHART ROAD
80	HURONIA ROAD	101	LOCKHART ROAD
85	YONGE STREET	105B	RAILWAY CROSSING
86	RAILWAY CROSSING	78	RAILWAY CROSSING
88	TOLLEDALE MILL ROAD	70	HARVIE ROAD
84	LITTLE AVENUE		

171	REACH Wh-3 (WATERCOURSE REALIGNMENT)
73	REACH Wh-4 (WATERCOURSE REALIGNMENT)
76	REACH Wh-5 (STABILIZE EXISTING BANK EROSION/FAILURE)
77	REACH Wh-6 (STABILIZE EXISTING BANK EROSION/FAILURE)
D 89	REACH Wh-10 (STABILIZE EXISTING BANK EROSION/FAILURE)
175	REACH Wh-10 (WATERCOURSE RE-GRADING/RESHAPING)
177	REACH Wh-10 (WATERCOURSE RE-GRADING/RESHAPING)
120	REACH Lv-19 (STABILIZE EXISTING BED AND BANK EROSION)
121	REACH Lv-20 (STABILIZE EXISTING BED AND BANK EROSION)
74	REACH Wh-4A THROUGH Wh-4C (CHANNEL RE-GRADING/RESHAPING)
81	REACH Wh-7B (WATERCOURSE REALIGNMENT)
179	REACH Wh-9 (WATERCOURSE RE-GRADING/RESHAPING)

100 YEAR DESIGN STORM CAPACITY

105B

**114** ESTHER DRIVE (FROM DEAN AVE. TO SWMF LV19)

**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.

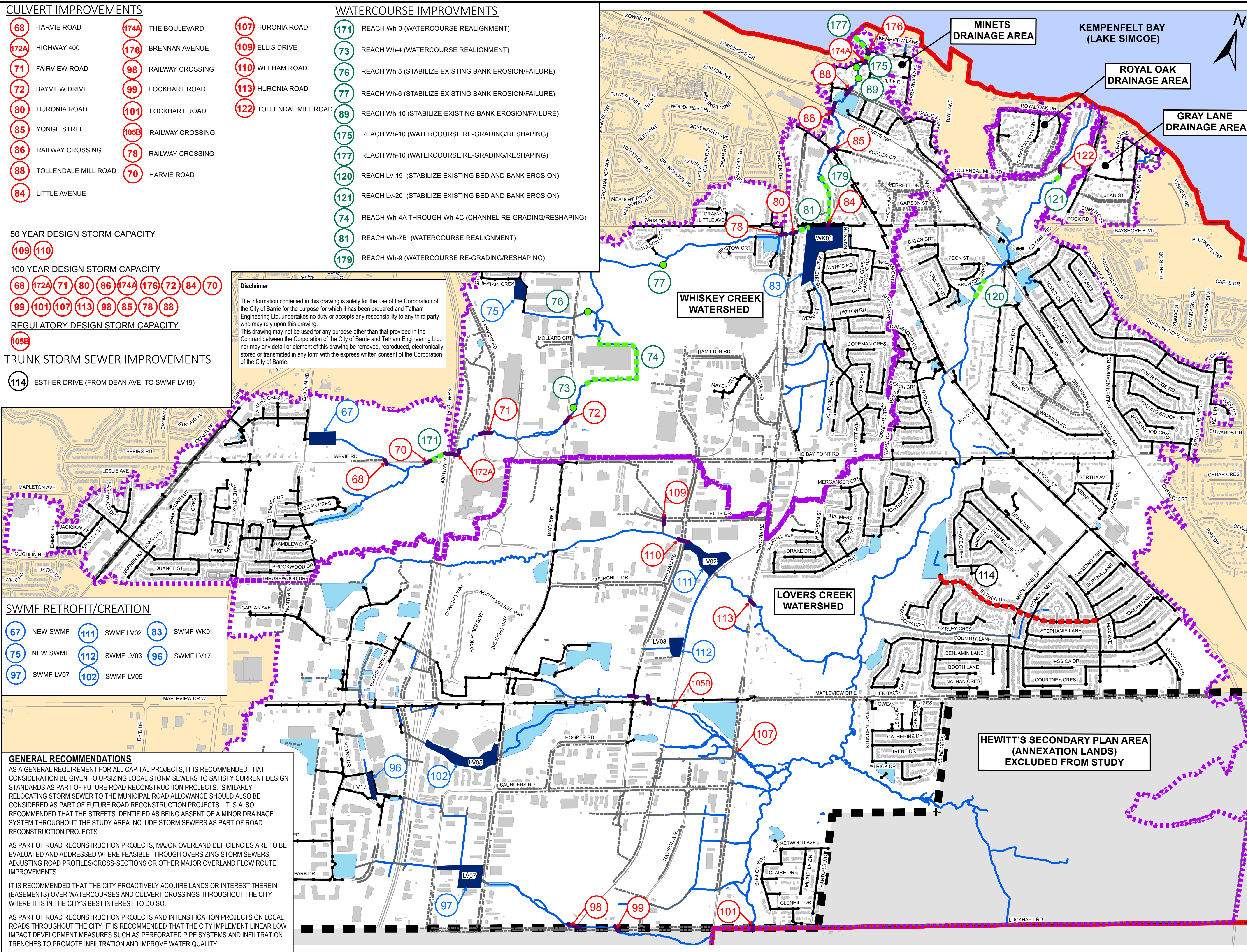
67	NEW SWMF	111	SWMF LV02	83	SWMF WK01
75	NEW SWMF	112	SWMF LV03	96	SWMF LV17
97	SWMF LV07	102	SWMF LV05		

AS A GENERAL REQUIREMENT FOR ALL CAPITAL PROJECTS, IT IS RECOMMENDED THAT CONSIDERATION BE GIVEN TO UPSIZING LOCAL STORM SEWERS TO SATISFY CURRENT DESIGN STANDARDS AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. SIMILARLY, RELOCATING STORM SEWER TO THE MUNICIPAL ROAD ALLOWANCE SHOULD ALSO BE CONSIDERED AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. IT IS ALSO RECOMMENDED THAT THE STREETS IDENTIFIED AS BEING ABSENT OF A MINOR DRAINAGE SYSTEM THROUGHOUT THE STUDY AREA INCLUDE STORM SEWERS AS PART OF ROAD RECONSTRUCTION PROJECTS.

AS PART OF ROAD RECONSTRUCTION PROJECTS, MAJOR OVERLAND DEFICIENCIES ARE TO BE EVALUATED AND ADDRESSED WHERE FEASIBLE THROUGH OVERSIZING STORM SEWERS, ADJUSTING ROAD PROFILES/CROSS-SECTIONS OR OTHER MAJOR OVERLAND FLOW ROUTE IMPROVEMENTS.

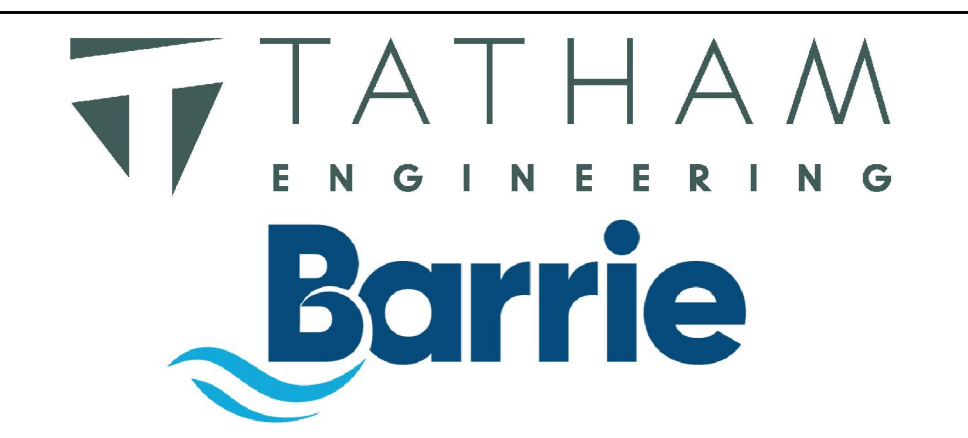
IT IS RECOMMENDED THAT THE CITY PROACTIVELY ACQUIRE LANDS OR INTEREST THEREIN (EASEMENTS) OVER WATERCOURSES AND CULVERT CROSSINGS THROUGHOUT THE CITY WHERE IT IS IN THE CITY'S BEST INTEREST TO DO SO.

AS PART OF ROAD RECONSTRUCTION PROJECTS AND INTENSIFICATION PROJECTS ON LOCAL ROADS THROUGHOUT THE CITY, IT IS RECOMMENDED THAT THE CITY IMPLEMENT LINEAR LOW IMPACT DEVELOPMENT MEASURES SUCH AS PERFORATED PIPE SYSTEMS AND INFILTRATION TRENCHES TO PROMOTE INFILTRATION AND IMPROVE WATER QUALITY.

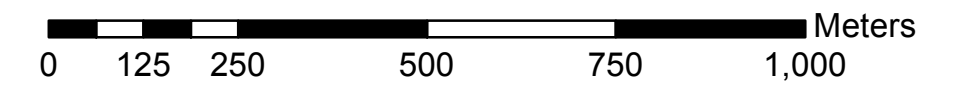


**KEY PLAN**

- EXISTING STORM MAINTENANCE HOLE
- EXISTING STORM SEWER
- CULVERT
- DITCH
- WATERCOURSE
- ROAD
- ++ RAILWAY
- PROPOSED TRUNK STORM SEWER IMPROVEMENTS
- PROPOSED WATERCOURSE IMPROVEMENTS
- PROPOSED CULVERT IMPROVEMENTS
- EXISTING SWMF
- PROPOSED SWMF RETROFIT/EXPANSION
- PARKLAND CONSIDERED FOR CENTRALIZED LID
- BUILDINGS
- WATERSHED/DRAINAGE AREA BOUNDARY
- ANNEXATION LANDS BOUNDARY
- MUNICIPAL BORDER
- EROSION SITE (BED AND BANK)



SCALE = 1:10,000



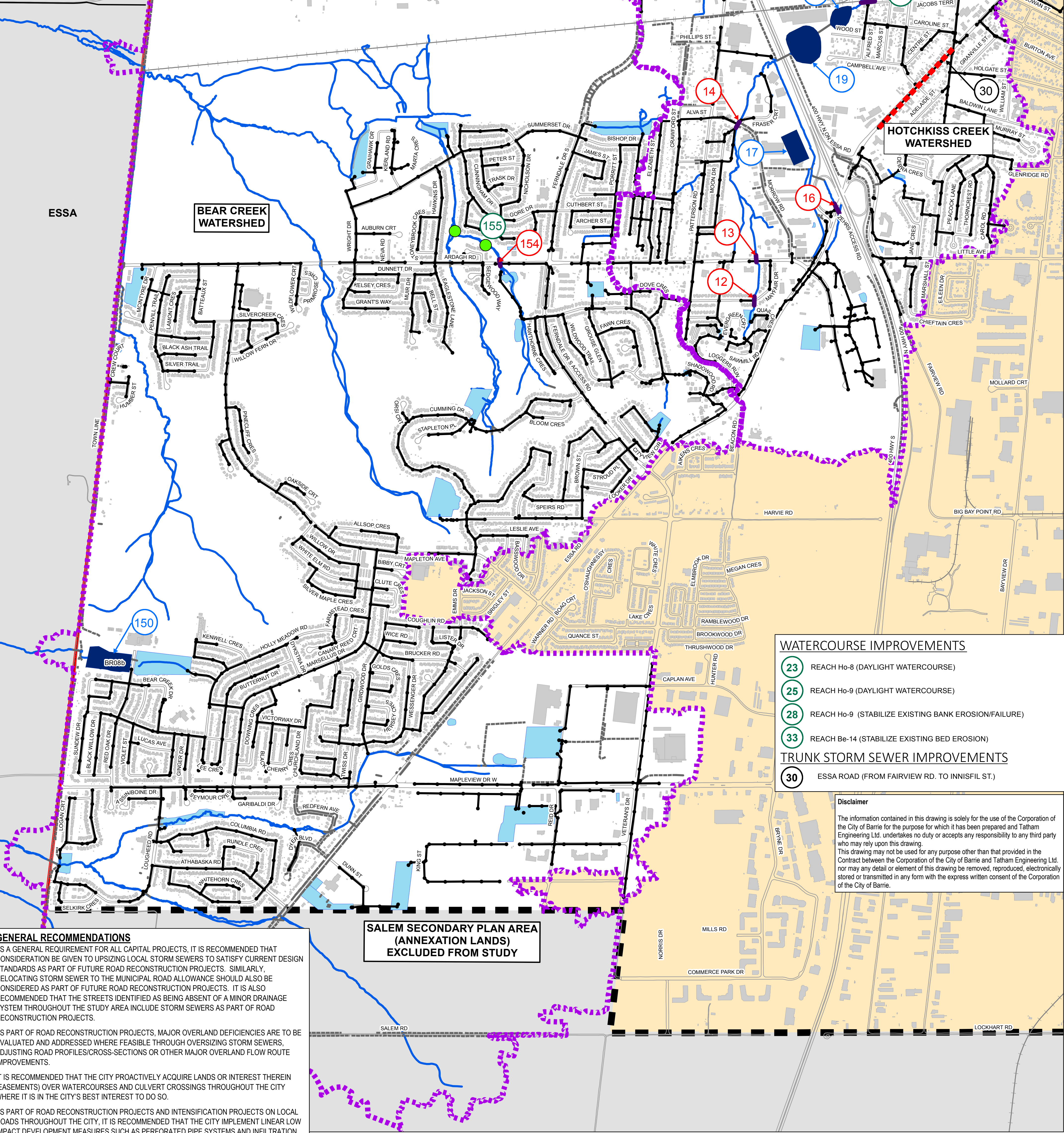
LOVERS CREEK & WHISKEY CREEK WATERSHEDS;  
MINETS, ROYAL OAK & GRAY LANE DRAINAGE AREAS

FIGURE 24 - FINAL PREFERRED ALTERNATIVE SOLUTIONS

DATE: MARCH 2019



CULVERT IMPROVEMENTS		50 YEAR DESIGN STORM CAPACITY		SWMF RETROFIT/CREATION	
12 MAYFAIR DRIVE	24 ANNE STREET SOUTH	12 14		17 NEW SWMF	150 SWMF BR08B
13 ARDAGH ROAD	27B INNISFIL STREET	100 YEAR DESIGN STORM CAPACITY		19 NEW SWMF	20 NEW SWMF
14 MORROW ROAD	22 TIFFIN STREET	13 16 22 24 21 27B 154			
16 ESSA ROAD	154 ARDAGH ROAD				
21 RAILWAY CROSSING					



**GENERAL RECOMMENDATIONS**

AS A GENERAL REQUIREMENT FOR ALL CAPITAL PROJECTS, IT IS RECOMMENDED THAT CONSIDERATION BE GIVEN TO UPSIZING LOCAL STORM SEWERS TO SATISFY CURRENT DESIGN STANDARDS AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. SIMILARLY, RELOCATING STORM SEWER TO THE MUNICIPAL ROAD ALLOWANCE SHOULD ALSO BE CONSIDERED AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. IT IS ALSO RECOMMENDED THAT THE STREETS IDENTIFIED AS BEING ABSENT OF A MINOR DRAINAGE SYSTEM THROUGHOUT THE STUDY AREA INCLUDE STORM SEWERS AS PART OF ROAD RECONSTRUCTION PROJECTS.

AS PART OF ROAD RECONSTRUCTION PROJECTS, MAJOR OVERLAND DEFICIENCIES ARE TO BE EVALUATED AND ADDRESSED WHERE FEASIBLE THROUGH OVERSIZING STORM SEWERS, ADJUSTING ROAD PROFILES/CROSS-SECTIONS OR OTHER MAJOR OVERLAND FLOW ROUTE IMPROVEMENTS.

IT IS RECOMMENDED THAT THE CITY PROACTIVELY ACQUIRE LANDS OR INTEREST THEREIN (EASEMENTS) OVER WATERCOURSES AND CULVERT CROSSINGS THROUGHOUT THE CITY WHERE IT IS IN THE CITY'S BEST INTEREST TO DO SO.

AS PART OF ROAD RECONSTRUCTION PROJECTS AND INTENSIFICATION PROJECTS ON LOCAL ROADS THROUGHOUT THE CITY, IT IS RECOMMENDED THAT THE CITY IMPLEMENT LINEAR LOW IMPACT DEVELOPMENT MEASURES SUCH AS PERFORATED PIPE SYSTEMS AND INFILTRATION TRENCHES TO PROMOTE INFILTRATION AND IMPROVE WATER QUALITY.

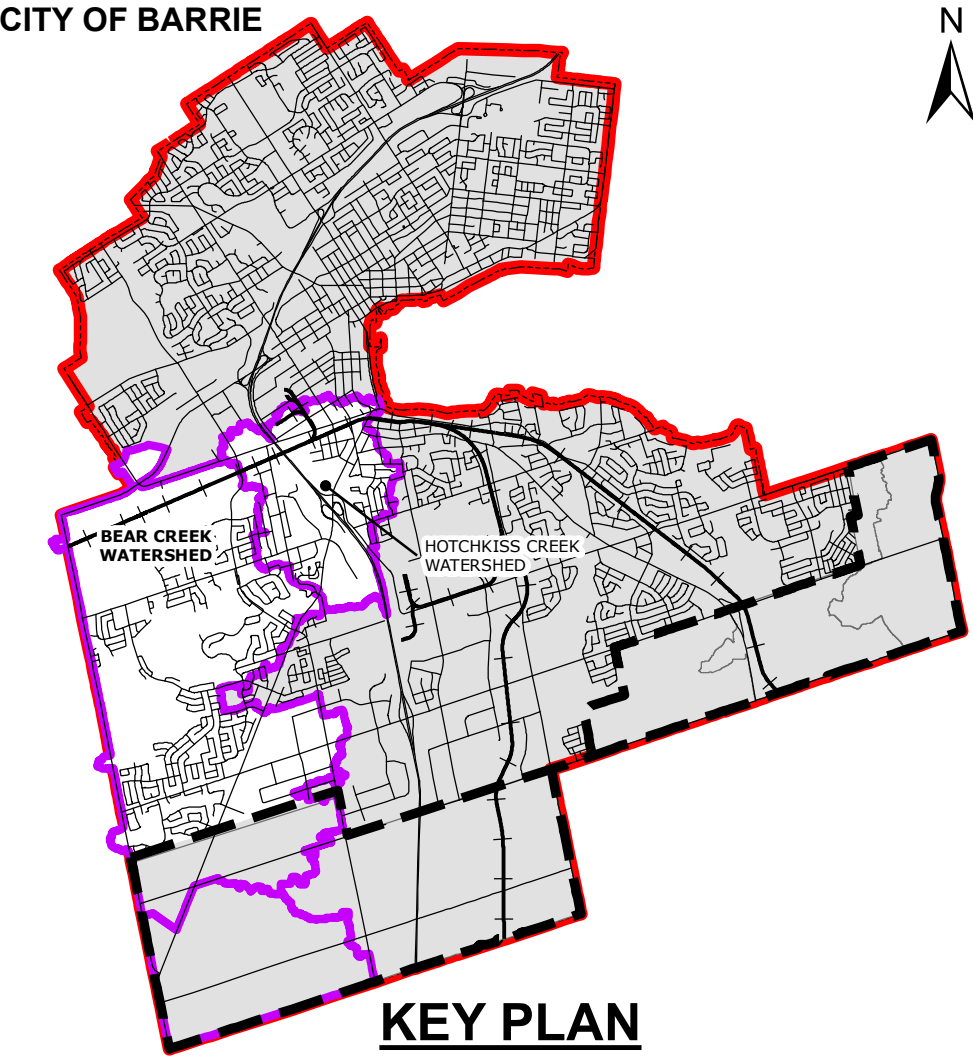
**SALEM SECONDARY PLAN AREA (ANNEXATION LANDS) EXCLUDED FROM STUDY**

- WATERCOURSE IMPROVEMENTS**
- 23 REACH Ho-8 (DAYLIGHT WATERCOURSE)
  - 25 REACH Ho-9 (DAYLIGHT WATERCOURSE)
  - 28 REACH Ho-9 (STABILIZE EXISTING BANK EROSION/FAILURE)
  - 33 REACH Be-14 (STABILIZE EXISTING BED EROSION)
- TRUNK STORM SEWER IMPROVEMENTS**
- 30 ESSA ROAD (FROM FAIRVIEW RD. TO INNISFIL ST.)

**Disclaimer**

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and Tatham Engineering Ltd. undertakes no duty or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the Contract between the Corporation of the City of Barrie and Tatham Engineering Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form with the express written consent of the Corporation of the City of Barrie.



- LEGEND**
- EXISTING STORM MAINTENANCE HOLE
  - EXISTING STORM SEWER
  - CULVERT
  - DITCH
  - WATERCOURSE
  - ROADS
  - RAILWAY
  - PROPOSED TRUNK STORM SEWER IMPROVEMENTS
  - PROPOSED WATERCOURSE IMPROVEMENTS
  - PROPOSED CULVERT IMPROVEMENTS
  - EXISTING SWMF
  - PROPOSED SWMF RETROFIT/EXPANSION
  - PARKLAND CONSIDERED FOR CENTRALIZED LID
  - BUILDINGS
  - WATERSHED/DRAINAGE AREA BOUNDARY
  - ANNEXATION LANDS BOUNDARY
  - MUNICIPAL BORDER
  - EROSION SITE (BED AND BANK)
  - PROJECT No.

**TATHAM ENGINEERING**

**Barrie**

SCALE = 1:10,000

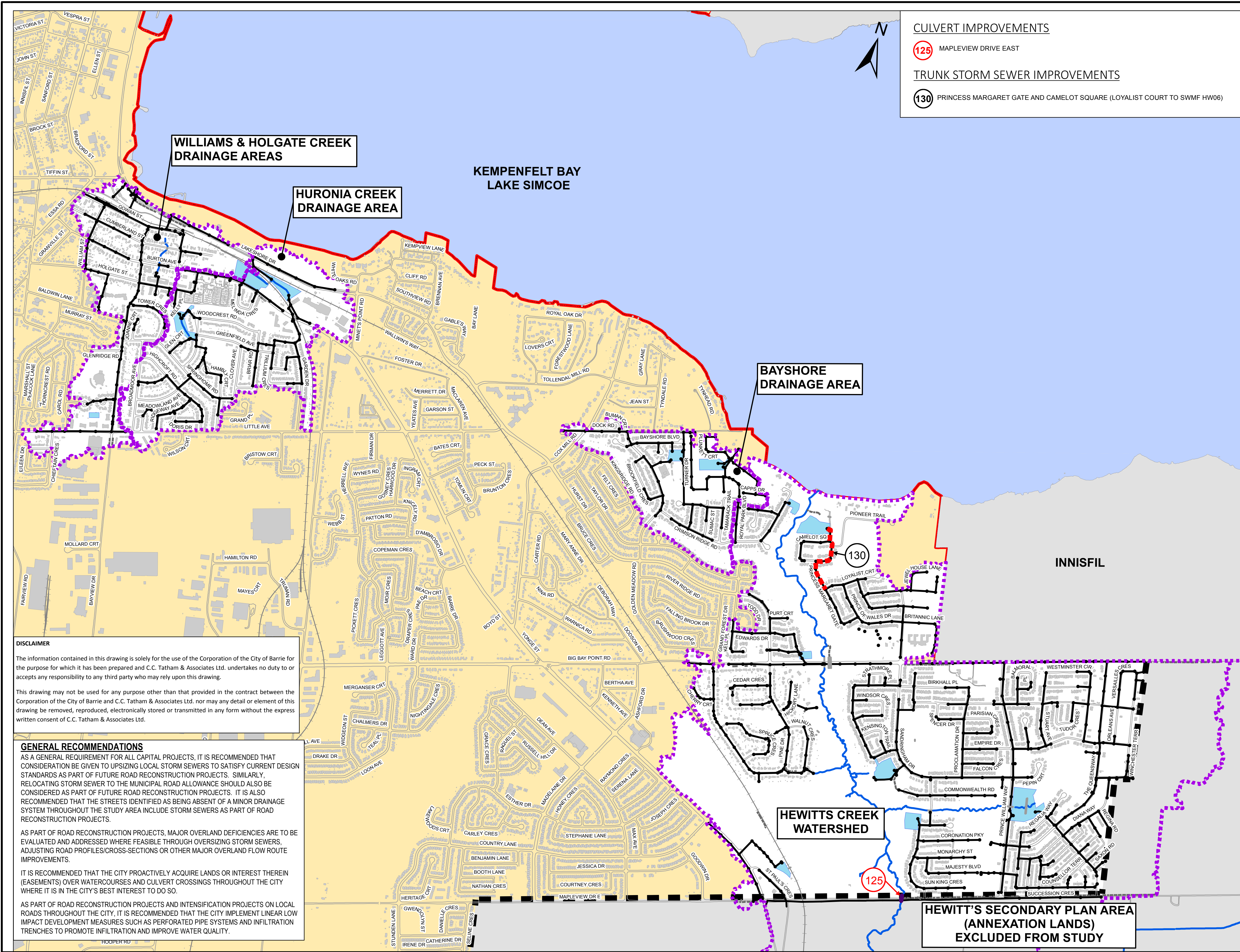
0 125 250 500 750 1,000 Meters

**DRAINAGE MASTER PLAN**

BEAR CREEK & HOTCHKISS CREEK WATERSHEDS

FIGURE 25 - FINAL PREFERRED ALTERNATIVE SOLUTIONS





CITY OF BARRIE

**KEY PLAN**

**LEGEND**

- STORM MAINTENANCE HOLE
- EXISTING STORM SEWER
- CULVERT
- DITCH
- WATERCOURSE
- ROADS
- RAILWAY
- PROPOSED CULVERT IMPROVEMENTS
- PROPOSED TRUNK STORM SEWER IMPROVEMENTS
- EXISTING SWMF
- PROPOSED SWMF RETROFIT/EXPANSION
- PARKLAND CONSIDERED FOR CENTRALIZED LID
- BUILDINGS
- WATERSHED/DRAINAGE AREA BOUNDARY
- ANNEXATION LANDS BOUNDARY
- MUNICIPAL BORDER
- EROSION SITE (BED AND BANK)
- PROJECT No.

**TATHAM ENGINEERING**

**Barrie**

SCALE = 1:10,000

0 125 250 500 750 1,000 Meters

**DRAINAGE MASTER PLAN**

HEWITTS CREEK & SANDY COVE WATERSHEDS;  
BAYSHORE, WILLIAMS, HOLGATE & HURONIA CREEKS DRAINAGE AREAS

FIGURE 26 - FINAL PREFERRED ALTERNATIVE SOLUTIONS

DATE: MARCH 2019

CULVERT IMPROVEMENTS

125 MAPLEVIEW DRIVE EAST

TRUNK STORM SEWER IMPROVEMENTS

130 PRINCESS MARGARET GATE AND CAMELOT SQUARE (LOYALIST COURT TO SWMF HW06)

WILLIAMS & HOLGATE CREEK  
DRAINAGE AREAS

HURONIA CREEK  
DRAINAGE AREA

KEMPENFELT BAY  
LAKE SIMCOE

BAYSHORE  
DRAINAGE AREA

INNISFIL

HEWITTS CREEK  
WATERSHED

HEWITT'S SECONDARY PLAN AREA  
(ANNEXATION LANDS)  
EXCLUDED FROM STUDY

DISCLAIMER

The information contained in this drawing is solely for the use of the Corporation of the City of Barrie for the purpose for which it has been prepared and C.C. Tatham & Associates Ltd. undertakes no duty to or accepts any responsibility to any third party who may rely upon this drawing.

This drawing may not be used for any purpose other than that provided in the contract between the Corporation of the City of Barrie and C.C. Tatham & Associates Ltd. nor may any detail or element of this drawing be removed, reproduced, electronically stored or transmitted in any form without the express written consent of C.C. Tatham & Associates Ltd.

GENERAL RECOMMENDATIONS

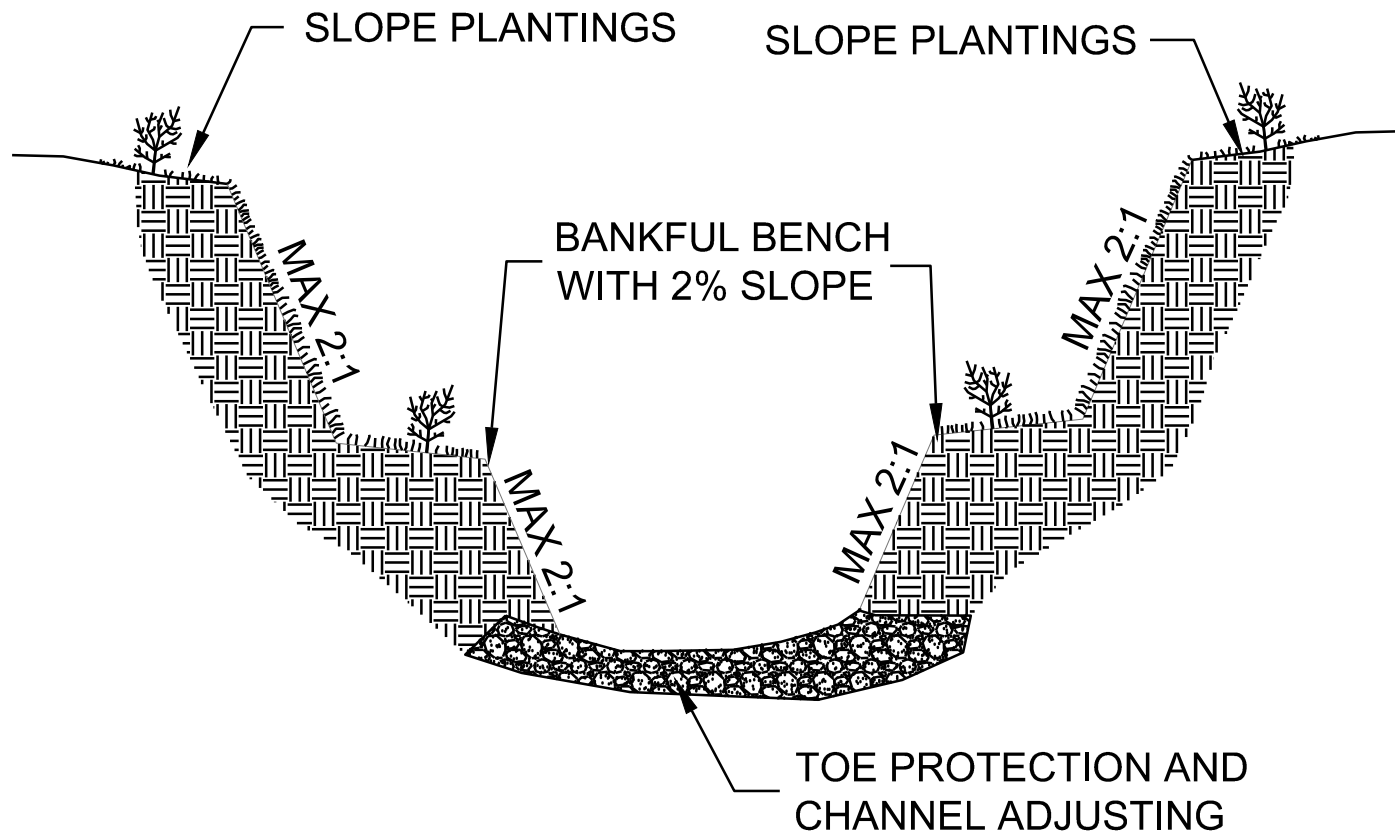
AS A GENERAL REQUIREMENT FOR ALL CAPITAL PROJECTS, IT IS RECOMMENDED THAT CONSIDERATION BE GIVEN TO UPSIZING LOCAL STORM SEWERS TO SATISFY CURRENT DESIGN STANDARDS AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. SIMILARLY, RELOCATING STORM SEWER TO THE MUNICIPAL ROAD ALLOWANCE SHOULD ALSO BE CONSIDERED AS PART OF FUTURE ROAD RECONSTRUCTION PROJECTS. IT IS ALSO RECOMMENDED THAT THE STREETS IDENTIFIED AS BEING ABSENT OF A MINOR DRAINAGE SYSTEM THROUGHOUT THE STUDY AREA INCLUDE STORM SEWERS AS PART OF ROAD RECONSTRUCTION PROJECTS.

AS PART OF ROAD RECONSTRUCTION PROJECTS, MAJOR OVERLAND DEFICIENCIES ARE TO BE EVALUATED AND ADDRESSED WHERE FEASIBLE THROUGH OVERSIZING STORM SEWERS, ADJUSTING ROAD PROFILES/CROSS-SECTIONS OR OTHER MAJOR OVERLAND FLOW ROUTE IMPROVEMENTS.

IT IS RECOMMENDED THAT THE CITY PROACTIVELY ACQUIRE LANDS OR INTEREST THEREIN (EASEMENTS) OVER WATERCOURSES AND CULVERT CROSSINGS THROUGHOUT THE CITY WHERE IT IS IN THE CITY'S BEST INTEREST TO DO SO.

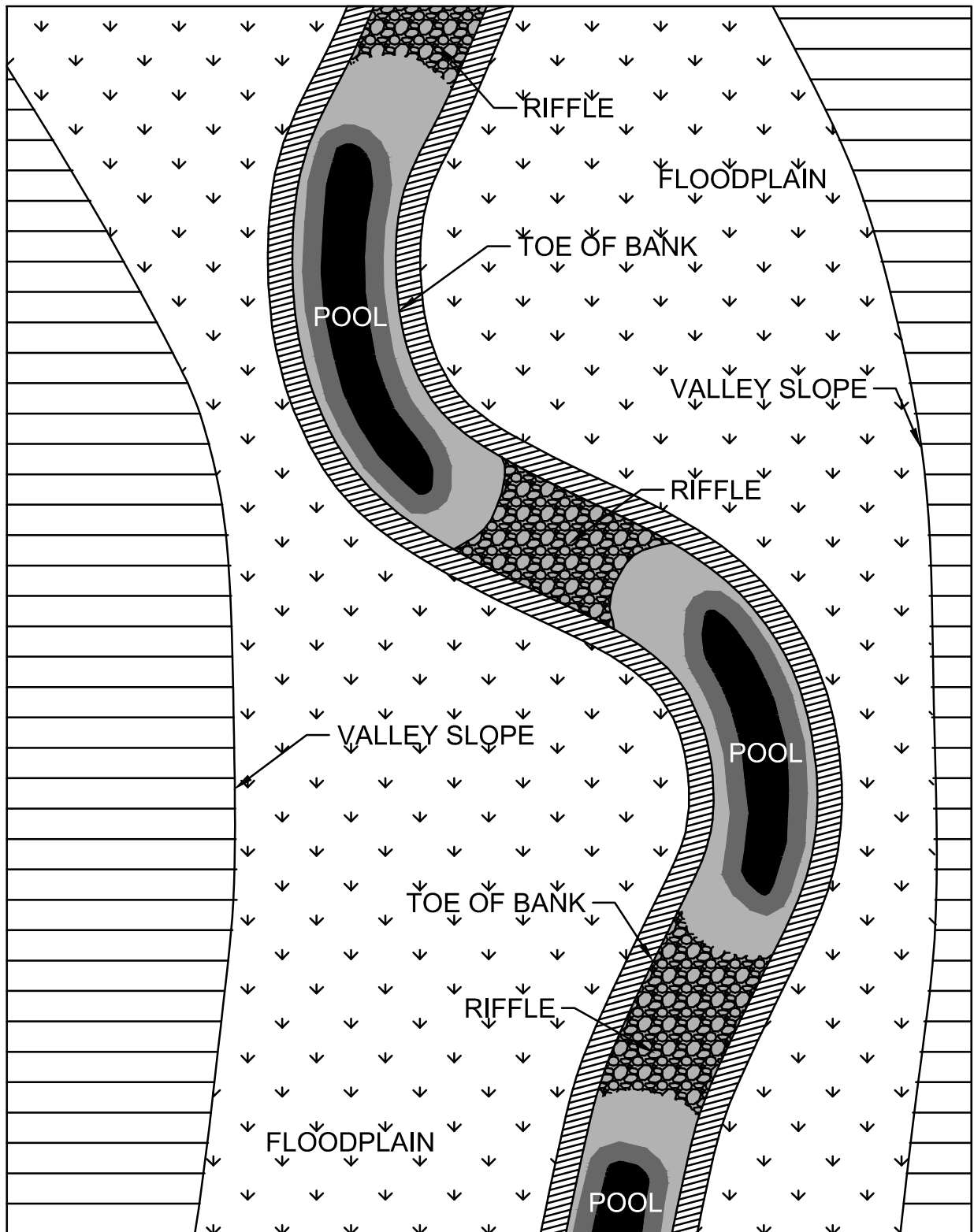
AS PART OF ROAD RECONSTRUCTION PROJECTS AND INTENSIFICATION PROJECTS ON LOCAL ROADS THROUGHOUT THE CITY, IT IS RECOMMENDED THAT THE CITY IMPLEMENT LINEAR LOW IMPACT DEVELOPMENT MEASURES SUCH AS PERFORATED PIPE SYSTEMS AND INFILTRATION TRENCHES TO PROMOTE INFILTRATION AND IMPROVE WATER QUALITY.





1 CONFINED NATURAL CHANNEL  
N.T.S.

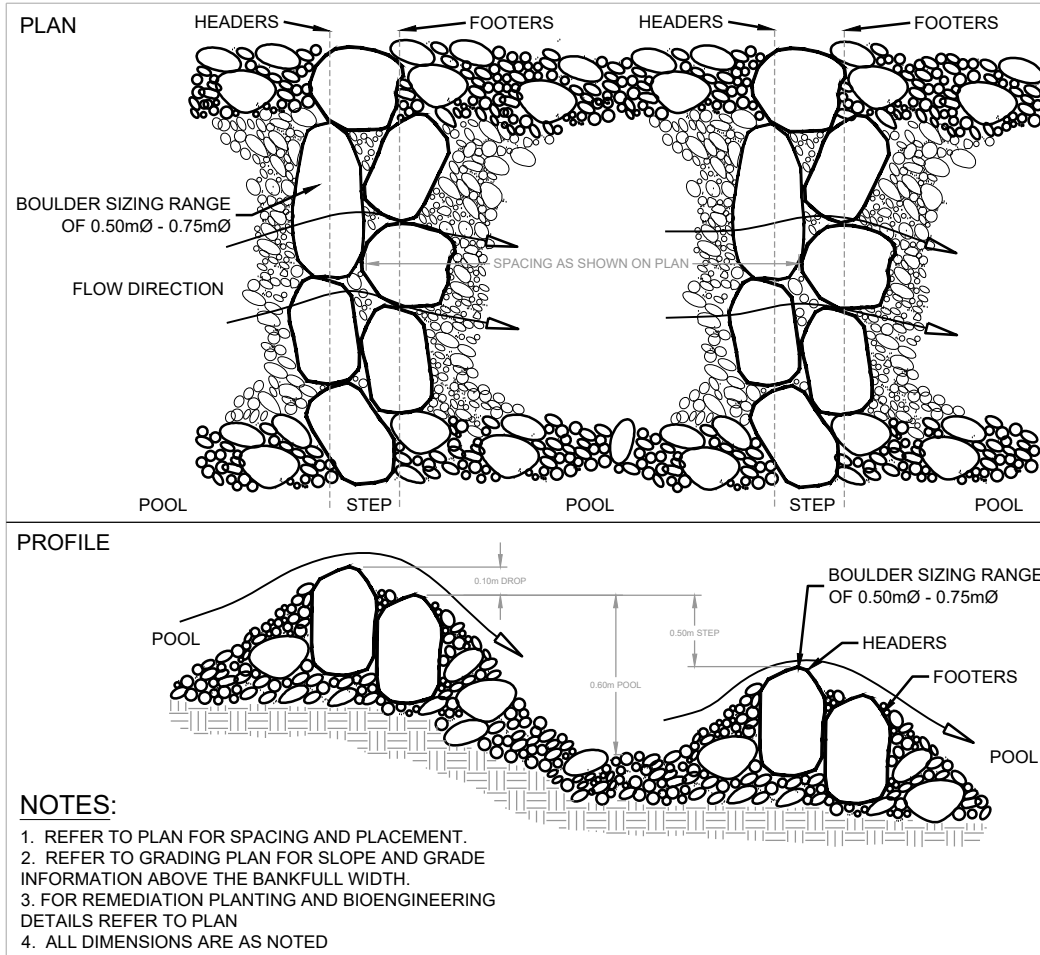




2

NATURAL CHANNEL PLAN VIEW  
N.T.S.





3

STEP / POOL (TYPICAL)

N.T.S.



## STEP

SLOPE VARIES

BOULDER SIZING RANGE  
OF 0.50mØ - 0.75mØ

3.5m WIDTH

HEADER STONES

MINIMUM STONE DEPTH 100mm

## POOL

SLOPE VARIES

1.5m POOL WIDTH

0.60m DEPTH

MINIMUM STONE DEPTH 200mm

## NOTES:

1. REFER TO PLAN FOR SPACING AND PLACEMENT.
2. REFER TO GRADING PLAN FOR SLOPE AND GRADE INFORMATION ABOVE THE BANKFULL WIDTH.
3. FOR REMEDIATION PLANTING AND BIOENGINEERING DETAILS REFER TO PLAN
4. ALL DIMENSIONS ARE AS NOTED

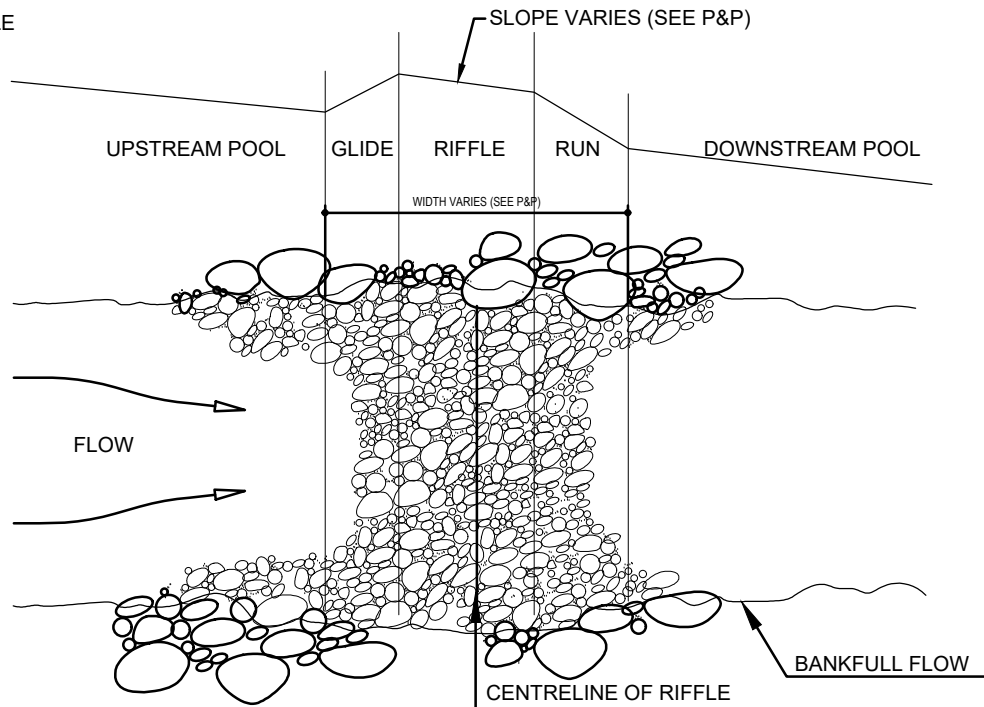
4

## STEP / POOL CROSS SECTION (TYPICAL)

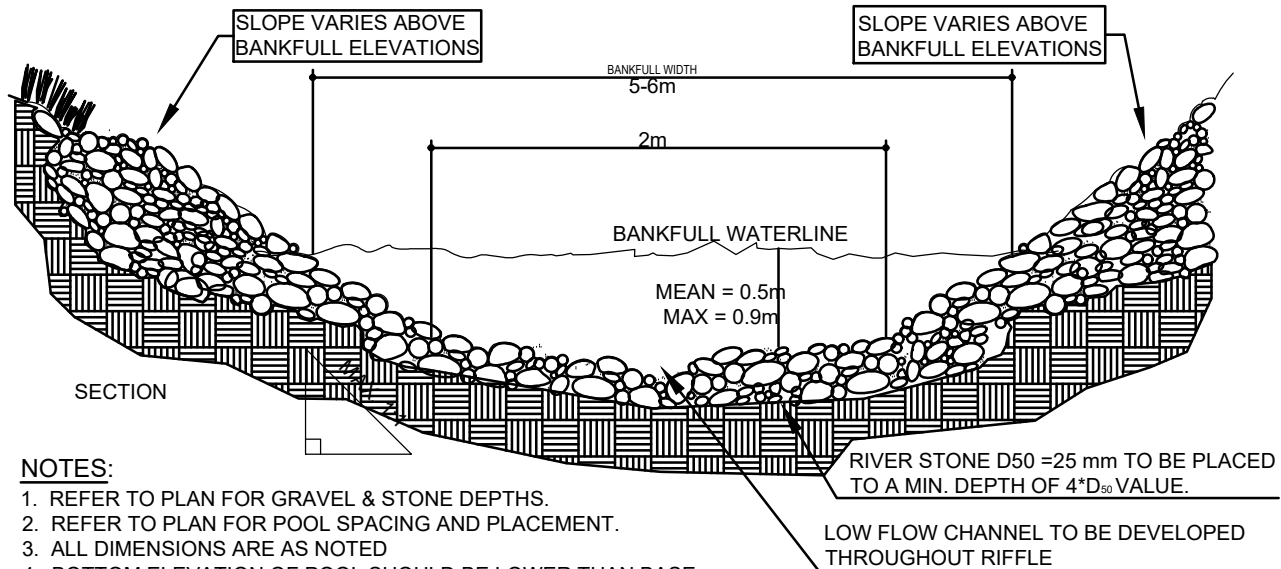
N.T.S.



PROFILE



FOR REMEDIATION PLANTING AND  
BIOENGINEERING DETAILS REFER TO PLAN



**NOTES:**

1. REFER TO PLAN FOR GRAVEL & STONE DEPTHS.
2. REFER TO PLAN FOR POOL SPACING AND PLACEMENT.
3. ALL DIMENSIONS ARE AS NOTED
4. BOTTOM ELEVATION OF POOL SHOULD BE LOWER THAN BASE FLOW (REFER TO PLAN AND NOTES). A LOW FLOW CHANNEL IS REQUIRED THROUGH THE CENTRE OF THE POOL STRUCTURE AS REQUIRED OR DIRECTED BY ENGINEER.
5. REFER TO GRADING PLAN FOR SLOPE AND GRADE INFORMATION ABOVE THE BANKFULL WIDTH.

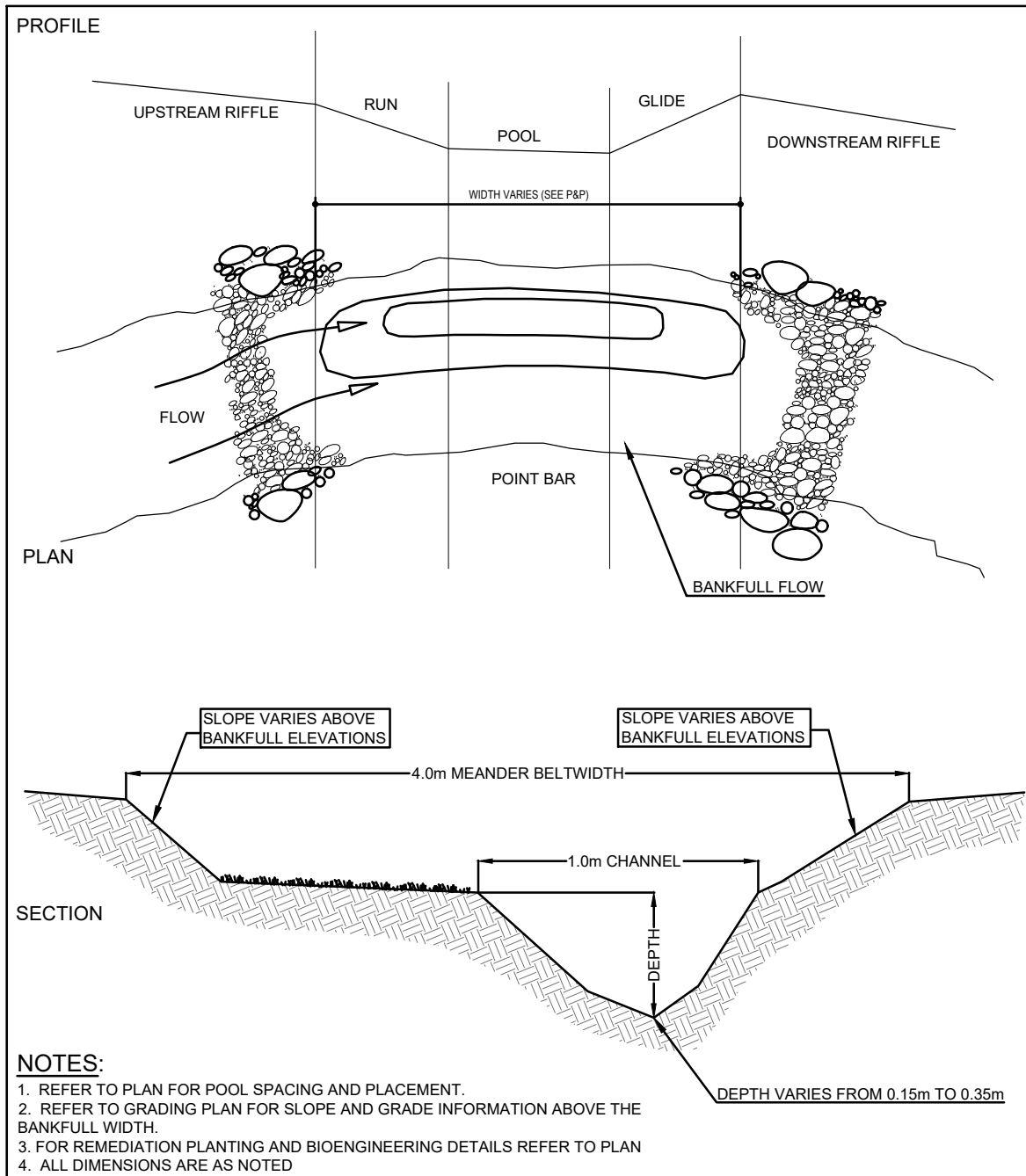
\*\*D<sub>50</sub> refers to the average sediment diameter of riverstone material. Material to consist of a range of sediment sizes, with the majority being of D<sub>50</sub>.

5

CHANNEL RIFFLE (TYPICAL)

N.T.S.



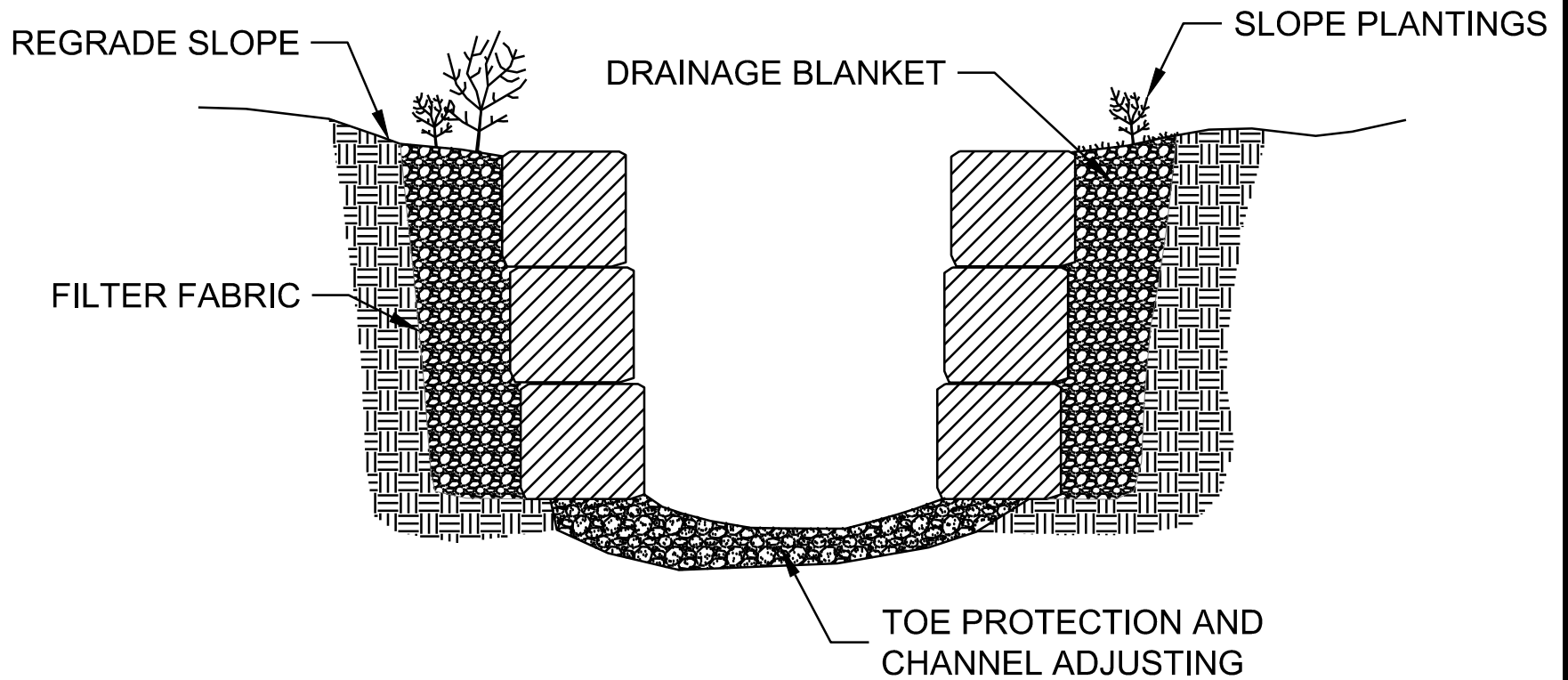


6

CHANNEL POOL (TYPICAL)

N.T.S.





4

ARMOURSTONE CHANNEL

N.T.S.



## BARRIE MASTER DRAINAGE PLAN

### TYPICAL WATERCOURSE IMPROVEMENT DETAILS

DWG. No.

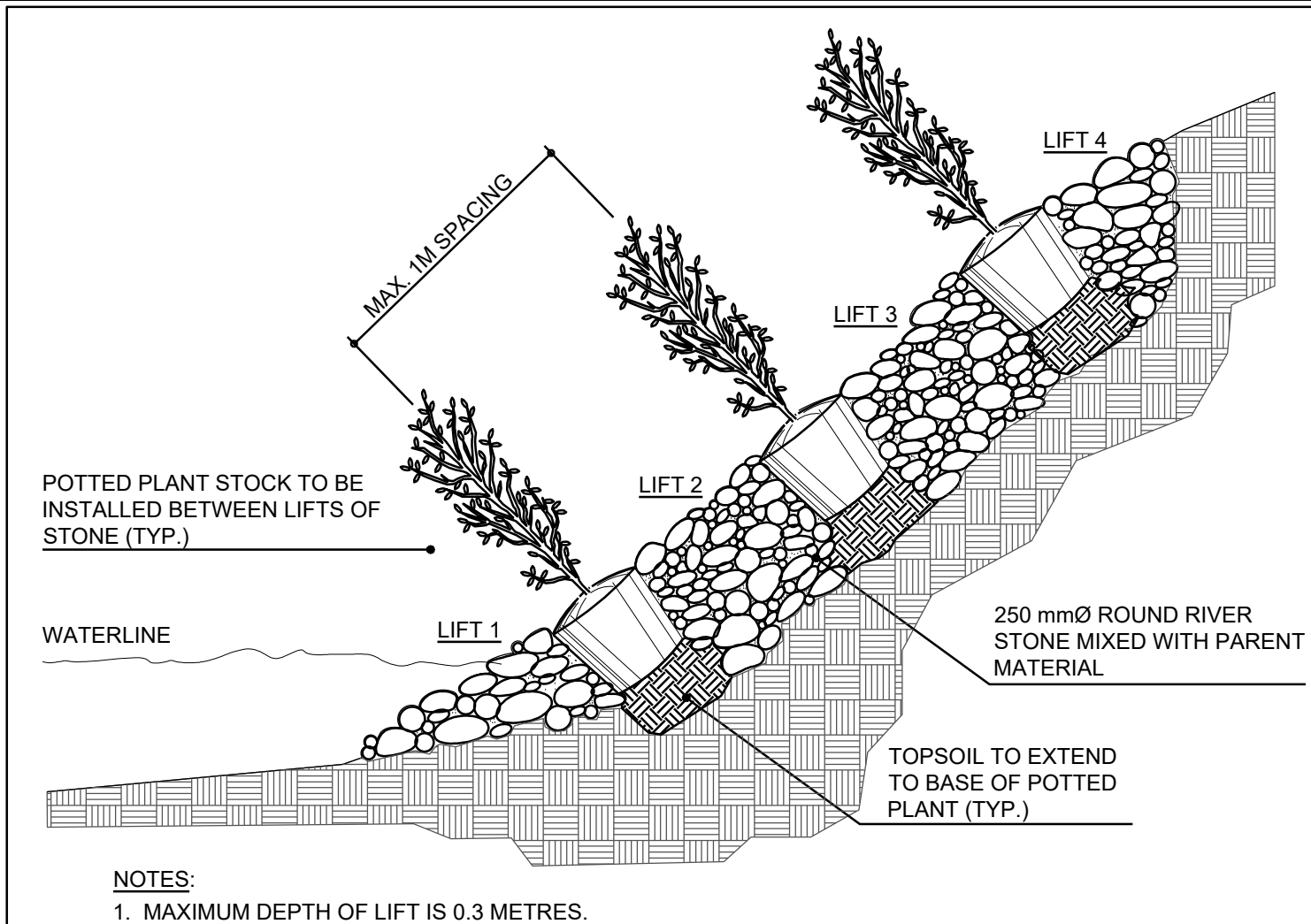
**7**

SCALE: NTS

DATE: MAR/19

JOB NO. 117076



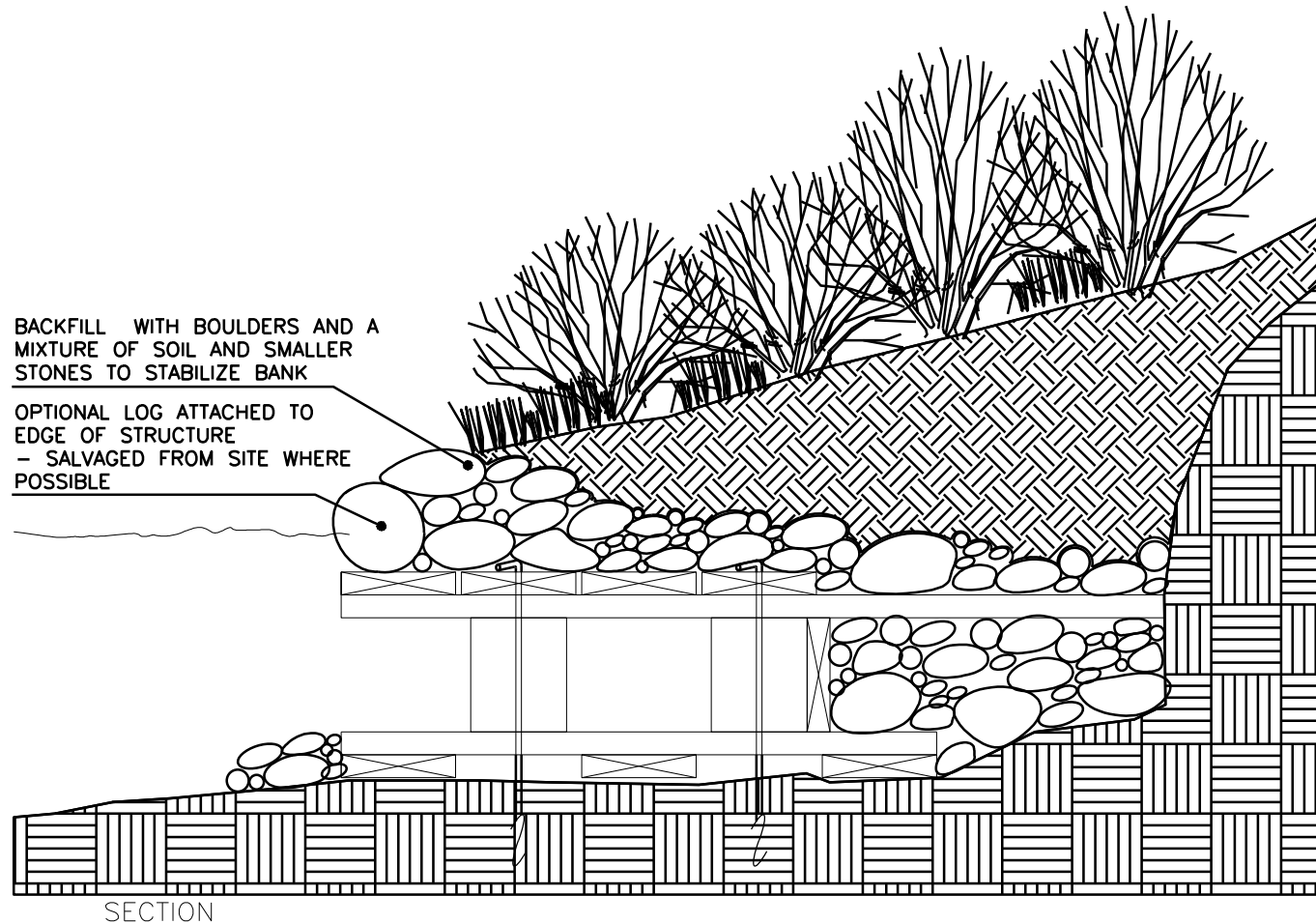


8

VEGETATED RIVERSTONE (TYPICAL)

N.T.S.

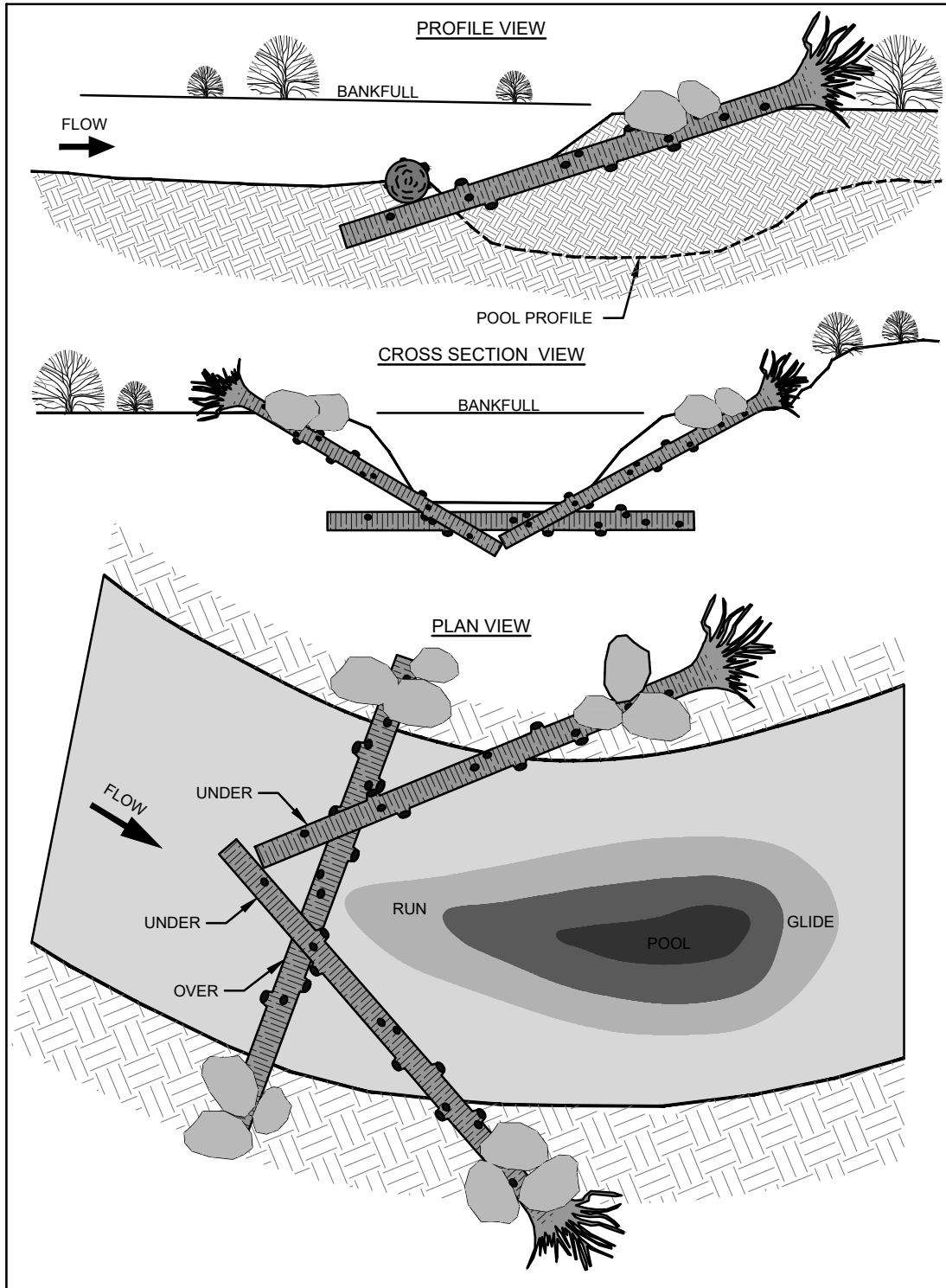




9

CRIB WALL  
N.T.S.



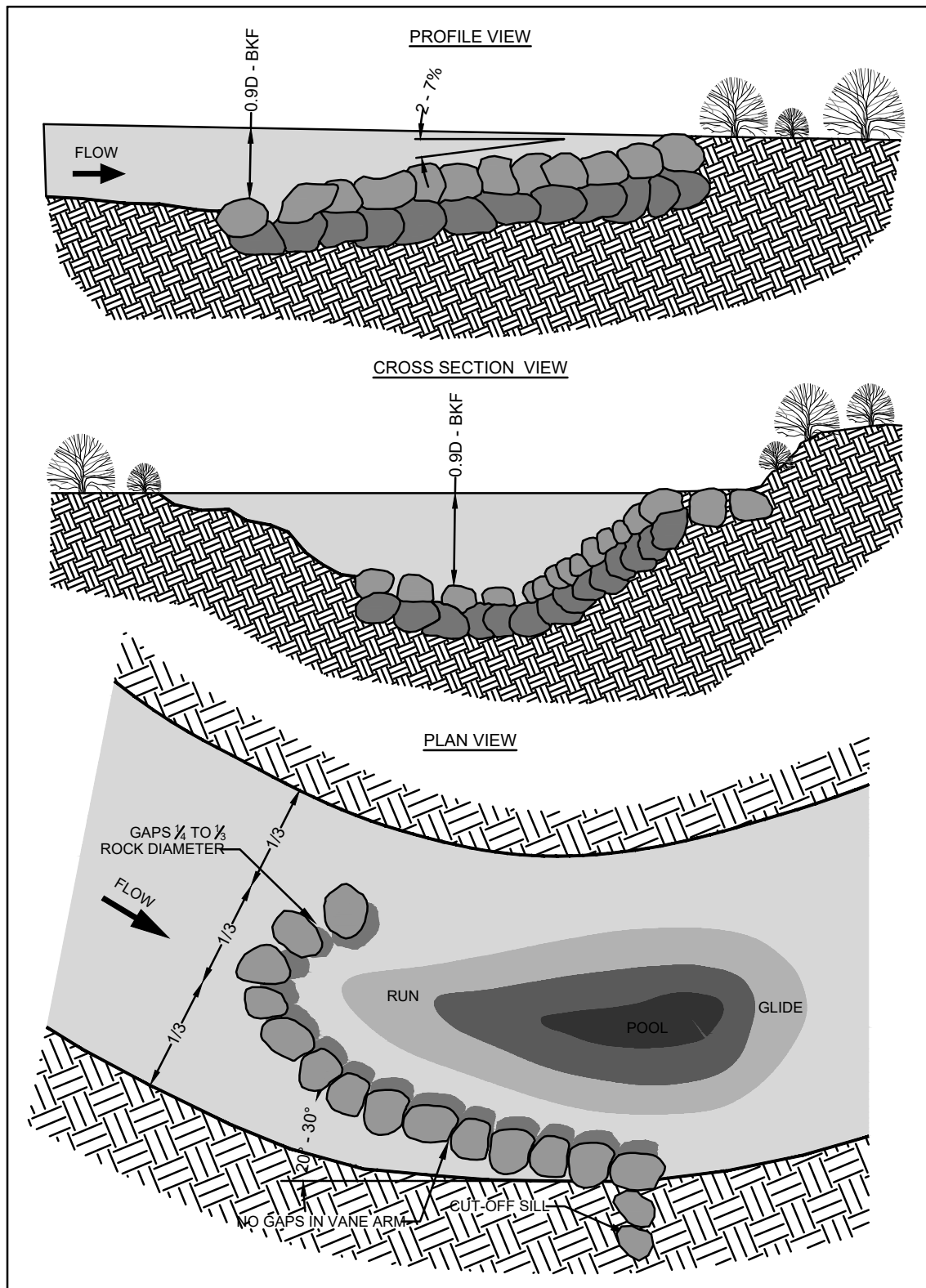


10

LOG VANE (TYPICAL)

N.T.S.

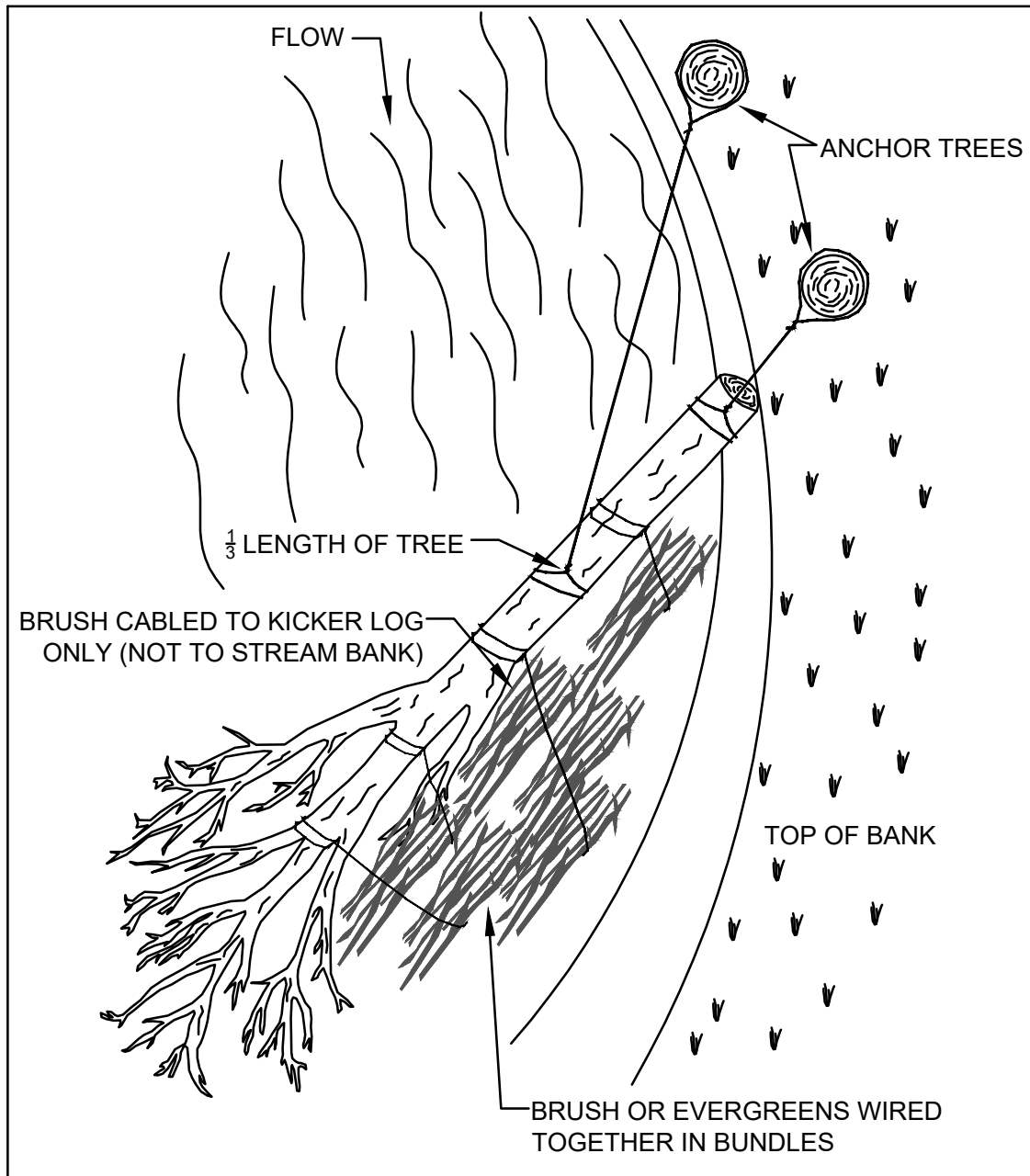




11

J-HOOK (TYPICAL)  
N.T.S.



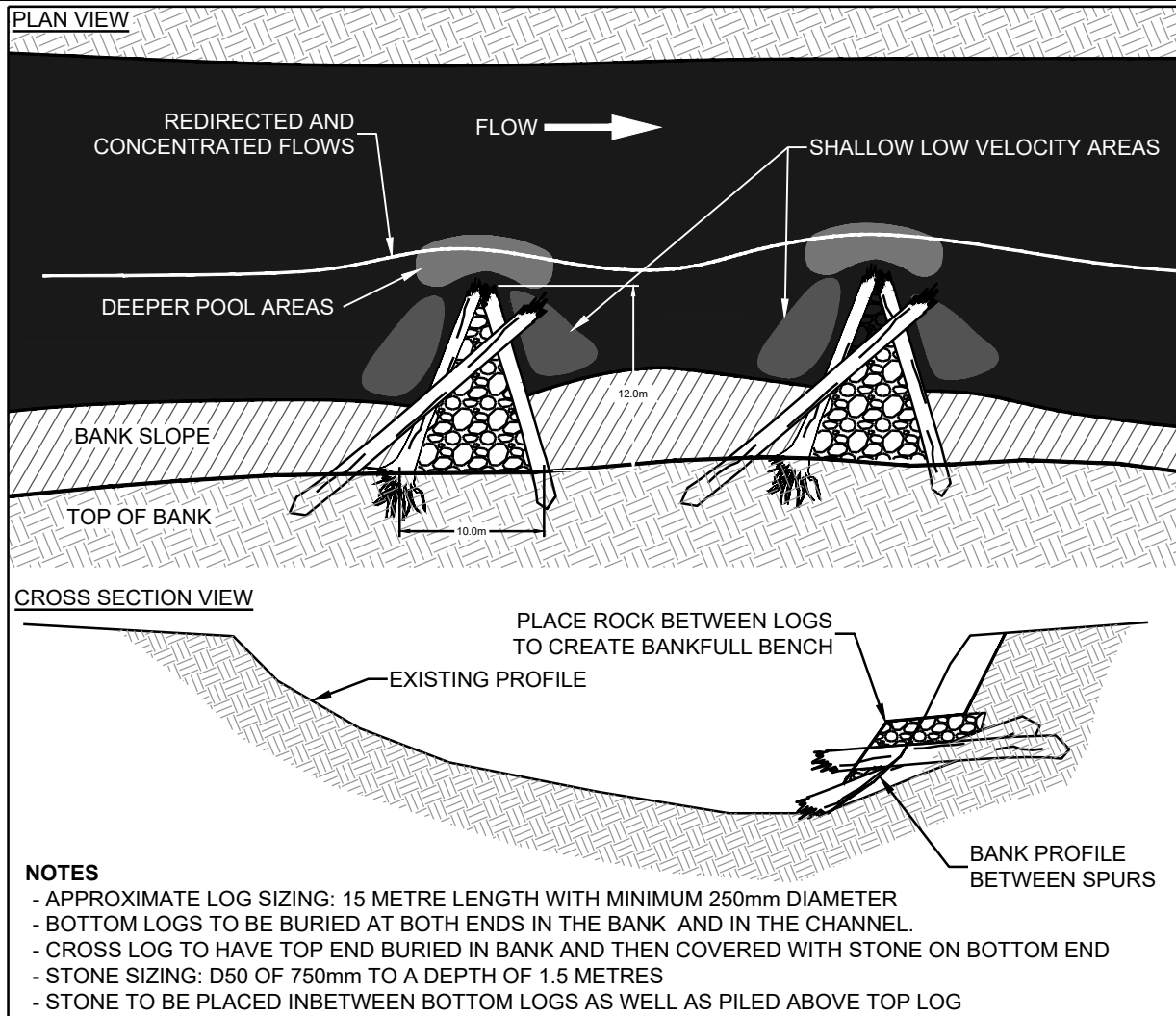


12

## TREE SWEEPER

N.T.S.





13

LOG AND STONE SPUR

N.T.S.