APPENDICES

A. Planning and Urban Design

B. Transportation

C. Servicing

APPENDIX A.
Planning and Urban Design

A-1 Study Area A & B: Site Statistics

A-2 Sun/Shadow Studies

Address	Use	Site Areas	Proposed GFA	No. of Units	Public Open Space (provided)	Public Open Space (required)
660 Eglinton Ave. E.	Mixed Use	9,469 m2 (total) 8,967 m2 (net mixed use)	33,767 m2 (total) 2,338 m2 (non-resid'l) 31,429 m2 (resid'l)	408	0 m2	897 m2
815-845 Eglinton Ave. E.	Mixed Use	35,614 m2 (total) 20,938 m2 (net mixed use) 9,955 m2 (net employment)	132,941 m2 (total) 16,834 m2 (non-resid'l) 116,107 m2 (resid'l)	1435	3,434 m2	3,340 m2
939 Eglinton Ave. E.	Mixed Use, Employment	20,235 m2 (total) 12,283 m2 (net mixed use) 5,359 m2 (net employment)	74,140 m2 (total) 6,140 m2 (non-resid'l) 68,000 m2 (resid'l)	985	1,720 m2	1,949 m2
70-80 Wicksteed Ave.	Retail/Comm'l	26,768 m2 (total/net employment)	15,669 m2 (non-resid'l)		0 m2	535 m2
3 Southvale Dr.	Residential	2,031 m2 (total) 2,021 m2 (net mixed use)	5,759 m2 (resid'l)	67	0 m2	202 m2
2 Laird Dr.	Residential	2,148 m2 (total/net mixed use)	7,375 m2 (resid'l)	74	0 m2	215 m2
146-150 Laird Dr.	Residential	6,762 m2 (total) 6,176 m2 (net mixed use)	18,967 m2 (resid'l)	253	0 m2	618 m2
220 McRae Dr.	Residential	504 m2 (total/net residential)	1,629 m2 (resid'l)	9	0 m2	50 m2

Figure A.1.1: Summary chart of approved and proposed developments in Study Area A and B

* as per Toronto Municipal Code Chapter 415, Development of Land (March 29, 2017), Sections 415-22 and 415-23

Address		Parcel Area	Existing Building Footprint	Existing Coverage	Proposed Building Footprint	Proposed Coverage
815-845	Eglinton Avenue E.	35,551 m2	11,956 m2	0.34	19,093 m2	0.54
849	Eglinton Avenue E.	14,136 m2	6,319 m2	0.45		
939	Eglinton Avenue E.	20,209 m2	9,268 m2	0.46	9,280 m2	0.46
953-963	Eglinton Avenue E.	27,296 m2	10,938 m2	0.40		
TOTAL AREA/AVG COVERAGE		97,192 m2	38,482 m2	0.40	28,373 m2	0.51
2	Laird Drive	2,148 m2	1,138 m2	0.53		
30	Laird Drive	1,153 m2	151 m2	0.13		
40	Laird Drive	413 m2	262 m2	0.64		
42	Laird Drive	400 m2	106 m2	0.27		
44	Laird Drive	413 m2	149 m2	0.36		
46-48	Laird Drive	1,173 m2	296 m2	0.25		
62	Laird Drive	1,073 m2	493 m2	0.46		
66	Laird Drive	247 m2	62 m2	0.25		
68	Laird Drive	204 m2	49 m2	0.24		
70	Laird Drive	227 m2	49 m2	0.22		
72	Laird Drive	275 m2	78 m2	0.28		
76-78	Laird Drive	904 m2	300 m2	0.33		
80-84	Laird Drive	942 m2	400 m2	0.42		
86-88,94	Laird Drive	1,884 m2	1,333 m2	0.71		
96-96A	Laird Drive	532 m2	253 m2	0.48		
110	Laird Drive	1,302 m2	921 m2	0.71		
114	Laird Drive	429 m2	149 m2	0.35		
116	Laird Drive	426 m2	322 m2	0.76		
118	Laird Drive	423 m2	215 m2	0.51		
120-122	Laird Drive	772 m2	654 m2	0.85		
126-130	Laird Drive	1,338 m2	506 m2	0.38		
132	Laird Drive	1,233 m2	596 m2	0.48		
134	Laird Drive	2,111 m2	656 m2	0.31		
146-150	Laird Drive	6,762 m2	2,238 m2	0.33	4,233 m2	0.63
180	Laird Drive	1,066 m2	254 m2	0.24		
186	Laird Drive	2,778 m2	1,989 m2	0.72		
190-200	Laird Drive	905 m2	340 m2	0.38		
202	Laird Drive	331 m2	262 m2	0.79		
206-210	Laird Drive	1,817 m2	879 m2	0.48		
214	Laird Drive	325 m2	210 m2	0.65		
83	Vanderhoof Avenue	390 m2	107 m2	0.27		
TOTAL AREA/AVG COVERAGE		34,392 m2	15,417 m2	0.45		

Figure A.1.2: Summary chart of existing parcel coverage


Figure A.2.1: Study Area A and B (north end). Sun/Shadow Study March 21st, 9:18 a.m.

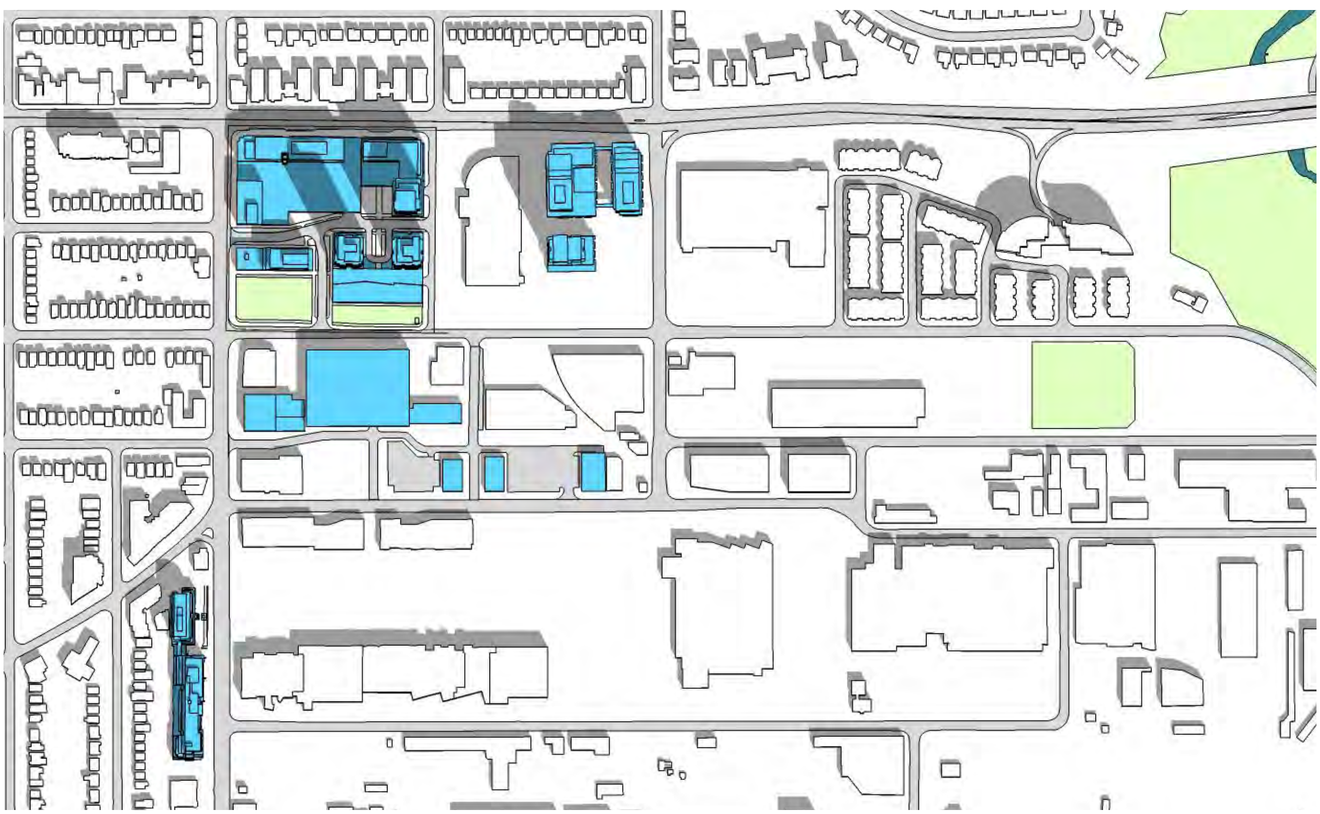


Figure A.2.2: Study Area A and B (north end). Sun/Shadow Study March 21st, 10:18 a.m.

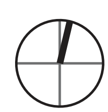



Figure A.2.3: Study Area A and B (north end). Sun/Shadow Study March 21st, 11:18 a.m.


Figure A.2.4: Study Area A and B (north end). Sun/Shadow Study March 21st, 12:18 a.m.

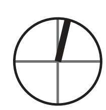


Figure A.2.5: Study Area A and B (north end). Sun/Shadow Study March 21st, 13:18 p.m.

Figure A.2.6: Study Area A and B (north end). Sun/Shadow Study March 21st, 14:18 p.m.

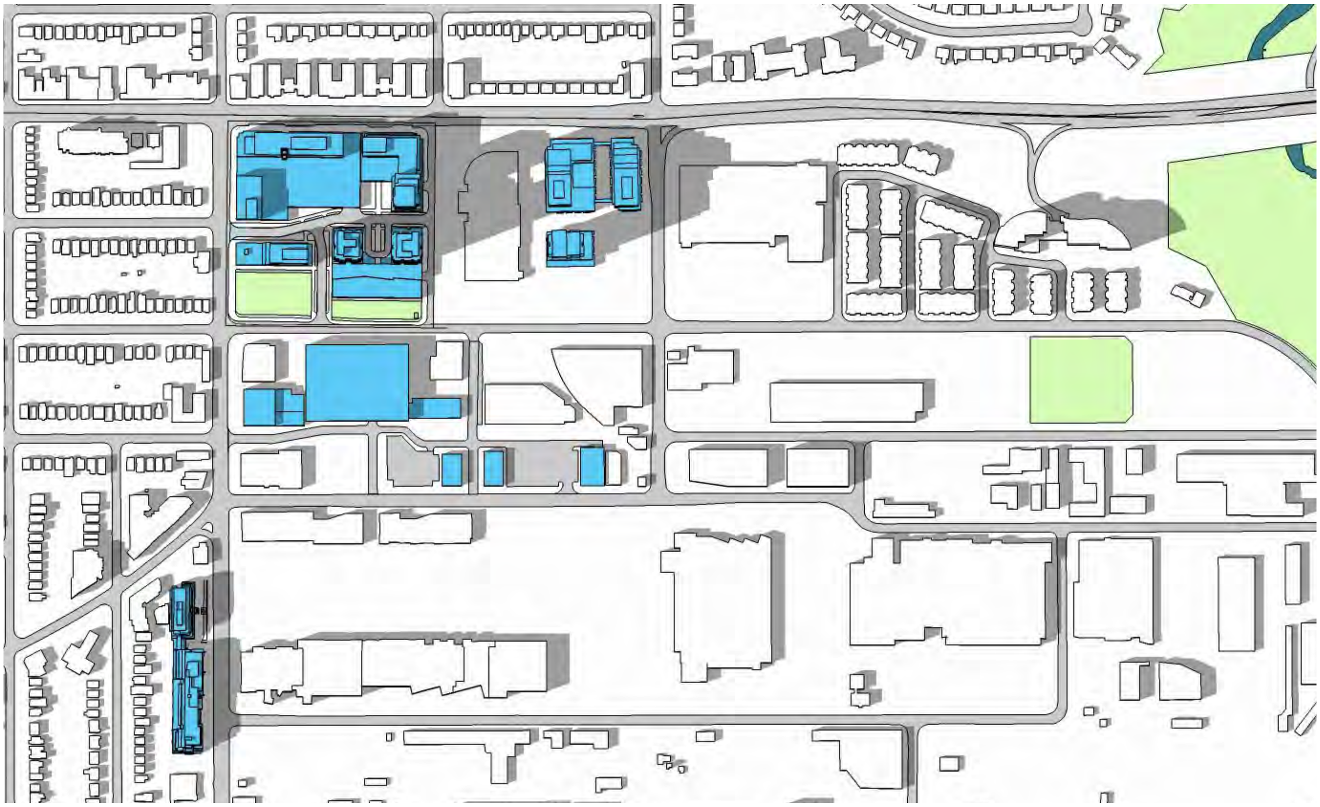


Figure A.2.7: Study Area A and B (north end). Sun/Shadow Study March 21st, 15:18 p.m.

Figure A.2.8: Study Area A and B (north end). Sun/Shadow Study March 21st, 16:18 p.m.

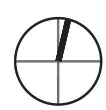


Figure A.2.9: Study Area A and B (north end). Sun/Shadow Study March 21st, 17:18 p.m.

Figure A.2.10: Study Area A and B (north end). Sun/Shadow Study March 21st, 18:18 p.m.

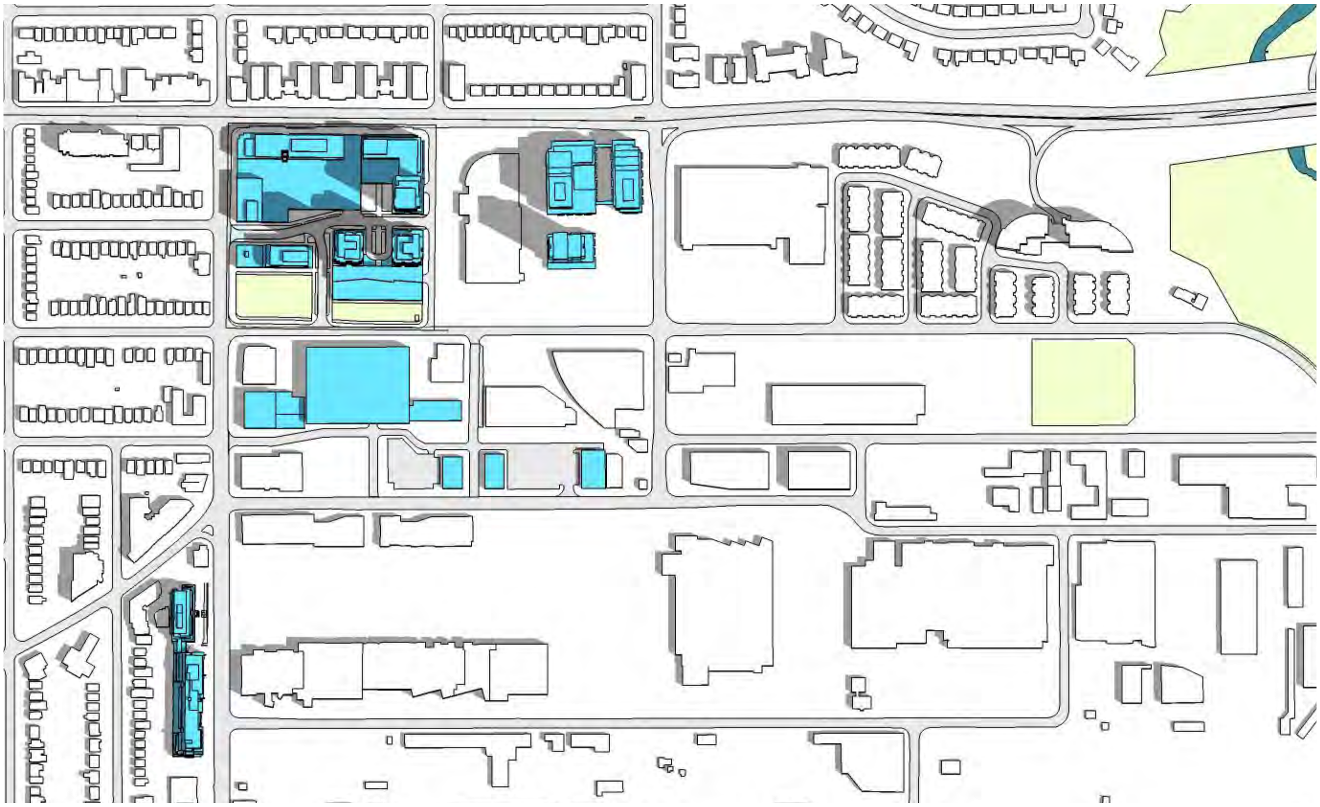


Figure A.2.11: Study Area A. Sun/Shadow Study June 21st, 9:18 a.m.

Figure A.2.12: Study Area A. Sun/Shadow Study June 21st, 10:18 a.m.

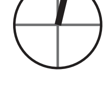


Figure A.2.13: Study Area A. Sun/Shadow Study June 21st, 11:18 a.m.

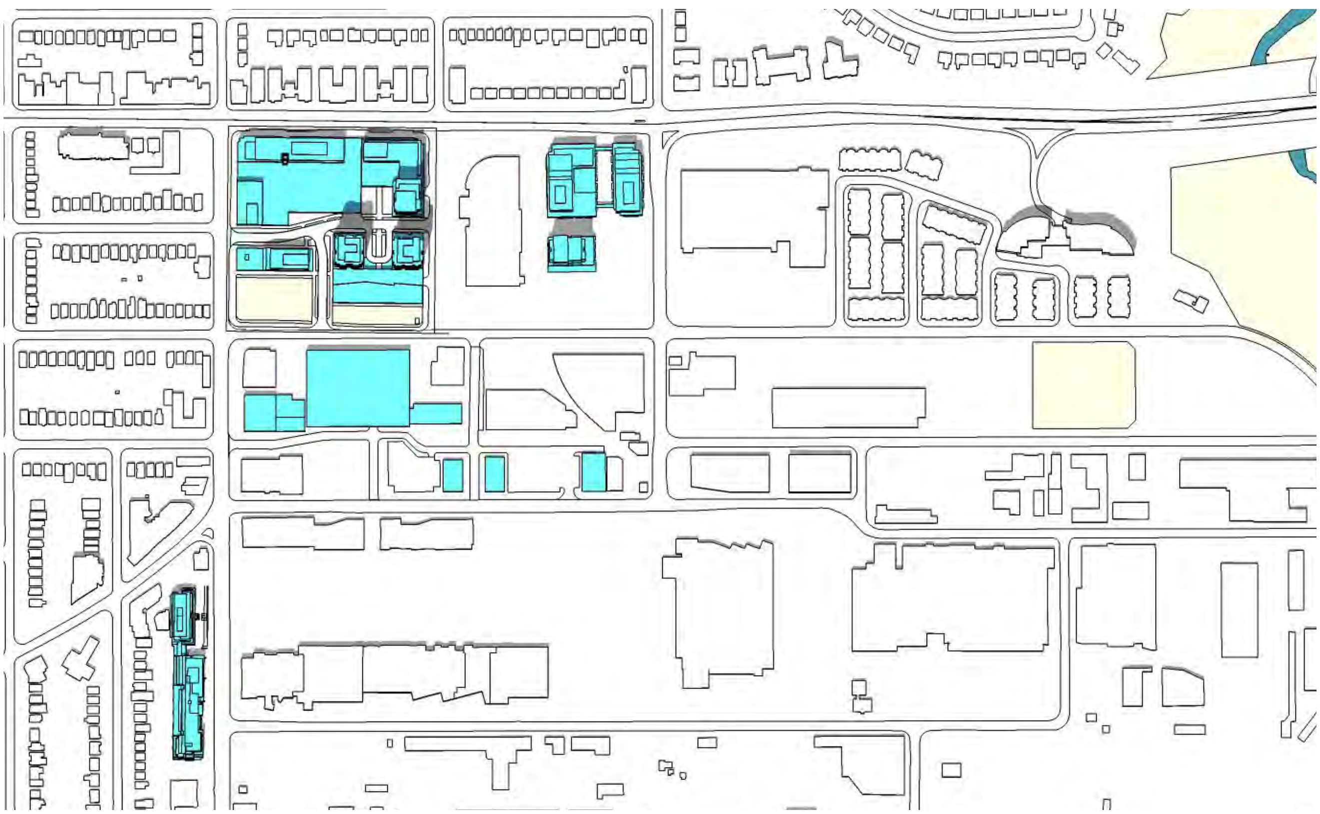


Figure A.2.14: Study Area A. Sun/Shadow Study June 21st, 12:18 p.m.

Figure A.2.15: Study Area A. Sun/Shadow Study June 21st, 13:18 p.m.

Figure A.2.16: Study Area A. Sun/Shadow Study June 21st, 14:18 p.m.

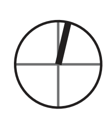



Figure A.2.17: Study Area A. Sun/Shadow Study June 21st, 15:18 p.m.

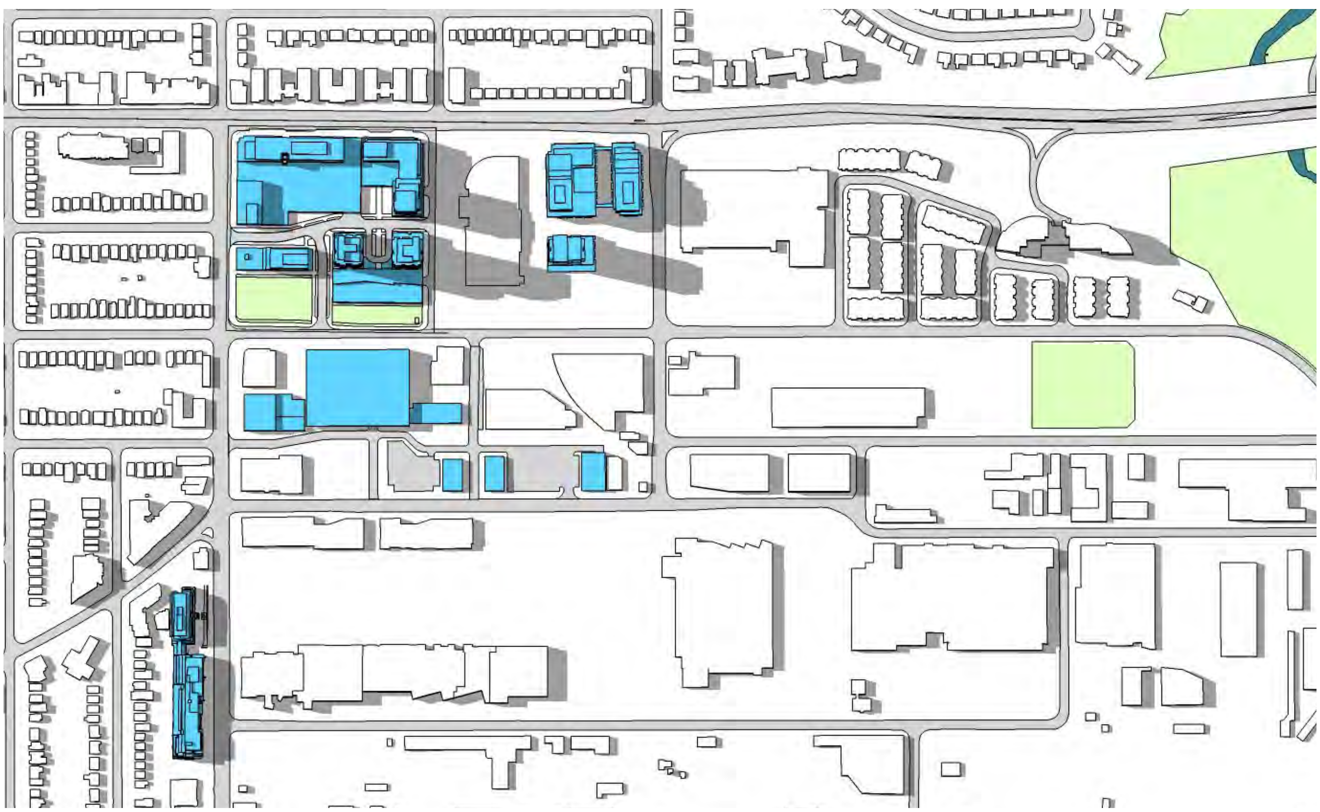
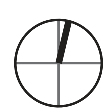


Figure A.2.18: Study Area A. Sun/Shadow Study June 21st, 16:18 p.m.



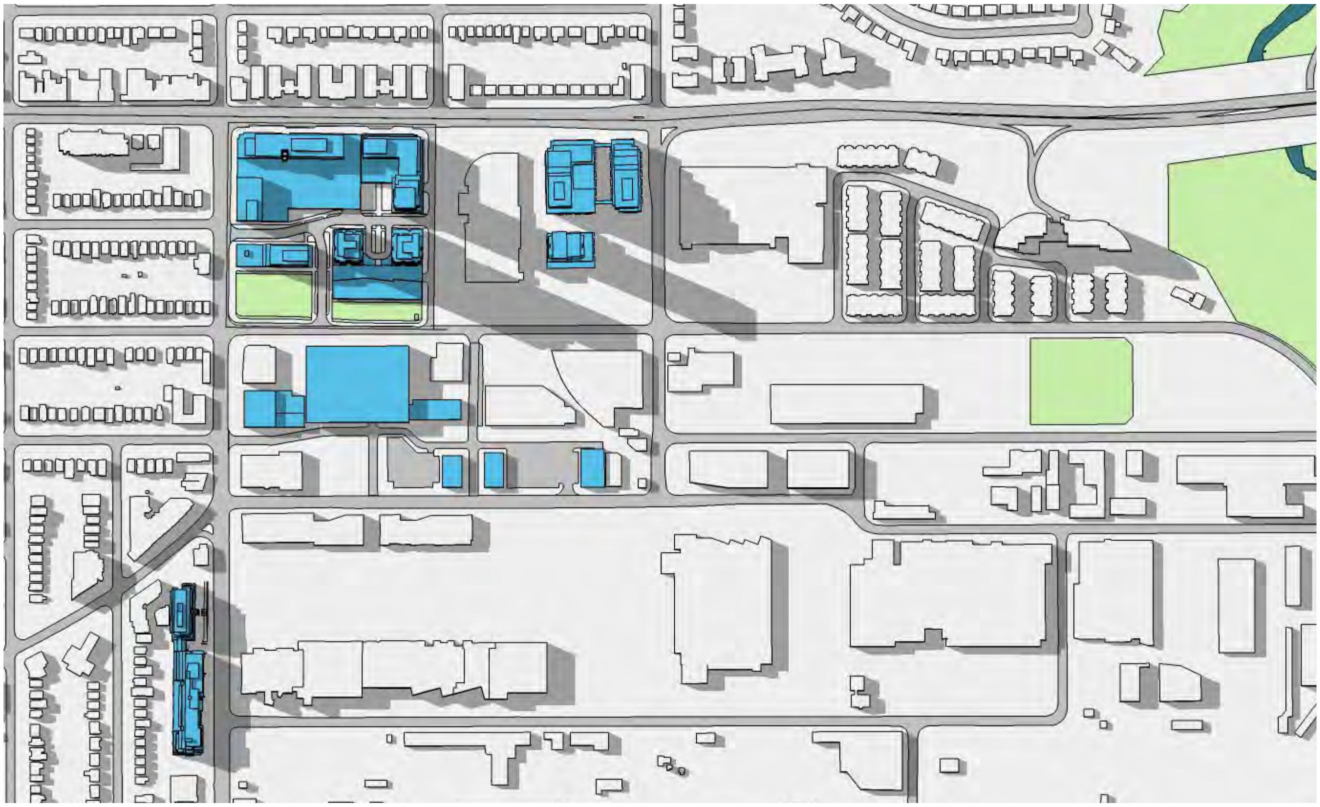


Figure A.2.19: Study Area A. Sun/Shadow Study June 21st, 17:18 p.m.

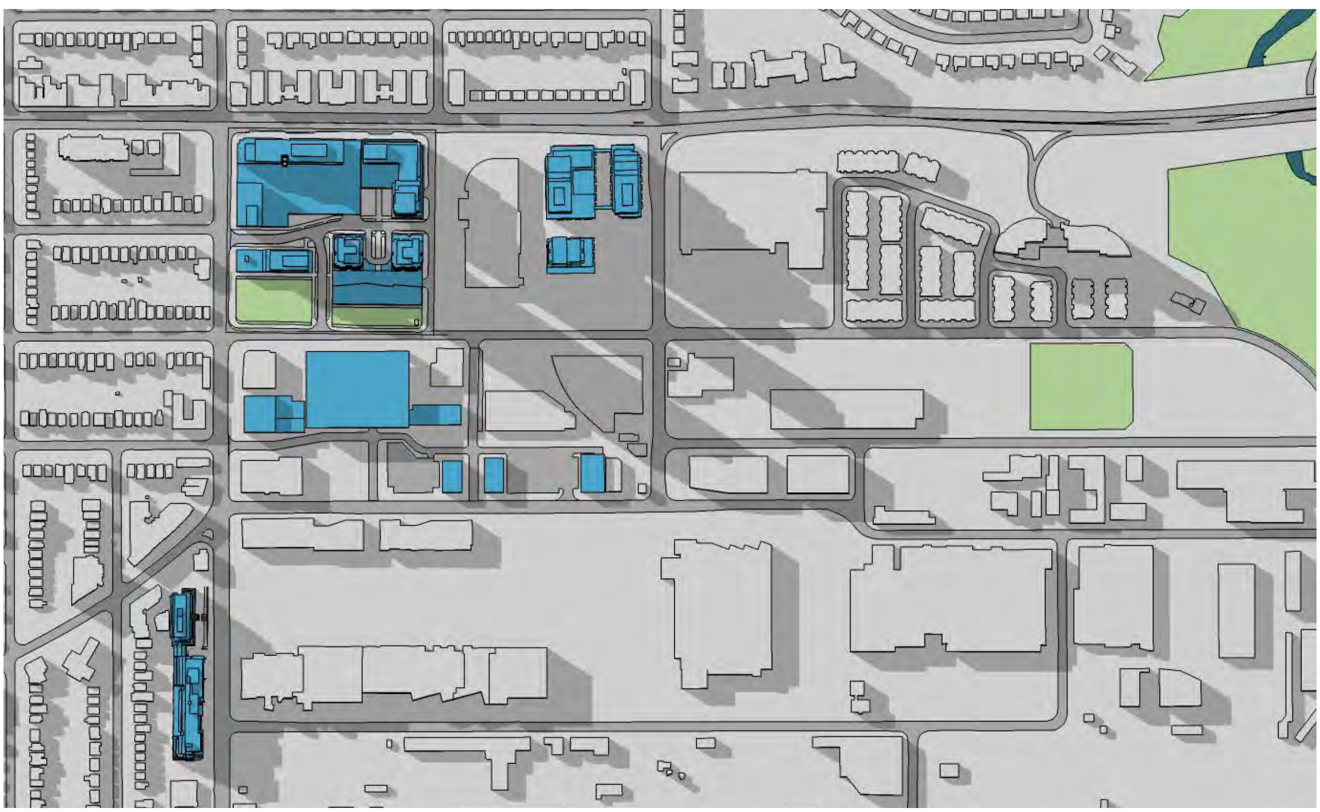


Figure A.2.20: Study Area A. Sun/Shadow Study June 21st, 18:18 p.m.

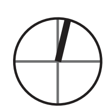


Figure A.2.21: Study Area B (south end). Sun/Shadow Study March 21st, 9:18 a.m.

Figure A.2.22: Study Area B (south end). Sun/Shadow Study March 21st, 10:18 a.m.

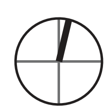


Figure A.2.23: Study Area B (south end). Sun/Shadow Study March 21st, 11:18 a.m.

Figure A.2.24: Study Area B (south end). Sun/Shadow Study March 21st, 12:18 p.m.

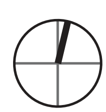


Figure A.2.25: Study Area B (south end). Sun/Shadow Study March 21st, 13:18 p.m.

Figure A.2.26: Study Area B (south end). Sun/Shadow Study March 21st, 14:18 p.m.

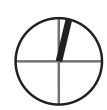


Figure A.2.27: Study Area B (south end). Sun/Shadow Study March 21st, 15:18 p.m.

Figure A.2.28: Study Area B (south end). Sun/Shadow Study March 21st, 16:18 p.m.

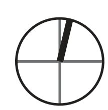
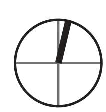


Figure A.2.29: Study Area B (south end). Sun/Shadow Study March 21st, 17:18 p.m.

Figure A.2.30: Study Area B (south end). Sun/Shadow Study March 21st, 18:18 p.m.

Figure A.2.31: Study Area B (south end). Sun/Shadow Study June 21st, 9:18 a.m.

Figure A.2.32: Study Area B (south end). Sun/Shadow Study June 21st, 10:18 a.m.



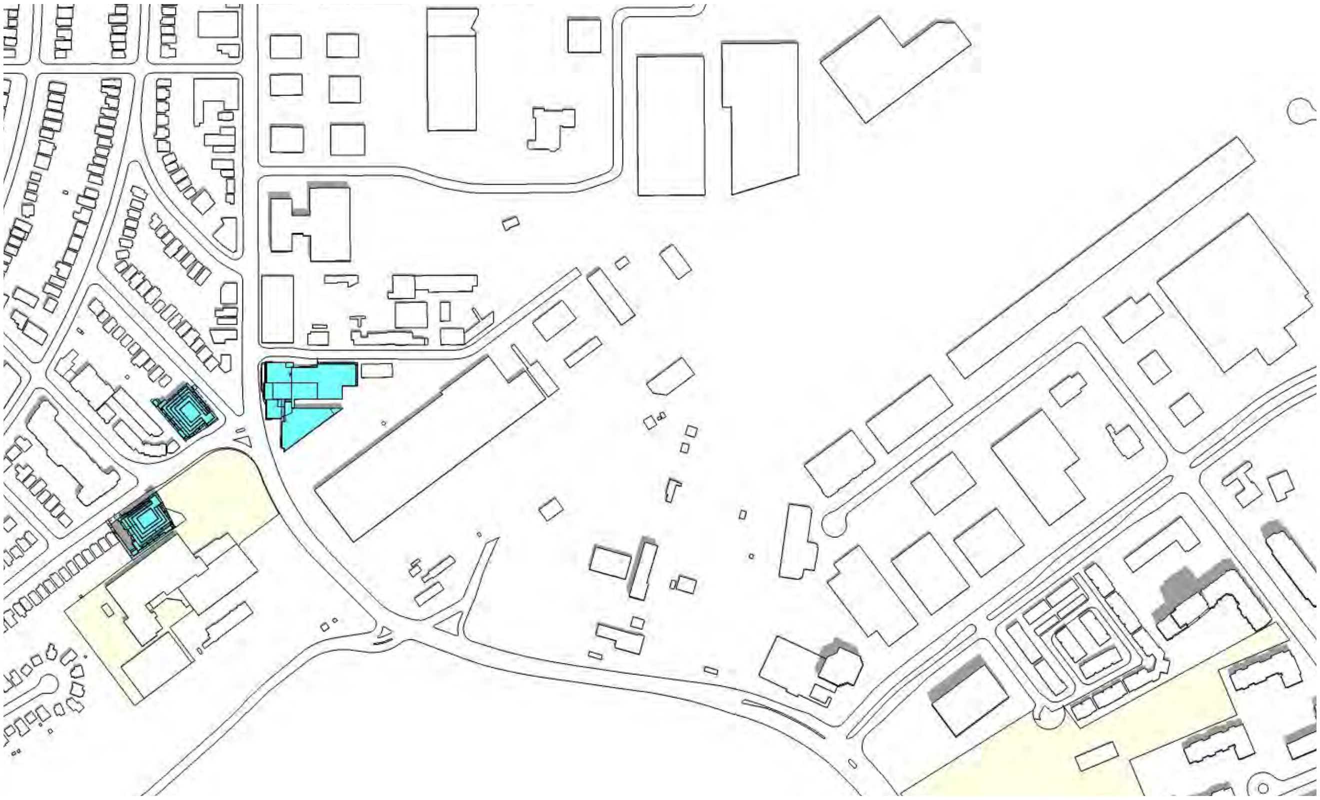


Figure A.2.33: Study Area B (south end). Sun/Shadow Study June 21st, 11:18 a.m.

Figure A.2.34: Study Area B (south end). Sun/Shadow Study June 21st, 12:18 p.m.

Figure A.2.35: Study Area B (south end). Sun/Shadow Study June 21st, 13:18 p.m.

Figure A.2.36: Study Area B (south end). Sun/Shadow Study June 21st, 14:18 p.m.

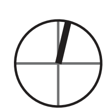
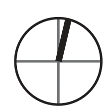


Figure A.2.37: Study Area B (south end). Sun/Shadow Study June 21st, 15:18 p.m.

Figure A.2.38: Study Area B (south end). Sun/Shadow Study June 21st, 16:18 p.m.

Figure A.2.39: Study Area B (south end). Sun/Shadow Study June 21st, 17:18 p.m.

Figure A.2.40: Study Area B (south end). Sun/Shadow Study June 21st, 18:18 p.m.



APPENDIX B.
Transportation

B-1 Goods Movement

B-2 Traffic Movement

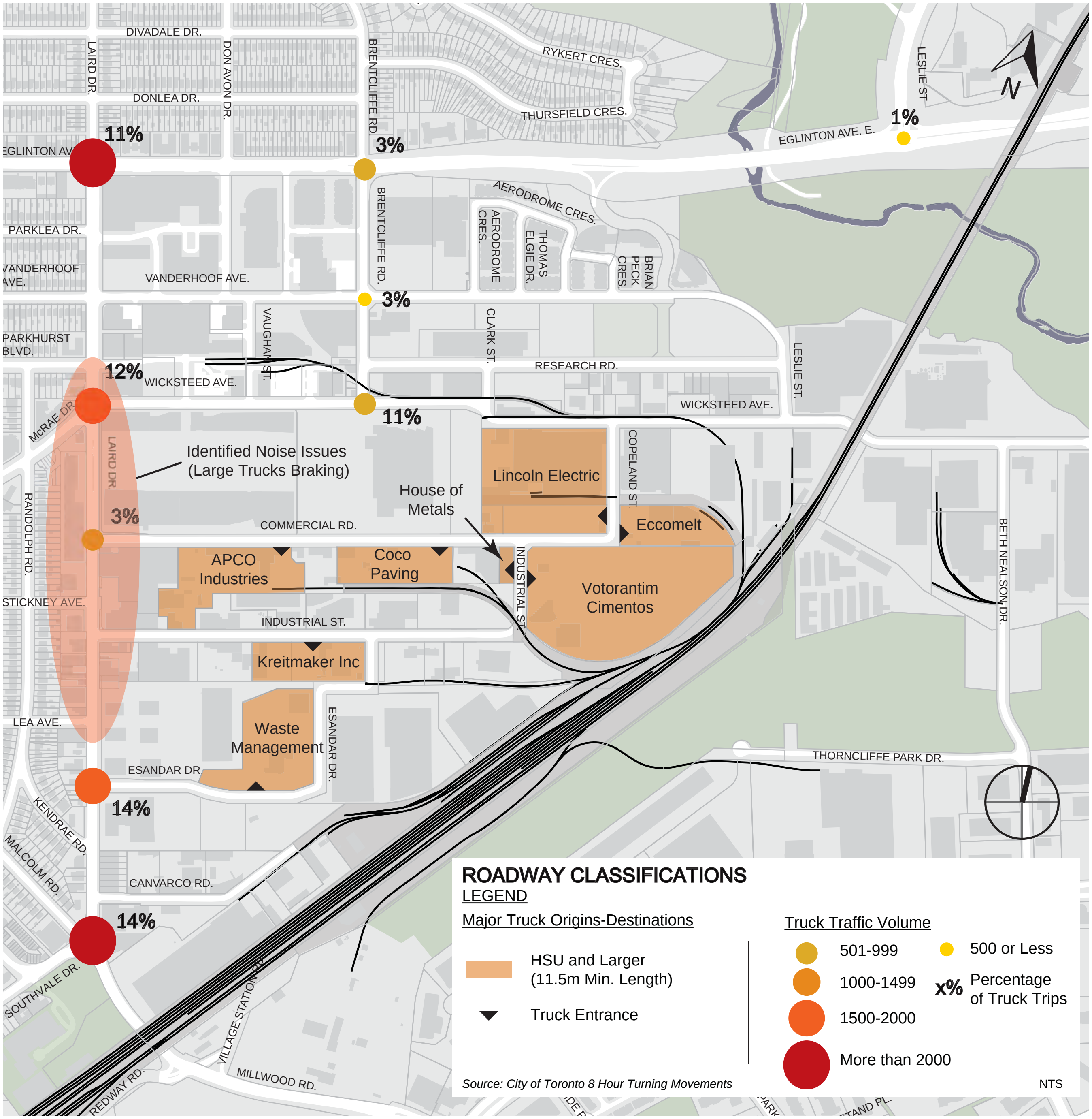
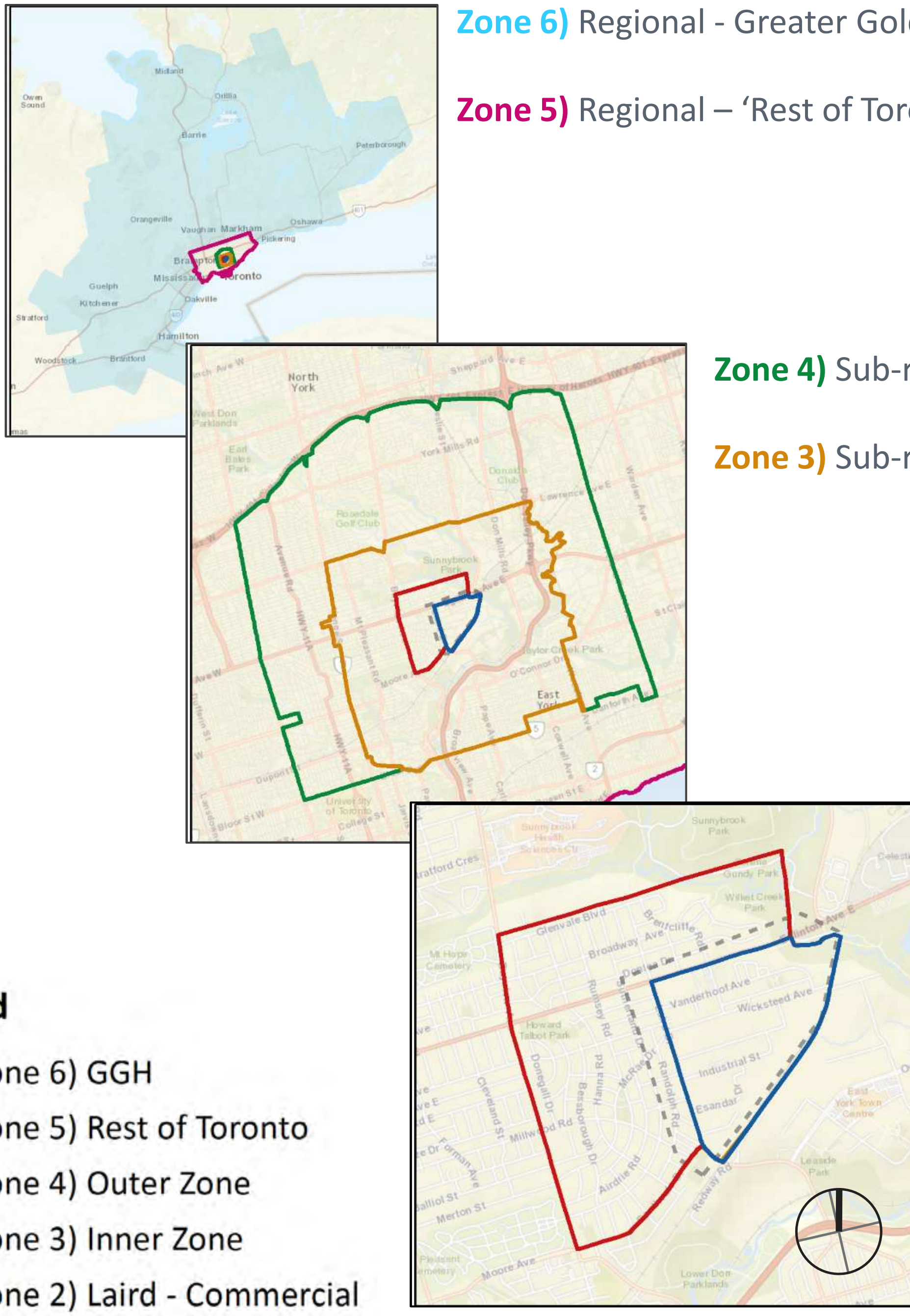


Figure B.1.1: Goods Movement Analysis

Origin - Destination Zones



Zone 6) Regional - Greater Golden Horseshoe

Zone 5) Regional – ‘Rest of Toronto’

Zone 4) Sub-regional (Outer Zone)

Zone 3) Sub-regional (Inner Zone)

Zone 2) Laird Commercial Area

Zone 1) Laird Residential Area (Leaside Area)

Legend

- Zone 6) GGH
- Zone 5) Rest of Toronto
- Zone 4) Outer Zone
- Zone 3) Inner Zone
- Zone 2) Laird - Commercial
- Zone 1) Laird - Residential
- Transportation Study Area

NOTE: All zones are combinations of TTS GTA06 zones

Figure B.2.1: Traffic Movement Analysis

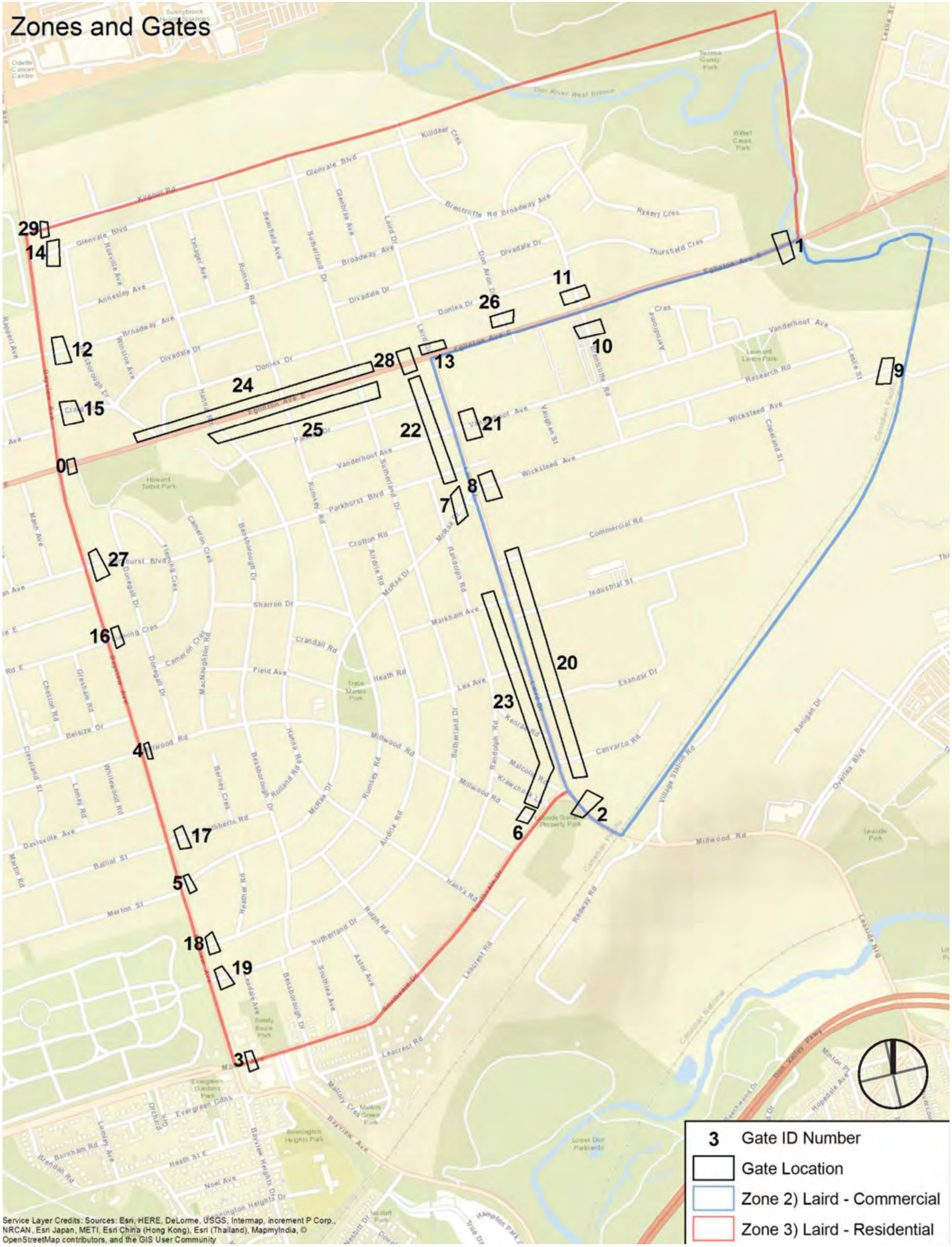


Figure B.2.2: Traffic Movement Analysis

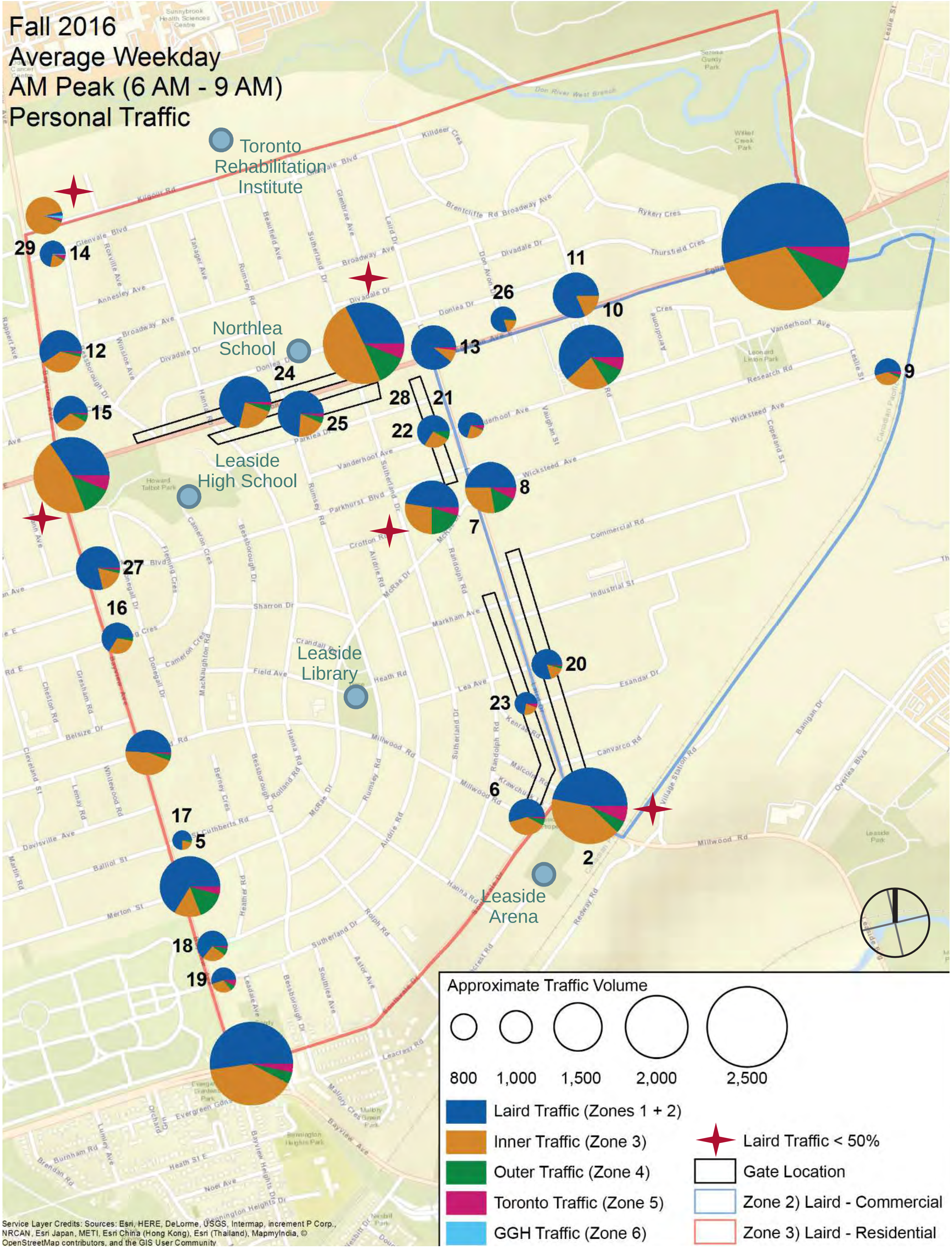


Figure B.2.3: Traffic Movement Analysis

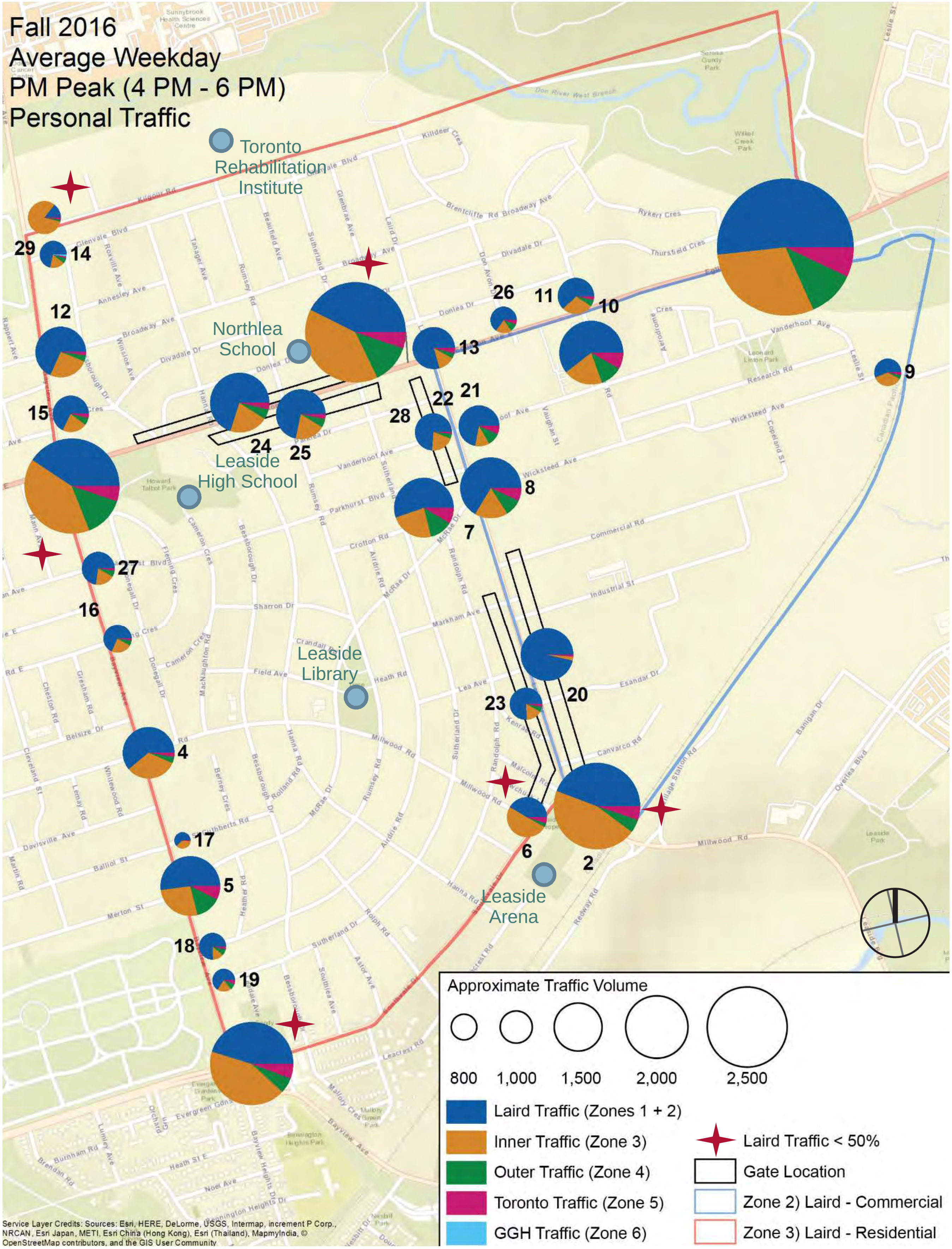


Figure B.2.4: Traffic Movement Analysis

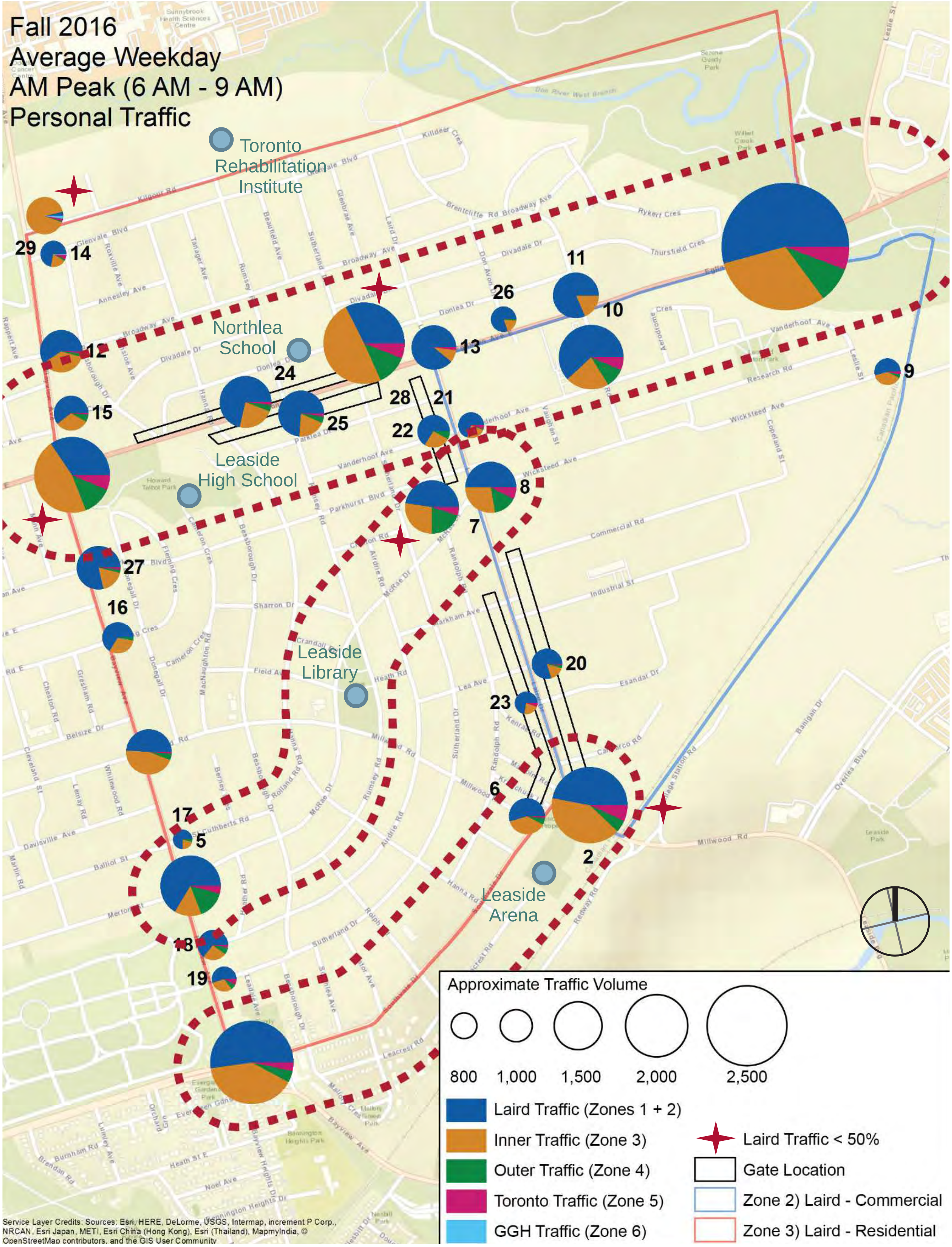


Figure B.2.5: Traffic Movement Analysis

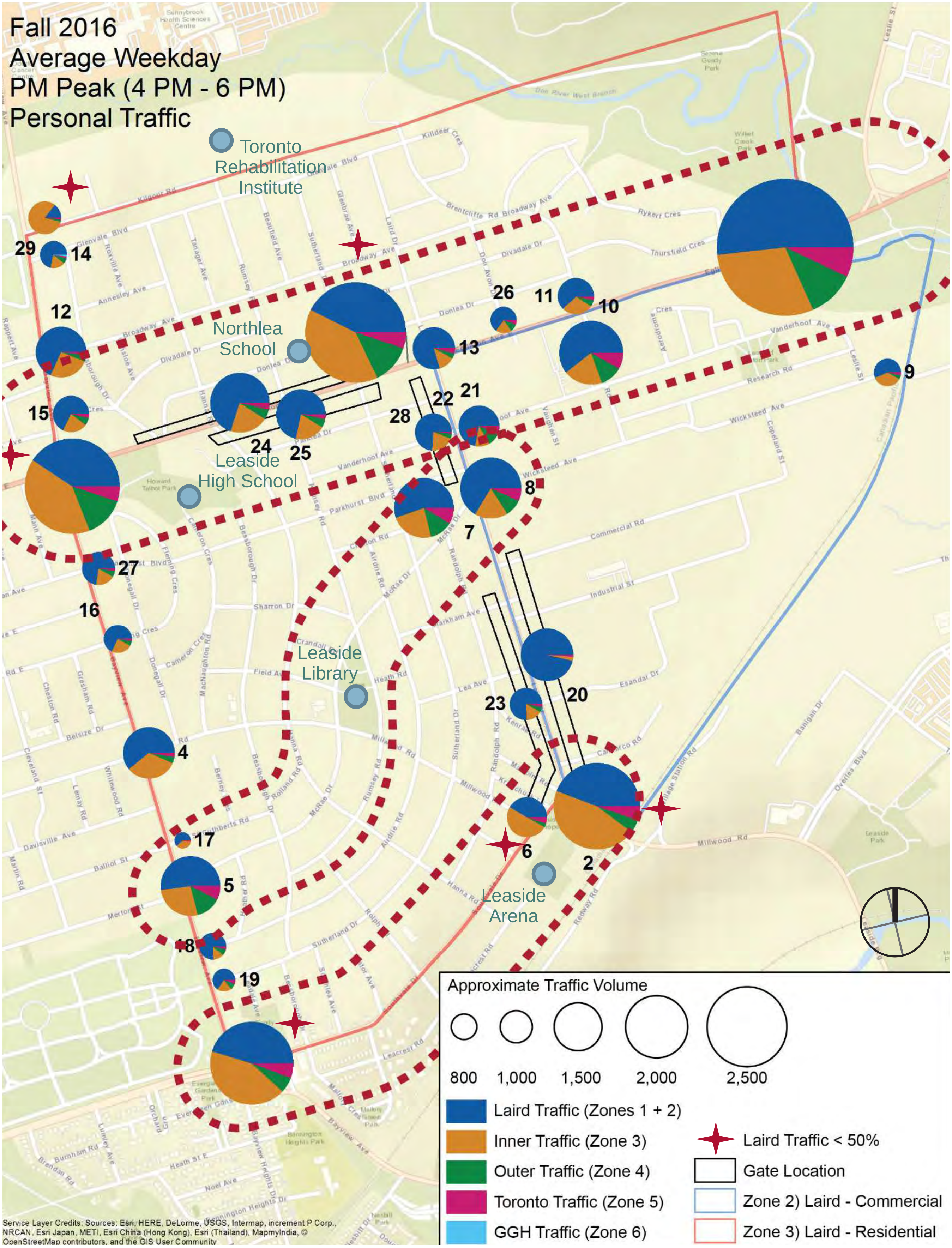


Figure B.2.6: Traffic Movement Analysis

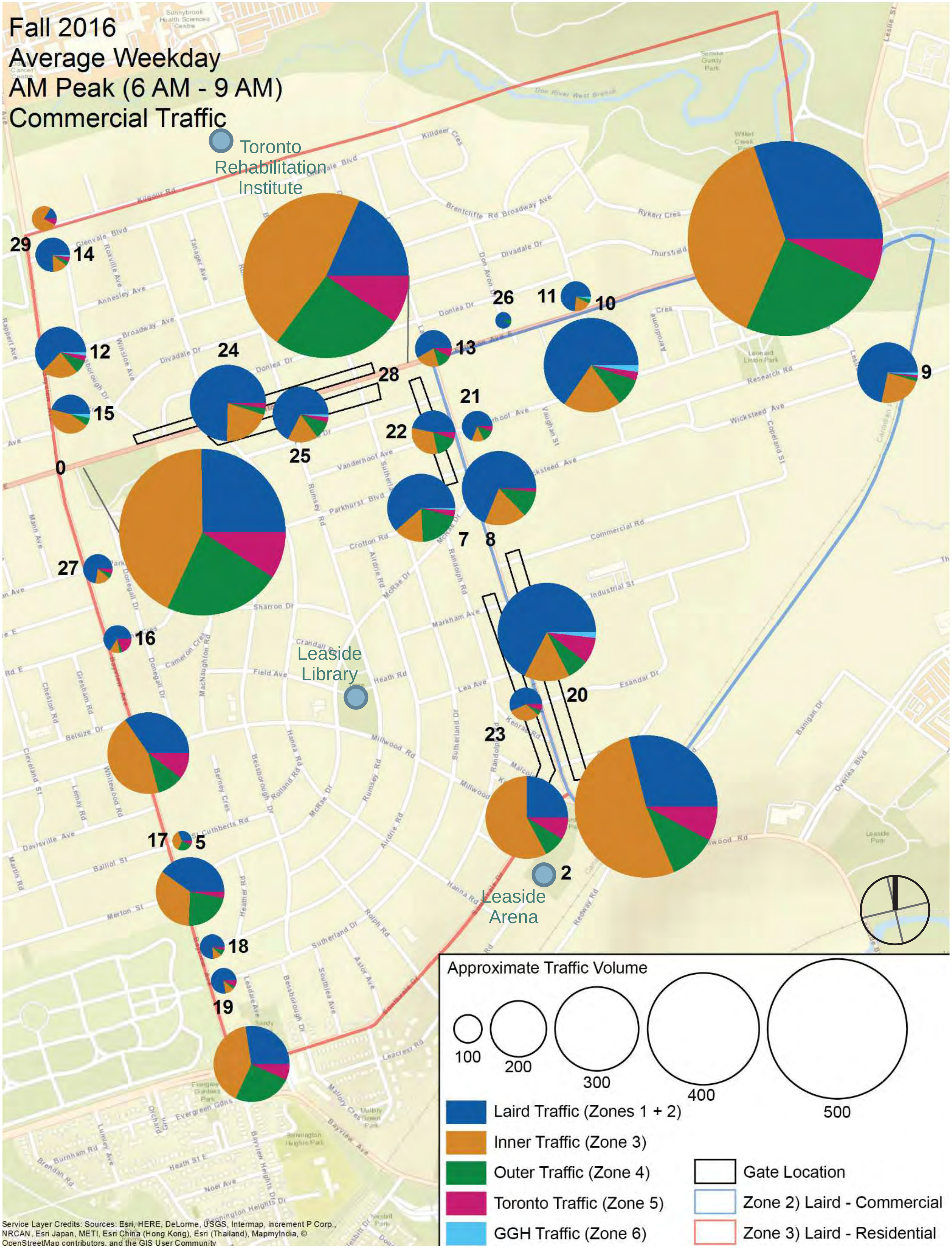


Figure B.2.7: Traffic Movement Analysis

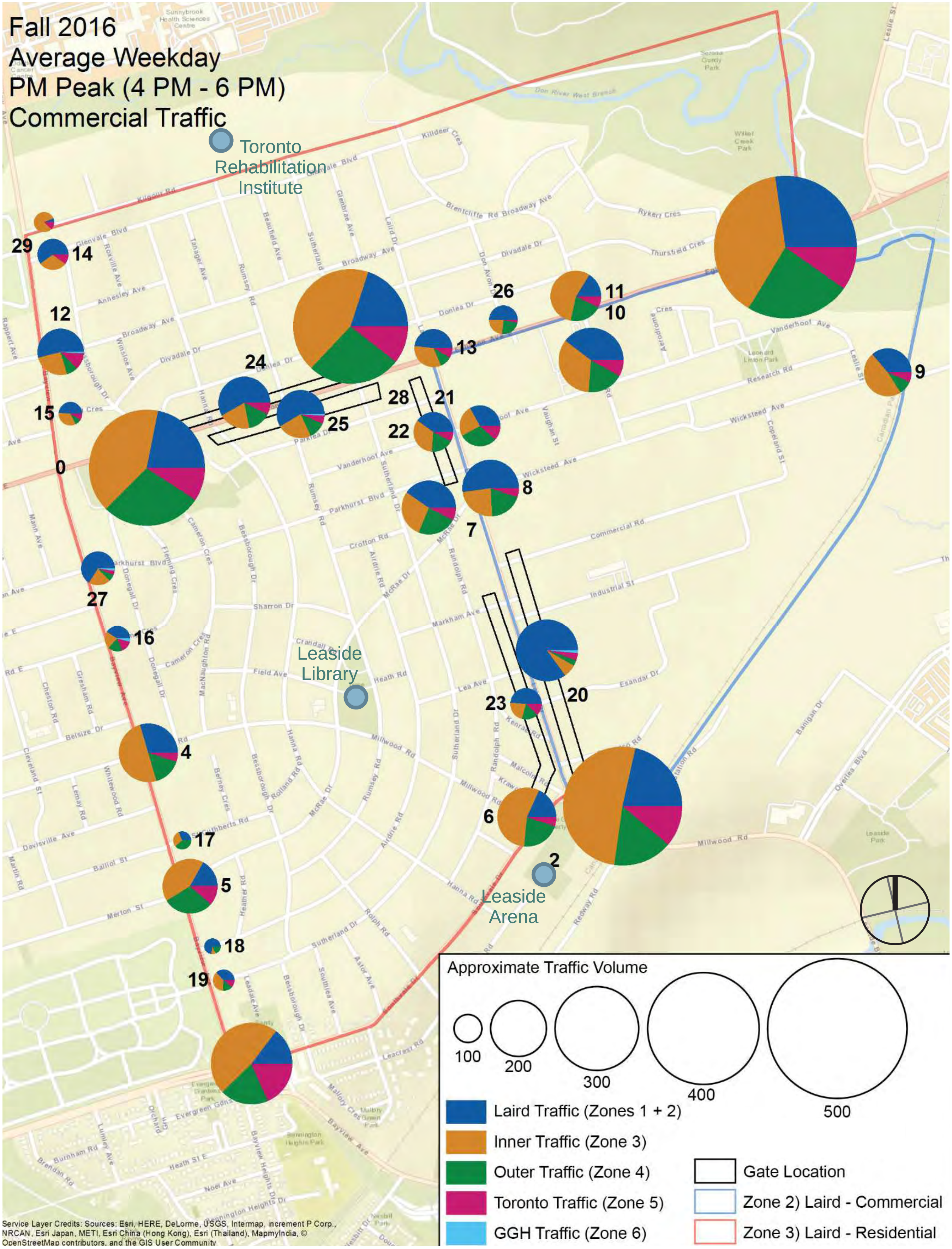


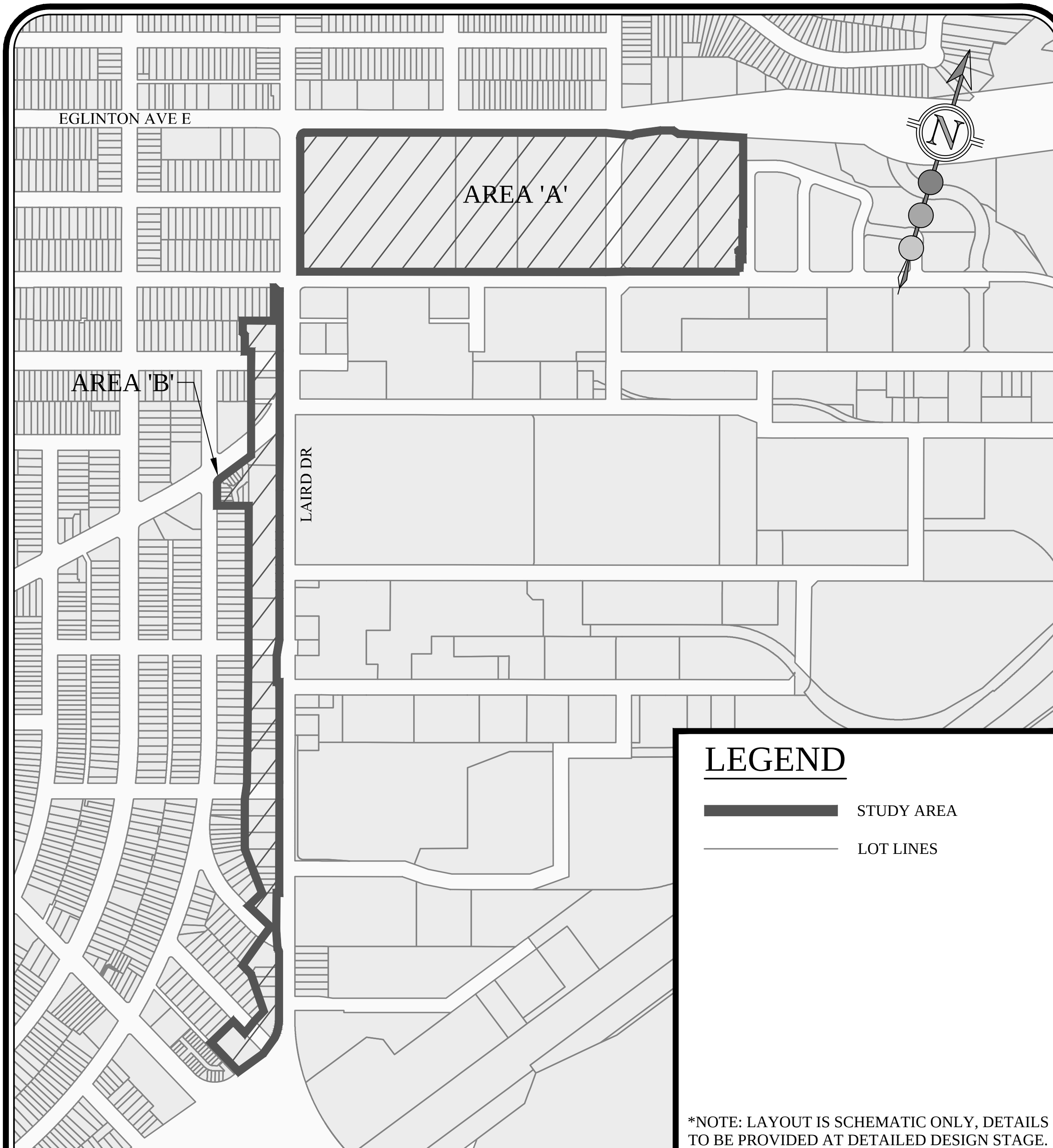
Figure B.2.8: Traffic Movement Analysis

APPENDIX C.
Servicing

C-1 System Maps

C-2 Modelling & Testing

C-3 Technical Memoranda



LAIRD FOCUS AREA STUDY		LAIRD STUDY AREA	
TORONTO — 100 QUEEN STREET WEST, TORONTO, ONTARIO M5H 2N2, TEL: (416) 392-2489, FAX: (416) 338-0685		DRAWN BY: M.L.M.	CHECKED BY: L.P.M.
		SCALE: N.T.S.	DATE: JANUARY 2018
SCS consulting group ltd — 30 CENTURIAN DRIVE, SUITE 100, MARKHAM, ONTARIO L3R 8B8, TEL: (905) 475-1900, FAX: (905) 475-8335		PROJECT No: 1896	FIGURE No: 6.1

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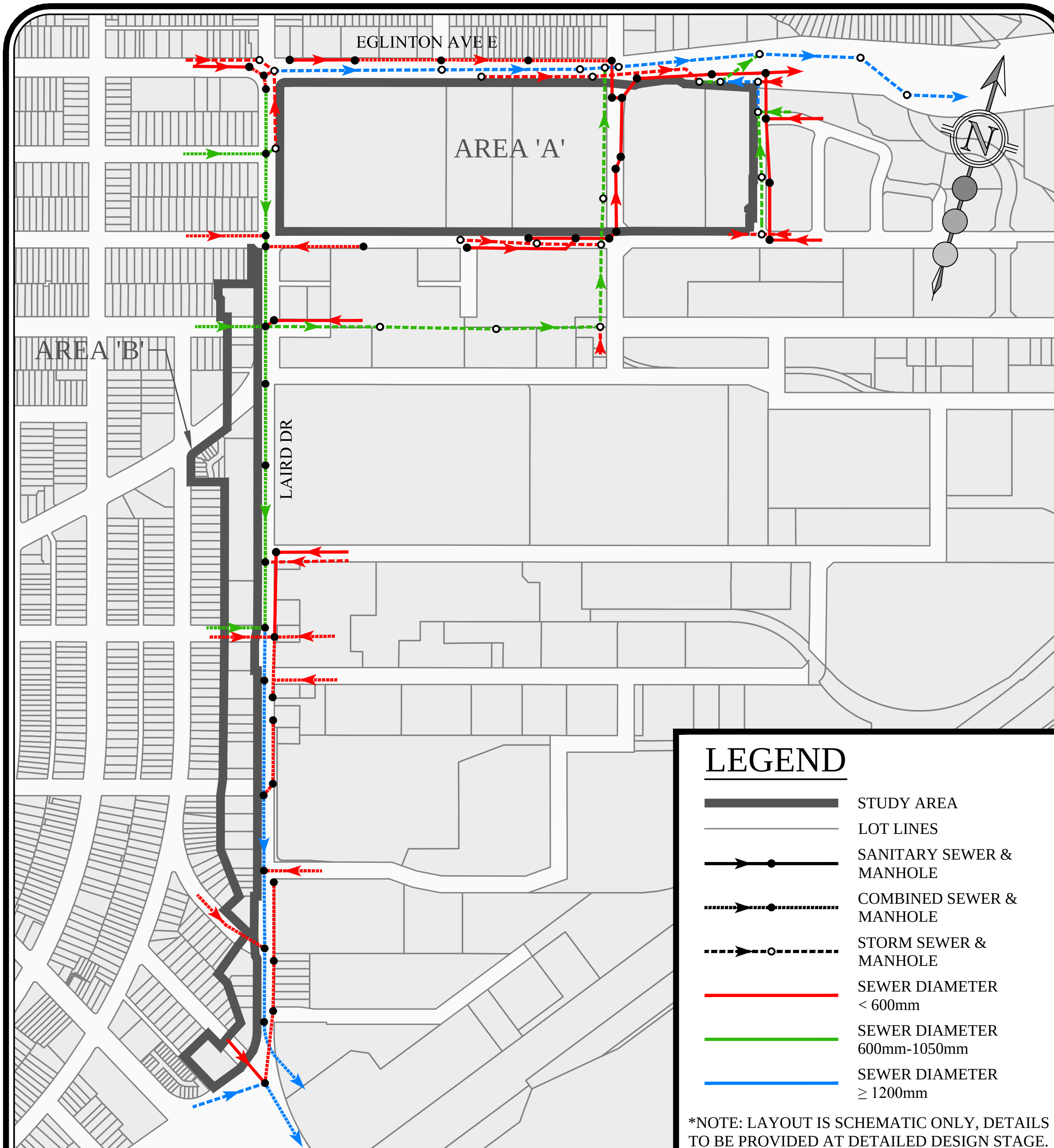

LAIRD FOCUS AREA STUDY	EXISTING SEWERS	
TORONTO 100 QUEEN STREET WEST TORONTO, ONTARIO M5H 2N2 TEL: (416) 392-2489 FAX: (416) 338-0685	DRAWN BY: M.L.M. SCALE: N.T.S.	CHECKED BY: L.P.M. DATE: JANUARY 2018
SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	PROJECT No: 1896	FIGURE No: 6.2

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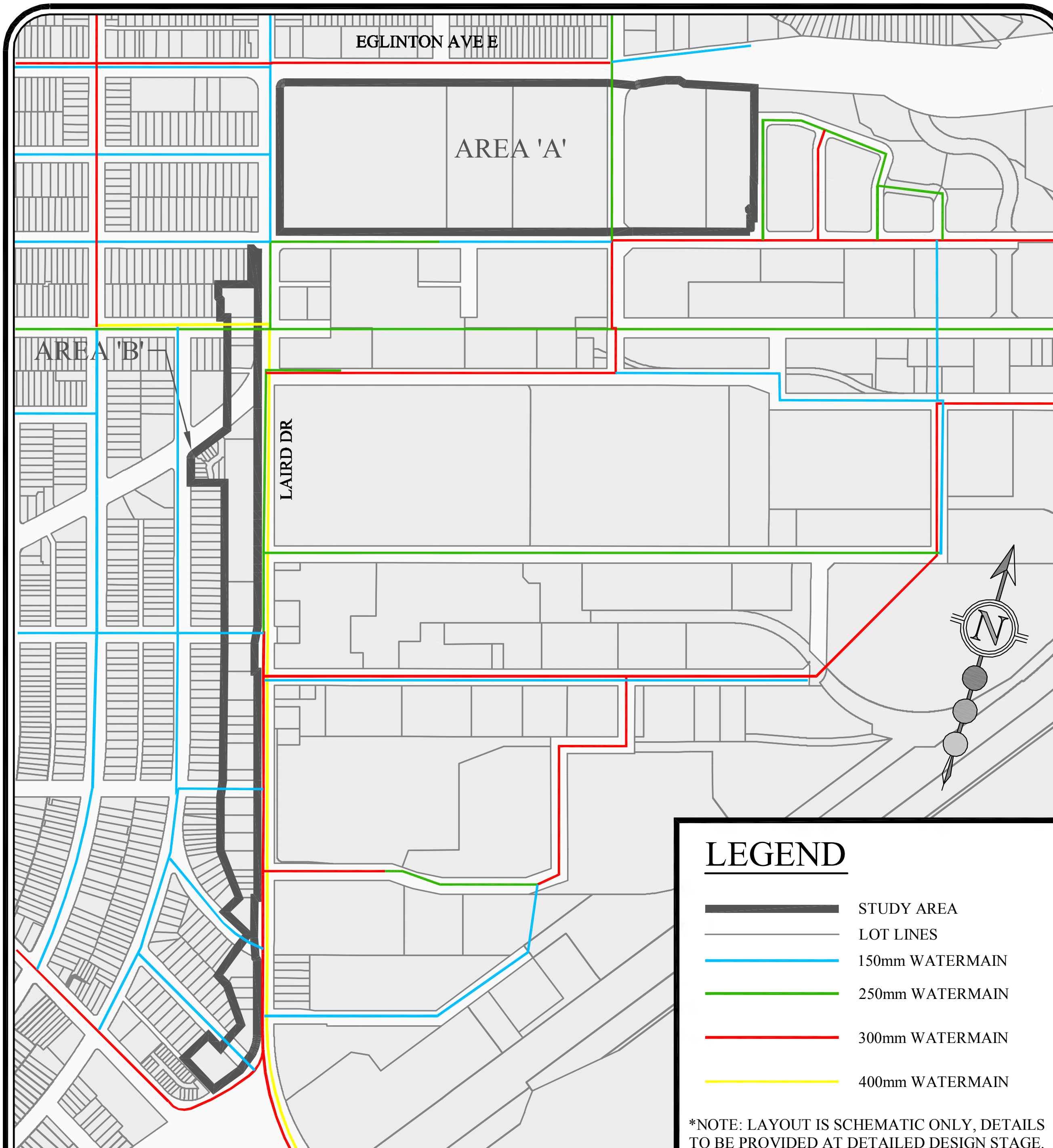

LAIRD FOCUS AREA STUDY		EXISTING WATERMAIN	
TORONTO	100 QUEEN STREET WEST TORONTO, ONTARIO M5H 2N2 TEL: (416) 392-2489 FAX: (416) 338-0685	DRAWN BY: J.R.L SCALE: N.T.S	CHECKED BY: L.P.M. DATE: JANUARY 2018
SCS consulting group ltd	30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	PROJECT No: 1896	FIGURE No: 6.3

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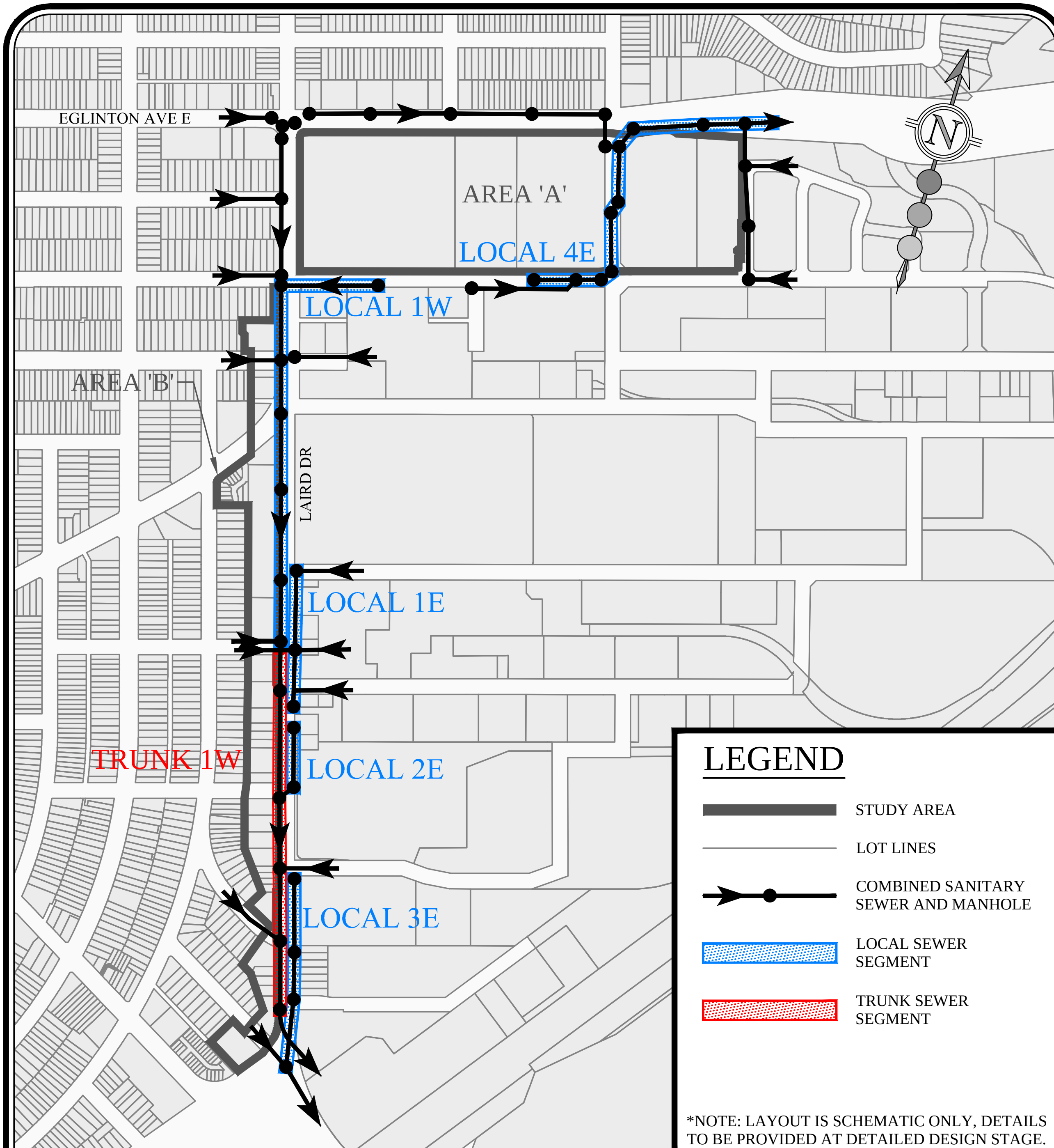

LAIRD FOCUS AREA STUDY	COMBINED SEWER SEGMENT NOMENCLATURE	
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SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	PROJECT No: 1896	FIGURE No: 6.4

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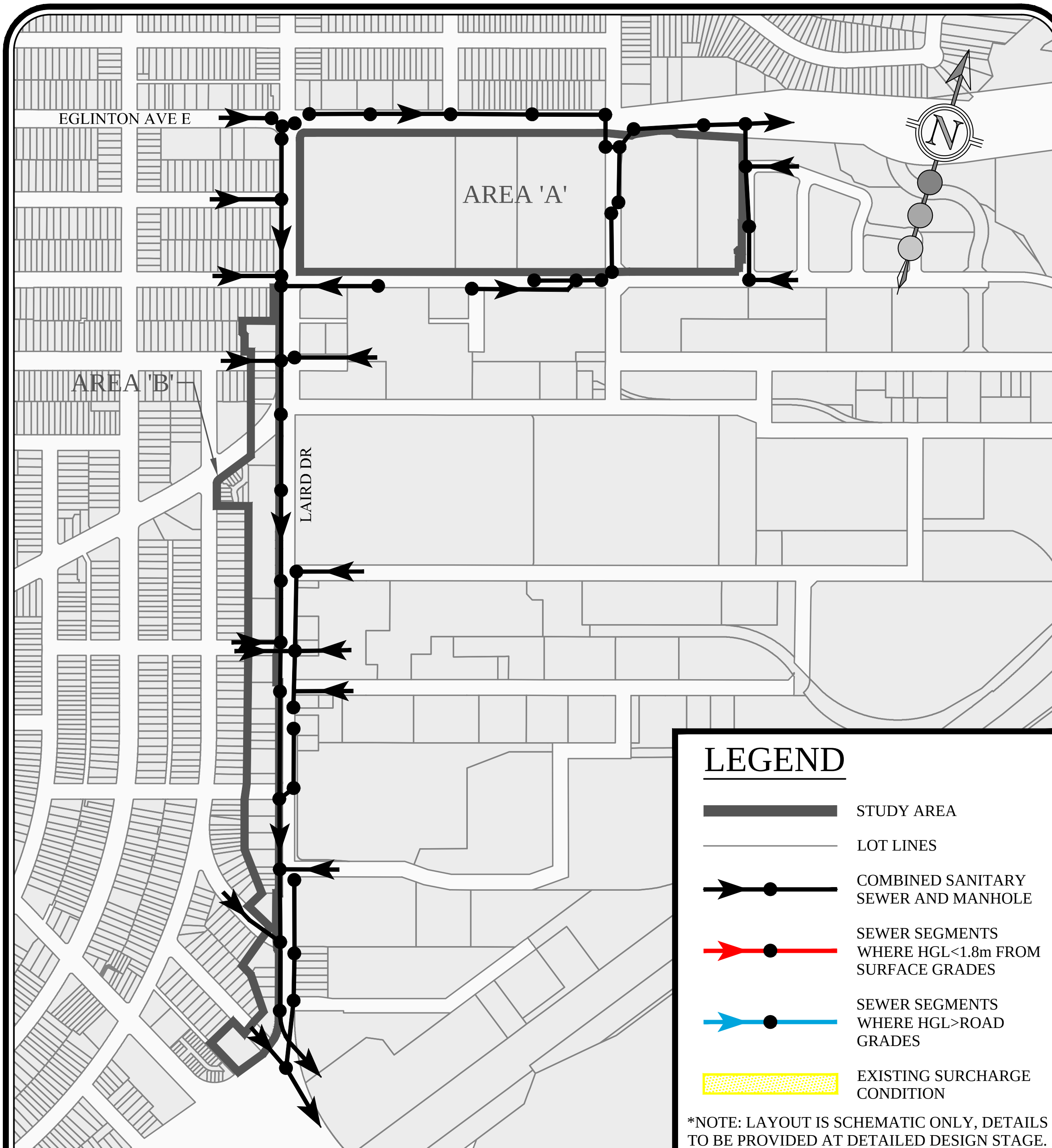

LAIRD FOCUS AREA STUDY	DRY WEATHER FLOW	
TORONTO — 100 QUEEN STREET WEST, TORONTO, ONTARIO M5H 2N2, TEL: (416) 392-2489, FAX: (416) 338-0685	DRAWN BY: M.L.M.	CHECKED BY: L.P.M.
	SCALE: N.T.S.	DATE: JANUARY 2018
SCS consulting group ltd — 30 CENTURIAN DRIVE, SUITE 100, MARKHAM, ONTARIO L3R 8B8, TEL: (905) 475-1900, FAX: (905) 475-8335	PROJECT No: 1896	FIGURE No: 6.5

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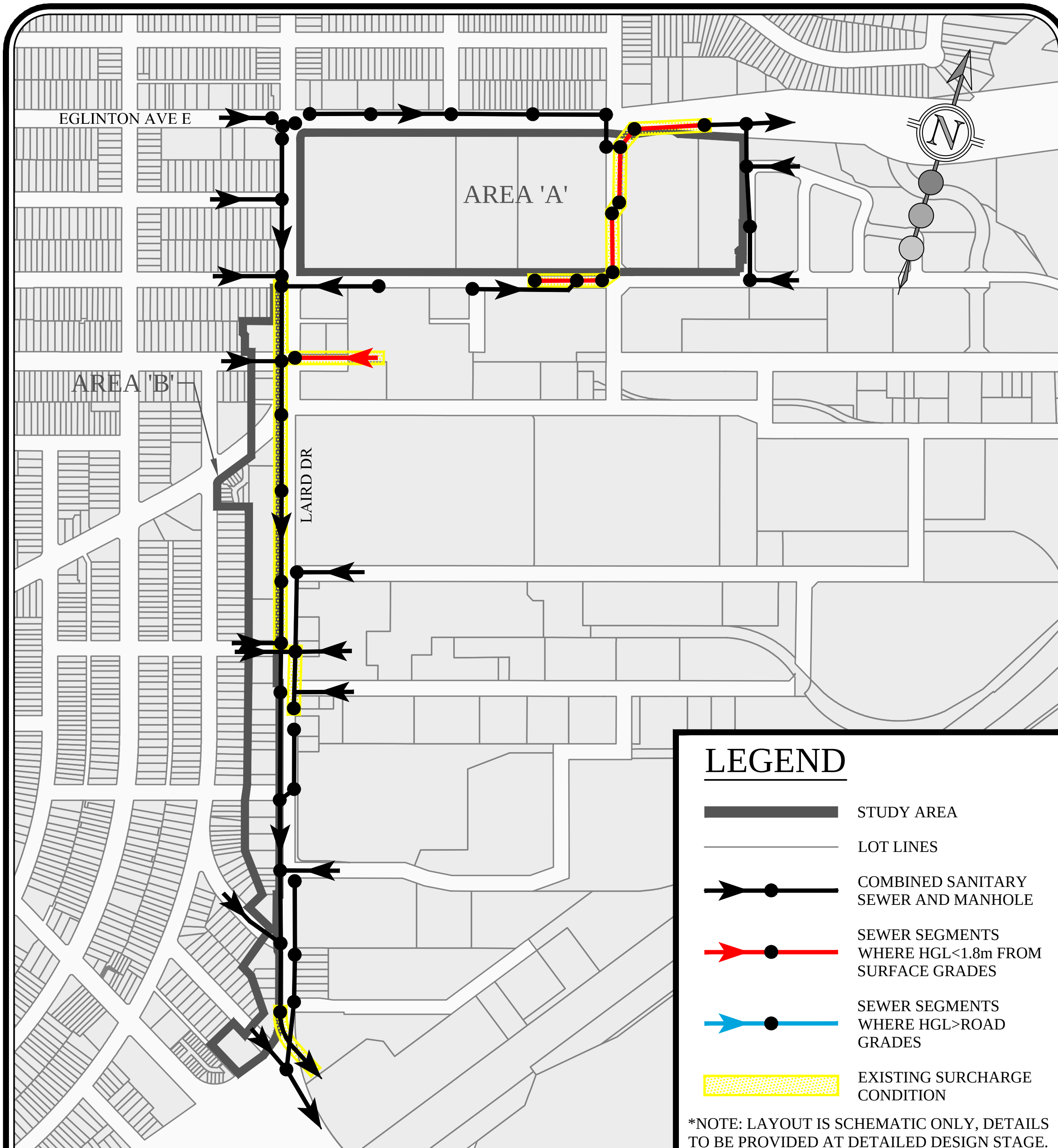

LAIRD FOCUS AREA STUDY	2-YEAR WET WEATHER FLOW	
TORONTO 100 QUEEN STREET WEST TORONTO, ONTARIO M5H 2N2 TEL: (416) 392-2489 FAX: (416) 338-0685	DRAWN BY: M.L.M.	CHECKED BY: L.P.M.
	SCALE: N.T.S.	DATE: JANUARY 2018
SCS consulting group ltd 30 CENTURIAN DRIVE, SUITE 100 MARKHAM, ONTARIO L3R 8B8 TEL: (905) 475-1900 FAX: (905) 475-8335	PROJECT No: 1896	FIGURE No: 6.6

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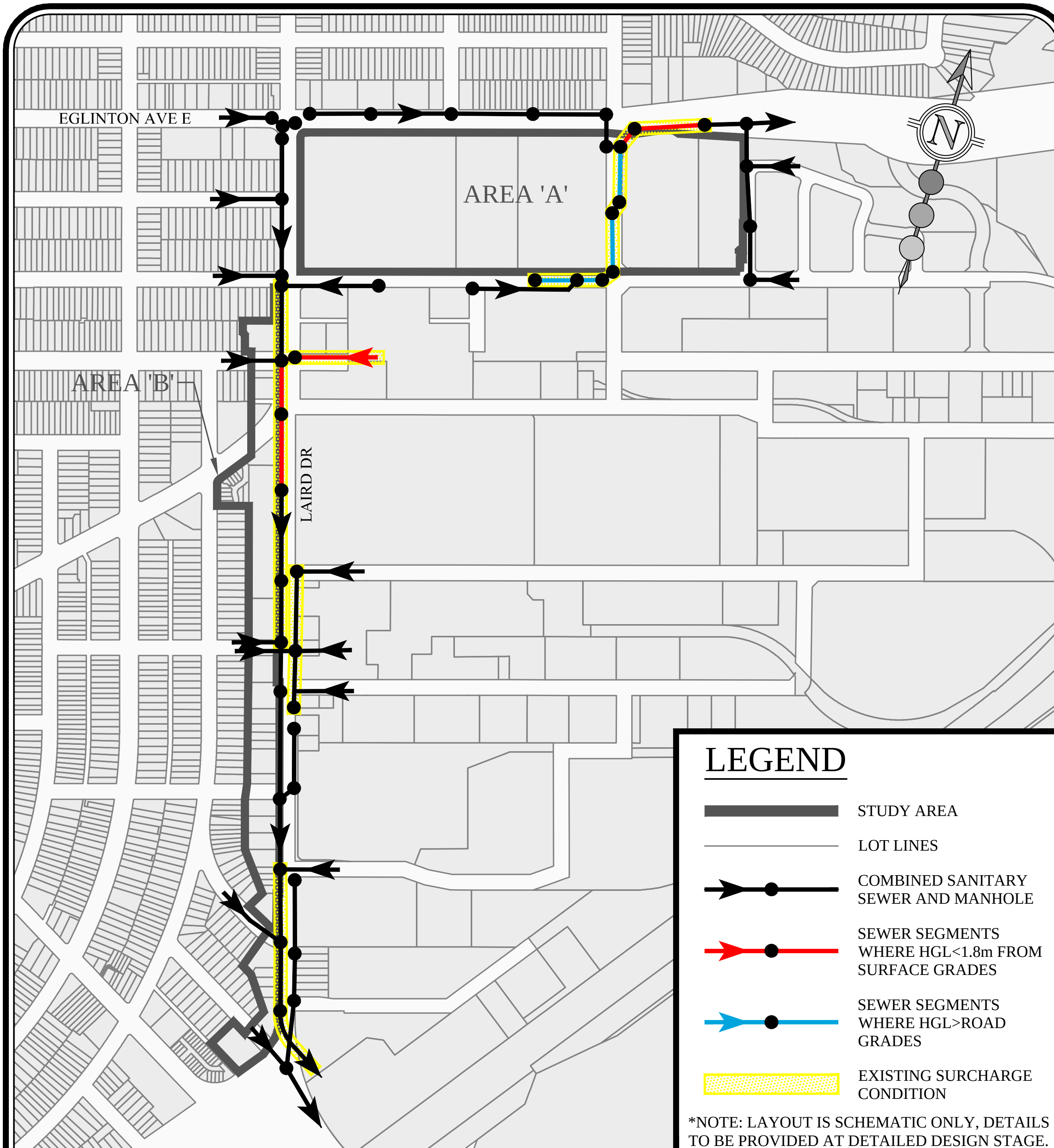

LAIRD FOCUS AREA STUDY

100-YEAR WET WEATHER FLOW

TORONTO
100 QUEEN STREET WEST
TORONTO, ONTARIO M5H 2N2
TEL: (416) 392-2489
FAX: (416) 338-0685

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DRAWN BY: M.L.M.	CHECKED BY: L.P.M.
SCALE: N.T.S.	DATE: JANUARY 2018
PROJECT No: 1896	FIGURE No: 6.7

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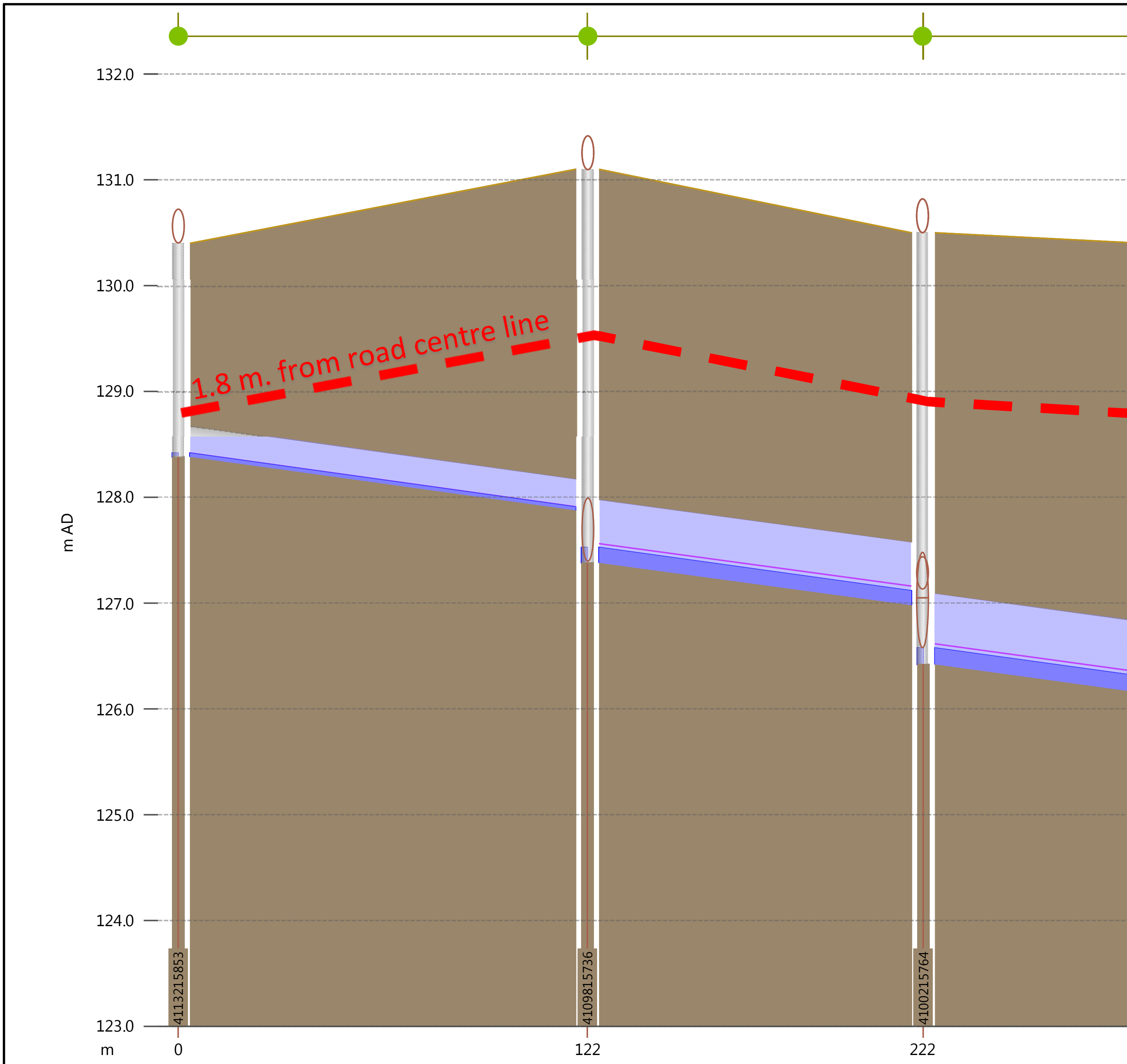

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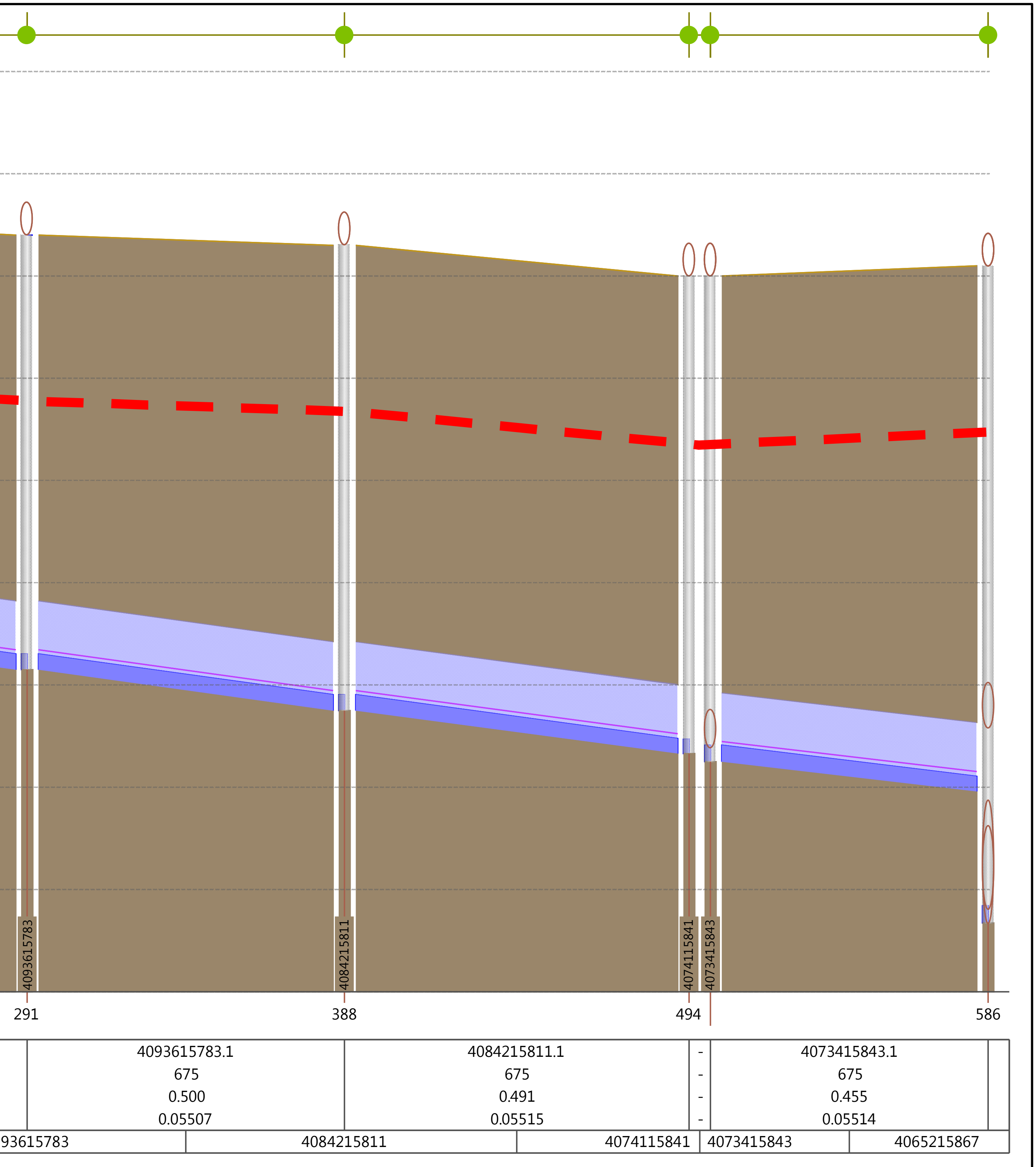
pfc (m3/s)	0.058	0.361	0.488
DS flow (m3/s)	0.00107	0.04486	0.05508

Node	4113215853	4109815736	4100215764	40

Local 1W – Dry-weather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586
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675
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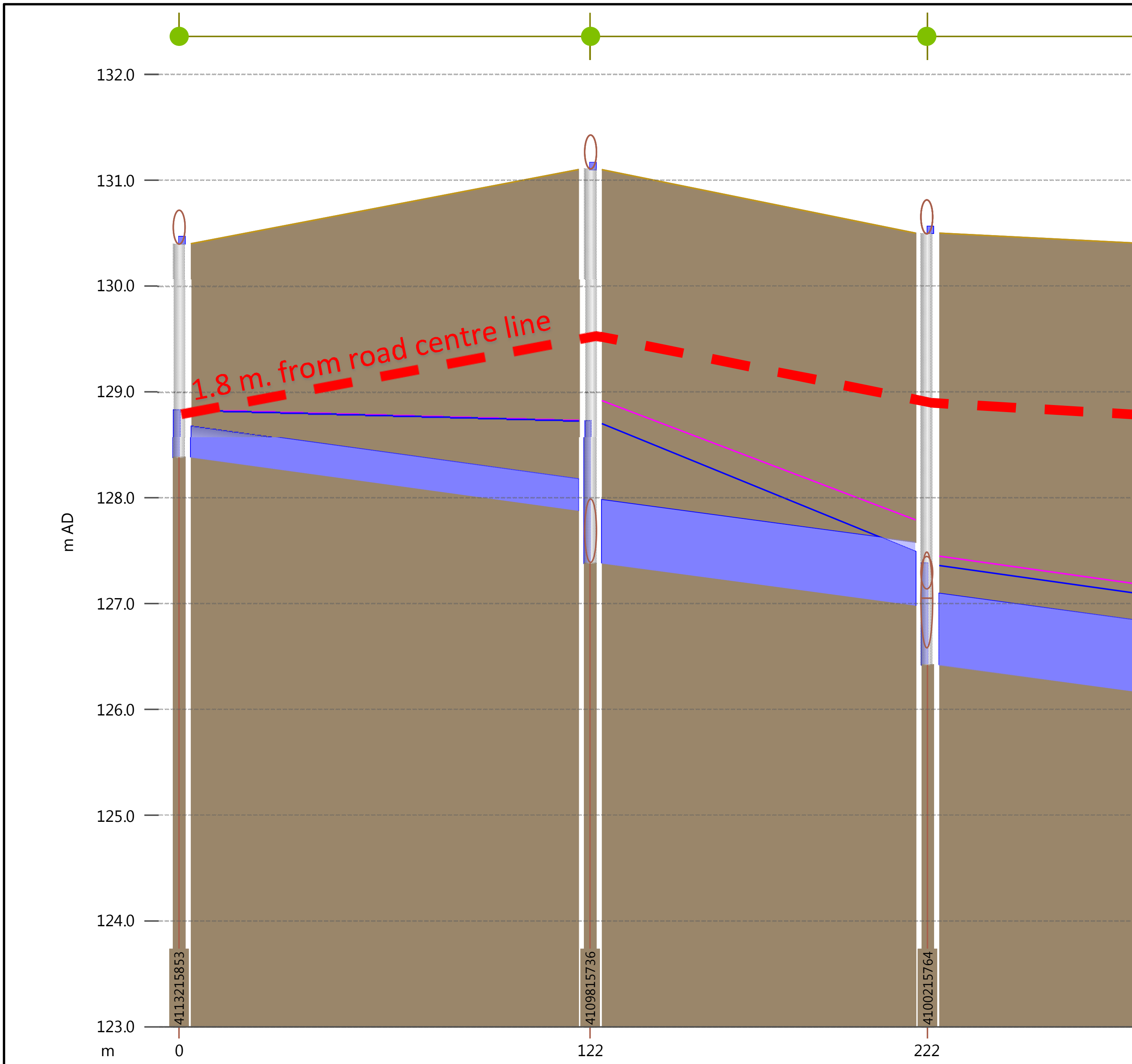

Link	4113215853.1	4109815736.1	4100215764.1
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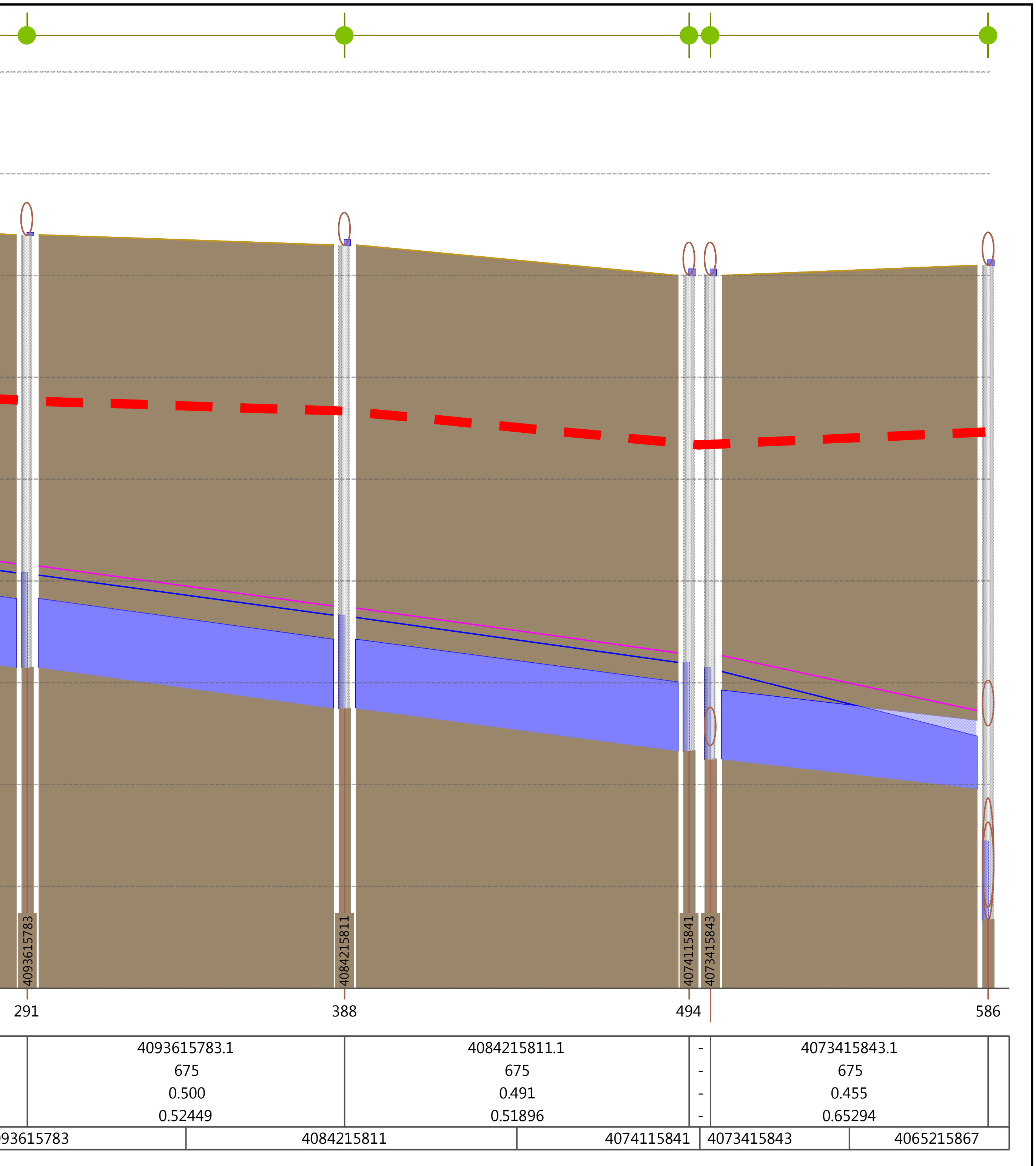
pfc (m3/s)	0.058	0.361	0.488
DS flow (m3/s)	0.02551	0.62134	0.55117
Node	4113215853	4109815736	4100215764

Local 1W – 2-year Storm Event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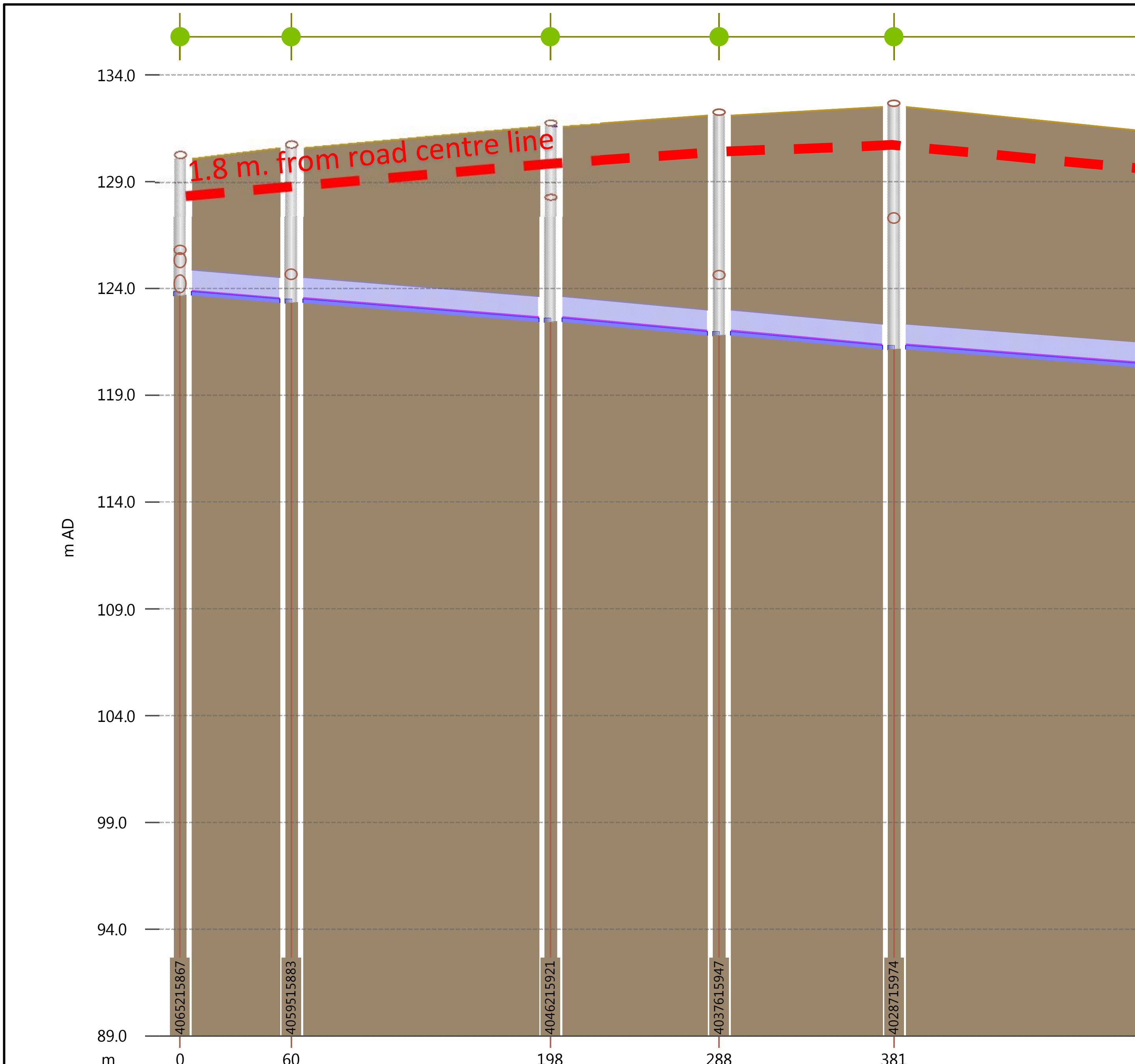
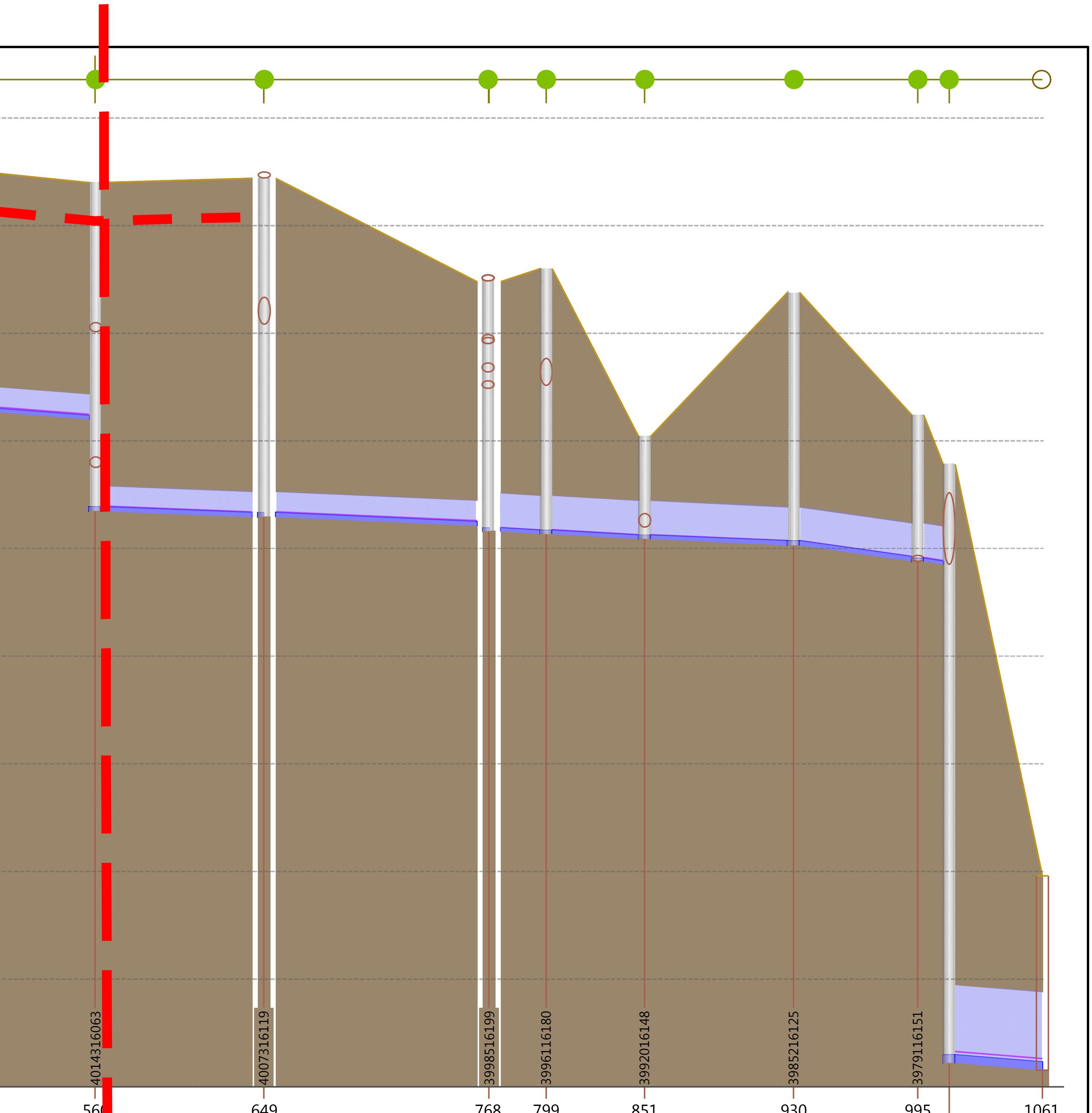


Link	4065215867.1	4059515883.1	4046215921.1	4037615947.1	4028715974.1
width (mm)	1200	1200	1200	1200	1200
pfc (m3/s)	2.757	2.909	3.038	3.034	2.899
DS flow (m3/s)	0.10299	0.10928	0.11003	0.11383	0.11535

Node	-	4059515883	4046215921	4037615947	4028715974

Trunk 1W – Dry-weather



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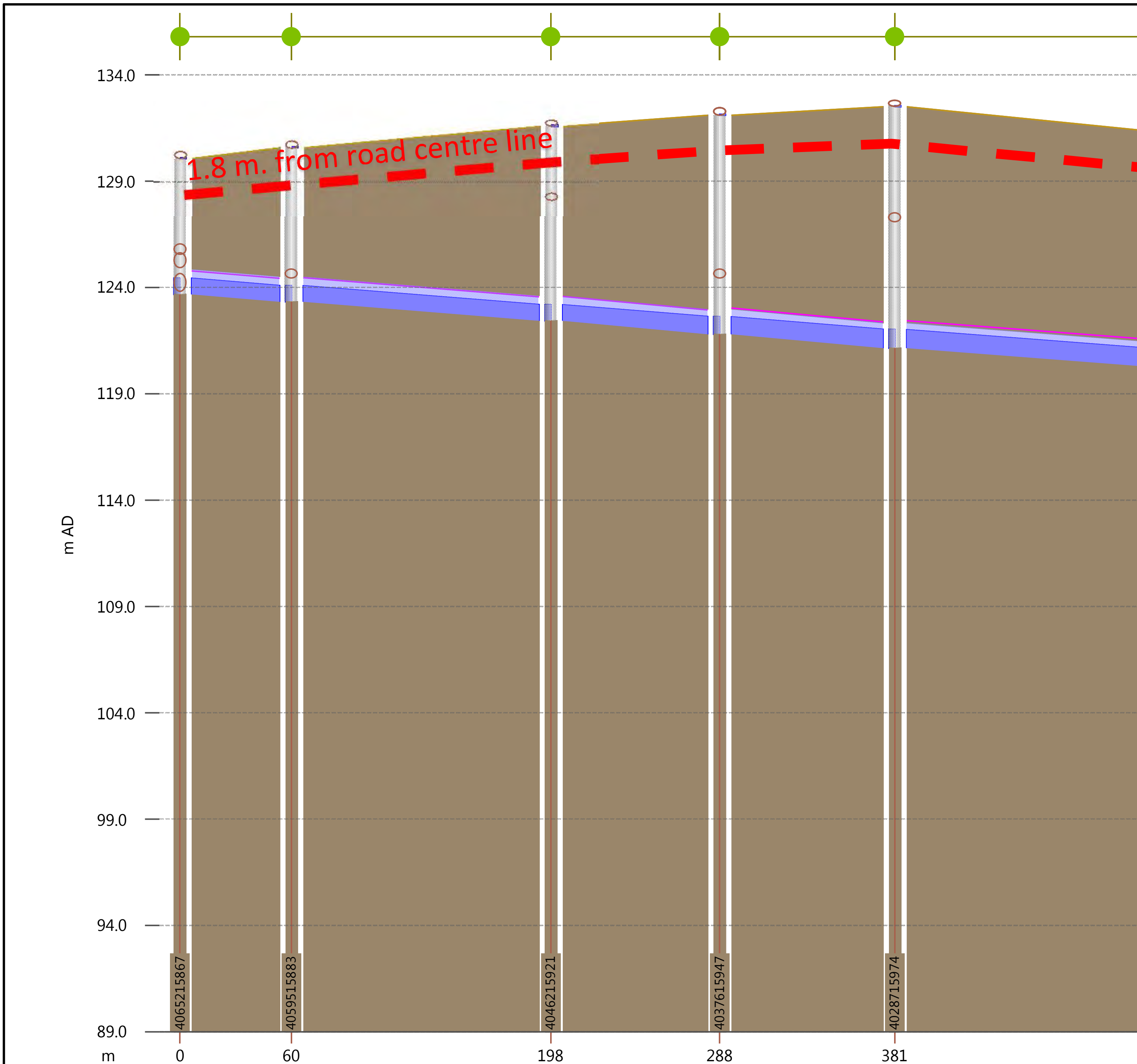
	1.990	2.117	5.539	6.114	5.661	9.634	-	57.793	
	0.11737	0.12056	-	0.15091	0.15091	0.15091	-	1.03583	

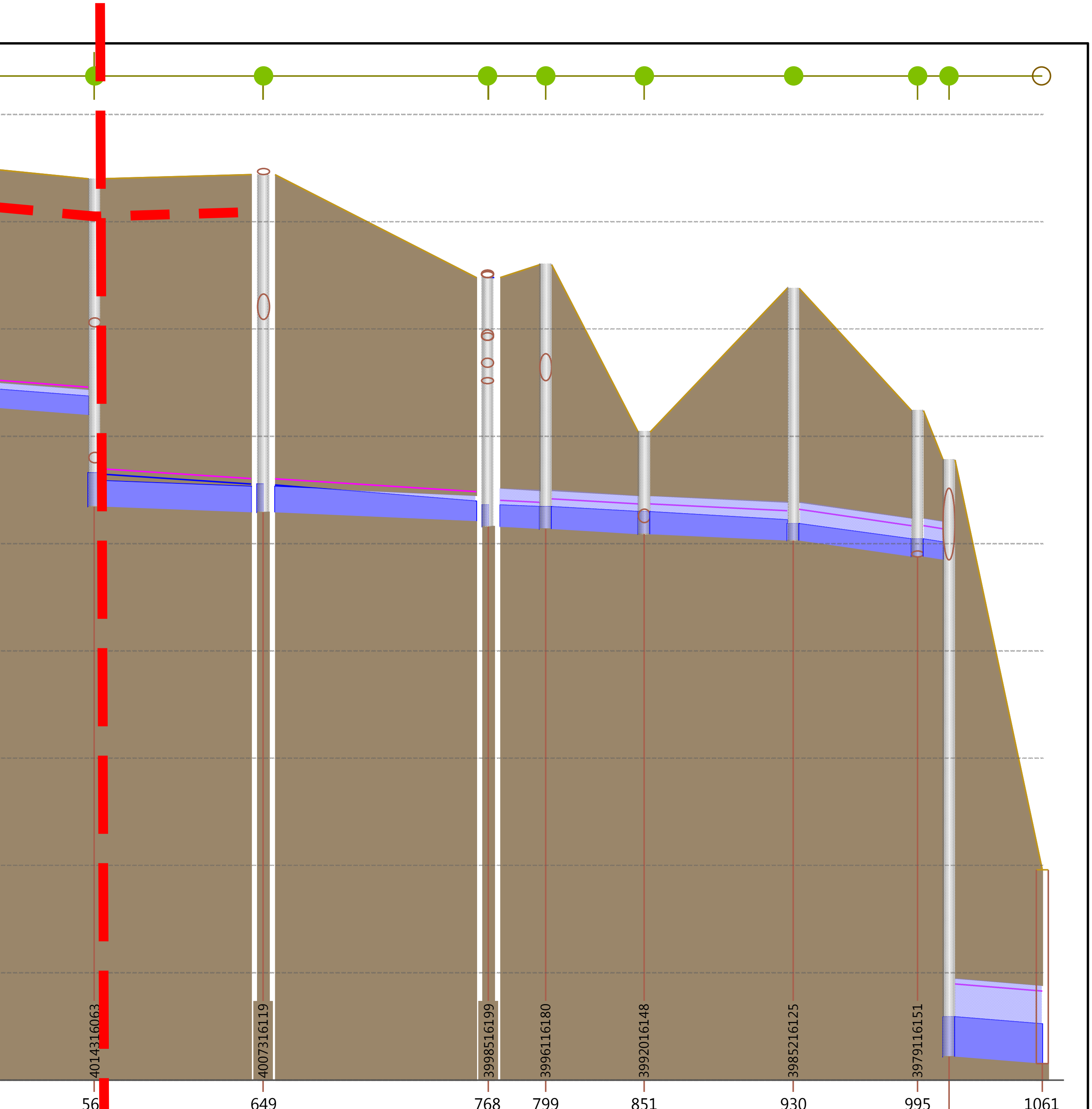
401431[illegible]063	4007316119	3998516199	-	3992016148	3985216125	-	-	-

END OF STUDY AREA



Link		4065215867.1	4059515883.1	4046215921.1	4037615947.1	4028715974.1
width (mm)		1200	1200	1200	1200	1200
pfc (m3/s)		2.757	2.909	3.038	3.034	2.899
DS flow (m3/s)		1.96777	2.03152	2.06492	2.34054	2.52559
Node	-	4059515883	4046215921	4037615947	4028715974	

Trunk 1W – 2-year Storm Event



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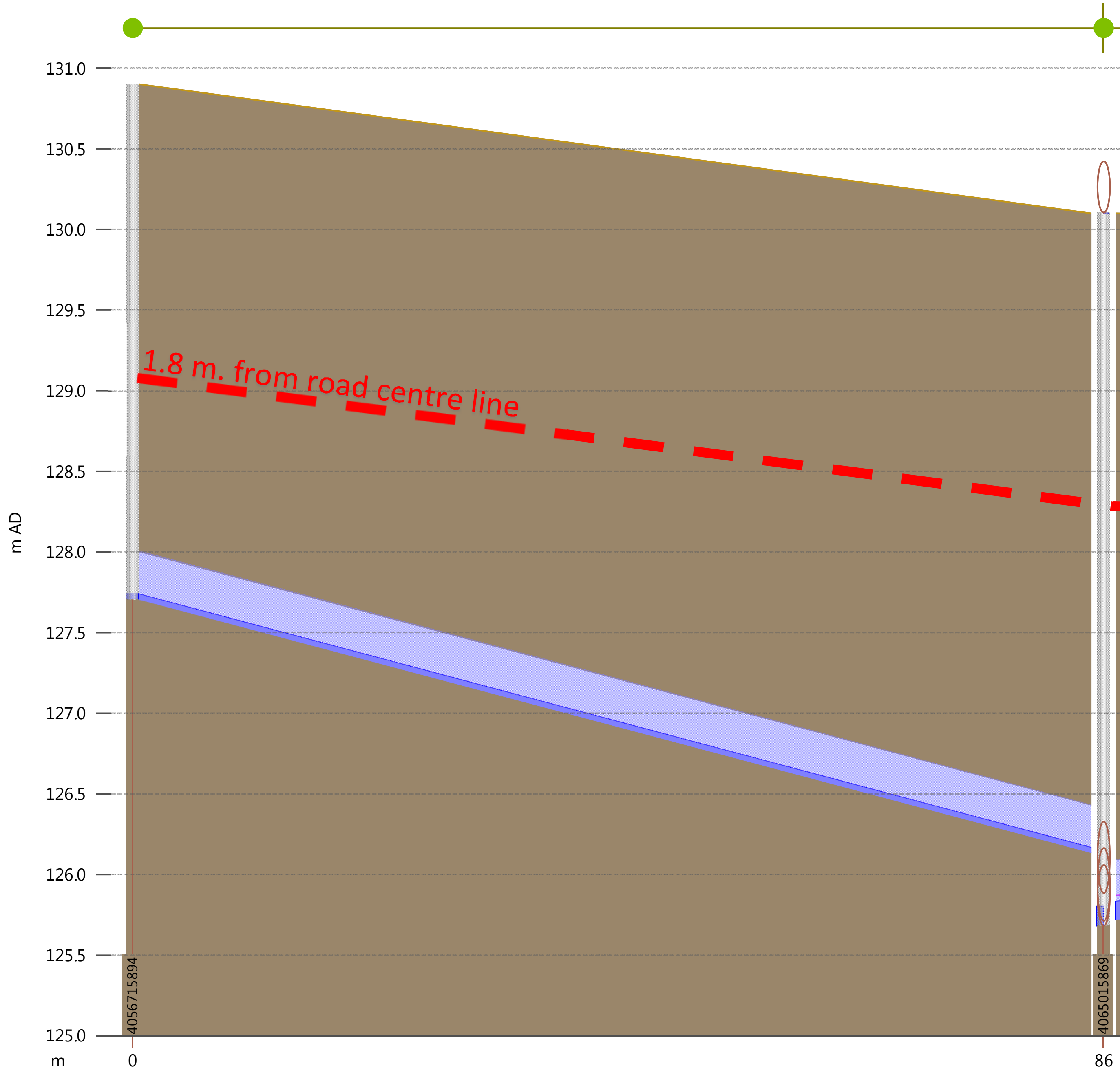
	1200	1200	1500	1500	1500	1500	-	3658	
	1.990	2.117	5.539	6.114	5.661	9.634	-	57.793	
	2.59960	2.76749	-	3.92206	3.91692	3.91172	-	29.15681	

4014316063	4007316119	3998516199	-	3992016148	3985216125	-	-	-

END OF STUDY AREA



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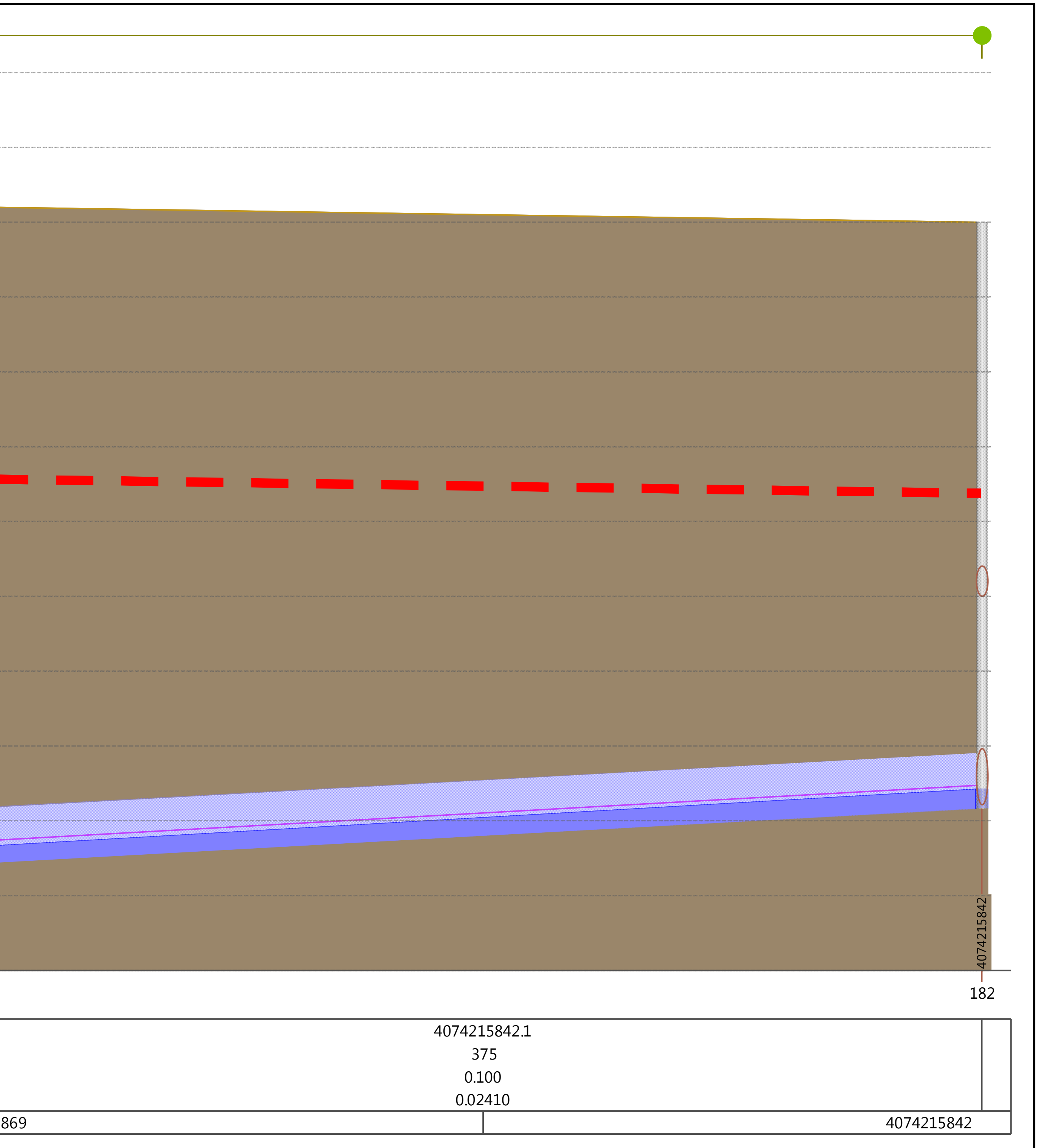
DS flow (m3/s)		0.00041
Node	4056715894	4065015

Local 1E – Dry-weather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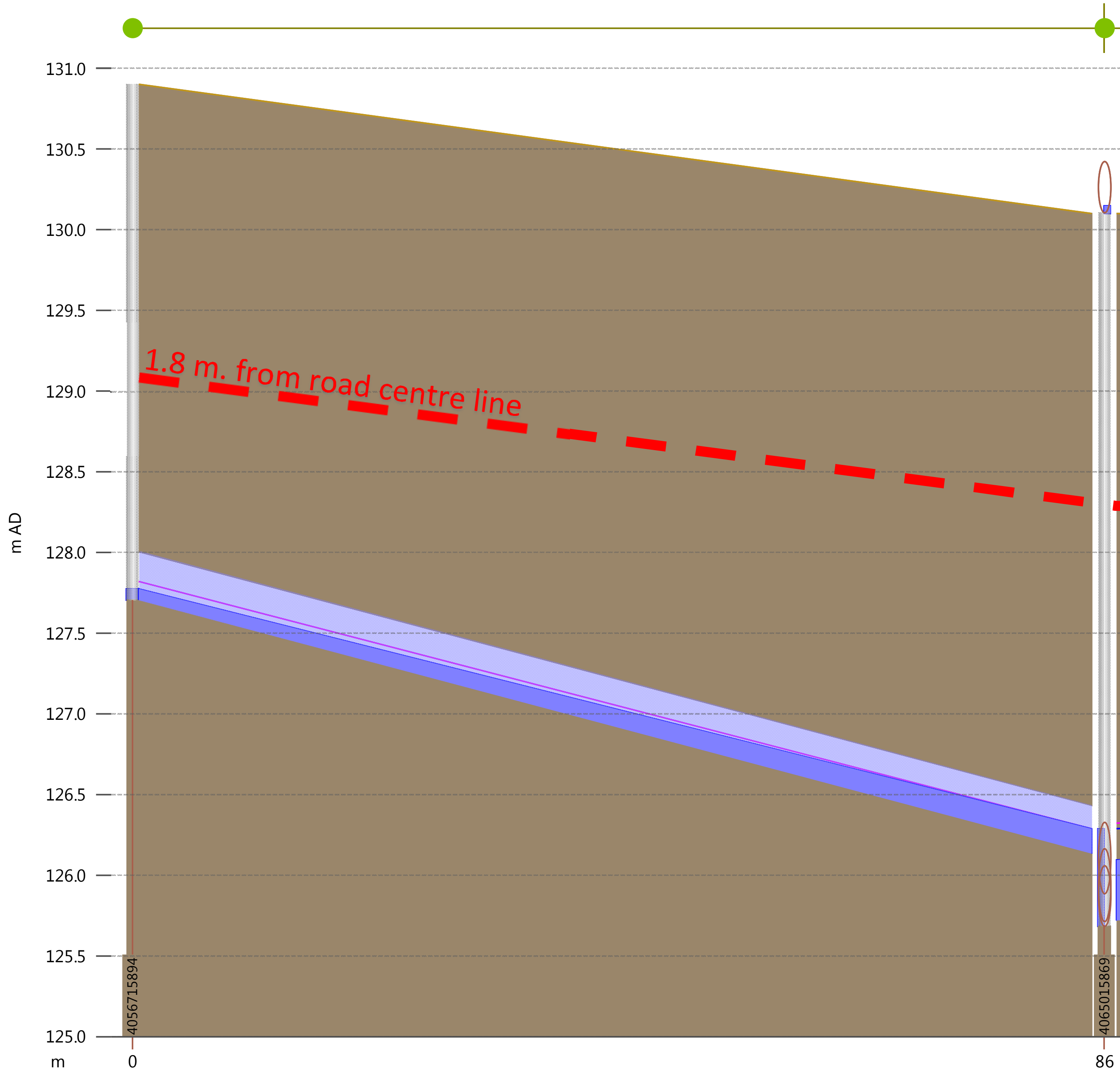

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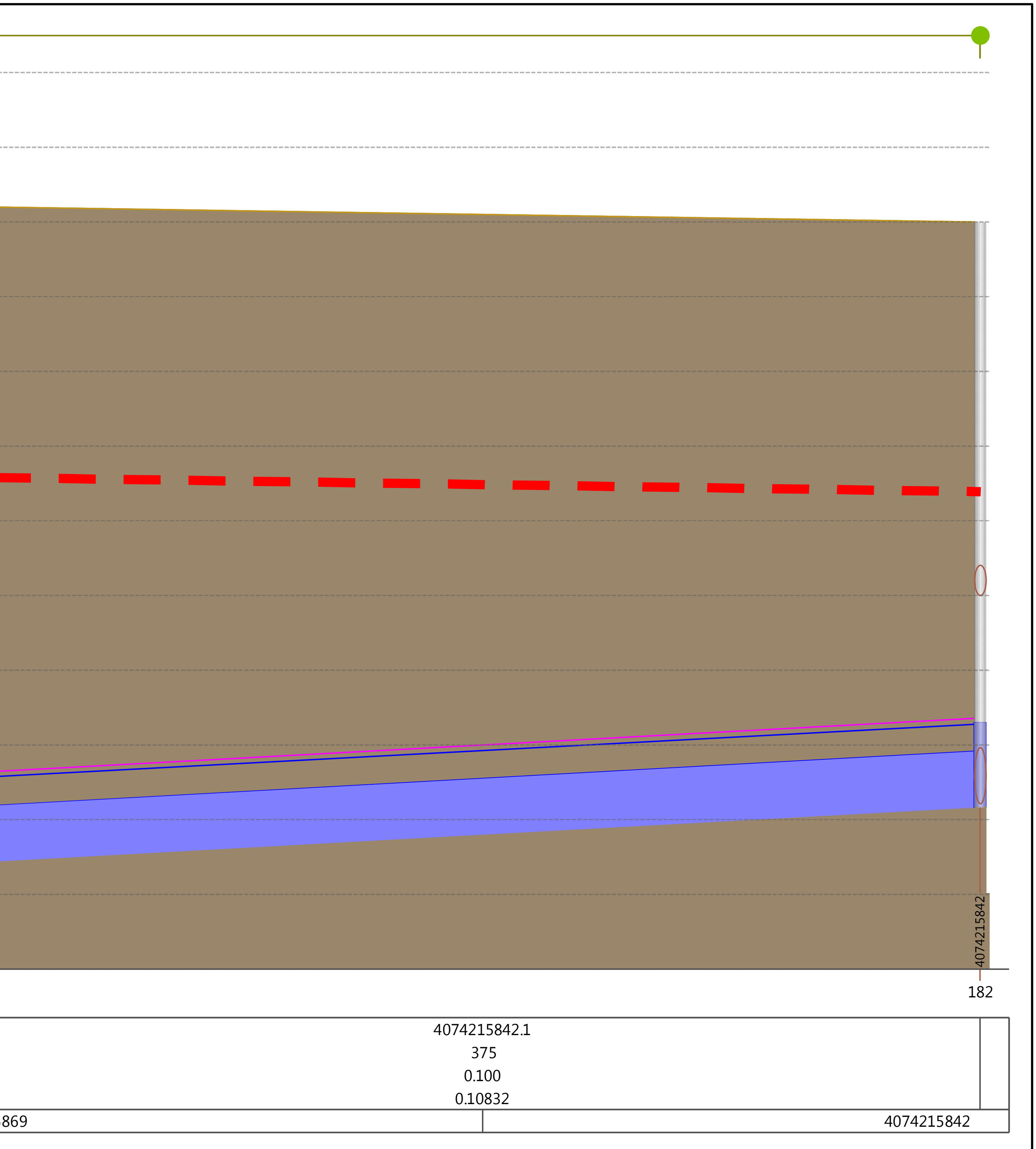
Node	4056715894	4065015

Local 1E – 2-year Storm Event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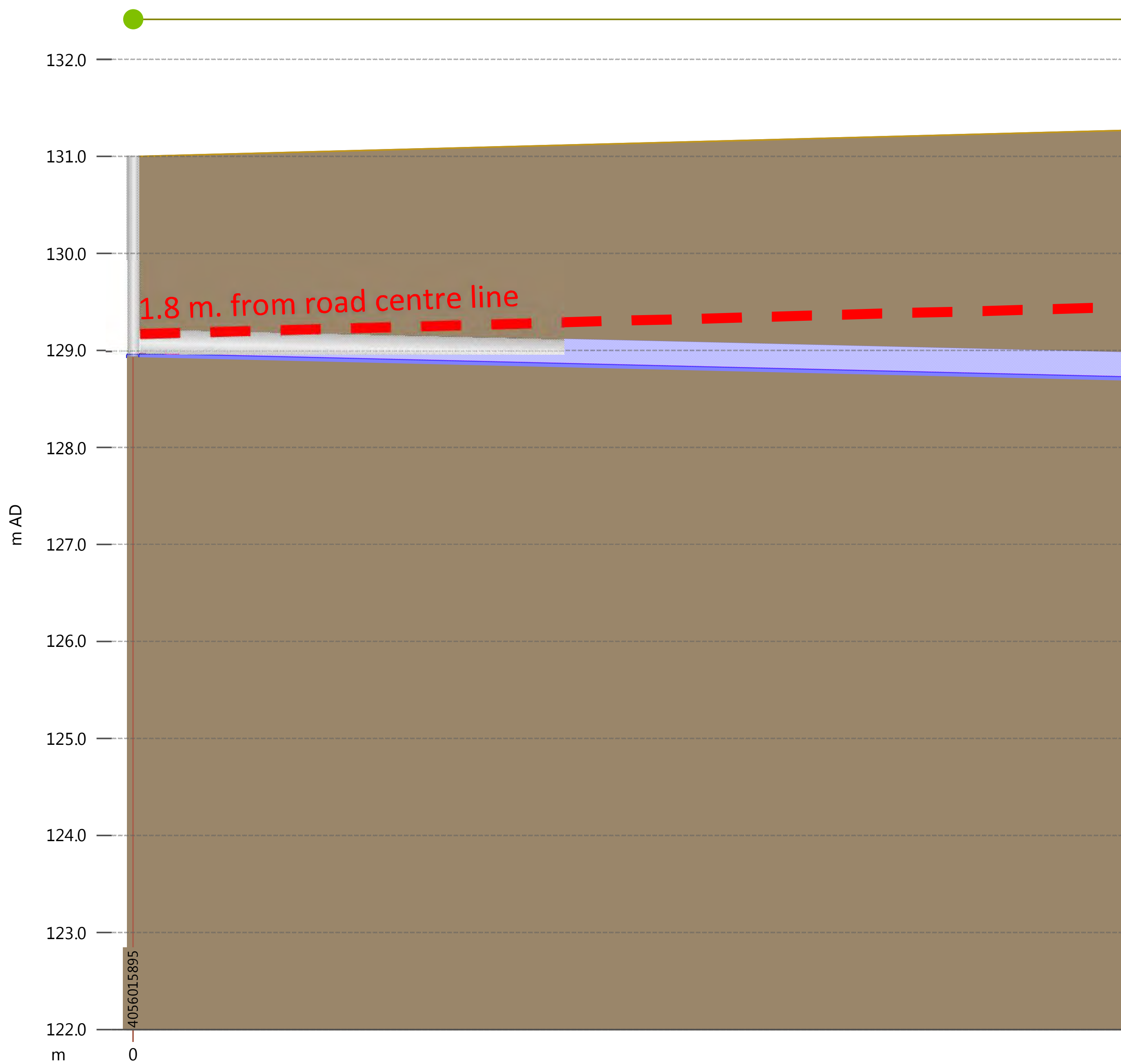

Link		4056015895.1
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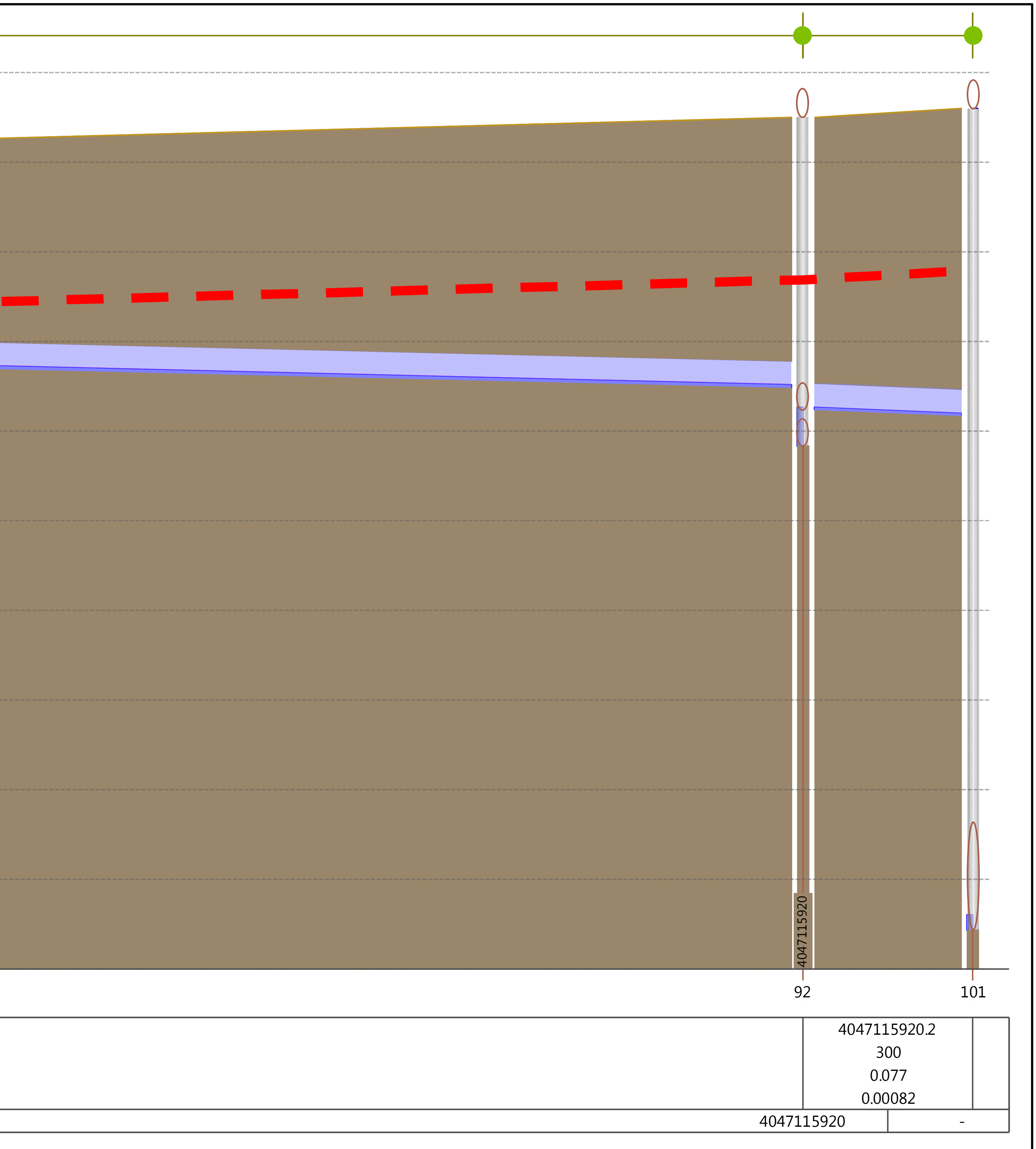
pfc (m3/s)		0.063
DS flow (m3/s)		0.00122
Node	4056015895	

Local 2E – Dry-weather



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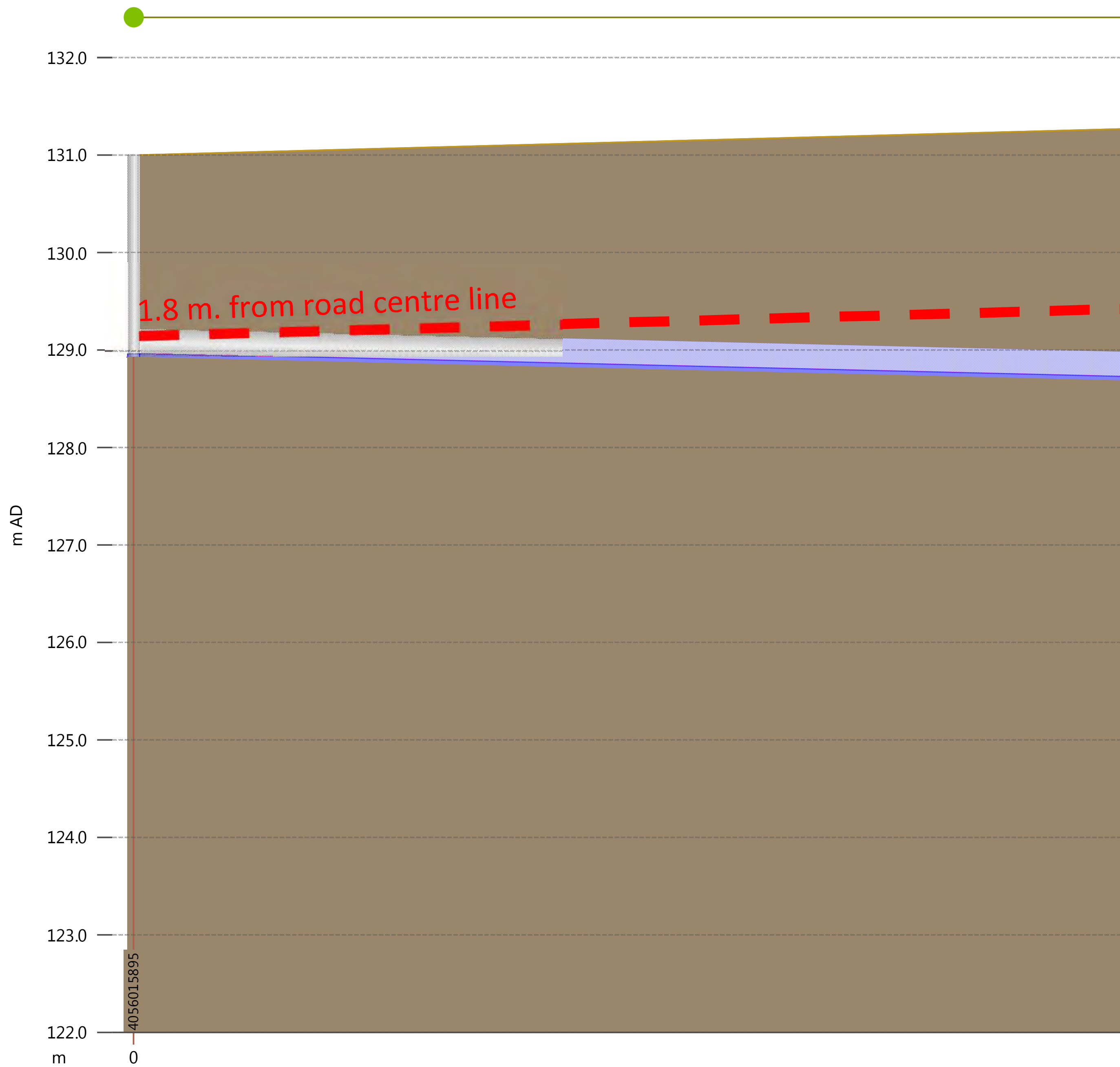

Link		4056015895.1
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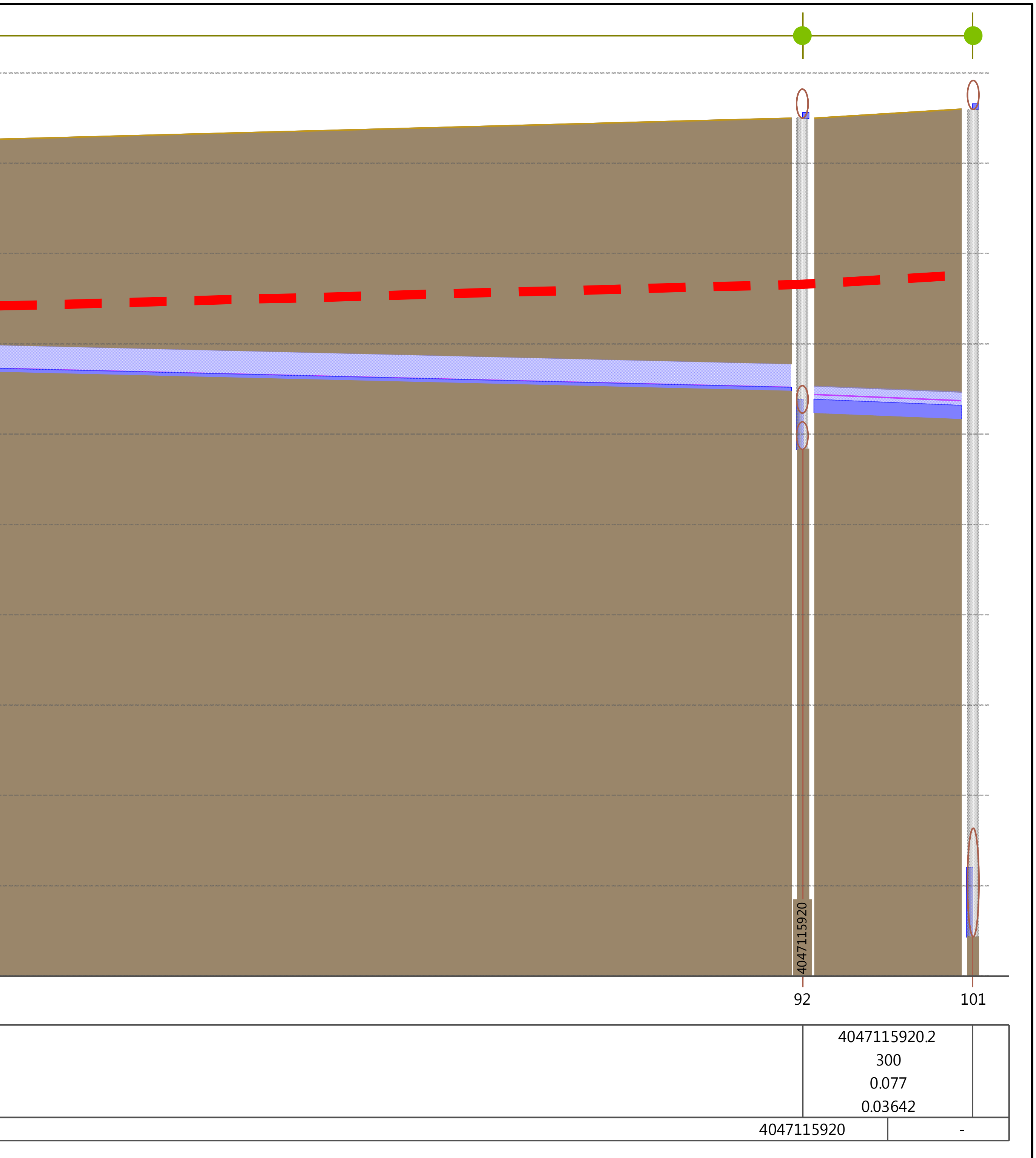
pfc (m3/s)		0.063
DS flow (m3/s)		0.00122
Node	4056015895	

Local 2E – 2-year Storm Event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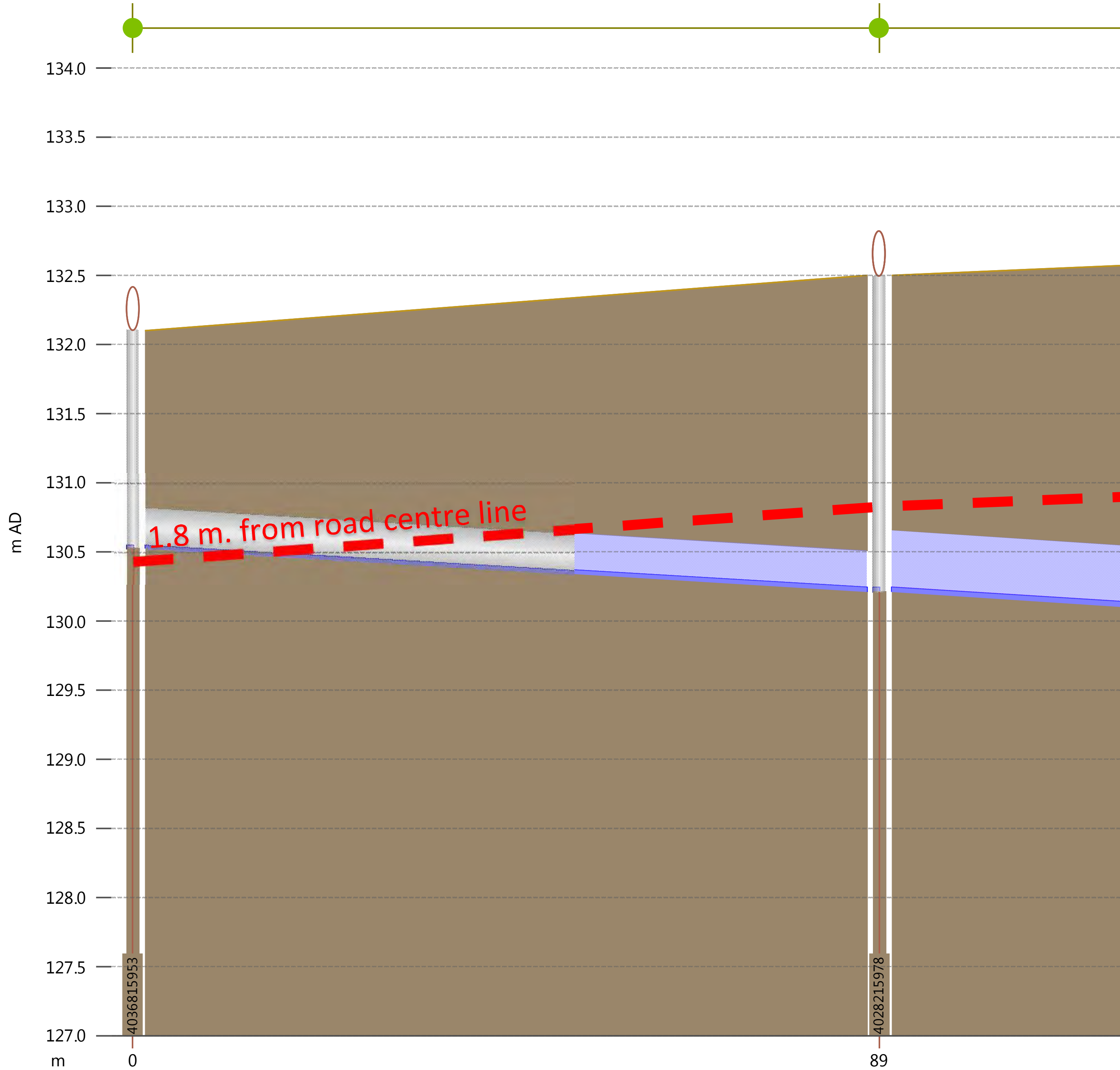
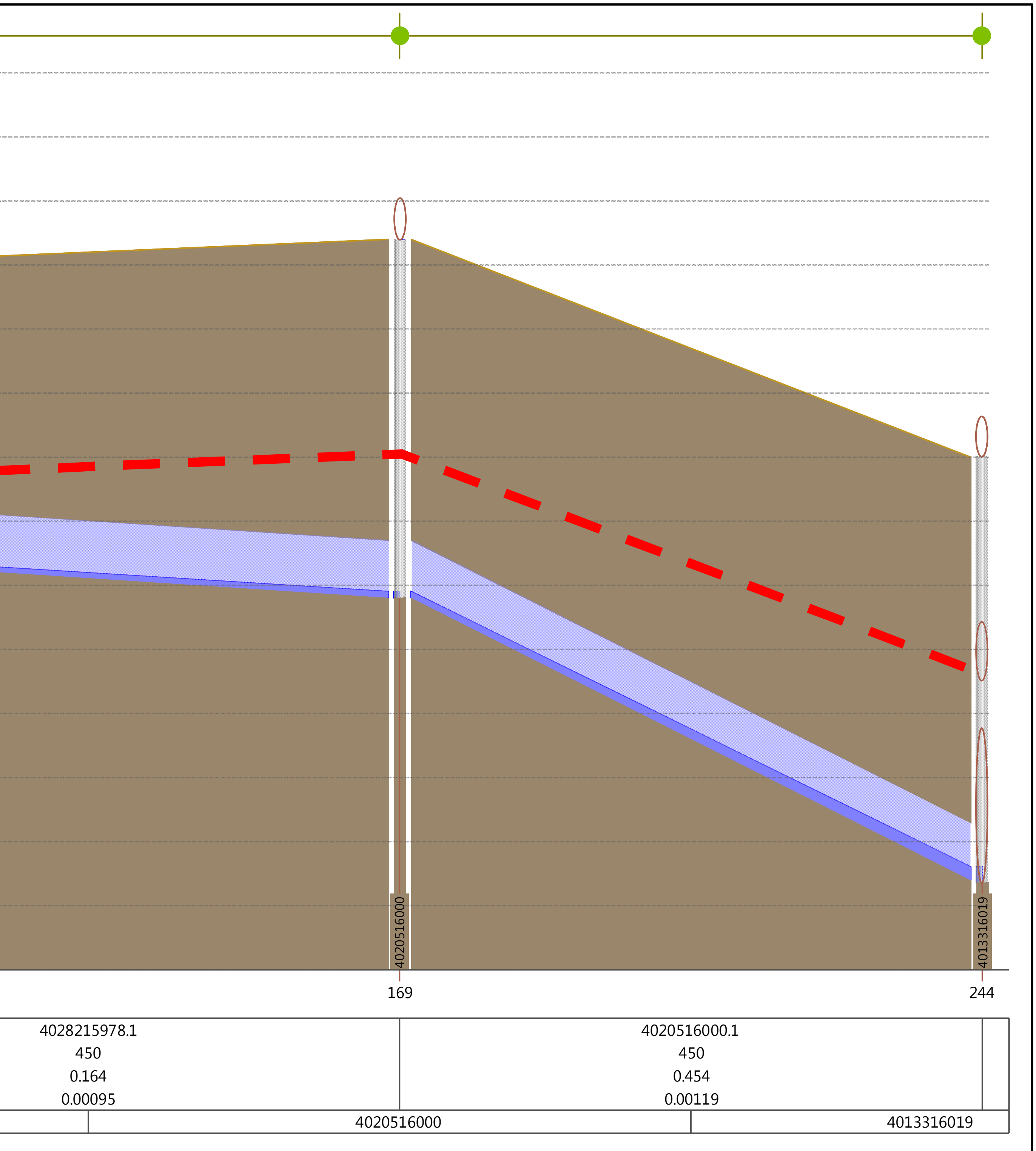
-



Link width (mm) pfc (m3/s) DS flow (m3/s)	4036815953.1 300 0.054 0.00022	
Node	4036815953	4028215978

Local 3E – Dry-weather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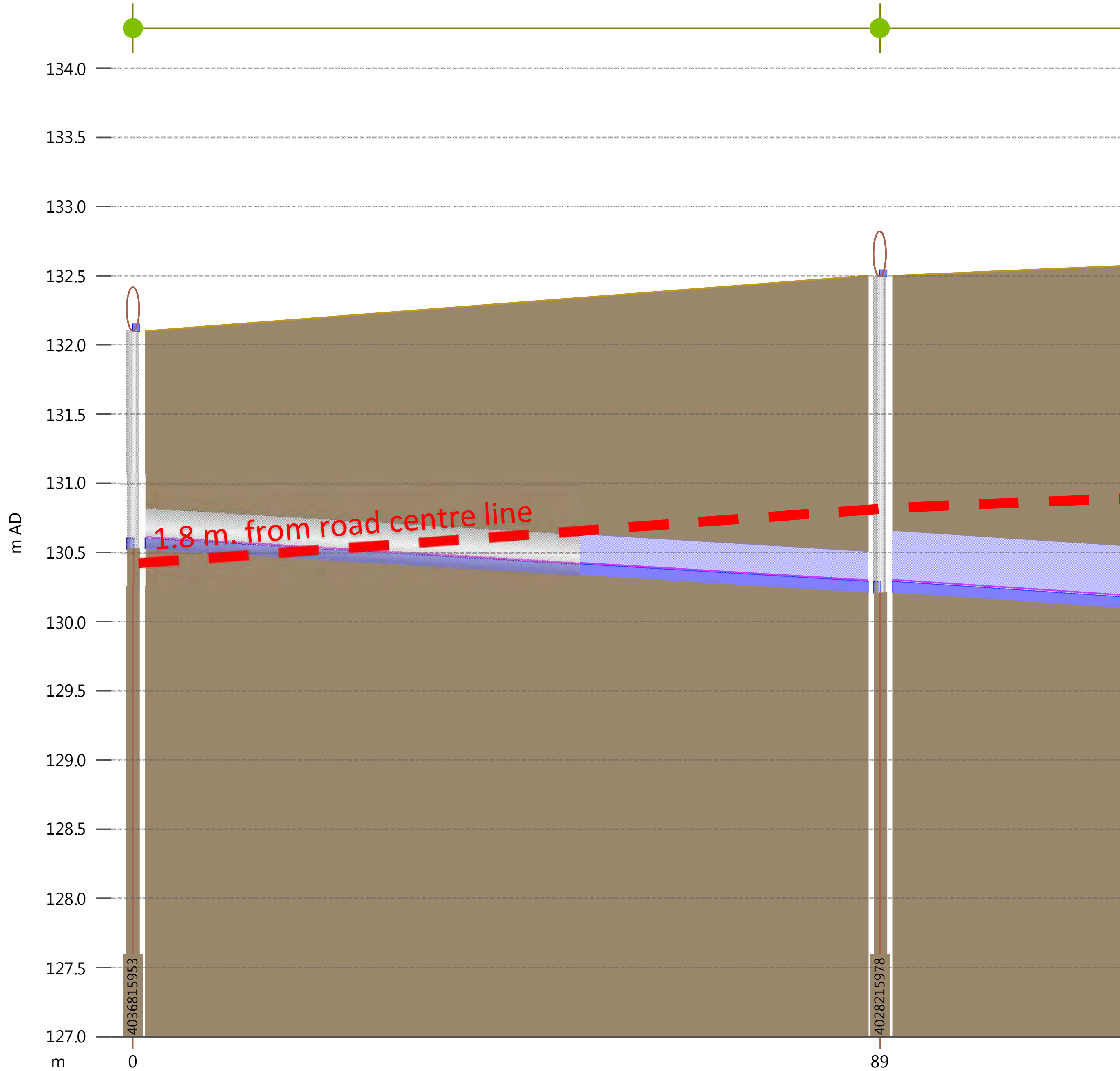
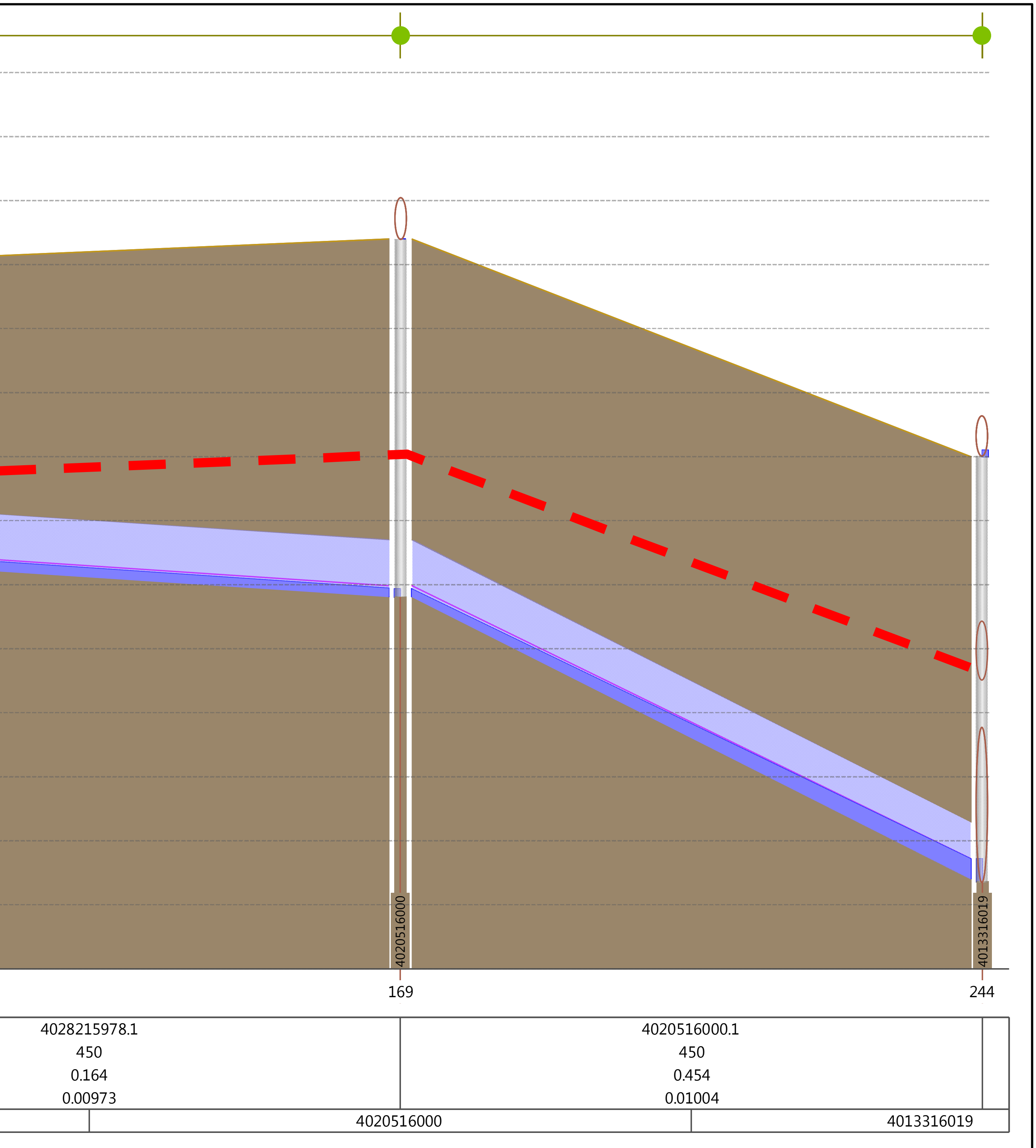


Link	4036815953.1	
width (mm)	300	
pfc (m3/s)	0.054	
DS flow (m3/s)	0.00684	
Node	4036815953	4028215978

Local 3E – 2-year Storm Event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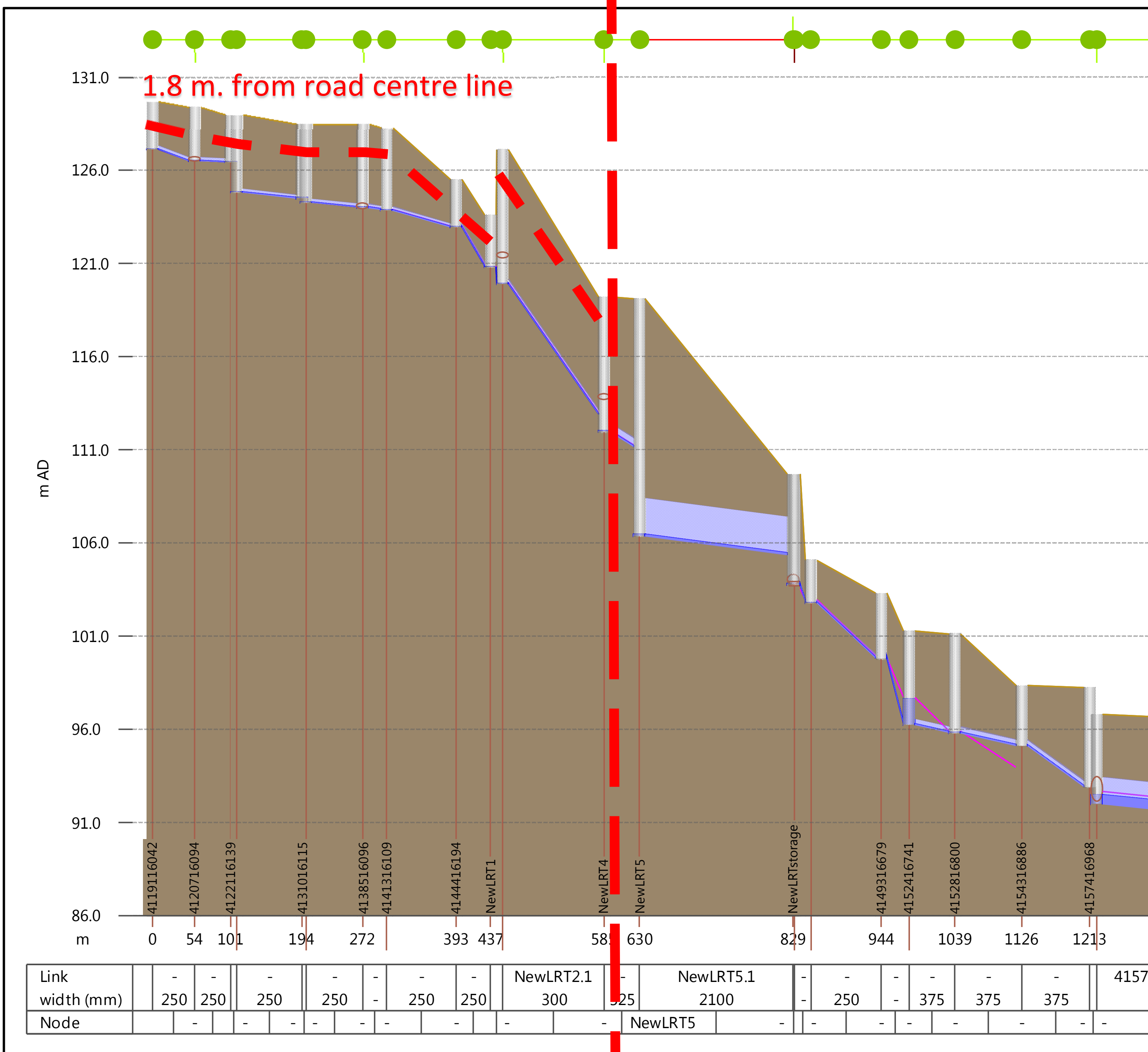
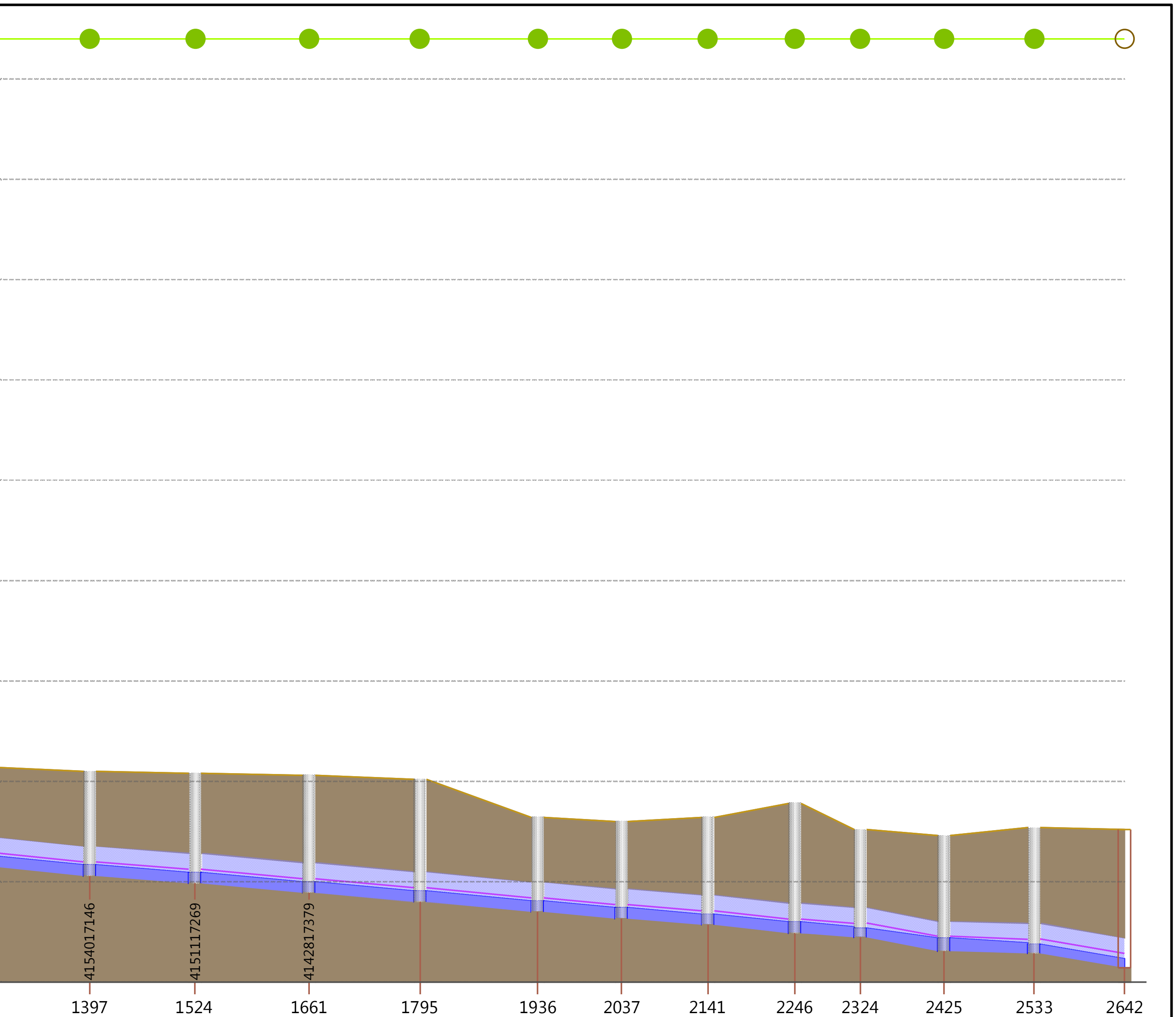


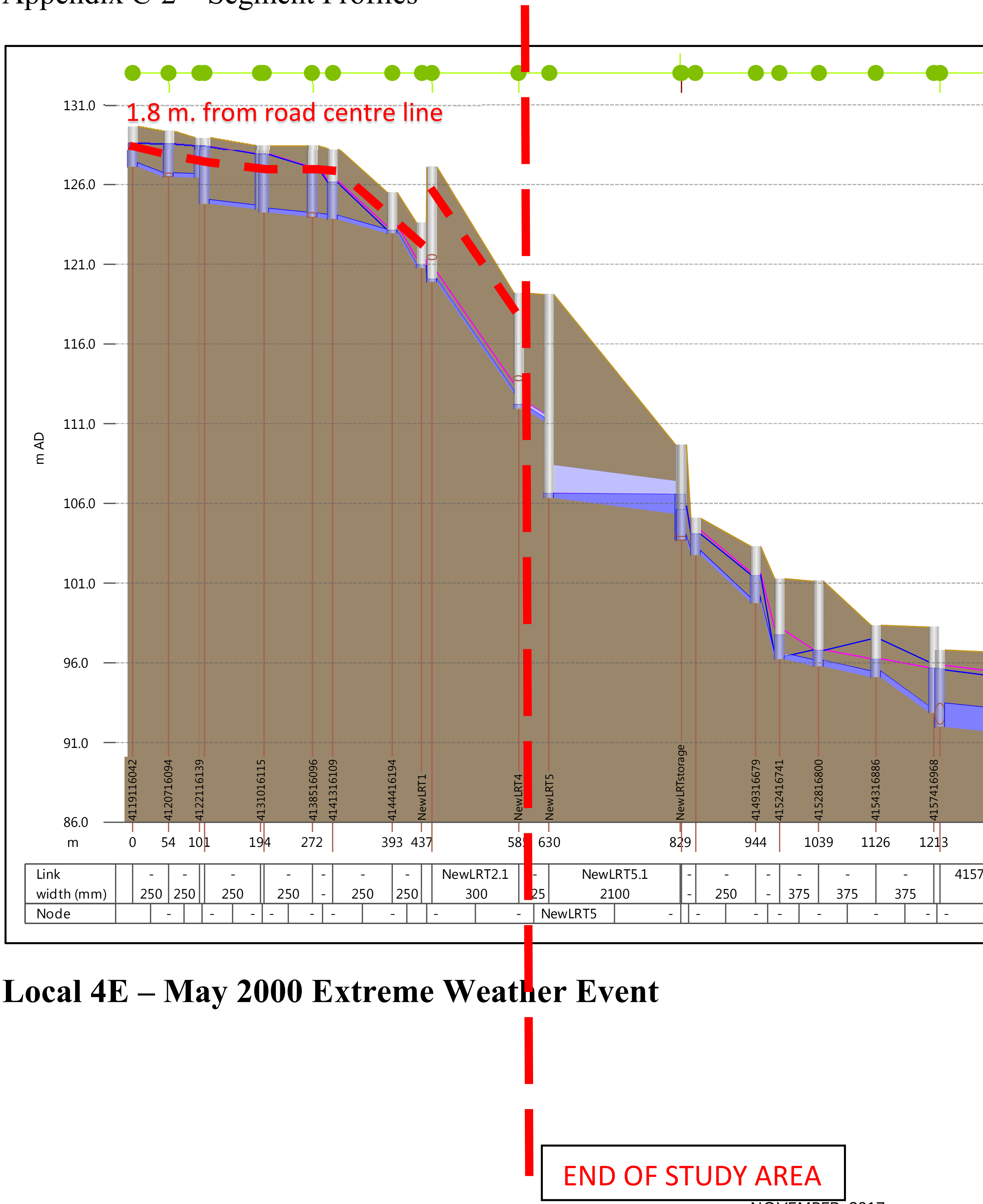
Local 4E – Dry-weather

END OF STUDY AREA

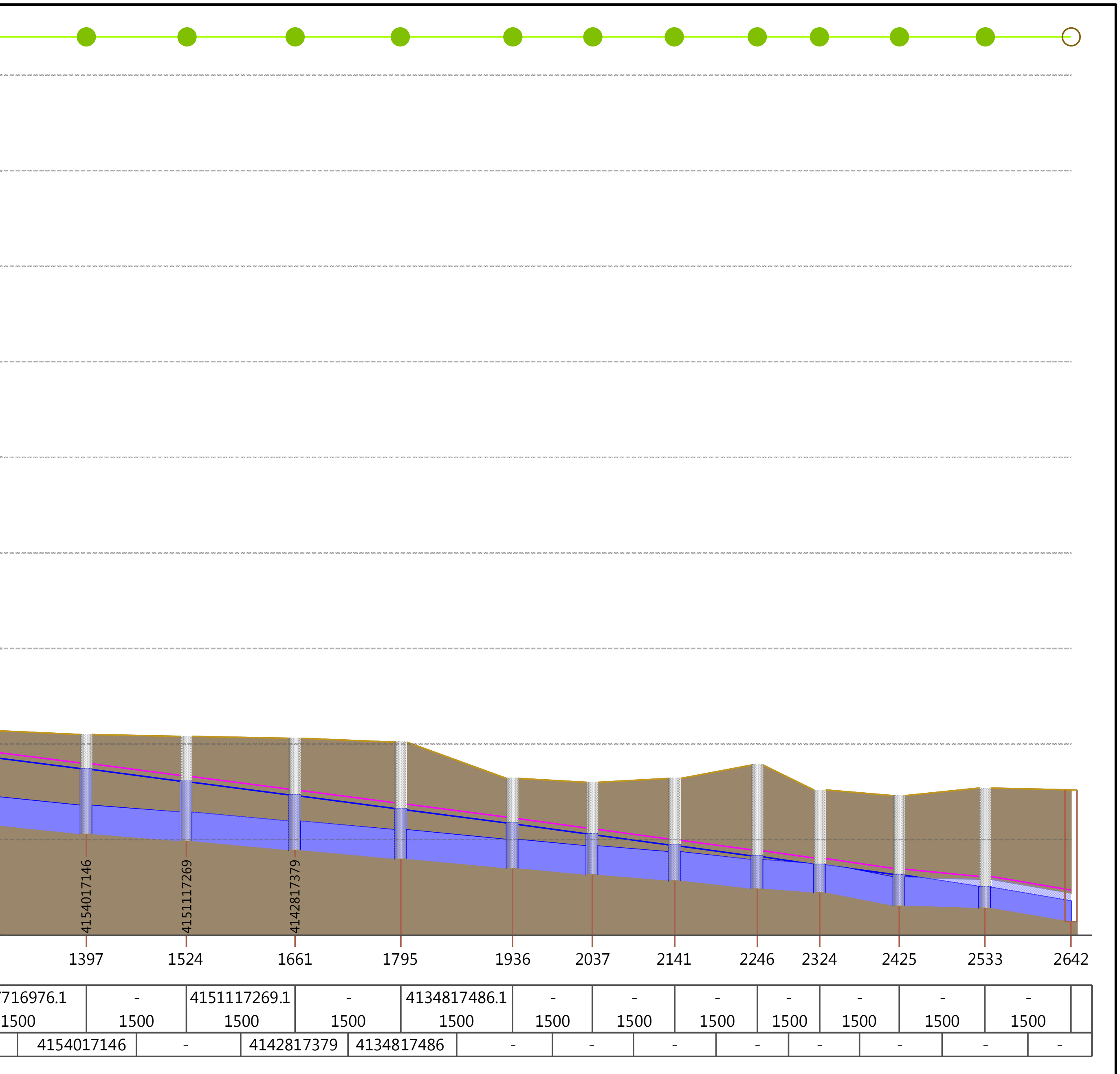


716976.1 1500	- 1500	41511117269.1 1500	- 1500	41348174861 1500	- 1500	- 1500	- 1500	- 1500	- 1500	- 1500	- 1500	

	4154017146	-	4142817379	4134817486	-	-	-	-	-	-	-	-



Local 4E – May 2000 Extreme Weather Event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1500
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1500
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4154017146
-
4142817379
4134817486
-
-
-
-
-
-
-
-

Table 1 – Local Sewers ‘1W’ D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q I [m
4113215853	4113215853	4109815736	121.7	300	0.00416	0.058	0.0
4109815736	4109815736	4100215764	99.9	600	0.004	0.361	0.0
4100215764	4100215764	4093615783	69	675	0.00391	0.488	0.0
4093615783	4093615783	4084215811	97.7	675	0.00409	0.5	0.0
4084215811	4084215811	4074115841	106.1	675	0.00396	0.491	0.0
4074115841	4074115841	4073415843	6.6	675	0.01212	0.86	0.0
4073415843	4073415843	4065215867	85.5	675	0.00339	0.455	0.0

* The lower value during the extreme weather event is likely the result of the combined sewer overflow (CSO) weir and i

Description and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model n3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
00107	1.84%	0.02551	43.98%	0.04937	85.12%	0.02957	50.98%
)4486	12.43%	0.62134	172.12%	0.73351	203.19%	0.65671	181.91%
)5508	11.29%	0.55117	112.94%	0.51781	106.11%	0.56535	115.85%
)5507	11.01%	0.52449	104.90%	0.51734	103.47%	0.53749	107.50%
)5515	11.23%	0.51896	105.69%	0.5263	107.19%	0.52086	106.08%
)5515	6.41%	0.53482	62.19%	0.58166	67.63%	0.5466	63.56%
)5514	12.12%	0.65294	143.50%	0.79836	175.46%	0.67802	149.02%

nlet control devices resulting in increased overland flows.

Table 2 – Trunk Sewer '1W' D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q I [n
4065215867	4065215867	4059515883	59.5	1200	0.0058	2.757	0.1
4059515883	4059515883	4046215921	138.2	1200	0.00645	2.909	0.1
4046215921	4046215921	4037615947	89.9	1200	0.00704	3.038	0.1
4037615947	4037615947	4028715974	93.4	1200	0.00702	3.034	0.1
4028715974	4028715974	4014316063	178.8	1200	0.00641	2.899	0.1
4014316063	4014316063	4007316119	89.4	1200	0.00302	1.99	0.1

* The lower value during the extreme weather event is likely the result of the combined sewer overflow (CSO) weir and i

Table 3 – Local Sewers '1E' D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q I [n
4056715894	4056715894	4065015869	86.4	300	0.01818	0.121	0.0
4074215842	4074215842	4065015869	95.7	375	0.00378	0.1	0.

escription and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model n3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
10299	3.74%	1.96777	71.37%	2.66718	96.74%	2.27273	82.43%
10928	3.76%	2.03152	69.84%	2.71133	93.20%	2.37075	81.50%
11003	3.62%	2.06492	67.97%	2.7527	90.61%	2.39787	78.93%
11383	3.75%	2.34054	77.14%	3.0707	101.21%	2.67755	88.25%
11535	3.98%	2.52559	87.12%	3.38097	116.63%	2.90684	100.27%
11737	5.90%	2.5996	130.63%	3.31812	166.74%	2.99771	150.64%

nlet control devices resulting in increased overland flows.

escription and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model n3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
00041	0.34%	0.01176	9.72%	0.01491	12.32%	0.01496	12.36%
0241	24.10%	0.10832	108.32%	0.14333	143.33%	0.1462	146.20%

Table 4 – Local Sewers ‘2E’ D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q M [m
4056015895	4056015895	4.05E+09	92	300	0.00487	0.063	0.0
4047115920	4047115920	4.05E+09	9.1	300	0.00736	0.077	0.0

* The lower value during the extreme weather event is unclear, but may suggest that the extreme wet weather event was l

Table 5 – Local Sewers ‘3E’ D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q M [m
4036815953	4036815953	4028215978	89	300	0.00356	0.054	0.0
4028215978	4028215978	4020516000	80.1	450	0.00385	0.164	0.0
4020516000	4020516000	4013316019	75	450	0.02937	0.454	0.0

* The lower value during the extreme weather event is unclear, but may suggest that the extreme wet weather event was l

escription and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model n3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
00122	1.94%	0.00122	1.94%	0.00122	1.94%	0.00122	1.94%
00082	1.06%	0.03642	47.30%	0.07201	93.52%	0.04446	57.74%

ocally smaller than the 100-year storm.

escription and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model n3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
00022	0.41%	0.00684	12.67%	0.01169	21.65%	0.00765	14.17%
00095	0.58%	0.00973	5.93%	0.01501	9.15%	0.01084	6.61%
00119	0.26%	0.01004	2.21%	0.01542	3.40%	0.01108	2.44%

ocally smaller than the 100-year storm.

Table 6 – Local Sewers '4E' D

Pipe Segment	From Node	To Node	Length [m]	Dia. [mm]	Slope [m/m]	Q CAP [m3/s]	Q N [n
4119116042	4119116042	4120716094	54.4	250	0.01151	0.059	0.
4120716094	4120716094	4122116139	46.8	250	0.00115	0.019	0.0
4122116139	4122116139	4122816139	7.8	250	0.20218	0.248	0.0
4122816139	4122816139	4131016115	84.6	250	0.00401	0.035	0.0
4131016115	4131016115	4131516117	5.4	250	0.04259	0.114	0.0
4131516117	4131516117	4138516096	73.4	250	0.00332	0.032	0.0
4138516096	4138516096	4141316109	30.5	250	0.00289	0.03	0.0
4141316109	4141316109	4144416194	90.3	250	0.00987	0.055	0.0
4144416194	4144416194	NewLRT1	44.2	250	0.04724	0.12	0.0
NewLRT1	NewLRT1	NewLRT2	16	300	0.053	0.207	0.0

escription and Modeling Results

Dry Weather		2-Year Storm Wet Weather		100-Year Storm Wet Weather		May 2000 Extreme Event	
Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]	% Cap.	Q Model [m3/s]*	% Cap.
0001	0.17%	0.01983	33.61%	0.03829	64.90%	0.02849	48.29%
00085	4.47%	0.02806	147.68%	0.05522	290.63%	0.0341	179.47%
00097	0.39%	0.04286	17.28%	0.06122	24.69%	0.05583	22.51%
00097	2.77%	0.03083	88.09%	0.05261	150.31%	0.04194	119.83%
00097	0.85%	0.02938	25.77%	0.05304	46.53%	0.04176	36.63%
00107	3.34%	0.03763	117.59%	0.06875	214.84%	0.05585	174.53%
00533	17.77%	0.08705	290.17%	0.10489	349.63%	0.09754	325.13%
00605	11.00%	0.0889	161.64%	0.10821	196.75%	0.09945	180.82%
00605	5.04%	0.0889	74.08%	0.1082	90.17%	0.09945	82.88%
00605	2.92%	0.0889	42.95%	0.1082	52.27%	0.09945	48.04%

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TECHNICAL MEMORANDUM

DATE	February 23, 2017
TO	**Kevin Brown**
CC	
SUBJECT	Eglinton and Laird – Model Review
FROM	Cassandra Leal
PROJECT NUMBER	17103

1 Introduction

The Municipal Infrastructure Group has been retained by SCS Consultants to provide modelling support for the proposed development in the Eglinton and Laird area.

The City of Toronto provided SCS/TMIG a trimmed InfoWorks ICM model to be used for this project. TMIG will use and note of any changes to the model made during this project.

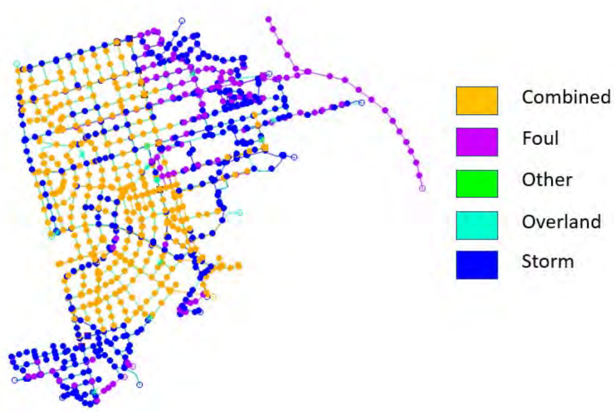
This work involves running the provided model to determine existing conditions, modifying the model based on proposed development details and evaluate the existing system with development for any future capacity constraints, under design conditions and extreme wet-weather conditions.

2 Sanitary Collection System

2.1 Methodology

TMIG received the model on January 9, 2017. When TMIG reviewed the model, it was noted:

- The network includes “foul”, “combined”, “storm” and “overland” nodes and pipes (shown below)



- The entire network has 1,927 subcatchments and a total population of 210098
- Some storm subcatchments have population (828 people in the entire network)
- Several storm subcatchments are “layered” (same area, different land use ID’s, different rainfall profiles)

- Manholes appear to be shared between the overland and combined system
- There are 11 different wastewater profiles within this network. A copy of the wastewater details is included in Attachment A.
- Within the study area, wastewater profiles 1, 5, 8 and 10 are used in the foul subcatchments.

As part of this project, TMIG will need to update necessary sanitary (“foul”) subcatchments, but it is unclear if the added development will impact the storm subcatchments in the same area. The City should provide the modelling methodology memo from the previous modelling exercise. Without this memo, a discussion with the City of Toronto will be required.

2.2 Discussion Questions

- Why is there population in storm subcatchments? Does this get affected by a change in the population in the sanitary (“foul”) subcatchments in the same area?
- Subcatchments have a base flow and an additional flow. Some new subcatchments may be created if the development area doesn’t line up with the existing subcatchments.
  - How was the “base flow” calculated?
  - How was the “additional flow” calculated? It was noted that “additional foul flow” was only found on subcatchments with no population.
  - Are either of these inflow/infiltration? If not, how is that being accounted for?
- Is it appropriate to continue using the same wastewater profile in the subcatchments, even if the population changes?
- It is assumed that the network to be used is the “AREA 2 – BASELINE Final_Existing Conditions (Metrolinx)”. Is this correct?
- What storm is to be used? Chicago 100Y 6hr Revised, Oriole-2000-5-12 Revised or 2-yr,24-hr Chicago (DT -10min)?
- It appears that the combined and overland systems share manholes.

2.3 Next Steps

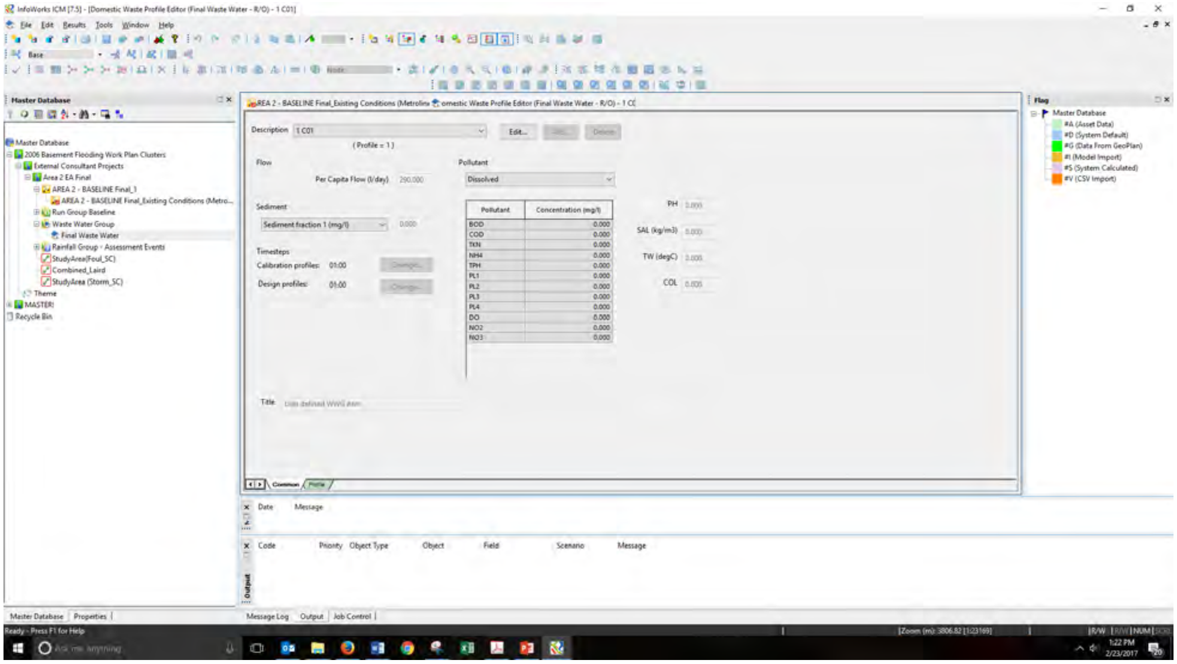
A meeting with the City to discuss the sanitary model methodology and to obtain a better understanding of the model.

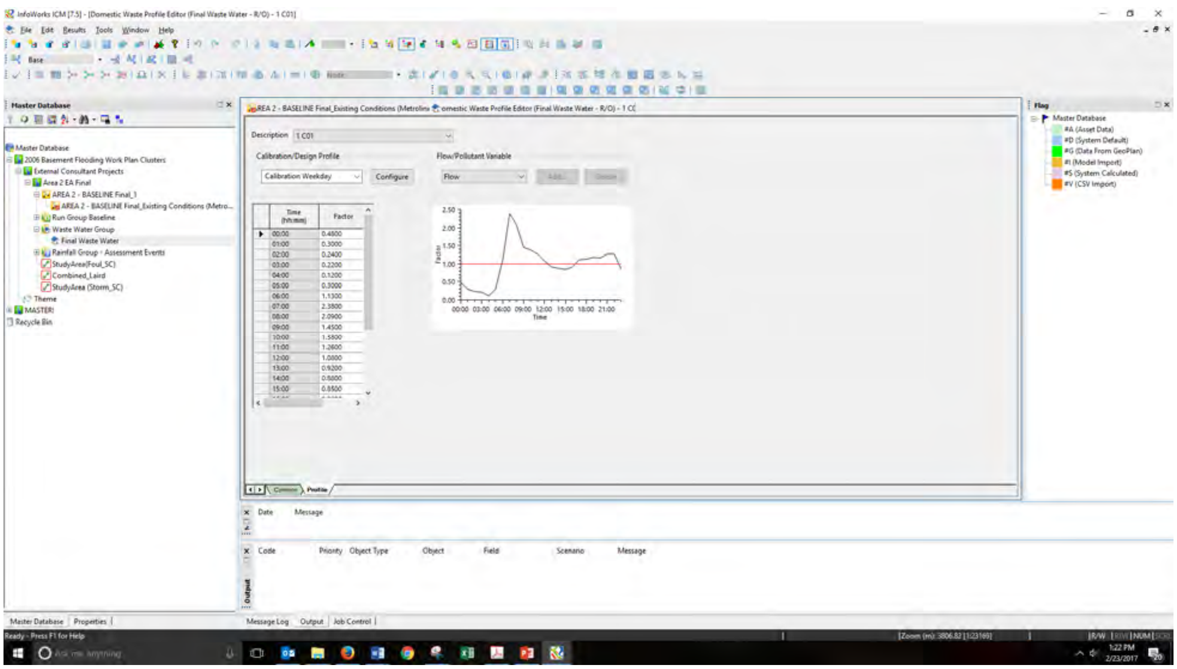
Following, the model will first be run to document existing conditions. The next step will be to modify the model by updating and changing populations in the Eglinton and Laird Study area to reflect the proposed development.

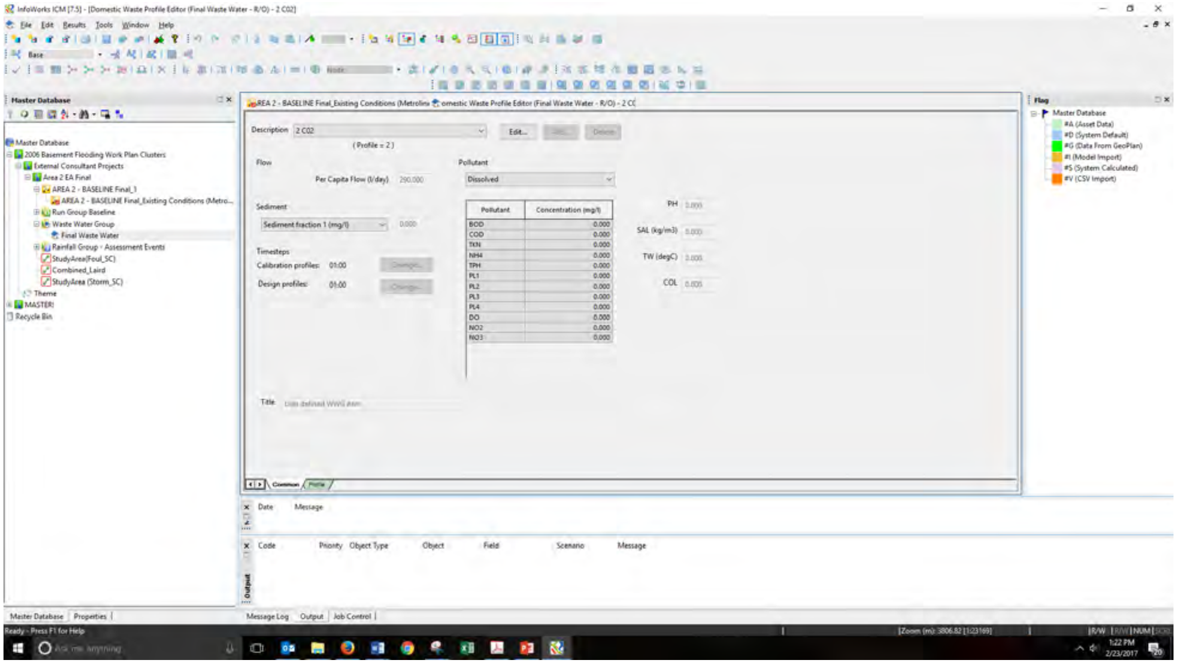
2.4 Proposed Methodology

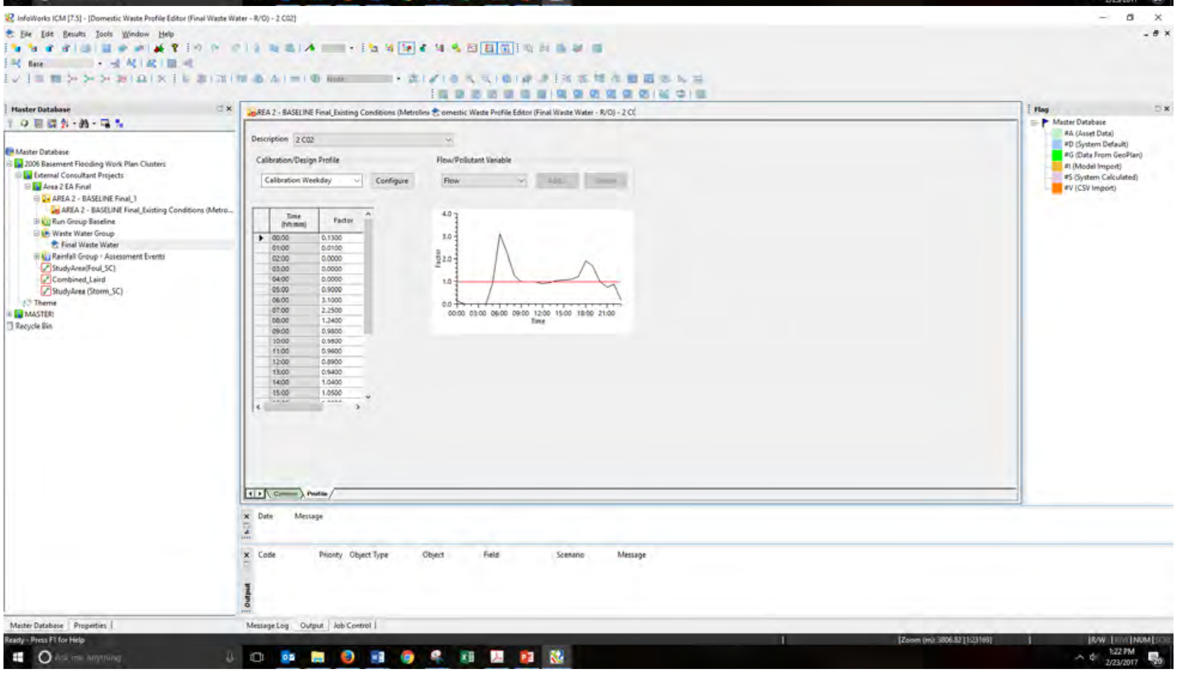
- Post-development population flows will be modelled on the basis of 240 Lpcd
- Post-development employment flows will be modelled on the basis of 250 Lpcd
- Sewer improvements will be sized based on 450 Lpcd applied to residential growth and 250 Lpcd for employment
- HGL profiles will be provided for pre and post development conditions. Due to the anticipated DWF increases from the study area, the HGL elevation should rise. This can be offset by removing the storm inflows from the lands being considered for redevelopment, to be replaced by only the base infiltration allowance of 0.26 L/ha/s.

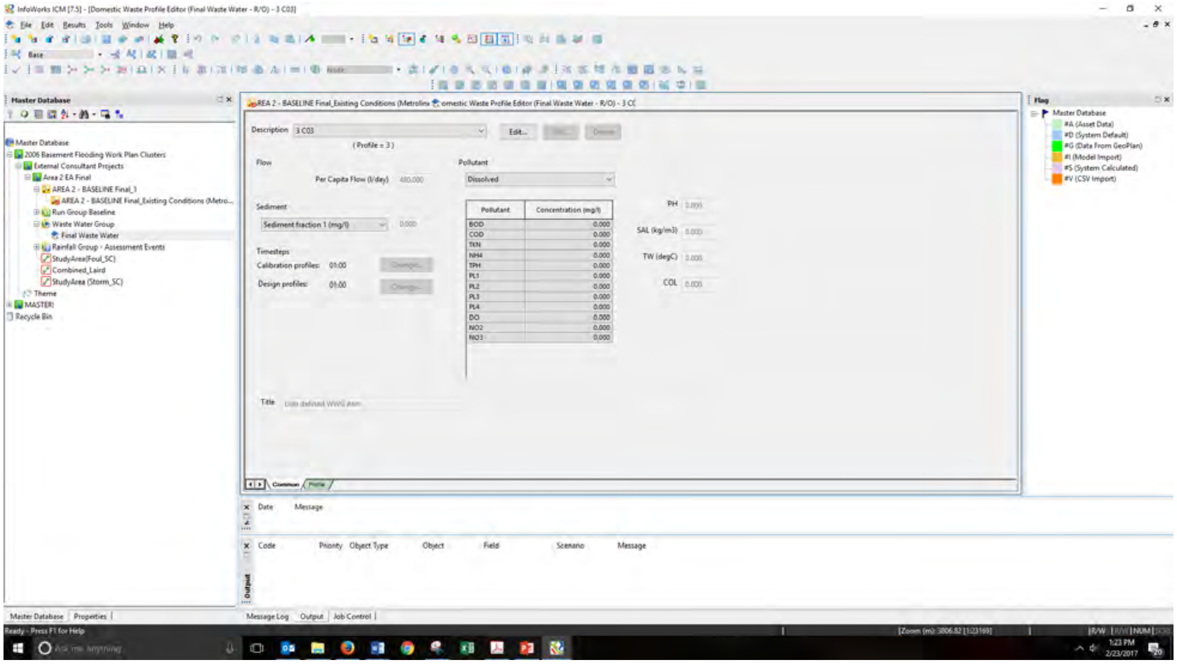
Wastewater Profiles

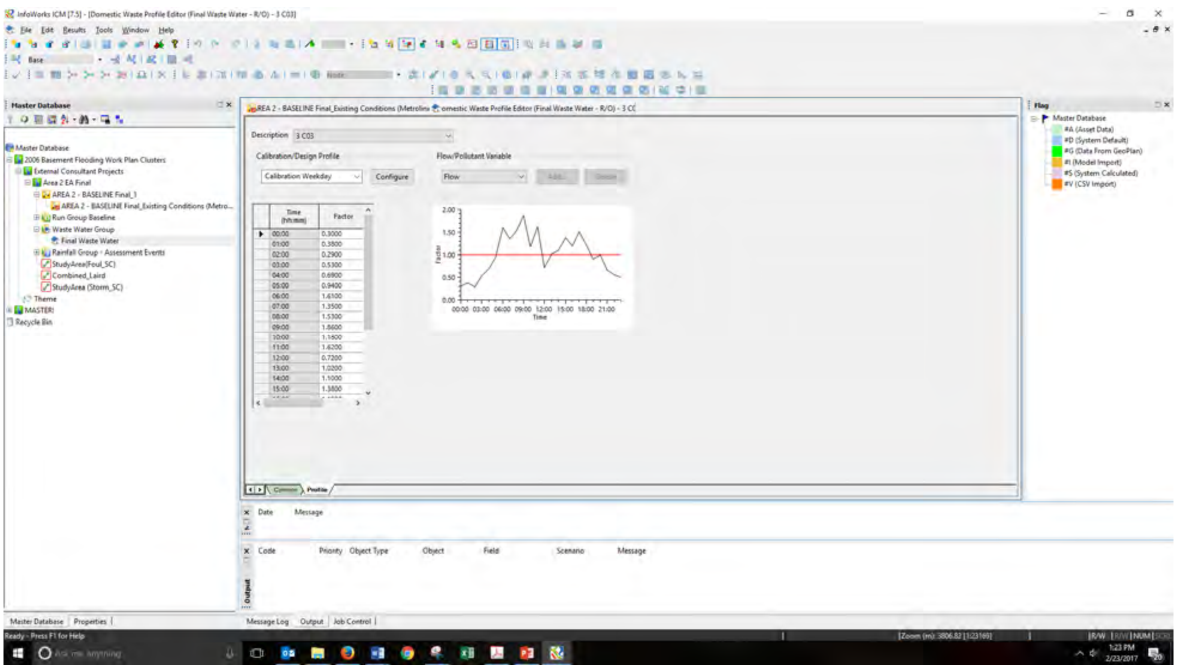

InfoWorks ICM [7.5] - [Domestic Waste Profile Editor (Final Waste Water - R/O) - 1 C01]
Master Database
Description
Flow
Per Capita Flow (l/day)
Pollutant
Dissolved
Sediment
Timesteps
Calibration profiles:
Design profiles:
Pollutant
Concentration (mg/l)
BOD
COD
TKN
NH4
TPH
PL1
PL2
PL3
PL4
DO
NO2
NO3
PH
SAL (kg/m3)
TW (degC)
COL
Title
Flag
Date
Message
Code
Priority
Object Type
Object
Field
Scenario
Message Log
Output
Job Control

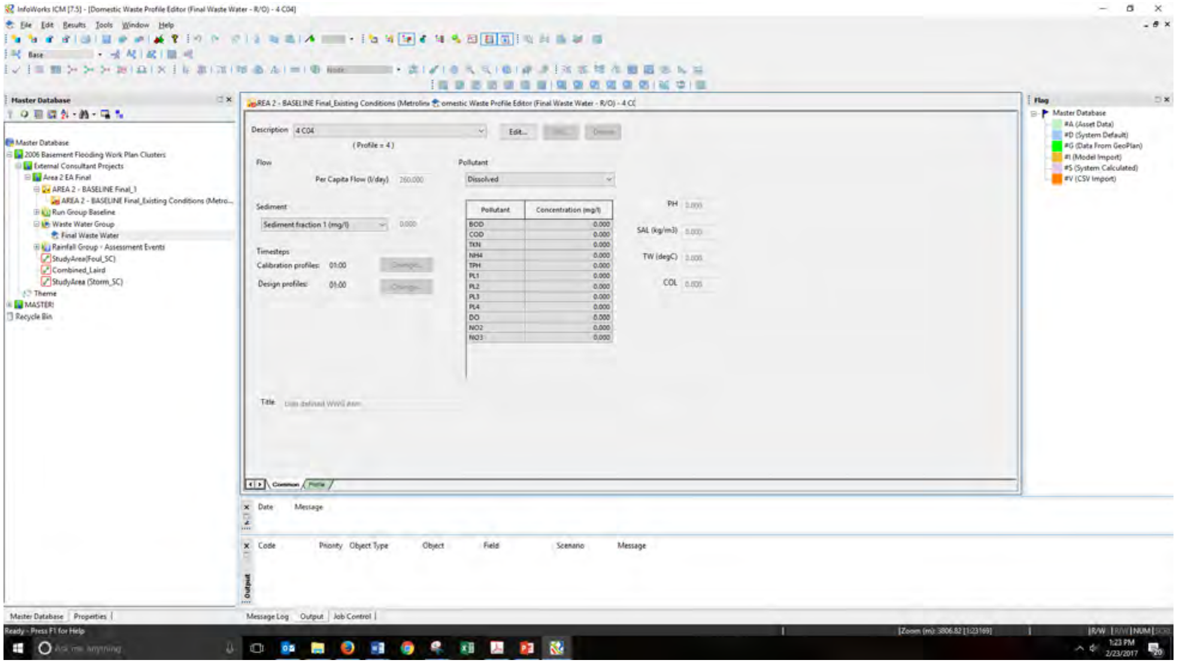

InfoWorks ICM [7.5] - [Domestic Waste Profile Editor (Final Waste Water - R/O) - 1 C01]
Master Database
Description
Calibration/Design Profile
Calibration Weekday
Configure
Flow/Pollutant Variable
Flow
Time
Factor
Date
Message
Code
Priority
Object Type
Object
Field
Scenario
Message Log
Output
Job Control

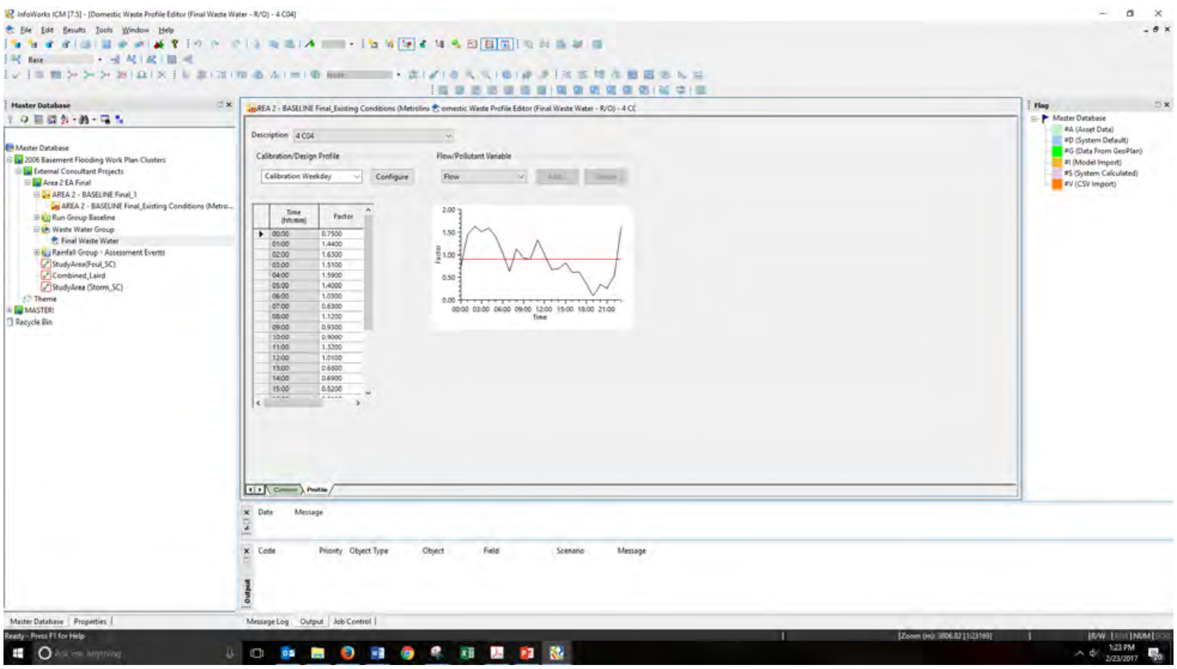


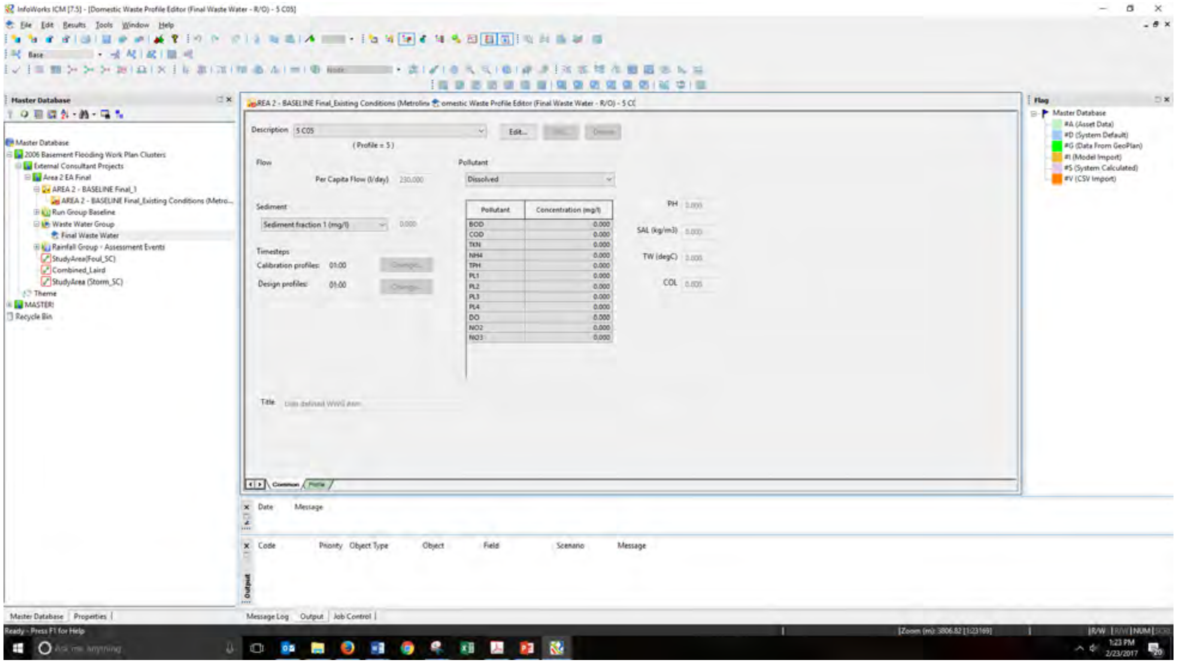


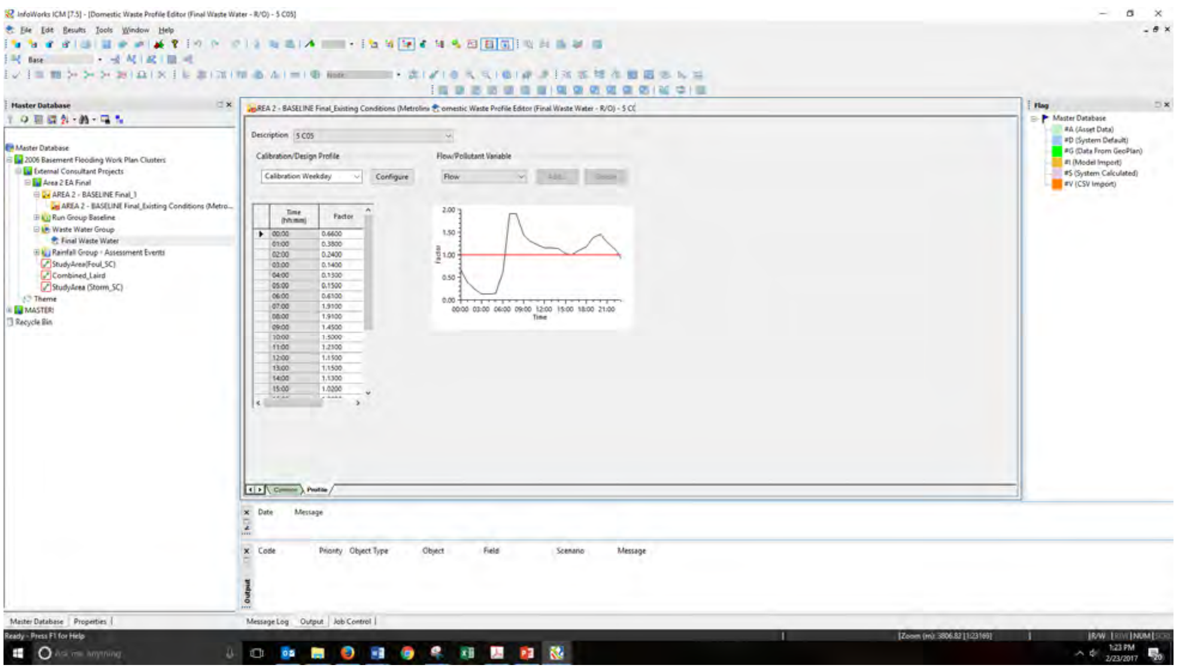


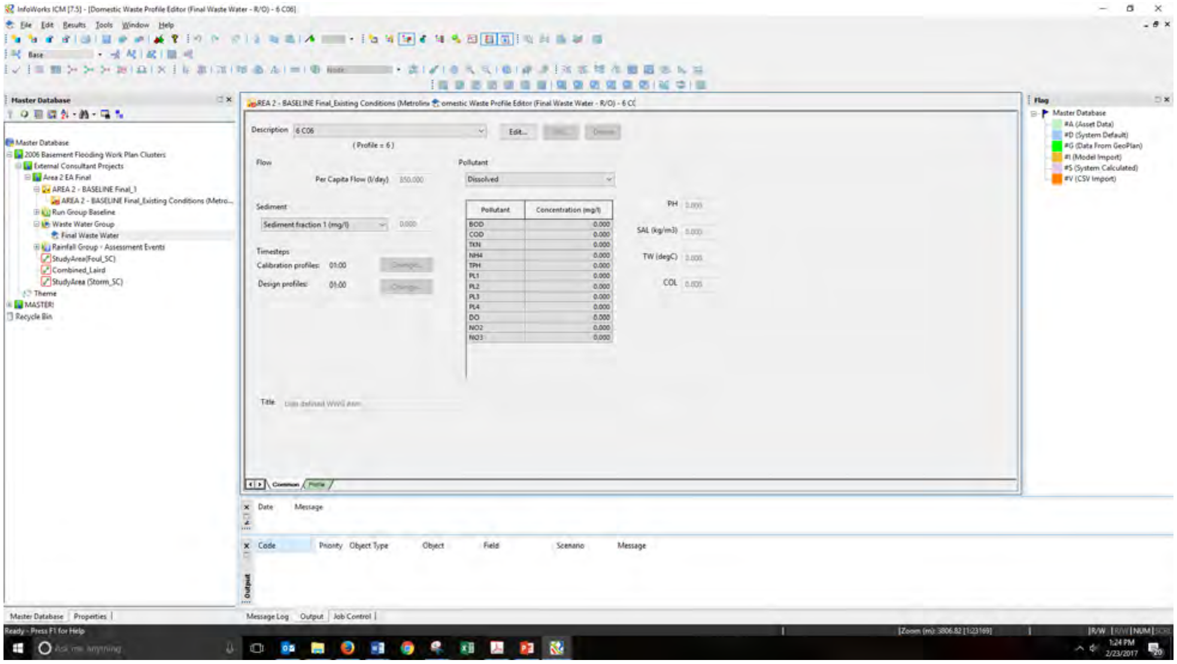


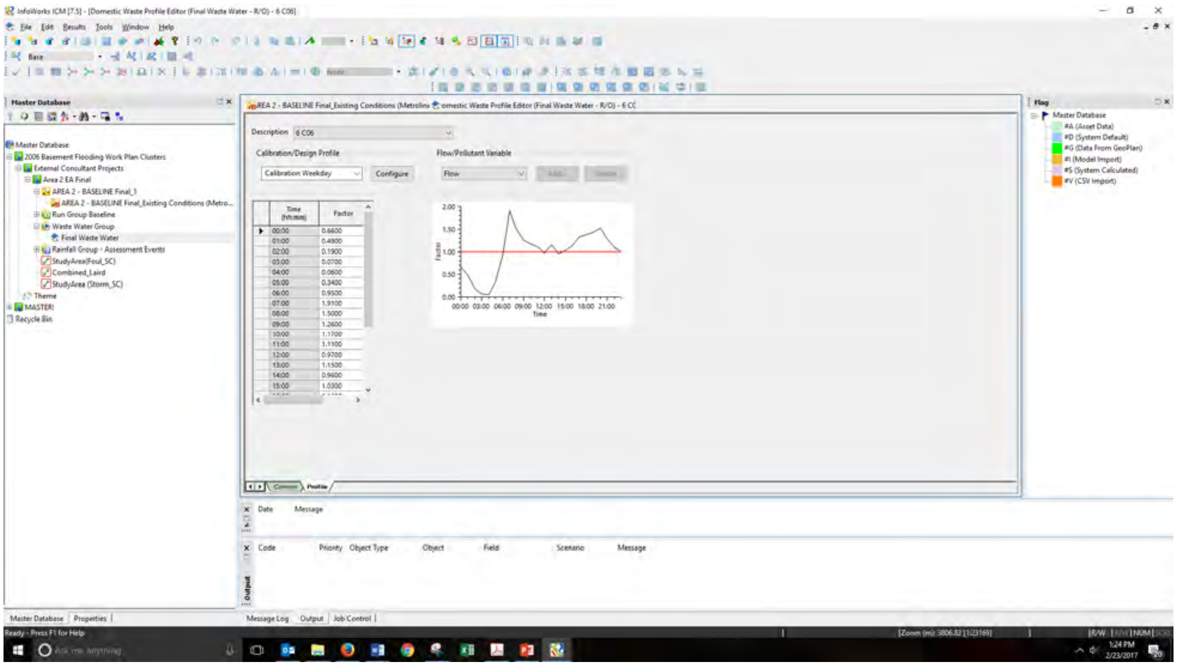

InfoWorks ICM [7.5] - [Domestic Waste Profile Editor (Final Waste Water - R/O) - 4 C04]
Master Database
Description
Flow
Pollutant
Per Capita Flow (l/day)
Dissolved
Sediment
Timesteps
Calibration profiles:
Design profiles:
Pollutant
Concentration (mg/l)
BOD
COD
TKN
NH4
TPH
PL1
PL2
PL3
PL4
DO
NO2
NO3
PH
SAL (kg/m3)
TW (degC)
COL
Title
Common
Profile
Date
Message
Code
Priority
Object Type
Object
Field
Scenario
Message Log
Output
Job Control

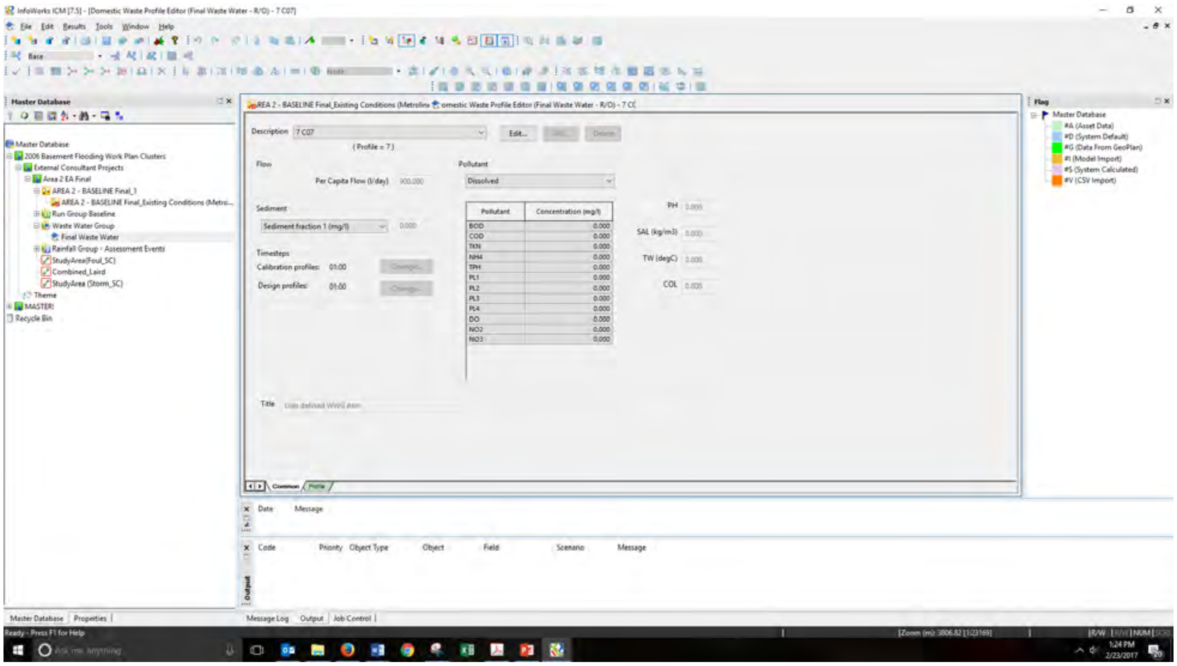

InfoWorks ICM [7.5] - [Domestic Waste Profile Editor (Final Waste Water - R/O) - 4 C04]
Master Database
Description
Calibration/Design Profile
Flow/Pollutant Variable
Calibration Weekday
Configure
Flow
Time (hh:mm)
Factor
Factor
Time
Common
Profile
Date
Message
Code
Priority
Object Type
Object
Field
Scenario
Message Log
Output
Job Control

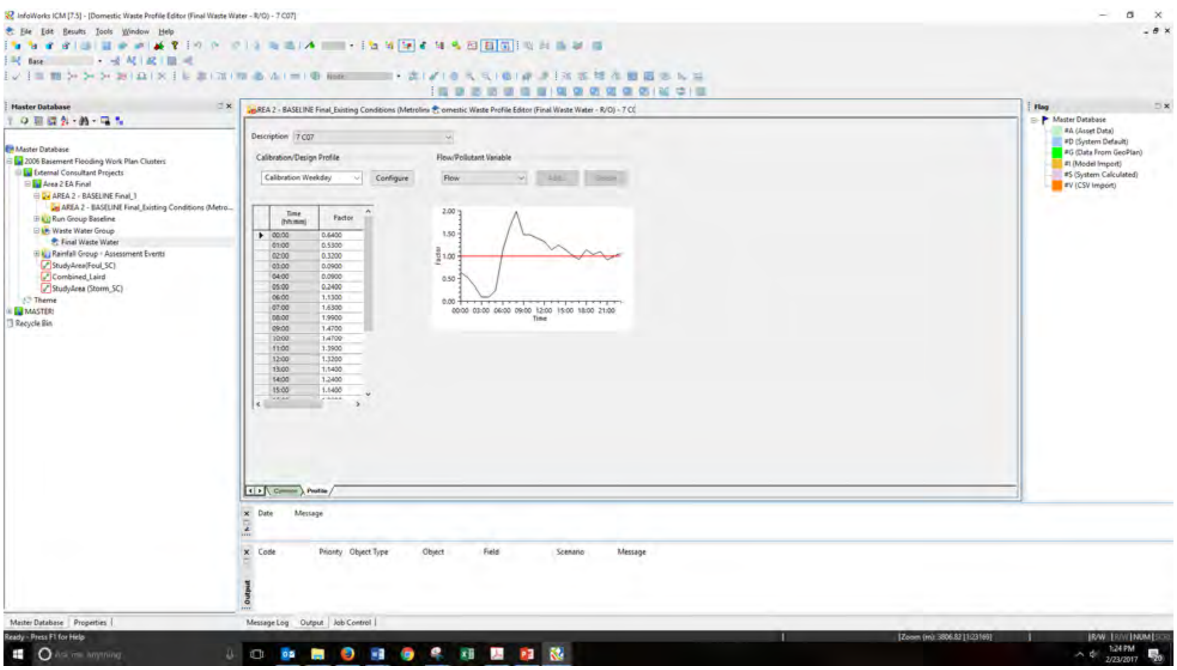


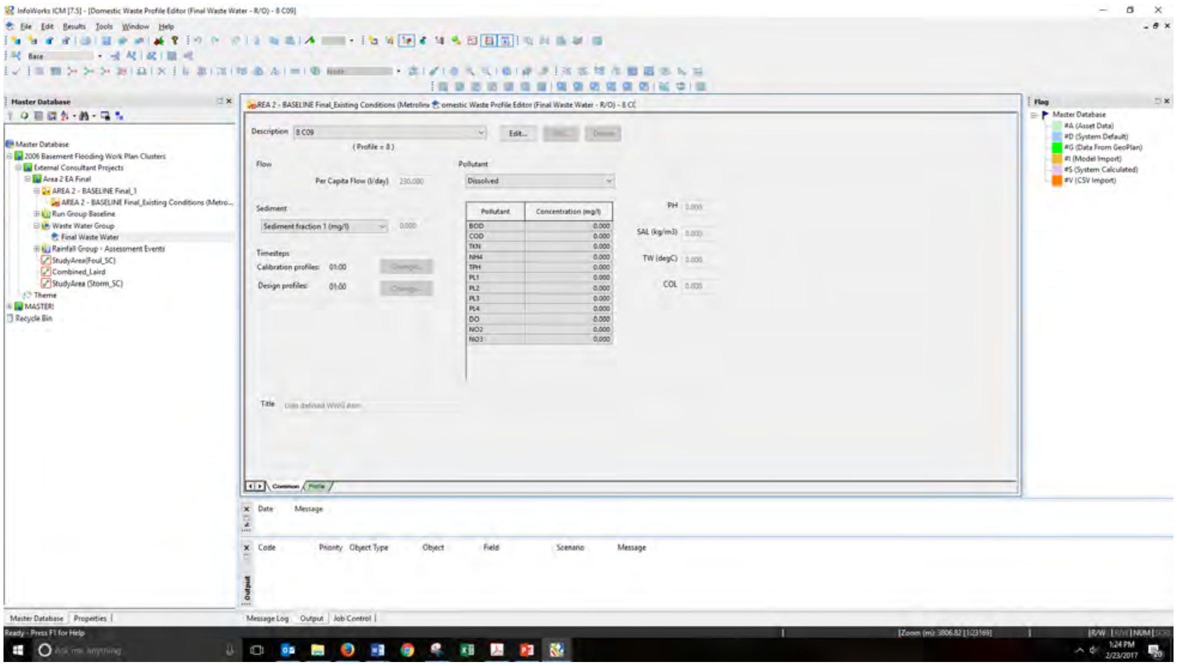


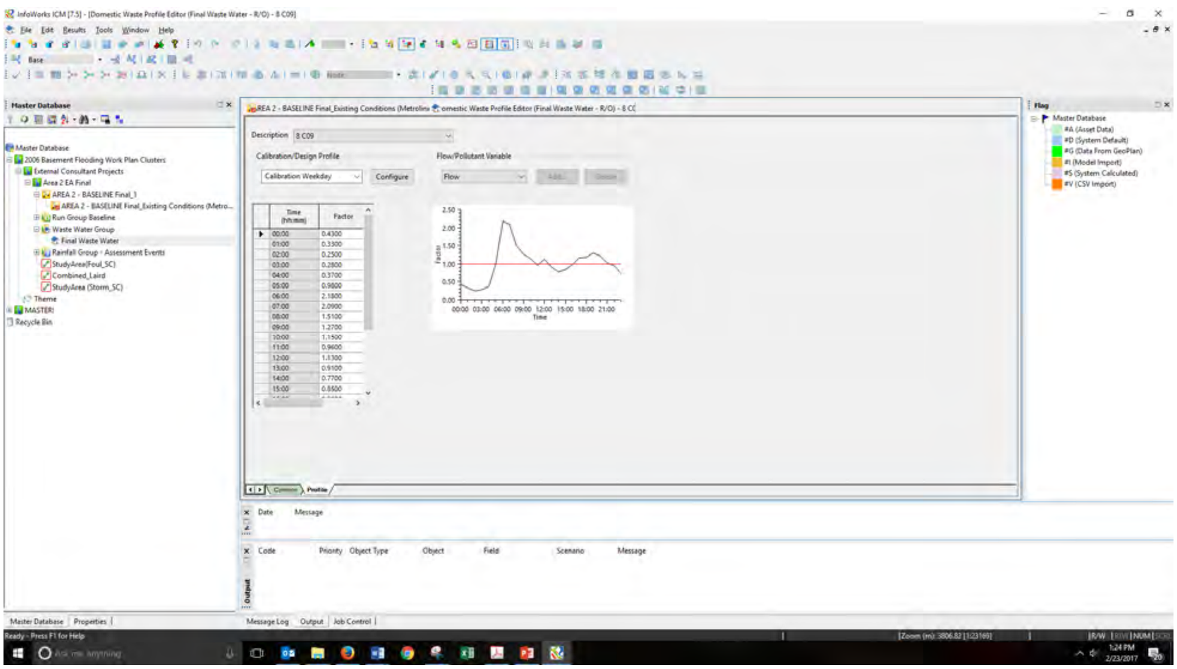


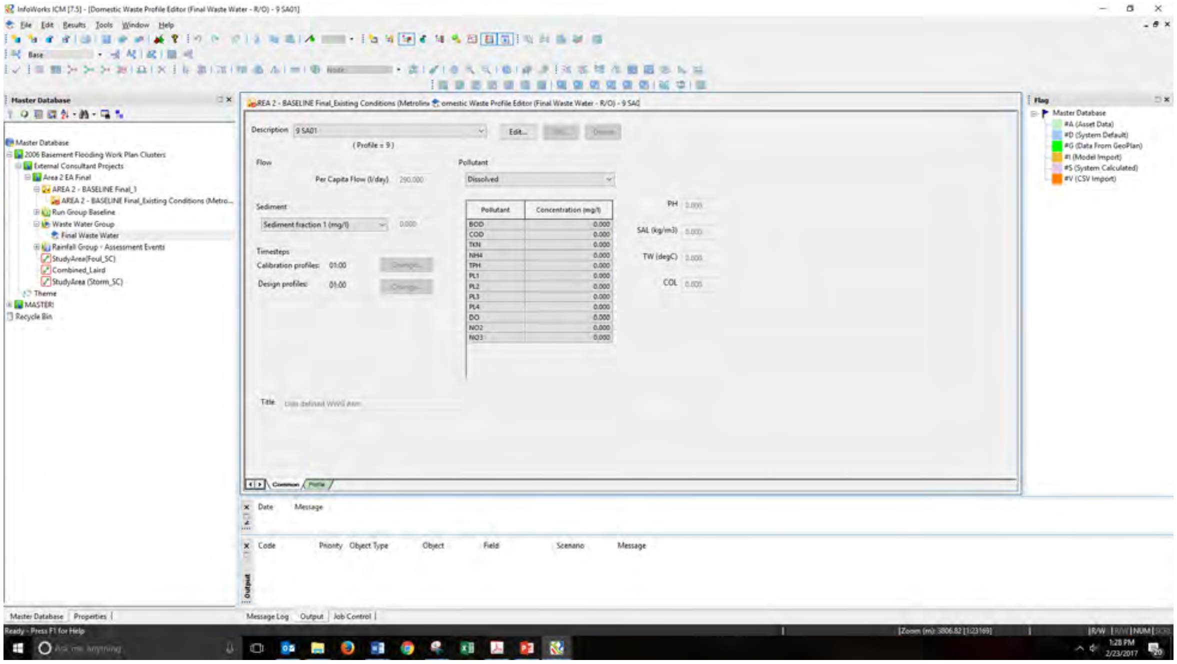


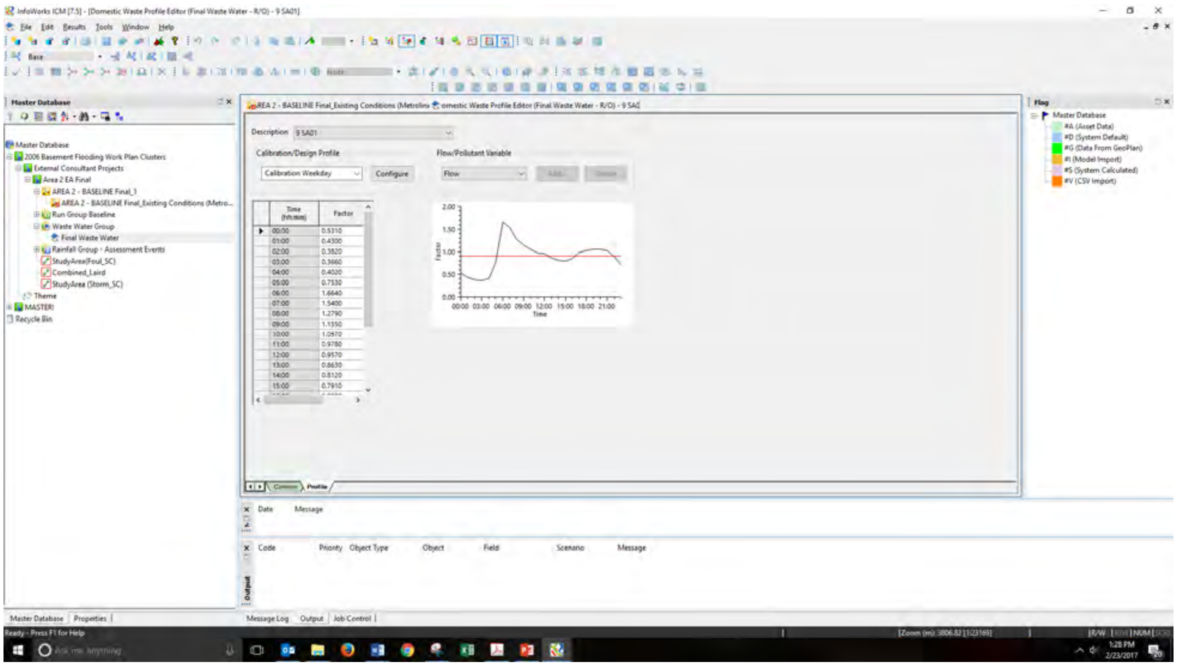


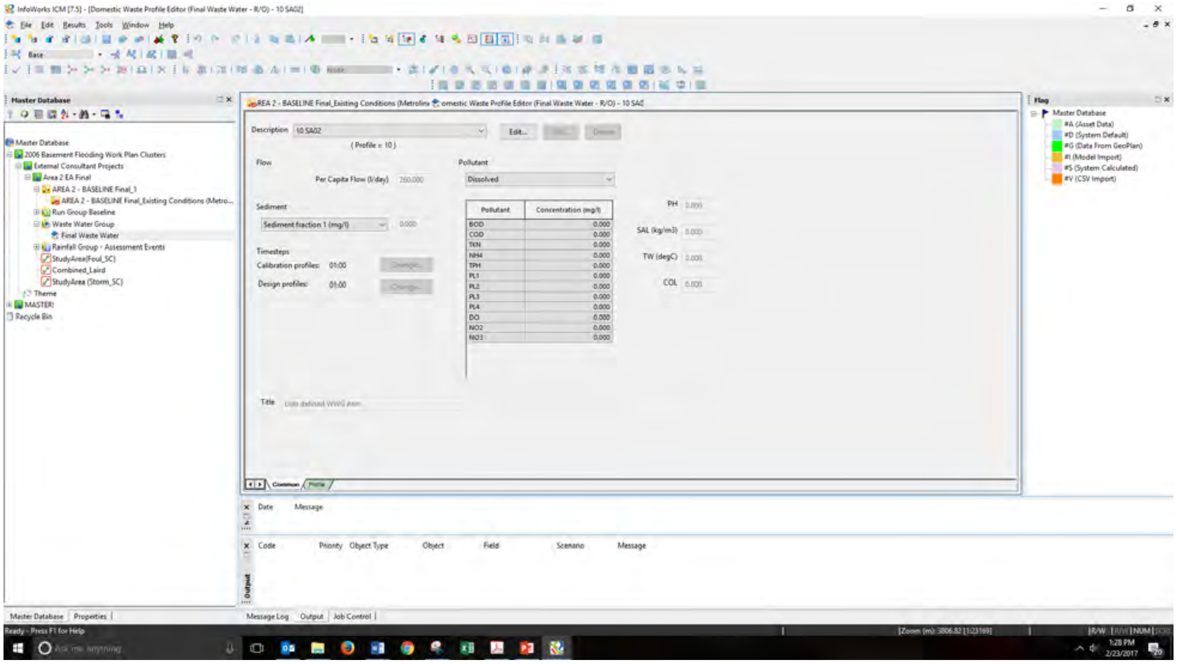


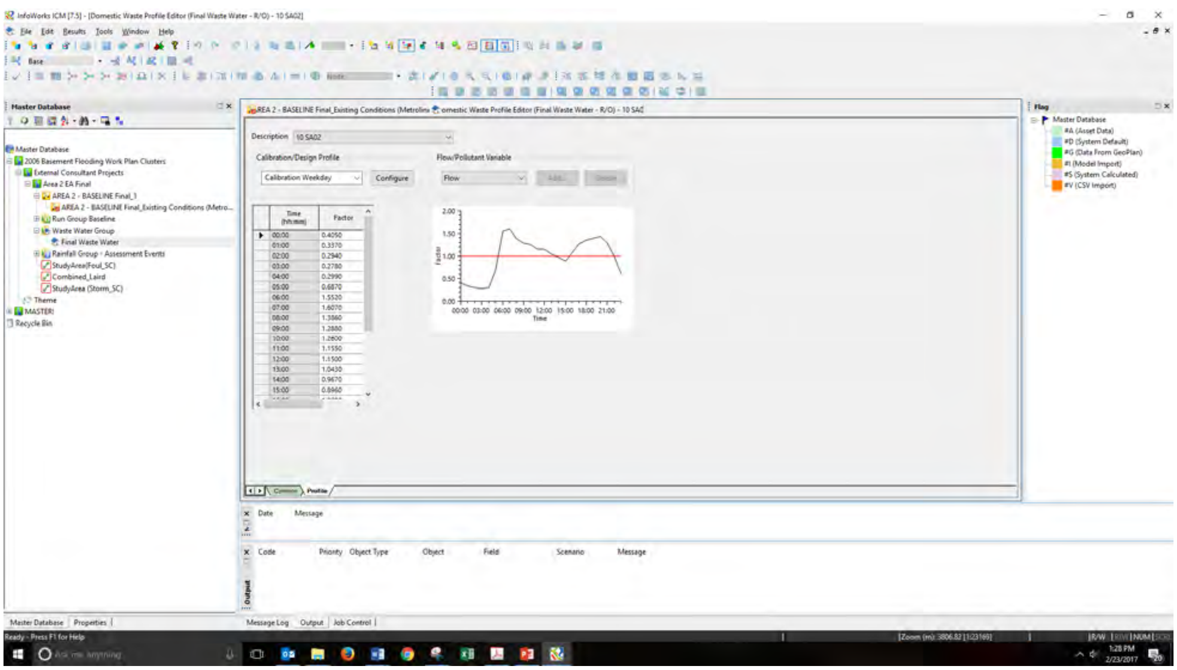


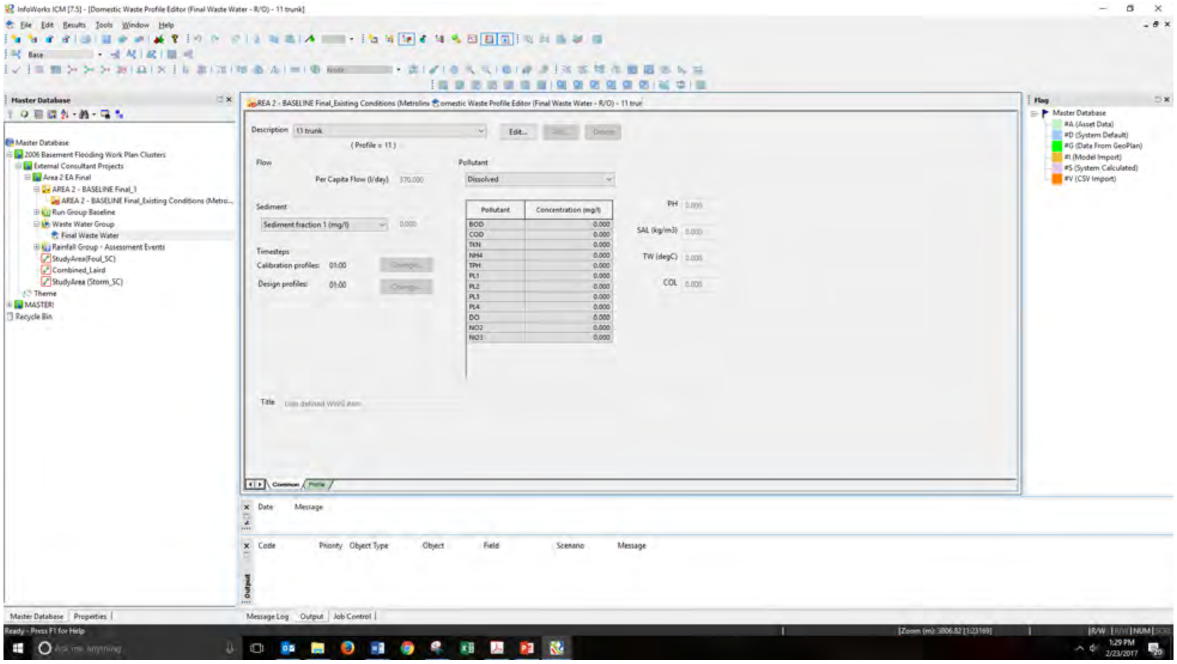


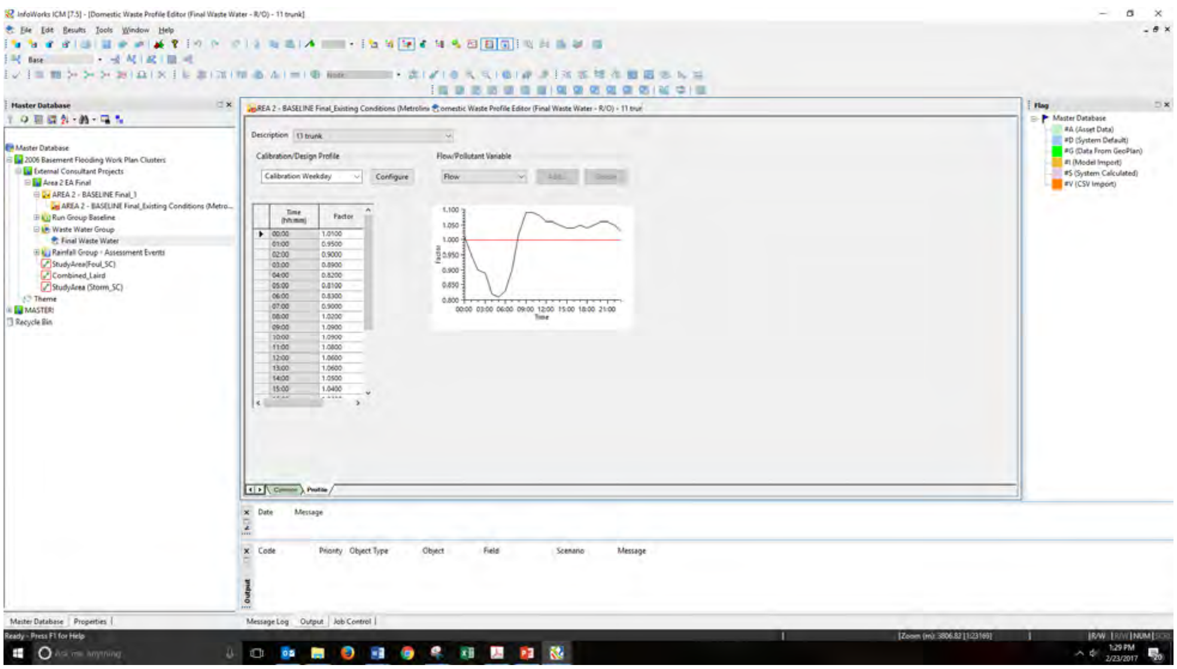












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TECHNICAL MEMORANDUM

DATE	April 5, 2017
TO	**Pascal Monat, SCS Consulting Limited**
CC	
SUBJECT	**Eglinton/Laird Ave Intensification Existing Wastewater Servicing Conditions**
FROM	Kevin Brown
PROJECT NUMBER	17103

1 Introduction

The Municipal Infrastructure Group Ltd. (TMIG) has been retained by SCS Consulting Limited (SCS) to conduct a servicing analysis to understand the existing water system in the study area and the capacity for the potential re-development of the Eglington/Laird Development Area.

Information provided by the City has been reviewed and our modelling methodology for the wastewater system analysis is detailed in this memorandum.

2 Existing Servicing Conditions

The City provided a copy of their InfoWorks model for “Basement Flooding Study Area 2”, which fully contains the Study Area.

The properties being reviewed as part of this planning study are tributary to one of two main sewer reaches:

1. Properties along Eglinton are generally connected to the Eglinton sanitary sewer, which flows east towards the Don Valley Trunk Sewer, outletting in the vicinity of Don Mills Road and Overlea Boulevard.
2. Properties along Laird Drive are connected to the Laird Drive combined sewer, which flows south along Laird Drive and Millwood Road to the Don Valley Trunk Sewer, outletting in the vicinity of Broadview Avenue and O’Connor Drive.

There is one Combined Sewer Overflow (CSO) location along the downstream reach of sewers along Laird Drive, at Wicksteed Avenue. At this location, surcharging within the combined sewer is relieved by overflowing to a 975 mm storm sewer running eastward along Wicksteed to the Don River (just south of Eglinton Avenue).

The following scenarios were provided in the model:

a) Area 2 - Baseline 100 Year (EC + Super Pipe MetroLinx)
b) Area 2 - Baseline 2-year storm (EC + Super Pipe MetroLinx)
c) Area 2 - Baseline DWF (EC + Super Pipe MetroLinx)
d) Area 2 - Baseline May 12,2000 (EC + Super Pipe MetroLinx)

Each of these includes a different rainfall profile, ranging from a one-year return period to the May 2000 actual rainfall event (which was slightly in excess of a 100-year storm).

The references to the “Super Pipe” appear to be related to a large-diameter (1200 mm) inline storage pipe along the Eglinton sanitary sewer. A review of the modelling results show this pipe serving as a flood control device, be controlling the flows out of the oversized sewer via a 250 mm orifice, effectively holding back the peak flows, and decreasing the peaking effects downstream.

The Hydraulic Grade Line (HGL) profiles from the existing conditions model runs are provided for both main reaches and for all four of the modelling scenarios provided.

3 Analysis Methodology

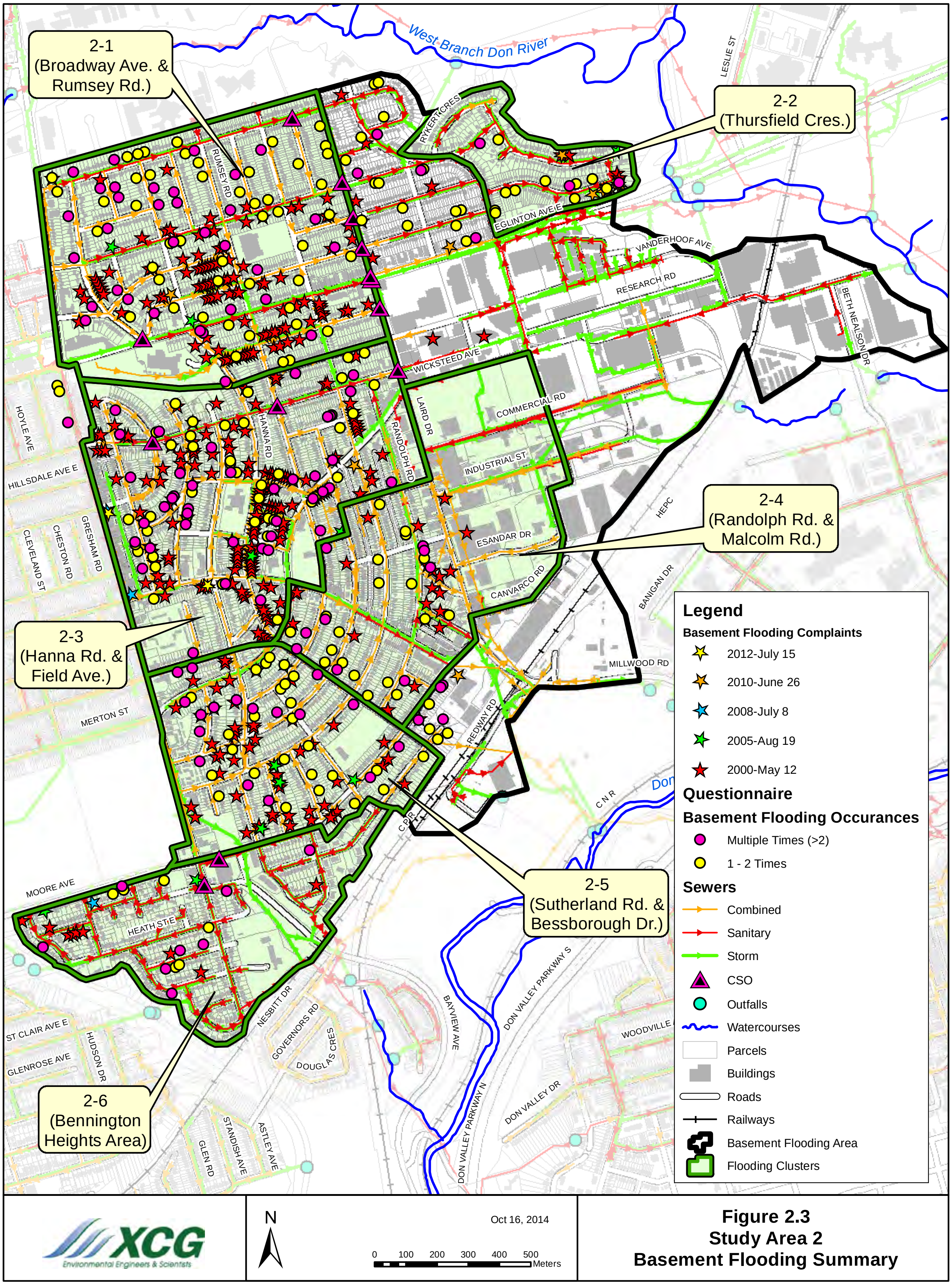
In assessing the post-development conditions in the wastewater collection system, the population and employment demands will be increased in accordance with the potential future population and employment totals based on the outcome of the land-use planning activities.

As we are expecting an increase in the dry-weather flows as a result of the potential intensification, the analysis of post-development conditions will result in increased overall flows versus existing conditions. The results of the post-development collection system modelling will be reviewed for three primary “upgrade triggers”:

1. Post-development flows exceeding the capacities of the downstream sewers, for both the 1-year and 2-year rainfall events
2. Post development HGL elevations within 1.8m of the surface for the 100-year and May 2000 storm events, indicating a risk of basement flooding under extreme wet-weather flow conditions;
3. An increase in CSO frequencies or volumes at the Laird and Wicksteed overflow structure. MOE Procedure F-5-5 prevents approval of an conditions resulting in increased CSO volumes.

If the modelling results indicate that either of the above triggers are realised, then opportunities to address the adverse condition will be evaluated. These will consist of:

a) Reducing the volume of wet-weather flows entering the combined sewers, potentially through lot-level controls within the lands being considered for redevelopment; or,
b) Improvements to the downstream sewers in order to increase their hydraulic capacity if there are individual hydraulic bottlenecks.

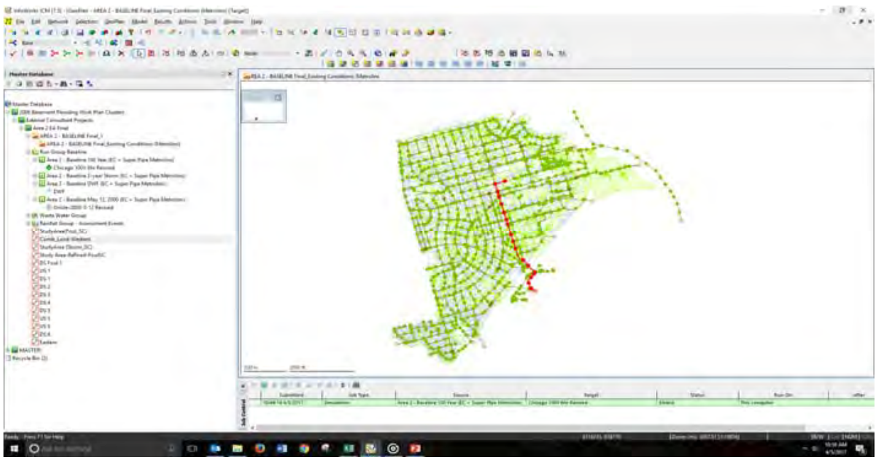


Oct 16, 2014

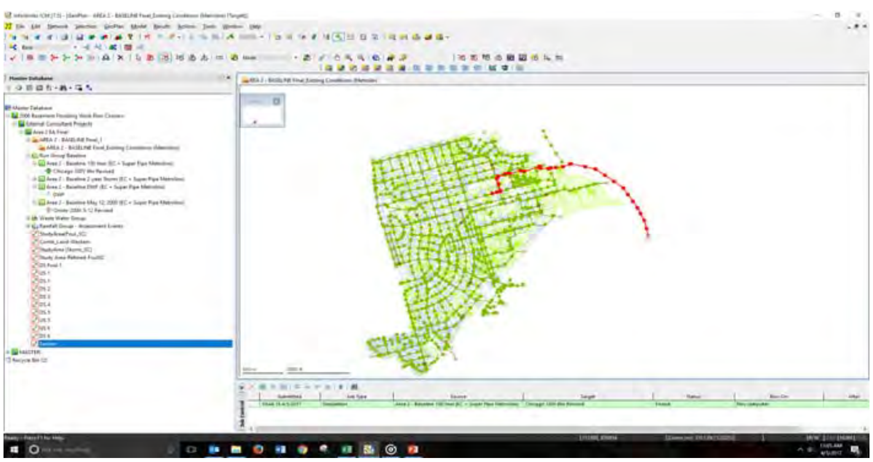
Figure 2.3
Study Area 2
Basement Flooding Summary

Run 1 Area 2 - Baseline 100 Year (EC + Super Pipe MetroLinx)
Run 2 Area 2 - Baseline 2-year storm (EC + Super Pipe MetroLinx)
Run 3 Area 2 - Baseline DWF (EC + Super Pipe MetroLinx)
Run 4 Area 2 - Baseline May 12,2000 (EC + Super Pipe MetroLinx)

Western This is the combined sewer from Eglinton, down Laird Ave, ending in the valley.



Eastern This is the foul sewer from east of Laird Ave, along Eglinton, and ending in the valley.



Drainage Maps
This sheet shows the entire study area in red hatch. This also shows the sections of the study area that are conveyed in either the western or eastern trunk.

Result Tables This sheet has the result tables for all scenarios (runs).

Western Pipe Details This sheet has the pipe details for the western branch (MH id, length, pipe diameter, etc).

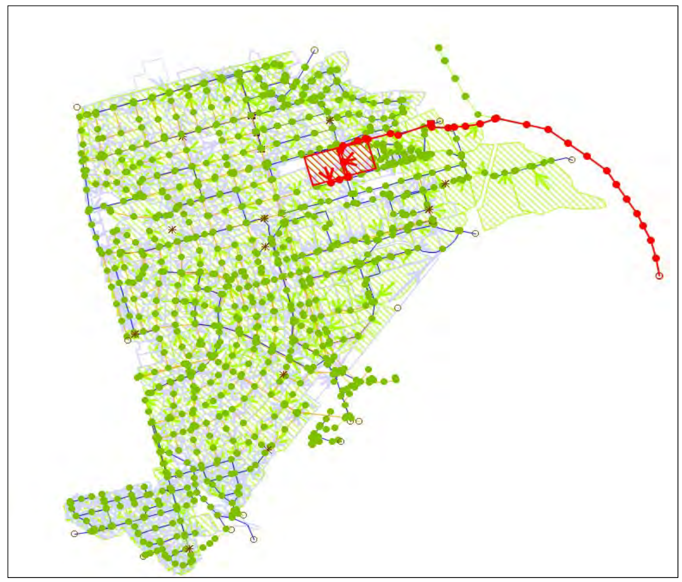
Eastern Pipe Details This sheet has the pipe details for the eastern branch (MH id, length, pipe diameter, etc).

Western - Run 1 through 4 Each sheet is associated with a run, and shows the result table for that run (from the model), as well as the hydraulic profile of the trunk.

Eastern - Run 1 through 4 Each sheet is associated with a run, and shows the result table for that run (from the model), as well as the hydraulic profile of the trunk.

CSO This sheet shows the location of the CSO within the study area, and the details for the weir at that location.

OVERALL STUDY AREA



WESTERN - RUN 1 Area 2 - Baseline 100 Year (EC + Super Pipe MetroLinx)

Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
4113215853	4113215853	4109815736	121.7	300	0.00416	0.058	0.04937	85.12%
4109815736	4109815736	4100215764	99.9	600	0.004	0.361	0.73351	203.19%
4100215764	4100215764	4093615783	69	675	0.00391	0.488	0.51781	106.11%
4093615783	4093615783	4084215811	97.7	675	0.00409	0.5	0.51734	103.47%
4084215811	4084215811	4074115841	106.1	675	0.00396	0.491	0.5263	107.19%
4074115841	4074115841	4073415843	6.6	675	0.01212	0.86	0.58166	67.63%
4073415843	4073415843	4065215867	85.5	675	0.00339	0.455	0.79836	175.46%
4065215867	4065215867	4059515883	59.5	1200	0.0058	2.757	2.66718	96.74%
4059515883	4059515883	4046215921	138.2	1200	0.00645	2.909	2.71133	93.20%
4046215921	4046215921	4037615947	89.9	1200	0.00704	3.038	2.7527	90.61%
4037615947	4037615947	4028715974	93.4	1200	0.00702	3.034	3.0707	101.21%
4028715974	4028715974	4014316063	178.8	1200	0.00641	2.899	3.38097	116.63%
4014316063	4014316063	4007316119	89.4	1200	0.00302	1.99	3.31812	166.74%
4007316119	4007316119	3998516199	119.1	1200	0.00342	2.117	3.59084	169.62%
3998516199	3998516199	3996116180	30.4	1500	0.00372	5.539	4.04211	72.98%
3996116180	3996116180	3992016148	52.1	1500	0.00453	6.114	5.6473	92.37%
3992016148	3992016148	3985216125	78.8	1500	0.00388	5.661	5.64385	99.70%
3985216125	3985216125	3979116151	65.8	1500	0.01125	9.634	5.6428	58.57%
3979116151	3979116151	3977616158	16.7	1500	0.00862	8.436	5.64248	66.89%
3977616158	3977616158	3975316202	49.3	3658	0.00668	57.793	81.77602	141.50%

EASTERN - RUN 1 Area 2 - Baseline 100 Year (EC + Super Pipe MetroLinx)

	Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
	4119116042	4119116042	4120716094	54.4	250	0.01151	0.059	0.03829	64.90%
	4120716094	4120716094	4122116139	46.8	250	0.00115	0.019	0.05522	290.63%
	4122116139	4122116139	4122816139	7.8	250	0.20218	0.248	0.06122	24.69%
	4122816139	4122816139	4131016115	84.6	250	0.00401	0.035	0.05261	150.31%
	4131016115	4131016115	4131516117	5.4	250	0.04259	0.114	0.05304	46.53%
	4131516117	4131516117	4138516096	73.4	250	0.00332	0.032	0.06875	214.84%
	4138516096	4138516096	4141316109	30.5	250	0.00289	0.03	0.10489	349.63%
	4141316109	4141316109	4144416194	90.3	250	0.00987	0.055	0.10821	196.75%
	4144416194	4144416194	NewLRT1	44.2	250	0.04724	0.12	0.1082	90.17%
	NewLRT1	NewLRT1	NewLRT2	16	300	0.053	0.207	0.1082	52.27%
	NewLRT2	NewLRT2	NewLRT4	131.5	300	0.05302	0.207	0.15919	76.90%
	NewLRT4	NewLRT4	NewLRT5	45.4	525	0.01753	0.529	0.28516	53.91%
	NewLRT5	NewLRT5	NewLRTstorage	199	2100	0.005	11.386	0.15445	1.36%
	NewLRTstorage	NewLRTstorage	NewLRTstorage_1	3.5	600	0.01	0.57	0.12925	22.68%
(Orifice)	NewLRTstorage_1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	NewLRT6	NewLRT6	4152316642	21.6	250	0.03973	0.11	0.13016	118.33%
	4152316642	4152316642	4149316679	90.6	250	0.03255	0.1	0.13013	130.13%
	4149316679	4149316679	4152416741	36.4	250	0.09598	0.171	0.13013	76.10%
	4152416741	4152416741	4152816800	58.9	375	0.00697	0.136	0.14381	105.74%
	4152816800	4152816800	4154316886	87.1	375	0.0077	0.143	0.16545	115.70%
	4154316886	4154316886	4157416968	87.7	375	0.02487	0.257	0.18504	72.00%
	4157716976	4157716976	4154017146	174.4	1500	0.00392	4.108	4.82171	117.37%
	4154017146	4154017146	4151117269	126.4	1500	0.00285	3.504	4.73789	135.21%
	4151117269	4151117269	4142817379	137.5	1500	0.00344	3.85	4.66365	121.13%
	4142817379	4142817379	4134817486	133.8	1500	0.00333	3.786	4.62646	122.20%
	4134817486	4134817486	4126317599	141.1	1500	0.00361	3.943	4.62645	117.33%
	4126317599	4126317599	4117917654	100.9	1500	0.00335	3.8	4.62645	121.75%
	4117917654	4117917654	4109117711	104.3	1500	0.00292	3.55	4.62645	130.32%
	4109117711	4109117711	4100417768	104.4	1500	0.00399	4.149	4.62645	111.51%
	4100417768	4100417768	4093317803	78.9	1500	0.00264	3.371	4.62644	137.24%
	4093317803	4093317803	4084317847	100.6	1500	0.00687	5.441	4.62644	85.03%
	4084317847	4084317847	4073817873	108.2	1500	0.00099	2.064	4.62644	224.15%
	4073817873	4073817873	4063117897	108.9	1500	0.0066	5.334	4.62644	86.73%

WESTERN - RUN 2 Area 2 - Baseline 2-year storm (EC + Super Pipe MetroLinx)

Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
4113215853	4113215853	4109815736	121.7	300	0.00416	0.058	0.02551	43.98%
4109815736	4109815736	4100215764	99.9	600	0.004	0.361	0.62134	172.12%
4100215764	4100215764	4093615783	69	675	0.00391	0.488	0.55117	112.94%
4093615783	4093615783	4084215811	97.7	675	0.00409	0.5	0.52449	104.90%
4084215811	4084215811	4074115841	106.1	675	0.00396	0.491	0.51896	105.69%
4074115841	4074115841	4073415843	6.6	675	0.01212	0.86	0.53482	62.19%
4073415843	4073415843	4065215867	85.5	675	0.00339	0.455	0.65294	143.50%
4065215867	4065215867	4059515883	59.5	1200	0.0058	2.757	1.96777	71.37%
4059515883	4059515883	4046215921	138.2	1200	0.00645	2.909	2.03152	69.84%
4046215921	4046215921	4037615947	89.9	1200	0.00704	3.038	2.06492	67.97%
4037615947	4037615947	4028715974	93.4	1200	0.00702	3.034	2.34054	77.14%
4028715974	4028715974	4014316063	178.8	1200	0.00641	2.899	2.52559	87.12%
4014316063	4014316063	4007316119	89.4	1200	0.00302	1.99	2.5996	130.63%
4007316119	4007316119	3998516199	119.1	1200	0.00342	2.117	2.76749	130.73%
3998516199	3998516199	3996116180	30.4	1500	0.00372	5.539	2.94616	53.19%
3996116180	3996116180	3992016148	52.1	1500	0.00453	6.114	3.92206	64.15%
3992016148	3992016148	3985216125	78.8	1500	0.00388	5.661	3.91692	69.19%
3985216125	3985216125	3979116151	65.8	1500	0.01125	9.634	3.91177	40.60%
3979116151	3979116151	3977616158	16.7	1500	0.00862	8.436	3.91177	46.37%
3977616158	3977616158	3975316202	49.3	3658	0.00668	57.793	29.15681	50.45%

EASTERN - RUN 2 Area 2 - Baseline 2-year storm (EC + Super Pipe MetroLinx)

	Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
	4119116042	4119116042	4120716094	54.4	250	0.01151	0.059	0.01983	33.61%
	4120716094	4120716094	4122116139	46.8	250	0.00115	0.019	0.02806	147.68%
	4122116139	4122116139	4122816139	7.8	250	0.20218	0.248	0.04286	17.28%
	4122816139	4122816139	4131016115	84.6	250	0.00401	0.035	0.03083	88.09%
	4131016115	4131016115	4131516117	5.4	250	0.04259	0.114	0.02938	25.77%
	4131516117	4131516117	4138516096	73.4	250	0.00332	0.032	0.03763	117.59%
	4138516096	4138516096	4141316109	30.5	250	0.00289	0.03	0.08705	290.17%
	4141316109	4141316109	4144416194	90.3	250	0.00987	0.055	0.0889	161.64%
	4144416194	4144416194	NewLRT1	44.2	250	0.04724	0.12	0.0889	74.08%
	NewLRT1	NewLRT1	NewLRT2	16	300	0.053	0.207	0.0889	42.95%
	NewLRT2	NewLRT2	NewLRT4	131.5	300	0.05302	0.207	0.10939	52.85%
	NewLRT4	NewLRT4	NewLRT5	45.4	525	0.01753	0.529	0.19175	36.25%
	NewLRT5	NewLRT5	NewLRTstorage	199	2100	0.005	11.386	0.15816	1.39%
	NewLRTstorage	NewLRTstorage	NewLRTstorage_1	3.5	600	0.01	0.57	0.13024	22.85%
(Orifice)	NewLRTstorage_1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	NewLRT6	NewLRT6	4152316642	21.6	250	0.03973	0.11	0.1223	111.18%
	4152316642	4152316642	4149316679	90.6	250	0.03255	0.1	0.12181	121.81%
	4149316679	4149316679	4152416741	36.4	250	0.09598	0.171	0.12179	71.22%
	4152416741	4152416741	4152816800	58.9	375	0.00697	0.136	0.12666	93.13%
	4152816800	4152816800	4154316886	87.1	375	0.0077	0.143	0.1336	93.43%
	4154316886	4154316886	4157416968	87.7	375	0.02487	0.257	0.13879	54.00%
	4157716976	4157716976	4154017146	174.4	1500	0.00392	4.108	4.58754	111.67%
	4154017146	4154017146	4151117269	126.4	1500	0.00285	3.504	4.55953	130.12%
	4151117269	4151117269	4142817379	137.5	1500	0.00344	3.85	4.52468	117.52%
	4142817379	4142817379	4134817486	133.8	1500	0.00333	3.786	4.47913	118.31%
	4134817486	4134817486	4126317599	141.1	1500	0.00361	3.943	4.44064	112.62%
	4126317599	4126317599	4117917654	100.9	1500	0.00335	3.8	4.42663	116.49%
	4117917654	4117917654	4109117711	104.3	1500	0.00292	3.55	4.4258	124.67%
	4109117711	4109117711	4100417768	104.4	1500	0.00399	4.149	4.42453	106.64%
	4100417768	4100417768	4093317803	78.9	1500	0.00264	3.371	4.42275	131.20%
	4093317803	4093317803	4084317847	100.6	1500	0.00687	5.441	4.42147	81.26%
	4084317847	4084317847	4073817873	108.2	1500	0.00099	2.064	4.42097	214.19%
	4073817873	4073817873	4063117897	108.9	1500	0.0066	5.334	4.42051	82.87%

WESTERN - RUN 3 Area 2 - Baseline DWF (EC + Super Pipe MetroLinx)

Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
4113215853	4113215853	4109815736	121.7	300	0.00416	0.058	0.00107	1.84%
4109815736	4109815736	4100215764	99.9	600	0.004	0.361	0.04486	12.43%
4100215764	4100215764	4093615783	69	675	0.00391	0.488	0.05508	11.29%
4093615783	4093615783	4084215811	97.7	675	0.00409	0.5	0.05507	11.01%
4084215811	4084215811	4074115841	106.1	675	0.00396	0.491	0.05515	11.23%
4074115841	4074115841	4073415843	6.6	675	0.01212	0.86	0.05515	6.41%
4073415843	4073415843	4065215867	85.5	675	0.00339	0.455	0.05514	12.12%
4065215867	4065215867	4059515883	59.5	1200	0.0058	2.757	0.10299	3.74%
4059515883	4059515883	4046215921	138.2	1200	0.00645	2.909	0.10928	3.76%
4046215921	4046215921	4037615947	89.9	1200	0.00704	3.038	0.11003	3.62%
4037615947	4037615947	4028715974	93.4	1200	0.00702	3.034	0.11383	3.75%
4028715974	4028715974	4014316063	178.8	1200	0.00641	2.899	0.11535	3.98%
4014316063	4014316063	4007316119	89.4	1200	0.00302	1.99	0.11737	5.90%
4007316119	4007316119	3998516199	119.1	1200	0.00342	2.117	0.12056	5.69%
3998516199	3998516199	3996116180	30.4	1500	0.00372	5.539	0.12057	2.18%
3996116180	3996116180	3992016148	52.1	1500	0.00453	6.114	0.15091	2.47%
3992016148	3992016148	3985216125	78.8	1500	0.00388	5.661	0.15091	2.67%
3985216125	3985216125	3979116151	65.8	1500	0.01125	9.634	0.15091	1.57%
3979116151	3979116151	3977616158	16.7	1500	0.00862	8.436	0.1509	1.79%
3977616158	3977616158	3975316202	49.3	3658	0.00668	57.793	1.03583	1.79%

EASTERN - RUN 3 Area 2 - Baseline DWF (EC + Super Pipe MetroLinx)

	Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
	4119116042	4119116042	4120716094	54.4	250	0.01151	0.059	0.0001	0.17%
	4120716094	4120716094	4122116139	46.8	250	0.00115	0.019	0.00085	4.47%
	4122116139	4122116139	4122816139	7.8	250	0.20218	0.248	0.00097	0.39%
	4122816139	4122816139	4131016115	84.6	250	0.00401	0.035	0.00097	2.77%
	4131016115	4131016115	4131516117	5.4	250	0.04259	0.114	0.00097	0.85%
	4131516117	4131516117	4138516096	73.4	250	0.00332	0.032	0.00107	3.34%
	4138516096	4138516096	4141316109	30.5	250	0.00289	0.03	0.00533	17.77%
	4141316109	4141316109	4144416194	90.3	250	0.00987	0.055	0.00605	11.00%
	4144416194	4144416194	NewLRT1	44.2	250	0.04724	0.12	0.00605	5.04%
	NewLRT1	NewLRT1	NewLRT2	16	300	0.053	0.207	0.00605	2.92%
	NewLRT2	NewLRT2	NewLRT4	131.5	300	0.05302	0.207	0.00793	3.83%
	NewLRT4	NewLRT4	NewLRT5	45.4	525	0.01753	0.529	0.0181	3.42%
	NewLRT5	NewLRT5	NewLRTstorage	199	2100	0.005	11.386	0.0181	0.16%
	NewLRTstorage	NewLRTstorage	NewLRTstorage_1	3.5	600	0.01	0.57	0.0181	3.18%
(Orifice)	NewLRTstorage_1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	NewLRT6	NewLRT6	4152316642	21.6	250	0.03973	0.11	0.01889	17.17%
	4152316642	4152316642	4149316679	90.6	250	0.03255	0.1	0.01889	18.89%
	4149316679	4149316679	4152416741	36.4	250	0.09598	0.171	0.01889	11.05%
	4152416741	4152416741	4152816800	58.9	375	0.00697	0.136	0.01889	13.89%
	4152816800	4152816800	4154316886	87.1	375	0.0077	0.143	0.01889	13.21%
	4154316886	4154316886	4157416968	87.7	375	0.02487	0.257	0.01898	7.39%
	4157716976	4157716976	4154017146	174.4	1500	0.00392	4.108	1.01363	24.67%
	4154017146	4154017146	4151117269	126.4	1500	0.00285	3.504	1.01362	28.93%
	4151117269	4151117269	4142817379	137.5	1500	0.00344	3.85	1.01361	26.33%
	4142817379	4142817379	4134817486	133.8	1500	0.00333	3.786	1.01361	26.77%
	4134817486	4134817486	4126317599	141.1	1500	0.00361	3.943	1.0136	25.71%
	4126317599	4126317599	4117917654	100.9	1500	0.00335	3.8	1.0136	26.67%
	4117917654	4117917654	4109117711	104.3	1500	0.00292	3.55	1.01359	28.55%
	4109117711	4109117711	4100417768	104.4	1500	0.00399	4.149	1.01359	24.43%
	4100417768	4100417768	4093317803	78.9	1500	0.00264	3.371	1.01359	30.07%
	4093317803	4093317803	4084317847	100.6	1500	0.00687	5.441	1.01358	18.63%
	4084317847	4084317847	4073817873	108.2	1500	0.00099	2.064	1.01358	49.11%
	4073817873	4073817873	4063117897	108.9	1500	0.0066	5.334	1.01358	19.00%

WESTERN - RUN 4 Area 2 - Baseline May 12,2000 (EC + Super Pipe MetroLinx)

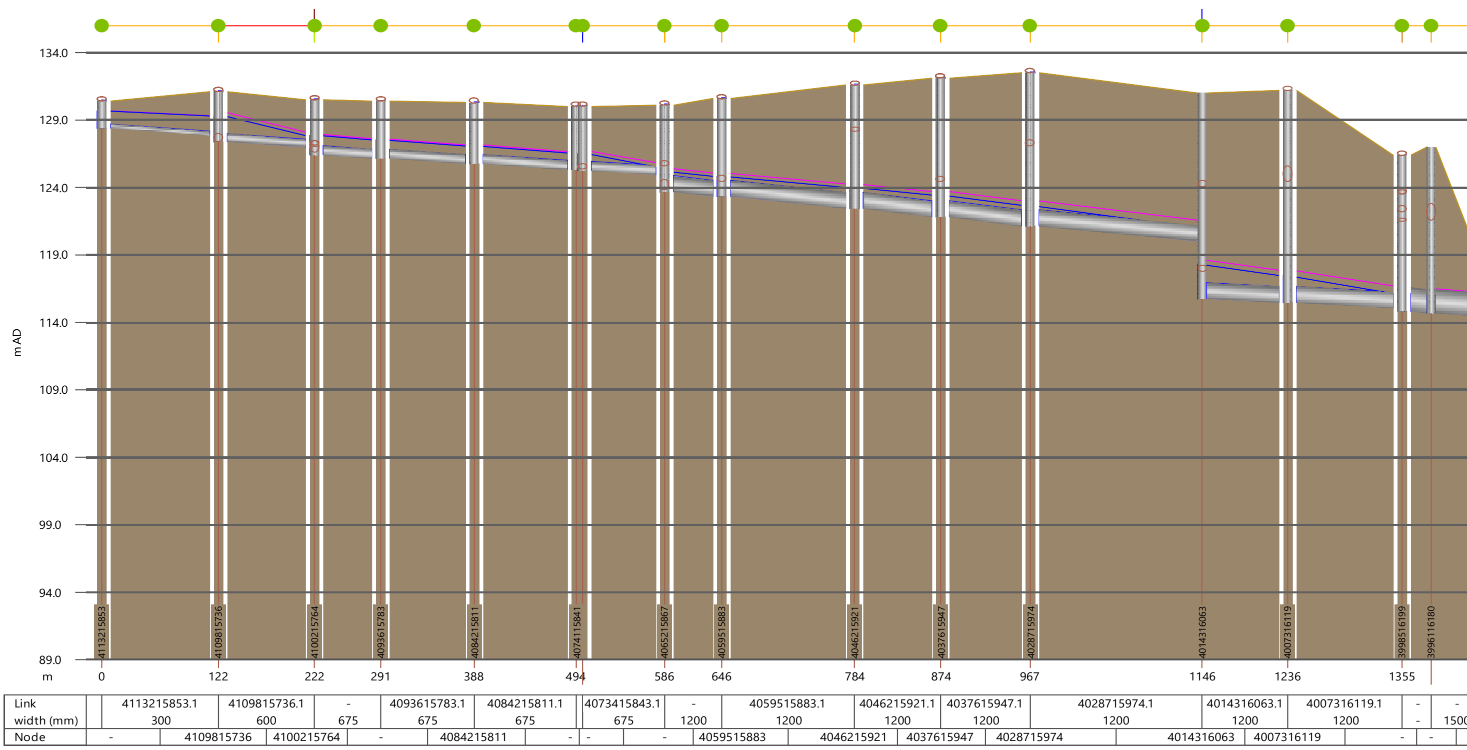
Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
4113215853	4113215853	4109815736	121.7	300	0.00416	0.058	0.02957	50.98%
4109815736	4109815736	4100215764	99.9	600	0.004	0.361	0.65671	181.91%
4100215764	4100215764	4093615783	69	675	0.00391	0.488	0.56535	115.85%
4093615783	4093615783	4084215811	97.7	675	0.00409	0.5	0.53749	107.50%
4084215811	4084215811	4074115841	106.1	675	0.00396	0.491	0.52086	106.08%
4074115841	4074115841	4073415843	6.6	675	0.01212	0.86	0.5466	63.56%
4073415843	4073415843	4065215867	85.5	675	0.00339	0.455	0.67802	149.02%
4065215867	4065215867	4059515883	59.5	1200	0.0058	2.757	2.27273	82.43%
4059515883	4059515883	4046215921	138.2	1200	0.00645	2.909	2.37075	81.50%
4046215921	4046215921	4037615947	89.9	1200	0.00704	3.038	2.39787	78.93%
4037615947	4037615947	4028715974	93.4	1200	0.00702	3.034	2.67755	88.25%
4028715974	4028715974	4014316063	178.8	1200	0.00641	2.899	2.90684	100.27%
4014316063	4014316063	4007316119	89.4	1200	0.00302	1.99	2.99771	150.64%
4007316119	4007316119	3998516199	119.1	1200	0.00342	2.117	3.1856	150.48%
3998516199	3998516199	3996116180	30.4	1500	0.00372	5.539	3.47988	62.83%
3996116180	3996116180	3992016148	52.1	1500	0.00453	6.114	4.60727	75.36%
3992016148	3992016148	3985216125	78.8	1500	0.00388	5.661	4.60362	81.32%
3985216125	3985216125	3979116151	65.8	1500	0.01125	9.634	4.60045	47.75%
3979116151	3979116151	3977616158	16.7	1500	0.00862	8.436	4.60065	54.54%
3977616158	3977616158	3975316202	49.3	3658	0.00668	57.793	46.90516	81.16%

EASTERN - RUN 4 Area 2 - Baseline May 12,2000 (EC + Super Pipe MetroLinx)

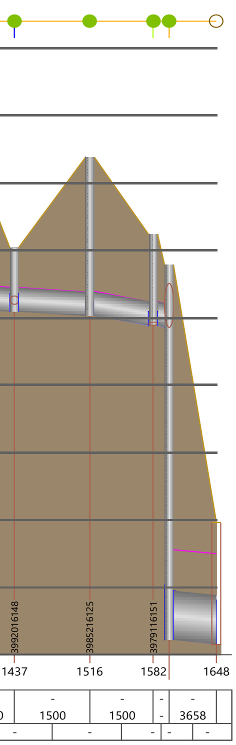
	Pipe	From	To	Length [m]	Diam. [mm]	Slope [m/m]	QCAP [m3/s]	QModel [m3/s]	% Cap.
	4119116042	4119116042	4120716094	54.4	250	0.01151	0.059	0.02849	48.29%
	4120716094	4120716094	4122116139	46.8	250	0.00115	0.019	0.0341	179.47%
	4122116139	4122116139	4122816139	7.8	250	0.20218	0.248	0.05583	22.51%
	4122816139	4122816139	4131016115	84.6	250	0.00401	0.035	0.04194	119.83%
	4131016115	4131016115	4131516117	5.4	250	0.04259	0.114	0.04176	36.63%
	4131516117	4131516117	4138516096	73.4	250	0.00332	0.032	0.05585	174.53%
	4138516096	4138516096	4141316109	30.5	250	0.00289	0.03	0.09754	325.13%
	4141316109	4141316109	4144416194	90.3	250	0.00987	0.055	0.09945	180.82%
	4144416194	4144416194	NewLRT1	44.2	250	0.04724	0.12	0.09945	82.88%
	NewLRT1	NewLRT1	NewLRT2	16	300	0.053	0.207	0.09945	48.04%
	NewLRT2	NewLRT2	NewLRT4	131.5	300	0.05302	0.207	0.12891	62.28%
	NewLRT4	NewLRT4	NewLRT5	45.4	525	0.01753	0.529	0.23175	43.81%
	NewLRT5	NewLRT5	NewLRTstorage	199	2100	0.005	11.386	0.17561	1.54%
	NewLRTstorage	NewLRTstorage	NewLRTstorage_1	3.5	600	0.01	0.57	0.13246	23.24%
(Orifice)	NewLRTstorage_1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	NewLRT6	NewLRT6	4152316642	21.6	250	0.03973	0.11	0.12617	114.70%
	4152316642	4152316642	4149316679	90.6	250	0.03255	0.1	0.12497	124.97%
	4149316679	4149316679	4152416741	36.4	250	0.09598	0.171	0.12496	73.08%
	4152416741	4152416741	4152816800	58.9	375	0.00697	0.136	0.13801	101.48%
	4152816800	4152816800	4154316886	87.1	375	0.0077	0.143	0.16156	112.98%
	4154316886	4154316886	4157416968	87.7	375	0.02487	0.257	0.17752	69.07%
	4157716976	4157716976	4154017146	174.4	1500	0.00392	4.108	4.84283	117.89%
	4154017146	4154017146	4151117269	126.4	1500	0.00285	3.504	4.73765	135.21%
	4151117269	4151117269	4142817379	137.5	1500	0.00344	3.85	4.66029	121.05%
	4142817379	4142817379	4134817486	133.8	1500	0.00333	3.786	4.5687	120.67%
	4134817486	4134817486	4126317599	141.1	1500	0.00361	3.943	4.52981	114.88%
	4126317599	4126317599	4117917654	100.9	1500	0.00335	3.8	4.52981	119.21%
	4117917654	4117917654	4109117711	104.3	1500	0.00292	3.55	4.5298	127.60%
	4109117711	4109117711	4100417768	104.4	1500	0.00399	4.149	4.5298	109.18%
	4100417768	4100417768	4093317803	78.9	1500	0.00264	3.371	4.52979	134.38%
	4093317803	4093317803	4084317847	100.6	1500	0.00687	5.441	4.52979	83.25%
	4084317847	4084317847	4073817873	108.2	1500	0.00099	2.064	4.52979	219.47%
	4073817873	4073817873	4063117897	108.9	1500	0.0066	5.334	4.52979	84.92%

Conditions:	Existing (Pre-Development)
Sewer Branch:	Western (South along Laird Drive)
Flow Conditions:	100-Year Storm

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
US node ID	Link suffix	Max US Fr	Cumulativ	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max US to	Max
3977616158	1	1.532	0	0	0.99	3.635		81.78705	1.532	360206.7	96.788	7.744	0	0	0.99	3.635	81.78705		96.788	
3979116151	1	1.35	0	0	0.58	1.046		5.64271	1.35	48167.21	115.197	3.837	0	0	0.58	1.046	5.64271		115.197	
3985216125	1	1.384	0	0	0.59	1.014		5.64377	1.384	48167.69	115.956	3.965	0	0	0.59	1.014	5.64377		115.956	
3992016148	1	0.923	0	0	0.73	1.316		5.64708	0.923	48167.98	116.235	3.045	0	0	0.73	1.316	5.64708		116.235	
3996116180	1	0.966	0	0	0.75	1.356		5.65336	0.966	48168.27	116.486	2.978	0	0	0.75	1.356	5.65336		116.486	
3998516199	1	0.844	0	0	0.77	1.332		4.04238	0.844	37556.04	116.364	2.205	0	0	0.77	1.332	4.04238		116.364	
4007316119	1	0.909	0	0	2	1.896		3.59281	0.909	37034.69	117.823	3.027	0	0	2	1.896	3.59281		117.823	
4014316063	1	0.852	0	0	2	2.503		3.31768	0.852	35564.34	118.617	2.766	0	0	2	2.503	3.31768		118.617	
4028715974	1	1.241	0	0	2	1.443		3.38159	1.241	34999.33	123.011	2.985	0	0	2	1.443	3.38159		123.011	
4037615947	1	1.294	0	0	2	1.55		3.07041	1.294	33816.47	123.693	2.967	0	0	2	1.55	3.07041		123.693	
4046215921	1	1.294	0	0	1	1.511		2.75123	1.294	31834.41	124.22	2.95	0	0	1	1.511	2.75123		124.22	
4059515883	1	1.244	0	0	1	1.448		2.77372	1.244	31420.25	125.042	2.944	0	0	1	1.448	2.77372		125.042	
4065215867	1	1.178	0	0	1	1.469		2.7443	1.178	30239.84	125.391	2.793	0	0	1	1.469	2.7443		125.391	
4073415843	1	0.826	0	0	2	1.191		0.79837	0.826	15409.13	126.67	2.116	0	0	2	1.191	0.79837		126.67	
4074115841	1	1.106	0	0	1	1.203		0.58166	1.106	14385.32	126.654	1.581	0	0	1	1.203	0.58166		126.654	
4084215811	1	0.887	0	0	2	1.298		0.52643	0.887	14262.83	127.146	1.574	0	0	2	1.298	0.52643		127.146	
4093615783	1	0.902	0	0	2	1.352		0.51744	0.902	14157.54	127.597	1.595	0	0	2	1.352	0.51744		127.597	
4100215764	1	0.882	0	0	2	1.408		0.52206	0.882	14157.6	127.922	1.569	0	0	2	1.408	0.52206		127.922	
4109815736	1	0.875	0	0	2	1.878		0.73405	0.875	11736.2	129.548	2.384	0	0	2	1.878	0.73405		129.548	
4113215853	1	0.776	0	0	1	1.275		0.04909	0.776	279.5	129.676	0.647	0	0	1	1.275	0.04909		129.676	

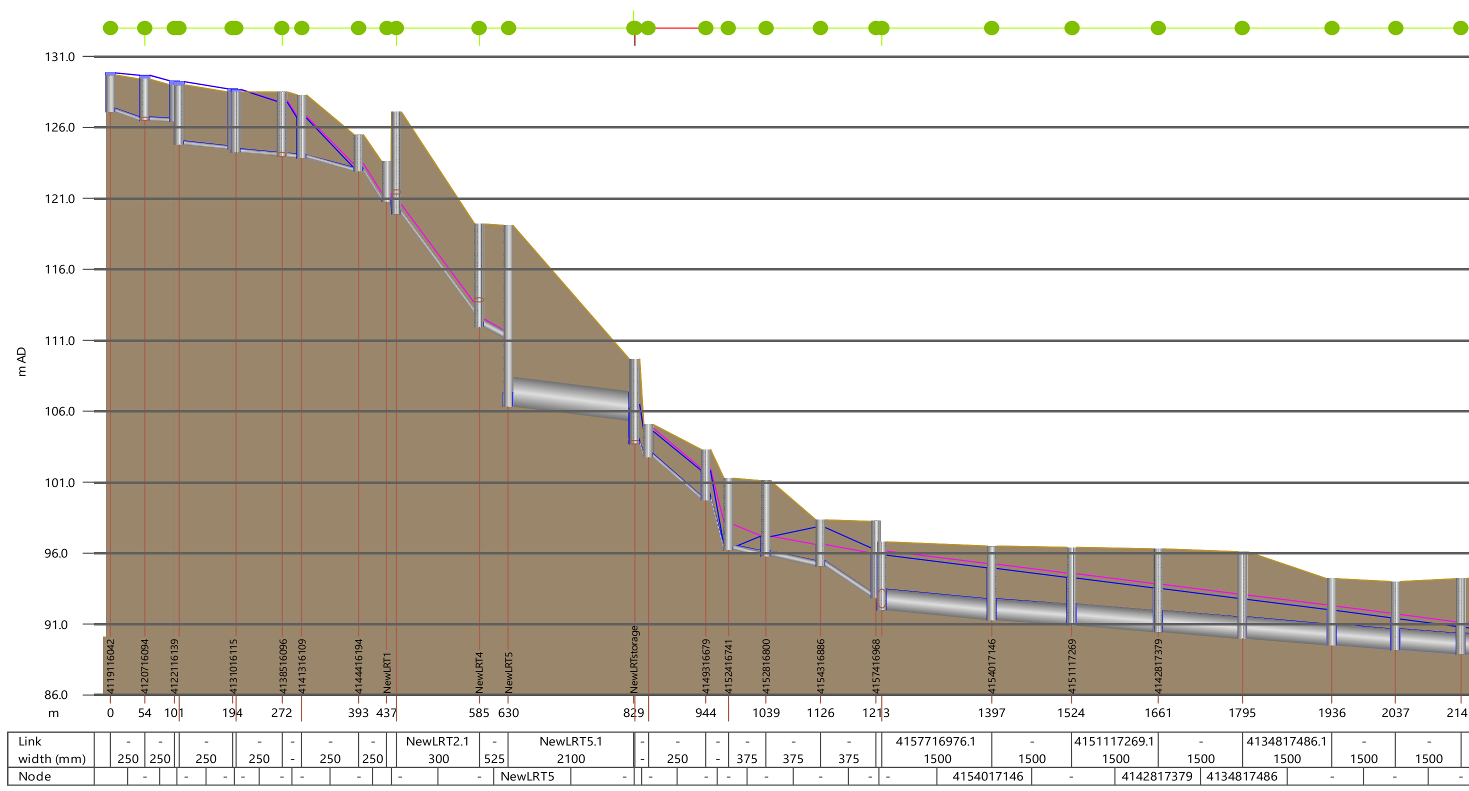


21	22	23	24	25	26	27	28	29	30	31	32	33
US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flow (m3/s)	Max DS Fr	Max DS to	Max DS ve	DS depth (
7.744	0	81.77602	1.517	360180.7	96.494	8.208	3.292	81.77602	1.517	96.494	8.208	3.292
3.837	0	5.64248	1.348	48167.07	115.053	3.837	1.046	5.64248	1.348	115.053	3.837	1.046
3.965	0	5.6428	1.346	48167.21	115.19	3.78	1.061	5.6428	1.346	115.19	3.78	1.061
3.045	0	5.64385	0.99	48167.69	115.906	3.364	1.188	5.64385	0.99	115.906	3.364	1.188
2.978	0	5.6473	0.923	48167.99	116.244	2.991	1.341	5.6473	0.923	116.244	2.991	1.341
2.205	0	4.04211	0.801	37555.86	116.285	2.14	1.381	4.04211	0.801	116.285	2.14	1.381
3.027	0	3.59084	0.997	37033.29	116.708	3.431	1.091	3.59084	0.997	116.708	3.431	1.091
2.766	0	3.31812	0.87	35563.29	117.869	2.794	2.017	3.31812	0.87	117.869	2.794	2.017
2.985	0	3.38097	1.235	34998.05	121.575	3.34	1.006	3.38097	1.235	121.575	3.34	1.006
2.967	0	3.0707	1.19	33816.3	123.025	2.672	1.537	3.0707	1.19	123.025	2.672	1.537
2.95	0	2.7527	1.2	31834.57	123.704	2.54	1.633	2.7527	1.2	123.704	2.54	1.633
2.944	0	2.71133	1.239	31419.68	124.272	2.751	1.575	2.71133	1.239	124.272	2.751	1.575
2.793	0	2.66718	1.174	30239.45	125.081	2.755	1.506	2.66718	1.174	125.081	2.755	1.506
2.116	0	0.79836	0.998	15408.96	125.843	2.498	0.564	0.79836	0.998	125.843	2.498	0.564
1.581	0	0.58166	0.809	14385.31	126.615	1.539	1.244	0.58166	0.809	126.615	1.539	1.244
1.574	0	0.5263	0.991	14262.68	126.661	1.535	1.232	0.5263	0.991	126.661	1.535	1.232
1.595	0	0.51734	0.878	14157.43	127.165	1.534	1.32	0.51734	0.878	127.165	1.534	1.32
1.569	0	0.51781	0.902	14157.54	127.617	1.573	1.372	0.51781	0.902	127.617	1.573	1.372
2.384	0	0.73351	0.998	11736.06	128.103	2.671	0.871	0.73351	0.998	128.103	2.671	0.871
0.647	0	0.04937	0.953	279.62	129.319	0.699	1.426	0.04937	0.953	129.319	0.699	1.426

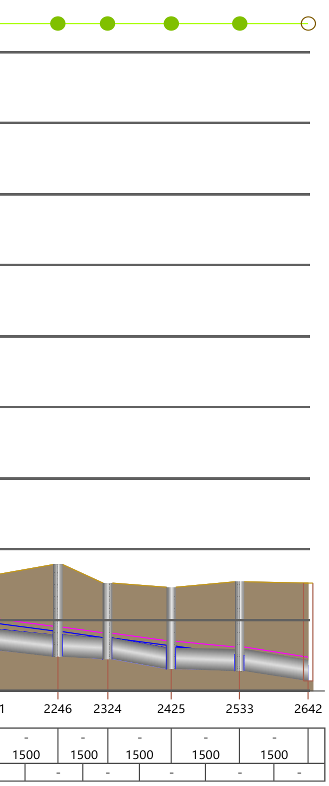


Conditions:	Existing (Pre-Development)
Sewer Branch:	Eastern (East along Eglinton)
Flow Conditions:	100-Year Storm

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max U
4.07E+09	1	1.302	0	0	0.72	1.078		4.62644	1.302	295558.1	89.101	3.404	0	0	0.72	1.078	4.62644		89
4.08E+09	1	0.648	0	0	2	1.627		4.62644	0.648	295558.7	89.493	2.534	0	0	2	1.627	4.62644		89
4.09E+09	1	1.273	0	0	1	1.493		4.62644	1.273	295559.1	90.069	2.904	0	0	1	1.493	4.62644		90
4.1E+09	1	0.858	0	0	2	1.733		4.62645	0.858	295559.4	90.495	2.588	0	0	2	1.733	4.62645		90
4.11E+09	1	0.992	0	0	2	1.901		4.62645	0.992	295560.1	91.079	2.666	0	0	2	1.901	4.62645		91
4.12E+09	1	0.882	0	0	2	2.196		4.62645	0.882	295561.1	91.675	2.501	0	0	2	2.196	4.62645		91
4.12E+09	1	1.223	0	0	1	2.736		0.04012	1.223	118.09	129.85	1.251	0	0	1	2.736	0.04012		12
4.12E+09	1	0.434	0	0	2	3.185		0.05533	0.434	298.7	129.696	0.847	0	0	2	3.185	0.05533		129
4.12E+09	1	4.618	0	0	1	2.856		0.06161	4.618	418.45	129.3	3.317	0	0	1	2.856	0.06161		1
4.12E+09	1	0.733	0	0	2	4.422		0.05246	0.733	418.45	129.235	0.751	0	0	2	4.422	0.05246		129
4.13E+09	1	0.921	0	0	2	2.454		4.62645	0.921	295563.1	92.268	2.524	0	0	2	2.454	4.62645		92
4.13E+09	1	2.717	0	0	1	4.197		0.05303	2.717	418.42	128.722	1.837	0	0	1	4.197	0.05303		128
4.13E+09	1	0.667	0	0	2	4.417		0.07023	0.667	519.5	128.697	0.992	0	0	2	4.417	0.07023		128
4.13E+09	1	0.96	0	0	2	2.734		4.62645	0.96	295565.8	93.055	2.626	0	0	2	2.734	4.62645		93
4.14E+09	1	0.626	0	0	2	3.844		0.10486	0.626	1739.41	127.914	1.531	0	0	2	3.844	0.10486		127
4.14E+09	1	1.144	0	0	2	2.847		0.10822	1.144	1873.35	126.807	1.697	0	0	2	2.847	0.10822		126
4.14E+09	1	0.927	0	0	2	3.034		4.64657	0.927	295566	93.796	2.612	0	0	2	3.034	4.64657		93
4.14E+09	1	2.448	0	0	0.77	0.192		0.10821	2.448	1873.35	123.486	2.731	0	0	0.77	0.192	0.10821		123
4.15E+09	1	1.959	0	0	2	2.074		0.13013	1.959	4896.74	101.96	2.188	0	0	2	2.074	0.13013		10
4.15E+09	1	0.939	0	0	2	3.314		4.71794	0.939	295565.5	94.547	2.662	0	0	2	3.314	4.71794		94
4.15E+09	1	2.805	0	0	1	1.829		0.13013	2.805	4896.94	104.808	3.121	0	0	1	1.829	0.13013		104
4.15E+09	1	2.091	0	0	1	0.194		0.13013	2.091	4896.48	98.027	2.365	0	0	1	0.194	0.13013		98
4.15E+09	1	1.802	0	0	1	1.394		0.15321	1.802	4896.49	97.212	2.179	0	0	1	1.394	0.15321		97
4.15E+09	1	0.863	0	0	2	3.639		4.79923	0.863	295567.4	95.229	2.618	0	0	2	3.639	4.79923		95
4.15E+09	1	1.481	0	0	1	2.728		0.17765	1.481	4923.4	96.601	1.828	0	0	1	2.728	0.17765		96
4.16E+09	1	1.161	0	0	2	3.451		0.20456	1.161	4923.25	95.997	1.668	0	0	2	3.451	0.20456		95
4.16E+09	1	0.997	0	0	2	3.88		4.95972	0.997	295563.4	96.15	2.856	0	0	2	3.88	4.95972		9
NewLRT1	2	2.67	0	0	0.56	0.157		0.1082	2.67	1873.34	121.358	2.888	0	0	0.56	0.157	0.1082		121
NewLRT2	1	2.671	0	0	0.67	0.2		0.15934	2.671	2295.13	120.583	3.181	0	0	0.67	0.2	0.15934		120
NewLRT4	1	1.692	0	0	0.54	0.282		0.28524	1.692	4722.59	112.518	2.419	0	0	0.54	0.282	0.28524		112
NewLRT5	1	0.942	0	0	0.93	0.95		0.28506	0.942	4722.56	107.296	1.21	0	0	0.93	0.95	0.28506		107
NewLRT6	1	1.596	0	0	2	2.841		0.13016	1.596	4896.94	106.415	2.235	0	0	2	2.841	0.13016		106
NewLRTstc	1	0.973	0	0	1	3.558		0.12925	0.973	4723.52	107.301	0.75	0	0	1	3.558	0.12925		107

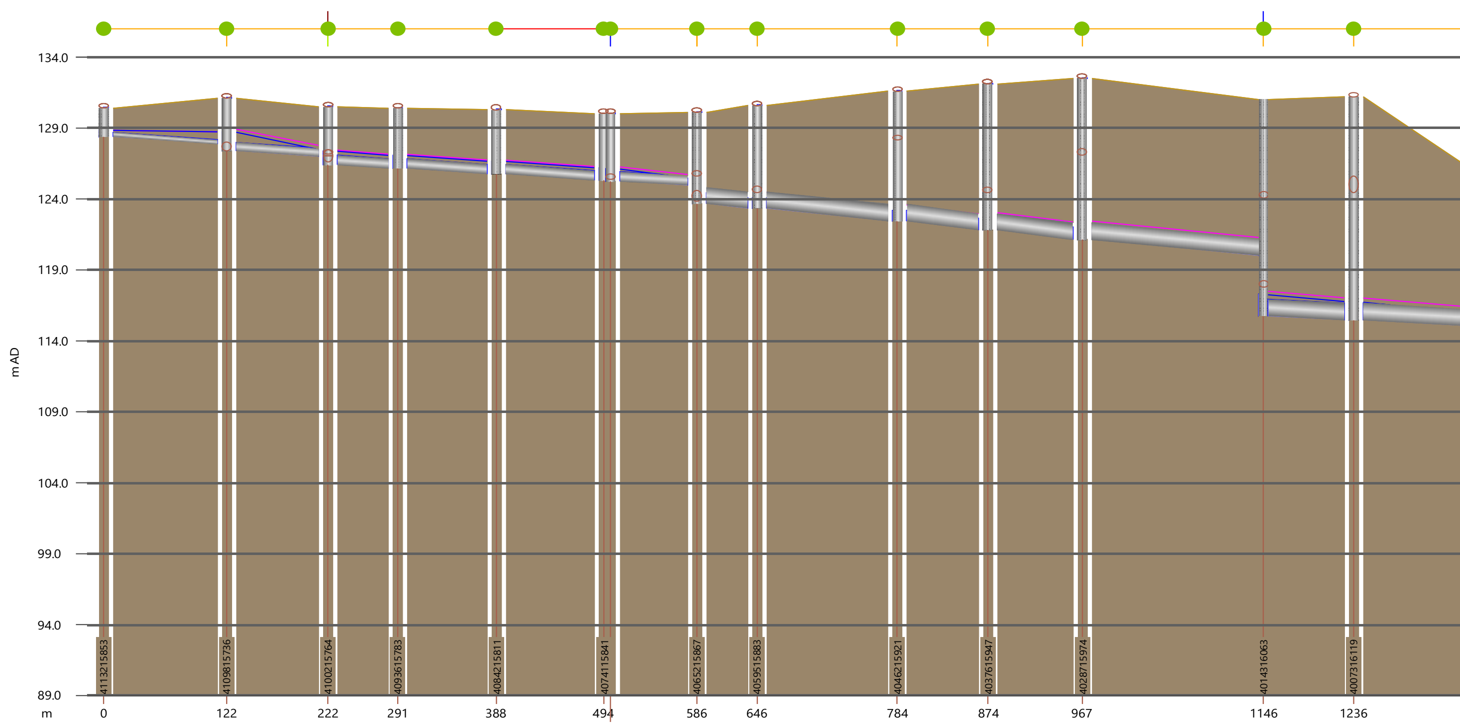


20	21	22	23	24	25	26	27	28	29				
JS tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS dept
.101	3.404	0	4.62644	1.301	295558	88.382	3.404	1.078	4.62644	1.301	88.382	3.404	1.0
.493	2.534	0	4.62644	0.998	295558.1	89.097	3.262	1.122	4.62644	0.998	89.097	3.262	1.1
.069	2.904	0	4.62644	0.643	295558.7	89.543	2.524	1.679	4.62644	0.643	89.543	2.524	1.6
.495	2.588	0	4.62644	0.996	295559.1	90.102	2.856	1.534	4.62644	0.996	90.102	2.856	1.5
.079	2.666	0	4.62645	0.857	295559.4	90.557	2.544	1.796	4.62645	0.857	90.557	2.544	1.7
.675	2.501	0	4.62645	0.987	295560.1	91.154	2.618	1.978	4.62645	0.987	91.154	2.618	1.9
29.85	1.251	0	0.03829	0.32	117.99	129.677	0.596	3.19	0.03829	0.32	129.677	0.596	3.
.696	0.847	0	0.05522	0.99	298.69	129.301	0.973	2.859	0.05522	0.99	129.301	0.973	2.8
129.3	3.317	0	0.06122	3.428	418.45	129.238	1.818	4.375	0.06122	3.428	129.238	1.818	4.3
.235	0.751	0	0.05261	0.824	418.42	128.724	0.77	4.25	0.05261	0.824	128.724	0.77	4.
.268	2.524	0	4.62645	0.882	295561.1	91.764	2.498	2.286	4.62645	0.882	91.764	2.498	2.2
.722	1.837	0	0.05304	1.49	418.42	128.686	0.767	4.392	0.05304	1.49	128.686	0.767	4.3
.697	0.992	0	0.06875	0.879	519.49	127.852	1.039	3.812	0.06875	0.879	127.852	1.039	3.8
.055	2.626	0	4.62645	0.92	295563.1	92.35	2.488	2.537	4.62645	0.92	92.35	2.488	2.5
.914	1.531	0	0.10489	0.993	1739.41	126.821	1.657	2.821	0.10489	0.993	126.821	1.657	2.8
.807	1.697	0	0.10821	1.333	1873.35	123.424	2.325	0.225	0.10821	1.333	123.424	2.325	0.2
.796	2.612	0	4.62646	0.959	295565.8	93.128	2.582	2.809	4.62646	0.959	93.128	2.582	2.8
.486	2.731	0	0.1082	2.443	1873.34	121.399	2.729	0.192	0.1082	2.443	121.399	2.729	0.1
01.96	2.188	0	0.13013	1.958	4896.48	98.183	2.796	0.225	0.13013	1.958	98.183	2.796	0.2
.547	2.662	0	4.66365	0.926	295566	93.86	2.573	3.098	4.66365	0.926	93.86	2.573	3.0
.808	3.121	0	0.13013	2.804	4896.74	102.001	2.928	2.034	0.13013	2.804	102.001	2.928	2.0
.027	2.365	0	0.14381	2.049	4896.49	97.222	2.311	1.393	0.14381	2.049	97.222	2.311	1.3
.212	2.179	0	0.16545	1.481	4896.51	96.609	1.798	2.736	0.16545	1.481	96.609	1.798	2.7
.229	2.618	0	4.73789	0.938	295565.5	94.597	2.627	3.365	4.73789	0.938	94.597	2.627	3.3
.601	1.828	0	0.18504	1.161	4923.25	96.004	1.507	3.459	0.18504	1.161	96.004	1.507	3.4
.997	1.668	0	0.20606	1.158	4923.27	95.939	1.677	3.494	0.20606	1.158	95.939	1.677	3.4
06.15	2.856	0	4.82171	0.862	295567.4	95.279	2.625	3.69	4.82171	0.862	95.279	2.625	3.
.358	2.888	0	0.1082	2.669	1873.34	120.51	2.888	0.167	0.1082	2.669	120.51	2.888	0.1
.583	3.181	0	0.15919	2.669	2295.15	113.611	3.179	0.2	0.15919	2.669	113.611	3.179	(
.518	2.419	0	0.28516	1.685	4722.56	111.722	2.413	0.282	0.28516	1.685	111.722	2.413	0.2
.296	1.21	0	0.15445	0.835	4723.52	107.295	0.95	1.945	0.15445	0.835	107.295	0.95	1.9
.415	2.235	0	0.13016	1.59	4896.94	104.85	2.627	1.8	0.13016	1.59	104.85	2.627	[illegible]
.301	0.75	0	0.12925	0.933	4723.45	107.299	0.613	3.592	0.12925	0.933	107.299	0.613	3.5



Conditions: Existing (Pre-Development)
Sewer Branch: Western (South along Laird Drive)
Flow Conditions: 2-Year Storm

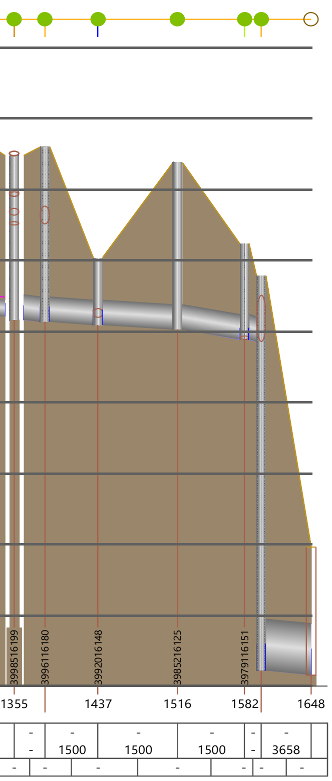
US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max U
3.98E+09	1	1.544	0	0	0.5	1.842		29.15986	1.544	168837.6	93.48	5.499	0	0	0.5	1.842	29.15986		9
3.98E+09	1	1.356	0	0	0.45	0.807		3.91157	1.356	28917.16	114.836	3.513	0	0	0.45	0.807	3.91157		114
3.99E+09	1	1.383	0	0	0.45	0.78		3.91662	1.383	28918.62	115.598	3.643	0	0	0.45	0.78	3.91662		115
3.99E+09	1	0.951	0	0	0.57	1.033		3.92087	0.951	28921.78	115.852	2.706	0	0	0.57	1.033	3.92087		115
4E+09	1	0.996	0	0	0.58	1.03		3.92978	0.996	28924.01	116.089	2.716	0	0	0.58	1.03	3.92978		116
4E+09	1	0.84	0	0	0.58	0.996		2.94888	0.84	23071.19	116.019	2.11	0	0	0.58	0.996	2.94888		116
4.01E+09	1	0.924	0	0	2	1.275		2.7778	0.924	22941.44	117.024	2.39	0	0	2	1.275	2.7778		117
4.01E+09	1	0.865	0	0	2	1.513		2.6011	0.865	22042.66	117.492	2.208	0	0	2	1.513	2.6011		117
4.03E+09	1	1.259	0	0	0.72	0.865		2.53139	1.259	21626.12	122.44	2.902	0	0	0.72	0.865	2.53139		12
4.04E+09	1	1.316	0	0	0.74	0.815		2.34278	1.316	20873.91	123.035	2.887	0	0	0.74	0.815	2.34278		123
4.05E+09	1	1.312	0	0	0.69	0.75		2.07238	1.312	19580.21	123.581	2.819	0	0	0.69	0.75	2.07238		123
4.06E+09	1	1.262	0	0	0.63	0.751		2.04628	1.262	19286.66	124.463	2.779	0	0	0.63	0.751	2.04628		124
4.07E+09	1	1.195	0	0	0.63	0.76		1.97285	1.195	18772.73	124.781	2.637	0	0	0.63	0.76	1.97285		124
4.07E+09	1	0.82	0	0	2	0.861		0.65296	0.82	11330.22	126.267	1.751	0	0	2	0.861	0.65296		126
4.07E+09	1	1.099	0	0	1	0.848		0.53498	1.099	10492.3	126.279	1.637	0	0	1	0.848	0.53498		126
4.08E+09	1	0.883	0	0	2	0.892		0.53285	0.883	10451.07	126.734	1.626	0	0	2	0.892	0.53285		126
4.09E+09	1	0.898	0	0	2	0.908		0.54924	0.898	10336.46	127.147	1.656	0	0	2	0.908	0.54924		127
4.1E+09	1	0.878	0	0	2	0.939		0.57126	0.878	10338.35	127.448	1.633	0	0	2	0.939	0.57126		127
4.11E+09	1	0.871	0	0	2	1.32		0.62148	0.871	8229.76	128.917	2.063	0	0	2	1.32	0.62148		128
4.11E+09	1	0.793	0	0	1	0.452		0.0253	0.793	106.92	128.84	0.657	0	0	1	0.452	0.0253		12



Link	4113215853.1	4109815736.1	-	4093615783.1	4084215811.1	4073415843.1	-	4059515883.1	4046215921.1	4037615947.1	4028715974.1	4014316063.1	4007316119.1
width (mm)	300	600	675	675	675	675	1200	1200	1200	1200	1200	1200	1200

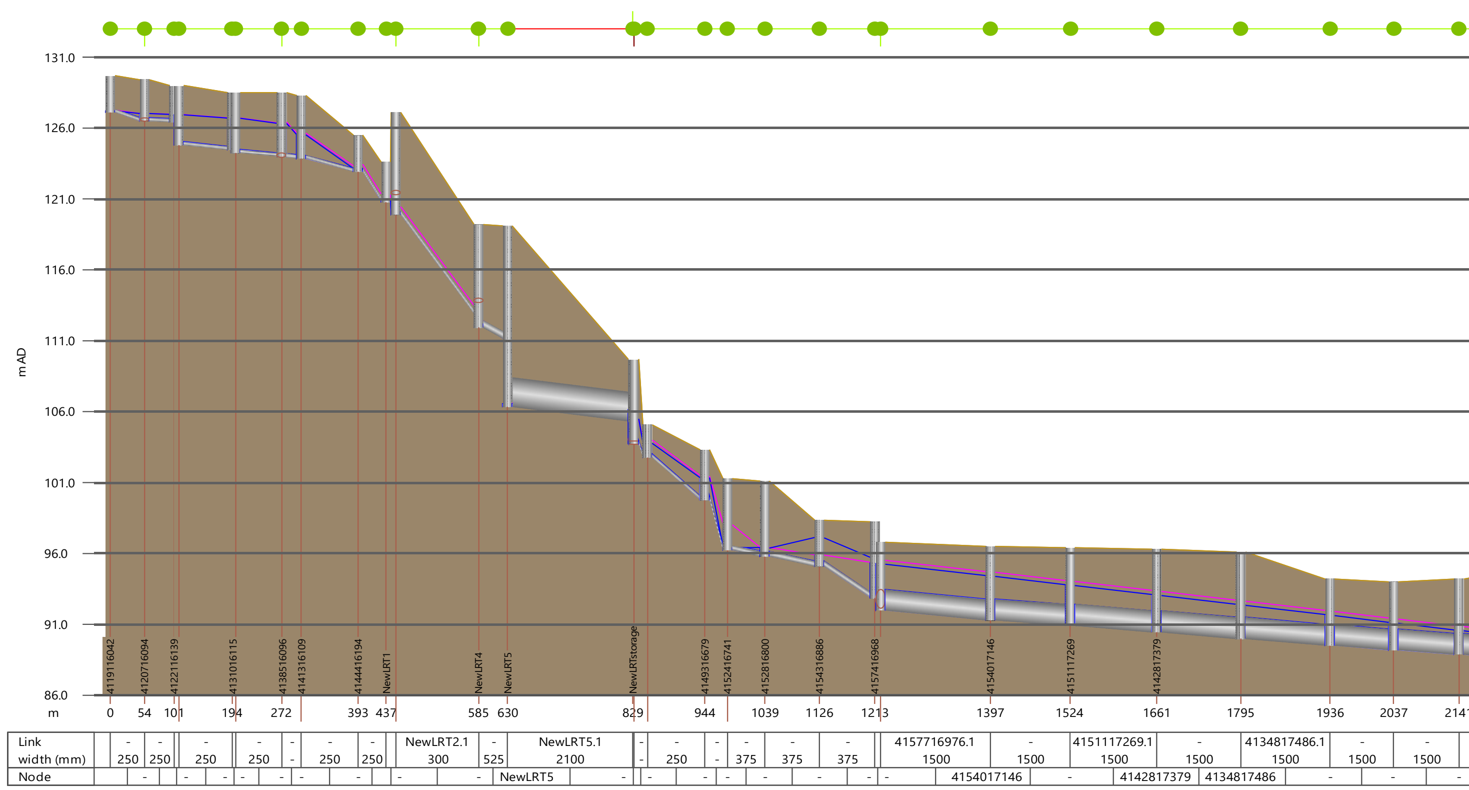
Node	-	4109815736	4100215764	-	4084215811	-	-	-	4059515883	4046215921	4037615947	4028715974	4014316063	4007316119

US tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS dep
93.48	5.499	0	29.15681	1.517	168829.7	93.151	5.499	1.842	29.15681	1.517	93.151	5.499	1.8
.836	3.513	0	3.91177	1.348	28916.59	114.692	3.512	0.807	3.91177	1.348	114.692	3.512	0.8
.598	3.643	0	3.91172	1.346	28917.26	114.836	3.511	0.807	3.91172	1.346	114.836	3.511	0.8
.852	2.706	0	3.91692	0.986	28918.68	115.535	2.92	0.959	3.91692	0.986	115.535	2.92	0.9
.089	2.716	0	3.92206	0.952	28921.91	115.853	2.688	1.039	3.92206	0.952	115.853	2.688	1.0
.019	2.11	0	2.94616	0.794	23070.06	115.928	2.023	1.036	2.94616	0.794	115.928	2.023	1.0
.024	2.39	0	2.76749	0.997	22936.53	116.424	2.981	0.918	2.76749	0.997	116.424	2.981	0.9
.492	2.208	0	2.5996	0.87	22038.94	117.03	2.221	1.318	2.5996	0.87	117.03	2.221	1.3
22.44	2.902	0	2.52559	1.235	21621.28	121.292	2.897	0.864	2.52559	1.235	121.292	2.897	0.8
.035	2.887	0	2.34054	1.194	20871.72	122.381	2.617	0.887	2.34054	1.194	122.381	2.617	0.8
.581	2.819	0	2.06492	1.21	19577.87	122.945	2.477	0.833	2.06492	1.21	122.945	2.477	0.8
.463	2.779	0	2.03152	1.239	19282.63	123.564	2.703	0.761	2.03152	1.239	123.564	2.703	0.7
.781	2.637	0	1.96777	1.174	18771.29	124.434	2.609	0.762	1.96777	1.174	124.434	2.609	0.7
.267	1.751	0	0.65294	0.997	11327.67	125.728	2.23	0.515	0.65294	0.997	125.728	2.23	0.5
.279	1.637	0	0.53482	0.798	10492.12	126.247	1.474	0.897	0.53482	0.798	126.247	1.474	0.8
.734	1.626	0	0.51896	0.991	10448.27	126.293	1.577	0.871	0.51896	0.991	126.293	1.577	0.8
.147	1.656	0	0.52449	0.874	10333.79	126.754	1.573	0.915	0.52449	0.874	126.754	1.573	0.9
.448	1.633	0	0.55117	0.897	10336.53	127.17	1.633	0.931	0.55117	0.897	127.17	1.633	0.9
.917	2.063	0	0.62134	0.998	8227.6	127.79	2.422	0.511	0.62134	0.998	127.79	2.422	0.5
28.84	0.657	0	0.02551	0.957	106.86	128.738	0.719	0.857	0.02551	0.957	128.738	0.719	0.8

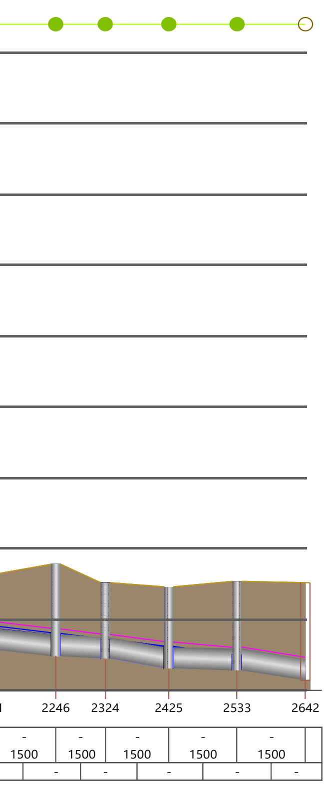


Conditions: Existing (Pre-Development)
Sewer Branch: Eastern (East along Eglinton)
Flow Conditions: 2-Year Storm

US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max U
4.07E+09	1	1.308	0	0	0.7	1.056		4.42094	1.308	108778.8	89.052	3.371	0	0	0.7	1.056	4.42094		89
4.08E+09	1	0.67	0	0	2	1.558		4.42143	0.67	108782.5	89.402	2.447	0	0	2	1.558	4.42143		89
4.09E+09	1	1.273	0	0	1	1.376		4.42261	1.273	108785.5	89.952	2.925	0	0	1	1.376	4.42261		89
4.1E+09	1	0.874	0	0	2	1.588		4.42427	0.874	108787.2	90.328	2.57	0	0	2	1.588	4.42427		90
4.11E+09	1	0.99	0	0	2	1.694		4.42535	0.99	108789.7	90.845	2.649	0	0	2	1.694	4.42535		90
4.12E+09	1	0.894	0	0	2	1.92		4.4261	0.894	108792.3	91.375	2.49	0	0	2	1.92	4.4261		91
4.12E+09	1	1.209	0	0	1	0.107		0.02131	1.209	59.91	127.267	1.064	0	0	1	0.107	0.02131		127
4.12E+09	1	0.48	0	0	2	0.542		0.03027	0.48	131.43	127.024	0.602	0	0	2	0.542	0.03027		127
4.12E+09	1	4.792	0	0	1	0.542		0.04421	4.792	189.09	127.096	3.431	0	0	1	0.542	0.04421		127
4.12E+09	1	0.753	0	0	1	2.139		0.03375	0.753	189.09	126.945	0.84	0	0	1	2.139	0.03375		126
4.13E+09	1	0.92	0	0	2	2.115		4.43056	0.92	108795.5	91.906	2.524	0	0	2	2.115	4.43056		91
4.13E+09	1	2.211	0	0	1	2.199		0.02936	2.211	189	126.716	1.51	0	0	1	2.199	0.02936		126
4.13E+09	1	0.687	0	0	2	2.44		0.03761	0.687	239.16	126.704	0.712	0	0	2	2.44	0.03761		126
4.13E+09	1	0.959	0	0	2	2.333		4.46552	0.959	108798.6	92.631	2.613	0	0	2	2.333	4.46552		92
4.14E+09	1	0.626	0	0	2	2.37		0.08705	0.626	747.78	126.424	1.419	0	0	2	2.37	0.08705		126
4.14E+09	1	1.144	0	0	2	1.711		0.0889	1.144	794.94	125.645	1.53	0	0	2	1.711	0.0889		125
4.14E+09	1	0.929	0	0	2	2.581		4.51029	0.929	108801.4	93.321	2.573	0	0	2	2.581	4.51029		93
4.14E+09	1	2.456	0	0	0.65	0.162		0.0889	2.456	794.83	123.44	2.636	0	0	0.65	0.162	0.0889		12
4.15E+09	1	1.959	0	0	2	1.593		0.12179	1.959	1815.33	101.467	2.185	0	0	2	1.593	0.12179		101
4.15E+09	1	0.938	0	0	2	2.81		4.5455	0.938	108805	94.022	2.596	0	0	2	2.81	4.5455		94
4.15E+09	1	2.807	0	0	1	1.007		0.12182	2.807	1815.38	103.988	3.115	0	0	1	1.007	0.12182		103
4.15E+09	1	2.091	0	0	1	0.178		0.12179	2.091	1815.21	98.021	2.36	0	0	1	0.178	0.12179		98
4.15E+09	1	1.803	0	0	1	0.604		0.12916	1.803	1815.1	96.419	2.154	0	0	1	0.604	0.12916		96
4.15E+09	1	0.872	0	0	2	3.097		4.57278	0.872	108809	94.666	2.486	0	0	2	3.097	4.57278		94
4.15E+09	1	1.483	0	0	1	2.022		0.13696	1.483	1822.24	95.891	1.846	0	0	1	2.022	0.13696		95
4.16E+09	1	1.163	0	0	1	2.833		0.14211	1.163	1822.08	95.374	1.147	0	0	1	2.833	0.14211		95
4.16E+09	1	1.01	0	0	2	3.271		4.60705	1.01	108813.9	95.521	2.758	0	0	2	3.271	4.60705		95
NewLRT1	2	2.67	0	0	0.47	0.142		0.08889	2.67	794.78	121.289	2.695	0	0	0.47	0.142	0.08889		121
NewLRT2	1	2.675	0	0	0.53	0.159		0.10951	2.675	949.75	120.452	2.891	0	0	0.53	0.159	0.10951		120
NewLRT4	1	1.684	0	0	0.43	0.225		0.19183	1.684	1756.39	112.403	2.161	0	0	0.43	0.225	0.19183		112
NewLRT5	1	0.875	0	0	0.38	0.213		0.19167	0.875	1756.33	106.613	1.043	0	0	0.38	0.213	0.19167		106
NewLRT6	1	1.591	0	0	2	1.823		0.12324	1.591	1815.43	105.405	2.228	0	0	2	1.823	0.12324		105
NewLRTstc	1	0.972	0	0	1	2.407		0.13042	0.972	1756.07	106.15	0.752	0	0	1	2.407	0.13042		10

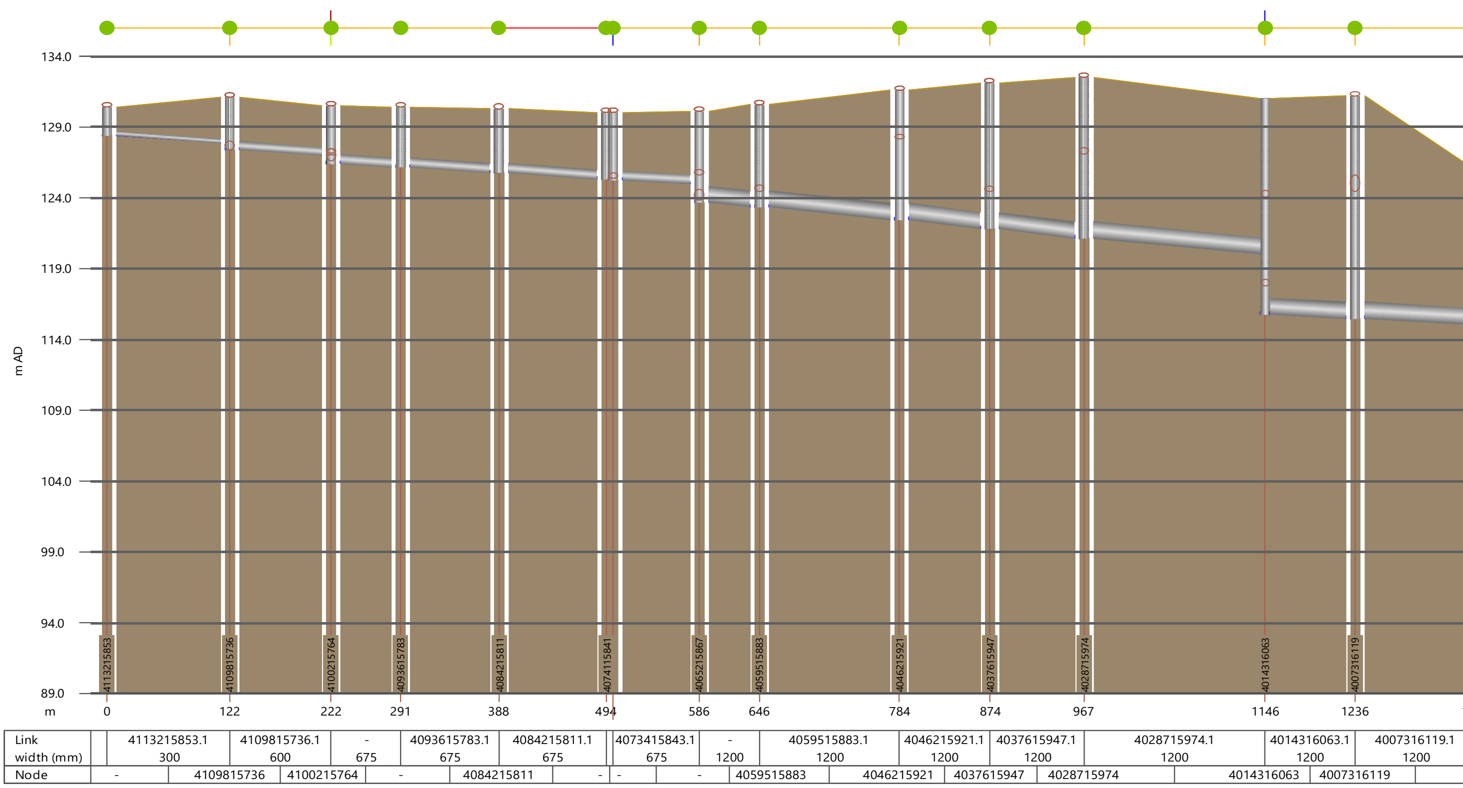


S tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS dept
.052	3.371	0	4.42051	1.301	108776.3	88.333	3.351	1.056	4.42051	1.301	88.333	3.351	1.0
.402	2.447	0	4.42097	0.998	108778.9	89.049	3.191	1.098	4.42097	0.998	89.049	3.191	1.0
.952	2.925	0	4.42147	0.666	108782.6	89.44	2.43	1.6	4.42147	0.666	89.44	2.43	[illegible]
.328	2.57	0	4.42275	0.996	108785.6	89.975	2.87	1.409	4.42275	0.996	89.975	2.87	1.4
.845	2.649	0	4.42453	0.873	108787.3	90.369	2.527	1.632	4.42453	0.873	90.369	2.527	1.6
.375	2.49	0	4.4258	0.991	108789.8	90.898	2.604	1.747	4.4258	0.991	90.898	2.604	1.7
.267	1.064	0	0.01983	0.384	59.89	127.021	0.398	0.543	0.01983	0.384	127.021	0.398	0.5
.024	0.602	0	0.02806	0.991	131.4	126.973	1.028	0.545	0.02806	0.991	126.973	1.028	0.5
.096	3.431	0	0.04286	3.415	189.09	126.947	1.842	2.091	0.04286	3.415	126.947	1.842	2.0
.945	0.84	0	0.03083	0.747	189	126.718	0.741	2.251	0.03083	0.747	126.718	0.741	2.2
.906	2.524	0	4.42663	0.895	108792.3	91.445	2.452	1.991	4.42663	0.895	91.445	2.452	1.9
.716	1.51	0	0.02938	1.48	189	126.699	0.758	2.413	0.02938	1.48	126.699	0.758	2.4
.704	0.712	0	0.03763	0.884	239.12	126.357	0.645	2.336	0.03763	0.884	126.357	0.645	2.3
.631	2.613	0	4.44064	0.92	108795.6	91.985	2.486	2.195	4.44064	0.92	91.985	2.486	2.1
.424	1.419	0	0.08705	0.993	747.72	125.66	1.502	1.681	0.08705	0.993	125.66	1.502	1.6
.645	1.53	0	0.0889	1.143	794.84	123.334	1.91	0.225	0.0889	1.143	123.334	1.91	0.2
.321	2.573	0	4.47913	0.959	108798.7	92.709	2.569	2.412	4.47913	0.959	92.709	2.569	2.4
3.44	2.636	0	0.0889	2.437	794.79	121.353	2.636	0.162	0.0889	2.437	121.353	2.636	0.1
.467	2.185	0	0.12179	1.997	1815.22	98.133	2.617	0.225	0.12179	1.997	98.133	2.617	0.2
.022	2.596	0	4.52468	0.93	108801.5	93.393	2.532	2.653	4.52468	0.93	93.393	2.532	2.6
.988	3.115	0	0.12181	2.997	1815.33	101.506	2.928	1.551	0.12181	2.997	101.506	2.928	1.5
.021	2.36	0	0.12666	2.054	1815.1	96.434	2.294	0.608	0.12666	2.054	96.434	2.294	0.6
.419	2.154	0	0.1336	1.485	1814.97	95.898	1.813	2.029	0.1336	1.485	95.898	1.813	2.0
.666	2.486	0	4.55953	0.939	108805.1	94.087	2.553	2.876	4.55953	0.939	94.087	2.553	2.8
.891	1.846	0	0.13879	1.162	1822.09	95.38	1.12	2.839	0.13879	1.162	95.38	1.12	2.8
.374	1.147	0	0.14229	1.163	1822.07	95.324	1.146	2.884	0.14229	1.163	95.324	1.146	2.8
.521	2.758	0	4.58754	0.871	108809.1	94.722	2.492	3.153	4.58754	0.871	94.722	2.492	3.1
.289	2.695	0	0.0889	2.669	794.77	120.441	2.695	0.142	0.0889	2.669	120.441	2.695	0.1
.452	2.891	0	0.10939	2.669	949.68	113.48	2.89	0.158	0.10939	2.669	113.48	2.89	0.1
.403	2.161	0	0.19175	1.68	1756.34	111.607	2.16	0.225	0.19175	1.68	111.607	2.16	0.2
.613	1.043	0	0.15816	0.842	1756.1	106.144	0.965	0.793	0.15816	0.842	106.144	0.965	0.7
.405	2.228	0	0.1223	1.59	1815.38	104.032	2.608	0.978	0.1223	1.59	104.032	2.608	0.9
6.15	0.752	0	0.13024	0.836	1756.05	106.148	0.617	2.441	0.13024	0.836	106.148	0.617	2.4

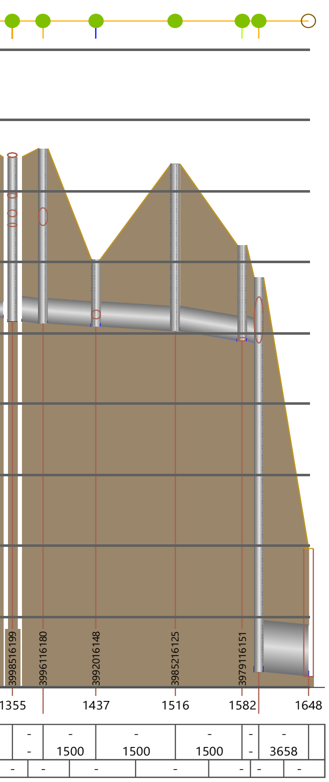


Conditions:	Existing (Pre-Development)
Sewer Branch:	Western (South along Laird Drive)
Flow Conditions:	Dry-Weather Flow

US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max U
3.98E+09	1	1.117	0	0	0.1	0.381		1.03586	1.117	56544.4	90.639	1.783	0	0	0.1	0.381	1.03586		90
3.98E+09	1	0.893	0	0	0.08	0.144		0.15091	0.893	8548.37	113.59	0.946	0	0	0.08	0.144	0.15091		11
3.99E+09	1	0.429	0	0	0.12	0.216		0.15091	0.429	8548.38	114.374	0.579	0	0	0.12	0.216	0.15091		114
3.99E+09	1	0.67	0	0	0.12	0.168		0.15091	0.67	8548.41	114.646	0.78	0	0	0.12	0.168	0.15091		114
4E+09	1	0.715	0	0	0.09	0.162		0.15091	0.715	8548.43	114.879	0.815	0	0	0.09	0.162	0.15091		114
4E+09	1	0.621	0	0	0.09	0.155		0.12056	0.621	6660.14	114.975	0.688	0	0	0.09	0.155	0.12056		114
4.01E+09	1	0.827	0	0	0.17	0.201		0.12056	0.827	6660.24	115.709	0.965	0	0	0.17	0.201	0.12056		115
4.01E+09	1	0.778	0	0	0.17	0.205		0.11738	0.778	6453.53	115.978	0.916	0	0	0.17	0.205	0.11738		115
4.03E+09	1	1.08	0	0	0.14	0.172		0.11535	1.08	6339.33	121.386	1.162	0	0	0.14	0.172	0.11535		121
4.04E+09	1	1.111	0	0	0.14	0.168		0.11383	1.111	6240.99	122.041	1.183	0	0	0.14	0.168	0.11383		122
4.05E+09	1	1.102	0	0	0.14	0.166		0.11003	1.102	6030.88	122.67	1.165	0	0	0.14	0.166	0.11003		12
4.06E+09	1	1.066	0	0	0.14	0.168		0.10928	1.066	5988.81	123.561	1.135	0	0	0.14	0.168	0.10928		123
4.07E+09	1	1.009	0	0	0.14	0.168		0.10299	1.009	5707.47	123.899	1.073	0	0	0.14	0.168	0.10299		123
4.07E+09	1	0.799	0	0	0.24	0.161		0.05515	0.799	2926.45	125.447	0.842	0	0	0.24	0.161	0.05515		125
4.07E+09	1	1.065	0	0	0.24	0.139		0.05515	1.065	2926.46	125.524	1.04	0	0	0.24	0.139	0.05515		125
4.08E+09	1	0.863	0	0	0.23	0.155		0.05515	0.863	2926.6	125.945	0.892	0	0	0.23	0.155	0.05515		125
4.09E+09	1	0.877	0	0	0.23	0.153		0.05508	0.877	2920.01	126.345	0.902	0	0	0.23	0.153	0.05508		126
4.1E+09	1	0.858	0	0	0.23	0.155		0.05508	0.858	2920.09	126.615	0.888	0	0	0.23	0.155	0.05508		126
4.11E+09	1	0.851	0	0	0.24	0.145		0.04487	0.851	2357.38	127.562	0.849	0	0	0.24	0.145	0.04487		127
4.11E+09	1	0.489	0	0	0.12	0.035		0.00107	0.489	57.94	128.419	0.235	0	0	0.12	0.035	0.00107		128

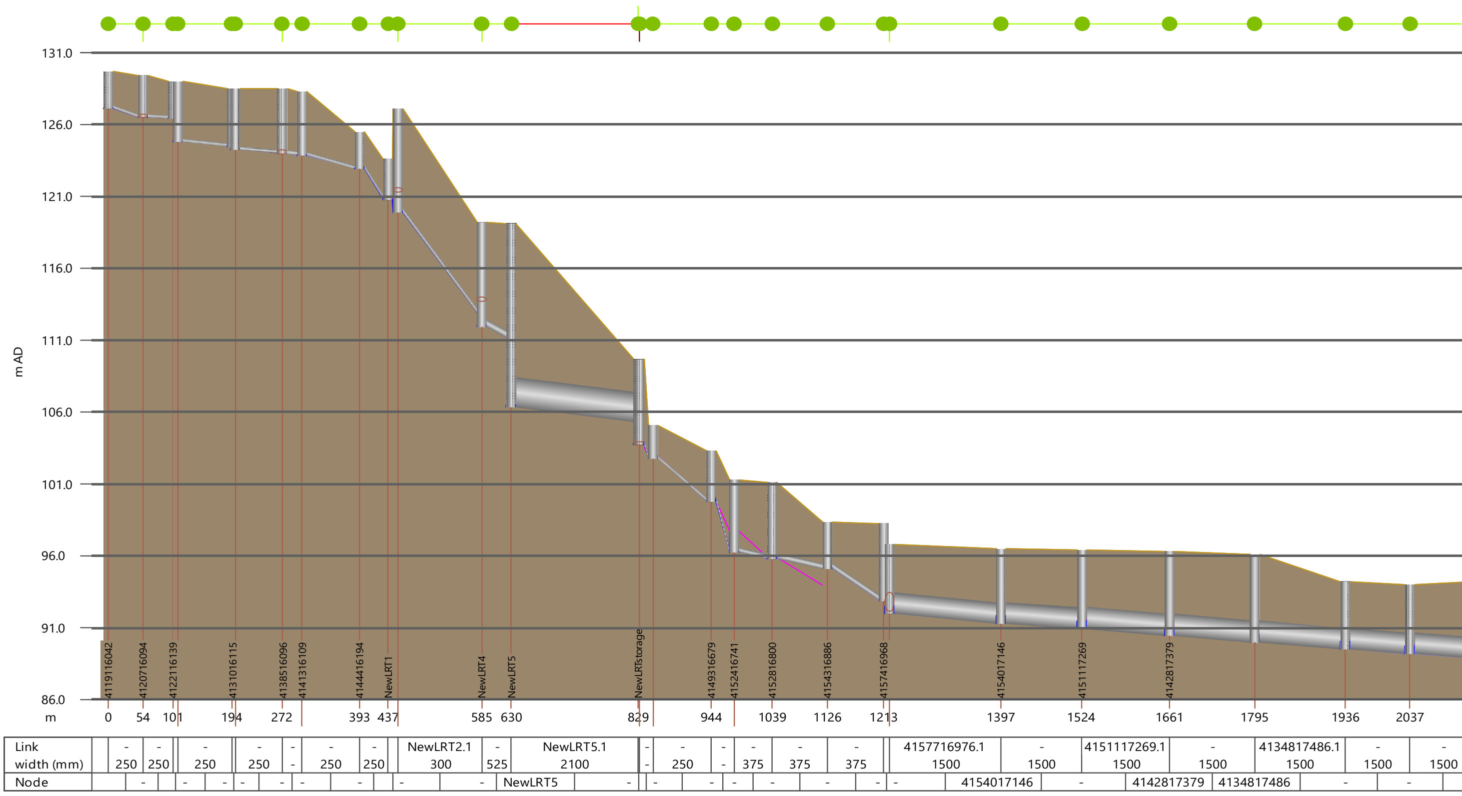


US tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS dept
.639	1.783	0	1.03583	1.117	56544.24	90.31	1.783	0.381	1.03583	1.117	90.31	1.783	0.3
13.59	0.946	0	0.1509	0.893	8548.36	113.447	0.946	0.144	0.1509	0.893	113.447	0.946	0.1
.374	0.579	0	0.15091	0.429	8548.37	113.634	0.579	0.216	0.15091	0.429	113.634	0.579	0.2
.646	0.78	0	0.15091	0.429	8548.38	114.374	0.579	0.216	0.15091	0.429	114.374	0.579	0.2
.879	0.815	0	0.15091	0.67	8548.41	114.646	0.78	0.168	0.15091	0.67	114.646	0.78	0.1
.975	0.688	0	0.12057	0.572	6660.12	114.867	0.651	0.162	0.12057	0.572	114.867	0.651	0.1
.709	0.965	0	0.12056	0.931	6660.14	115.299	1.054	0.189	0.12056	0.931	115.299	1.054	0.1
.978	0.916	0	0.11737	0.804	6453.4	115.706	0.939	0.201	0.11737	0.804	115.706	0.939	0.2
.386	1.162	0	0.11535	1.08	6338.93	120.24	1.162	0.172	0.11535	1.08	120.24	1.162	0.1
2.041	1.183	0	0.11383	1.065	6240.73	121.385	1.146	0.172	0.11383	1.065	121.385	1.146	0.1
22.67	1.165	0	0.11003	1.073	6030.59	122.037	1.143	0.168	0.11003	1.073	122.037	1.143	0.1
.561	1.135	0	0.10928	1.066	5988.34	122.669	1.135	0.168	0.10928	1.066	122.669	1.135	0.1
.899	1.073	0	0.10299	1.009	5707.29	123.554	1.073	0.168	0.10299	1.009	123.554	1.073	0.1
.447	0.842	0	0.05514	0.966	2926.34	125.154	0.968	0.146	0.05514	0.966	125.154	0.968	0.1
.524	1.04	0	0.05515	0.799	2926.46	125.447	0.842	0.161	0.05515	0.799	125.447	0.842	0.1
.945	0.892	0	0.05515	0.963	2926.47	125.524	0.967	0.146	0.05515	0.963	125.524	0.967	0.1
.345	0.902	0	0.05507	0.861	2919.9	125.945	0.89	0.155	0.05507	0.861	125.945	0.89	0.1
.615	0.888	0	0.05508	0.876	2920.02	126.345	0.902	0.153	0.05508	0.876	126.345	0.902	0.1
7.562	0.849	0	0.04486	0.967	2357.29	127.16	0.936	0.136	0.04486	0.967	127.16	0.936	0.1
.419	0.235	0	0.00107	0.597	57.94	127.911	0.273	0.031	0.00107	0.597	127.911	0.273	0.0



Conditions:	Existing (Pre-Development)
Sewer Branch:	Eastern (East along Eglinton)
Flow Conditions:	Dry-Weather Flow

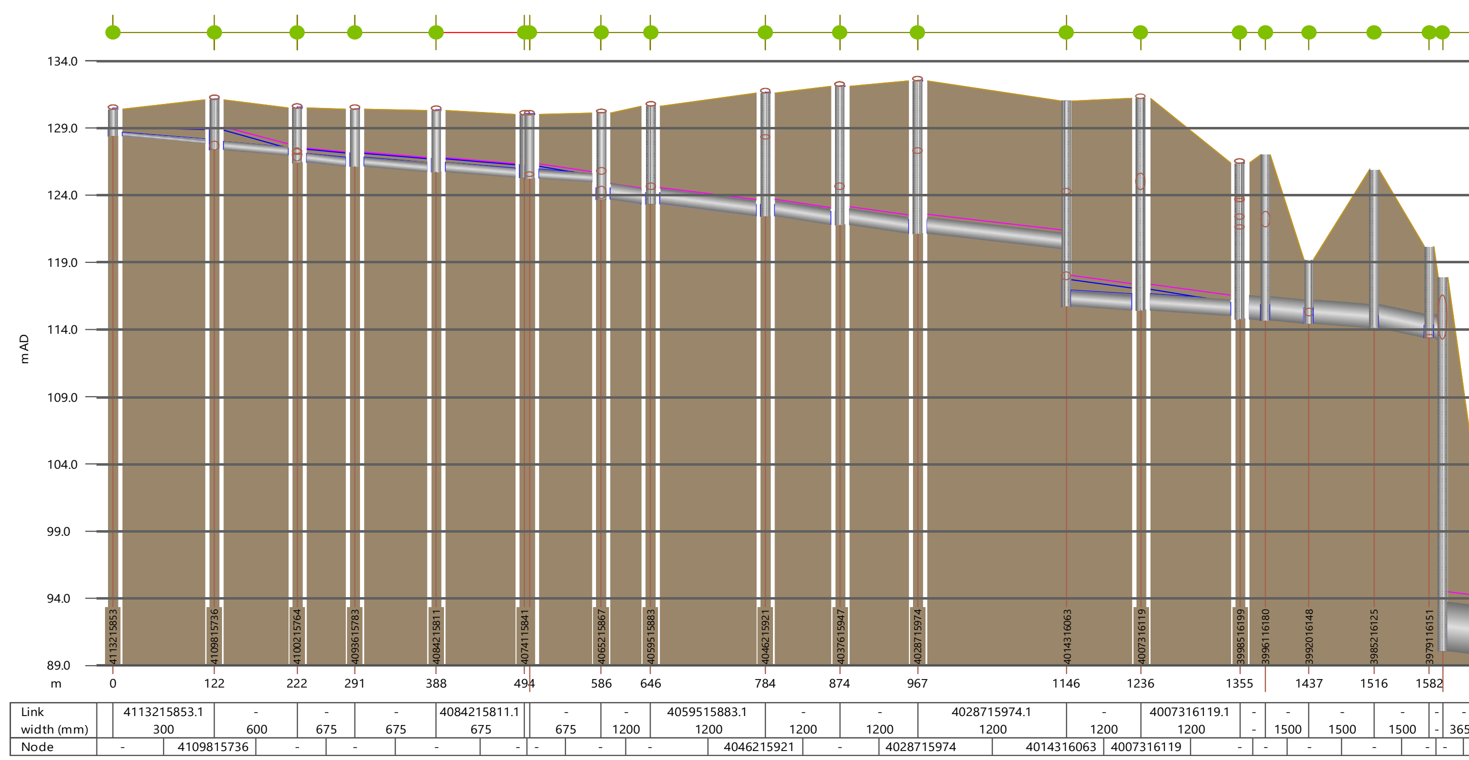
US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Ma
4.07E+09	1	1.3	0	0	0.3	0.446		1.01358	1.3	81631.14	88.148	2.305	0	0	0.3	0.446	1.01358		
4.08E+09	1	0.628	0	0	0.43	0.65		1.01358	0.628	81631.26	88.286	1.382	0	0	0.43	0.65	1.01358		
4.09E+09	1	1.273	0	0	0.43	0.451		1.01359	1.273	81631.35	88.943	2.267	0	0	0.43	0.451	1.01359		
4.1E+09	1	0.855	0	0	0.37	0.553		1.01359	0.855	81631.41	89.141	1.712	0	0	0.37	0.553	1.01359		
4.11E+09	1	0.992	0	0	0.37	0.517		1.01359	0.992	81631.49	89.552	1.877	0	0	0.37	0.517	1.01359		
4.12E+09	1	0.877	0	0	0.36	0.546		1.0136	0.877	81631.56	89.861	1.743	0	0	0.36	0.546	1.0136		
4.12E+09	1	0.091	0	0	0.16	0.026		0.0001	0.091	8.91	127.128	0.038	0	0	0.16	0.026	0.0001		
4.12E+09	1	0.309	0	0	0.16	0.041		0.00085	0.309	51.18	126.518	0.162	0	0	0.16	0.041	0.00085		
4.12E+09	1	0.78	0	0	0.11	0.027		0.00097	0.78	62.3	126.455	0.334	0	0	0.11	0.027	0.00097		
4.12E+09	1	0.486	0	0	0.32	0.035		0.00097	0.486	62.3	124.833	0.235	0	0	0.32	0.035	0.00097		
4.13E+09	1	0.912	0	0	0.36	0.535		1.0136	0.912	81631.62	90.197	1.792	0	0	0.36	0.535	1.0136		
4.13E+09	1	0.659	0	0	0.12	0.03		0.00097	0.659	62.3	124.54	0.295	0	0	0.12	0.03	0.00097		
4.13E+09	1	0.48	0	0	0.15	0.037		0.00107	0.48	70.33	124.286	0.239	0	0	0.15	0.037	0.00107		
4.13E+09	1	0.954	0	0	0.36	0.526		1.01361	0.954	81631.7	90.705	1.832	0	0	0.36	0.526	1.01361		
4.14E+09	1	0.609	0	0	0.3	0.074		0.00533	0.609	309.83	124.036	0.44	0	0	0.3	0.074	0.00533		
4.14E+09	1	1.064	0	0	0.24	0.059		0.00605	1.064	349.71	123.897	0.681	0	0	0.24	0.059	0.00605		
4.14E+09	1	0.916	0	0	0.36	0.534		1.01361	0.916	81631.76	91.151	1.795	0	0	0.36	0.534	1.01361		
4.14E+09	1	1.782	0	0	0.18	0.045		0.00605	1.782	349.71	123.019	0.992	0	0	0.18	0.045	0.00605		
4.15E+09	1	1.896	0	0	0.32	0.079		0.01889	1.896	1086.99	99.826	1.416	0	0	0.32	0.079	0.01889		
4.15E+09	1	0.93	0	0	0.36	0.531		1.01362	0.93	81631.81	91.623	1.809	0	0	0.36	0.531	1.01362		
4.15E+09	1	2.552	0	0	0.27	0.068		0.01889	2.552	1086.99	102.953	1.758	0	0	0.27	0.068	0.01889		
4.15E+09	1	1.647	0	0	0.2	0.076		0.01889	1.647	1086.99	97.706	1.186	0	0	0.2	0.076	0.01889		
4.15E+09	1	1.493	0	0	0.23	0.08		0.01889	1.493	1086.99	95.903	1.104	0	0	0.23	0.08	0.01889		
4.15E+09	1	0.861	0	0	0.37	0.551		1.01363	0.861	81631.86	91.987	1.72	0	0	0.37	0.551	1.01363		
4.15E+09	1	1.302	0	0	0.24	0.086		0.01898	1.302	1094.26	93.96	1.001	0	0	0.24	0.086	0.01898		
4.16E+09	1	1.156	0	0	0.24	0.091		0.01898	1.156	1094.26	92.634	0.918	0	0	0.24	0.091	0.01898		
4.16E+09	1	0.997	0	0	0.37	0.517		1.01364	0.997	81631.91	92.665	1.878	0	0	0.37	0.517	1.01364		
NewLRT1	2	1.634	0	0	0.15	0.045		0.00605	1.634	349.71	120.863	0.904	0	0	0.15	0.045	0.00605		
NewLRT2	1	1.812	0	0	0.16	0.049		0.00793	1.812	459.61	119.973	1.047	0	0	0.16	0.049	0.00793		
NewLRT4	1	1.101	0	0	0.16	0.083		0.0181	1.101	1040.03	112.058	0.825	0	0	0.16	0.083	0.0181		
NewLRT5	1	0.276	0	0	0.06	0.12		0.0181	0.276	1040.03	106.467	0.234	0	0	0.06	0.12	0.0181		
NewLRT6	1	1.544	0	0	0.35	0.088		0.01889	1.544	1086.99	103.527	1.227	0	0	0.35	0.088	0.01889		
NewLRTst(	1	0.972	0	0	0.17	0.086		0.0181	0.972	1040.03	103.848	0.732	0	0	0.17	0.086	0.0181		



ax US to	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS to	Max DS ve	DS dep
88.148	2.305	0	1.01358	1.3	81631.06	87.429	2.305	0.446	1.01358	1.3	87.429	2.305	0.
88.286	1.382	0	1.01358	0.991	81631.14	88.129	1.901	0.512	1.01358	0.991	88.129	1.901	0.
88.943	2.267	0	1.01358	0.628	81631.26	88.286	1.382	0.65	1.01358	0.628	88.286	1.382	0
89.141	1.712	0	1.01359	0.986	81631.35	88.927	1.893	0.514	1.01359	0.986	88.927	1.893	0.
89.552	1.877	0	1.01359	0.854	81631.41	89.141	1.711	0.554	1.01359	0.854	89.141	1.711	0.
89.861	1.743	0	1.01359	0.983	81631.49	89.552	1.876	0.517	1.01359	0.983	89.552	1.876	0.
127.128	0.038	0	0.0001	0.07	8.91	126.517	0.031	0.041	0.0001	0.07	126.517	0.031	0.
126.518	0.162	0	0.00085	0.544	51.18	126.456	0.246	0.031	0.00085	0.544	126.456	0.246	0.
126.455	0.334	0	0.00097	0.78	62.3	124.878	0.334	0.027	0.00097	0.78	124.878	0.334	0.
124.833	0.235	0	0.00097	0.096	62.3	124.536	0.072	0.08	0.00097	0.096	124.536	0.072	0
90.197	1.792	0	1.0136	0.876	81631.56	89.861	1.742	0.546	1.0136	0.876	89.861	1.742	0.
124.54	0.295	0	0.00097	0.659	62.3	124.31	0.295	0.03	0.00097	0.659	124.31	0.295	0
124.286	0.239	0	0.00107	0.616	70.33	124.039	0.287	0.032	0.00107	0.616	124.039	0.287	0.
90.705	1.832	0	1.0136	0.912	81631.62	90.197	1.791	0.535	1.0136	0.912	90.197	1.791	0.
124.036	0.44	0	0.00533	0.931	309.83	123.942	0.597	0.059	0.00533	0.931	123.942	0.597	0.
123.897	0.681	0	0.00605	1.064	349.71	123.006	0.681	0.059	0.00605	1.064	123.006	0.681	0.
91.151	1.795	0	1.01361	0.953	81631.7	90.705	1.831	0.527	1.01361	0.953	90.705	1.831	0.
123.019	0.992	0	0.00605	1.782	349.71	120.932	0.992	0.045	0.00605	1.782	120.932	0.992	0.
99.826	1.416	0	0.01889	1.895	1086.99	97.74	1.416	0.079	0.01889	1.895	97.74	1.416	0.
91.623	1.809	0	1.01361	0.916	81631.76	91.151	1.794	0.535	1.01361	0.916	91.151	1.794	0.
102.953	1.758	0	0.01889	2.552	1086.99	99.95	1.758	0.068	0.01889	2.552	99.95	1.758	0.
97.706	1.186	0	0.01889	1.647	1086.99	95.918	1.186	0.076	0.01889	1.647	95.918	1.186	0.
95.903	1.104	0	0.01889	1.3	1086.98	93.959	0.998	0.085	0.01889	1.3	93.959	0.998	0.
91.987	1.72	0	1.01362	0.929	81631.81	91.623	1.808	0.532	1.01362	0.929	91.623	1.808	0.
93.96	1.001	0	0.01898	1.155	1094.26	92.634	0.918	0.091	0.01898	1.155	92.634	0.918	0.
92.634	0.918	0	0.01898	1.156	1094.26	92.534	0.918	0.091	0.01898	1.156	92.534	0.918	0.
92.665	1.878	0	1.01363	0.86	81631.86	91.987	1.72	0.552	1.01363	0.86	91.987	1.72	0.
120.863	0.904	0	0.00605	1.634	349.71	120.015	0.904	0.045	0.00605	1.634	120.015	0.904	0.
119.973	1.047	0	0.00793	1.812	459.61	113.001	1.047	0.049	0.00793	1.812	113.001	1.047	0.
112.058	0.825	0	0.0181	1.101	1040.03	111.262	0.825	0.083	0.0181	1.101	111.262	0.825	0.
106.467	0.234	0	0.0181	0.276	1040.03	105.472	0.234	0.12	0.0181	0.276	105.472	0.234	0
103.527	1.227	0	0.01889	1.544	1086.99	102.963	1.227	0.088	0.01889	1.544	102.963	1.227	0.
103.848	0.732	0	0.0181	0.933	1040.03	103.818	0.568	0.102	0.0181	0.933	103.818	0.568	0.

Conditions: Existing (Pre-Development)
Sewer Branch: Western (South along Laird Drive)
Flow Conditions: May 2000 Extreme Rainfall

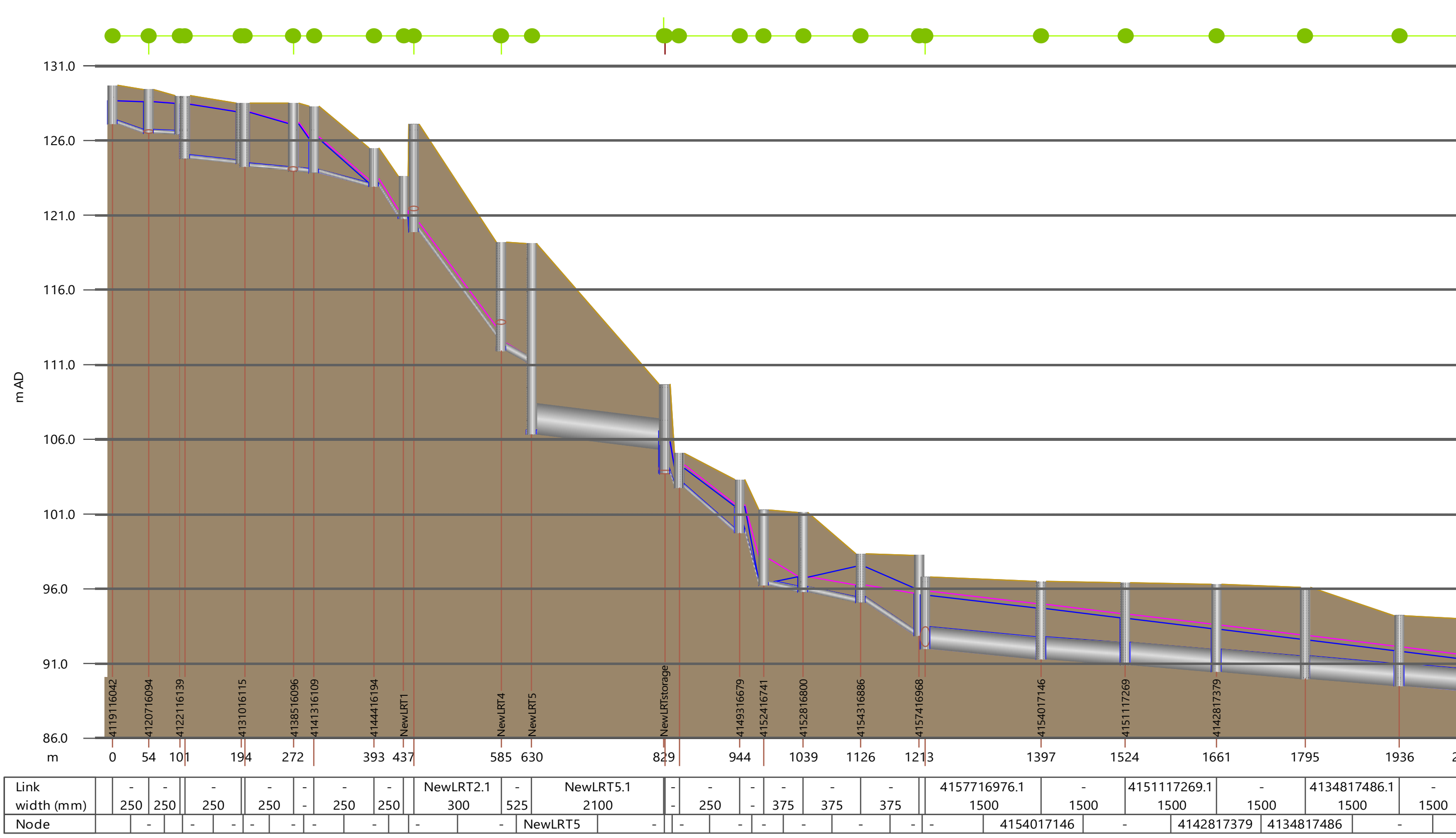
US node ID	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltra	Max Latera	Max Surch	Max US de	Max US flo	Volume (m	Max U
3.98E+09	1	1.582	0	0	0.69	2.539		46.9296	1.582	439672.5	94.489	6.143	0	0	0.69	2.539	46.9296		94
3.98E+09	1	1.364	0	0	0.5	0.907		4.6003	1.364	61509.93	114.984	3.642	0	0	0.5	0.907	4.6003		114
3.99E+09	1	1.383	0	0	0.5	0.882		4.60343	1.383	61509.66	115.742	3.754	0	0	0.5	0.882	4.60343		115
3.99E+09	1	0.968	0	0	0.64	1.151		4.6065	0.968	61509.34	116.008	2.841	0	0	0.64	1.151	4.6065		116
4E+09	1	1.021	0	0	0.65	1.159		4.61328	1.021	61508.04	116.247	2.831	0	0	0.65	1.159	4.61328		116
4E+09	1	0.855	0	0	0.65	1.131		3.4819	0.855	48277.18	116.17	2.219	0	0	0.65	1.131	3.4819		11
4.01E+09	1	0.974	0	0	2	1.542		3.1857	0.974	47903.18	117.375	2.703	0	0	2	1.542	3.1857		117
4.01E+09	1	0.914	0	0	2	1.984		2.99747	0.914	46077.04	118.038	2.521	0	0	2	1.984	2.99747		118
4.03E+09	1	1.291	0	0	0.86	1.031		2.92219	1.291	45186.75	122.583	2.968	0	0	0.86	1.031	2.92219		122
4.04E+09	1	1.342	0	0	0.89	0.958		2.69702	1.342	43786.23	123.153	2.939	0	0	0.89	0.958	2.69702		123
4.05E+09	1	1.332	0	0	0.82	0.85		2.4199	1.332	41133.86	123.692	2.905	0	0	0.82	0.85	2.4199		123
4.06E+09	1	1.283	0	0	0.72	0.839		2.38082	1.283	40611.13	124.571	2.874	0	0	0.72	0.839	2.38082		124
4.07E+09	1	1.215	0	0	0.71	0.847		2.27706	1.215	39078.54	124.883	2.717	0	0	0.71	0.847	2.27706		124
4.07E+09	1	0.86	0	0	2	0.913		0.67805	0.86	20914.52	126.331	1.815	0	0	2	0.913	0.67805		126
4.07E+09	1	1.144	0	0	1	0.908		0.54679	1.144	19429.8	126.342	1.772	0	0	1	0.908	0.54679		126
4.08E+09	1	0.918	0	0	2	0.953		0.54705	0.918	19300.26	126.794	1.684	0	0	2	0.953	0.54705		126
4.09E+09	1	0.928	0	0	2	0.967		0.56322	0.928	19176.87	127.205	1.721	0	0	2	0.967	0.56322		127
4.1E+09	1	0.911	0	0	2	0.997		0.5894	0.911	19177.49	127.505	1.708	0	0	2	0.997	0.5894		127
4.11E+09	1	0.895	0	0	2	1.47		0.65673	0.895	15505.49	129.089	2.167	0	0	2	1.47	0.65673		129
4.11E+09	1	0.794	0	0	1	0.64		0.0295	0.794	350.17	129.03	0.652	0	0	1	0.64	0.0295		12



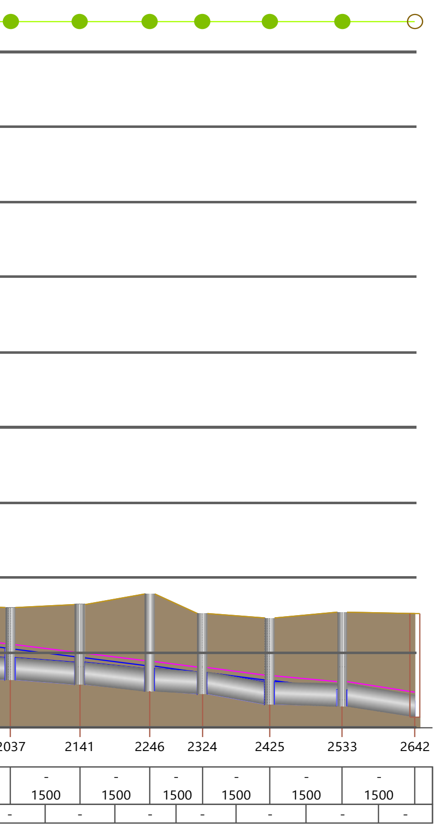
US tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS dep
.489	6.143	0	46.90516	1.517	439674.4	94.157	6.104	2.539	46.90516	1.517	94.157	6.104	2.5
.984	3.642	0	4.60065	1.348	61510.05	114.84	3.642	0.907	4.60065	1.348	114.84	3.642	0.9
.742	3.754	0	4.60045	1.346	61509.94	114.983	3.636	0.908	4.60045	1.346	114.983	3.636	0.9
.008	2.841	0	4.60362	0.988	61509.66	115.686	3.099	1.055	4.60362	0.988	115.686	3.099	1.0
.247	2.831	0	4.60727	0.97	61509.31	116.011	2.811	1.164	4.60727	0.97	116.011	2.811	1.1
6.17	2.219	0	3.47988	0.833	48277.82	116.08	2.105	1.172	3.47988	0.833	116.08	2.105	1.1
.375	2.703	0	3.1856	0.997	47903.98	116.562	3.222	0.98	3.1856	0.997	116.562	3.222	0
.038	2.521	0	2.99771	0.881	46078.52	117.422	2.539	1.634	2.99771	0.881	117.422	2.539	1.6
.583	2.968	0	2.90684	1.235	45187.31	121.417	3.058	0.94	2.90684	1.235	121.417	3.058	0
.153	2.939	0	2.67755	1.201	43786.69	122.536	2.643	1.065	2.67755	1.201	122.536	2.643	1.0
.692	2.905	0	2.39787	1.212	41134.1	123.081	2.53	0.984	2.39787	1.212	123.081	2.53	0.9
.571	2.874	0	2.37075	1.239	40609.92	123.676	2.769	0.87	2.37075	1.239	123.676	2.769	0
.883	2.717	0	2.27273	1.174	39078.48	124.538	2.684	0.857	2.27273	1.174	124.538	2.684	0.8
.331	1.815	0	0.67802	0.997	20914.34	125.748	2.274	0.524	0.67802	0.997	125.748	2.274	0.5
.342	1.772	0	0.5466	0.853	19429.78	126.309	1.572	0.956	0.5466	0.853	126.309	1.572	0.9
.794	1.684	0	0.52086	0.993	19299.89	126.355	1.704	0.934	0.52086	0.993	126.355	1.704	0.9
.205	1.721	0	0.53749	0.89	19176.21	126.815	1.627	0.977	0.53749	0.89	126.815	1.627	0.9
.505	1.708	0	0.56535	0.932	19176.88	127.229	1.699	0.991	0.56535	0.932	127.229	1.699	0.9
.089	2.167	0	0.65671	0.998	15505.11	127.824	2.514	0.522	0.65671	0.998	127.824	2.514	0.5
29.03	0.652	0	0.02957	0.958	350.12	128.893	0.727	1.01	0.02957	0.958	128.893	0.727	1

Conditions: Existing (Pre-Development)
Sewer Branch: Eastern (East along Eglinton)
Flow Conditions: May 2000 Extreme Rainfall

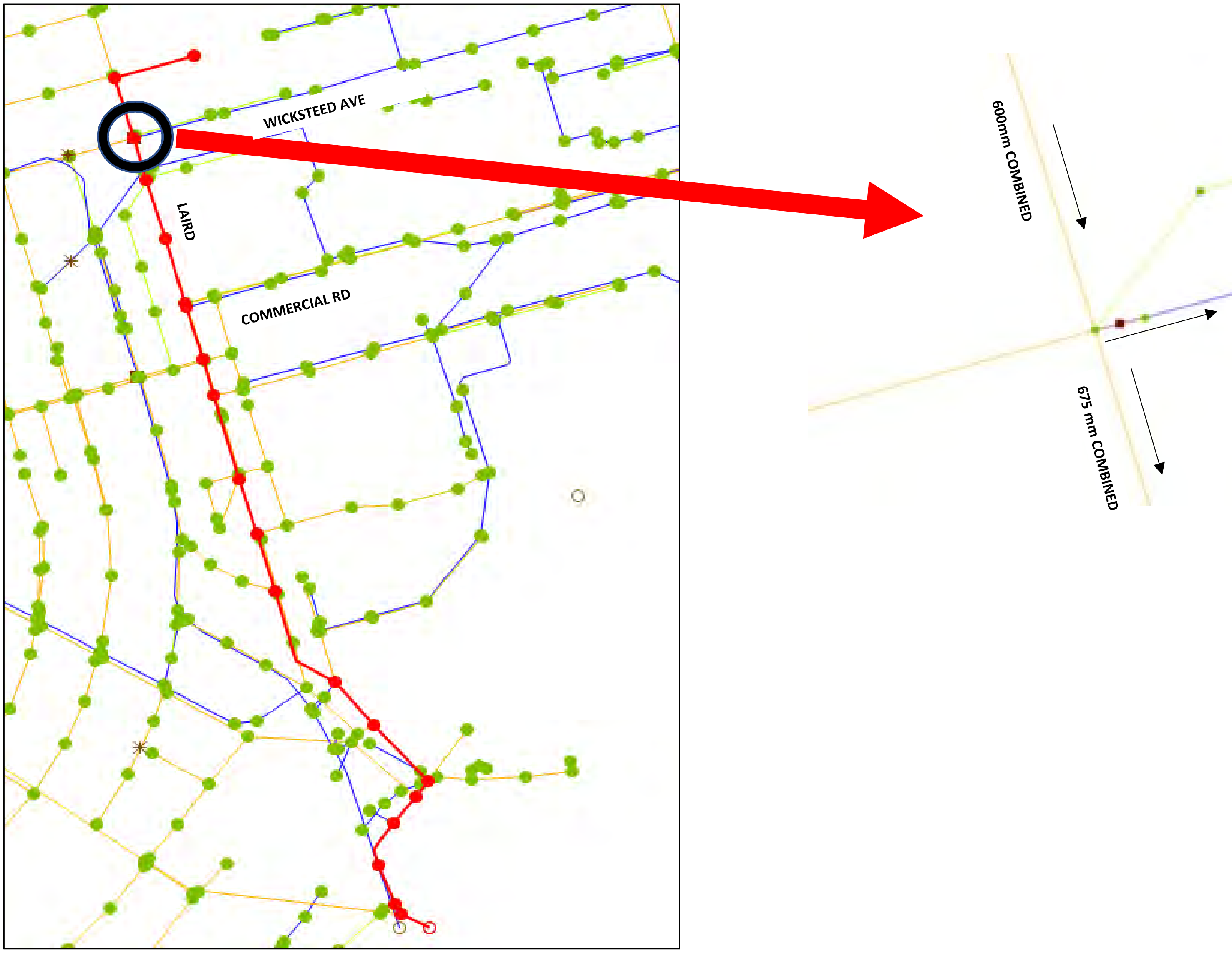
US node IE	Link suffix	Max US Fr	Cumulative	Lateral infl	Surcharge	US depth (	Hydraulic g	US flow (m	US Froude	US cumula	US total he	US velocity	Max Infiltr	Max Latera	Max Surch	Max US de	Max US flo	Volu
4.07E+09	1	1.325	0	0	0.71	1.069		4.52979	1.325	383484.6	89.077	3.378	0	0	0.71	1.069	4.52979	
4.08E+09	1	0.695	0	0	2	1.594		4.52979	0.695	383483.8	89.449	2.491	0	0	2	1.594	4.52979	
4.09E+09	1	1.287	0	0	1	1.436		4.52979	1.287	383482.5	90.011	3.023	0	0	1	1.436	4.52979	
4.1E+09	1	0.896	0	0	2	1.662		4.5298	0.896	383481.1	90.412	2.616	0	0	2	1.662	4.5298	
4.11E+09	1	1.016	0	0	2	1.8		4.5298	1.016	383479.1	90.964	2.691	0	0	2	1.8	4.5298	
4.12E+09	1	0.913	0	0	2	2.063		4.5298	0.913	383477.5	91.53	2.571	0	0	2	2.063	4.5298	
4.12E+09	1	1.221	0	0	1	1.55		0.03345	1.221	139.34	128.656	1.205	0	0	1	1.55	0.03345	
4.12E+09	1	0.486	0	0	2	2.118		0.03786	0.486	368.2	128.604	0.736	0	0	2	2.118	0.03786	
4.12E+09	1	4.894	0	0	1	2.061		0.05809	4.894	508.37	128.508	3.706	0	0	1	2.061	0.05809	
4.12E+09	1	0.77	0	0	2	3.627		0.04221	0.77	508.36	128.442	0.883	0	0	2	3.627	0.04221	
4.13E+09	1	0.945	0	0	2	2.291		4.52981	0.945	383476.6	92.094	2.623	0	0	2	2.291	4.52981	
4.13E+09	1	2.472	0	0	1	3.416		0.04176	2.472	508.52	127.942	1.757	0	0	1	3.416	0.04176	
4.13E+09	1	0.706	0	0	2	3.636		0.05606	0.706	627.26	127.917	0.83	0	0	2	3.636	0.05606	
4.13E+09	1	0.983	0	0	2	2.544		4.55382	0.983	383476	92.853	2.721	0	0	2	2.544	4.55382	
4.14E+09	1	0.662	0	0	2	3.165		0.09754	0.662	2090.33	127.23	1.492	0	0	2	3.165	0.09754	
4.14E+09	1	1.157	0	0	2	2.305		0.09946	1.157	2264.9	126.254	1.629	0	0	2	2.305	0.09946	
4.14E+09	1	0.955	0	0	2	2.818		4.64549	0.955	383473.1	93.57	2.701	0	0	2	2.818	4.64549	
4.14E+09	1	2.454	0	0	0.71	0.178		0.09945	2.454	2264.81	123.463	2.665	0	0	0.71	0.178	0.09945	
4.15E+09	1	1.963	0	0	2	1.772		0.12496	1.963	5930.29	101.651	2.185	0	0	2	1.772	0.12496	
4.15E+09	1	0.96	0	0	2	3.074		4.72087	0.96	383471	94.297	2.747	0	0	2	3.074	4.72087	
4.15E+09	1	2.807	0	0	1	1.313		0.12497	2.807	5930.31	104.294	3.131	0	0	1	1.313	0.12497	
4.15E+09	1	2.095	0	0	1	0.181		0.12496	2.095	5930.15	98.026	2.369	0	0	1	0.181	0.12496	
4.15E+09	1	3.327	0	0	1	1.006		0.14605	3.327	5930.13	96.823	2.582	0	0	1	1.006	0.14605	
4.15E+09	1	0.896	0	0	2	3.382		4.82073	0.896	383468.3	94.961	2.662	0	0	2	3.382	4.82073	
4.15E+09	1	1.485	0	0	1	2.384		0.17178	1.485	5960.27	96.255	1.822	0	0	1	2.384	0.17178	
4.16E+09	1	1.224	0	0	2	3.151		0.19384	1.224	5960.31	95.694	1.57	0	0	2	3.151	0.19384	
4.16E+09	1	1.024	0	0	2	3.585		4.98459	1.024	383471.9	95.845	2.974	0	0	2	3.585	4.98459	
NewLRT1	2	2.67	0	0	0.5	0.15		0.09945	2.67	2264.82	121.329	2.809	0	0	0.5	0.15	0.09945	
NewLRT2	1	2.68	0	0	0.58	0.174		0.12894	2.68	2797.35	120.511	3.032	0	0	0.58	0.174	0.12894	
NewLRT4	1	1.691	0	0	0.48	0.252		0.23179	1.691	5715.73	112.452	2.26	0	0	0.48	0.252	0.23179	
NewLRT5	1	0.906	0	0	0.58	0.267		0.23171	0.906	5715.78	106.64	1.122	0	0	0.58	0.267	0.23171	
NewLRT6	1	1.596	0	0	2	2.202		0.12642	1.596	5930.36	105.781	2.282	0	0	2	2.202	0.12642	
NewLRTstc	1	0.98	0	0	1	2.821		0.13275	0.98	5716.18	106.564	0.773	0	0	1	2.821	0.13275	

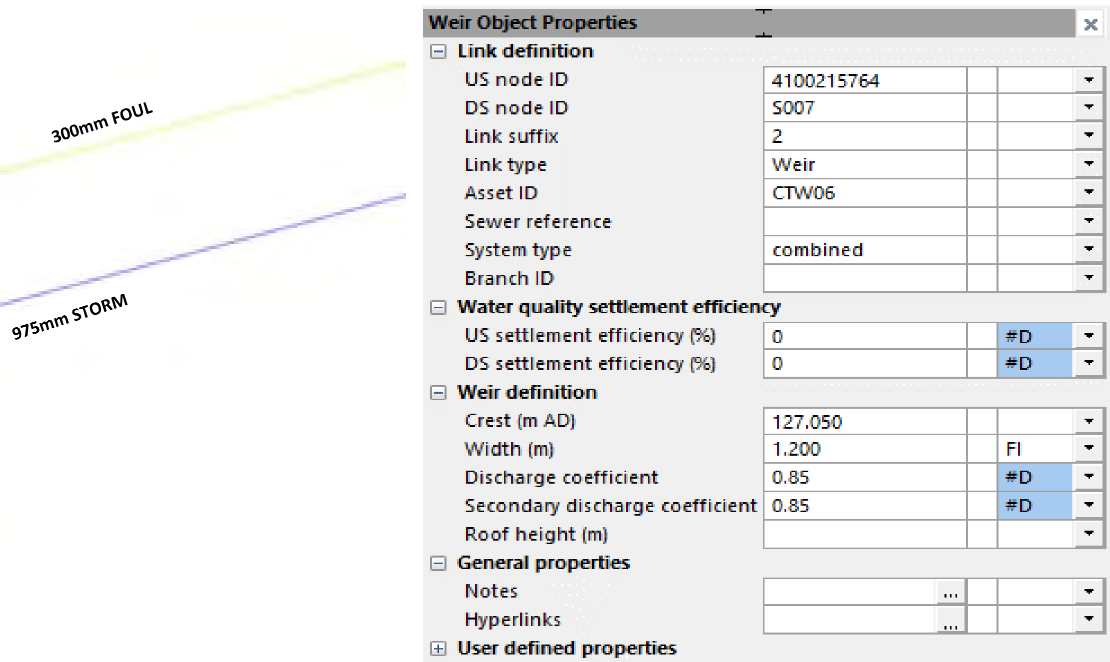


me (m	Max US tot	Max US ve	Infiltration	DS flow (m	DS Froude	DS cumula	DS total he	DS velocity	Max DS de	Max DS flo	Max DS Fr	Max DS tot	Max DS ve	DS depth (
	89.077	3.378	0	4.52979	1.301	383484.8	88.358	3.364	1.069	4.52979	1.301	88.358	3.364	1.069
	89.449	2.491	0	4.52979	0.998	383484.6	89.074	3.228	1.111	4.52979	0.998	89.074	3.228	1.111
	90.011	3.023	0	4.52979	0.692	383483.8	89.493	2.477	1.642	4.52979	0.692	89.493	2.477	1.642
	90.412	2.616	0	4.52979	0.996	383482.5	90.038	2.909	1.472	4.52979	0.996	90.038	2.909	1.472
	90.964	2.691	0	4.5298	0.896	383481.1	90.464	2.571	1.716	4.5298	0.896	90.464	2.571	1.716
	91.53	2.571	0	4.5298	0.994	383479.1	91.031	2.645	1.867	4.5298	0.994	91.031	2.645	1.867
	128.656	1.205	0	0.02849	0.439	139.3	128.6	0.554	2.12	0.02849	0.439	128.6	0.554	2.12
	128.604	0.736	0	0.0341	0.993	368.16	128.496	1.104	2.065	0.0341	0.993	128.496	1.104	2.065
	128.508	3.706	0	0.05583	3.481	508.36	128.445	1.854	3.58	0.05583	3.481	128.445	1.854	3.58
	128.442	0.883	0	0.04194	0.826	508.52	127.945	0.797	3.47	0.04194	0.826	127.945	0.797	3.47
	92.094	2.623	0	4.52981	0.915	383477.5	91.611	2.535	2.145	4.52981	0.915	91.611	2.535	2.145
	127.942	1.757	0	0.04176	1.516	508.52	127.907	0.793	3.612	0.04176	1.516	127.907	0.793	3.612
	127.917	0.83	0	0.05585	0.936	627.04	127.17	0.859	3.132	0.05585	0.936	127.17	0.859	3.132
	92.853	2.721	0	4.52981	0.945	383476.6	92.177	2.585	2.375	4.52981	0.945	92.177	2.585	2.375
	127.23	1.492	0	0.09754	0.993	2090.3	126.271	1.601	2.277	0.09754	0.993	126.271	1.601	2.277
	126.254	1.629	0	0.09945	1.225	2264.81	123.381	2.137	0.225	0.09945	1.225	123.381	2.137	0.225
	93.57	2.701	0	4.5687	0.985	383476	92.929	2.677	2.621	4.5687	0.985	92.929	2.677	2.621
	123.463	2.665	0	0.09945	2.444	2264.82	121.376	2.665	0.178	0.09945	2.444	121.376	2.665	0.178
	101.651	2.185	0	0.12496	1.958	5930.15	98.152	2.685	0.225	0.12496	1.958	98.152	2.685	0.225
	94.297	2.747	0	4.66029	0.956	383473.1	93.638	2.655	2.887	4.66029	0.956	93.638	2.655	2.887
	104.294	3.131	0	0.12497	2.803	5930.29	101.691	2.929	1.731	0.12497	2.803	101.691	2.929	1.731
	98.026	2.369	0	0.13801	2.047	5930.13	96.832	2.303	1.005	0.13801	2.047	96.832	2.303	1.005
	96.823	2.582	0	0.16156	1.482	5930.66	96.263	1.791	2.392	0.16156	1.482	96.263	1.791	2.392
	94.961	2.662	0	4.73765	0.962	383471	94.356	2.701	3.134	4.73765	0.962	94.356	2.701	3.134
	96.255	1.822	0	0.17752	1.222	5960.31	95.701	1.451	3.158	0.17752	1.222	95.701	1.451	3.158
	95.694	1.57	0	0.19464	1.173	5960.29	95.64	1.579	3.197	0.19464	1.173	95.64	1.579	3.197
	95.845	2.974	0	4.84283	0.896	383468.3	95.01	2.637	3.431	4.84283	0.896	95.01	2.637	3.431
	121.329	2.809	0	0.09945	2.669	2264.79	120.481	2.809	0.15	0.09945	2.669	120.481	2.809	0.15
	120.511	3.032	0	0.12891	2.67	2797.33	113.539	3.032	0.174	0.12891	2.67	113.539	3.032	0.174
	112.452	2.26	0	0.23175	1.685	5715.78	111.656	2.26	0.252	0.23175	1.685	111.656	2.26	0.252
	106.64	1.122	0	0.17561	0.859	5716.18	106.558	1.006	1.208	0.17561	0.859	106.558	1.006	1.208
	105.781	2.282	0	0.12617	1.59	5930.31	104.337	2.711	1.285	0.12617	1.59	104.337	2.711	1.285
	106.564	0.773	0	0.13246	0.933	5716.15	106.562	0.624	2.855	0.13246	0.933	106.562	0.624	2.855



Laird and Wicksteed CSO Configuration




300mm FOUL
975mm STORM
Weir Object Properties
Link definition
US node ID 4100215764
DS node ID S007
Link suffix 2
Link type Weir
Asset ID CTW06
Sewer reference
System type combined
Branch ID
Water quality settlement efficiency
US settlement efficiency (%) 0 #D
DS settlement efficiency (%) 0 #D
Weir definition
Crest (m AD) 127.050
Width (m) 1.200 FI
Discharge coefficient 0.85 #D
Secondary discharge coefficient 0.85 #D
Roof height (m)
General properties
Notes
Hyperlinks
User defined properties

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Vaughan, Ontario L4K 0C5
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www.tmig.ca

TECHNICAL MEMORANDUM

DATE	April 5, 2017
TO	**Pascal Monat, SCS Consulting Limited**
CC	
SUBJECT	**Eglinton/Laird Ave Intensification** **Preliminary Water Modelling Methodology**
FROM	Kevin Brown
PROJECT NUMBER	17103

1 Introduction

The Municipal Infrastructure Group Ltd. (TMIG) has been retained by SCS Consulting Limited (SCS) to conduct a servicing analysis to understand the existing water system in the study area and the capacity for the potential re-development of the Eglington/Laird Development Area.

Information provided by the City has been reviewed and our modelling methodology for the water system analysis is detailed in this memorandum.

2 Water Distribution System – Model Development

InfoWater has been selected for modelling the water distribution system for the study area. The key input factors for the model are described below:

2.1. Pipe Network

The shapefiles provided by the City such as Water Line, Water junction, were used to generate the pipe network for the InfoWater model.

While converting the water line and junction shapefile, we identified that appeared to have incorrect Pressure District information. For the purpose of the City's review and confirmation, we relabeled the attributes as 1-1 (labeled as 1 belongs to 1), 3-3 (labeled as 3 belongs to 3), 1-3 (labeled as 1 belongs to 3), 3-1 (labeled as 3 belongs to 1). Fig.1 shows the water network with pressure district information.

2.2. Water Demand

The average consumption data from the geocoded meter data provided has been used as average day demand for the design demand calculations.

Using the demand allocation tool in InfoWater, these demands has been assigned to closest node in pipe network to create an average day demand set.

Based on the MOE guidelines the peaking factor for the Maximum day is 1.8 and Peak hour is 2.7. The average consumption from the meter data was multiplied with the peaking factors to create the Maximum day demand and Peak hour demand set.

Fire demand based on the land use has been calculated and added to the InfoWater Fire nodes.

2.3. Boundary conditions

Since we are modelling a local area from within a larger distribution network, we need to establish a suitable boundary condition at the study area limits.

A fixed head reservoir will be established east of Overlea Boulevard and Thorncliffe Park Drive servicing the 400 mm transmission main along Overlea Boulevard. The HGL elevation will be established through pressure logging and will be adjusted based on the calibration of the model from field test.

3 Water Distribution System – Model Calibration

Model calibration involves the adjustment of the primary network model parameters (i.e. pipe roughness coefficients and Reservoir HGL) until the model results closely approximate actual observed conditions as measured from field data. Thus to calibrate model, a testing program is formulated within study area.

The tests involves, a series of hydrant flow tests along major water mains to calibrate the roughness coefficient along these primary feeds. Also the pressure logger along the 400mm water main in Overlea Blvd and another pressure logger along Laird Drive will give a better understanding of pressure variations in the system. Fig.2 shows the field testing program.

The subsequent figures demonstrate which pipes should see significant increases in flow rate and velocity, indicating which pipes can be calibrated with the results from each test. The testing program has been developed such that all major mains are calibrated and that specific fire flow tests along the redevelopment area are conducted.

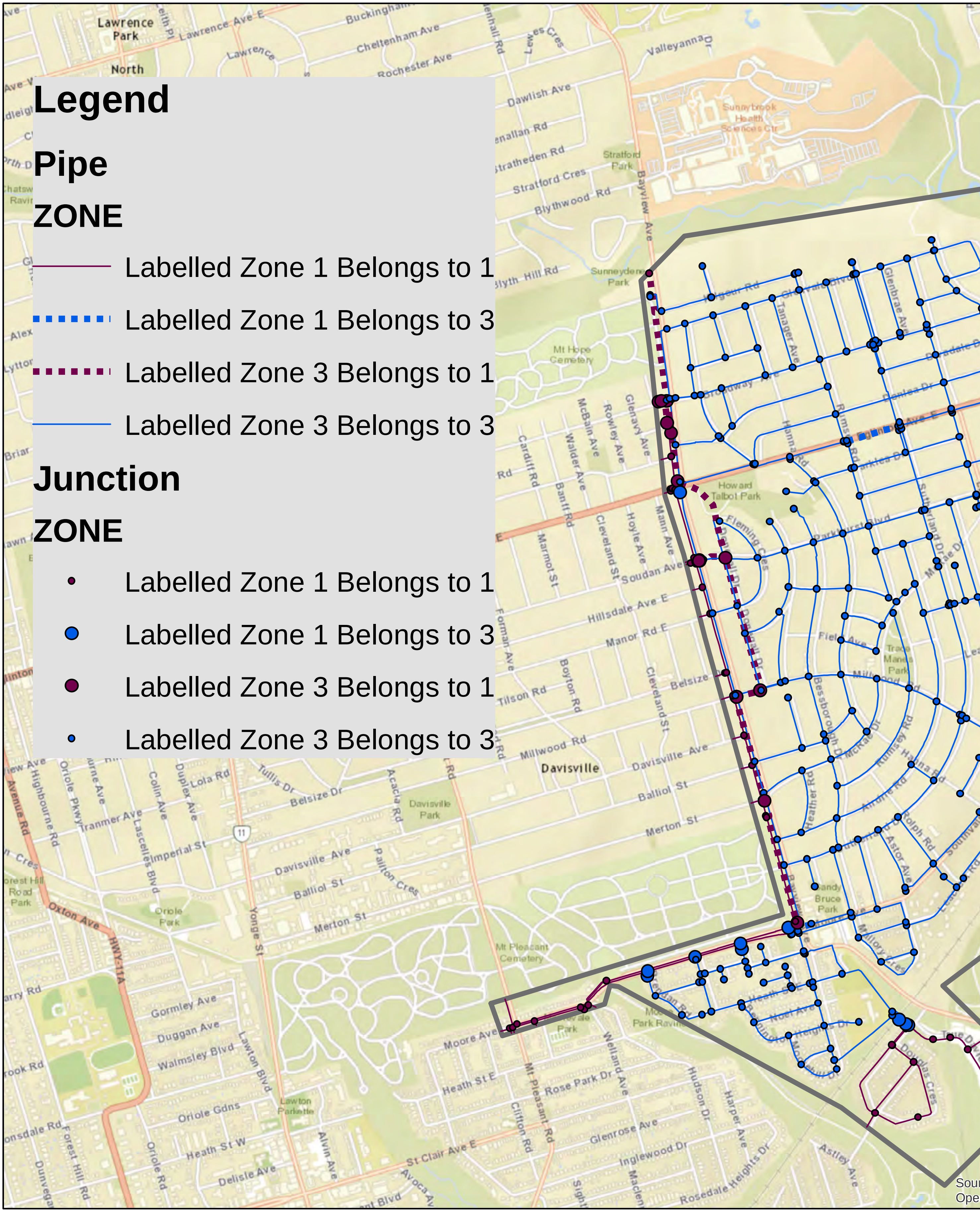
Based on our review of the system, we are proposing to pressure loggers (in place for one week) and five fire flow tests (to be scheduled to take place while the loggers are active). The original work plan accounted for one pressure logger and four fire flow tests, so the testing program would have to be expanded.

4 Water Distribution System – Model Simulation

With a validated network and calibrated model reflecting the observed conditions we can simulate the model to test for the intensification in study area.

The model can be simulated for the following scenarios and the pressure and flow in system can be studied to understand the capacity.

Water Demand Modeling Scenario	Minimum Water System Requirements
Average Day Demand	Recommended Normal Pressures within System = 275 kPa to 690 kPa
Maximum Day Demand	Recommended Normal Pressures within System = 275 kPa to 690 kPa
Peak Hour Demand	Recommended Normal Pressures within the System = 275 kPa to 690 kPa
Required Fire Flow to be provided at a residual pressure of no less than 140 kPa	
Maximum Day Demand plus Fire Flow	Residential Fire flow requirements per City of Toronto Standards, Q_f >64 L/s to 189 L/s
	Employment Fire flow requirements per City of Toronto Standards, Q_f = 189 L/s to 317 L/s


Legend
Pipe
ZONE
Labelled Zone 1 Belongs to 1
Labelled Zone 1 Belongs to 3
Labelled Zone 3 Belongs to 1
Labelled Zone 3 Belongs to 3
Junction
ZONE
Labelled Zone 1 Belongs to 1
Labelled Zone 1 Belongs to 3
Labelled Zone 3 Belongs to 1
Labelled Zone 3 Belongs to 3


Sunnybrook Park
Serena Gundy Park
Don River West Branch
Wilket Creek Park
Rykert Cres
Eglinton Ave E
Leslie St
Celestica
Ernest Thompson Seton Park
Ontario Science Centre
Don Mills Rd
Gervais Dr
Windom Rd
Ferrand Dr
Ferrand Drive Park
Rochefort Dr
St Dennis Dr
Deauville Ln
Don Valley Pkwy
Flemingdon Park Golf Club
Linkwood Ln
Linkwood Lane Park
Flemingdon Park
Grenoble Dr
Gateway Blvd
Gateway Greenbelt
Vanderhoof Ave
Research Rd
Wicksteed Ave
Commercial Rd
Industrial St
Beth Nealson Dr
Thorncliffe Park Dr
Overlea Blvd
East York Town Centre
Esandar Dr
Canvarco Rd
Village Station Rd
Banigan Dr
RV Burgess Park
Leaside Park
Leaside Brg
Thorncliffe
Parkview Hill Cres
Alder Rd
Coxwell Ravine Park
Taylor Dr
Four Oaks Gate
O'Connor Dr
Judith Dr
Plains Rd
Davies Cres
Lower Don Parklands
Beechwood Dr
Woodville Ave
Torrens Ave
Cosburn Ave
Memorial Park Ave
Dieppe Park
Cosburn Park
East York
Don Valley Dr
Hillside Dr
Queensdale
Sammon Ave
Floyd Ave
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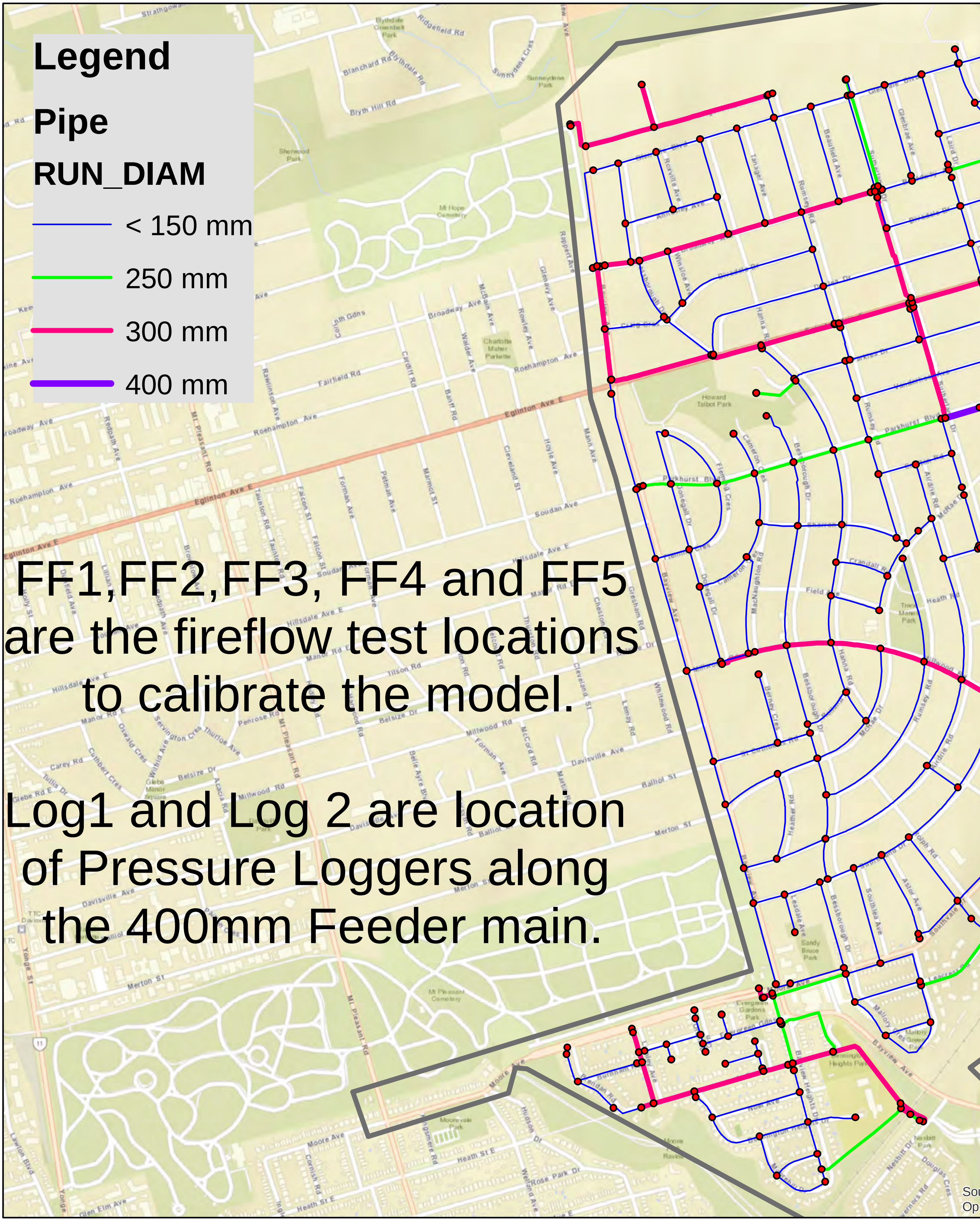
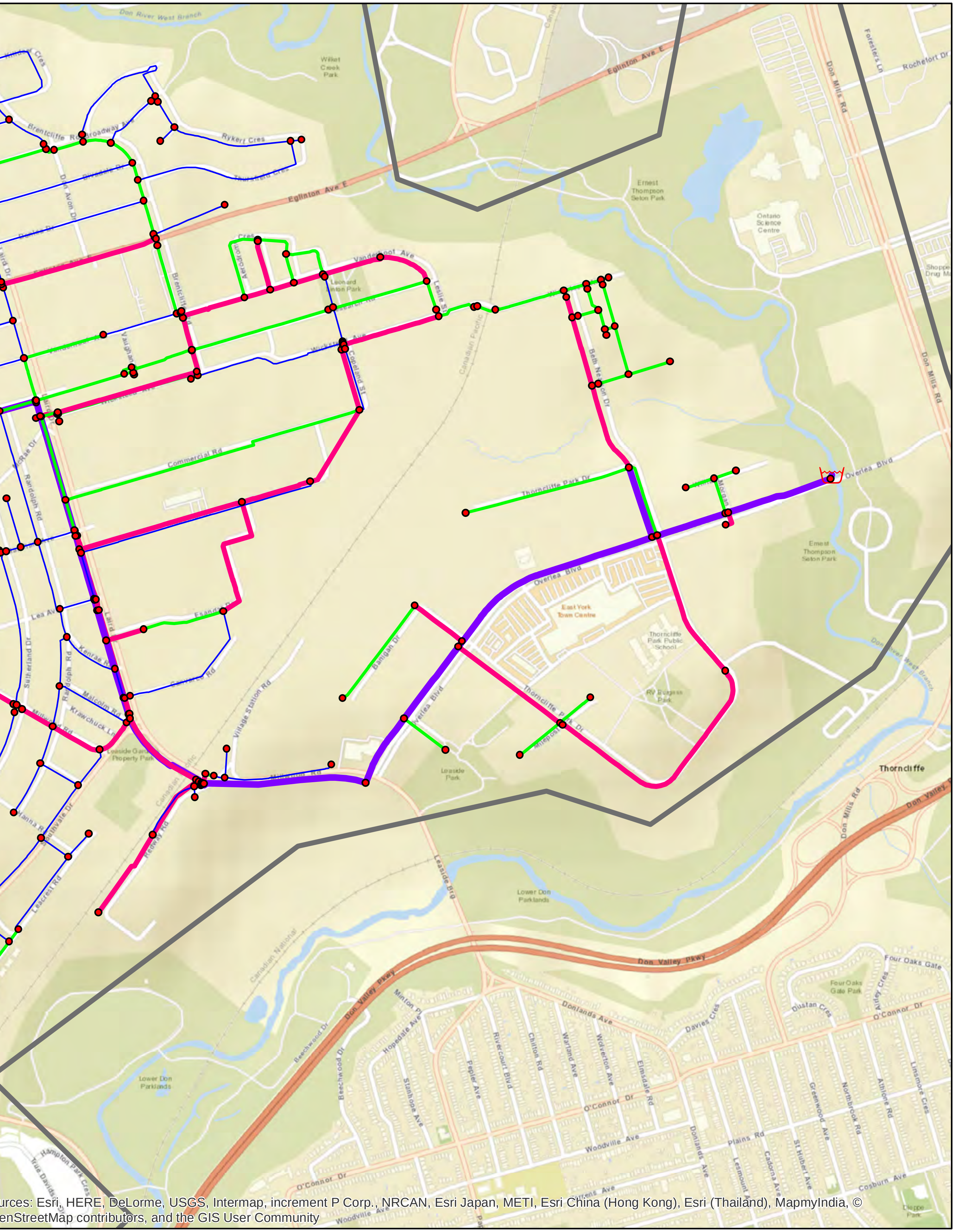

Legend
Pipe
RUN_DIAM
< 150 mm
250 mm
300 mm
400 mm
FF1,FF2,FF3, FF4 and FF5
are the fireflow test locations
to calibrate the model.
Log1 and Log 2 are location
of Pressure Loggers along
the 400mm Feeder main.



Don River West Branch
Willet Creek Park
Eglinton Ave E
Brentcliffe Rd
Broadway Ave
Rykert Cres
Don Avon Dr
Thurston Cres
Vanderhoof Ave
Leonard Linton Park
Leslie St
Aerodrome Cres
Wicksteed Ave
Commercial Rd
Copeland St
Randolph Rd
McRae Dr
Laird Dr
Esandar Dr
Lea Ave
Kenrae Rd
Malcolm Rd
Krawchuck Ln
Sutherland Dr
Village Station Rd
Research Rd
Leaside Gardens Property Park
Millwood Rd
Canadian Pacific
Ernest Thompson Seton Park
Ontario Science Centre
Don Mills Rd
Foresters Ln
Rochefort Dr
Beth Nealson Dr
Thorncliffe Park Dr
Overlea Blvd
Wynford Dr
East York Town Centre
Thorncliffe Park Public School
RV Burgess Park
Banigan Dr
Leaside Park
Leaside Brg
Lower Don Parklands
Don Valley Pkwy
Thorncliffe
Four Oaks Gate
Four Oaks Gate Park
Donlands Ave
Davies Cres
Dustan Cres
O'Connor Dr
Minton Pl
Hopedale Ave
Beechwood Dr
Pepler Ave
Rivercourt Blvd
Chilton Rd
Warland Ave
Wolverton Ave
Elmsdale Rd
Greenwood Ave
Northbrook Rd
Athlone Rd
Linsmore Cres
Stanhope Ave
Woodville Ave
Plains Rd
St Hubert Ave
Cosburn Ave
Hampton Park Cres
Canadian National
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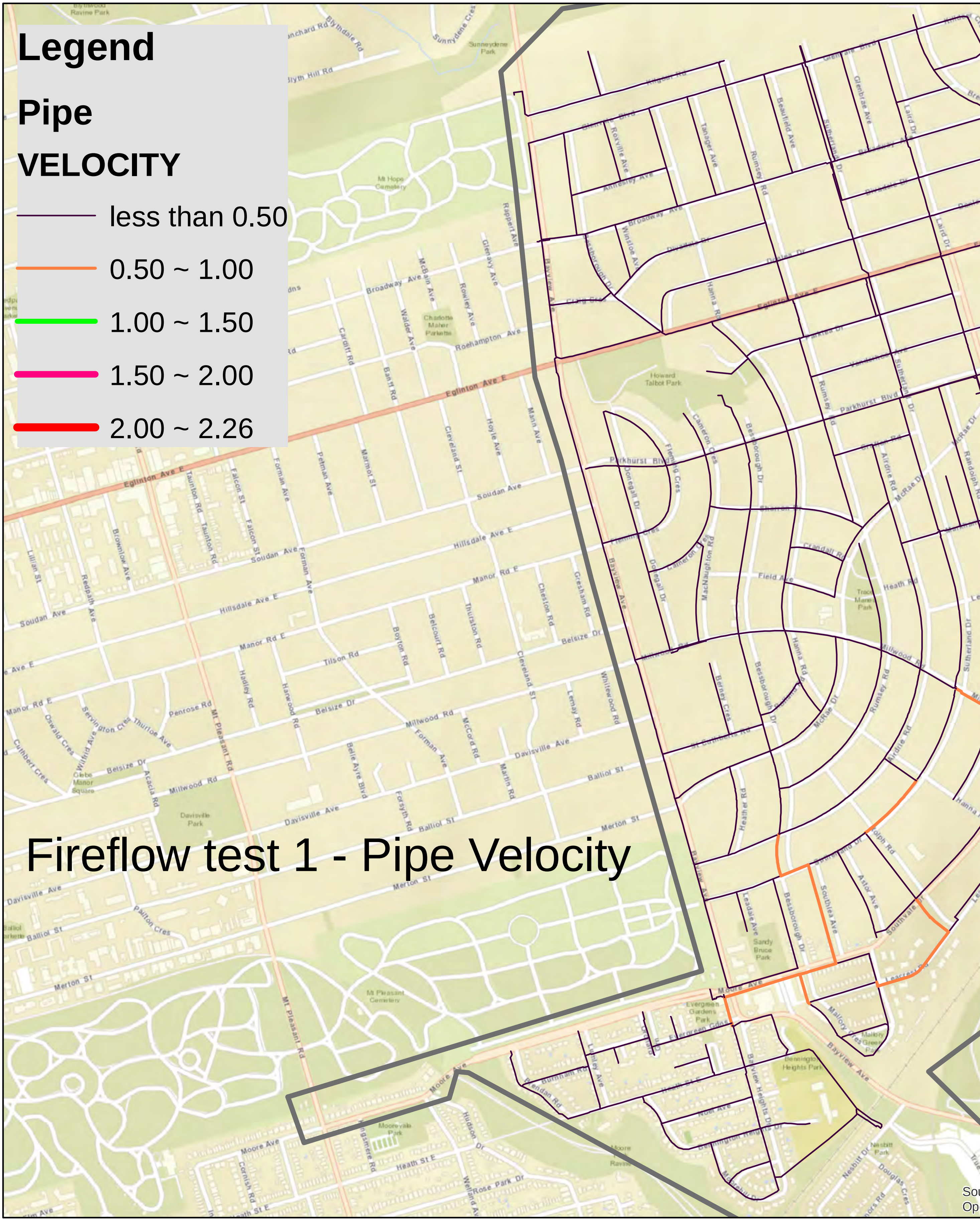
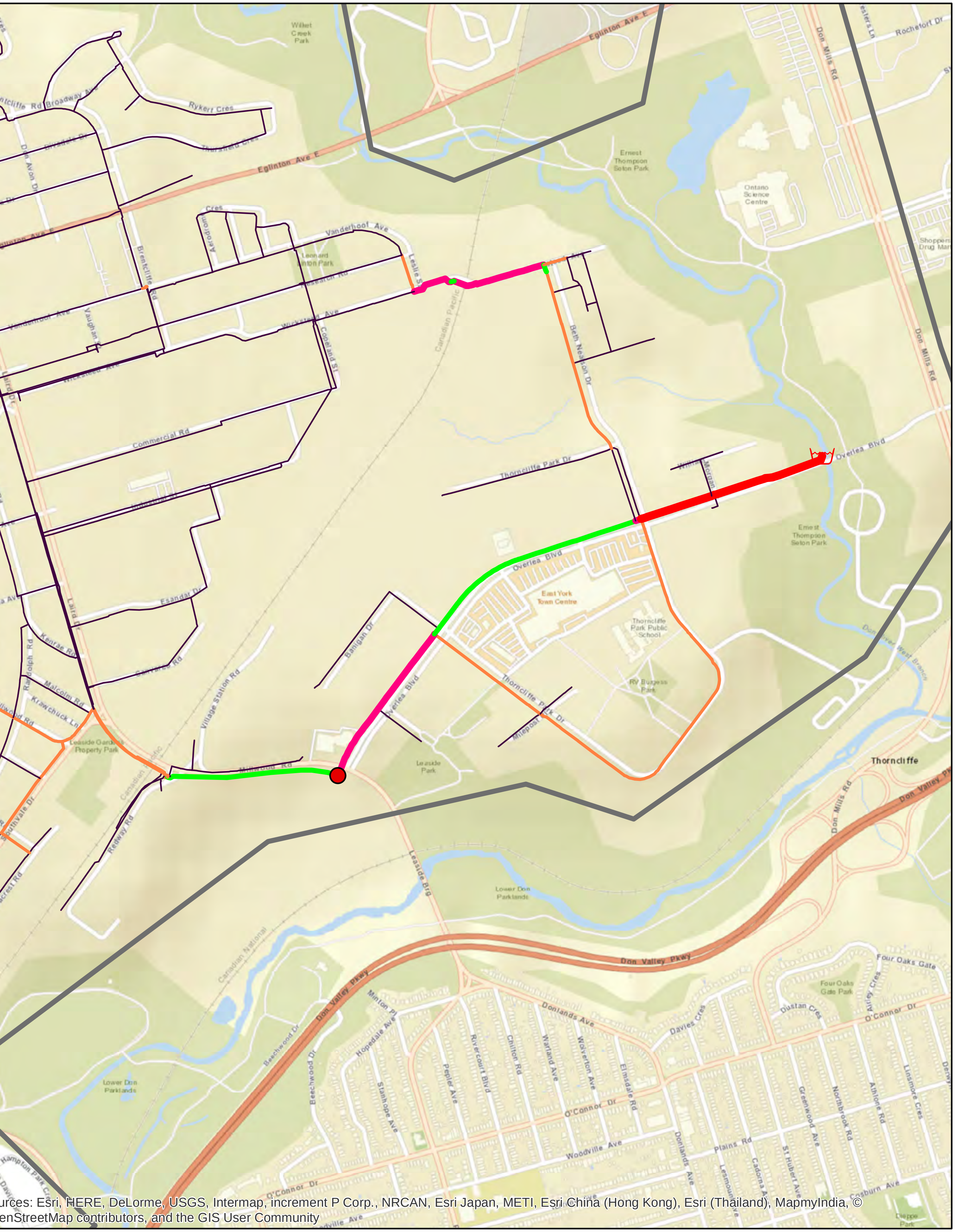

Legend
Pipe
VELOCITY
less than 0.50
0.50 ~ 1.00
1.00 ~ 1.50
1.50 ~ 2.00
2.00 ~ 2.26
Fireflow test 1 - Pipe Velocity
Eglinton Ave E
Mt Pleasant Rd
Bayview Ave
Moore Ave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Don Mills Rd
Rochefort Dr
Willet Creek Park
Rykert Cres
Ernest Thompson Seton Park
Ontario Science Centre
Vanderhoof Ave
Leonard Linton Park
Research Rd
Leslie St
Wicksteed Ave
Beth Nealson Dr
Copeland St
Commercial Rd
Thorncliffe Park Dr
Overlea Blvd
East York Town Centre
Thorncliffe Park Public School
RV Burgess Park
Esandar Dr
Laird Dr
Village Station Rd
Banigan Dr
Millwood Rd
Leaside Park
Leaside Brg
Thorncliffe
Don Valley Pkwy
Lower Don Parklands
Four Oaks Gate
O'Connor Dr
Donlands Ave
Woodville Ave
Plains Rd
Cosburn Ave
Dieppe Park
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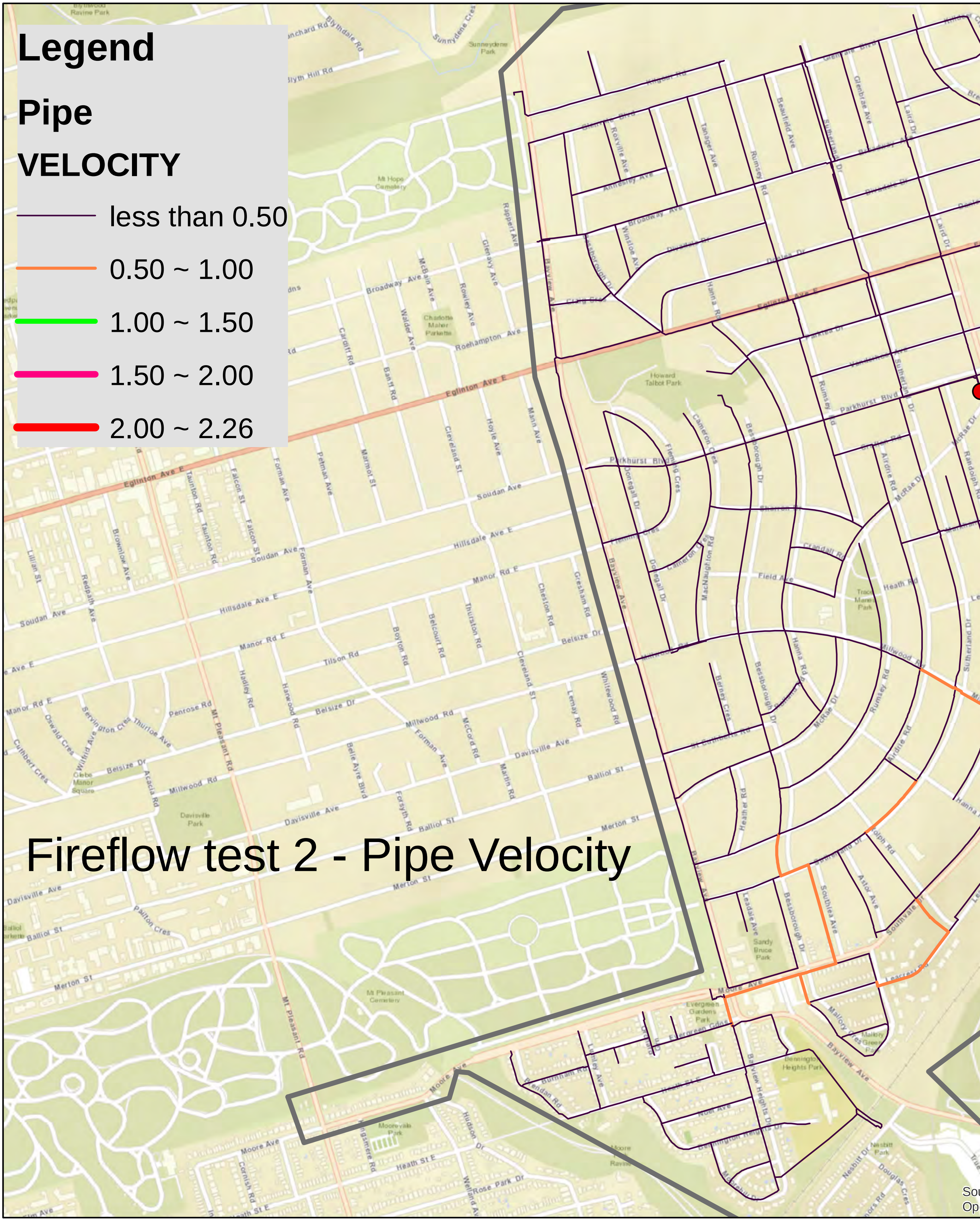
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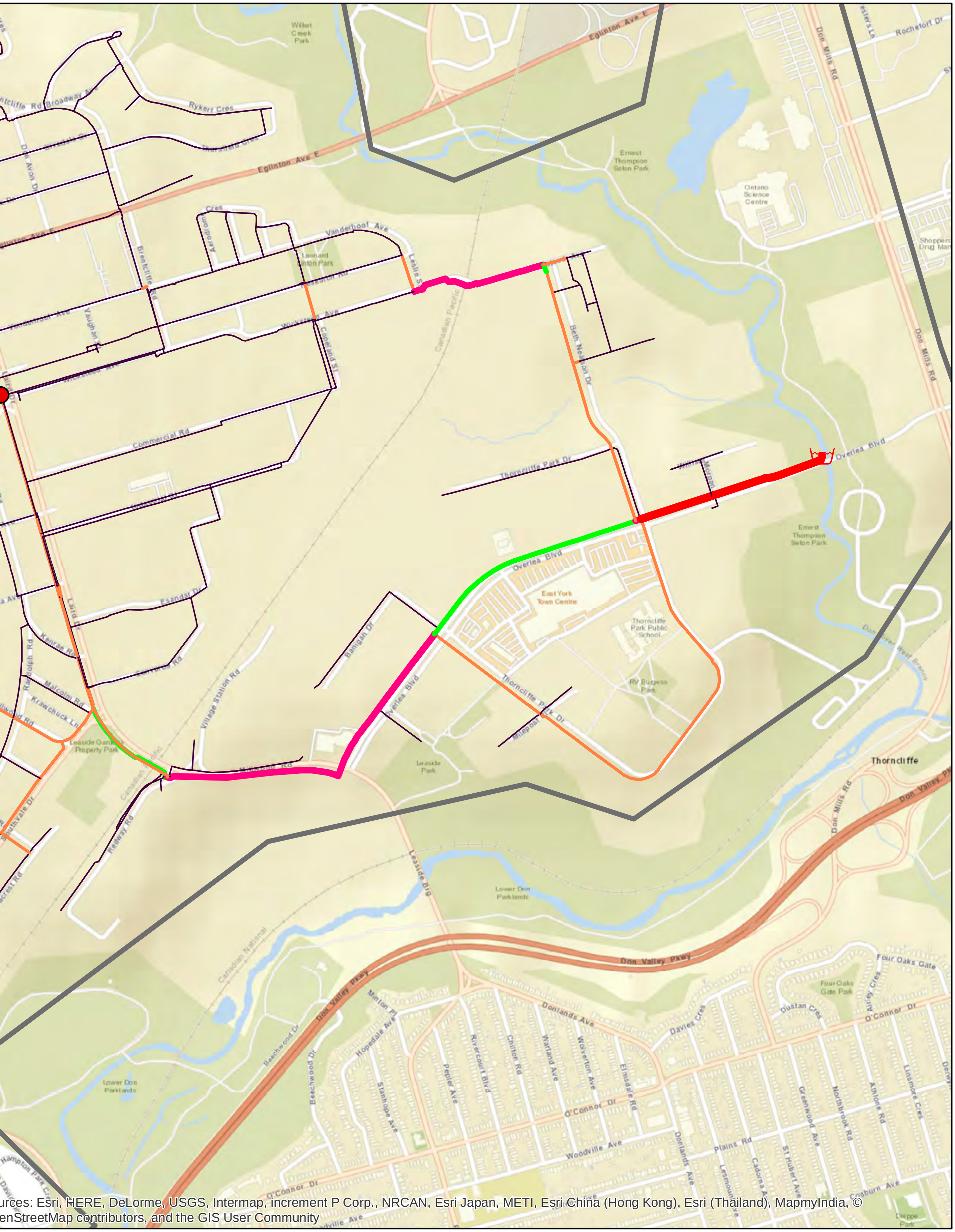
0.50 ~ 1.00
1.00 ~ 1.50
1.50 ~ 2.00
2.00 ~ 2.26
Fireflow test 2 - Pipe Velocity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Eglinton Ave E
Overlea Blvd
Thorncliffe Park Dr
Laird Dr
Millwood Rd
Don Valley Pkwy
Don Mills Rd
Leslie St
Beth Nealson Dr
East York Town Centre
Ernest Thompson Seton Park
Ontario Science Centre
Thorncliffe
Lower Don Parklands
O'Connor Dr
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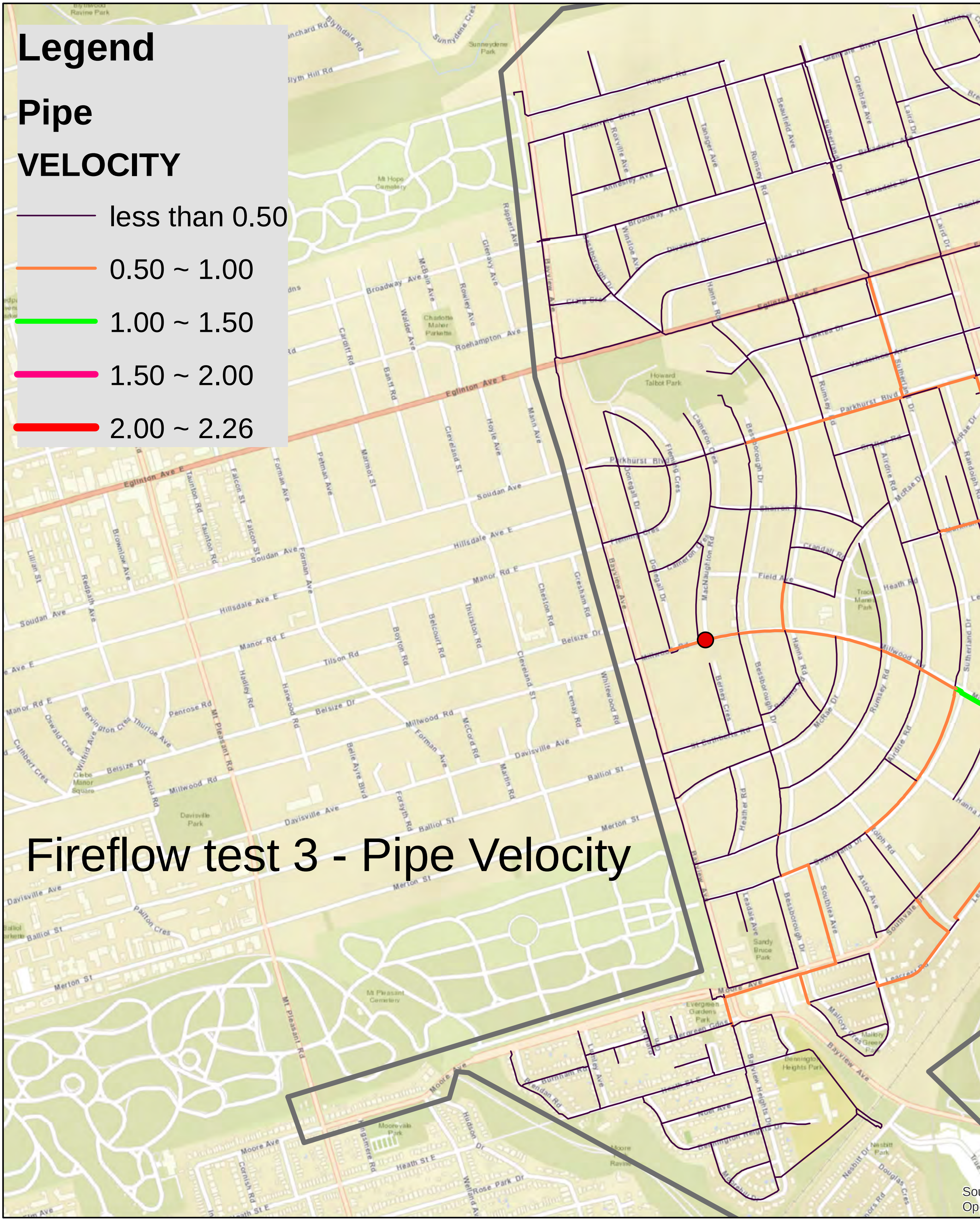
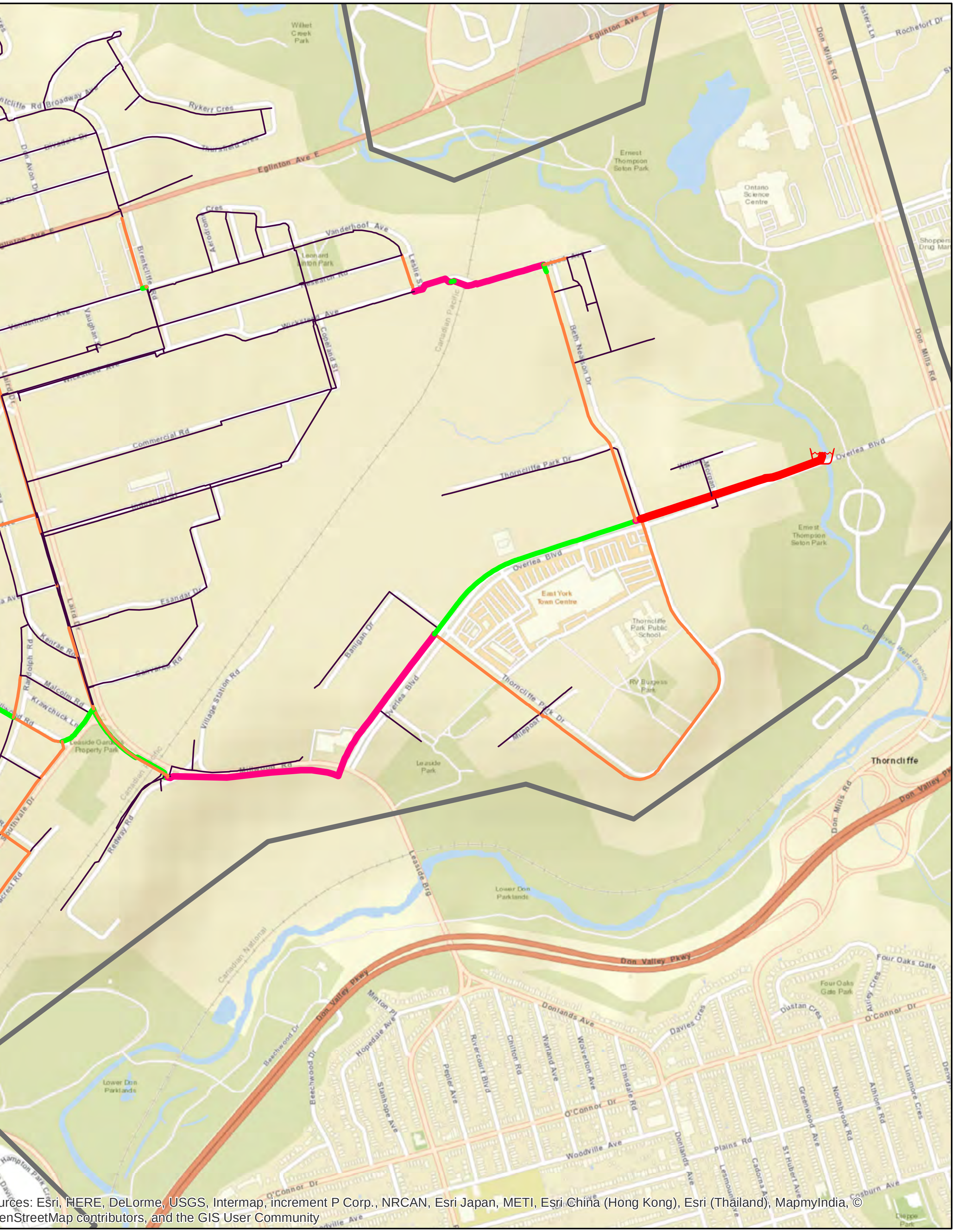
Leaside Bdg
Commercial Rd
Wicksteed Ave
Vanderhoof Ave
Research Rd
Copeland St
Esandar Dr
Village Station Rd
Leaside Park


Legend
Pipe
VELOCITY
less than 0.50
0.50 ~ 1.00
1.00 ~ 1.50
1.50 ~ 2.00
2.00 ~ 2.26
Fireflow test 3 - Pipe Velocity


Eglinton Ave E
Rykert Cres
Broadway Ave
Thursfield Cres
Willket Creek Park
Don Mills Rd
Rochefort Dr
Ernest Thompson Seton Park
Ontario Science Centre
Vanderhoof Ave
Brentcliffe Rd
Aerodrome Cres
Leonard Linton Park
Research Rd
Leslie St
Wicksteed Ave
Copeland St
Vaughan Rd
Laird Dr
Commercial Rd
Beth Nealson Dr
Canadian Pacific
Thorncliffe Park Dr
Overlea Blvd
East York Town Centre
Thorncliffe Park Public School
RV Burgess Park
Esandar Dr
Kenrae Rd
Malcolm Rd
Krawchuck Ln
Randolph Rd
Parkhurst Blvd
Village Station Rd
Banigan Dr
Leaside Gardens Property Park
Leaside Park
Millwood Rd
Milepost Pl
Redway Rd
Southvale Dr
Leaside Brg
Lower Don Parklands
Don Valley Pkwy
Thorncliffe
Canadian National
Beechwood Dr
Minton Pl
Hopedale Ave
Stanhope Ave
Pepler Ave
Rivercourt Blvd
Chilton Rd
Wartand Ave
Wolverton Ave
Elmsdale Rd
Donlands Ave
Davies Cres
Dustan Cres
Four Oaks Gate
Four Oaks Gate Park
Airley Cres
O'Connor Dr
Woodville Ave
Plains Rd
Lesmount Ave
Cadorna Ave
St Hubert Ave
Greenwood Ave
Northbrook Rd
Athlone Rd
Linsmore Cres
Cosburn Ave
Dieppe Park
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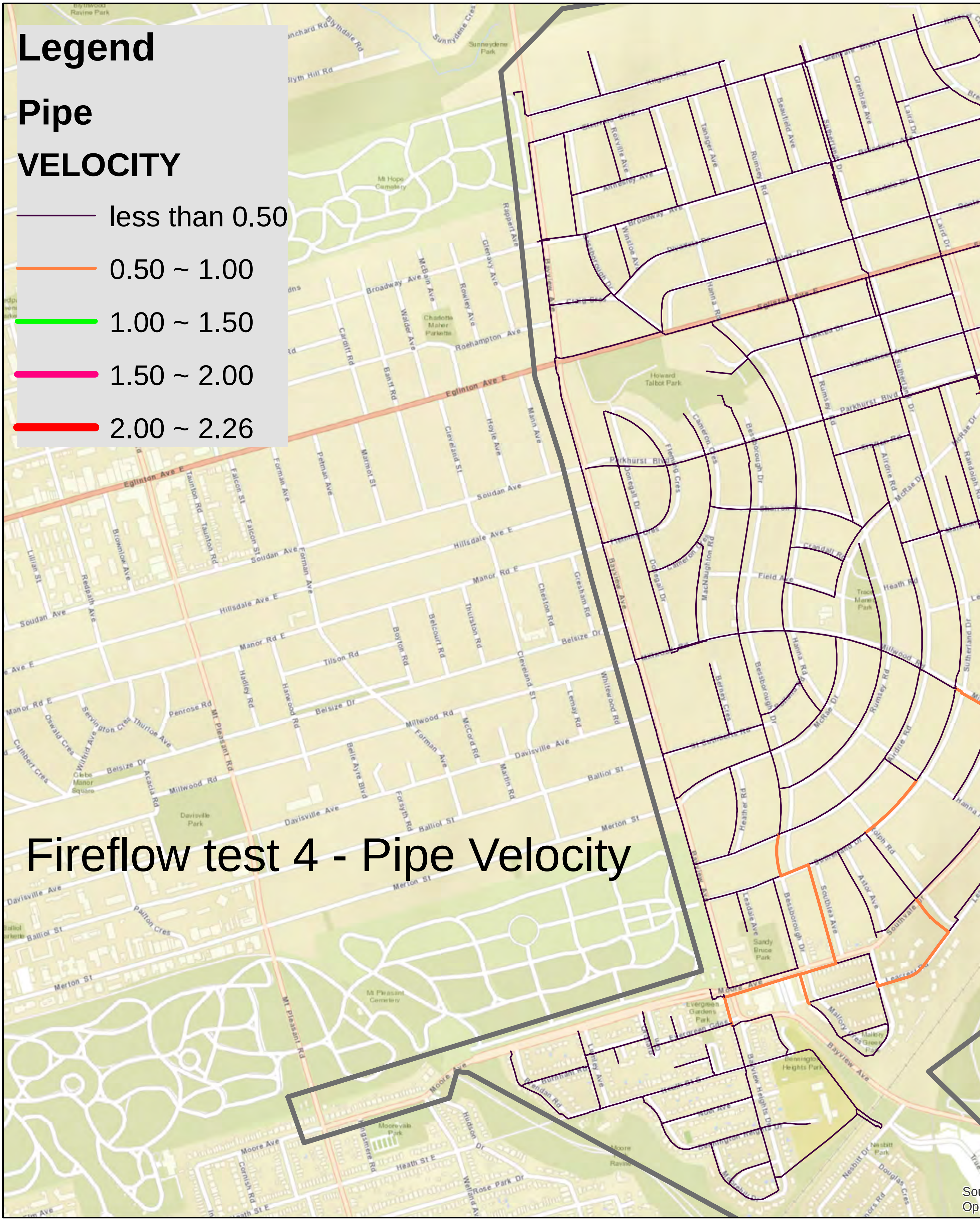
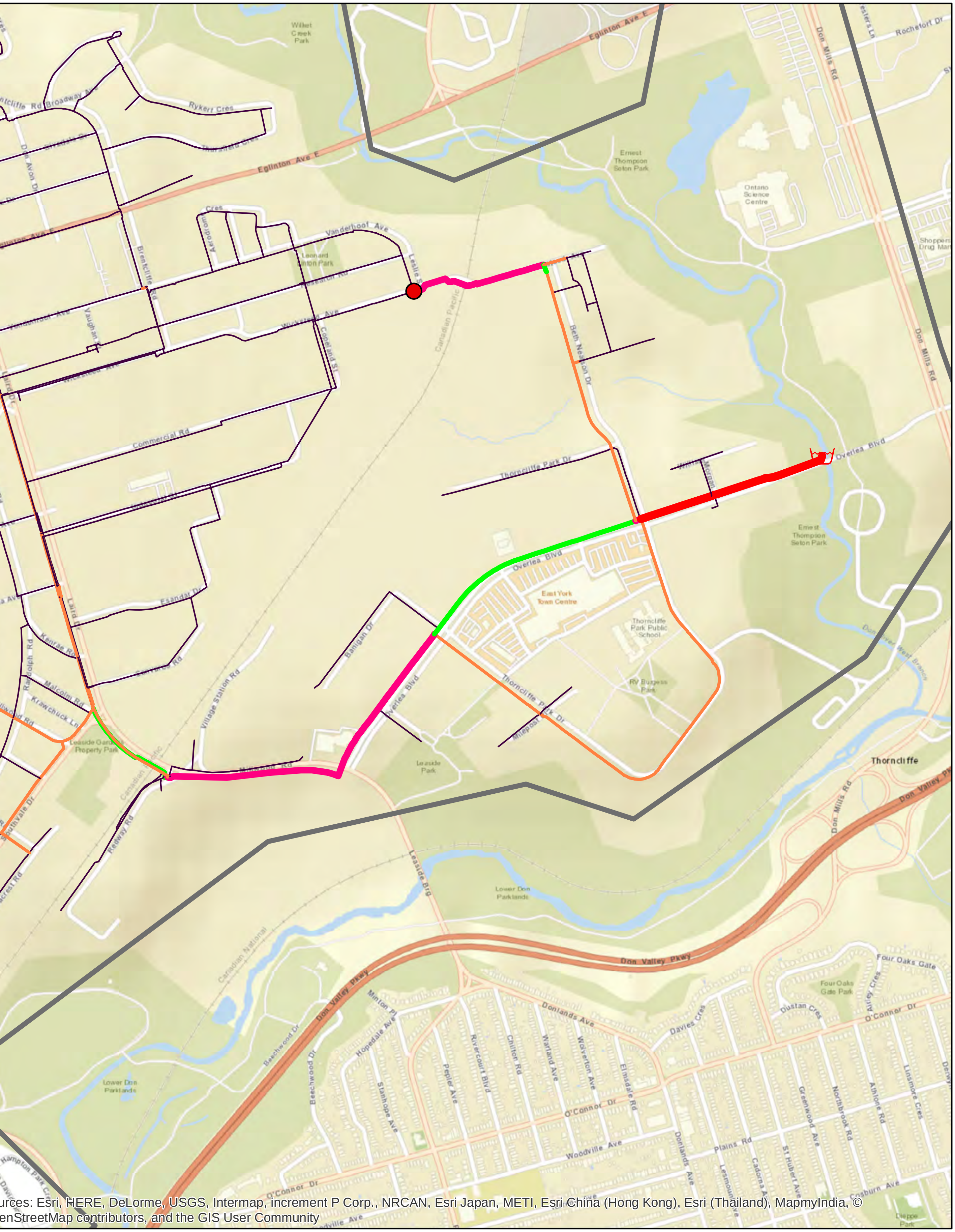

Legend
Pipe
VELOCITY
less than 0.50
0.50 ~ 1.00
1.00 ~ 1.50
1.50 ~ 2.00
2.00 ~ 2.26
Fireflow test 4 - Pipe Velocity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Laird Dr
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Leslie St
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Ontario Science Centre
Thorncliffe
Lower Don Parklands
O'Connor Dr
Donlands Ave
Woodville Ave
Commercial Rd
Wicksteed Ave
Vanderhoof Ave
Esandar Dr
Village Station Rd
Leaside Park
Leaside Brg
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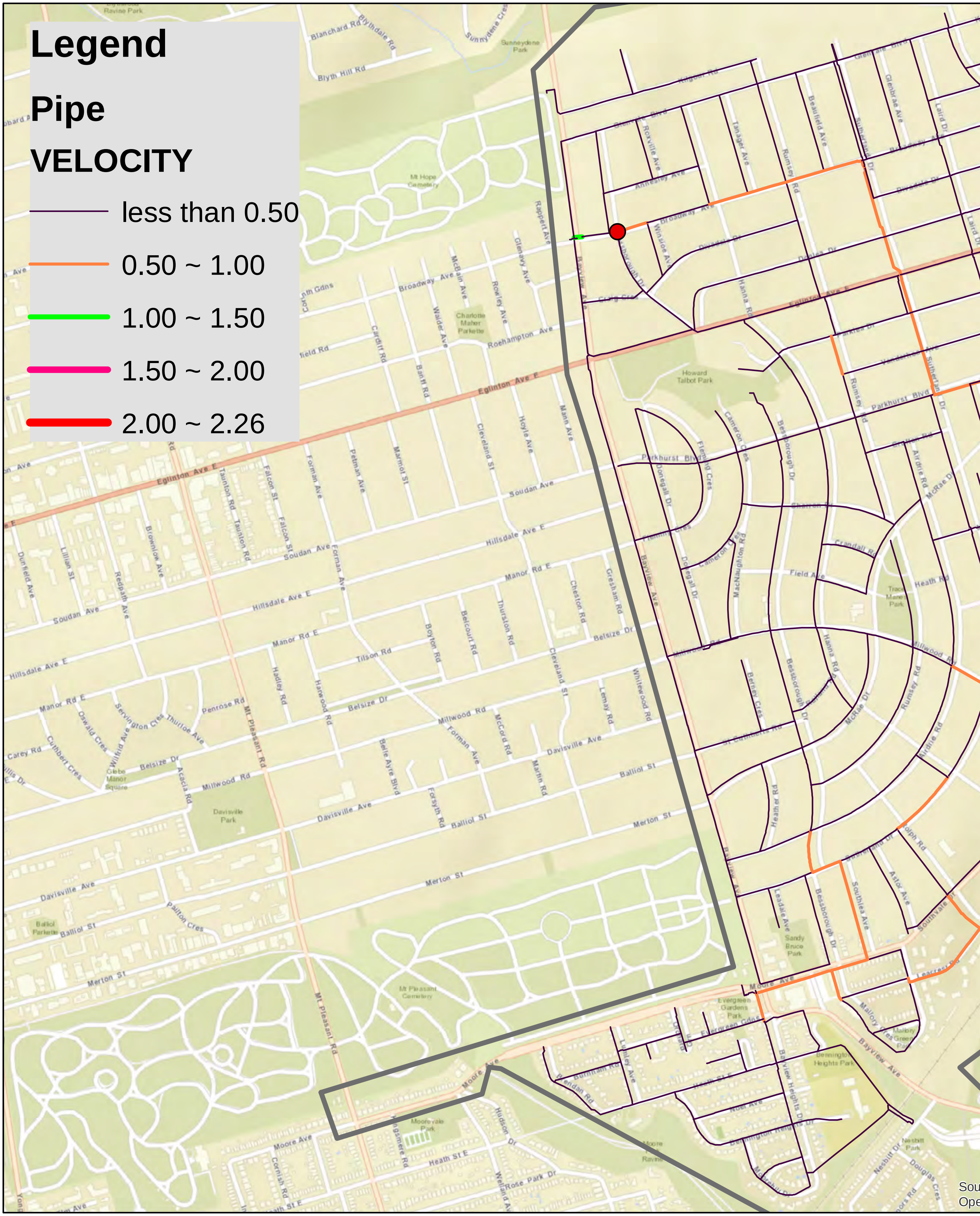
Legend
Pipe
VELOCITY
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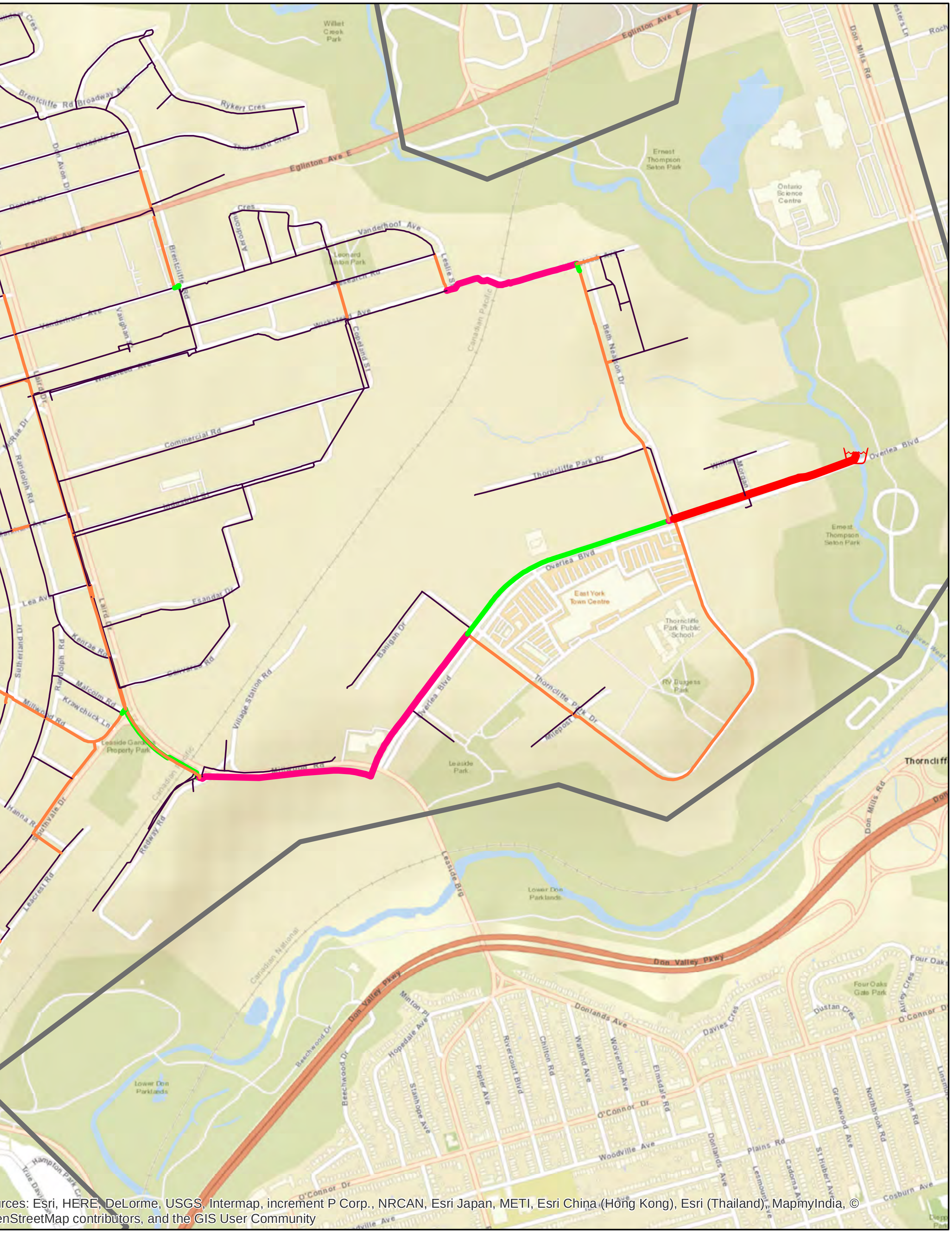
1.00 ~ 1.50
1.50 ~ 2.00
2.00 ~ 2.26



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THE MUNICIPAL INFRASTRUCTURE GROUP LTD.
8800 Dufferin Street, Suite 200 T 905.738.5700
Vaughan, Ontario L4K 0C5 F 905.738.0065
www.tmig.ca

TECHNICAL MEMORANDUM

DATE	August 18, 2017
TO	**Pascal Monat, SCS Consulting Limited**
CC	
SUBJECT	**Eglinton/Laird Ave Intensification** **Water Servicing Analysis – Model Calibration**
FROM	Kevin Brown
PROJECT NUMBER	17103

1 Introduction

The Municipal Infrastructure Group Ltd. (TMIG) has been retained by SCS Consulting Limited to conduct a servicing analysis to understand the existing water system in the study area and the capacity of the existing system to service the potential development of the Eglington/Laird Development Area.

Information about the water system provided by the City was reviewed, and a modelling methodology developed to be applied to the analysis as per the memo dated June 7, 2017. As part of the modelling methodology, a field testing program was designed for model calibration. This memo describes the model calibration adopted from field test results.

2 Water Distribution System – Model Development

The City provided GIS shapefiles for the Water system (Water Line, Water junction, valves), and these were used to generate the pipe network for the InfoWater model. The average consumption data from the geocoded meter data provided has been used as average day demand for the design demand calculations. Using the demand allocation tool in InfoWater, these demands has been assigned to closest node in pipe network to create an average day demand set. Based on City of Toronto guidelines, the peaking factor for the Maximum day is 1.8. The average consumption from the meter data was multiplied with the peaking factors to create the Maximum day demand set.

Since the model developed is for the local area only, additional system data was collected to provide a suitable boundary condition at the study area limits. A fixed head reservoir has been established west of Don River and east of Overlea Boulevard and Thorncliffe Park Drive servicing the 400-mm transmission main along Overlea Boulevard. The HGL elevation will be established through pressure logging.

3 Water Distribution System – Field Testing Program

To calibrate the model to simulated the field conditions a field testing program was formed. Theses tests involved five hydrant flow tests along major water mains to calibrate the roughness coefficient along these primary feeds. Also, pressure loggers were installed at two locations (Overlea Blvd and Parkhurst Blvd) to track normal pressure variations Fig.1 shows the details of the field testing program.

The fire flow test analysis was performed for all the five locations using NFPA 291 Extrapolation Methodology. Attachment A shows the fire flow analysis on all the five locations. Attachment B shows the pressure variations at those locations during hydrant test.

4 Water Distribution System – Model Calibration

The hydraulic information in model regarding pipe roughness (Hazen Williams Coefficient) and the boundary conditions (HGL for Fixed Head Reservoir) were initially assumed based on standards. Model calibration involves the adjustment of the primary network model parameters (i.e. pipe roughness coefficients and Reservoir HGL) until the model results closely approximate actual observed conditions as measured from field data.

a. Boundary conditions

Using the pressure logger data at two locations and the static pressure data at the five-fire flow locations, the HGL for fixed head reservoir is adjusted to reasonable value.

b. Pipe Roughness Coefficient

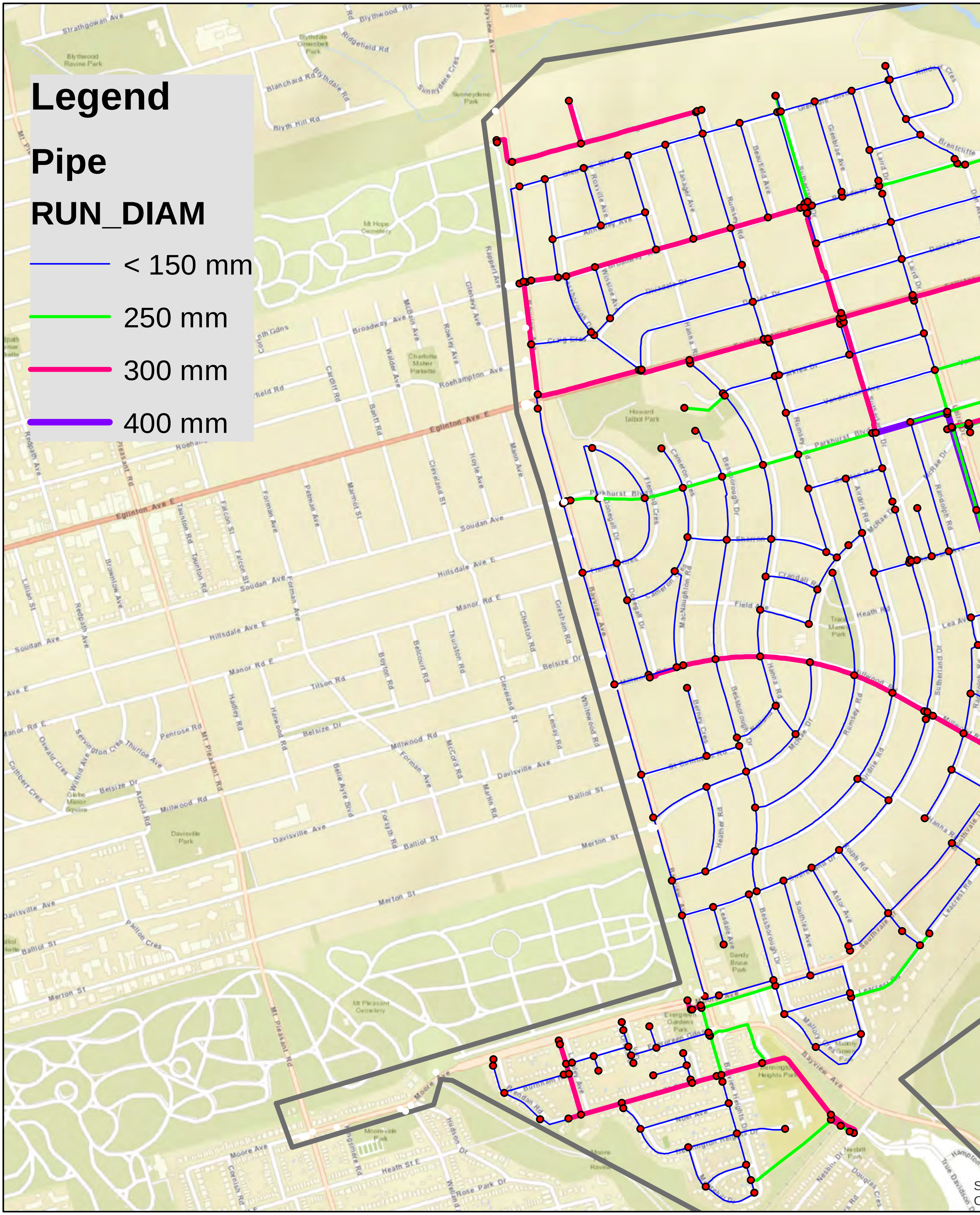
The model was simulated for all five fire flow tests by assigning the maximum hydrant flow to "Demand 10" in model at the Fire flow node and the residual pressure at the nearby node is noted. The pipe roughness was adjusted along the mains such that to reduce the difference in residual head between model and field data. The adjusted pipe roughness coefficient is within the range specific by City of Toronto Standards.

The calibrated model head with observed field data is given in Attachment C. It is observed that the observed and simulated HGL differ in the range of +5 m to -5 m. This difference is within anticipated test accuracy limits; therefore the model can be considered to be calibrated to reflect field conditions satisfactorily.

5 Water Distribution System – Model Simulation

With the model calibrated, we simulated the existing conditions to establish the residual pressures under several demands scenarios throughout the Study Area. The model will be simulated for the following scenarios and the pressure and flow in system can be studied to understand the capacity under the future planning scenarios.

Water Demand Modeling Scenario	Minimum Water System Requirements
Average Day Demand	Recommended Normal Pressures within System = 275 kPa to 690 kPa
Maximum Day Demand	Recommended Normal Pressures within System = 275 kPa to 690 kPa
Peak Hour Demand	Recommended Normal Pressures within the System = 275 kPa to 690 kPa
Required Fire Flow to be provided at a residual pressure of no less than 140 kPa	
Maximum Day Demand plus Fire Flow	Residential Fire flow requirements per City of Toronto Standards, Q_f >64 L/s to 189 L/s
	Employment Fire flow requirements per City of Toronto Standards, Q_f = 189 L/s to 317 L/s


Legend
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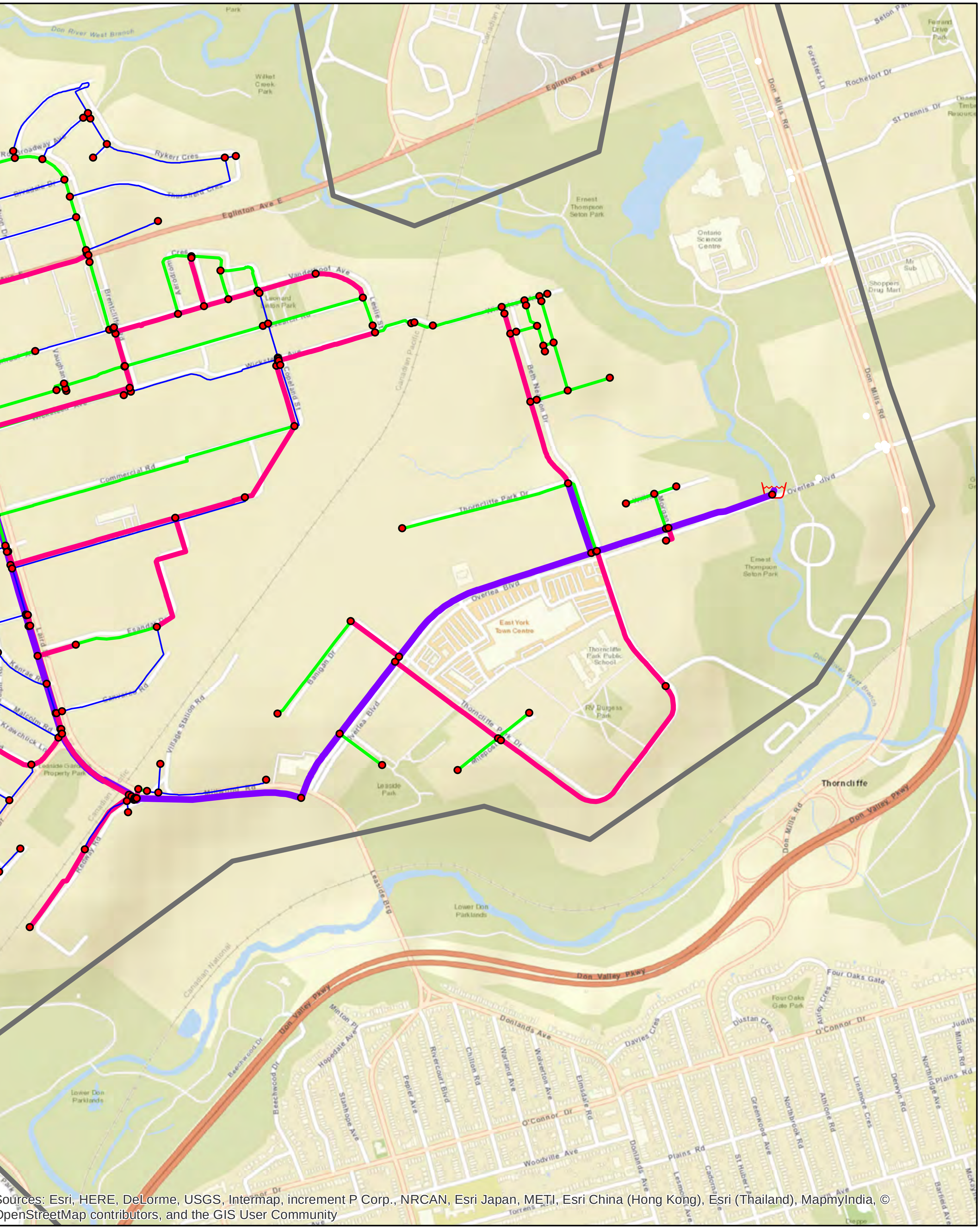
RUN_DIAM
< 150 mm
250 mm
300 mm
400 mm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Eglinton Ave E
Overlea Blvd
Thorncliffe Park Dr
Don Mills Rd
Don Valley Pkwy
East York Town Centre
Ontario Science Centre
Ernest Thompson Seton Park
Thorncliffe
Laird
Commercial Rd
Wicksteed Ave
Vanderhoof Ave
Beth Nealson Dr
Village Station Rd
O'Connor Dr
Donlands Ave
Woodville Ave
Lower Don Parklands
Leaside Brg

TMIG

Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

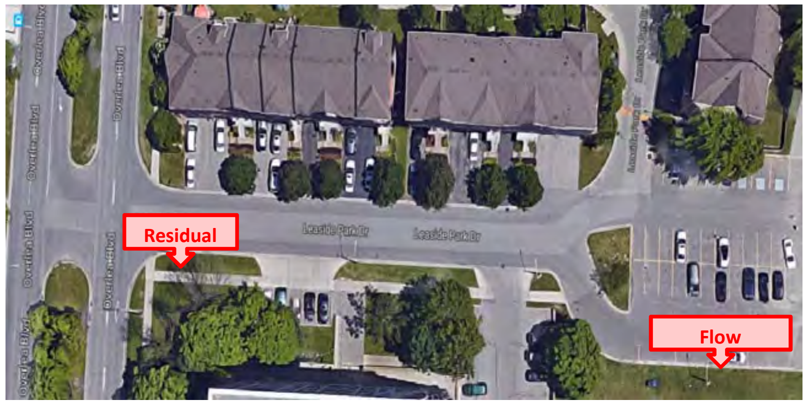
Eglinton & Laird

Hydrant Test #1; Leaside Park Dr

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:10 AM
Contractor: Aquazition
Flow Hydrant: 5 Leaside Park Dr
Residual Hydrant: 1 Leaside Park Dr

	Hydrant Test	
Data Point	**Flow L/s**	**Head psi**
1	0	85
2	68	75
3	92	67



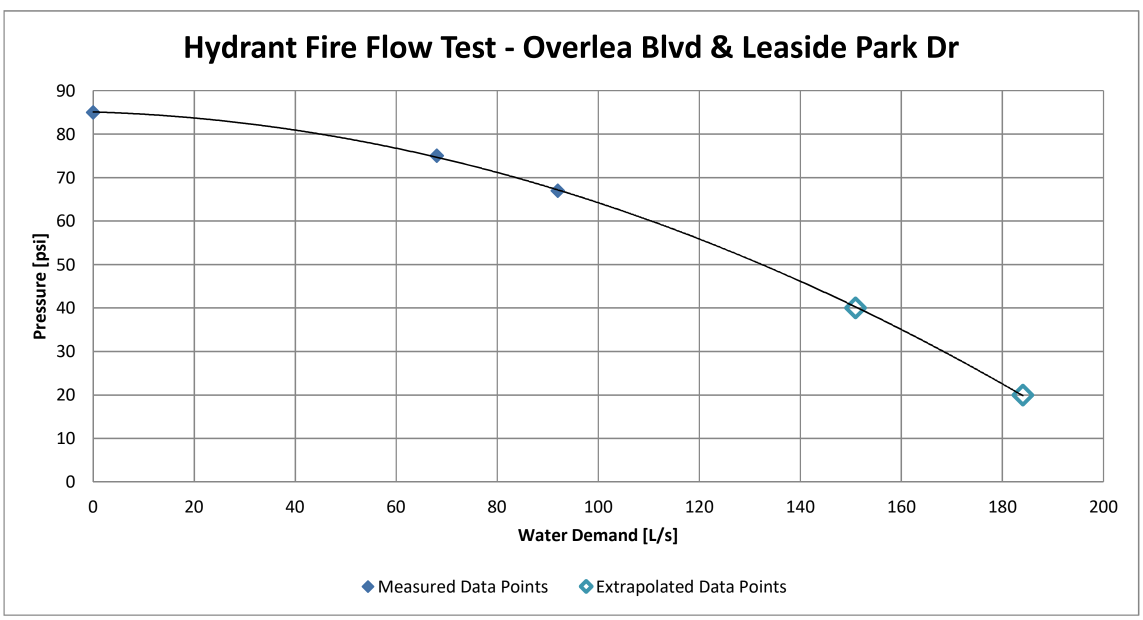
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \quad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure psi	Q_F L/s	h_r psi	h_f psi	Q_R L/s
40	92	45	18	151
20	92	65	18	184



2017 08 02 - 17103 - Hydrant Test Data Extrapolation
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TMIG

Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #2; 45 Wicksteed Ave

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:35 AM
Contractor: Aquazition
Flow Hydrant: 45 Wicksteed Ave (West)
Residual Hydrant: 45 Wicksteed Ave (East)

	Hydrant Test	
	Flow	**Head**
Data Point	**L/s**	**psi**
1	0	80
2	72	74
3	121	70

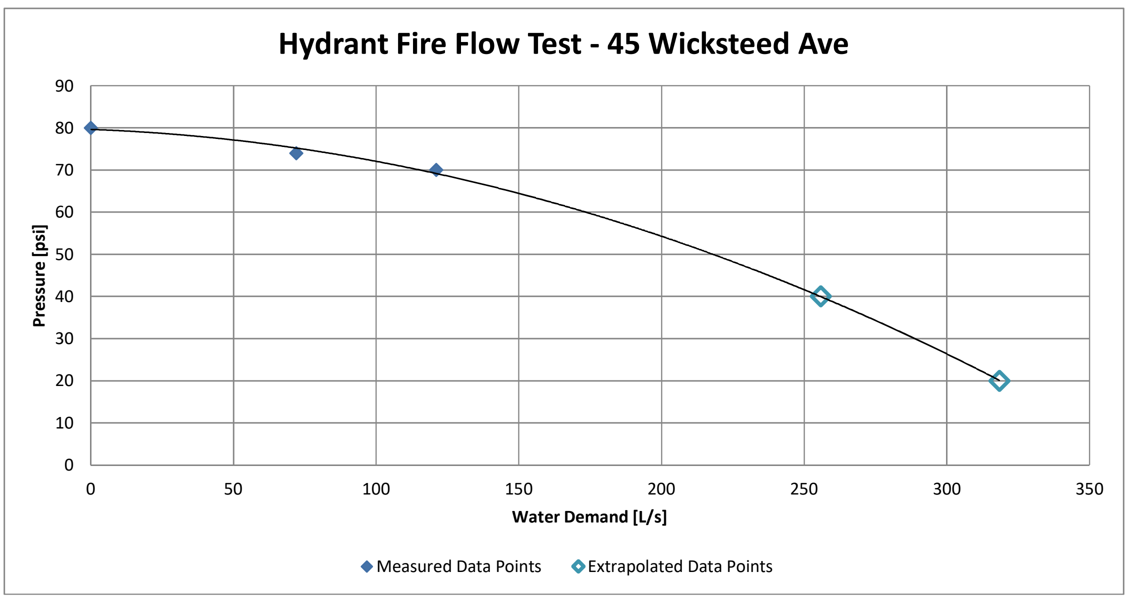
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	121.00	40	10	256
20	121.00	60	10	318



2017 08 02 - 17103 - Hydrant Test Data Extrapolation
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Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #3; Macnaughton Rd

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 9:30 AM
Contractor: Aquazition
Flow Hydrant: 24 Macnaughton Rd
Residual Hydrant: 4 Maughnaughtan Rd

	Hydrant Test	
	Flow	Head
Data Point	L/s	psi
1	0	60
2	52	53
3	82	48

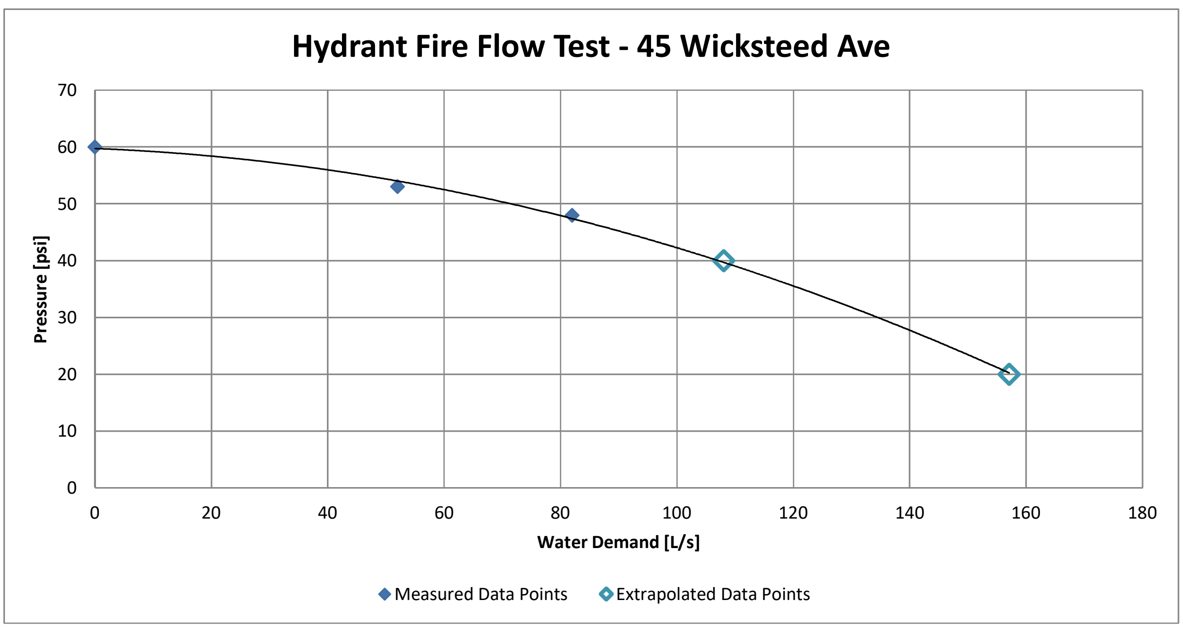
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad (4.10.1.2)$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	82.00	20	12	108
20	82.00	40	12	157



Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #4; 218 Wicksteed Ave

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:55 AM
Contractor: Aquazition
Flow Hydrant: 210 Wicksteed ave
Residual Hydrant: 218 Wicksteed Ave

	Hydrant Test	
	Flow	Head
Data Point	L/s	psi
1	0	86
2	69	76
3	114	71

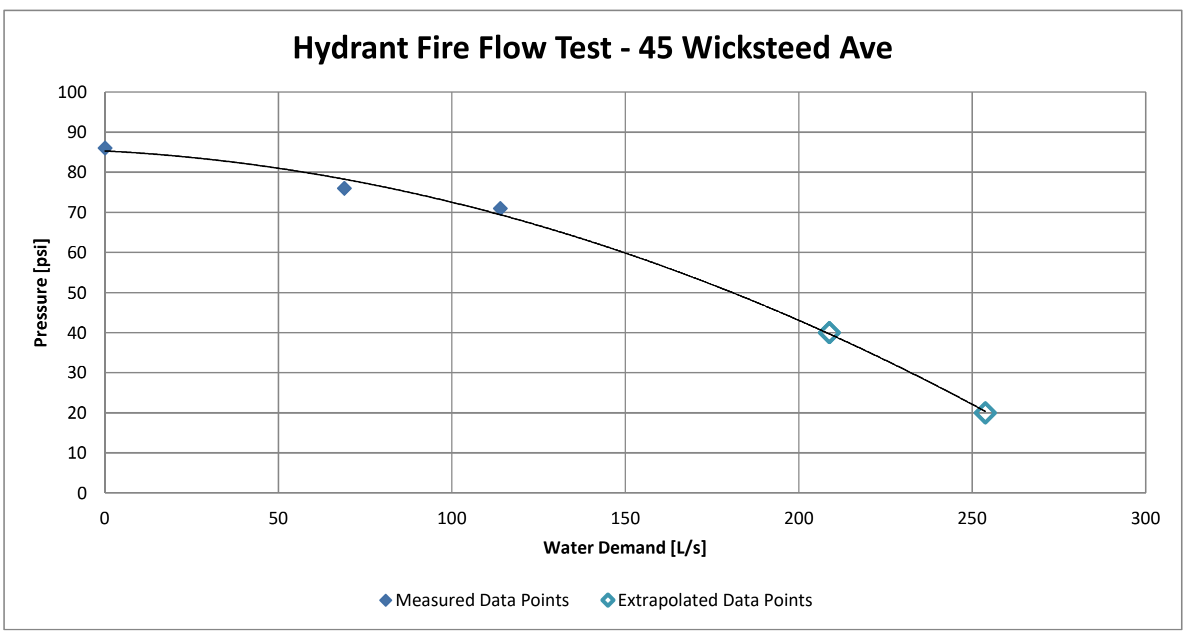
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	114.00	46	15	209
20	114.00	66	15	254



2017 08 02 - 17103 - Hydrant Test Data Extrapolation
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Fire Flow Test Analysis

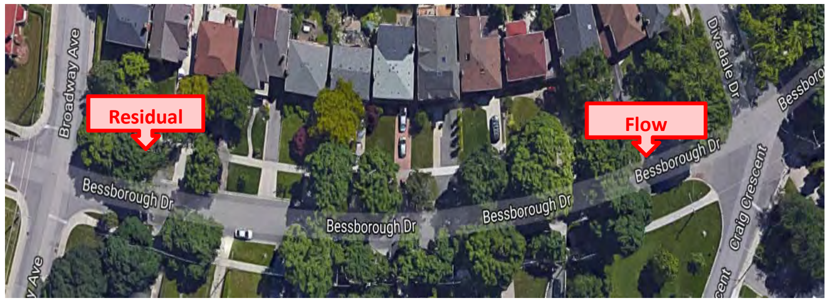
NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #4; Bessborough Dr

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 10:00 AM
Contractor: Aquazition
Flow Hydrant: 331 Bessborough Dr
Residual Hydrant: 297 Bessborough Dr



	Hydrant Test	
	Flow	Head
Data Point	L/s	psi
1	0	51
2	38	44
3	42	43

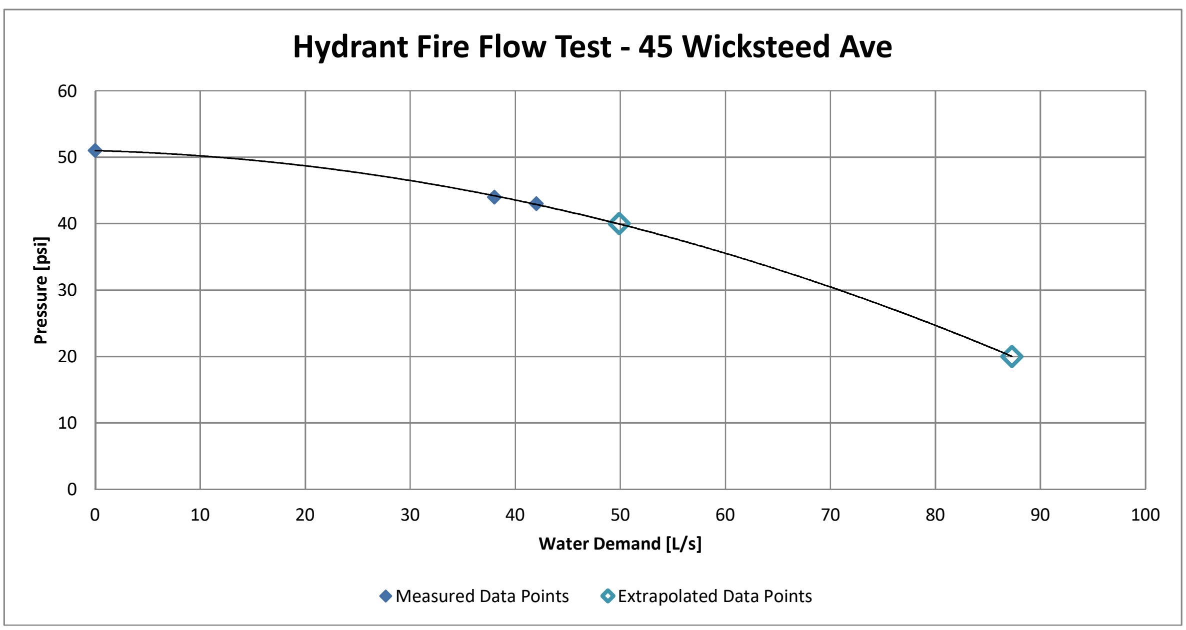
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

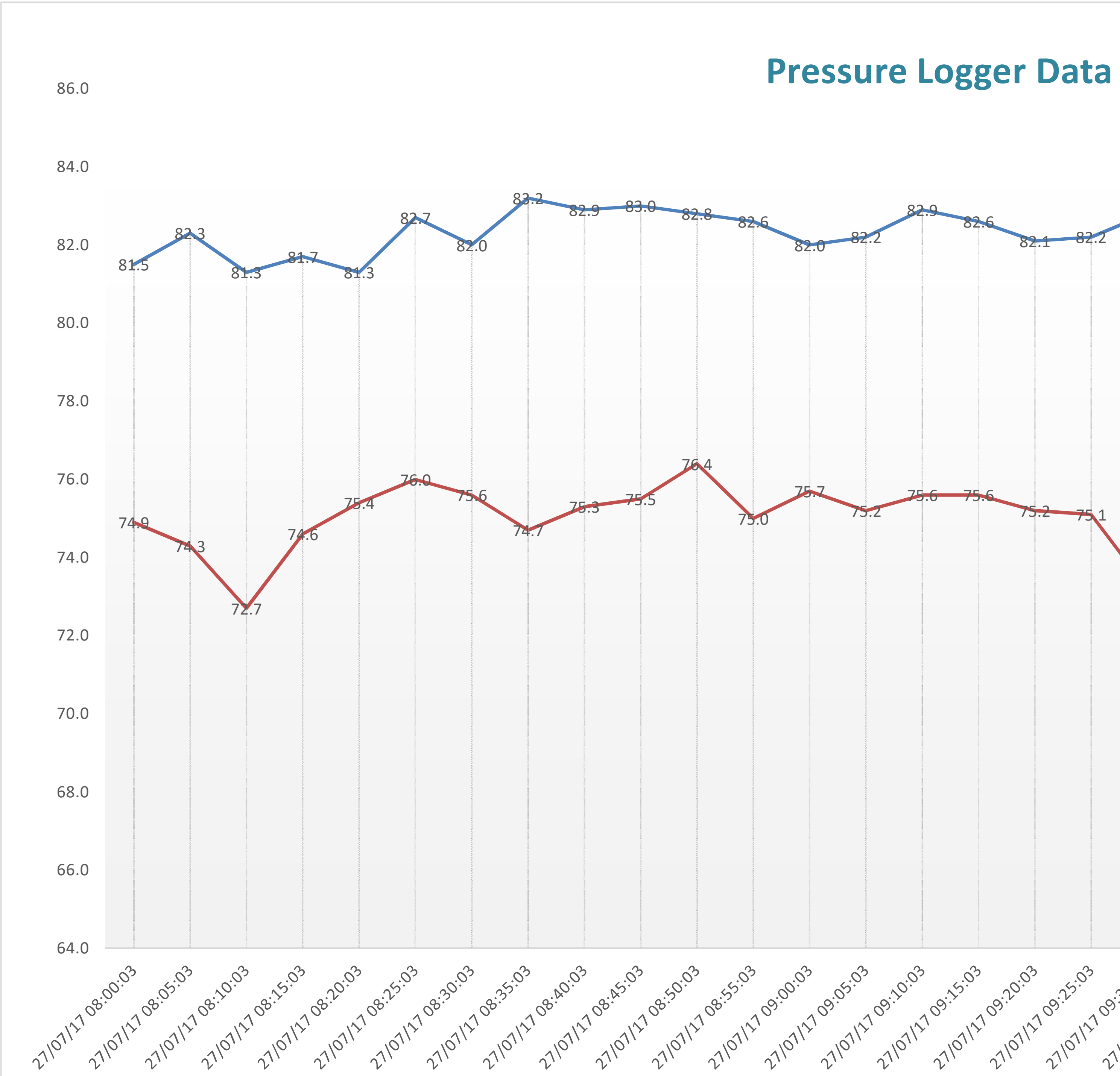
$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	42.00	11	8	50
20	42.00	31	8	87

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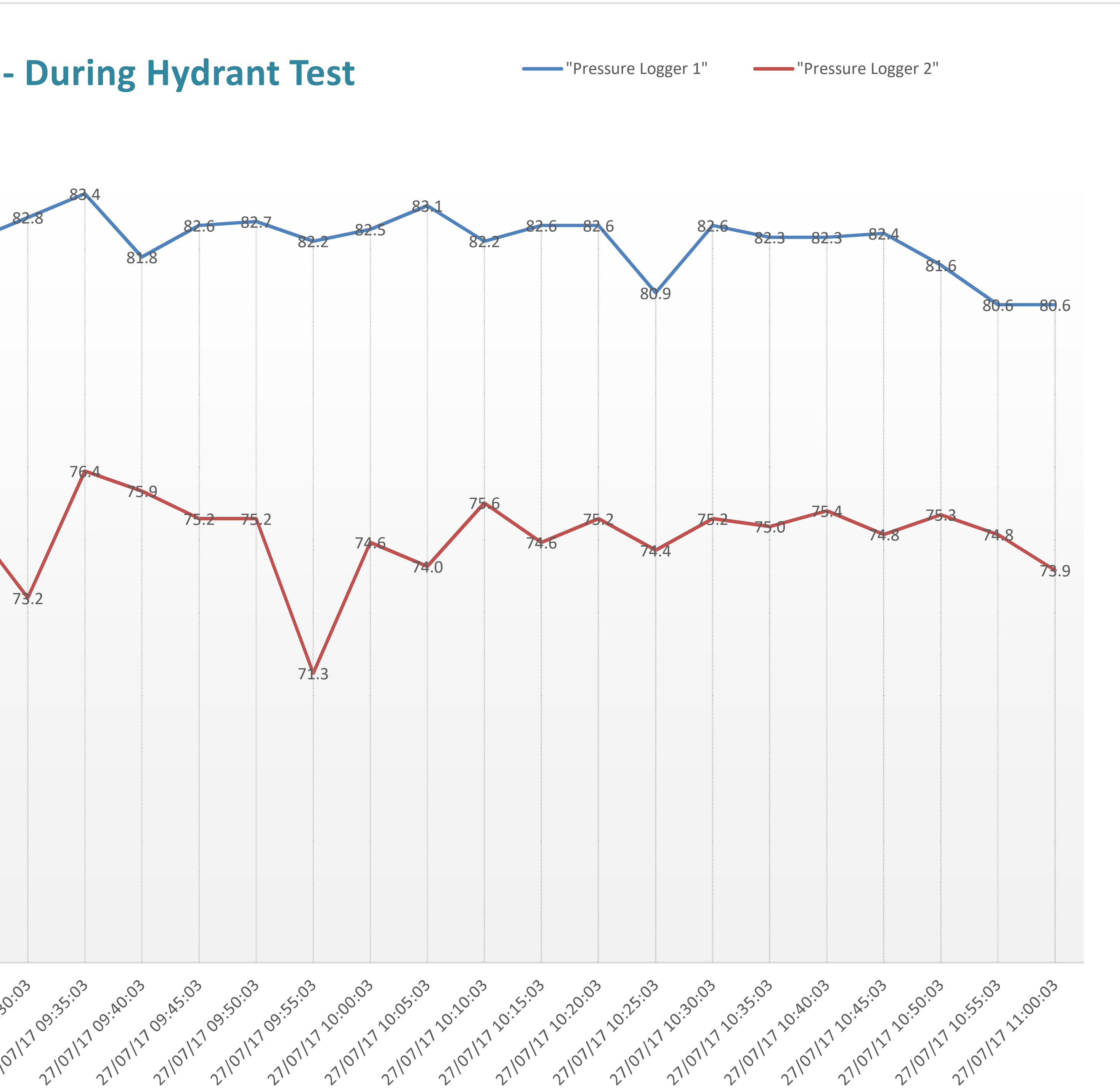

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80.9
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82.3
82.3
82.4
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75.2
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EGLINTION & LAIRD INTENSIFICATION

Model Calibration Table

Project: 17103 **Date:** 11-Aug-17

By: VP **Checked:** KCB

Pressure Logger 1	
ID	J16
Elevation (m)	128
Field Test Static Head (m)	186
Field Test Static Pressure (psi)	83
Calibrated Model Head (m)	192
Calibrated Model Pressure (psi)	90

Pressure Logger 2	
ID	J16
Elevation (m)	131
Field Test Static Head (m)	184
Field Test Static Pressure (psi)	75
Calibrated Model Head (m)	187
Calibrated Model Pressure (psi)	79

Fire Hydrant Test 1	
ID	WJ3000758
Elevation (m)	127
Field Test Max Flow (l/s)	92
Field Test Max flow Head (m)	174
Field Test Static Pressure (psi)	67
Calibrated Model Head (m)	180
Calibrated Model Pressure (psi)	75

Fire Hydrant Test 2	
ID	WJ3001072
Elevation (m)	130
Field Test Max Flow (l/s)	121
Field Test Max flow Head (m)	179
Field Test Static Pressure (psi)	70
Calibrated Model Head (m)	174
Calibrated Model Pressure (psi)	63

Fire Hydrant Test 3	
ID	WJ3000563
Elevation (m)	147
Field Test Max Flow (l/s)	82
Field Test Max flow Head (m)	180
Field Test Static Pressure (psi)	48
Calibrated Model Head (m)	177
Calibrated Model Pressure (psi)	44

Fire Hydrant Test 4	
ID	WJ38171
Elevation (m)	127
Field Test Max Flow (l/s)	114
Field Test Max flow Head (m)	177
Field Test Static Pressure (psi)	71
Calibrated Model Head (m)	177
Calibrated Model Pressure (psi)	70

Fire Hydrant Test 5	
ID	WJ3000097
Elevation (m)	154
Field Test Max Flow (l/s)	42
Field Test Max flow Head (m)	184
Field Test Static Pressure (psi)	43
Calibrated Model Head (m)	183
Calibrated Model Pressure (psi)	41

Refer Fig.1 For location of Loggers and fire flow test

TECHNICAL MEMORANDUM

DATE	October 27, 2017
TO	**Pascal Monat, SCS Consulting Limited**
CC	
SUBJECT	**Eglinton/Laird Ave Intensification** **Water Servicing Analysis – Existing Condition**
FROM	Kevin Brown
PROJECT NUMBER	17103

1 Introduction

The Municipal Infrastructure Group Ltd. (TMIG) has been retained by SCS Consulting Limited to conduct a servicing analysis to understand the existing water system in the study area and the capacity of the existing system to service the potential development of the Eglington/Laird Development Area.

Information about the water system provided by the City was reviewed, and a modelling methodology developed to be applied to the analysis as per the memo dated June 7, 2017 and as part of the modelling methodology, a model calibration was performed as per the memo dated August 8, 2017. This memo also describes the Existing condition analysis with the calibrated model.

2 Water Distribution System – Model Development

2.1. Pipe Network

The City provided GIS shapefiles for the Water system (Water Line, Water junction, valves), and these were used to generate the pipe network for the InfoWater model after clarifying the information gaps. (Refer Fig 1 – Water system)

2.2. Water Demand

The average consumption data from the geocoded meter data provided has been used as average day demand for the design demand calculations. Using the demand allocation tool in InfoWater, these demands has been assigned to closest node in pipe network to create an average day demand set.

Based on City of Toronto guidelines, the peaking factor for the Maximum day is 1.8 and Peak hour is 2.5. The average consumption from the meter data was multiplied with the peaking factors to create the Maximum day and Peak hour demand set.

Fire demand based on the land use has been calculated and added to the InfoWater Fire nodes. (Refer Fig 2-Fire demand allocation)

2.3. Boundary conditions

Since the model developed is for the local area only, additional system data was collected to provide a suitable boundary condition at the study area limits. A fixed head reservoir has been established west of Don River and east of Overlea Boulevard and Thorncliffe Park Drive servicing the 400-mm transmission main along Overlea Boulevard. The HGL elevation will be established through pressure logging.

3 Water Distribution System – Field Testing Program

To calibrate the model to simulate the field conditions a field testing program was formed. These tests involved five hydrant flow tests along major water mains to calibrate the roughness coefficient along these primary feeds. Also, pressure loggers were installed at two locations (Overlea Blvd and Parkhurst Blvd) to track normal pressure variations Fig.3 shows the details of the field testing program.

The fire flow test analysis was performed for all the five locations using NFPA 291 Extrapolation Methodology. Attachment A shows the fire flow analysis on all the five locations. Attachment B shows the pressure variations at those locations during hydrant test.

4 Water Distribution System – Model Calibration

The hydraulic information in model regarding pipe roughness (Hazen Williams Coefficient) and the boundary conditions (HGL for Fixed Head Reservoir) were initially assumed based on standards. Model calibration involves the adjustment of the primary network model parameters (i.e. pipe roughness coefficients and Reservoir HGL) until the model results closely approximate actual observed conditions as measured from field data.

a. Boundary conditions

Using the pressure logger data at two locations and the static pressure data at the five-fire flow locations, the HGL for fixed head reservoir is adjusted to reasonable value.

b. Pipe Roughness Coefficient

The model was simulated for all five fire flow tests by assigning the maximum hydrant flow to "Demand 10" in model at the Fire flow node and the residual pressure at the nearby node is noted. The pipe roughness was adjusted along the mains such that to reduce the difference in residual head between model and field data. The adjusted pipe roughness coefficient is within the range specific by City of Toronto Standards.

The calibrated model head with observed field data is given in Attachment C. It is observed that the observed and simulated HGL differ in the range of +5 m to -5 m. This difference is within anticipated test accuracy limits; therefore, the model can be calibrated to reflect field conditions satisfactorily.

5 Water Distribution System – Model Simulation

With the model calibrated, we simulated the existing conditions to establish the residual pressures under several demands scenarios throughout the Study Area. The model was simulated for the following scenarios and the pressure and flow in system can be studied to understand the capacity under the future planning scenarios. Results are provided in Table 1.

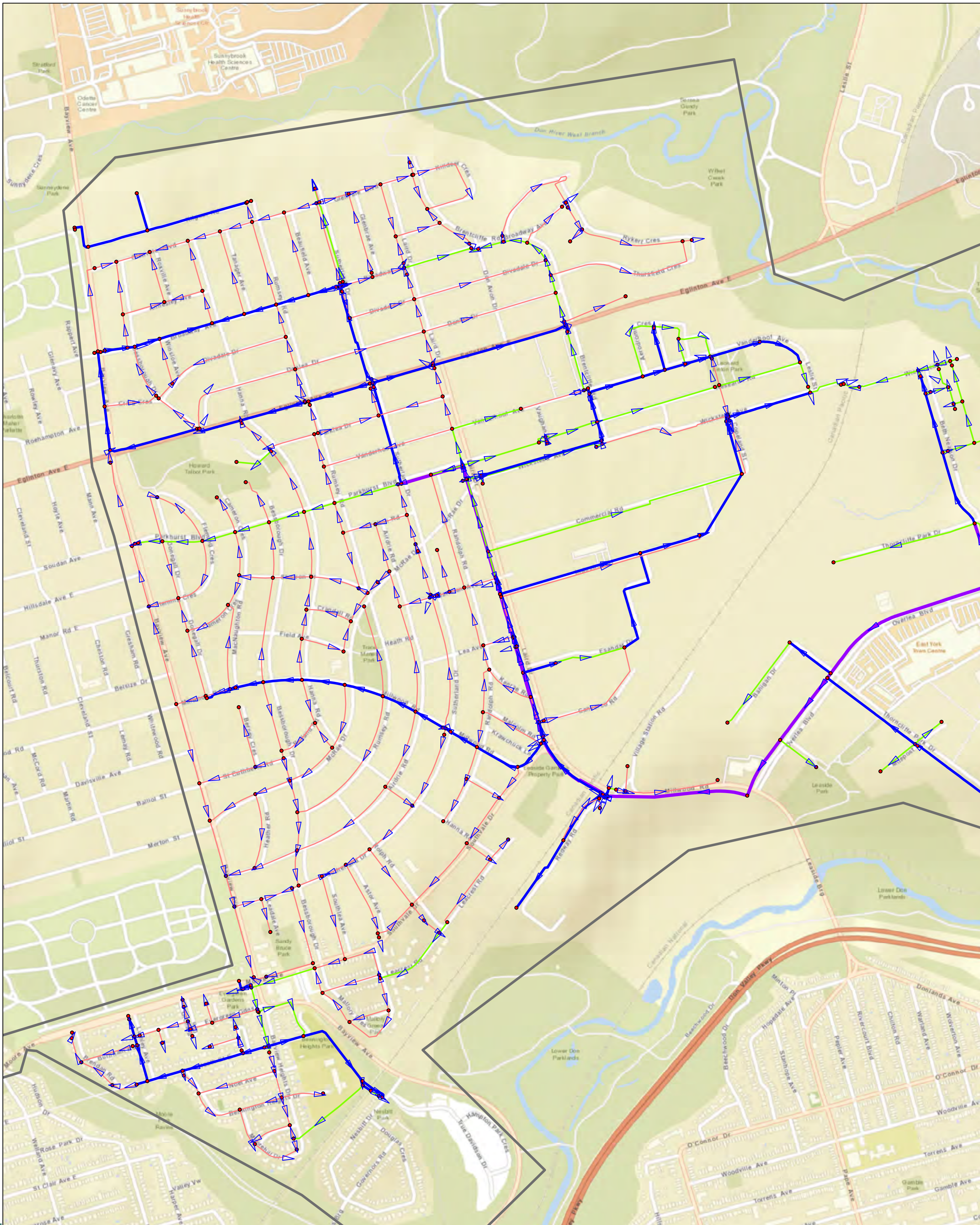
Table 1 – Modelling Scenario Results

Water Demand Modeling Scenario	Minimum Water System Requirements	Modelling Results
Average Day Demand	Recommended System Pressures = 275 kPa to 690 kPa	Model System Pressure = 331 kPa to 662 kPa (Ref Fig 4)
Maximum Day Demand	Recommended System Pressures = 275 kPa to 690 kPa	Model System Pressure = 283 kPa to 641 kPa (Ref Fig 5)
Peak Hour Demand	Recommended System Pressures = 275 kPa to 690 kPa	Model System Pressure = 255 kPa to 627 kPa (Ref Fig 6)
Required Fire Flow to be provided at a residual pressure of no less than 140 kPa		
Maximum Day Demand plus Fire Flow	Residential Fire flow requirements per City of Toronto Standards, Q_f >64 L/s to 189 L/s	Model Residential Available Fire flow = 57 L/s to 239 L/s (Ref Fig 7)
	Employment Fire flow requirements per City of Toronto Standards, $Q_{f=}$ 189 L/s to 317 L/s	Model Employment / High Rise Available Fire flow 82 L/s to 569 L/s

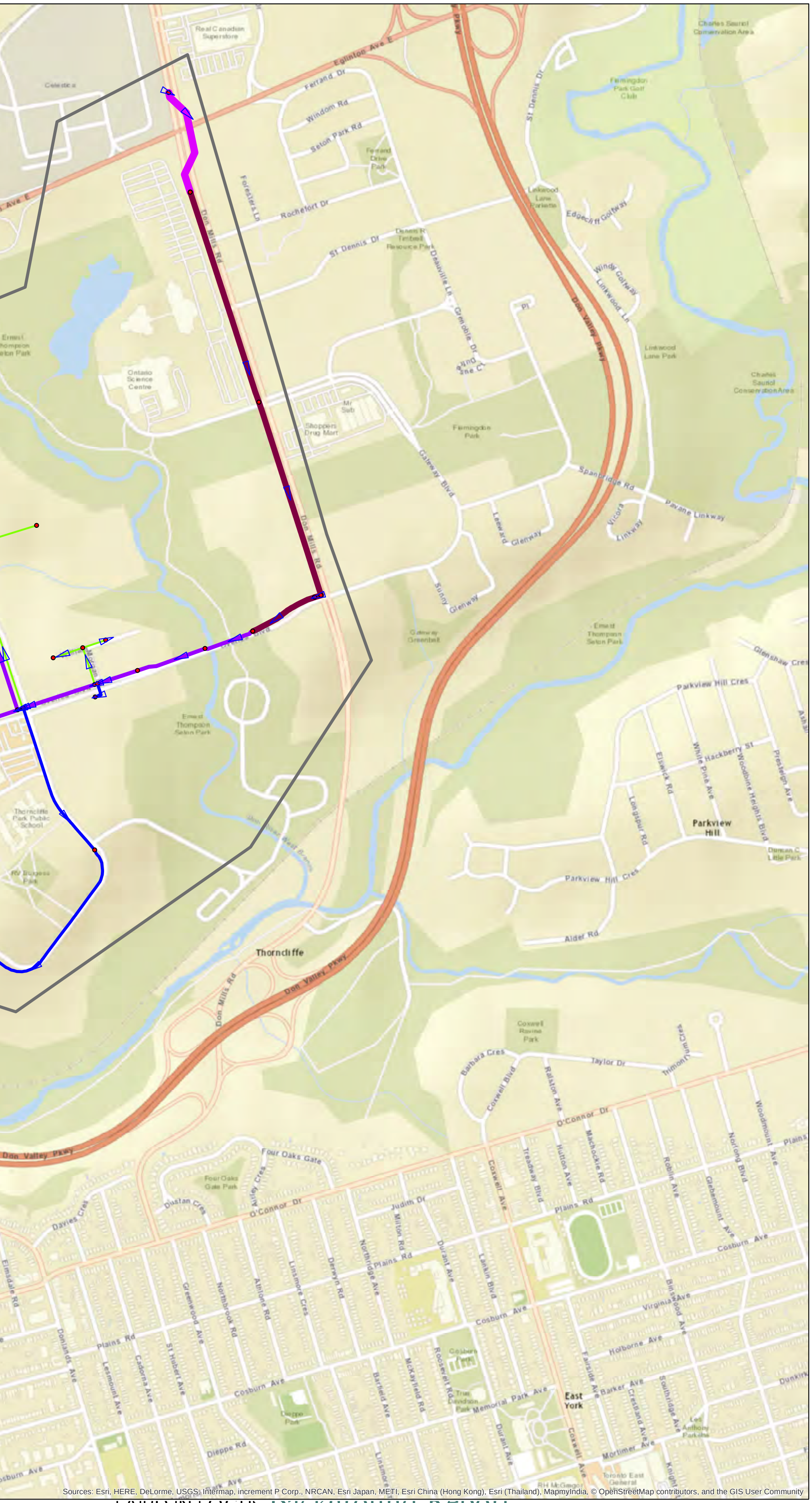
6 Conclusion

The model simulation results show that the system pressures are within the recommended range of 40 psi to 100 psi (275 kpa to 690 kpa) in most of the area. However, under peak hour demand scenario, there are areas with low pressures and these are at the higher elevation range of the current pressure district.

Fire flow analysis performed shows that available fire flows are generally suitable for the existing development. There may be upgrades required improve fire flows within the municipal infrastructure to support future development along Laird Drive. However this will be determined upon review of the proposed massing. Generally, Fire Underwriters Survey fire flows tend to be slightly lower than the general values found in the City's Design Guidelines. This will be taken into consideration in assessing the network's adequacy, when the building massing is available for review.



Sunnybrook Health Sciences Centre
Odette Cancer Centre
Bayview Ave
Don River West Branch
Serena Gundy Park
Wilket Creek Park
Leslie St
Eglinton Ave E
Brentcliffe Rd
Broadway Ave
Rykert Cres
Thursfield Cres
Divadale Dr
Parkhurst Blvd
Howard Talbot Park
Commercial Rd
Thorncliffe Park Dr
Overlea Blvd
East York Town Centre
Vanderhoof Ave
Wicksteed Ave
Laird Dr
Village Station Rd
Millwood Rd
Heath Rd
Field Ave
Bessborough Dr
Rumsey Rd
Sutherland Dr
Randolph Rd
McRae Dr
Hanna Rd
Sharron Rd
Leslie Park
Lower Don Parklands
Don Valley Pkwy
Moore Ave
Bennington Heights Park
Nesbitt Park
Hampton Park Cres
O'Connor Dr
Woodville Ave
Torrens Ave
Gamble Ave
Pape Ave
Donlands Ave
Merton St
Balliol St
Davisville Ave
Soudan Ave
Hillsdale Ave E
Roehampton Ave
St Clair Ave E

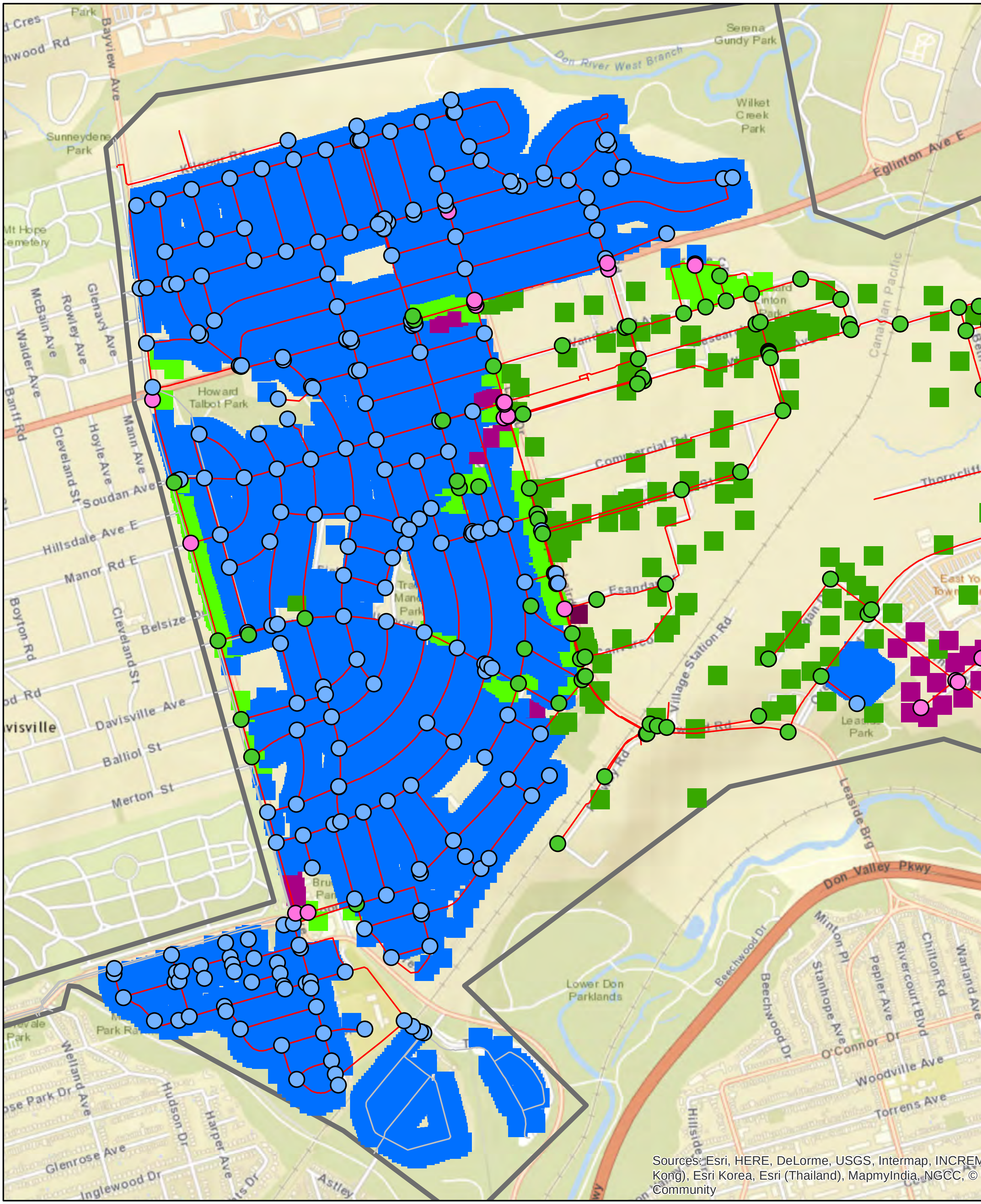


Legend

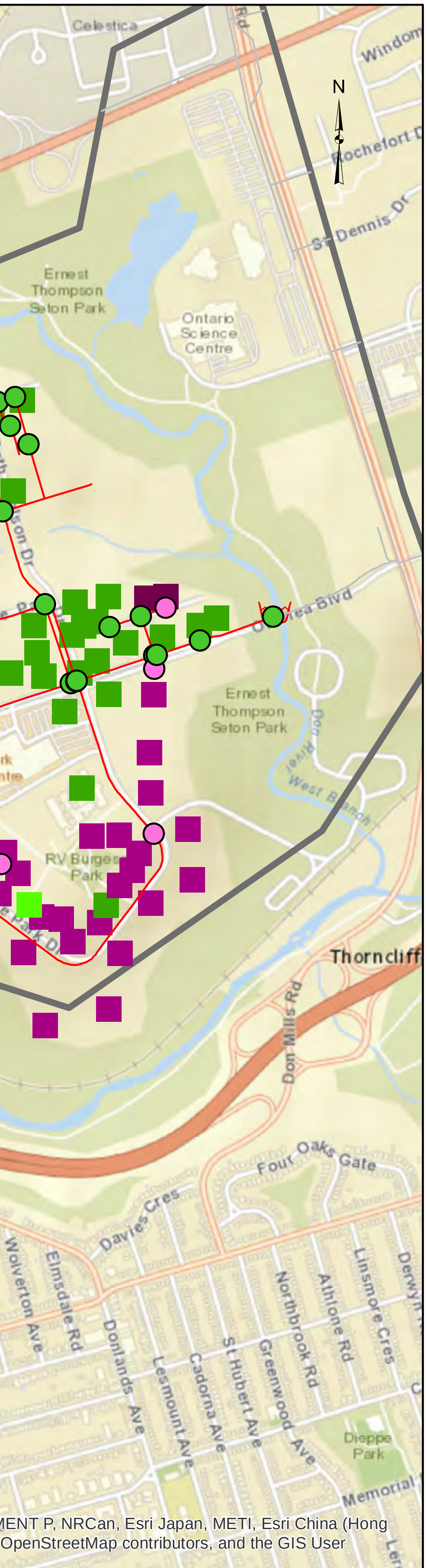
Pipe

RUN_DIAM

- <= 150 mm
- <= 250 mm
- 300 mm
- 400 mm
- 600 mm
- 750 mm



Bayview Ave
Sunneydene Park
Serena Gundy Park
Don River West Branch
Wilket Creek Park
Eglinton Ave E
Mt Hope Cemetery
McBain Ave
Rowley Ave
Glenavy Ave
Walder Ave
Banff Rd
Cleveland St
Hoyle Ave
Mann Ave
Howard Talbot Park
Soudan Ave
Hillsdale Ave E
Manor Rd E
Boynton Rd
Belsize Dr
Davisville Ave
Davisville
Balliol St
Merton St
Commercial Rd
Esandar Dr
Village Station Rd
Canadian Pacific
Thorncliffe
Leaside Park
Leaside Brg
Don Valley Pkwy
Lower Don Parklands
Beechwood Dr
Minton Pl
Stanhope Ave
Pepler Ave
Rivercourt Blvd
Chilton Rd
Warland Ave
O'Connor Dr
Woodville Ave
Torrens Ave
Hillside
Welland Ave
Hudson Dr
Harper Ave
Glenrose Ave
Inglewood Dr
Astley
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREM
Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, ©
Community



Legend

Junction

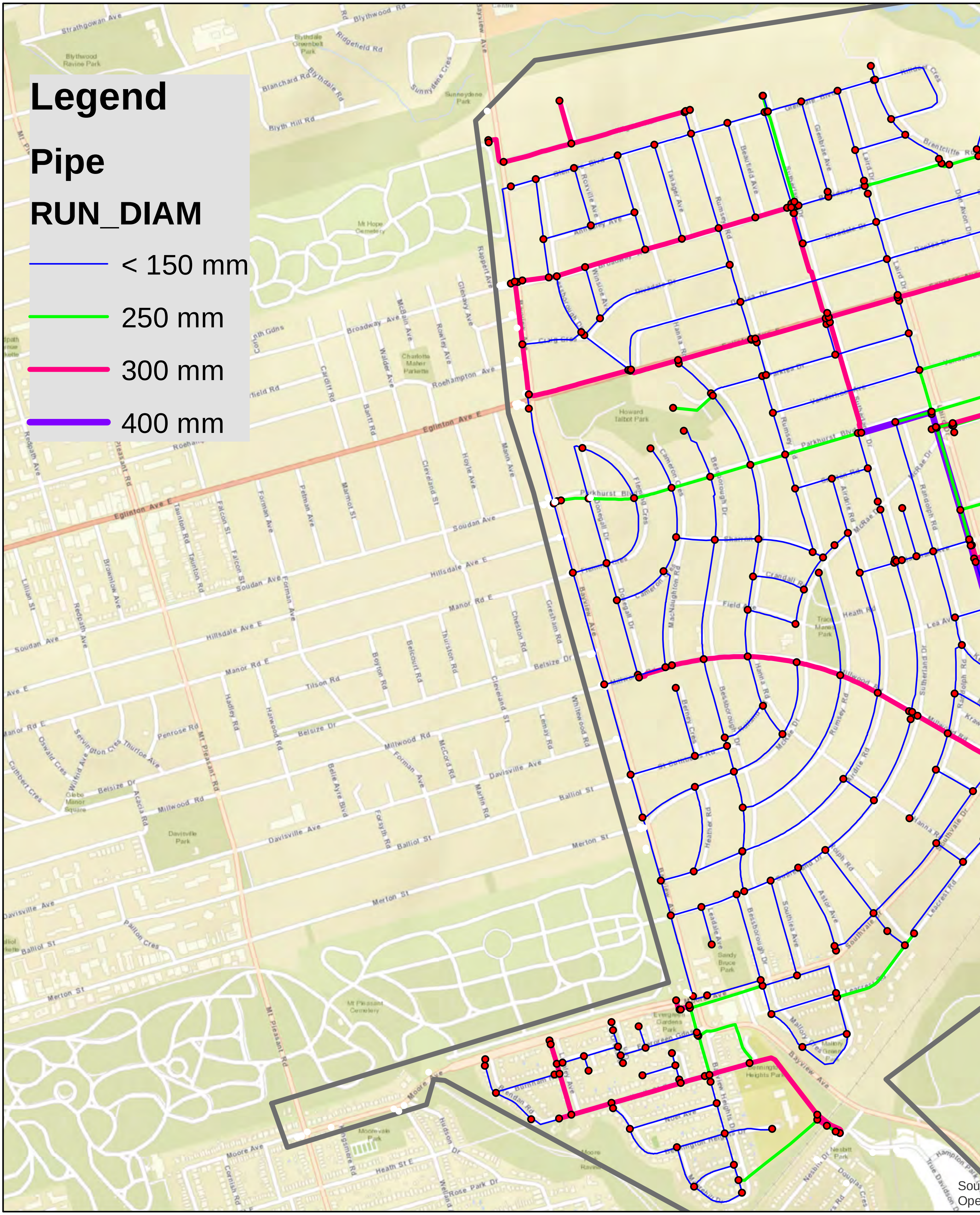
FIRE_DEM

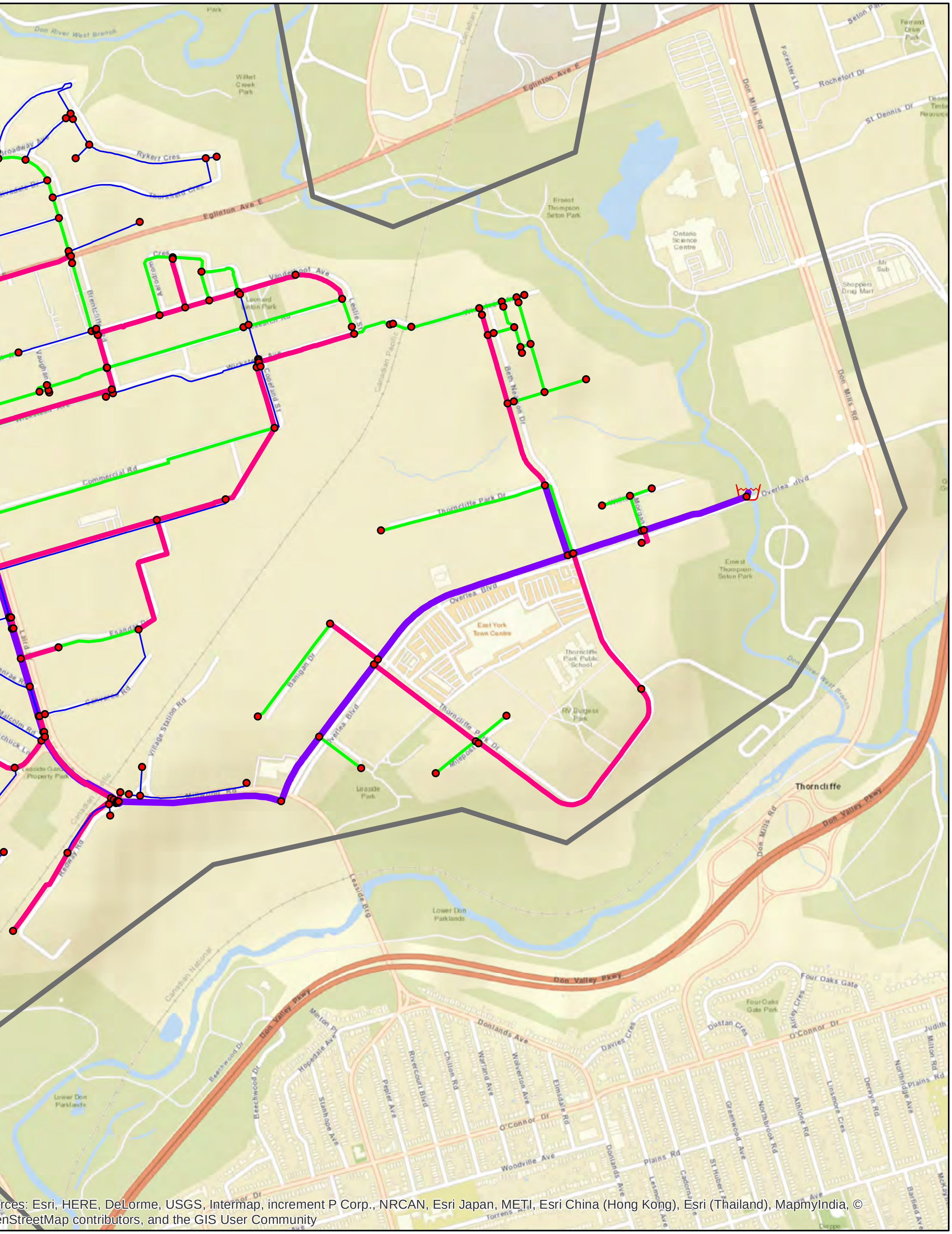
- 65 L/s
- 190 L/s
- 317 L/s

Meterdata_Landuse_Final

Land_Use

- RES, FF = 65 L/s
- ICI + RES , FF = 190 L/s
- ICI, FF = 190 L/s
- RES-HD, FF = 317 L/s
- ICI-HR, FF = 317 L/s


Legend
Pipe
RUN_DIAM
< 150 mm
250 mm
300 mm
400 mm


Don River West Branch
Wilket Creek Park
Eglinton Ave E
Don Mills Rd
Foresters Ln
Rochefort Dr
St Dennis Dr
Seton Park
Ferrand Drive Park
Broadway Ave
Rykert Cres
Thurston Cres
Ernest Thompson Seton Park
Ontario Science Centre
Shoppers Drug Mart
Vanderhoof Ave
Leslie St
Brentcliffe Rd
Aerodrome Cres
Leonard Linton Park
Wicksteed Ave
Copeland St
Beth Nealson Dr
Vaughan Rd
Commercial Rd
Canadian Pacific
Thorncliffe Park Dr
Overlea Blvd
Morrison Ave
East York Town Centre
Thorncliffe Park Public School
RV Burgess Park
Esandar Dr
Laird Dr
Village Station Rd
Research Rd
Banigan Dr
Malcolm Rd
Millwood Rd
Leaside Gardens Property Park
Leaside Park
Parkway Rd
Thorncliffe
Don Valley Pkwy
Leaside Brg
Lower Don Parklands
Four Oaks Gate
Four Oaks Gate Park
Dustan Cres
O'Connor Dr
Donlands Ave
Davies Cres
Minton Pl
Hopedale Ave
Beechwood Dr
Stanhope Ave
Pepler Ave
Rivercourt Blvd
Chilton Rd
Warland Ave
Wolverleigh Blvd
Elmsdale Rd
Woodville Ave
Plains Rd
Greenwood Ave
Northbrook Rd
Athlone Rd
Linsmore Cres
Dewhurst Rd
Northridge Ave
Milton Rd
Canadian National
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enStreetMap contributors, and the GIS User Community

TMIG

Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

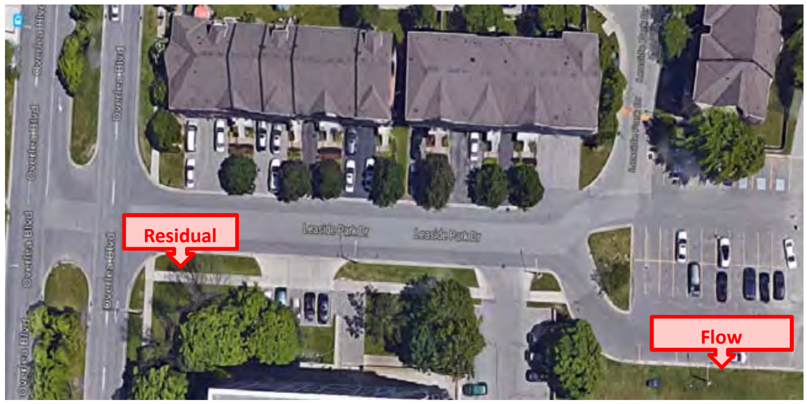
Hydrant Test #1; Leaside Park Dr

Project: 17103 **Date:** 3-Aug-17

By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:10 AM
Contractor: Aquazition
Flow Hydrant: 5 Leaside Park Dr
Residual Hydrant: 1 Leaside Park Dr

	Hydrant Test	
	Flow	**Head**
Data Point	**L/s**	**psi**
1	0	85
2	68	75
3	92	67



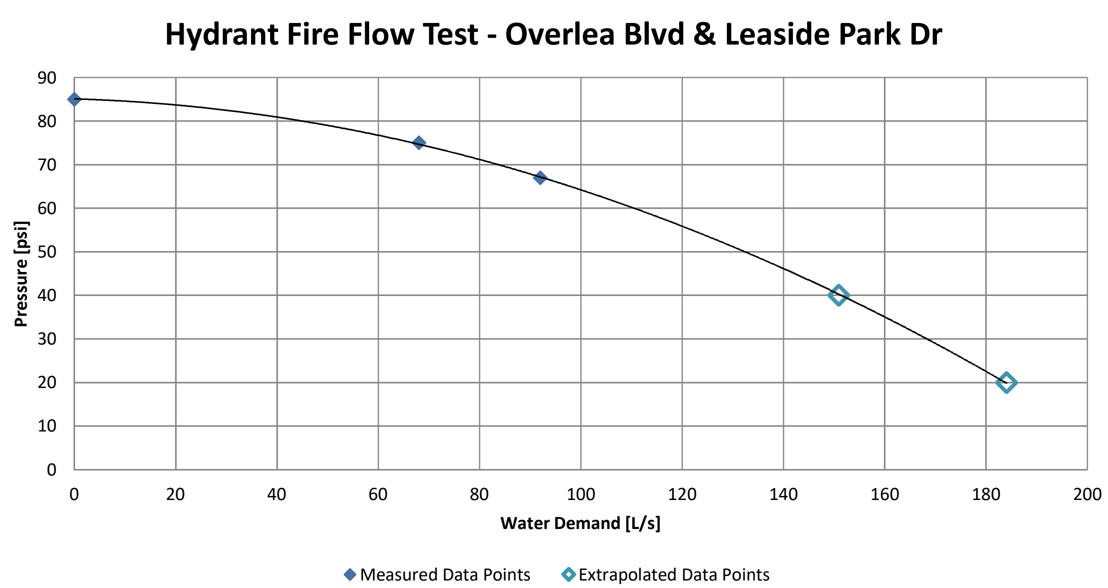
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \quad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	92	45	18	151
20	92	65	18	184



2017 08 02 - 17103 - Hydrant Test Data Extrapolation
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TMIG	**Fire Flow Test Analysis** *NFPA 291 Extrapolation Methodology* **Eglinton & Laird** **Hydrant Test #2; 45 Wicksteed Ave** **Project:** 17103 **Date:** 3-Aug-17 **By:** VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:35 AM
Contractor: Aquazition
Flow Hydrant: 45 Wicksteed Ave (West)
Residual Hydrant: 45 Wicksteed Ave (East)

	Hydrant Test	
	Flow	**Head**
Data Point	**L/s**	**psi**
1	0	80
2	72	74
3	121	70

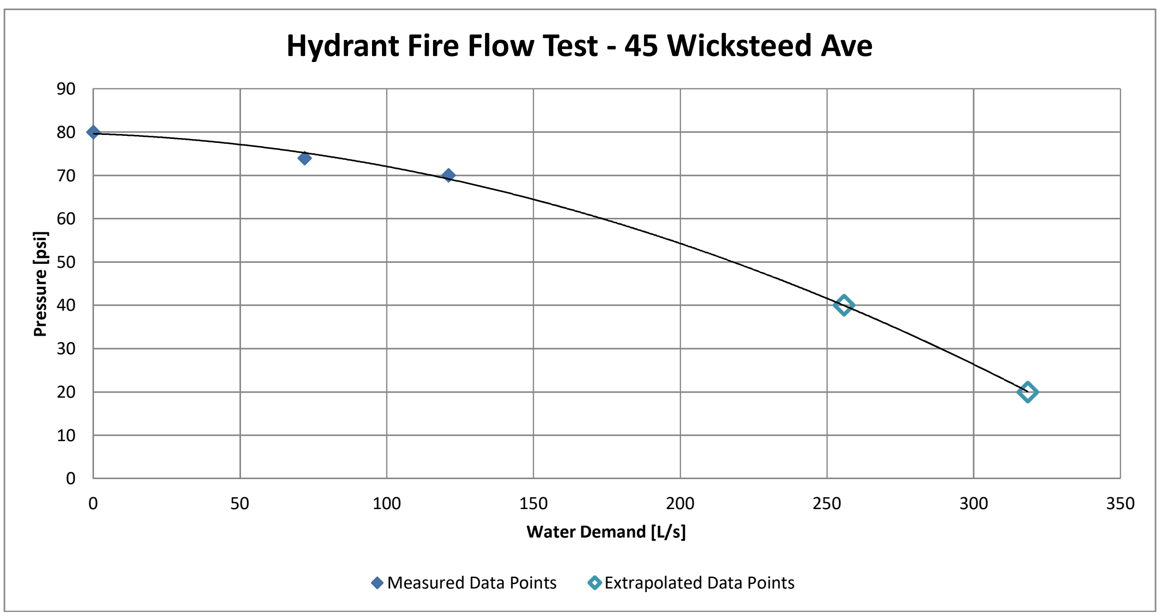
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad (4.10.1.2)$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	**Q_F**	**h_r**	**h_f**	**Q_R**
psi	L/s	psi	psi	L/s
40	121.00	40	10	256
20	121.00	60	10	318



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Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #3; Macnaughton Rd

Project: 17103 **Date:** 3-Aug-17

By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 9:30 AM

Contractor: Aquazition

Flow Hydrant: 24 Macnaughton Rd

Residual Hydrant: 4 Maughnaughtan Rd

	Hydrant Test	
Data Point	**Flow** L/s	**Head** psi
1	0	60
2	52	53
3	82	48

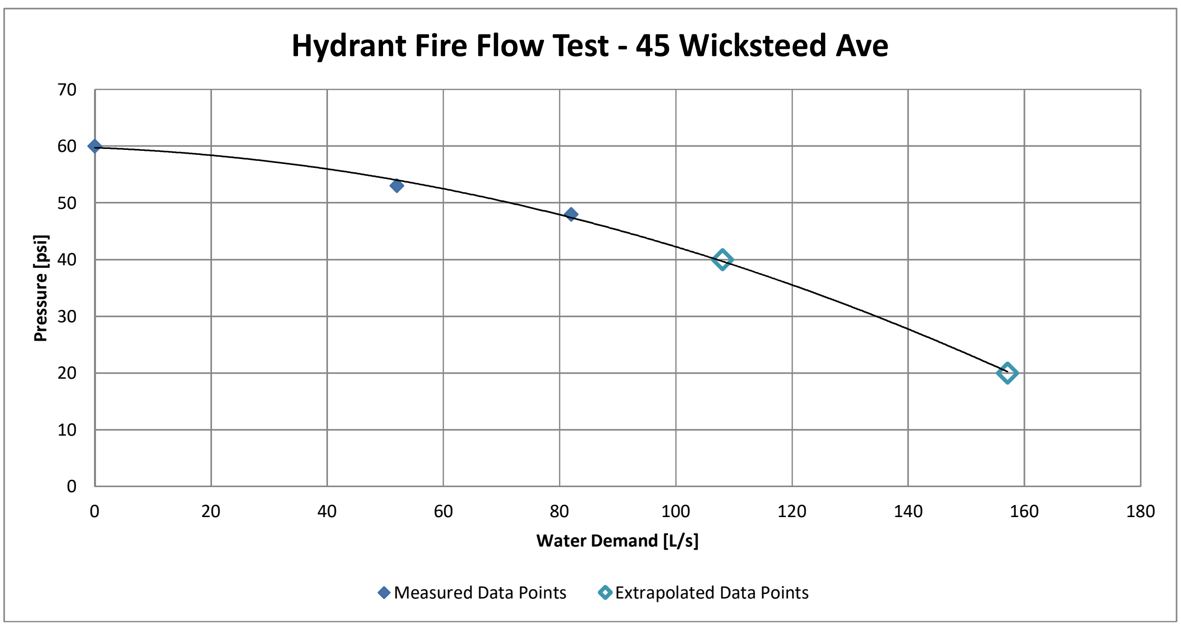
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad \textbf{(4.10.1.2)}$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure psi	Q_F L/s	h_r psi	h_f psi	Q_R L/s
40	82.00	20	12	108
20	82.00	40	12	157



TMIG

Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #4; 218 Wicksteed Ave

Project: 17103 **Date:** 3-Aug-17
By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 8:55 AM
Contractor: Aquazition
Flow Hydrant: 210 Wicksteed ave
Residual Hydrant: 218 Wicksteed Ave

	Hydrant Test	
	Flow	**Head**
Data Point	**L/s**	**psi**
1	0	86
2	69	76
3	114	71

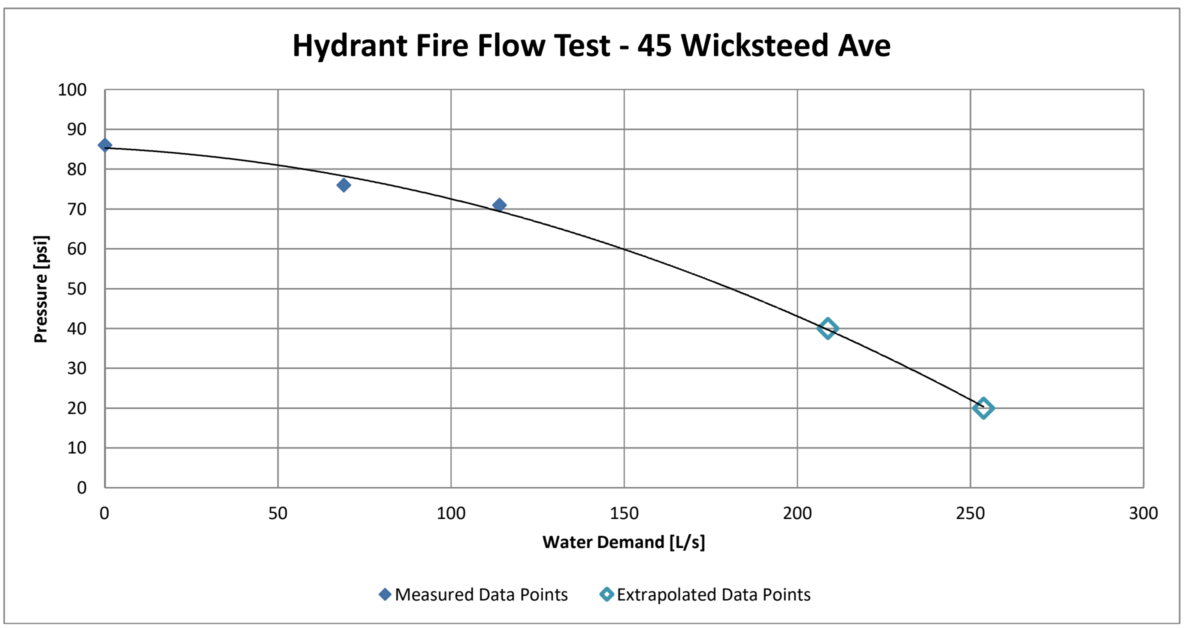
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad (4.10.1.2)$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	114.00	46	15	209
20	114.00	66	15	254



2017 08 02 - 17103 - Hydrant Test Data Extrapolation
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Fire Flow Test Analysis

NFPA 291 Extrapolation Methodology

Eglinton & Laird

Hydrant Test #4; Bessborough Dr

Project: 17103 **Date:** 3-Aug-17

By: VP **Checked:** KCB

Date of Hydrant Test: 27-Jul-17 10:00 AM

Contractor: Aquazition

Flow Hydrant: 331 Bessborough Dr

Residual Hydrant: 297 Bessborough Dr

	Hydrant Test	
	Flow	**Head**
Data Point	**L/s**	**psi**
1	0	51
2	38	44
3	42	43

4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

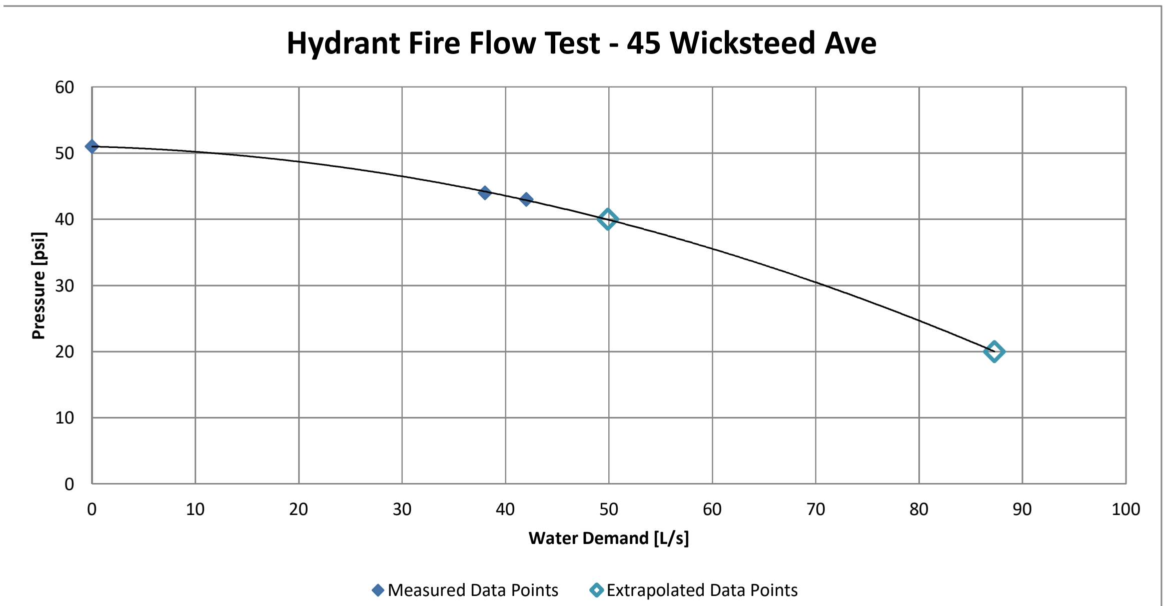
$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad \textbf{(4.10.1.2)}$$

where:

Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Based on Data Point 3

Desired Pressure	Q_F	h_r	h_f	Q_R
psi	L/s	psi	psi	L/s
40	42.00	11	8	50
20	42.00	31	8	87



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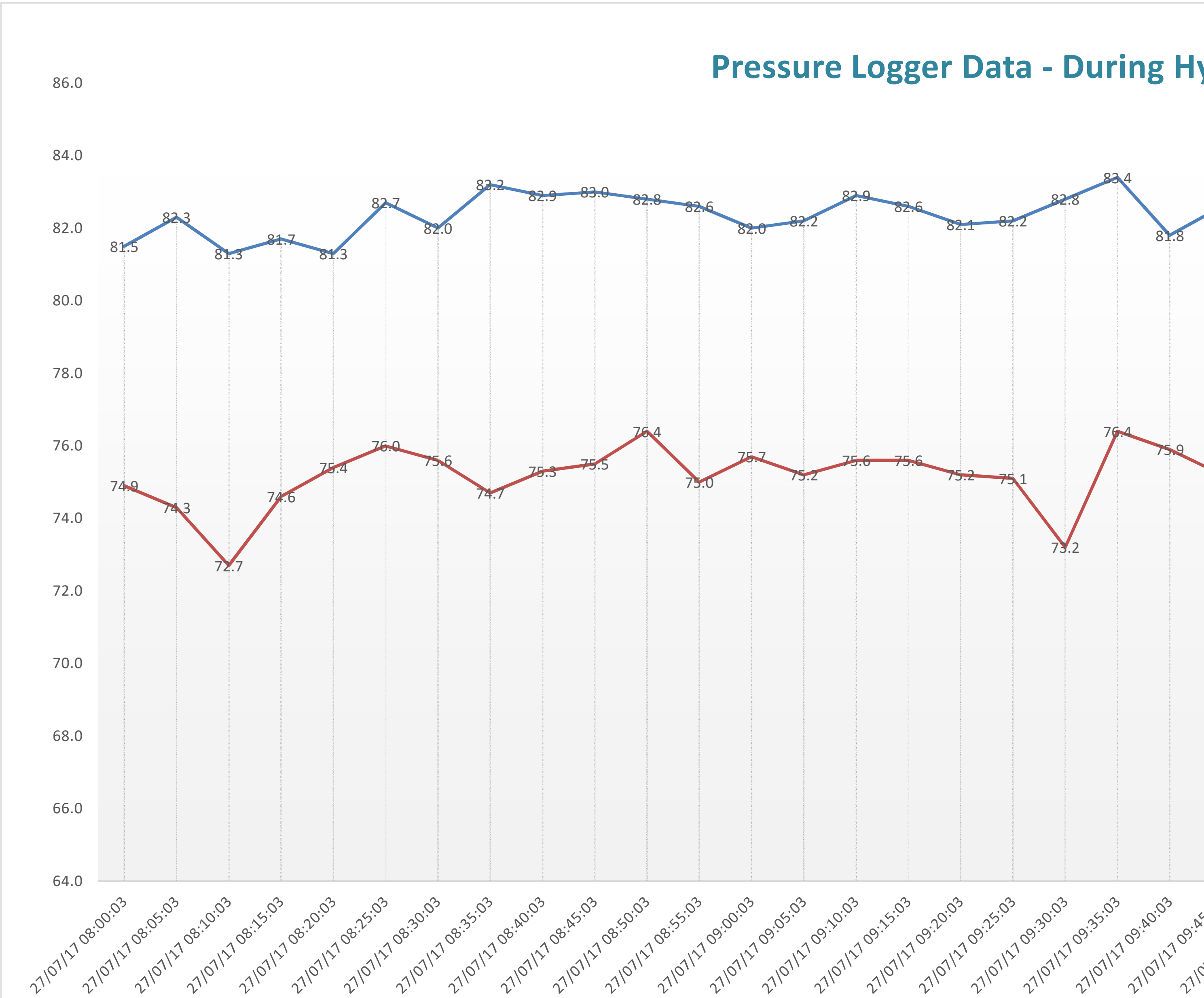
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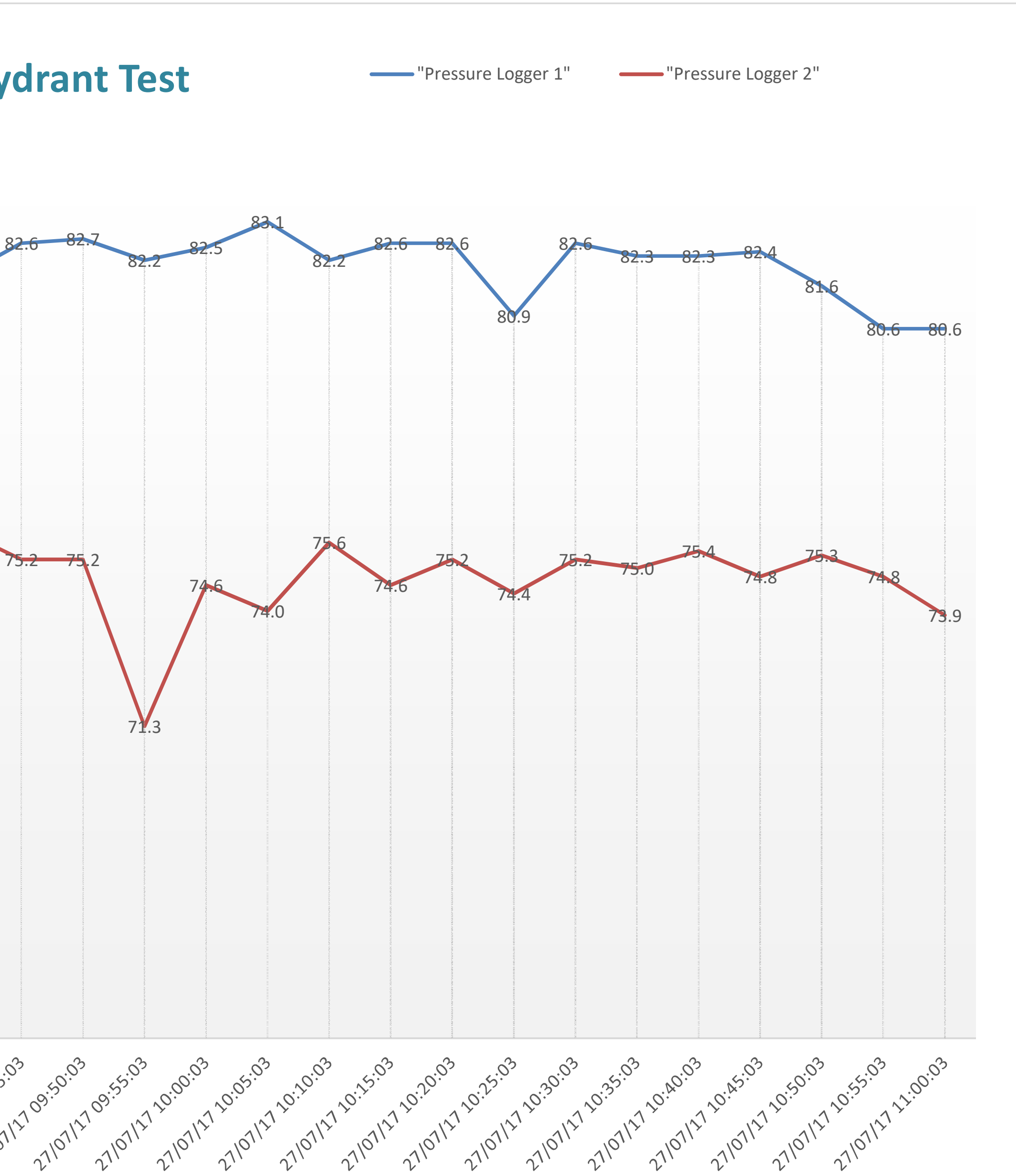
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27/07/17 10:50:03
27/07/17 10:55:03
27/07/17 11:00:03

TMIG

EGLINTION & LAIRD INTENSIFICATION
Model Calibration Table

Project: 17103 **Date:** 11-Aug-17
By: VP **Checked:** KCB

Pressure Logger 1	
ID	J16
Elevation (m)	128
Field Test Static Head (m)	186
Field Test Static Pressure (psi)	83
Calibrated Model Head (m)	192
Calibrated Model Pressure (psi)	90

Pressure Logger 2	
ID	J16
Elevation (m)	131
Field Test Static Head (m)	184
Field Test Static Pressure (psi)	75
Calibrated Model Head (m)	187
Calibrated Model Pressure (psi)	79

Fire Hydrant Test 1	
ID	WJ3000758
Elevation (m)	127
Field Test Max Flow (l/s)	92
Field Test Max flow Head (m)	174
Field Test Static Pressure (psi)	67
Calibrated Model Head (m)	180
Calibrated Model Pressure (psi)	75

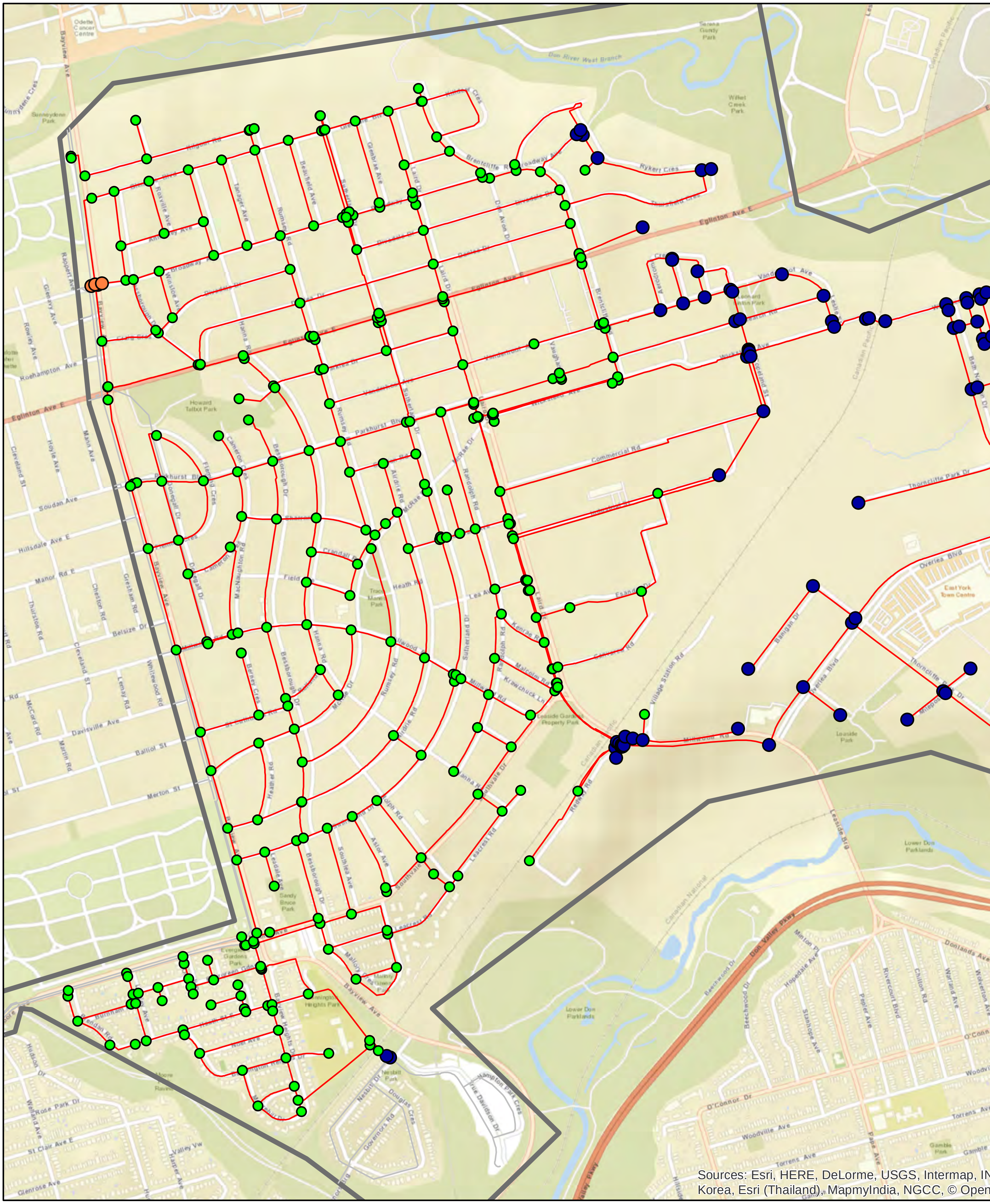
Fire Hydrant Test 2	
ID	WJ3001072
Elevation (m)	130
Field Test Max Flow (l/s)	121
Field Test Max flow Head (m)	179
Field Test Static Pressure (psi)	70
Calibrated Model Head (m)	174
Calibrated Model Pressure (psi)	63

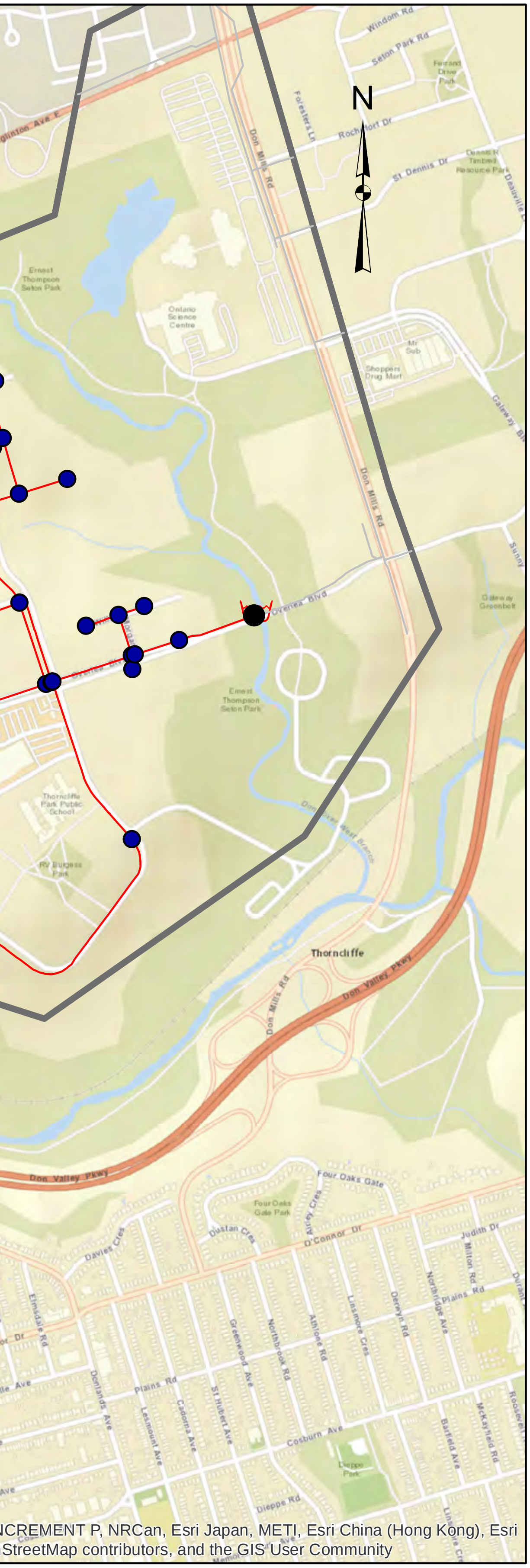
Fire Hydrant Test 3	
ID	WJ3000563
Elevation (m)	147
Field Test Max Flow (l/s)	82
Field Test Max flow Head (m)	180
Field Test Static Pressure (psi)	48
Calibrated Model Head (m)	177
Calibrated Model Pressure (psi)	44

Fire Hydrant Test 4	
ID	WJ38171
Elevation (m)	127
Field Test Max Flow (l/s)	114
Field Test Max flow Head (m)	177
Field Test Static Pressure (psi)	71
Calibrated Model Head (m)	177
Calibrated Model Pressure (psi)	70

Fire Hydrant Test 5	
ID	WJ3000097
Elevation (m)	154
Field Test Max Flow (l/s)	42
Field Test Max flow Head (m)	184
Field Test Static Pressure (psi)	43
Calibrated Model Head (m)	183
Calibrated Model Pressure (psi)	41

Refer Fig.1 For location of Loggers and fire flow test


Sources: Esri, HERE, DeLorme, USGS, Intermap, IN
Korea, Esri (Thailand), MapmyIndia, NGCC, © Open

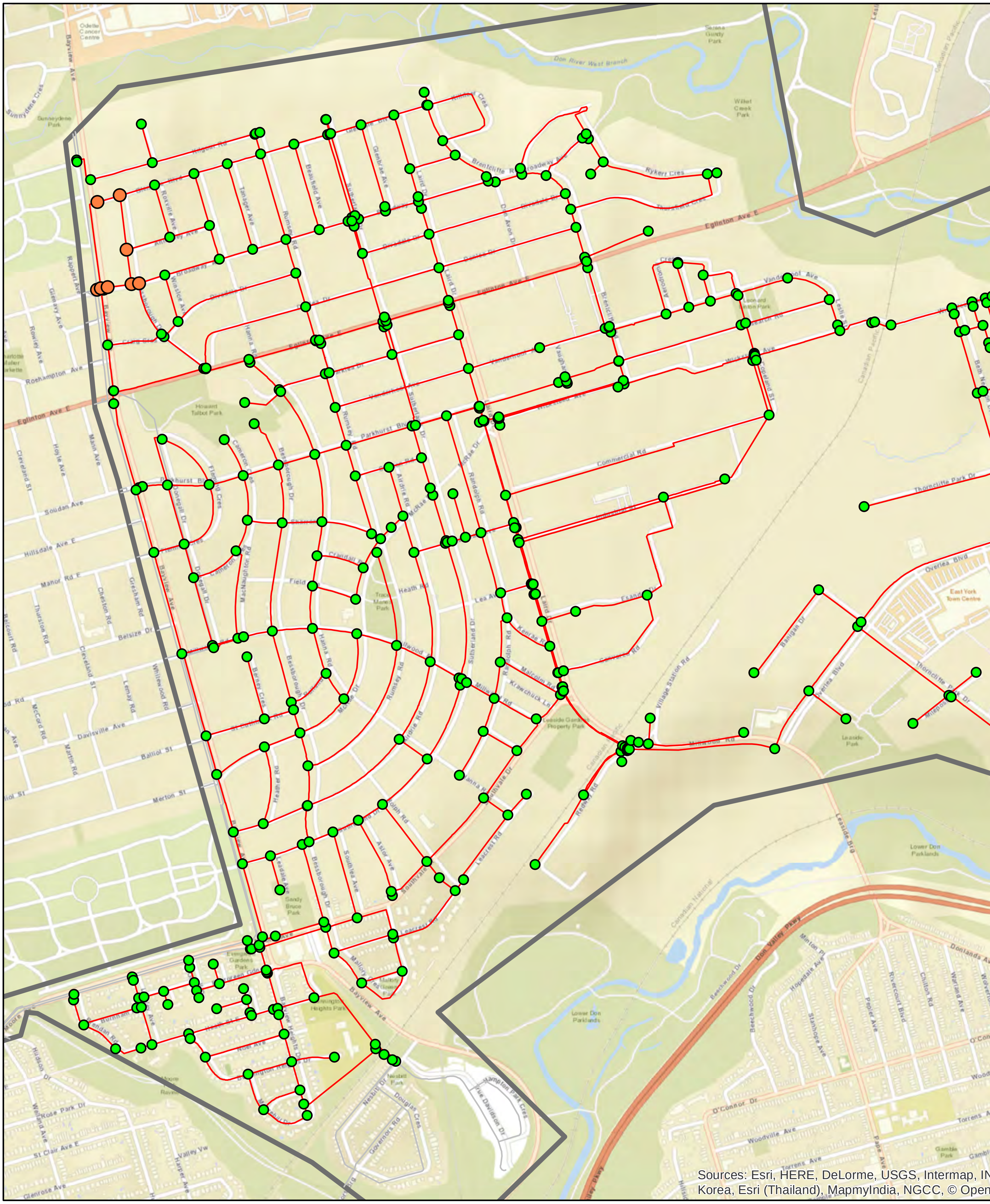


Legend

Junction

PRESSURE

- < 40 psi
- 40 - 50 psi
- 50 -90 psi
- 90 -100 psi
- > 100 psi


Sources: Esri, HERE, DeLorme, USGS, Intermap, IN
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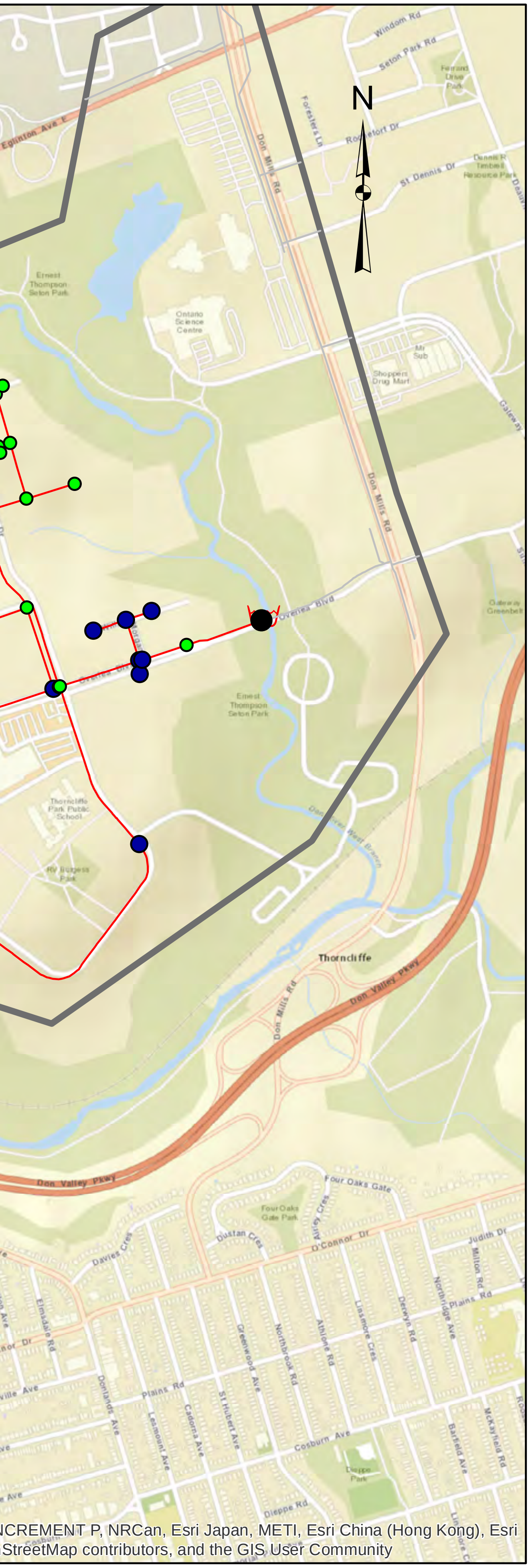
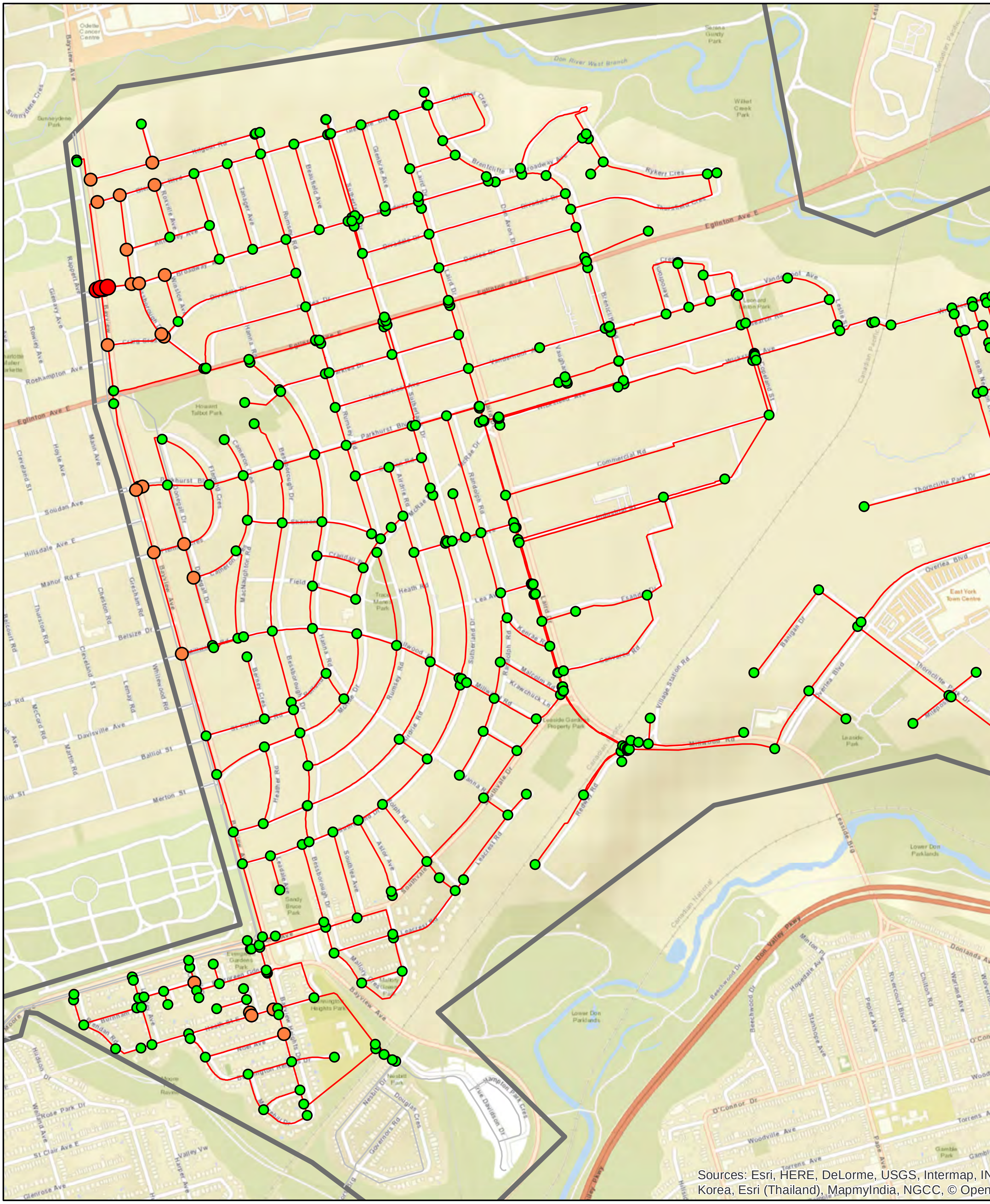


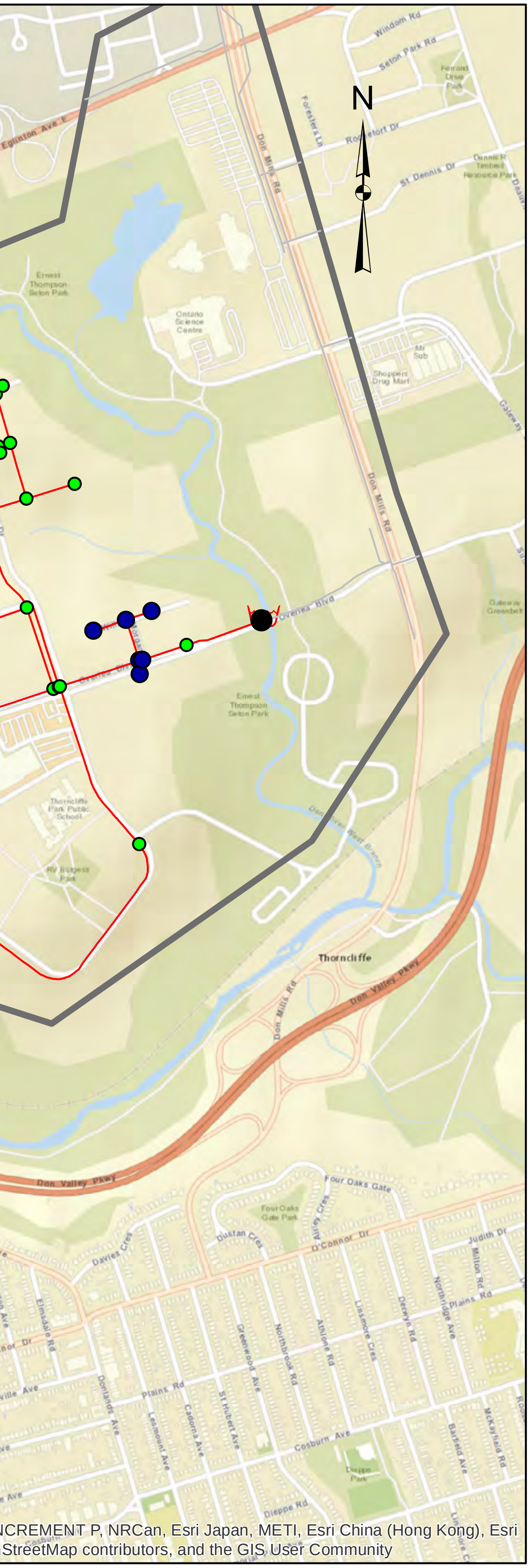
Legend

Junction

PRESSURE

- < 40 psi
- 40 - 50 psi
- 50 -90 psi
- 90 -100 psi
- > 100 psi


Eglinton Ave E
Bayview Ave
Don River West Branch
Commercial Rd
Thorncliffe Park Dr
Overlea Blvd
Millwood Rd
Don Valley Pkwy
Leaside Park
Lower Don Parklands
East York Town Centre
Sources: Esri, HERE, DeLorme, USGS, Intermap, IN
Korea, Esri (Thailand), MapmyIndia, NGCC, © Open

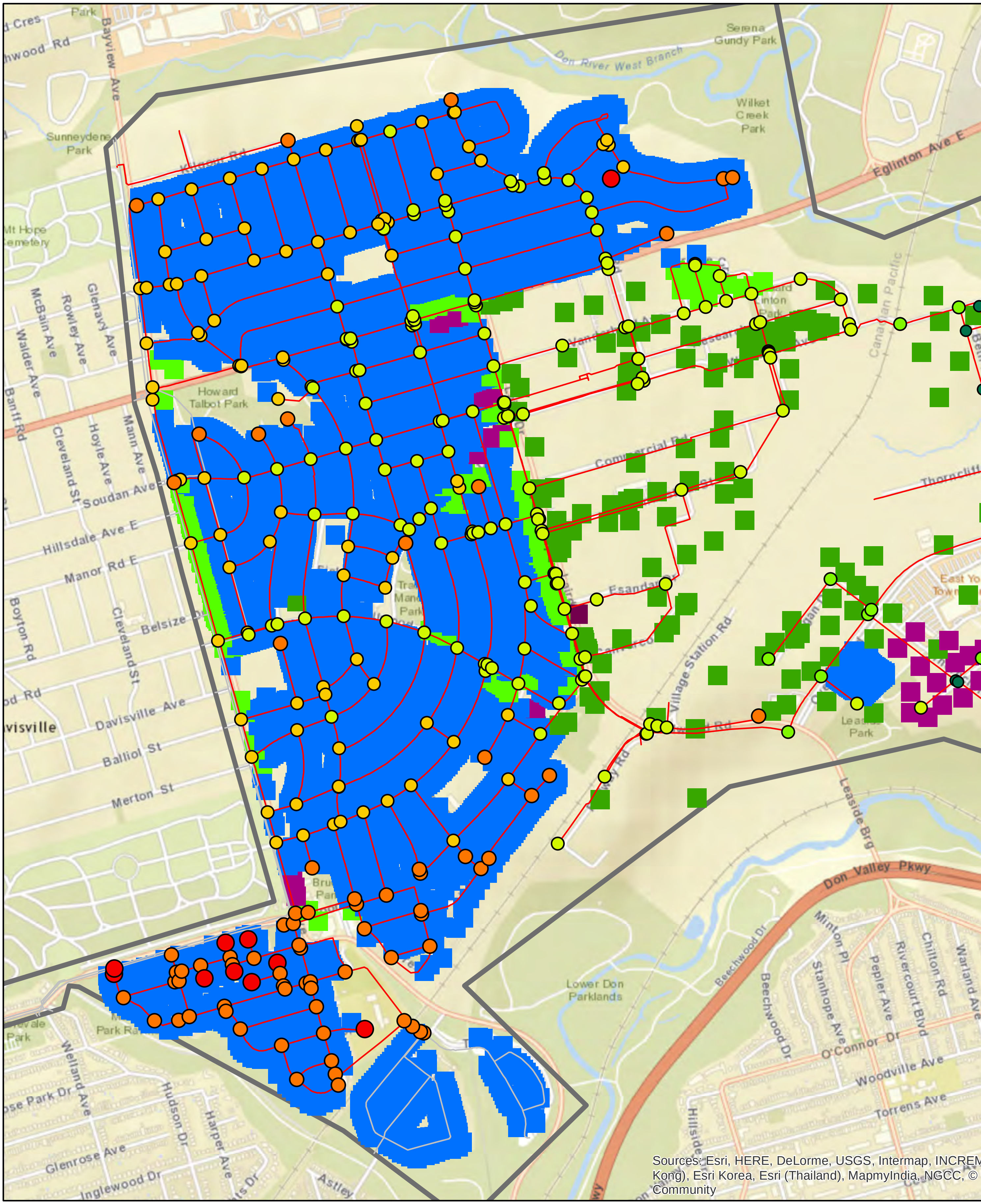


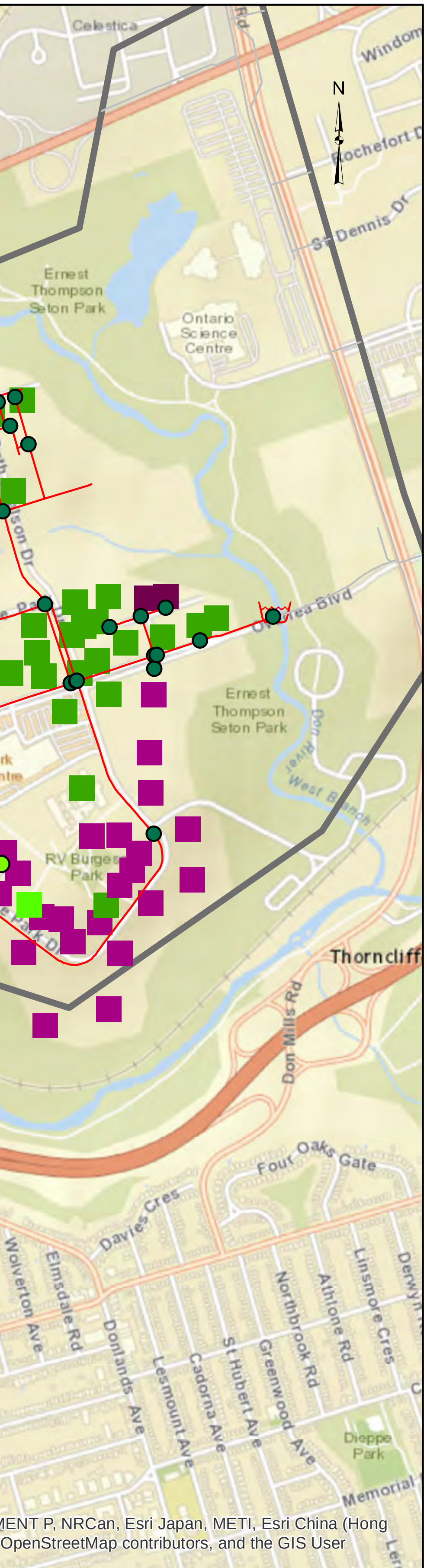
Legend

Junction

PRESSURE

- < 40 psi
- 40 - 50 psi
- 50 -90 psi
- 90 -100 psi
- > 100 psi


Serena Gundy Park
Don River West Branch
Wilket Creek Park
Sunnydene Park
Eglinton Ave E
Mt Hope Cemetery
Bayview Ave
McBain Ave
Rowley Ave
Glenavy Ave
Walder Ave
Banff Rd
Cleveland St
Hoyle Ave
Mann Ave
Howard Talbot Park
Soudan Ave
Hillsdale Ave E
Manor Rd E
Boyton Rd
Belsize Dr
Davisville Ave
Balliol St
Merton St
Commercial Rd
Esandar Dr
Village Station Rd
Thorncliffe
Canadian Pacific
Leaside Brg
Don Valley Pkwy
Lower Don Parklands
Beechwood Dr
Minton Pl
Stanhope Ave
Pepler Ave
Rivercourt Blvd
Chilton Rd
Warland Ave
O'Connor Dr
Woodville Ave
Torrens Ave
Hillside Dr
Welland Ave
Hudson Dr
Harper Ave
Glenrose Ave
Inglewood Dr
Astley
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREM
Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, ©
Community



Legend

Junction

DESGN_FLOW

- < 65 L/s
- 65 - 130 L/s *Available Fire flow*
- 130 -190 L/s
- 190 - 250 L/s
- 250 - 317 L/s
- > 317 L/s

Meterdata_Landuse_Final

Land_Use

- RES, FF = 65 L/s
- ICI + RES , FF = 190 L/s
- ICI, FF = 190 L/s
- RES-HD, FF = 317 L/s
- ICI-HR, FF = 317 L/s