david schaeffer engineering ltd
SMART SUBDIVISIONS™

120 Iber Road, Unit 103
Stittsville, Ontario K2S 1E9
Tel (613) 836-0856
Fax (613) 836-7183
www.dsel.ca

MEMORANDUM

DATE: 2017-12-13 *EMAIL*

TO: **City of Ottawa IAD Review Officer**

SUBJECT: **Proposed Amendment to IBI Servicing Report**
800 Cedarview Road

OUR FILE: DSEL Project No.14-746

ATTACHMENTS:

- Appendix A – Correspondence
- Appendix B – Water Servicing
- Appendix C – Stormwater Management
- Drawings/Figures
- Revised Draft Plan of Subdivision prepared by Annis, O'sullivan, Vollebekk dated December 8, 2017
- Water Servicing Figure prepared by DSEL dated December 13, 2017
- Storm Servicing Figure pepared by DSEL dated December 13, 2017

Mattamy Homes has retained DSEL to prepare an addendum to support their proposed changes to the approved draft plan, for 800 Cedarview Drive. The subject property is situated at the southwestern boundary of the City of Ottawa's urban area - east of Highway 416, south of West Hunt Club Road, west of Cedarview Road and north of Fallowfield Road and O'Keefe Court. The subject lands were contemplated as Phase 2 of a country lot subdivision, Phase 1 is constructed and located immediately to the north-east, see ***Figure 1*** below for site limits.

Figure 1: Site Location

The Phase 1 lands are serviced by municipal watermains, but rely on private lot-level septic systems for wastewater disposal and treatment. The Phase 2 lands currently have draft plan of subdivision approval for development as a country lot subdivision, following the same municipal water and private lot-level septic system servicing approach.

The following memo supports the storm and water servicing based on an updated draft plan of subdivision, refer to ***Drawings/Figures*** for updated draft plan. Sanitary servicing will continue to be provided by lot-level servicing. The draft plan proposed modificaitons to provide a conservation area at the south limits of the subject property and includes a proposed road connection to O'Keefe Court.

Water Supply Servicing

Based on the updated draft plan, there is an overall reduction in number of units due to the increase in conservation area at the south limits compared to the previously approved draft plan. A water servicing report was completed for the Onassa Springs Subdivision - Phase 1 lands by exp Services Inc. dated May 2011 (***Phase 1 Water Report***). The report contemplated the Phase 2 development and provided a 300mm service at the limits of Phase 1 and Phase 2 lands within Onassa Circle.

The proposed development will be serviced by one connection the existing 610mm diameter watermain within O' Keefe Court, and one connection to the existing 305mm diameter watermain

within Onassa Circle, at Tilby Court, refer to ***Water Servicing Drawing*** in ***Drawing/Figures*** for water servicing details.

A water boundary condition was submitted to the City of Ottawa for the updated water demand for the updated draft plan as well as the updated FUS calculated fire demand. At the time of this publication the boundary conditions have not been received. See ***Appendix A*** for boundary conditions requested submitted to the City.

In the advance of receiving boundary conditions from the City of Ottawa, DSEL estimated the boundary condition at the connection to the Onassa Circle watermain based on pressures from the ***Phase 1 Water Report***. Head at the connection to the watermain within O'Keefe Court has been estimated to be equal to the head at the Moodie Drive Elevated Tank, shown in the Figure 1-1 prepared by the City of Ottawa in ***Appendix B***.

Pressures and available fire flow to be verified once updated boundary conditions are received from the City of Ottawa.

Water demands and estimated boundary conditions for the development are summarized in ***Table 1*** below.

Table 1: Water Demand and Boundary Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] O'Keefe Connection (m H_2O / kPa)	Boundary Condition[3] Onassa Connection (m H_2O / kPa)
Average Daily Demand	114.9	51.25 / 502.8	46.1 / 452.2
Max Day + Fire Flow	308.2 + 16,000	51.25 / 502.8	28.24 / 277.0
Peak Hour	484.9	51.25 / 502.8	36.49 / 358.0

1) Water demand calculation per ***Water Supply Guidelines***. See the ***Appendix*** for detailed calculations.
2) Assumed ground elevation of 103.75m.
3) Assumed ground elevation of 109.50m.

The demands shown in ***Table 1*** include water demands from the proposed development south-west of the subject site, 4497 O'Keefre Court, that could be serviced from the proposed watermain within future road connection to O'Keefe Court. Water demands are based on the Site Servicing Brief – Water Supply for 4497 O'Keefe Court prepared by DSEL dated May 2017.

Fire flow was determined based on the minimum front / sideyard setbacks and maximum building footprint allowed for by the zoning in combination with unit types that exist within the adjacent estate lot subdivision. These include 1 storey bungalow, 2 storey homes and 2 storey + loft units. The 2 storey + loft unit resulted in the highest fire flow of ***16,000 L/min***. See calculations of water demand and fire protection in the ***Appendix B***.

EPANet was utilized to determine pipe sizing and the availability of pressures throughout the system during Average Day demand, Peak Hour, and Max Day plus Fire Flow. The static model determines pressures based on the available head obtained from the boundary conditions described above, as indicated in ***Table 1.***

The model utilizes the Hazen-Williams equation to determine pressure drops, while the pipe properties, including friction factors, have been selected in accordance with Table 4.4 of the ***Water Supply Guidelines***.

A summary of the resulting pressures at all nodes are summarized in ***Table 2*** below.

Table 2: Water Demand and Boundary Conditions

Node ID	Average Day (kPa)	Peak Hour (kPa)	Max Day + Fire Flow* (kPa)
9	519.3	511.7	478.1
22	446.0	415.9	277.0
15	495.0	464.7	325.2
18	415.4	380.7	220.3
24	374.0	333.7	145.4
33	469.2	412.9	255.6
28	445.8	373.8	247.3
*The fire flow yielding the lowest pressure was found at node 24, which was used in this analysis.			

The minimum and maximum pressures shown in ***Table 2*** fall within the allowable pressures during the Max Day plus Fire Flow scenario. Pressures during Average Day and Peak Hour are at the high end of allowable pressure. A pressure test should be conducted at the time of construction to determine if pressure reducing valves are required.

The model predicted that water will flow in all areas of the system and no 'dead' zones were found.

Stormwater Management

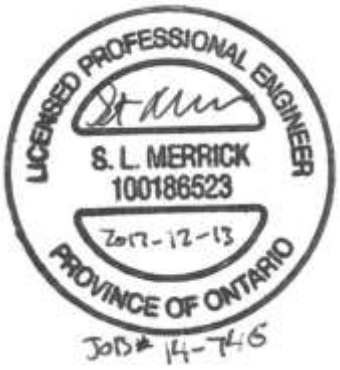
Stormwater management for the subject property has been previously contemplated in the Conceptual Stormwater Management Plan prepared JF Sabourin and Associates Inc. dated March 2007. Phase 1 north-east of the subject site had also been contemplated in the Storwmater Design Brief prepared by JF Sabourin and Associates Inc. dated February 2011. It is not proposed to alter any of the stormwater management recommendations provided in the previous reports. It is proposed to provide some alterations to the ditch systems external to the subject property to accommodate the proposed road connection to O'Keefe Court and provide a drainage and wildlife connection from the conservation area to the existing ditch south-east of the subject property. Please refer to ***Storm Servicing Drawing*** in ***Drawings/Figures*** for proposed stormwater management plan.

It is proposed to direct flow currently being conveyed by a ditch system to the existing water feature through a storm sewer and continue to discharge to the water feature to the south. The storm sewer system within the proposed road is sized to convey the 100-year storm event from the existing parkland to the east and the proposed development to the west as well as drainage from the road.

Please refer to ***Appendix C*** for storm sewer design sheet as well as time of concentration calculations for existing drainage areas.

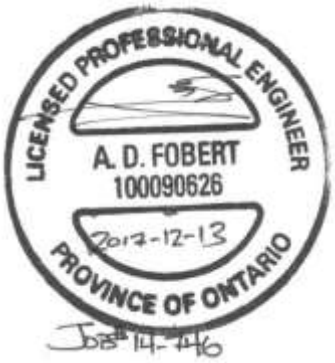
We trust that the above is sufficient to support the amendment to the draft plan of subdivision. Please contact the undersigned if you have any questions.

Yours truly,
David Schaeffer Engineering Ltd.



Per: Steven L. Merrick, P.Eng.

Yours truly,
David Schaeffer Engineering Ltd.



Per: Adam D. Fobert, P.Eng.

Z:\Projects\14-746_800_Cedarview\B_Design\B3_Reports\B3-2_Servicing (DSEL)\2017-12_servicing-update\2017-12-13_746_memo_hjp.docx

APPENDIX A

Pre-Consultation

Steve Merrick

From: Steve Merrick
Sent: Tuesday, December 5, 2017 9:48 AM
To: Adam Fobert; Rogers, Christopher; Shillington, Jeffrey
Cc: Aliu, Astrit
Subject: RE: 800 Cedarview Road - Boundary Condition Request
Attachments: wtr-2017-12-04_746_slm.pdf

Hi Chris & Astrit,

Please see our FUS calculations. We calculated the fire flow as the building area will exceed 600m^2, for example the adjacent home shown below has a footprint of approximately 900m^2. We believe this falls outside of the intent of the cap of 10,000 L/min for single detached dwellings defined in the ISDTB 2014-02. Due to the potential large footprint of these units we believe a more conservative estimate of fire flow is required.

Feel free to call if you have any questions.

Thanks,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

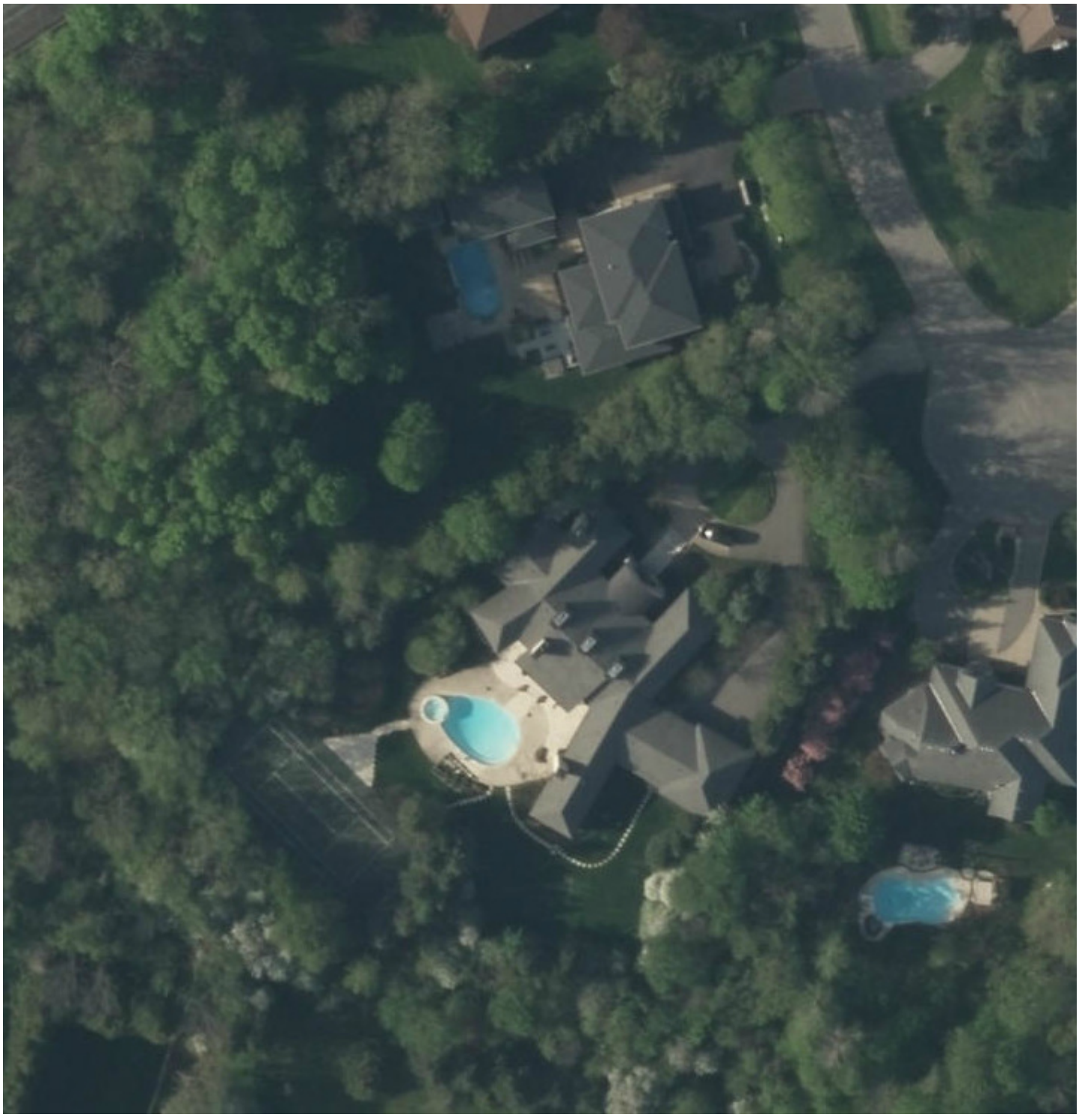
phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

From: Adam Fobert
Sent: Tuesday, December 5, 2017 9:08 AM
To: Rogers, Christopher <Christopher.Rogers@ottawa.ca>; Steve Merrick <SMerrick@dsel.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Cc: Aliu, Astrit <astrit.aliu@ottawa.ca>
Subject: RE: 800 Cedarview Road - Boundary Condition Request

Thank you Chris,

Steve will send along the FUS calculations.

We are looking at much larger homes than average, so we have completed a detailed review of the FUS requirements. IE, see below:



Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

office: (613) 836-0856
direct: (613) 836-0626
cell: (613) 222-9493
email: afobert@DSEL.ca

From: Rogers, Christopher [mailto:Christopher.Rogers@ottawa.ca]
Sent: Tuesday, December 5, 2017 8:56 AM
To: Steve Merrick <SMerrick@dsel.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Cc: Adam Fobert <AFobert@dsel.ca>; Aliu, Astrit <astrit.aliu@ottawa.ca>
Subject: RE: 800 Cedarview Road - Boundary Condition Request

Steve,
Astrit Aliu is familiar with this file and will be responding to you. Your fire flows seem high. Recall the 10,000 L/min cap would apply and even that seems high for 1 acre SF lots. Could you send Astrit your FUS calc sheets? Thanks.
Chris

From: Steve Merrick [mailto:SMerrick@dsel.ca]
Sent: 2017/12/04 5:01 PM
To: Rogers, Christopher <Christopher.Rogers@ottawa.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Cc: Adam Fobert <AFobert@dsel.ca>
Subject: 800 Cedarview Road - Boundary Condition Request

Hi Chris,

I am working with Adam Fobert on a water analysis for the proposed subdivision at 800 Cedarview. I'm reaching out to directly as you have already been in contact with Adam regarding the adjacent property at 4497 O'Keefe Court, see attached correspondence.

We hope you can provide boundary conditions at the proposed connections on Onassa Court and O'Keefe Court as shown on the attached figure. Phase 1 has been constructed and we are currently reviewing water servicing options for servicing Phase 2.

Please see below for water demands, calculated assuming 2.069 ha of industrial lands (4497 O'Keefe) and approximately 78 residential units from the subject property (Phase 2) will be serviced through a looped connection from O'Keefe to Onassa.

	L/min	L/s
Avg. Daily	114.9	1.92
Max Day	308.2	5.14
Peak Hour	484.9	8.08

We hope you can also provide pressures based on fire demands for potential different unit types. We have estimated the FUS based on the current zoning requirements for setbacks and building footprint. We have assumed a 1 storey bungalow, 2 storey and 2 storey + loft product that could potential be constructed, consistent with the surrounding properties. The resulting fire flows for each unit type are 10,000 L/min, 15,000 L/min and 16,000 L/min, respectively.

Feel free to call if you have any questions or concerns.

Thanks in advance,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

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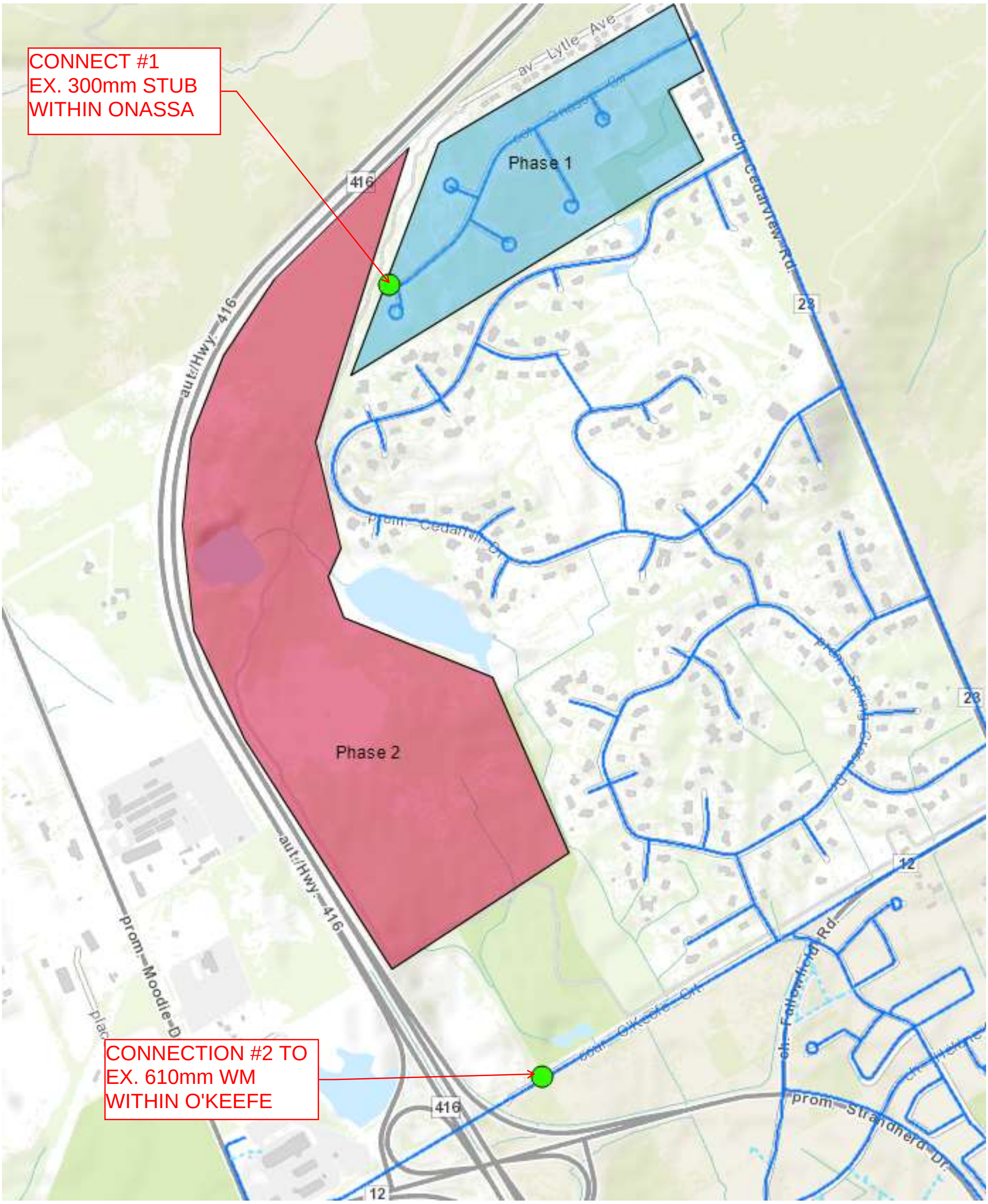
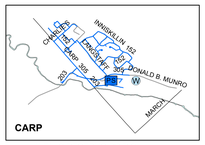
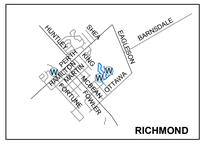

CONNECT #1
EX. 300mm STUB
WITHIN ONASSA
Phase 1
Phase 2
CONNECTION #2 TO
EX. 610mm WM
WITHIN O'KEEFE
416
12
29
28

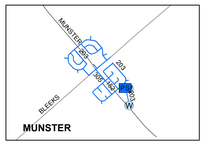
APPENDIX B

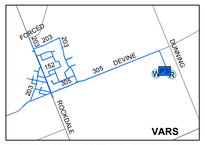
Water Supply

City of Ottawa - Water Distribution System
Facilities & Feedermains



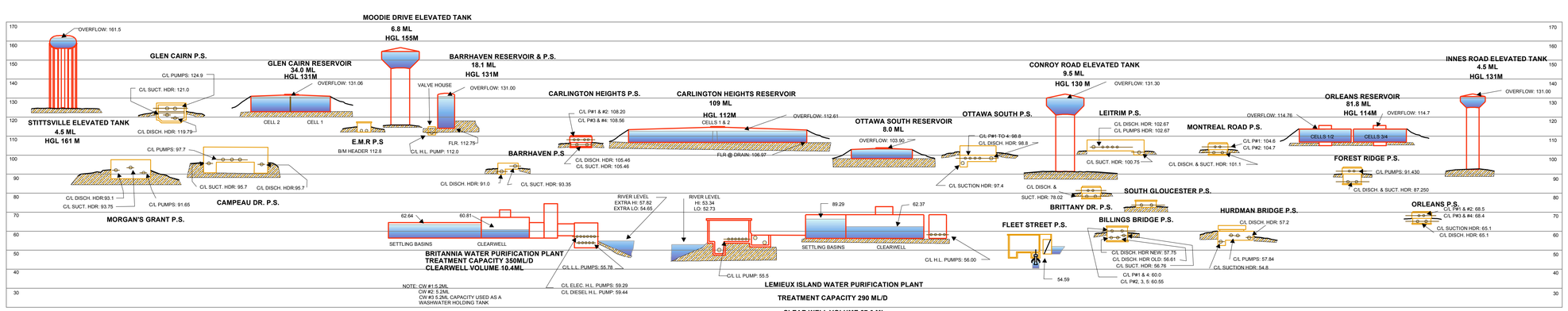






ORLEANS P.S.
FOREST RIDGE P.S
Ogilvie Rd. Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
INNES RD ELEVATED TANK
Innes Rd/BearBrook Rd Backup P.S.
HURDMAN P.S.
Innes Rd Backup P.S.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
BILLINGS BRIDGE P.S.
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
ENERGY MINES & RESOURCES P.S.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
SOUTH GLOUCESTER P.S. (INACTIVE)
LEITRIM P.S.
GLEN CAIRN P.S. & RES
BARRHAVEN P.S.
Merivale Rd. Backup P.S.
OTTAWA SOUTH P.S & RES.
STITTSVILLE ELEVATED TANK
BARRHAVEN RES. & P.S.
Abbott/Iber St. Backup P.S.
MOODIE ELEVATED TANK
Shadow Ridge
SHADOW RIDGE P.S. & WELLS
SHADOW RIDGE WELL

1E 1W 2C 2E 2W 3C 3W 4C MONT ME MG EMR BARR SHAD



Legend

Water System Structure

- Pump Station
- Backup Pump Station
- Water Treatment Plant
- Well
- Elevated Tank
- Reservoir

WATERMAINS

Priority, Internal Diameter

- Backbone 1524mm - 1981mm
- Backbone 1067mm - 1372mm
- Backbone 610mm - 914mm
- Backbone 406mm - 508mm
- Backbone 152mm - 305mm
- Distribution 1676mm - 1981mm
- Distribution 1067mm - 1372mm
- Distribution 610mm - 914mm
- Distribution 406mm - 508mm
- Distribution 305mm - 381mm

PRESSURE ZONES

- 1E
- 1W
- 2C
- 2E
- 2W
- 3C
- 3W
- 4C
- BARR
- EMR
- ME
- MG
- MONT
- SHAD

N W E S

Ottawa

Infrastructure Services & Community Sustainability
Infrastructure Services

0 1,000 2,000 4,000 6,000

Meters

FIGURE 1-1

DRAWN BY: D. HESS

DATE: 03 Feb 2015

800 Cedarview
Water Demand - Proposed Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	78	266
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	266	93.1	64.7	335.2	232.8	502.7	349.1

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily m^3/d	Avg. Daily L/min	Max Day m^3/d	Max Day L/min	Peak Hour m^3/d	Peak Hour L/min
Commercial floor space	2.5 $L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light*	35,000 L/gross ha/d	2.069	72.42	50.3	108.6	75.4	195.5	135.8
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	72.4	50.3	108.6	75.4	195.5	135.8
		Total Demand	**165.5**	**114.9**	**443.8**	**308.2**	**698.3**	**484.9**

* Industrial drainagea area per Water Servicing Memo for 4497 O'Keefe Court prepared by DSEL (Job#16-886) dated 2017-05-18

Mattamy Homes
800 Cedarview
FUS-Fire Flow Demand
1 Storey Bungalow

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	640.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	8348.4	L/min	
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**6800.0 L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%
Reduction	**0 L/min**

4. Increase for Separation Distance

N	30.1m-45m	5%	
S	>45m	0%	
E	3.1m-10m	20%	
W	3.1m-10m	20%	
	% Increase	**45%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**3060.0 L/min**

Total Fire Flow

Fire Flow	9860.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1282.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11815.7	L/min	
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**10200.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

N	30.1m-45m	5%	
S	>45m	0%	
E	3.1m-10m	20%	
W	3.1m-10m	20%	
	% Increase	**45%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**4590.0**	**L/min**

Total Fire Flow

Fire Flow	14790.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Wood Frame

C	1.5		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1602.5	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	13210.3	L/min	
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**11050.0 L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%
Reduction	**0 L/min**

4. Increase for Separation Distance

N	30.1m-45m	5%	
S	>45m	0%	
E	3.1m-10m	20%	
W	3.1m-10m	20%	
	% Increase	**45%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**4972.5**	**L/min**

Total Fire Flow

Fire Flow	16022.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:

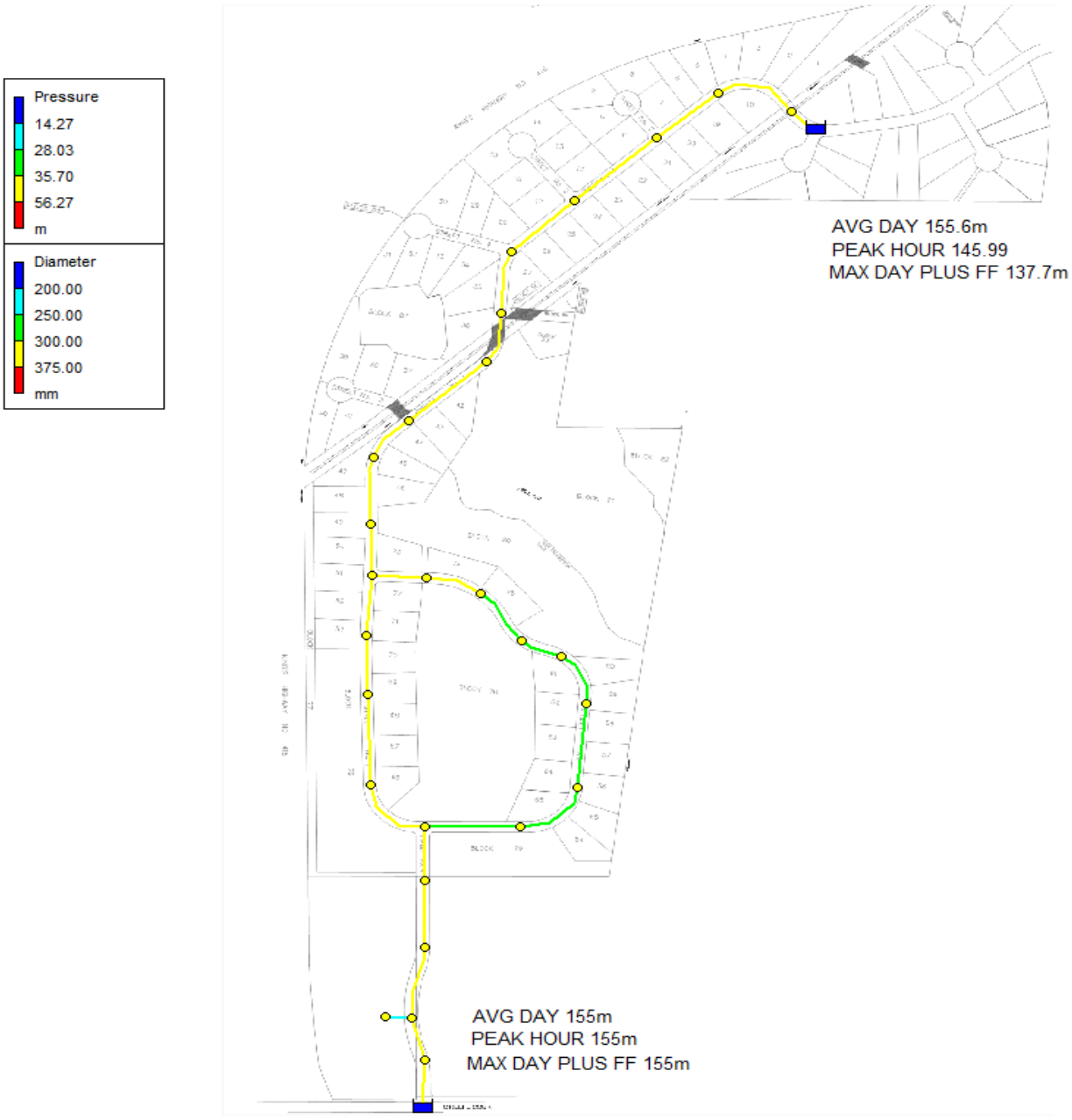
-Calculations based on Fire Underwriters Survey - Part II

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	**m^3/d**	**L/min**	**m^3/d**	**L/min**	**m^3/d**	**L/min**
Commercial floor space	2.5	$L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75	$L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000	L/gross ha/d	2.069	72.43	50.3	108.6	75.4	195.5	135.8
		Total I/CI Demand		72.4	50.3	108.6	75.4	195.5	135.8
		Total Demand		**72.4**	**50.3**	**108.6**	**75.4**	**195.5**	**135.8**

AVERAGE DAY SCENARIO



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**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
**********************************************************************
```

AVERAGE DAY

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	O'KEEFE	7	80.1	300
4	7	9	80.1	300
5	9	10	131.2	300
6	10	11	126.3	300
7	11	12	93.3	300
8	12	13	150.9	250
9	13	14	133.2	250
10	14	15	152.3	250
11	15	16	111.1	250
12	16	17	77.4	250
13	17	18	91.1	250
14	18	19	99.8	300
15	19	20	90.5	300
16	12	21	109.2	300
17	21	22	160.1	300
18	22	23	122.1	300
19	23	20	127.2	300
20	20	24	101.9	300
21	24	32	126.8	300
22	32	25	79.6	300
23	25	33	161.1	300
24	33	26	101.1	300
25	26	27	108.0	300
26	27	28	147.9	300
27	28	29	180.0	300
28	29	30	119.0	300
29	30	31	124.3	300
30	31	TILBY	96.2	300
1	9	IND	29.1	200

Page 2

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
7	0.00	155.02	54.92	0.00	
9	0.00	155.04	52.94	0.00	
10	0.00	155.07	54.47	0.00	
11	0.00	155.10	52.00	0.00	
12	3.48	155.12	50.72	0.00	
13	3.48	155.14	53.44	0.00	
14	3.48	155.15	52.05	0.00	
15	3.48	155.16	50.46	0.00	
16	3.48	155.17	49.32	0.00	
17	3.48	155.18	48.88	0.00	
18	3.48	155.19	42.34	0.00	
19	3.48	155.19	40.69	0.00	
20	3.48	155.20	39.10	0.00	
21	3.48	155.14	47.74	0.00	
22	3.48	155.16	45.46	0.00	
23	3.48	155.18	44.33	0.00	
24	3.48	155.22	38.12	0.00	
25	6.96	155.29	45.29	0.00	
26	3.48	155.36	47.51	0.00	
27	6.96	155.39	45.99	0.00	
28	6.96	155.44	45.44	0.00	
29	6.96	155.49	45.69	0.00	
30	3.48	155.53	46.18	0.00	
31	3.48	155.57	49.22	0.00	
32	3.48	155.26	43.41	0.00	
33	3.48	155.33	47.83	0.00	
IND	50.30	155.04	52.81	0.00	
O'KEEFE	911.52	155.00	0.00	0.00	Reservoir
TILBY	-1052.30	155.60	0.00	0.00	Reservoir

Link Results:

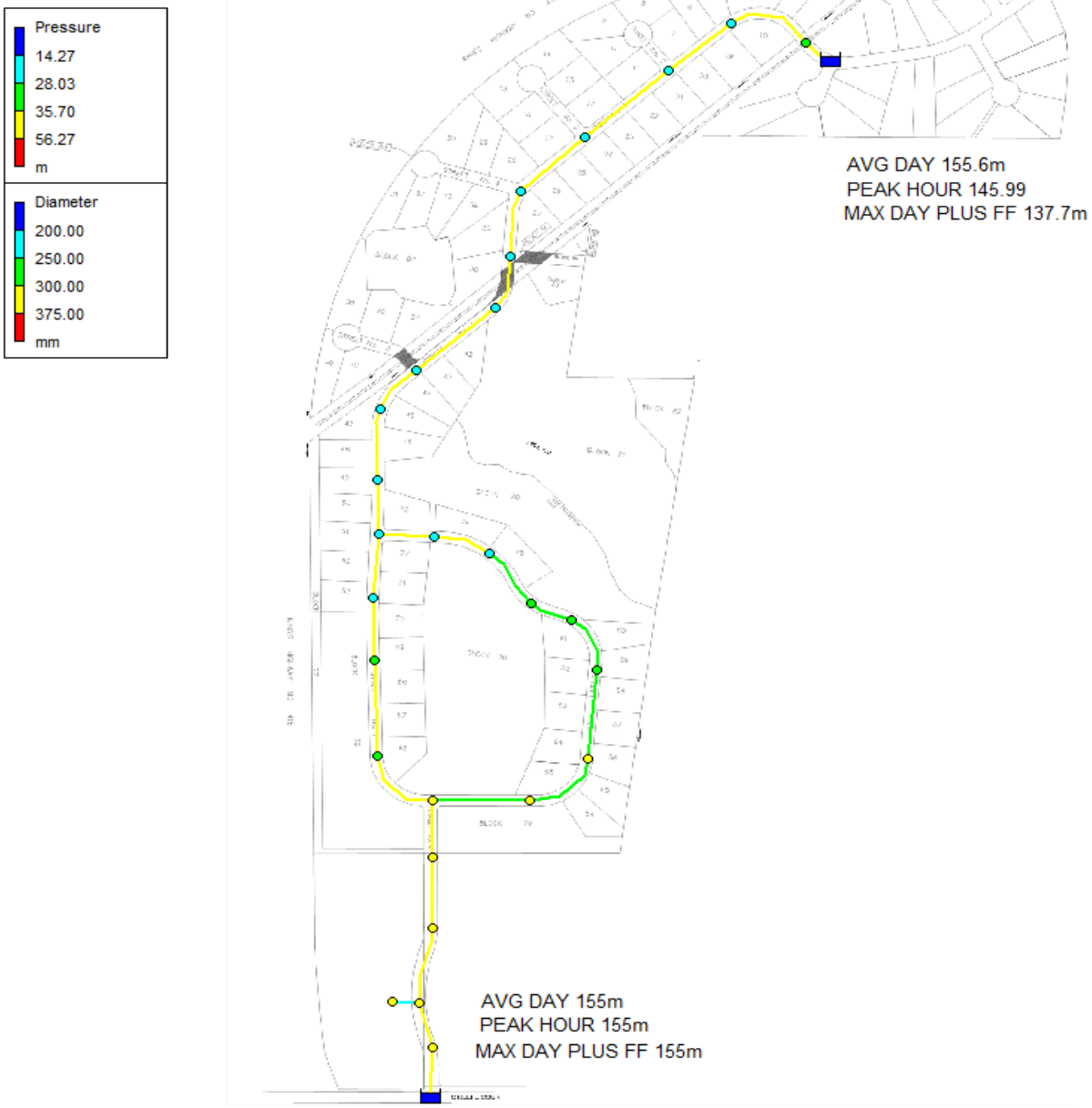
Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
3	-911.52	0.21	0.23	Open
4	-911.52	0.21	0.23	Open
5	-961.82	0.23	0.25	Open
6	-961.82	0.23	0.25	Open
7	-961.82	0.23	0.25	Open
8	-298.92	0.10	0.09	Open

9	-302.40	0.10	0.09	Open
10	-305.88	0.10	0.09	Open
11	-309.36	0.11	0.09	Open
12	-312.84	0.11	0.09	Open
13	-316.32	0.11	0.10	Open
14	-319.80	0.08	0.03	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
15	-323.28	0.08	0.03	Open
16	-666.37	0.16	0.16	Open
17	-669.85	0.16	0.13	Open
18	-673.33	0.16	0.13	Open
19	-676.81	0.16	0.14	Open
20	-1003.58	0.24	0.29	Open
21	-1007.06	0.24	0.28	Open
22	-1010.54	0.24	0.31	Open
23	-1017.50	0.24	0.28	Open
24	-1020.98	0.24	0.29	Open
25	-1024.46	0.24	0.31	Open
26	-1031.42	0.24	0.30	Open
27	-1038.38	0.24	0.30	Open
28	-1045.34	0.25	0.29	Open
29	-1048.82	0.25	0.31	Open
30	-1052.30	0.25	0.36	Open
1	50.30	0.03	0.01	Open

MAX DAY + FIRE FLOW SCENARIO



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**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
**********************************************************************
```

MAX DAY PLUS FIREFLOW

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	O'KEEFE	7	80.1	300
4	7	9	80.1	300
5	9	10	131.2	300
6	10	11	126.3	300
7	11	12	93.3	300
8	12	13	150.9	250
9	13	14	133.2	250
10	14	15	152.3	250
11	15	16	111.1	250
12	16	17	77.4	250
13	17	18	91.1	250
14	18	19	99.8	300
15	19	20	90.5	300
16	12	21	109.2	300
17	21	22	160.1	300
18	22	23	122.1	300
19	23	20	127.2	300
20	20	24	101.9	300
21	24	32	126.8	300
22	32	25	79.6	300
23	25	33	161.1	300
24	33	26	101.1	300
25	26	27	108.0	300
26	27	28	147.9	300
27	28	29	180.0	300
28	29	30	119.0	300
29	30	31	124.3	300
30	31	TILBY	96.2	300
1	9	IND	29.1	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
7	0.00	152.92	52.82	0.00	
9	0.00	150.84	48.74	0.00	
10	0.00	147.46	46.86	0.00	
11	0.00	144.22	41.12	0.00	
12	9.34	141.82	37.42	0.00	
13	9.34	140.37	38.67	0.00	
14	9.34	139.16	36.06	0.00	
15	9.34	137.85	33.15	0.00	
16	9.34	136.83	30.98	0.00	
17	9.34	136.14	29.84	0.00	
18	9.34	135.31	22.46	0.00	
19	9.34	134.98	20.48	0.00	
20	9.34	134.72	18.62	0.00	
21	9.34	139.96	32.56	0.00	
22	9.34	137.94	28.24	0.00	
23	9.34	136.39	25.54	0.00	
24	16009.34	131.92	14.82	0.00	
25	18.68	132.87	22.87	0.00	
26	9.34	134.01	26.16	0.00	
27	18.68	134.54	25.14	0.00	
28	18.68	135.21	25.21	0.00	
29	18.68	136.03	26.23	0.00	
30	9.34	136.56	27.21	0.00	
31	9.34	137.16	30.81	0.00	
32	9.34	132.47	20.62	0.00	
33	9.34	133.56	26.06	0.00	
IND	75.40	150.83	48.60	0.00	
O'KEEFE	-11779.81	155.00	0.00	0.00	Reservoir
TILBY	-4538.43	137.70	0.00	0.00	Reservoir

Link Results:

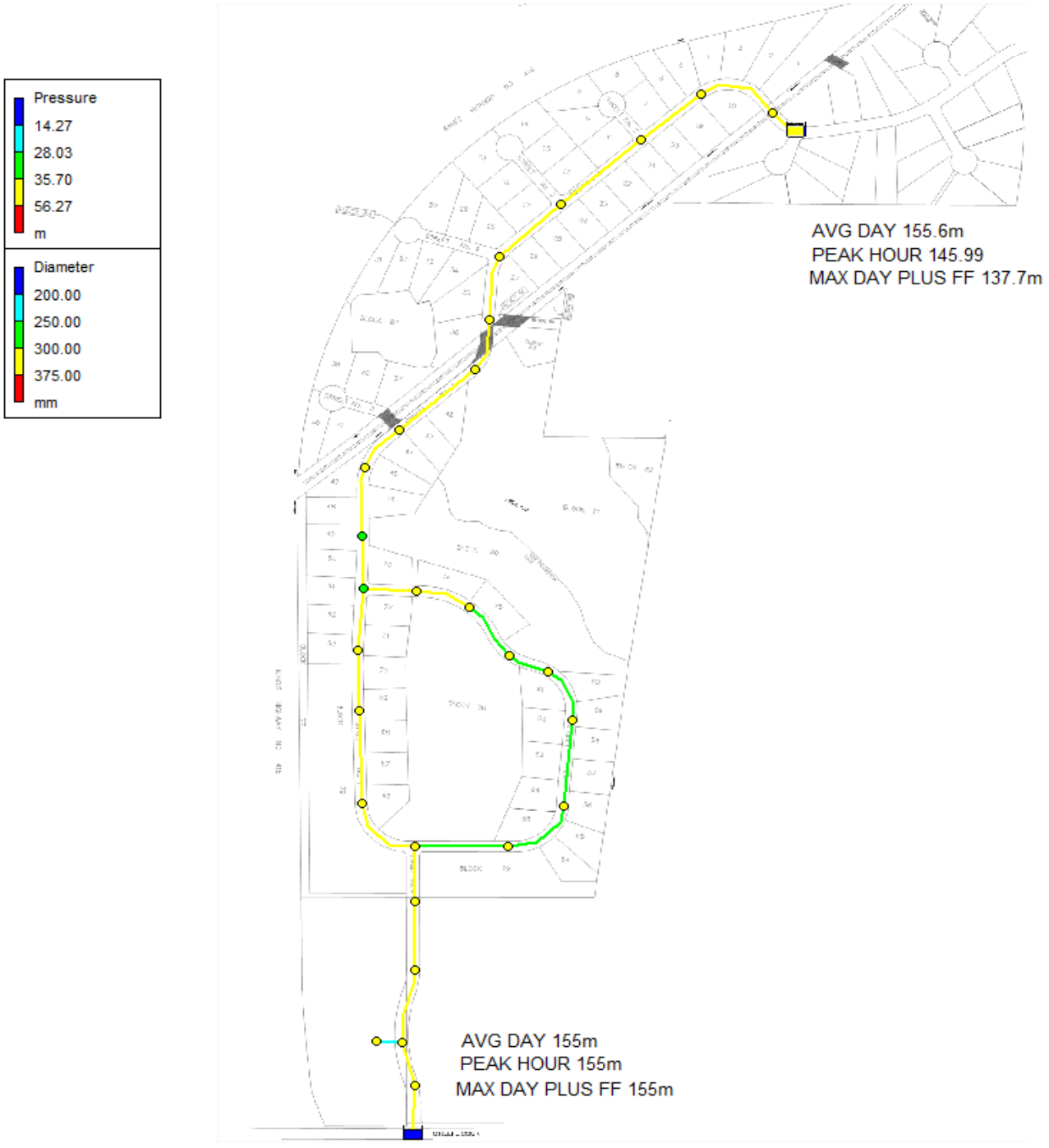
Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
3	11779.81	2.78	26.00	Open
4	11779.81	2.78	26.00	Open
5	11704.41	2.76	25.69	Open
6	11704.41	2.76	25.69	Open
7	11704.41	2.76	25.69	Open
8	3695.82	1.25	9.63	Open

9	3686.48	1.25	9.11	Open
10	3677.14	1.25	8.59	Open
11	3667.80	1.25	9.12	Open
12	3658.46	1.24	8.92	Open
13	3649.12	1.24	9.16	Open
14	3639.78	0.86	3.25	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
15	3630.44	0.86	2.94	Open
16	7999.26	1.89	17.01	Open
17	7989.92	1.88	12.67	Open
18	7980.58	1.88	12.64	Open
19	7971.24	1.88	13.18	Open
20	11592.33	2.73	27.48	Open
21	-4417.01	1.04	4.40	Open
22	-4426.35	1.04	4.94	Open
23	-4445.03	1.05	4.28	Open
24	-4454.37	1.05	4.52	Open
25	-4463.71	1.05	4.83	Open
26	-4482.39	1.06	4.57	Open
27	-4501.07	1.06	4.57	Open
28	-4519.75	1.07	4.41	Open
29	-4529.09	1.07	4.80	Open
30	-4538.43	1.07	5.66	Open
1	75.40	0.04	0.02	Open

PEAK HOUR SCENARIO



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**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
**********************************************************************
```

PEAK HOUR

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	O'KEEFE	7	80.1	300
4	7	9	80.1	300
5	9	10	131.2	300
6	10	11	126.3	300
7	11	12	93.3	300
8	12	13	150.9	250
9	13	14	133.2	250
10	14	15	152.3	250
11	15	16	111.1	250
12	16	17	77.4	250
13	17	18	91.1	250
14	18	19	99.8	300
15	19	20	90.5	300
16	12	21	109.2	300
17	21	22	160.1	300
18	22	23	122.1	300
19	23	20	127.2	300
20	20	24	101.9	300
21	24	32	126.8	300
22	32	25	79.6	300
23	25	33	161.1	300
24	33	26	101.1	300
25	26	27	108.0	300
26	27	28	147.9	300
27	28	29	180.0	300
28	29	30	119.0	300
29	30	31	124.3	300
30	31	TILBY	96.2	300
1	9	IND	29.1	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
7	0.00	154.63	54.53	0.00	
9	0.00	154.26	52.16	0.00	
10	0.00	153.69	53.09	0.00	
11	0.00	153.14	50.04	0.00	
12	14.69	152.73	48.33	0.00	
13	14.69	152.49	50.79	0.00	
14	14.69	152.28	49.18	0.00	
15	14.69	152.07	47.37	0.00	
16	14.69	151.90	46.05	0.00	
17	14.69	151.79	45.49	0.00	
18	14.69	151.66	38.81	0.00	
19	14.69	151.61	37.11	0.00	
20	14.69	151.57	35.47	0.00	
21	14.69	152.43	45.03	0.00	
22	14.69	152.10	42.40	0.00	
23	14.69	151.84	40.99	0.00	
24	14.69	151.12	34.02	0.00	
25	29.38	150.22	40.22	0.00	
26	14.69	149.17	41.32	0.00	
27	29.38	148.70	39.30	0.00	
28	29.38	148.10	38.10	0.00	
29	29.38	147.39	37.59	0.00	
30	14.69	146.94	37.59	0.00	
31	14.69	146.44	40.09	0.00	
32	14.69	150.59	38.74	0.00	
33	14.69	149.59	42.09	0.00	
IND	135.80	154.26	52.03	0.00	
O'KEEFE	-4626.19	155.00	0.00	0.00	Reservoir
TILBY	4108.45	145.99	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	4626.19	1.09	4.60	Open
4	4626.19	1.09	4.60	Open
5	4490.39	1.06	4.36	Open
6	4490.39	1.06	4.36	Open
7	4490.39	1.06	4.36	Open
8	1426.79	0.48	1.63	Open

9	1412.10	0.48	1.53	Open
10	1397.41	0.47	1.43	Open
11	1382.72	0.47	1.49	Open
12	1368.03	0.46	1.43	Open
13	1353.34	0.46	1.44	Open
14	1338.65	0.32	0.50	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
15	1323.96	0.31	0.45	Open
16	3048.91	0.72	2.75	Open
17	3034.22	0.72	2.11	Open
18	3019.53	0.71	2.09	Open
19	3004.84	0.71	2.15	Open
20	4314.11	1.02	4.36	Open
21	4299.42	1.01	4.19	Open
22	4284.73	1.01	4.65	Open
23	4255.35	1.00	3.94	Open
24	4240.66	1.00	4.12	Open
25	4225.97	1.00	4.36	Open
26	4196.59	0.99	4.05	Open
27	4167.21	0.98	3.96	Open
28	4137.83	0.98	3.75	Open
29	4123.14	0.97	4.03	Open
30	4108.45	0.97	4.69	Open
1	135.80	0.07	0.07	Open

APPENDIX C

Stormwater Management

Estimated Peak Stormwater Flow Rate
City of Ottawa Sewer Design Guidelines, 2012

A104

Area	4.4040	ha
C	0.20	Rational Method runoff coefficient
L	240	m
Up Elev	106	m
Dn Elev	103	m
Slope	1.3	%
Tc	42.2	min

1) Time of Concentration per Federal Aviation Administration

$$t_c = \frac{1.8(1.1-C)L^{0.5}}{S^{0.333}}$$

tc, in minutes
C, rational method coefficient, (-)
L, length in ft
S, average watershed slope in %

Estimated Peak Flow

	2-year	5-year	100-year	
i	31.6	42.5	72.3	mm/hr
Q	77.4	104.1	221.2	L/s

Estimated Peak Stormwater Flow Rate
City of Ottawa Sewer Design Guidelines, 2012

A102

Area	2.8400	ha
C	0.20	Rational Method runoff coefficient
L	250	m
Up Elev	105.5	m
Dn Elev	102.25	m
Slope	1.3	%
Tc	42.5	min

1) Time of Concentration per Federal Aviation Administration

$$t_c = \frac{1.8(1.1-C)L^{0.5}}{S^{0.333}}$$

tc, in minutes
C, rational method coefficient, (-)
L, length in ft
S, average watershed slope in %

Estimated Peak Flow

	2-year	5-year	100-year	
i	31.5	42.3	71.9	mm/hr
Q	49.7	66.8	141.9	L/s

Estimated Peak Stormwater Flow Rate
City of Ottawa Sewer Design Guidelines, 2012

Area A201-Ph2

Area	4.41	ha
C	0.30	Rational Method runoff coefficient
L	225	m
Up Elev	110.5	m
Dn Elev	104.5	m
Slope	2.7	%
Tc	28.2	min

1) Time of Concentration per Federal Aviation Administration

$$t_c = \frac{1.8(1.1-C)L^{0.5}}{S^{0.333}}$$

tc, in minutes
C, rational method coefficient, (-)
L, length in ft
S, average watershed slope in %

Estimated Peak Flow

	2-year	5-year	100-year	
i	41.7	56.2	95.8	mm/hr
Q	153.4	206.7	440.3	L/s

											Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C***	**I**	**Q**	**Q_{total}**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
			(ha)	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
A104	STM104	STM103	4.404	0.20	0.88	0.88	42.2	72.3	176.9	176.9	600	0.15	75.5	0.283	0.150	0.84	237.8	1.5	0.74
	STM103	STM102	0.000	0.20	0.00	0.88	43.7	70.5	172.6	172.6	600	0.15	67.5	0.283	0.150	0.84	237.8	1.3	0.73
A102	STM102	STM101	2.842	0.20	0.57	1.45	45.0	69.0	277.8	277.8	675	0.15	35.7	0.358	0.169	0.91	325.6	0.7	0.85
							45.7												
A201-Ph2	DICB 201A	STM201	4.414	0.30	1.32	1.32	28.2	95.8	440.3	440.3	750	0.20	13.0	0.442	0.188	1.13	497.9	0.2	0.88
A201-Ph1**	STM201	STM101	2.470	0.30	0.74	2.07	28.4	95.4	247.3	687.6	900	0.20	20.5	0.636	0.225	1.27	809.6	0.3	0.85
							28.7												
	STM101	HW100	0.000	0.00	0.00	3.51	45.7	68.3	666.7	666.7	1050	0.15	36.8	0.866	0.263	1.22	1057.6	0.5	0.63
							46.2												

* Refer to TC Calculations for Area A104, A102 and Area A201-PH2

**Refer to Functional Servicing and Stormwater Management Report for 4497 O'Keefe Court - Phase 1 prepared by DSEL (Job#16-886) dated February 2017 for Tc and Allowable Flow

Note: All sewers sized for the 100-year storm event

DRAWINGS / FIGURES

KEY MAP
NOT TO SCALE

SUBJECT TO THE CONDITIONS, IF ANY, SET I
DATED

THIS DRAFT PLAN IS APPROVED BY THE CIT
SECTION 51 OF THE PLANNIN
THIS ____ DAY OF _____

DERRICK MOODIE, MANAC
DEVELOPMENT REVIEW W
PLANNING, INFRASTRUCTURE AND ECONC
DEPARTMENT
CITY OF OTTAWA

DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 22, 23, 24 AI
CONCESSION 4 (Rideau Front
GEOGRAPHIC TOWNSHIP OF NI
And
PART OF BLOCK F
REGISTERED PLAN M-278
CITY OF OTTAWA

SCALE 1 : 2500

100 75 50 25 0 50 100 150 200 M

METRIC : Distances shown on this plan are in metres and can be converted to feet by dividing by 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

The boundaries of the lands to be subdivided and their relatior to adjoining lands have been accurately and correctly shown a from existing reference plans and subdivision plans.

DATE

E. H. HERWE
ONTARIO LAND S

MINIMUM LOT AREA = 4000 S
MINIMUM LOT FRONTAGE = 30m

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

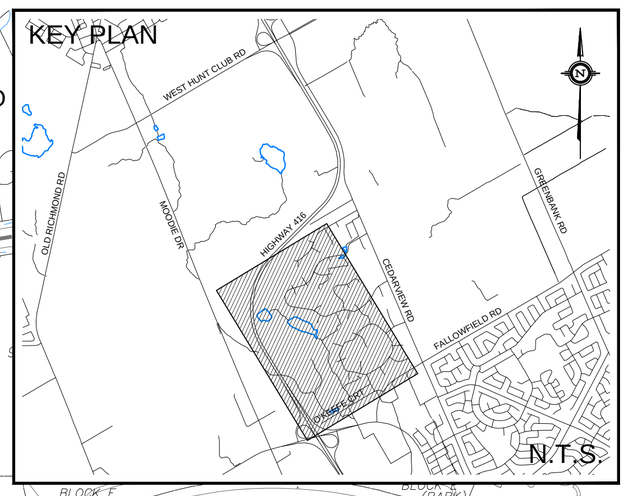
(a) see plan (boundaries)
(b) see plan (highways)
(c) see plan (key plan)
(d) single family estate lots
(e) see plan (adjoining lands)
(f) see plan (units)
(g) see plan (features)
(h) City of Ottawa water to be available.
(i) see soil report.
(j) see plan (elevations, contours)
(k) municipal water , bell , hydrocable & gas. to be avail
(l) see plan (easements)

ANNIS, O'SULLIVAN, VOLLEBEKK
Ontario Land Surveyors
14 CONCOURSE GATE, SUITE 500, NEPEAN, ONTARIO
TEL.(613)727-0850 FAX(613)727-1079

Job N

Dec

KEY PLAN



TOPOGRAPHIC INFORMATION

1K MAPPING INFORMATION PROVIDED BY CITY OF OTTAWA

SUPPLEMENTAL TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES
PROJ. NO. 17-10-130-00
DATED NOVEMBER 21, 2017

DRAFT PLAN INFORMATION

DRAFT PLAN INFORMATION PROVIDED BY ANNIS O'SULLIVAN VOLLEBEKK
PROJ. NO. 18428-17
DATED DECEMBER 8, 2017

LEGEND

- PROPOSED 300mmØ WATERMAIN
- PROPOSED 250mmØ WATERMAIN
- PROPOSED 200mmØ WATERMAIN
- EXISTING WATERMAIN

david schaeffer engineering ltd
SMART SUBDIVISIONS™

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Stittsville, Ontario, K2S 1E9
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Fax. (613) 836-7183
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WATER SERVICING

PROJECT No. :	14-746
SCALE:	1:2500
DATE:	DECEMBER 2017
DRAWING No.	1

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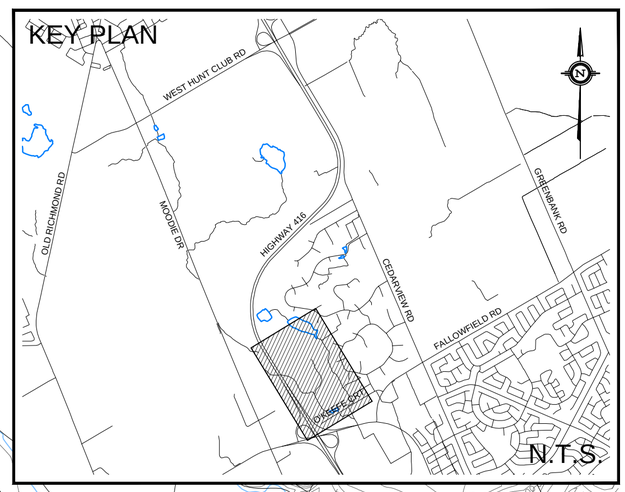
KEY PLAN



TOPOGRAPHIC INFORMATION

1K MAPPING INFORMATION PROVIDED BY CITY OF OTTAWA

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DATED NOVEMBER 21, 2017

DRAFT PLAN INFORMATION

DRAFT PLAN INFORMATION PROVIDED BY ANNIS O'SULLIVAN VOLLEBEKK
PROJ. NO. 18428-17
DATED DECEMBER 8, 2017

LEGEND

- PROPOSED STORM SEWER
- PROPOSED SWALE
- POST DEVELOPMENT STORM DRAINAGE BOUNDARY
- PROPOSED STORM MANHOLE
- PROPOSED DITCH INLET CATCH BASIN
- MAJOR SYSTEM FLOW ROUTE
- A104 — DRAINAGE AREA ID
- 4.40Ha / 0.20 — POST DEVELOPMENT STORM DRAINAGE AREA / RUN-OFF COEFFICIENT

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SMART SUBDIVISIONS™

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Stittsville, Ontario, K2S 1E9
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Fax. (613) 836-7183
www.DSEL.ca

STORM SERVICING

PROJECT No. :	14-746
SCALE:	1:1500
DATE:	DECEMBER 2017
DRAWING No.	2

z:\projects\14-746_800_cedarview\b_design\b2_drawings\b2-5_sketches and figures\2017-12-08_stm-serv\2017-12-13_746_fsr-fig.dwg