Appendix A

Previous Studies

Documents	Comments	Received
01 REPORTS/STUDIES		
2012 Township of North Dundas Village of Winchester Sanitary Sewer System Capacity Assessment (JLR)	Developed a working SewerCAD® model of the Winchester wastewater collection system and evaluate capacity	✓
2017 Village of Winchester – Main Street West Pumping Station Assessment (JLR)	Assess the capacity of the existing Main Street West Pumping Station (PS), based on current development and operation of the pumping station, a proposed gas station/car wash site and future development envisioned as part of the Class EA	✓
2018 Supporting Docs for ECA Amendment (OCWA)	Provided supporting information to complete the ECA Amendment and included Stantec's 2005 Design Brief for Main Street West SPS	✓
2019 Township of North Dundas – Winchester Wastewater Capacity Assessment (JLR)	Assesses the remaining wastewater capacity of the Main Street West Sewage Pumping Station (SPS), Bailey Street SPS and trunk gravity sewers in Winchester, Ontario	✓
2020 Township of North Dundas Drinking Water Supply System Capacity Expansion Class EA, Technical Memorandum No.1 Population Growth and Development Projection (JLR)	Established the proposed 20-year population projections for the Village of Winchester and Village of Chesterville within the Township boundary by determining their potential development opportunities for growth	✓
2020 Township of North Dundas Water and Wastewater Servicing Study (JLR)	Assesses the ability of existing sanitary and potable water infrastructure to support future growth and development.	✓
02 APPROVALS		
May 16, 2005 ECA	ECA No. 4037-6CAMCT	✓
2019 ECA Amendment	ECA No. 9743-B9ALZN	✓

TOWNSHIP OF NORTH DUNDAS
VILLAGE OF WINCHESTER
SANITARY SEWER SYSTEM CAPACITY ASSESSMENT

December, 2012

Prepared for:

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JLR No. 25447

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1.0 INTRODUCTION

1.1 Background

The Village of Winchester (Village) is located approximately 45 km southeast of the City of Ottawa in the Township of North Dundas (refer to Figure 1). The entire Village covers a total area of approximately 187 hectares, with an estimated total population of approximately 2,500. Residents of this urban area are serviced by a communal water supply/distribution system and a communal wastewater collection/treatment system. The wastewater system consists of a gravity sewer collection system, several local pumping stations with forcemains and a wastewater treatment lagoon.

Local operational knowledge and experience suggests that certain portions of Winchester's sewer system may be nearing their design capacity. In addition there is substantial development, conceptually proposed in the west end of the community. As such, the Village in association with the Ontario Clean Water Agency (OCWA) identified the need to assess the capacity of the sanitary sewer system.

1.2 Objectives

J.L. Richards & Associates Limited (JLR) in association with Flowmetrix Technical Services Inc. (Flowmetrix) was retained by the Village in the Spring of 2012 to develop a working SewerCAD® model of the Winchester wastewater collection system and evaluate capacity.

The Objectives of the investigation were to:

- Establish theoretical conveyance capacities of the wastewater collection system based on available as-constructed drawings (i.e., not field surveyed information);
- Develop modelling parameters based on flow monitoring data;
- Evaluate theoretical conveyance capacities under existing conditions; and
- Evaluate theoretical conveyance capacities under future development conditions (the future development condition is based on planned intensification mainly focused on the west side of the Village, namely the Hyde Park development).

The objective of this Report is to summarize the results of the work completed to date.

PROJECT:

TOWNSHIP OF **North Dundas**

NORTH DUNDAS, ONTARIO

DRAWING:

VILLAGE OF WINCHESTER
SANITARY SEWER SYSTEM
CAPACITY ASSESSMENT STUDY

KEY PLAN

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FIGURE 1

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2.0 STUDY AREA DESCRIPTION

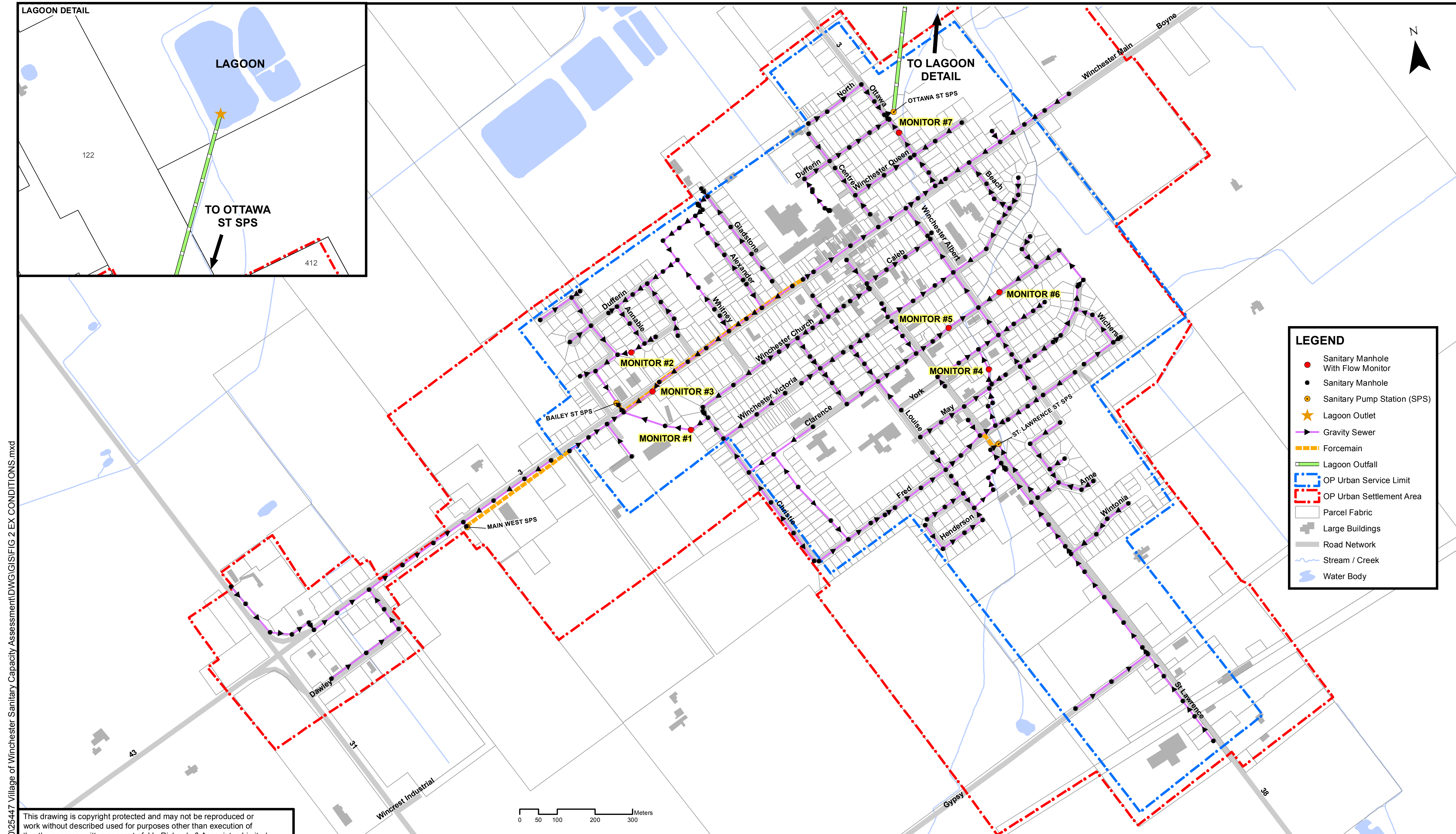
2.1 Existing Study Area

The existing Winchester wastewater collection system consists of gravity pipes and forcemains totalling approximately 20 kilometres in length and approximately 250 maintenance holes. The system includes a wastewater treatment lagoon, four (4) pumping stations (one main station and three sub-area stations) and a 400 mm diameter, 1.2 km long forcemain which discharges into the lagoon for treatment. Refer to Figure 2 for an overview of the existing wastewater collection system.

A number of institutional, commercial and industrial (ICI) developments were identified as potential high sewage generators. It was assumed that historically high water consumers would also generate sewage at a similar high rate. The Village provided two (2) years of total annual water consumption data for the highest water uses (refer to Appendix ‘A’ for correspondence). An average daily sewage rate was developed for the top four (4) high water users and included in the model. The four highest water consumers were the Winchester General Hospital, Parmalat Canada located at 694 St. Lawrence Street (the Parmalat facility located at 490 Gordon Street was not included in the model because it discharges to a private lagoon system), Dundas Manor Nursing Home and Tim Hortons.

2.2 Potential Future Development Areas

Potential future development areas were forecasted in close consultation with the Village and are focused in the West Service area. A revised JLR memorandum complete with Village comments dated September 27, 2012 formed the basis of anticipated future development projects to be included in the hydraulic model (refer to Appendix ‘B’ for a copy of the memo). In addition, the proposed 16.8 hectare Hyde Park development located along Main Street West approximately 400 m east of the intersection of Country Roads Nos. 43 and 31 was also included and evaluated in the hydraulic model (refer to Figure 3 for an overview of future development areas). The projected build-out population for the Hyde Park development of 1,621 was obtained from the sanitary sewer design sheet contained in the September 26, 2012 Servicing Brief for this development (refer to Appendix ‘C’).



DRAWING:

VILLAGE OF WINCHESTER SANITARY SEWER SYSTEM CAPACITY ASSESSMENT STUDY

EXISTING CONDITIONS

PROJECT:

TOWNSHIP OF North Dundas

NORTH DUNDAS, ONTARIO

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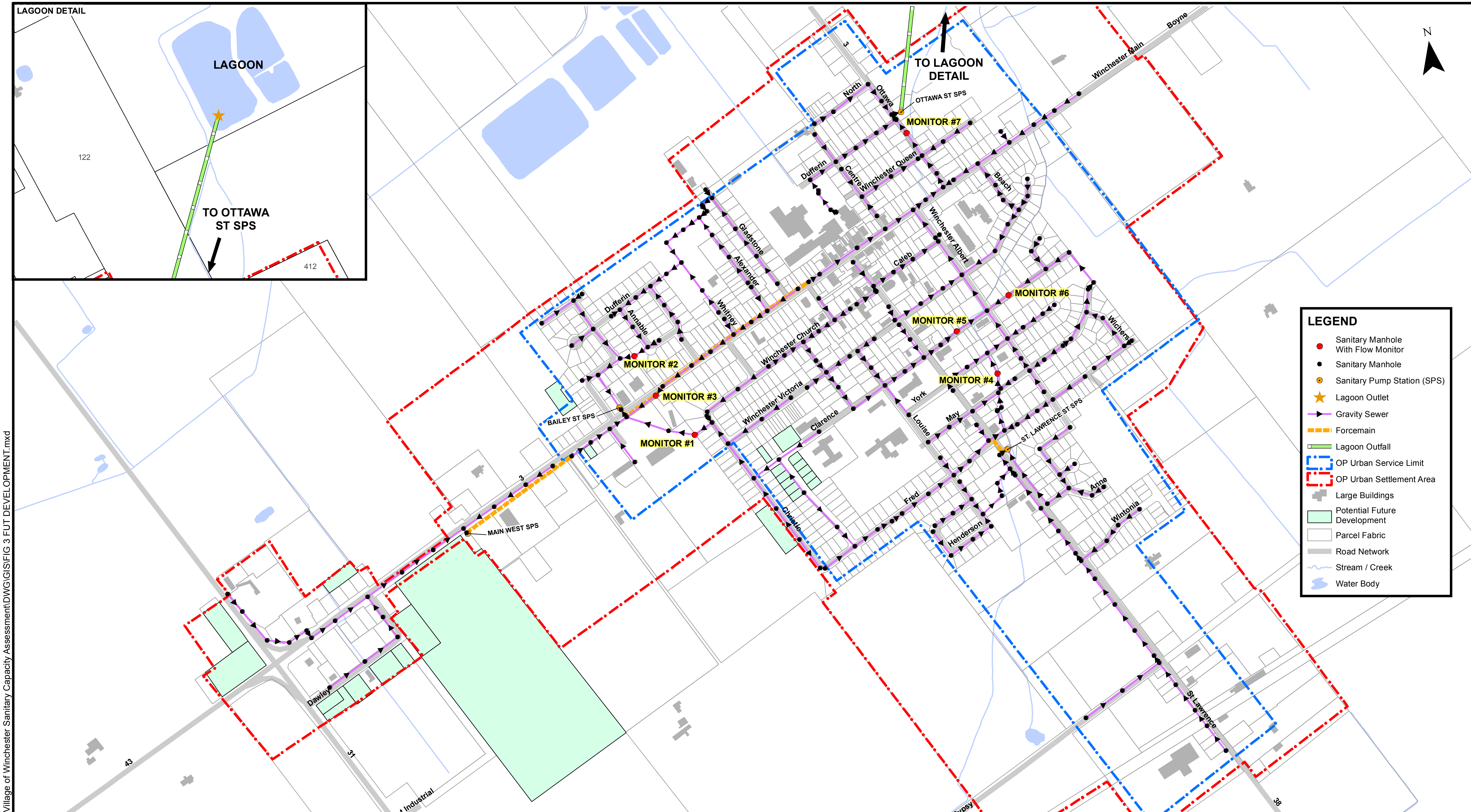

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DRAWING:

VILLAGE OF WINCHESTER
SANITARY SEWER SYSTEM
CAPACITY ASSESSMENT STUDY
POTENTIAL FUTURE DEVELOPMENT

PROJECT:

TOWNSHIP OF
North Dundas
NORTH DUNDAS, ONTARIO

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3.0 FLOW MONITORING PROGRAM (2012)

3.1 Description

Flowmetrix conducted a 6-week flow monitoring program between April 26 and June 6, 2012 in the Village in order to measure instantaneous sewage flows throughout the sanitary sewer system. Seven (7) flow monitoring locations were strategically selected in order to capture the majority of sewage flows conveyed to the Village's Lagoon. Each flow monitor measured flow from different types of drainage areas throughout the system, with the exception of Monitor No. 7, which monitored flows from the entire service area less a few blocks north of its location. Refer to Figure 4 for a map of flow monitoring locations and their respective drainage areas.

3.2 Data Evaluation

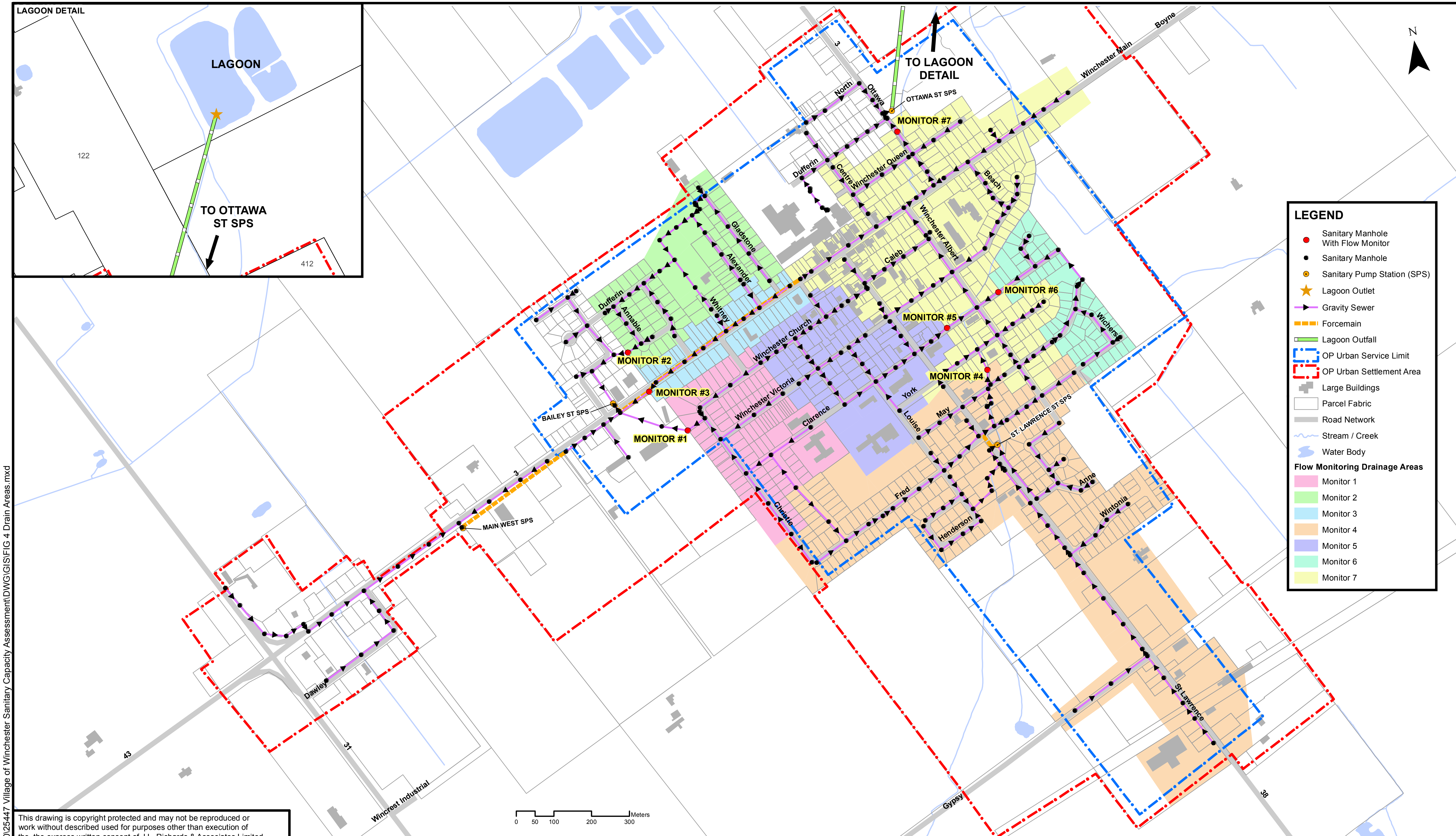
The flow monitoring devices were installed in manholes (refer to Figure 4 for locations) and programmed to record instantaneous flows every five (5) minutes. The data recorded over this period was analyzed and used to:

- Develop Average Daily Dry Weather Flow (ADDWF) Hydrographs;
- Estimate baseline infiltration;
- Estimate per capita flow rates; and
- Assess wet weather response.

The flow monitoring data was also used to develop system wide sewage flow parameters and peaking factors that reasonably approximate the measured flows at each of the flow monitoring locations.

<u>Average Daily Dry Weather Flow (ADDWF) Hydrographs</u>

The ADDWF hydrographs were developed for each flow monitoring location by averaging dry weather days that occurred during the flow monitoring period and that did not appear to be influenced by rainfall events. ADDWF hydrographs were produced using data from a minimum of four (4) separate days by averaging the instantaneous flow recorded at each five (5) minute intervals over the 24 hour period of the selected dry weather days (refer to Appendix 'D' for ADDWF Hydrographs). Once developed, the ADDWF was calculated as the average flow of the ADDWF hydrograph at each flow monitoring location. Table 1 summarizes the resulting ADDWF hydrographs calculated at each flow monitoring location.



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DRAWING:	PROJECT:		DESIGN: M.B.	DRAWING NO.: FIGURE 4
VILLAGE OF WINCHESTER SANITARY SEWER SYSTEM CAPACITY ASSESSMENT STUDY MONITORING PROGRAM	TOWNSHIP OF North Dundas NORTH DUNDAS, ONTARIO	J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS J.L. Richards & Associates Limited 864 Lady Ellen Place Ottawa, ON Canada K1Z 5M2 Tel: 613 728 3571 Fax: 613 728 6012	DRAWN: K.T.K. CHECKED: M.B. PLOTTED: 06-Nov-2012	JLR NO: 25447

Table 1: ADDWF Hydrograph Summary

Location	ADDWF (L/s)	Peak Flow (L/s)	Peaking Factor
Monitor No. 1	0.3	1.1	3.5
Monitor No. 2	0.4	0.8	1.8
Monitor No. 3	0.3	0.7	2.1
Monitor No. 4	2.9	9.4	3.2
Monitor No. 5	2.7	5.7	2.1
Monitor No. 6	0.8	1.1	1.4
Monitor No. 7	16.5	23.6	1.4

The ADDWF hydrographs that were developed generally depict a diurnal pattern common for residential areas with higher flows recorded during the morning and evening, lower flows during midday, and the lowest flows occurring overnight. Peaking factors were developed at each location by dividing the highest measured flow of each ADDWF hydrograph by the calculated ADDWF (refer to Table 1). Per capita flow rates and peaking factors used in the hydraulic model were developed based on the data obtained by Flow Monitor No. 7, since it was located just upstream of the Ottawa Street Pumping Station and captured a majority of the collection system. This flow monitor was deemed to provide a reasonable approximation of the collection system as a whole. Based on the results, a peaking factor of 1.4 was applied to the simulated wastewater flows to illustrate high flow periods. The overnight period generated the lowest flows (i.e., most activity ceases overnight) and, as such was assumed to yield a reasonable approximation of non-rainfall induced baseline infiltration rates.

The Village has a number of sewage pumping stations located throughout the wastewater collection system, and it is worth noting that the measured flows at Flow Monitor No. 4, that was located downstream of the St. Lawrence Street Pumping Station, did show evidence of cyclic peaks in the hydrograph that would be attributed to regular pumping cycles.

Non-Rainfall Induced Baseline Infiltration

Non-rainfall induced baseline infiltration is generally a function of the groundwater level and sewer integrity. Given that there would still be some sewage generation during the overnight period, the non-rainfall induced baseline infiltration was estimated to be eighty-five percent (85%) of the average ADDWF (typically occurs between 1:30 a.m. and 4:30 a.m.). Eighty-five percent is a typical value used for residential areas to determine the non-rainfall induced baseline infiltration rate. This value assumes that fifteen percent (15%) of the observed overnight flows can be attributed to actual wastewater activities.

The drainage area tributary to each flow monitoring location was determined in hectares (ha) and used to calculate an area based infiltration rate (L/s/ha) using the non-rainfall induced baseline infiltration computed for each area. Refer to Table 2 summarizing the baseline infiltration rates that were determined for each flow monitoring location (refer to Appendix 'D' for Baseline Infiltration rates assigned in the model).

Table 2: Non-Rainfall Induced Baseline Infiltration Summary

Location	Average Low ADDWF (L/s)	Baseline Infiltration (L/s)	Area (ha)	Infiltration Rate (L/s/ha)
Monitor No. 1	0.07	0.06	12.0	0.005
Monitor No. 2	0.33	0.28	12.3	0.023
Monitor No. 3	0.21	0.18	5.6	0.031
Monitor No. 4	2.31	1.96	49.3	0.039
Monitor No. 5	1.66	1.41	14.3	0.098
Monitor No. 6	0.68	0.58	6.6	0.087
Monitor No. 7	12.36	10.51	134.2	0.078

A non-rainfall induced baseline infiltration rate of 0.08 L/s/ha was included in the model based data obtained by Flow Monitor No. 7 since it was located upstream of the Ottawa Street Pumping Station and captured a majority of the collection system.

Per Capita Flow Rate

The per capita flow rate represents the amount of residential wastewater generated by the current population. The total number of units located in the drainage area tributary to each flow monitor was estimated by counting the number of exiting units. It should be noted that apartments and multi-unit buildings were considered as one unit. These values were then multiplied by a unit density of 2.6 people/unit as provided by the Township.

The per capita flow rate used in the wastewater model was also developed by firstly accounting for the sewage generated by the top four (4) highest water users. The Township provided the 2010 and 2011 annual water consumption for these high water users. It was assumed that there were no water losses and, therefore, the wastewater production for these high water users was equal to the total water usage. The per capita flow rate was calculated by subtracting the non-rainfall baseline infiltration and the wastewater production from the high water users from the ADDWF and then dividing the resulting value by the population located within the flow monitoring drainage area. The following table summarizes the per capita flow rates that were developed for each flow monitoring location.

Table 3: Per Capita Flow Rate Summary

Location	Population	ADDWF – Infiltration (L/s)*	Per Capita Rate (L/cap/day)
Monitor No. 1	179	0.26	125
Monitor No. 2	177	0.16	80
Monitor No. 3	112	0.14	107
Monitor No. 4	484	0.48	85
Monitor No. 5	182	0.56	268
Monitor No. 6	143	0.23	137
Monitor No. 7	2096	4.44	183

*Note: Excludes wastewater production from high water users.

Similar to the analyses completed for the ADDWF and the baseline infiltration, the per capita flow rate used in the model was developed based on the data obtained by Flow Monitor No. 7 since it was located upstream of the Ottawa Street Pumping Station and captured a majority of the collection system. It was deemed to provide a better representation of sewage generation for the entire collection system. To be conservative, a rounded per capita flow rate of 200 L/cap/day was applied in the model. Refer to Appendix 'D' for a summary of all sewage demands assigned in the model.

Wet Weather Response

During rain events sanitary sewers typically experience an increase in flows due to wet weather inflows that can occur through the various direct connections. As part of the flow monitoring analysis, rain events that occurred over the course of the flow monitoring period were compared to measured rain events from a local rain gauge. Rain gauge data was collected at the Chesterville Dam, located approximately 10 km east of the Village, and was provided courtesy of the South Nation Conservation Authority. The rain data was then used to analyze the response of the wastewater collection system during the monitoring period to wet weather events. Wet weather related extraneous flow hydrographs were developed by subtracting the ADDWF hydrographs from the total flow monitoring hydrographs. All monitoring stations did not show strong, quick responses to rainfall events that are typically indicative of direct inflow to the system. This could be a result of the early snowmelt in the Spring of 2012 that was not capture by the monitoring program or the region wide drought (Level 1 low water conditions within the South Nation Conservation region) as noted by OCWA during a June 7th , 2012 meeting.

Average wet weather extraneous flow rates and peaking factors were developed from the wet weather extraneous flow hydrographs. Three marked increases in wastewater flows were noted to coincide with rainfall events. The area under the wet weather extraneous flow hydrographs represents the total volume of extraneous wastewater flow that was conveyed by the sewers. Dividing this total volume by the time for the sewers to convey the increased flow yielded an average wet weather extraneous flow rate for each event. The wet weather peaking factor was calculated by dividing the peak flow from the wet weather extraneous flow hydrographs by the average wet weather extraneous flow rate. Three wet weather extraneous flow rates and peaking factors (i.e., one for each of the three extraneous flow responses in the Spring 2012) were calculated at each flow monitoring location. The following table summarizes the average of the three wet weather flow rates and peaking factors that were calculated at each flow monitoring location during the flow monitoring period (refer to Appendix 'D' for a table summarizing the three rain events at each flow monitor).

Table 4: Wet Weather Influence Summary

Location	Average Wet Weather Extraneous Flow (L/s)	Wet Weather Extraneous Flow Rate (L/s/ha)	Extraneous Peak Wet Weather Flow (L/s)	Extraneous Wet Weather Peaking Factor
Monitor No. 1	0.10	0.008	1.79	17.9
Monitor No. 2	0.16	0.013	0.68	4.2
Monitor No. 3	0.26	0.046	3.81	14.7
Monitor No. 4	1.97	0.040	15.06	7.7
Monitor No. 5	0.90	0.063	7.81	8.7
Monitor No. 6	0.43	0.065	0.98	2.3
Monitor No. 7	4.57	0.034	17.99	3.9

It should be noted that Monitor Nos. 1 and 3 exhibit larger peaking factors relative to the other monitoring locations. These peaking factors may indeed be representative of the specific locations and timeframes; however, given their relatively small drainage areas (12 and 5.6 ha, respectively) and the limited storm events actually monitored during the time they were installed, the decision was made to not include these peaking factors in the development of the model. Similar to the development of modelling parameters for baseline infiltration and per capita sewage rates, data from Flow Monitor No. 7 was used to develop the wet weather extraneous flow rate model input. To be conservative, a rounded wet weather extraneous flow rate of 0.035 L/s/ha and peaking factor of 4 were applied in the model (refer to Appendix 'D' for wet weather flow rates applied in the model).

Adding the peaked wet weather flow rate (0.035 x 4 = 0.140 L/s/ha) and baseline infiltration rate (0.08 L/s/ha) yields a total extraneous flow rate of 0.22 L/s/ha as an input to the model. This value is somewhat lower than the standard infiltration guideline of 0.28 L/s/ha outlined in the MOE Sewer Design Guidelines, which is typically used as part of the peak extraneous flow component for the design of new sewers, irrespective of land usage, sewer construction or soil type, however, is in a comparable order of magnitude.

4.0 SANITARY SEWER MODEL DEVELOPMENT

The SewerCAD® hydraulic model was constructed using shapefiles generated from the GIS data provided by the Township of North Dundas. The shapefiles were imported into the software along with MH top of grate elevations and sewer invert elevations obtained from as-constructed drawings provided by OCWA. The four pumping stations included in the model were Main Street West, Bailey Street, St. Lawrence Street and Ottawa Street. Pump curves for the pumps contained in each pumping station were provided by OCWA and included in the model (refer to Appendix 'E' for pump curves). This information created the "skeleton" of the sewer model onto which wastewater flows could be applied.

The wastewater flow parameters utilized in the SewerCAD® model were developed based on the analysis of the flow monitoring data. As outlined previously, the flow monitoring data was dissected into five components; ADDWF per capita, dry weather peaking factor, non-rainfall induced baseline infiltration rate, wet weather extraneous flow rate and a wet weather peaking factor. The following table summarizes the values developed for each parameter that were incorporated into the model.

Table 5: Wastewater Flow Parameters

Demand Scenario Simulation	Flow
ADDWF (L/cap/d)	200
Dry Weather Peaking Factor	1.4
Baseline Infiltration (L/s/ha)	0.08
Wet Weather Extraneous Flow Rate (L/s/ha)	0.035
Wet Weather Peaking Factor	4
Total Extraneous Flow (L/s/ha)	0.22

For comparison purposes, the ADDWF rate was compared to recorded water consumption during the sewer flow monitoring period between April and June. After removing the high water users from the data, the water consumption records yielded a rate of approximately 240 L/cap/day (refer to Appendix ‘A’ for water consumption correspondences). The ADDWF value therefore appears fairly representative of the operating conditions recorded during the flow monitoring period.

The ADDWF is noted to be somewhat lower than the typical MOE Sewage Design Guideline that recommends domestic flows range between 225 and 450 L/cap/day. While the flow monitoring data and water meter records appear to corroborate the ADDWF used in the model, it is still recommended that typical MOE sewage parameters be considered for any new development or future capacity expansions to ensure an appropriate level of conservatism.

5.0 FLOW MODELLING OF EXISTING CONDITIONS

The SewerCAD® model was used to evaluate the existing wastewater collection system during peak wet weather flows under pumped conditions. Although SewerCAD® is able to simulate flows generated by a sewage pumping station, the model conservatively applies the simulated pumping rate to all sewer sections located downstream of the pumping station as a “plug” flow. Typically, pumped flows attenuate as they are conveyed through the collection system, however sewer sections located immediately downstream of a pumping station forcemain are expected to be subject to some increase in flow during pump operation as seen in Monitor No. 4 located downstream of the St. Lawrence Street PS. Based on the pump curves that were input into the model, the model simulated the following pumped flow rates:

Table 6: Peak Wet Weather Pumped Sewer Flows

Pump Station	Simulated Inflow (L/s)	Simulated Pump Flow (L/s)	MOE Certificate of Approval (L/s)	OCWA Draw Down Test (L/s)
Main Street West	5.1	5.1	3.5	2.4
Bailey Street	16.0	28.9	31.4	29.2
St. Lawrence Street	8.9	26.5	-	21.2
Ottawa Street	78.9	2 x 50 *	3 x 90 *	-

* Note: The simulated pump flow was based on two VFD pumps each operating at 50 L/s. The MOE Certificate of Approval states three pumps and each rated for 90 L/s.

A review of the model results for the linear infrastructure indicates that the simulated peak wet weather flow along two (2) sections of sewer exceeded their theoretical conveyance capacity and are listed in the following table (refer to Appendix ‘F’ for complete simulation results).

Table 7: Peak Wet Weather Sewer Flows and Capacities

Sewer Section	Location	Capacity (L/s)	Simulated Flow (L/s)	Percent of Capacity (%)
182	Easement b/w York & May	25.56	30.75	120.3
186	Easement b/w York & May	28.08	30.07	107.1

The ratio of simulated flow to theoretical conveyance capacity of the next nine highest sewer sections ranged from 95% to 57% (refer to Appendix 'F' for complete simulation results). The capacity of reverse sloped pipes was not included in the modelled peak flow vs. theoretical conveyance capacity comparison since flow through these sewer sections is governed by the hydraulic grade line (HGL). Based on a review of the as-constructed drawings only sewer section 451, the inlet to the Main Street West PS was identified as having a reverse slope, which could indicate inaccurate as-constructed data.

6.0 FLOW MODELLING OF POTENTIAL FUTURE CONDITIONS

The SewerCAD® model was used to evaluate the impact that future development in the West Service Area would have on the existing wastewater collection system during peak wet weather flows under pumped conditions. Revised pump curves for the Main Street West and Bailey Street Pumping Stations were simulated in the model, in order to convey the future wastewater flows to the downstream gravity sewers. Based on the revised pump curves, the model simulated the following inflow and pumped flow rates at each station:

Table 8: Future Peak Wet Weather Pumped Sewer Flows

Pump Station	Simulated Inflow (L/s)	Simulated Pump Flow (L/s)
Main Street West	36.9	40.4
Bailey Street	52.7	60.8
St. Lawrence Street	8.9	26.5
Ottawa Street	110.8	2 x 50 + 110 *

* Note: The simulated pump flow was based on two VFD pumps each operating at 50 L/s and one constant speed pump operating at 110 L/s.

A review of the model results for the linear infrastructure indicates that the simulated peak wet weather flow along nine (9) sewer sections exceeded their theoretical conveyance capacity and are listed in the following table (refer to Appendix ‘G’ for complete simulation results).

Table 9: Future Peak Wet Weather Sewer Flows and Capacities

Sewer Section	Location	Capacity (L/s)	Simulated Flow (L/s)	Percent of Capacity (%)
45	Inlet to Bailey St. PS	20.18	47.90	237.4
47	Main St. West of Bailey	21.00	40.96	195.0
48	Main St. West of Bailey	21.95	40.74	185.7
96	Main St. West at Louise	35.80	60.89	170.1
46	Main St. West of Bailey	26.34	41.43	157.3
97	Main St. West at Louise	39.32	61.26	155.8
450	Main St. West at Hyde Park	26.25	35.42	135.0
182	Easement b/w York & May	25.56	30.75	120.3
186	Easement b/w York & May	28.08	30.07	107.1

The ratio of simulated flow to theoretical conveyance capacity of the next ten highest sewer sections ranged from 98% to 54% (refer to Appendix ‘G’ for complete simulation results).

7.0 DISCUSSION

Existing Conditions

Based on the hydraulic modelling results, under existing conditions the overall wastewater collection system appears to have sufficient capacity to convey the estimated peak sewage flows developed from the flow monitoring data. The simulated results indicated that two (2) sewer sections (182 and 186) located along the easement between York Street and May Street are flowing beyond their theoretical conveyance capacity; however, it is worth noting that these sewer section are located downstream of the St. Lawrence Street PS and are likely subject to conservatively applied pumped flows simulated in the model.

The four pumping stations appear to have adequate pumping capacity to accommodate the simulated wastewater inflows, with the exception of the Main Street West PS. The simulation result for the Main Street West PS appears to indicate that the station is operating at or near its full capacity. In addition, the simulated pump flow of 5.1 L/s exceeds both the MOE Certificate of Approval rating of 3.5 L/s and the OCWA draw down test result of 2.4 L/s. Draw down test results were also provided by OCWA for St. Lawrence St. PS and Bailey St. PS and closely matched the simulated results (refer to Table 6).

Future Conditions

Based on hydraulic modelling results under future development conditions, infrastructure located on the west side of the Village is unable to accommodate the wastewater flows generated by the proposed build-out development. The simulated results indicate that nine (9) sewer sections exceed their theoretical conveyance capacity under this scenario. It is worth noting that the majority of these sewers are located along Main Street West between the proposed Hyde Park development and Mill Street. Depending on the ultimate servicing solution of the Hyde Park development, it is likely that the majority of the identified sewer sections will require capacity upgrades. In addition, pumping stations that service the west side of the Village will also require upgrades.

The model assumed that sewage flows generated from the Hyde Park development discharged directly to the gravity sewer section fronting the site (i.e., sewer 450). Therefore, three (3) pumping stations are required to convey wastewater flows from the west side of the Village ultimately to the Lagoon (i.e., Main Street West, Bailey Street and ultimately the Ottawa Street PS). Pump curves at these stations were upgraded in the model for the purposed of conveying the estimated peak wastewater flows. In addition to the simulated pump capacity increases, it is likely that upgrades to forcemains and wet wells would also be required. The scope of potential system upgrades is highly dependent on the ultimate servicing solution proposed for the Hyde Park development (e.g. a new pumping station and forcemain could be installed to bypass certain sewer section).

8.0 RECOMMENDATIONS

The development of a hydraulic sewer model for the Village of Winchester has been a very useful exercise and will allow for the simulation of many different potential scenarios. The Township is now in a position to readily assess wastewater flow capacities in the existing network and to forecast the effects that proposed development could have on downstream infrastructure. The model was developed based on the current available GIS and as-constructed information. Analysis of actual flow monitoring data facilitated the development of wastewater parameters that are reflective of actual field conditions. Moving forward, additional flow monitoring could be conducted in early Spring to capture wastewater flows more representative of spring runoff conditions and further refine model input parameter to increase accuracy. Also, various future development servicing solutions can easily be evaluated in the model in order to define the scope and timing of wastewater system upgrades to accommodate future development areas. As with any model, its effectiveness in simulating actual conditions depend on the information used to create the model. It is our experience that new and higher quality information typically becomes available over time. In this regard, it will be important to periodically update the Model as this information becomes available.

Based on the work completed as part of this assignment, it is recommended that:

1. Sewers shown to be operating at capacity greater than 60% full under existing conditions and future conditions be checked to confirm that the physical data utilized in the model is accurate (i.e., survey sewer sizes and inverts).

2. Additional flow monitoring be considered for late Winter/Spring 2013 at strategic locations based on the work completed to date.

3. Additional draw down tests be undertaken to confirm existing pump station capacities as some discrepancies have been noted between published and field data.

4. A Master Servicing Plan be considered for both water and wastewater infrastructure capacity expansion and renewal in the long term.

5. All new development areas and future capacity expansions of existing infrastructure should continue to be designed using typical MOE sewage design values.

6. Any necessary short term capacity expansions be reviewed in consideration of planned development.

7. The SewerCAD® model be utilized when needed and updated with new and current information as it becomes available approximately on an annual basis.

Prepared by: Reviewed by:

Mark Buchanan, P.Eng. Brian Hein, P.Eng.

MB/BH:jd

APPENDIX ‘A’

Annual Consumption Data – High Water Users

Mark Buchanan - Winchester Sanitary Sewer System Capacity Assessment - water metering records

From: "Angela Rutley" <arutley@northdundas.com>
To: "'Sarah Gore'" <SGore@jlrichards.ca>, "'Blair Henderson'" <BHenderson@oc...
Date: 3/30/2012 11:40 AM
Subject: Winchester Sanitary Sewer System Capacity Assessment - water metering records
CC: "'Mark Buchanan'" <MBuchanan@jlrichards.ca>

As requested, here is the water consumption data for our top users, excluding Parmalat, 490 Gordon Street that has its own lagoon system.

	2010	2011
Winchester & District Memorial Hospital, 550 Louise Street	21,757 m^3	23,389 m^3
Parmalat Canada, 694 St. Lawrence Street	12,062 m^3	19,186 m^3
Dundas Manor Nursing Home, 533 Clarence Street	11,041 m^3	9,951 m^3
Tim Hortons, 12001 County Rd 3	4,344 m^3	4,738 m^3
Cornwall & Area Housing Apt. Bldg., 517 Albert St.	2,683 m^3	3,002 m^3
Winchester Nonprofit Apt. Bldg., 510 Beach St.	2,502 m^3	2,343 m^3
Winchester Community Centre, 577 Main Street	2,090 m^3	2,787 m^3

If you need anything further, let me know.

Angela Rutley
Deputy CAO
Township of North Dundas

>>> "Mary Lynn Plummer" <MPlummer@northdundas.com> 11/23/2012 11:09 AM >>>
Good morning Brian,

It was a pleasure to meet you yesterday! Please see below: Consumption for April, May & June as per our conversation. If you have any questions, please contact me and I will be more than happy to assist!

Have a great weekend.

Mary Lynn Plummer
Water/Sewer Assistant Manager
Township of North Dundas
Ph: 613-774-2105 ext:227
Fax: 613-774-5699
www.northdundas.com

From: Mary Lynn Plummer
Sent: Friday, November 23, 2012 10:29 AM
To: 'BHenderson@ocwa.com'
Cc: 'Dave Markell'
Subject: Consumption for April May & June

Here are my calculations: Quarterly Billing including finals : 49,090.70 cubic meters
April May June Monthly billings: 81,439.98 cubic meters
Sub Total :130,530.68 cubic meters
Minus Parmalat , WDMH, Dundas Manor & Tim Horton's :- 76,104.38 cubic meters
& Winchester Cheese Total 54,426.30 cubic meters

Location	April	May	June
Parmalat 490 Gordon	20,267	22,728	14,073
Parmalat 490 Gordon	1,707	2,052	2,141
Dundas Manor	1,183	1,128.20	1,360.80
WDMH	1,765.70	2,455.34	3,066.34
Winchester Cheese	241	547	449
Tim Horton's			940
Total Consumption	25,163.70	28,910.54	22,030.14

Hope this is what you are looking for?
Cheerio,

Mary Lynn Plummer
Water/Sewer Assistant Manager
Township of North Dundas
Ph: 613-774-2105 ext:227
Fax: 613-774-5699
www.northdundas.com

APPENDIX ‘B’

Memorandum – West Service Area Future Development

Sept 27, 2012
C. Pol

MEMORANDUM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

TO: Calvin Pol, BES, MCIP, RPP
Director of Planning, Building and Enforcement
Township of North Dundas

DATE: June 28, 2012
REVISED July 26, 2012 (noted in red)

JOB NO.: 25447

FROM: Sarah Gore, P.Eng.

CC: Angela Rutley, Township of North Dundas
~~Blair Henderson, Ontario Clean Water Agency~~
~~Dave Markell, Ontario Clean Water Agency~~
Mark Buchanan, P.Eng., J.L. Richards & Associates Limited
Brian Hein, P.Eng., J.L. Richards & Associates Limited

RE: **Village of Winchester**
Sanitary Sewer Capacity Study
West Service Area Development Projections

INTRODUCTION

The purpose of this Memorandum is to establish proposed short-term (0 - 5 years) and long-term (5 - 20 years) population projections for the West Service Area of the Village of Winchester to serve as the basis for the Sanitary Sewer System Capacity Assessment Study.

POTENTIAL DEVELOPMENT STRATEGY

In order to assess the impacts of growth within the West Service Area on the sanitary collection and pumping infrastructure, spatial and land-use definitions of the proposed development areas are needed. The attached Proposed Boundaries – Winchester Map from the Comprehensive Settlement Area Boundary Study illustrates the current vacant lands and future development areas. In addition, based on the feedback received at the Project Meeting No. 2 held on June 7, 2012 and comments provided on July 18, 2012, we have prepared the following potential future development areas for review and comment (refer to the attached Figure for the noted development areas):

Eastern Engineering to Provide

Development Area	Description Split	# of Lots or Area	# of Units Connected to Existing System	Short-Term (0 - 5 years)	Long-Term (5 - 20 years)
1	Commercial Pioneer Gas Bar/Car Wash	1	0	~~1~~ 1.21/see	0
Split > 3	Residential / Commercial	~~23~~	~~6~~ 4 connected 3 committed	~~5~~ ~~0~~ NIL	~~12~~ 9
2	Commercial	1	0	0	1
4	Future Development Employment District	2 ha (existing) 12 ha (possible)	1 0	0 0	0 2
5	Commercial Dean's Food Store	2	0	~~1~~ 0	~~0~~ 2
6	Residential Development	~~740~~ SEE ATTACHED	0	~~540~~	~~200~~
REMOVE 7	~~Future Development Area Residential~~	~~14 ha~~	~~Provide Density~~	~~TBD~~	~~TBD~~ REMOVE AREA
8	Residential Development	~~6~~ 12	0	~~6~~ 12	0
9	Residential Development	12	0	~~12~~ 0	~~0~~ 12
10	Residential/Commercial Development	2	0	~~2~~ 0	~~0~~ 2
11	Residential Development Semi Detached Units (1)	~~2~~ (semi's) 4 houses	~~0~~ 1 Semi	~~4~~ 6	0

MEMORANDUM

J.L. Richards
ENGINEERS · ARCHITECTS · PLANNERS

J.L. Richards & Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

TO: Calvin Pol, BES, MCIP, RPP
Director of Planning, Building and Enforcement
Township of North Dundas

DATE: June 28, 2012
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CC: Angela Rutley, Township of North Dundas
~~Blair Henderson, Ontario Clean Water Agency~~
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Brian Hein, P.Eng., J.L. Richards & Associates Limited

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Development Area	Description	# of Lots or Area	# of Units Connected to Existing System	Short-Term (0 - 5 years)	Long-Term (5 - 20 years)
1	Commercial Pioneer Gas Bar/Car Wash	1	0	1	0
2	Commercial	1	0	0	1
3	Residential	23	6	5	12
4	Future Development Employment District	2 ha (existing)	1	0	0
		12 ha (possible)	0	0	2
5	Commercial Dean's Food Store	1	0	1	0
6	Residential Development	740	0	540	200
~~7~~	~~Future Development Area Residential~~	~~14 ha~~	~~*Provide Density*~~	~~*TBD*~~	~~*TBD*~~
8	Residential Development	6	0	6	0
9	Residential Development	12	0	12	0
10	Residential/Commercial Development	2	0	2	0
11	Residential Development Semi Detached Units	2 (semi's)	0	4	0

As noted in the Table above, we require the Township to confirm the following:

- The proposed short-term (0 - 10 years) and long-term (10 - 20 years) planning periods are acceptable. An alternate scenario may be to consider short and long-term planning periods of (0 - 5 years) and (5 - 20 years), respectively. Use (0 - 5 years) and (5 - 20 years).
- Development Area No. 3: We understand that some residential units are currently connected to the sanitary sewer system, while other homes continue to operate private systems. In order to accurately depict the existing and future conditions in the hydraulic model, we require the number of homes currently connected to the sanitary system and an estimate of the short and long-term connections. As noted in the Table.
- Development Area No. 4: We had discussed this area not being included in the model at the Project Meeting. If the Township would like us to include this area as a commercial user in the long-term scenario, please advise. Note that adding 14 ha of commercial lands within the hydraulic model may significantly impact flows from the West Service Area. Use an equivalent of 2 Units.
- Development Area No. 6: As discussed at the Project Meeting, please provide an estimate of the short and long-term connections to be utilized within this model. To be confirmed at July 25, 2012 meeting.
- ~~Development Area No. 7: We are assuming that this area will ultimately be a residential development area. Similarly as Development Area No. 4, please confirm whether this development area is to be included in the hydraulic model in the long-term scenario. If the Township elects to include this development within the hydraulic model, we would require an approximate unit density to determine the number of households within this growth area.~~ Delete Development Area No. 7.

We understand that the Township is currently working towards updating background studies to support future Official Plan updates and acknowledge that the information may not be readily available We currently have the existing hydraulic model constructed and will require this information at your earliest convenience to review impacts of development on the wastewater infrastructure and maintain the proposed project schedule.

If you have any questions or concerns, please do not hesitate to call.

Prepared by,

J.L. RICHARDS & ASSOCIATES LIMITED

Sarah Gore.

Sarah Gore, P.Eng.


WEST SERVICE AREA GROWTH
TO OTTAWA ST SPS
MAIN WEST SPS
BAILEY ST SPS
MONITOR #1
MONITOR #2
MONITOR #3
① 1 Unit
② 1 Unit
③ Confirm Existing Connections
④ Future Development Area
⑤ 1 Unit
⑥ 740 Units
⑦ Future Development Area
⑧ 6 Units
⑨ 12 Units
⑩ 1 Unit
⑪ 2 Units
AREA ≈ 14 ha
AREA ≈ 14 ha
Wincrest Industrial
Dawley
Dufferin
Gladstone
Alexander
Clarence
Christie
Winchester Sewer Model
JUNE 26/2012
JLR Notes from Meeting No. 2

APPENDIX ‘C’

Hyde Park Servicing Brief

Kollaard Associates
Engineers
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental

(613) 860-0923

FAX: (613) 258-0475

120064

September 26, 2012

Township of North Dundas
636 St. Lawrence Street,
P.O. Box 489
Winchester, Ontario
K0C 2K0

Attention: Mr. Calvin Pol

SERVICING BRIEF
PROPOSED MIXED USE SUBDIVISION DEVELOPMENT
WINCHESTER ONTARIO

Courtyard Development Inc has retained the services of Kollaard Associates Inc. (Kollaard) to prepare the servicing design and brief for the proposed mixed used subdivision development at the south side of Main Street West about 420 metres east of the intersection of County Road 43 and County Road 31 in the village of Winchester, Township of North Dundas, Ontario. The proposed Residential Development occupies a total area of about 16.8 hectares (42 acres). It is planned to construct the subdivision in three phases. Phase 1 will contain a total of 4 large buildings ranging in size from 3 to 4 storeys. The building use will vary from either completely residential occupancy to commercial/institutional occupancy on the first and or second storey and institutional/residential occupancy on the remaining storeys. The proposed development in Phase 2 is to consist of 2 large residential buildings and residential multi unit row house dwellings. Development in Phase 3 is intended to consist of residential multi unit row house dwellings.

Phase 1 is composed of the following Building types:

- Type A – 3-story mixed use (Residential and Commercial and Institutional)
- Type B – 3-story mixed use (Residential and Commercial)
- Type C – 3-story mixed use (Residential and Institutional)
- Type D – 4-story single use (Residential)
- Type E – 4-story single use (Residential)

Phase 2 is composed of the following Building types:

- Type E – 4-story single use (Residential)
- Type F – 4-story single use (Residential)
- Type G – 1-story multi unit row house
- Type H – 1-story multi unit row house

Phase 3 is composed of the following Building types:

- Type G – 1-story multi unit row house
- Type H – 1-story multi unit row house
- Type J – 1-story multi unit row house

The development is to include underground services consisting of municipal water, sanitary sewer, and storm sewer.

This brief identifies the water and sanitary servicing requirements to accommodate the proposed development.

SANITARY SEWER CONNECTION

The sanitary flow requirements have been calculated per phase and are summarized on the attached sanitary sewer design sheet is attached.

The sanitary flow calculations for the proposed development are based on the City of Ottawa design parameters, Ontario Building Code, as well as site specific parameters:

Table -1

Q = Average daily flow per capita	350 l/day per capita
Apartment/Condos/Hotel	2.0 pers. per unit
Res. Semi-detached and Row house Units	2.0 pers. per unit
Care units	1.6 pers. per unit
Commercial / Institutional	8.1 l/sqm
Additional Flow Doctor Office	250 l/day per practitioner
Infiltration	0.23 l/s per gross ha.

The life lease agreement that anyone acquiring a unit will have to sign stipulates that the maximum occupancy for any residential unit of any type is 2 persons.

Phase 1

<u>Sanitary Flows:</u>

Detailed Calculations are included on the attached sanitary sewer design sheet.

<u>Residential Capacity Requirement</u>

Number of persons from sanitary sewer design calculation sheet in Phase 1:
1291 occupants and 8 practitioners.

Peaking Factor: Residential Peak Factor: 4.0

Average daily Flow: 873 x 350 L/c/day + 8 x 250 L/c/day = 3.56 L/s

Peak Residential Sanitary Flow: 3.56 L/s x 4.0 = 14.24 L/s

Commercial / Institutional Capacity Requirement

Based on expected commercial and institutional occupancy the sanitary demand was calculated as follows : 75 (Litres/person/day)/ 9.3 (m^2/person) = 8.1 L/m^2/day
Commercial / Institutional Peak Factor: 1.5

Average daily flow: 6671 m^2 x 8.1 L/m^2/day = 54.04 m^3/day = 0.63 L/s
Peak sanitary flow (factor 1.5): 0.63 L/s x 1.5 = 0.94 L/s

Extraneous Flows:

Infiltration Allowance: 0.23 l/s/effective gross ha
Gross Area Expected to contribute to Sanitary Sewer = 3.45 ha.

Peak extraneous flows = 3.45 x 0.23 = 0.79 L/s

Therefore:

Phase 1 Total Average Sanitary Capacity Requirement = 5.56 + 0.63 + 0.79 = 4.98 L/s
Phase 1 Total Peak Sanitary Capacity Requirement = 14.24 + 0.94 + 0.79 = 15.67 L/s

Phase 2

Sanitary Flows:

Detailed Calculations are included on the attached sanitary sewer design sheet.

Residential Capacity Requirement

Number of persons from sanitary sewer design calculation sheet in Phase 2:
476 occupants.

Peaking Factor: Residential Peak Factor: 4.0

Average daily Flow: 476 x 350 L/c/day = 1.93 L/s

Peak Residential Sanitary Flow: 1.93 L/s x 4.0 = 7.72 L/s

Commercial / Institutional Capacity Requirement = 0

Extraneous Flows:

Infiltration Allowance: 0.23 l/s/effective gross ha
Gross Area Expected to contribute to Sanitary Sewer = 3.40 ha.

Peak extraneous flows = 3.40 x 0.23 = 0.78L/s

Therefore:

Phase 2 Total Average Sanitary Capacity Requirement = 1.93 + 0.0 + 0.78 = 2.71L/s
Phase 2 Total Peak Sanitary Capacity Requirement = 7.72 + 0.0 + 0.78 = 8.49 L/s

Sewage discharges is residential in type and in compliance with the Winchester Use By-law. The sewer will be tied to the municipal sewer system.

Phase 3

Sanitary Flows:

Detailed Calculations are included on the attached sanitary sewer design sheet.

Residential Capacity Requirement

Number of persons from sanitary sewer design calculation sheet in Phase 3:
264 occupants.

Peaking Factor: Residential Peak Factor: 4.0

Average daily Flow: 264 x 350 L/c/day = 1.07 L/s

Peak Residential Sanitary Flow: 1.07 L/s x 4.0 = 4.28 L/s

Commercial / Institutional Capacity Requirement = 0

Extraneous Flows:

Infiltration Allowance: 0.23 l/s/effective gross ha
Gross Area Expected to contribute to Sanitary Sewer = 2.3 ha.

Peak extraneous flows = 5.20 x 0.23 = 1.2 L/s

Therefore:

Phase 3 Total Average Sanitary Capacity Requirement = 1.07 + 0.0 + 1.20 = 2.27 L/s
Phase 3 Total Peak Sanitary Capacity Requirement = 4.28 + 0.0 + 1.20 = 5.47 L/s

Total Sanitary Requirement

Total Average Sanitary Capacity Requirement = 9.96 L/s
Total Peak Sanitary Capacity Requirement = 29.94 L/s

Sewage discharges is residential in type and in compliance with the Winchester Use By-law. The sewer will be tied to the municipal sewer system.

WATER REQUIREMENTS

From the sanitary sewer calculations above, the residential occupancy of the proposed subdivision development is 1621 persons. It is assumed that the water demand for the commercial / institutional usage will match the sanitary demand for the commercial / institutional use.

The residential water demand is estimated based on the City of Ottawa Watermain Guidelines as follows:

Average daily demand of 350 L/c/day gives = 567.4 m^3/day or 6.57 L/s

Maximum daily demand (factor of 2.5) is 6.57 L/s x 2.5 = 16.43 L/s

Peak hourly demand (factor of 2.2) = 16.43 L/s x 2.2 = 36.15 L/s

The commercial / Institutional Demand is as follows

Total estimated commercial / institutional building area is 3700 m^2.

From the sewer design sheet, the estimated water demand is 8.1 L/m^2/day.

Commercial average daily demand = 3700 m^2 x 8.1 L/m^2/day = 0.35 L/s or 29.97 m^3/day.

Commercial maximum daily demand (factor 1.5) = 0.63 L/s x 1.5 = 0.95 L/s

Commercial maximum hourly demand (factor 1.8) = 0.95 L/s x 1.8 = 1.71 L/s

Therefore, the total water demand is

Total average daily demand = 7.20 L/s
Total maximum daily demand = 17.38 L/s
Total maximum hourly demand = 37.86 L/s

We trust that the information provided is sufficient for your present requirements. Do not hesitate to contact our office should you have additional questions or concerns.

Sincerely,
KOLLAARD ASSOCIATES INC.,

Steven deWit, P.Eng.

Sanitary Sewer Design Calculations

HYDE PARK- WINCHESTER

Location			Residential / Institutional Flow						Commercial /		Infiltration		Flow	
1	2	3	4		5	6	8	10	11	13	15	17	18	20
BUILDING TYPE / FLOOR	From Buil.	To MH	Hotel / Condos	Care Unit	Row / Semi Units	Pop. [no.]	Cumulative Pop. [no.]	Pop. Flow, $Q_{(p)}$ [L/s]	Area [Sq.m]	Flow, $Q_{(p)}$ [L/s]	Total Area [ha]	Infiltration Flow [L/s]	Average Design Flow [L/s]	Peak Design Flow [L/s]
Phase 1														
A / 1st	A	MH-A	0	0	0	0	0	0.00	1592	0.15	0.60	0.14	0.29	0.36
A / 2cd	A	MH-A	0	0	0	8	8	0.02	1778	0.17	0.00	0.00	0.19	0.34
A / 3rd	A	MH-A	40	0	0	80	88	0.32	0	0.00	0.00	0.00	0.32	1.30
B / 1st	B	MH-A	10	0	0	20	20	0.08	823	0.08	0.60	0.14	0.30	0.58
B / 2cd & 3rd	B	MH-A	40	0	0	80	100	0.32	0	0.00	0.00	0.00	0.32	1.30
C / b & 1st	C	MH-B	0	10	0	16	16	0.06	2478	0.23	0.75	0.17	0.47	0.78
C / 2cd - 3rd	C	MH-C	88	0	0	176	192	0.71	0	0.00	0.00	0.00	0.71	2.85
C / 4th	C		0	17	0	27	219	0.11	0	0.00	0.00	0.00	0.11	0.44
								0.00						
D/ 1st - 4th	D	MH-D	55	0	0	110	110	0.45	0	0.00	0.30	0.07	0.51	1.85
								0.00						
E / 1st - 4th	E1	MH-E1	91	0	0	182	182	0.74	0	0.00	0.60	0.14	0.88	3.09
E / 1st - 4th	E2	MH-E1	91	0	0	182	364	0.74	0	0.00	0.60	0.14	0.88	3.09
Subtotal Phase 1						**881**		**3.56**	**6671**	**0.63**	**3.45**	**0.79**	**4.98**	**15.97**
Phase 2														
E / 1st - 4th	E3	MH-E1	91	0	0	182	182	0.74	0	0.00	0.60	0.14	0.88	3.09
F / 1st - 4th	F	F1	79	0	0	158	158	0.64	0	0.00	0.60	0.14	0.64	2.70
G x 7	G(1-7)		0	0	28	56	56	0.23	0	0.00	1.10	0.25	0.23	1.16
H x 8	H(1-8)		0	0	40	80	80	0.32	0	0.00	1.10	0.25	0.32	1.55
Subtotal Phase 2						**476**		**1.93**	**0**	**0.00**	**3.40**	**0.78**	**2.71**	**8.49**
Phase 3														
G x 13	G(1-13)	MH-E1	0	0	52	104	104	0.42	0	0.00	2.20	0.51	0.93	2.19
H x 12	H(1-12)	F1	0	0	60	120	120	0.49	0	0.00	2.20	0.51	0.49	2.45
J x 4	J(1-4)		0	0	20	40	40	0.16	0	0.00	0.80	0.18	0.16	0.83
Subtotal Phase 3						**264**		**1.07**	**0**	**0.00**	**5.20**	**1.20**	**2.27**	**5.47**
Total All Phases						**1621**		**6.56**	**6671**	**0.63**	**12.05**		**9.96**	**29.94**

Notes:

Q = Average daily flow per capita	350	L/day per capita
$Q_{ext.}$ = Unit peak extraneous flow	0.23	L/s per gross Ha.
FP_{max} = Peak Factor Residential	4	
FPmax = Peak Factor Commercial / institutional	1.5	
Hotel / Condos / Apartment	2	Persons per unit
Pop. Semi-Detached & Row House	2	Persons per unit
Care unit	1.6	Persons per unit
Commercial / Institutional Flows	8.1	L/sq.m/day
Institutional Flows	250.0	L/practitioner/day
Qp = Peak population flow		

HYDE PARK-WINCHESTER

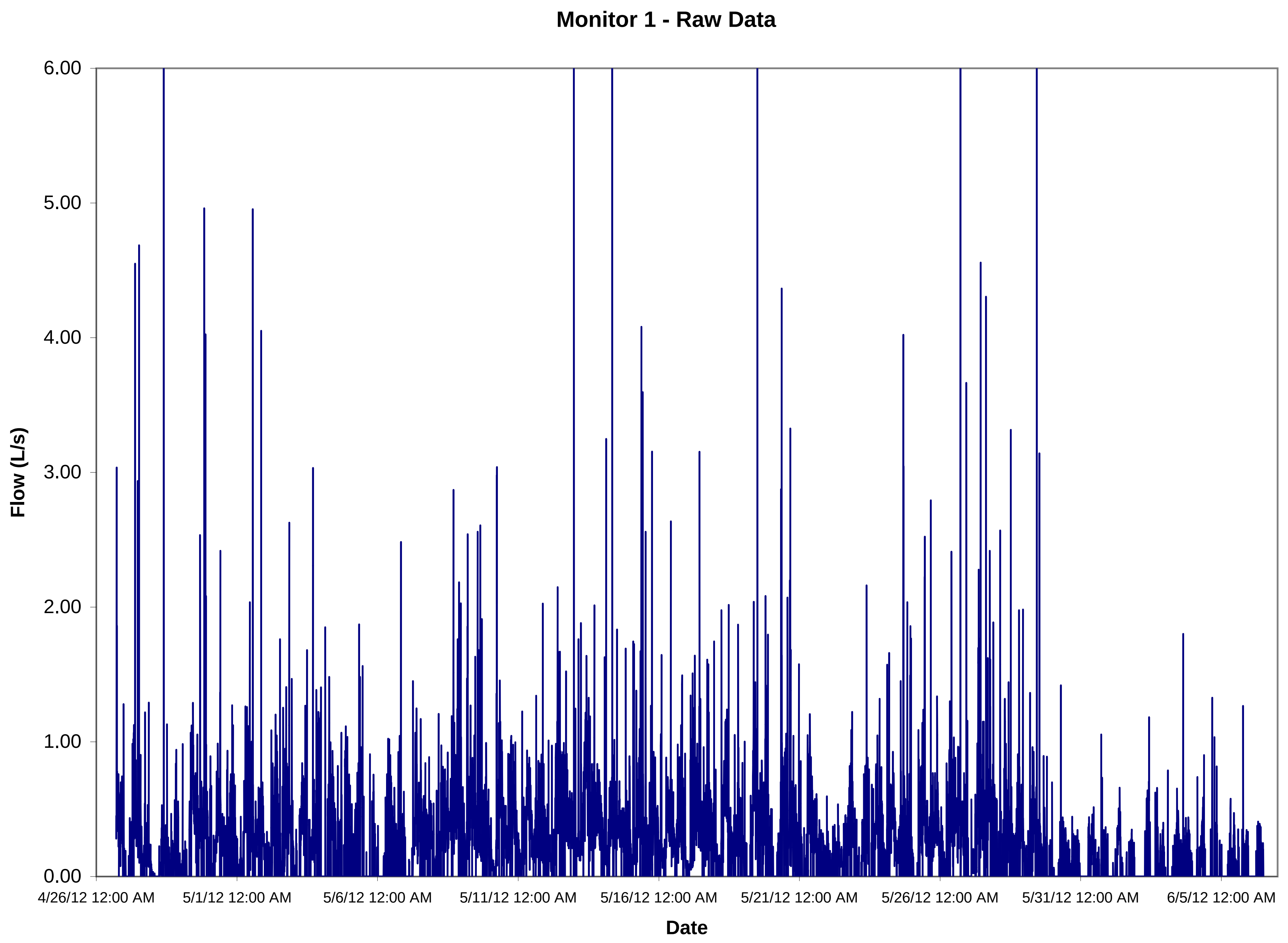
HYDE PARK

WINCHESTER, ON

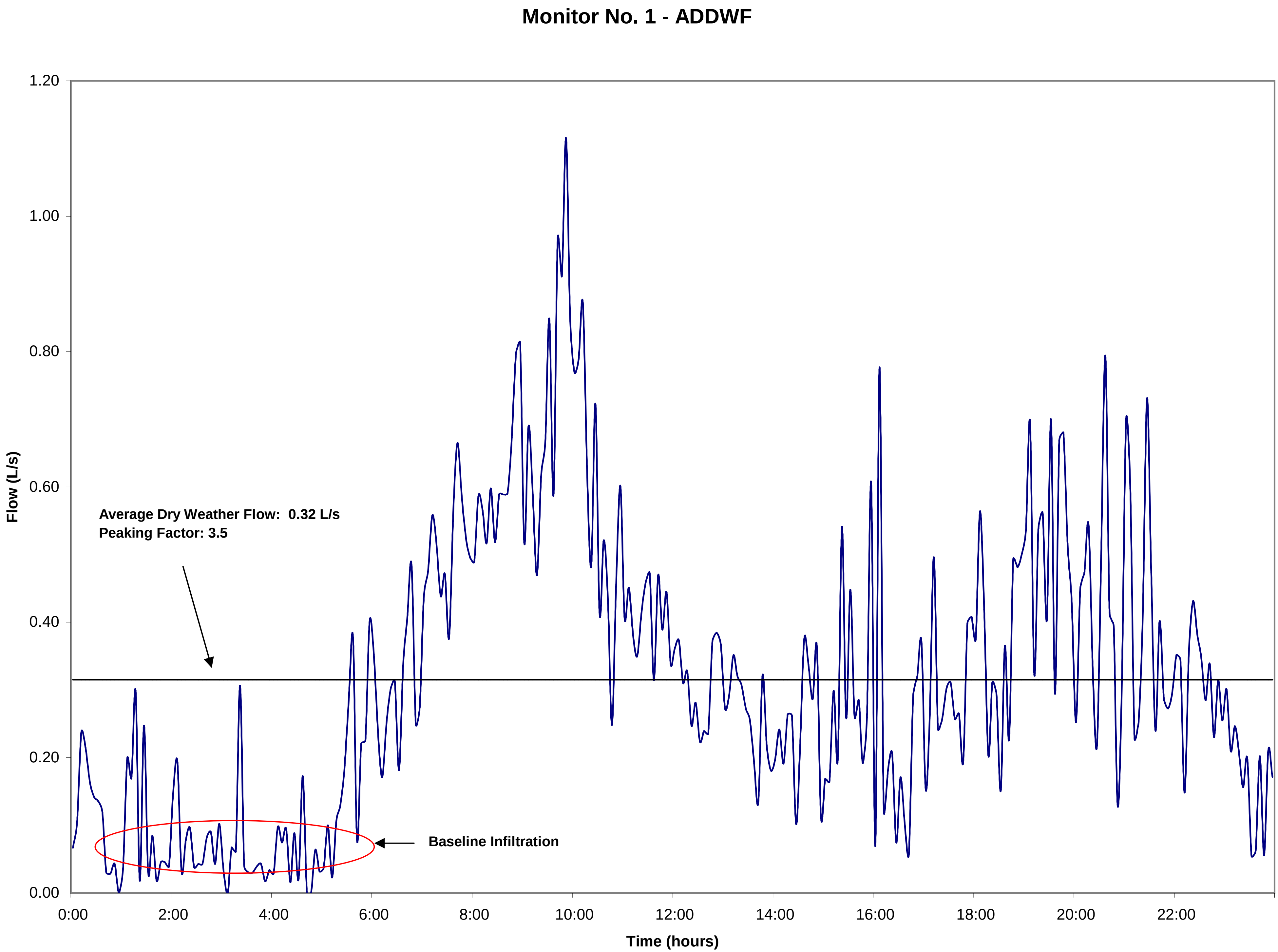
Kollaard Associates File #: 120064

APPENDIX 'D'

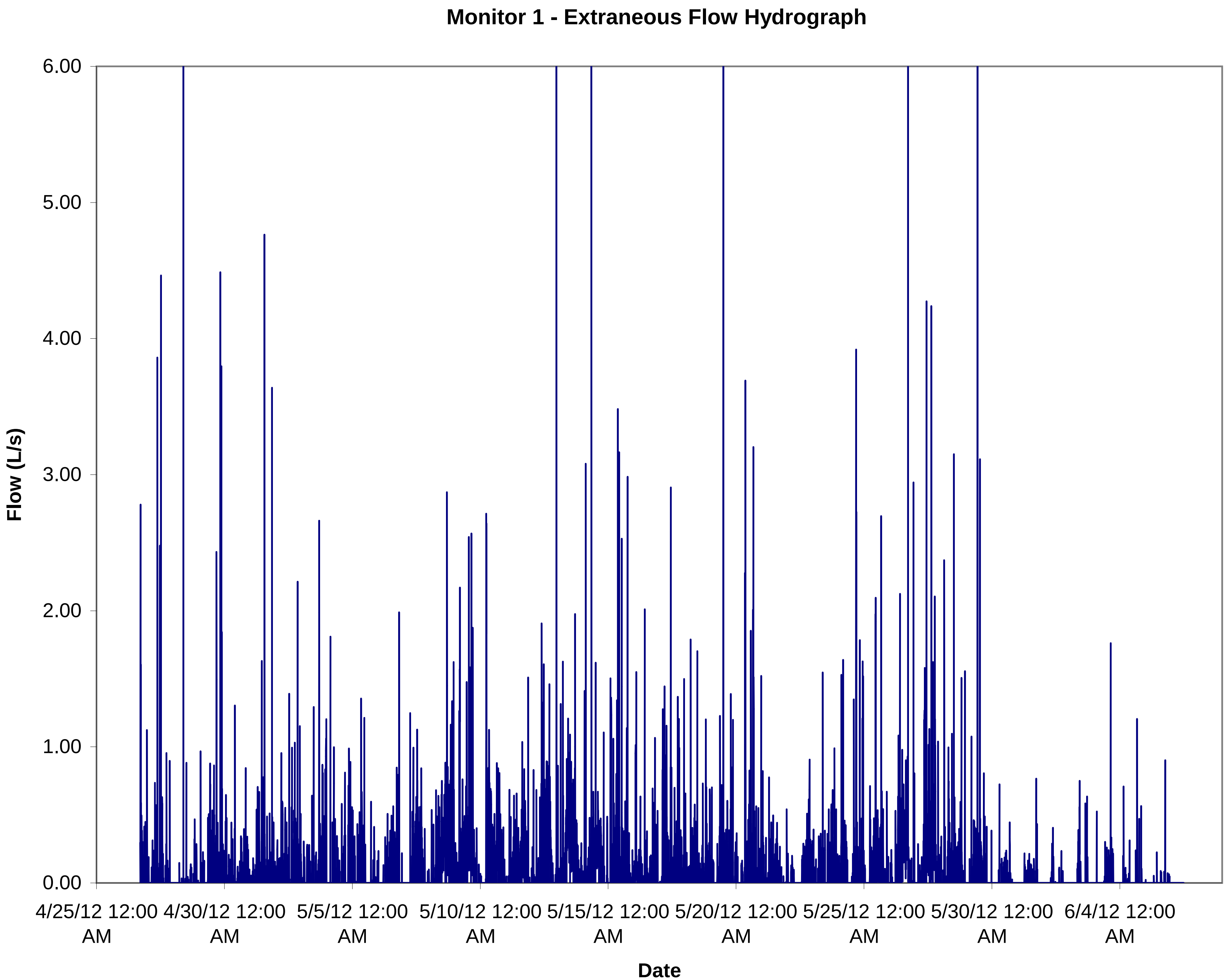
Flow Monitoring Data – ADDWF Hydrographs, Baseline Infiltration, Per Capita Flow Rates and Wet Weather Response



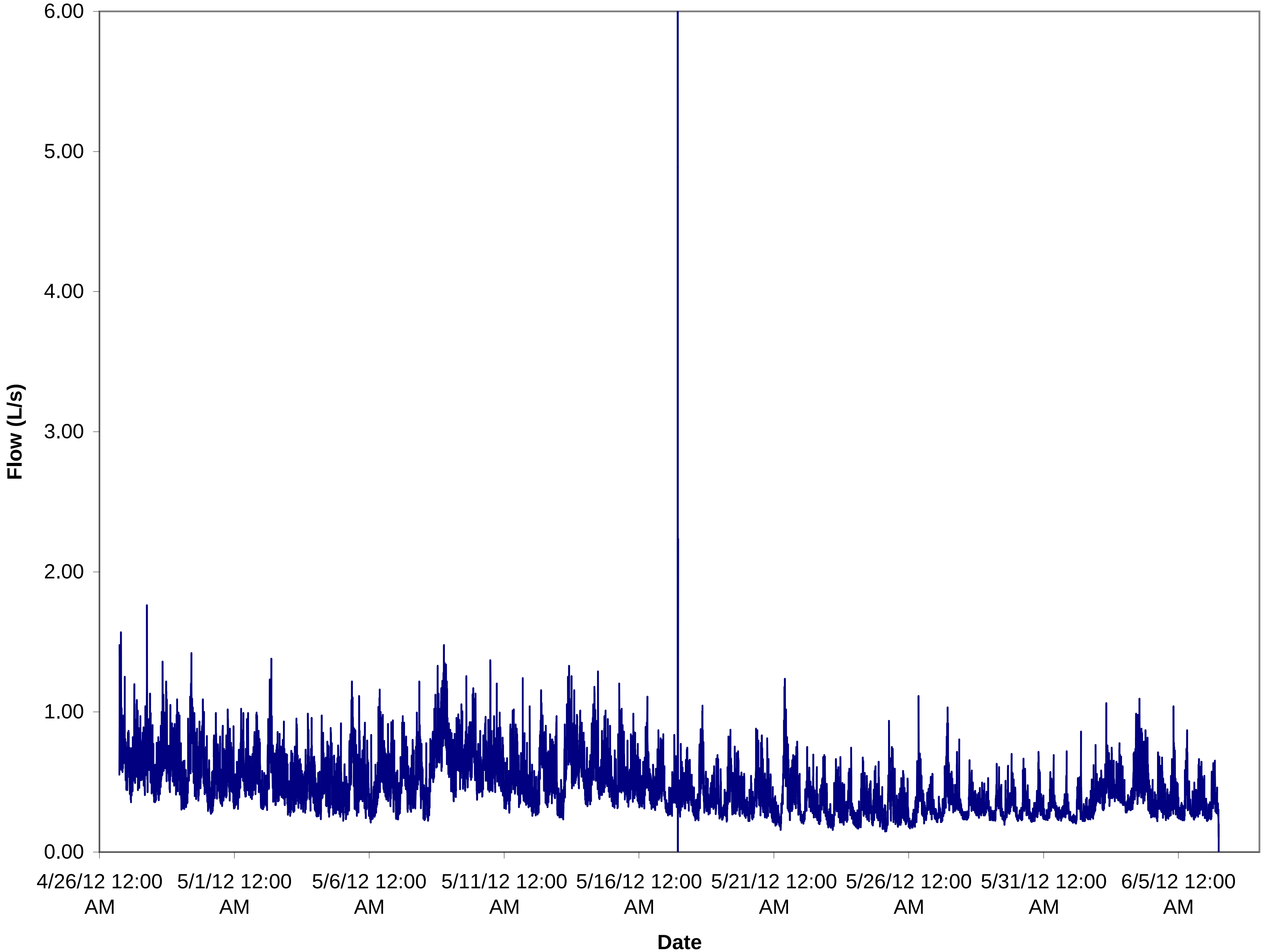
Monitor 1 - Raw Data
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

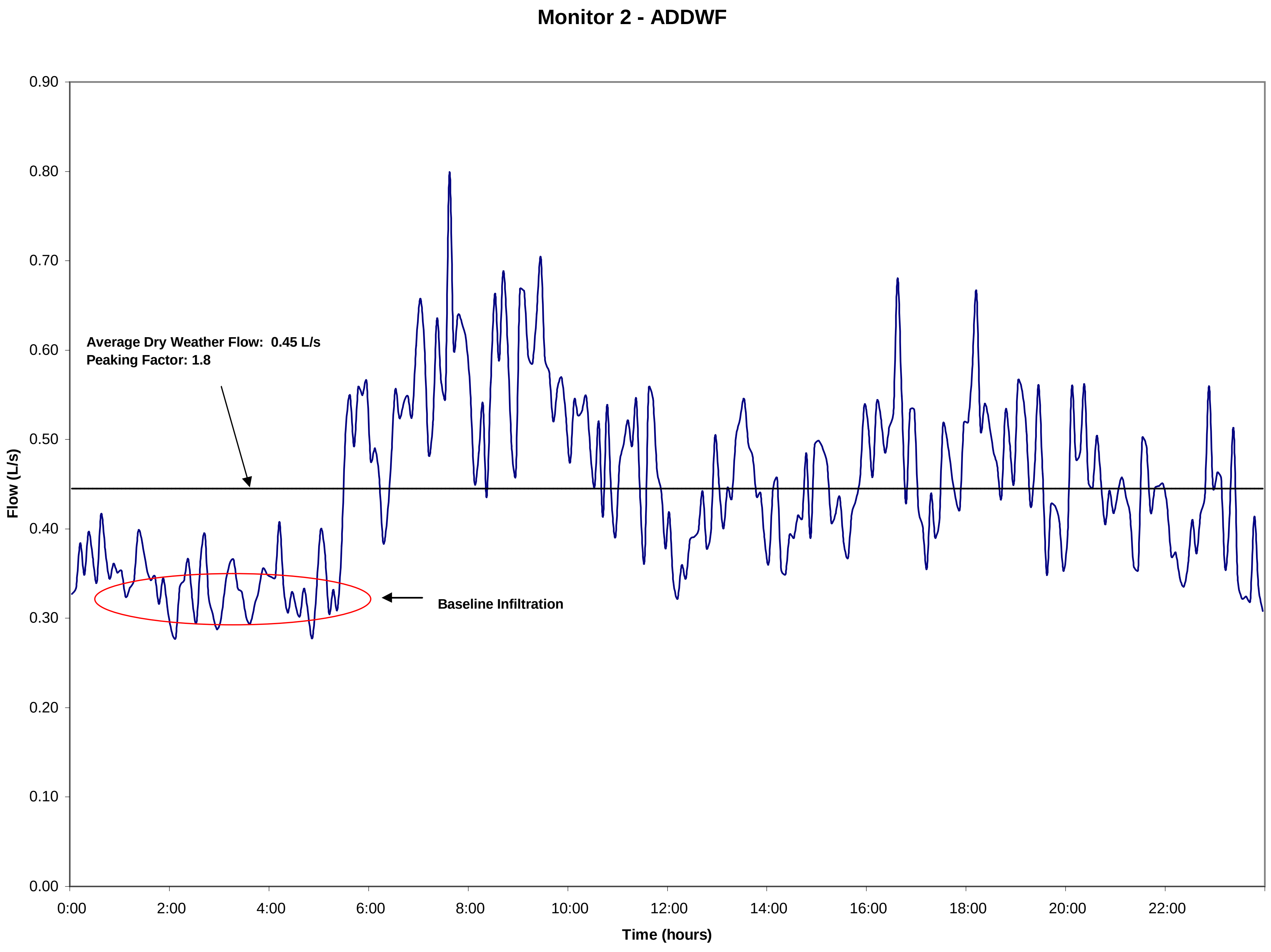


Monitor No. 1 - ADDWF
Flow (L/s)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)
Average Dry Weather Flow: 0.32 L/s
Peaking Factor: 3.5
Baseline Infiltration

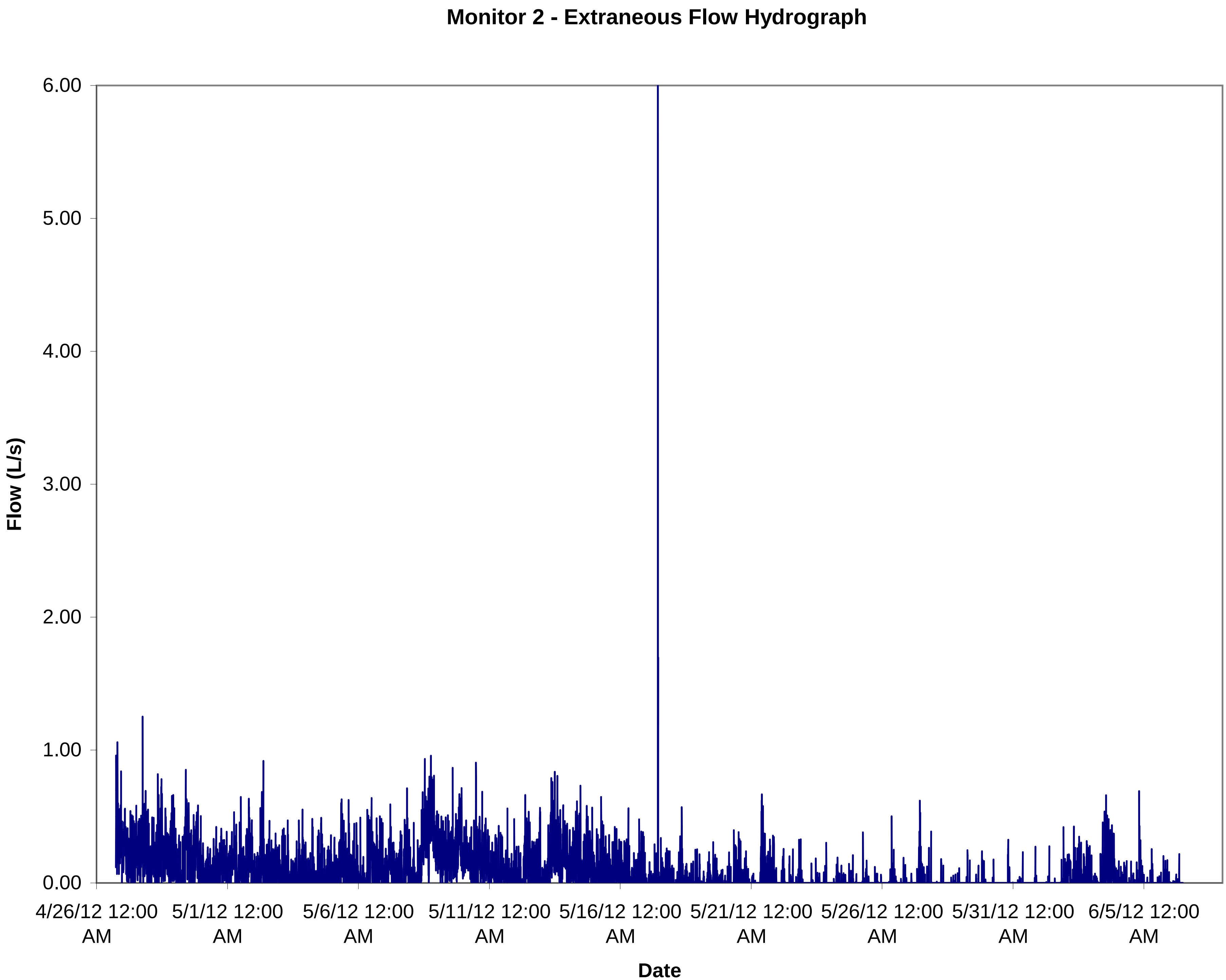

Monitor 1 - Extraneous Flow Hydrograph
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/25/12 12:00 AM
4/30/12 12:00 AM
5/5/12 12:00 AM
5/10/12 12:00 AM
5/15/12 12:00 AM
5/20/12 12:00 AM
5/25/12 12:00 AM
5/30/12 12:00 AM
6/4/12 12:00 AM
Date

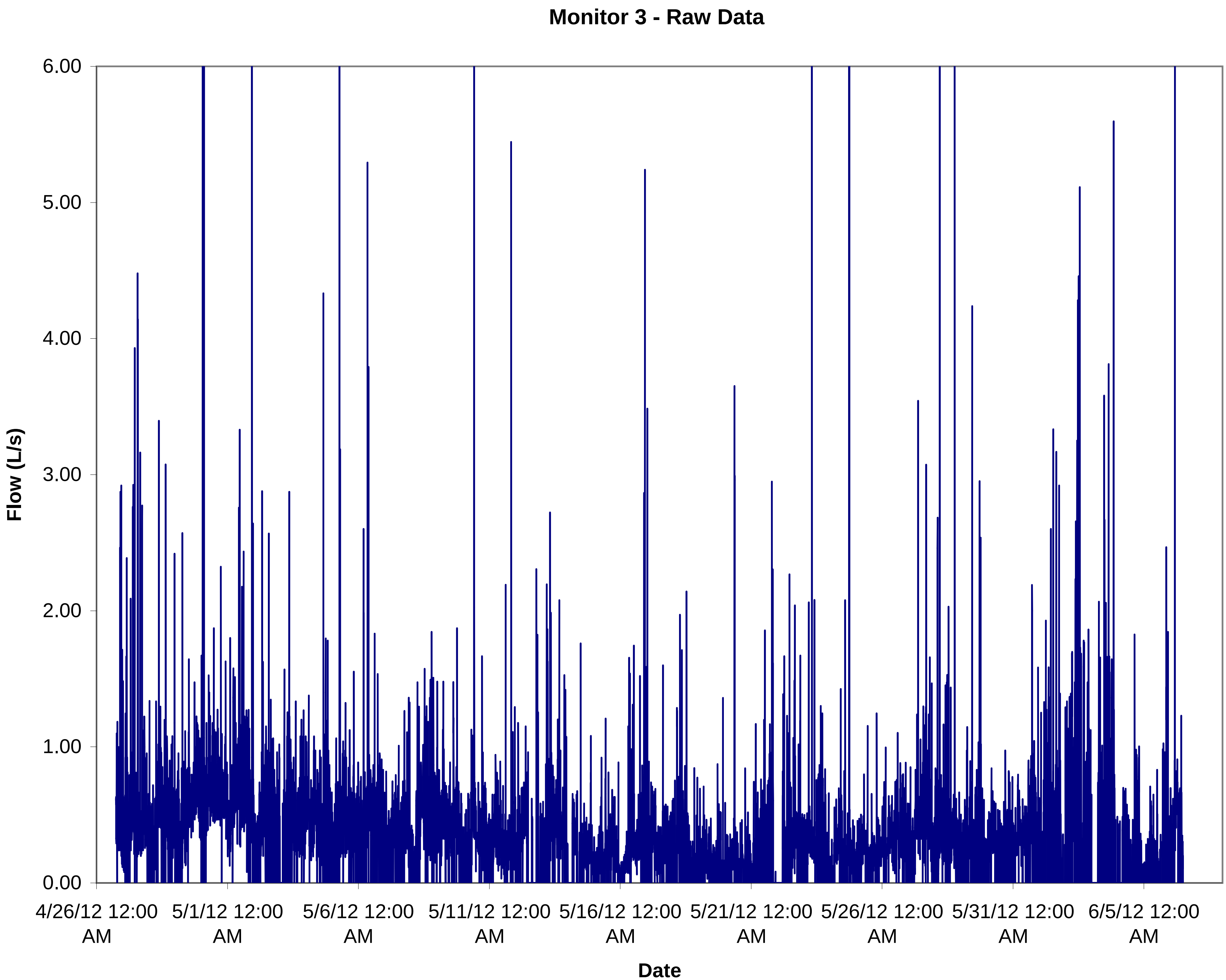
Monitor 2 - Raw Data

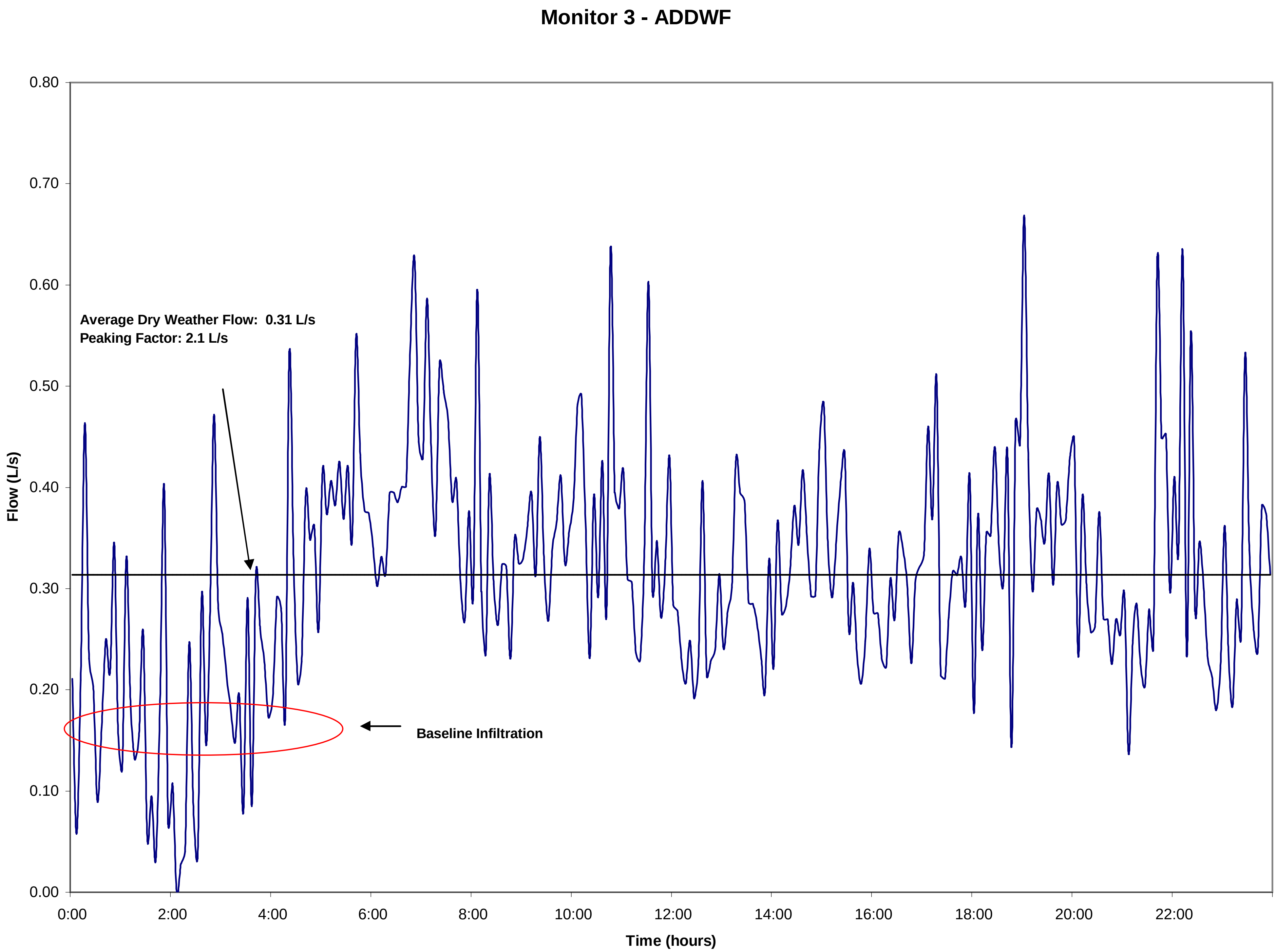


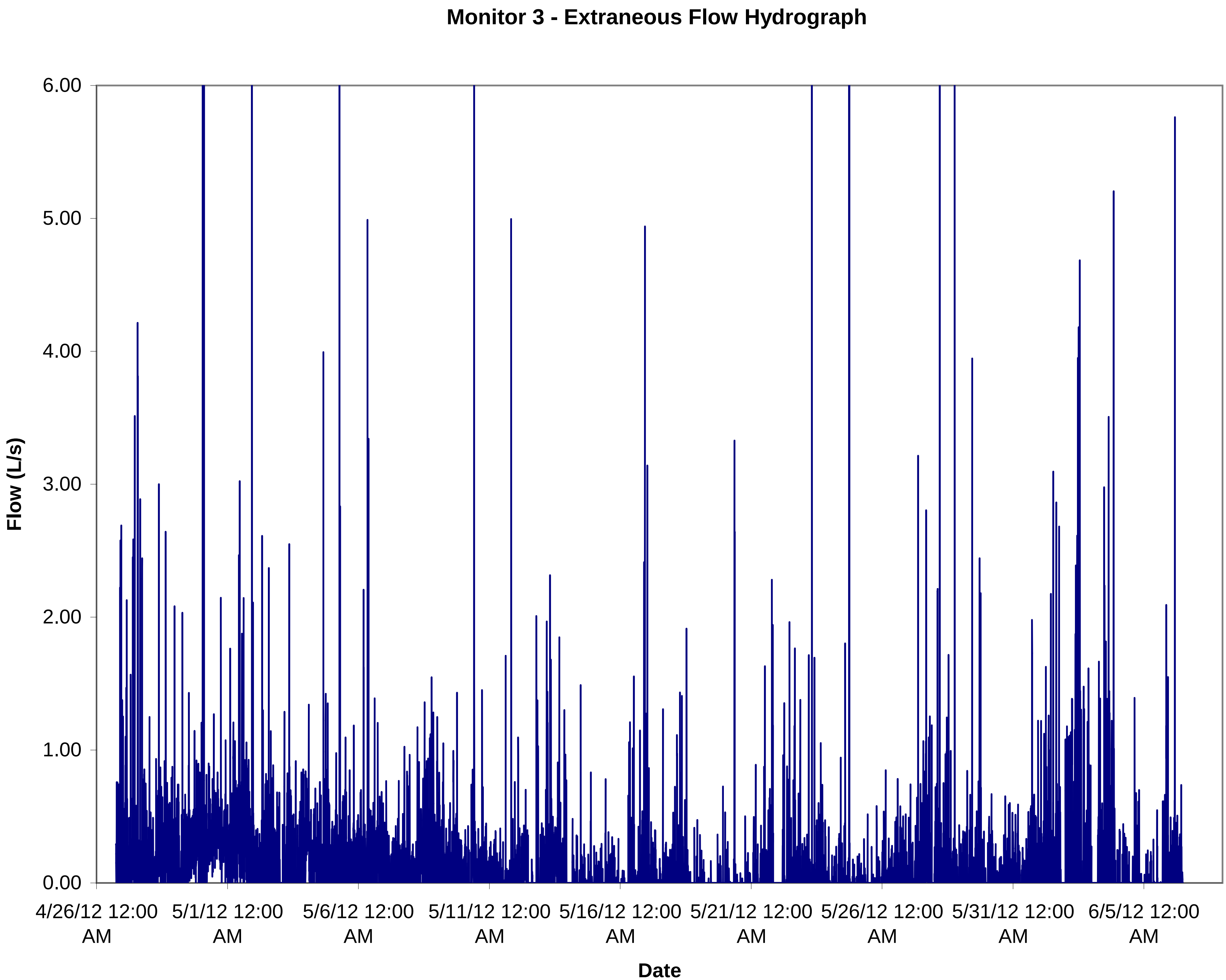


Monitor 2 - ADDWF
Average Dry Weather Flow: 0.45 L/s
Peaking Factor: 1.8
Baseline Infiltration
Flow (L/s)
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)

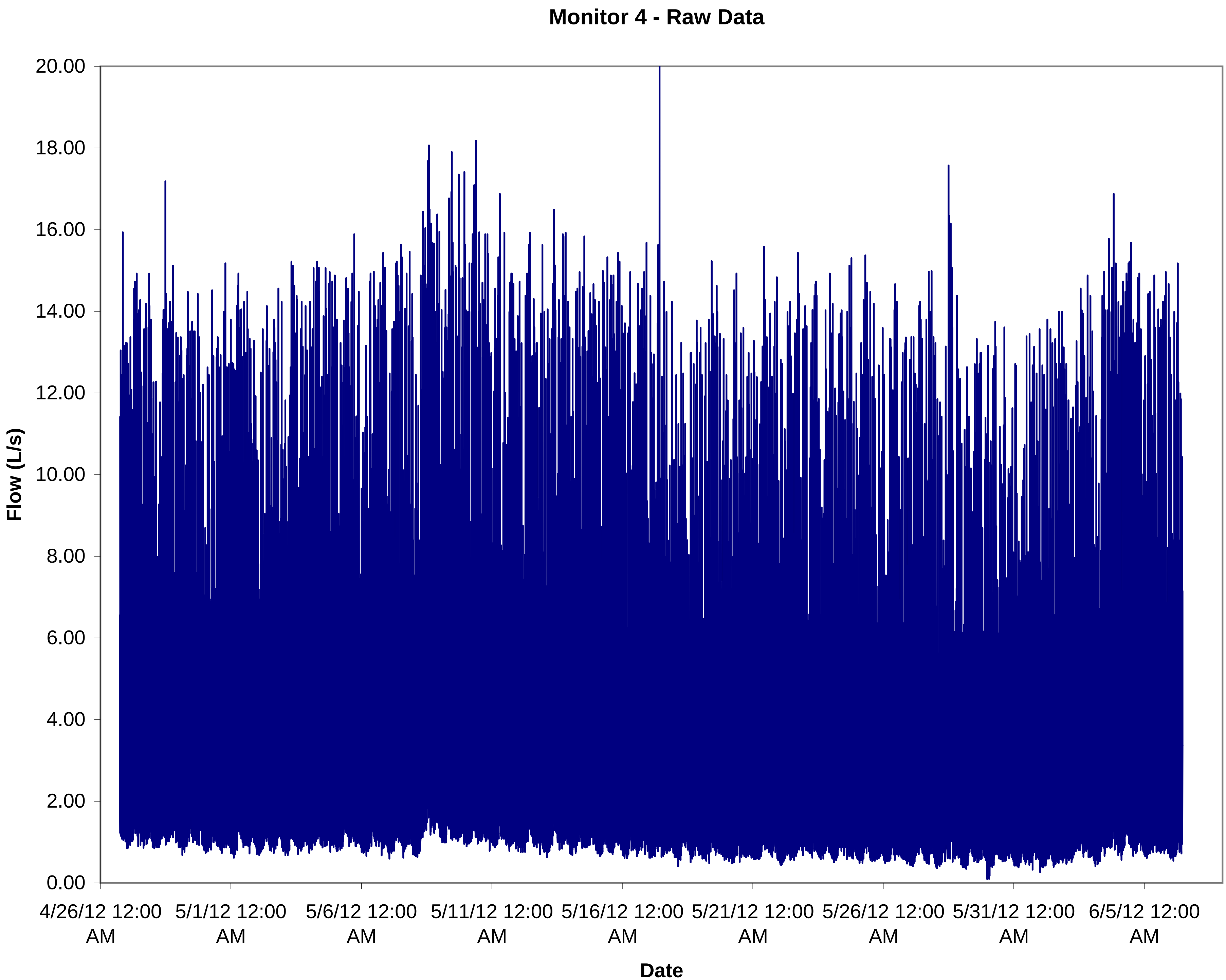

Monitor 2 - Extraneous Flow Hydrograph
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

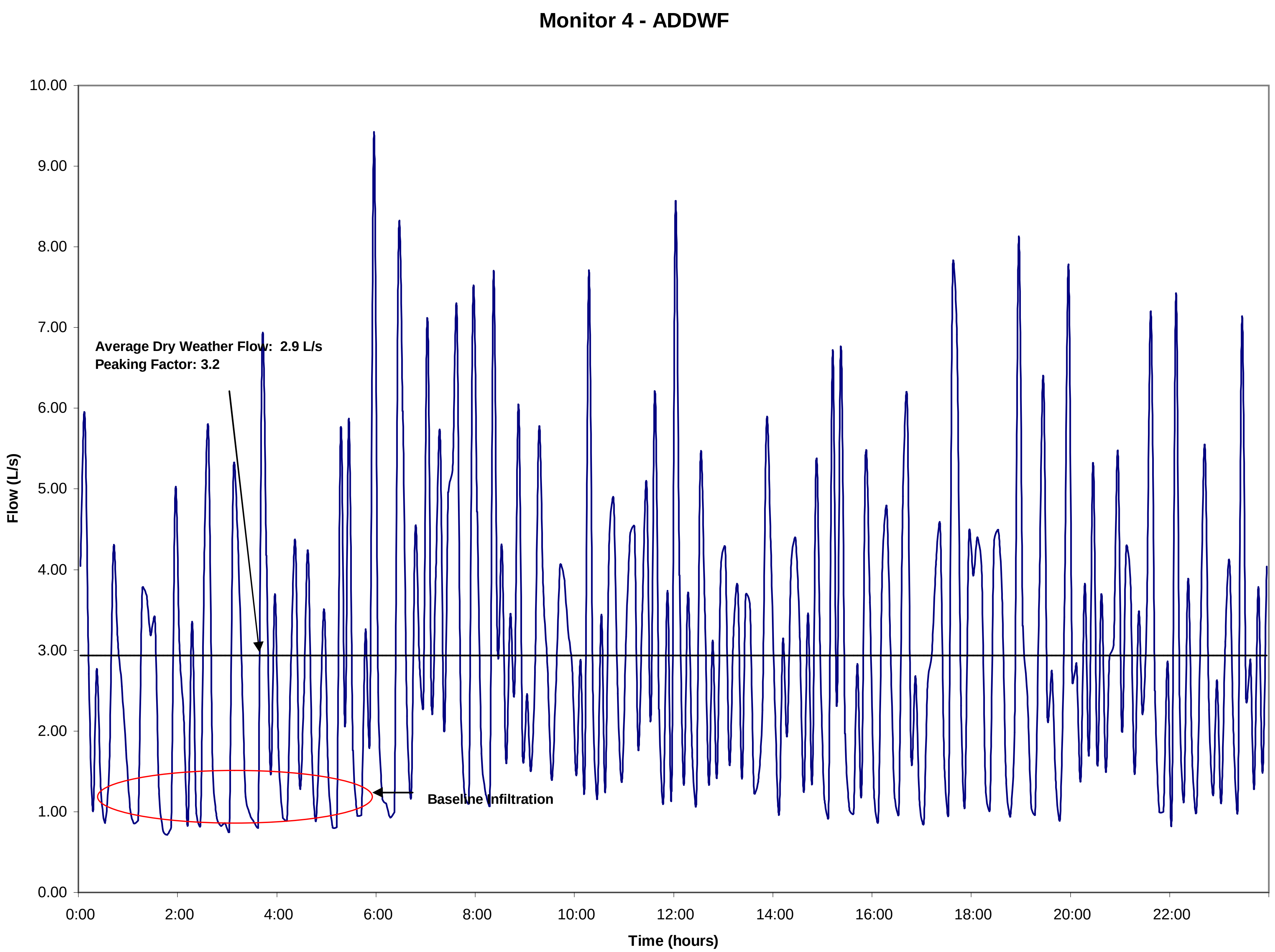

Monitor 3 - Raw Data
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

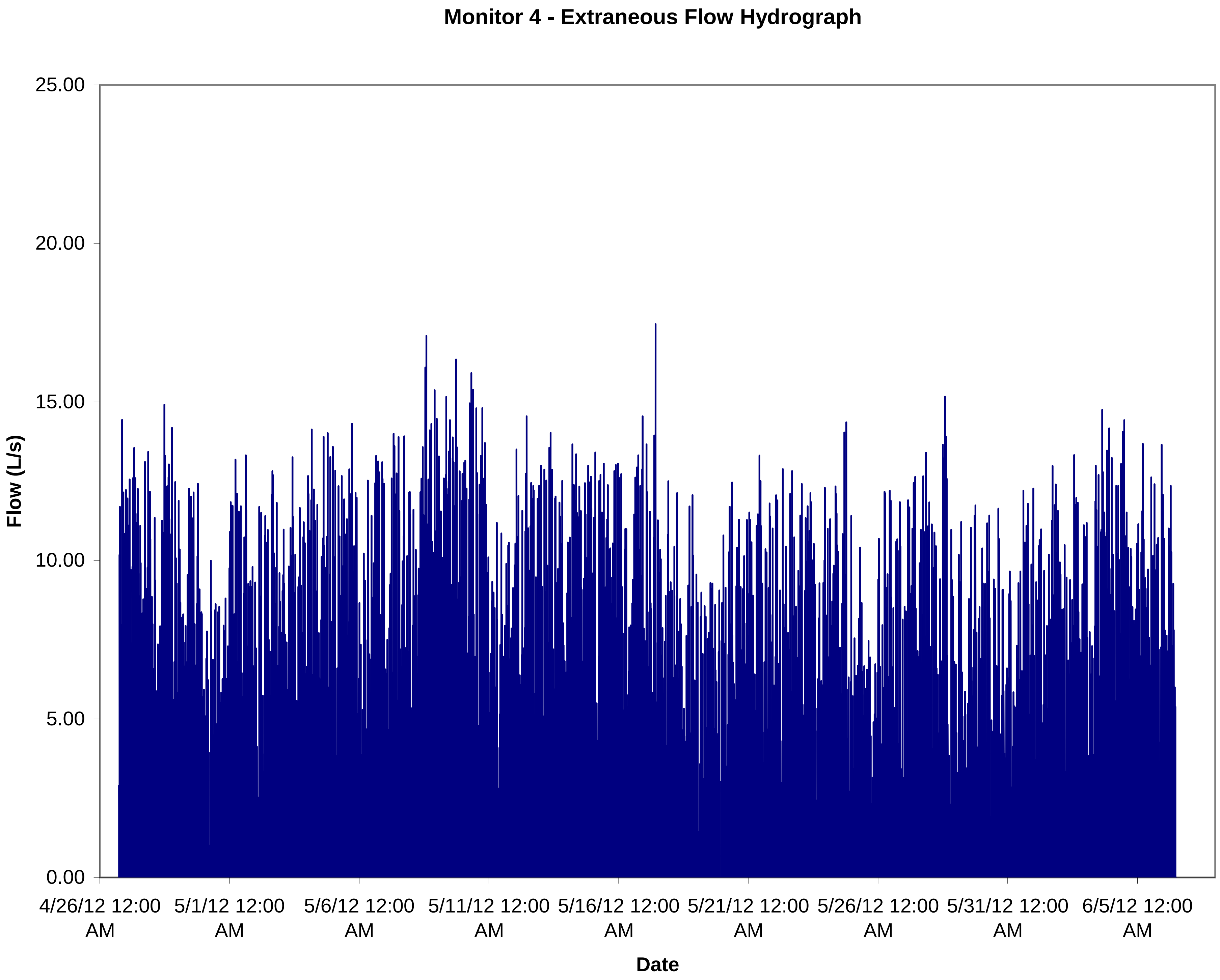

Monitor 3 - ADDWF
Average Dry Weather Flow: 0.31 L/s
Peaking Factor: 2.1 L/s
Baseline Infiltration
Flow (L/s)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)

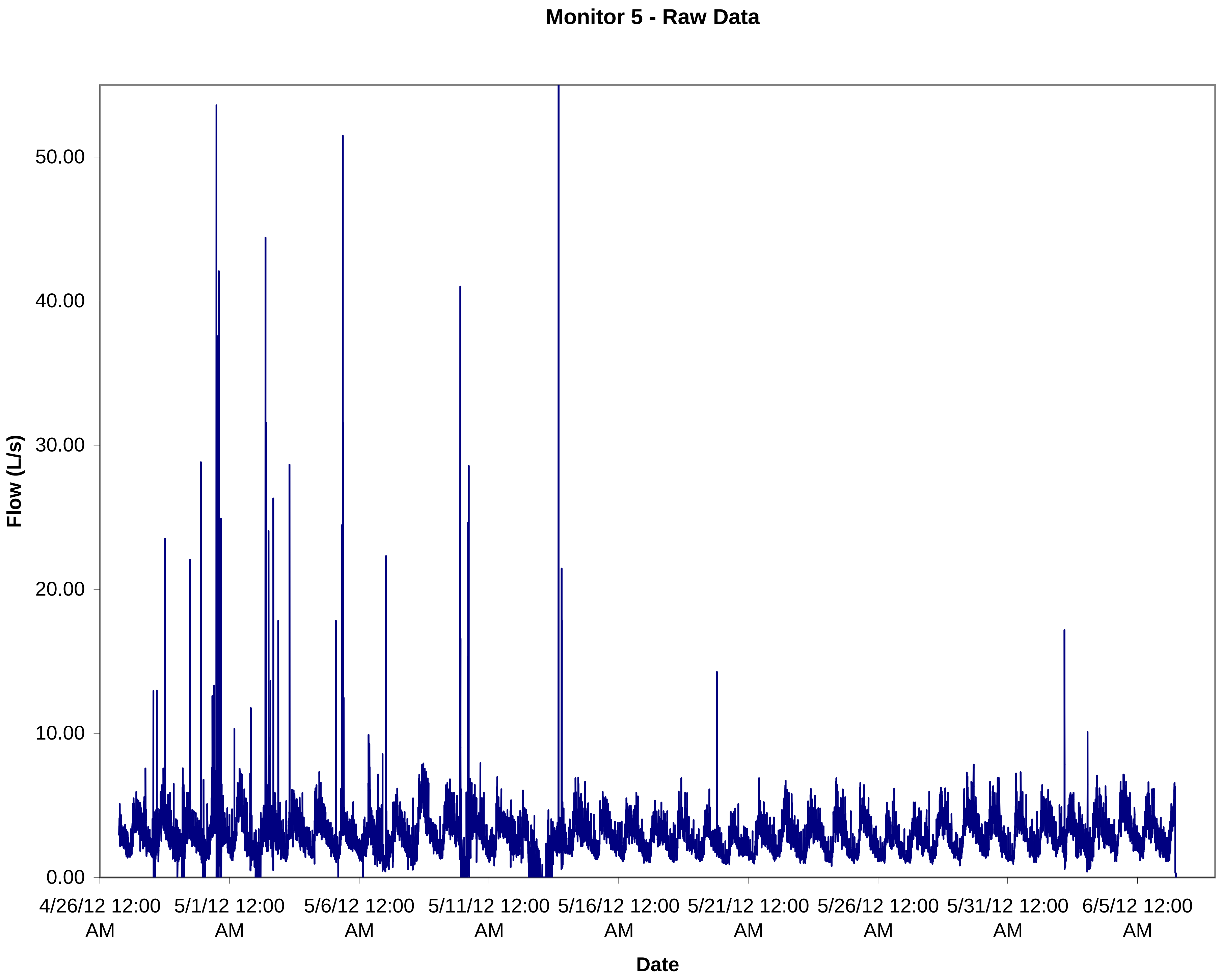


Monitor 3 - Extraneous Flow Hydrograph
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

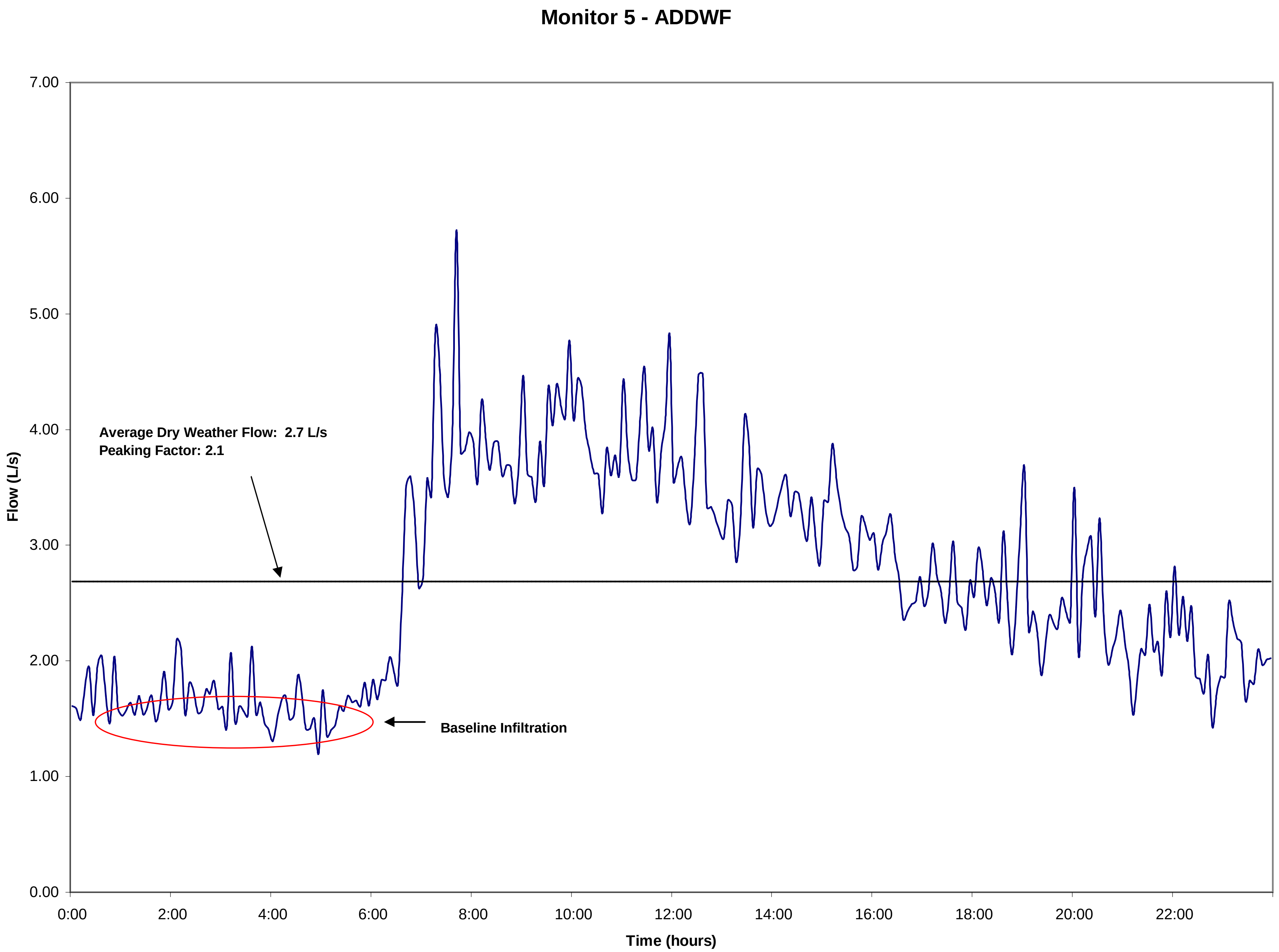

Monitor 4 - Raw Data
Flow (L/s)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

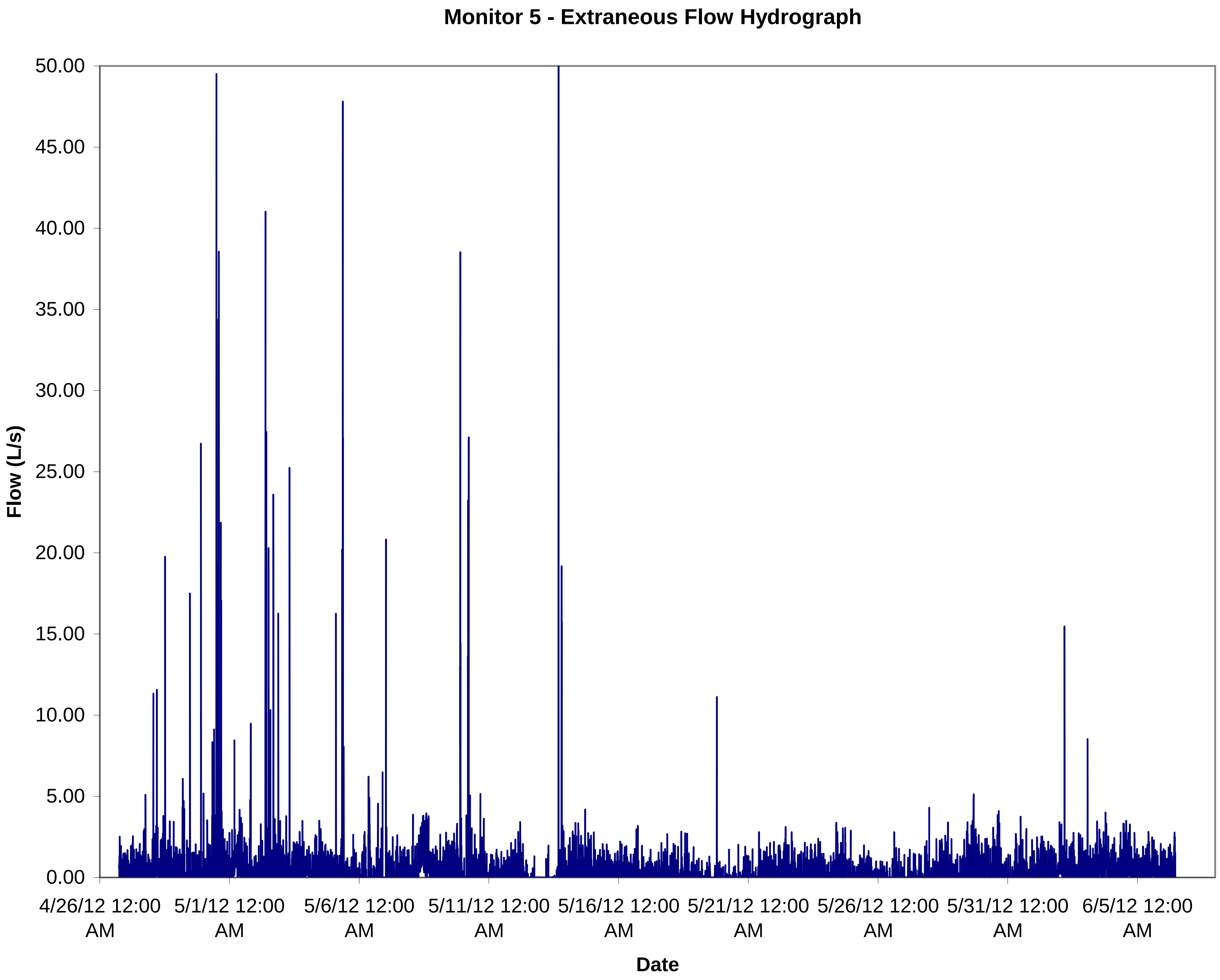

Monitor 4 - ADDWF
Average Dry Weather Flow: 2.9 L/s
Peaking Factor: 3.2
Baseline Infiltration
Flow (L/s)
Time (hours)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00


Monitor 4 - Extraneous Flow Hydrograph
25.00
20.00
15.00
10.00
5.00
0.00
Flow (L/s)
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

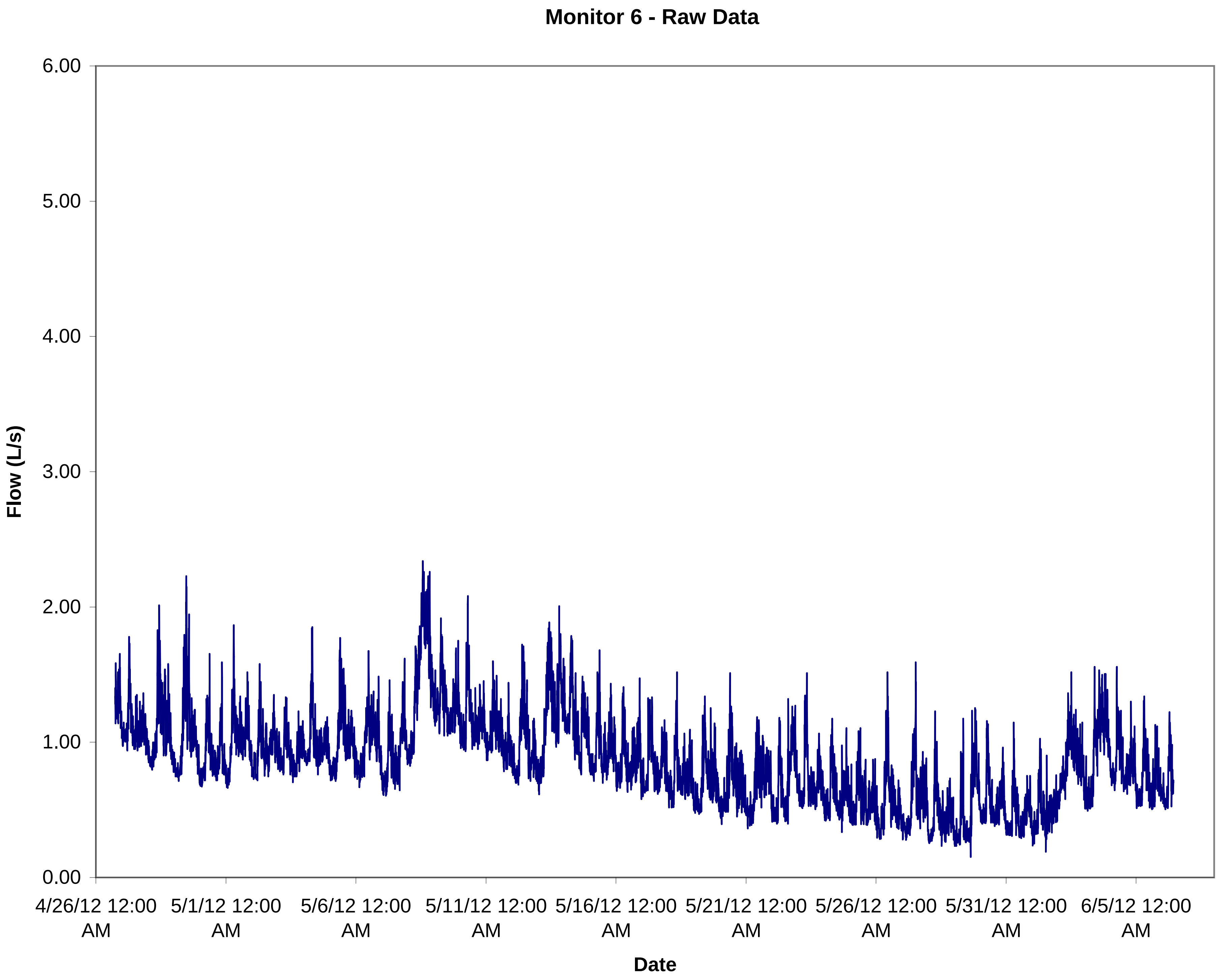


Monitor 5 - Raw Data
Flow (L/s)
50.00
40.00
30.00
20.00
10.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

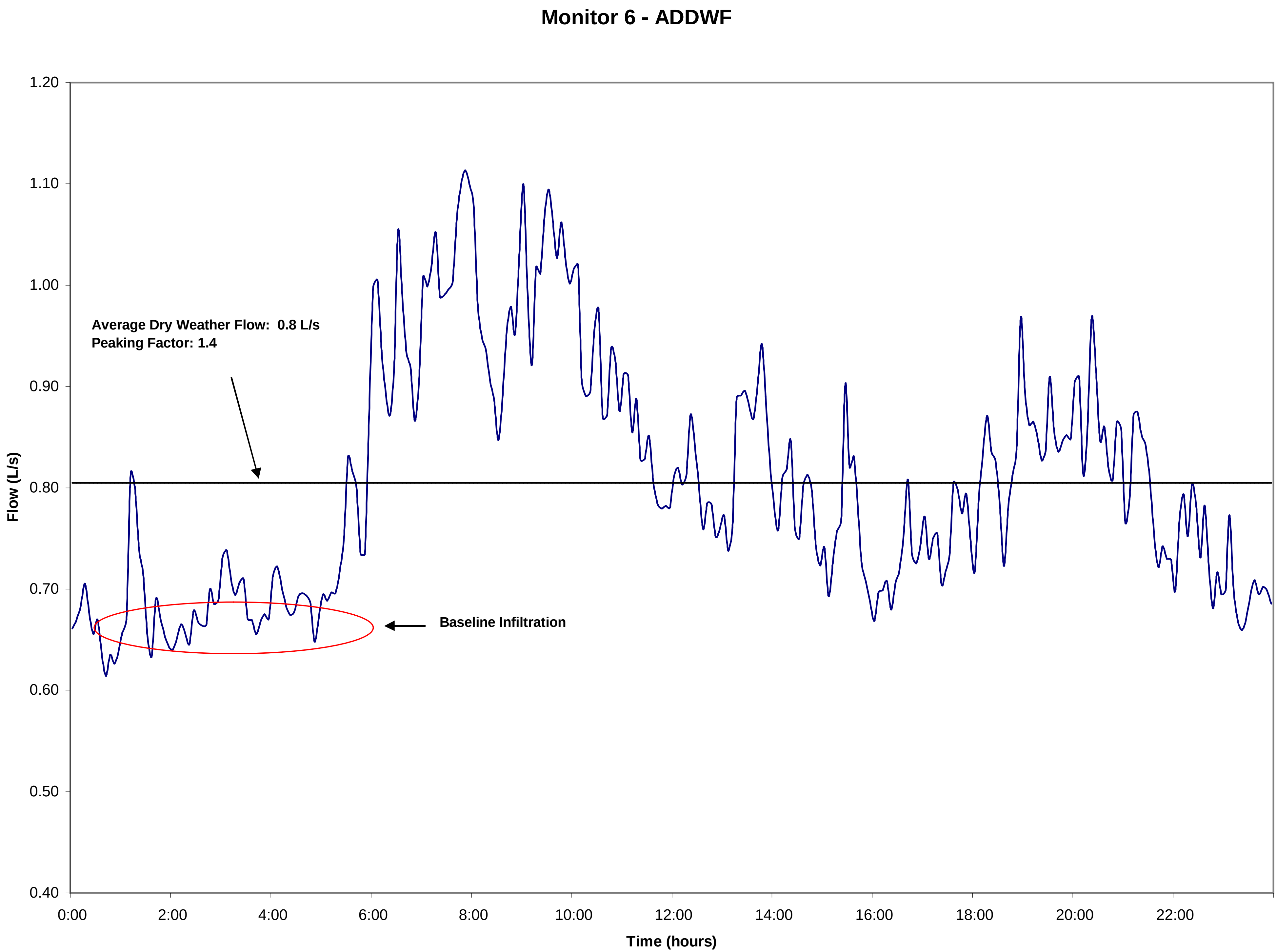

Monitor 5 - ADDWF
Flow (L/s)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)
Average Dry Weather Flow: 2.7 L/s
Peaking Factor: 2.1
Baseline Infiltration



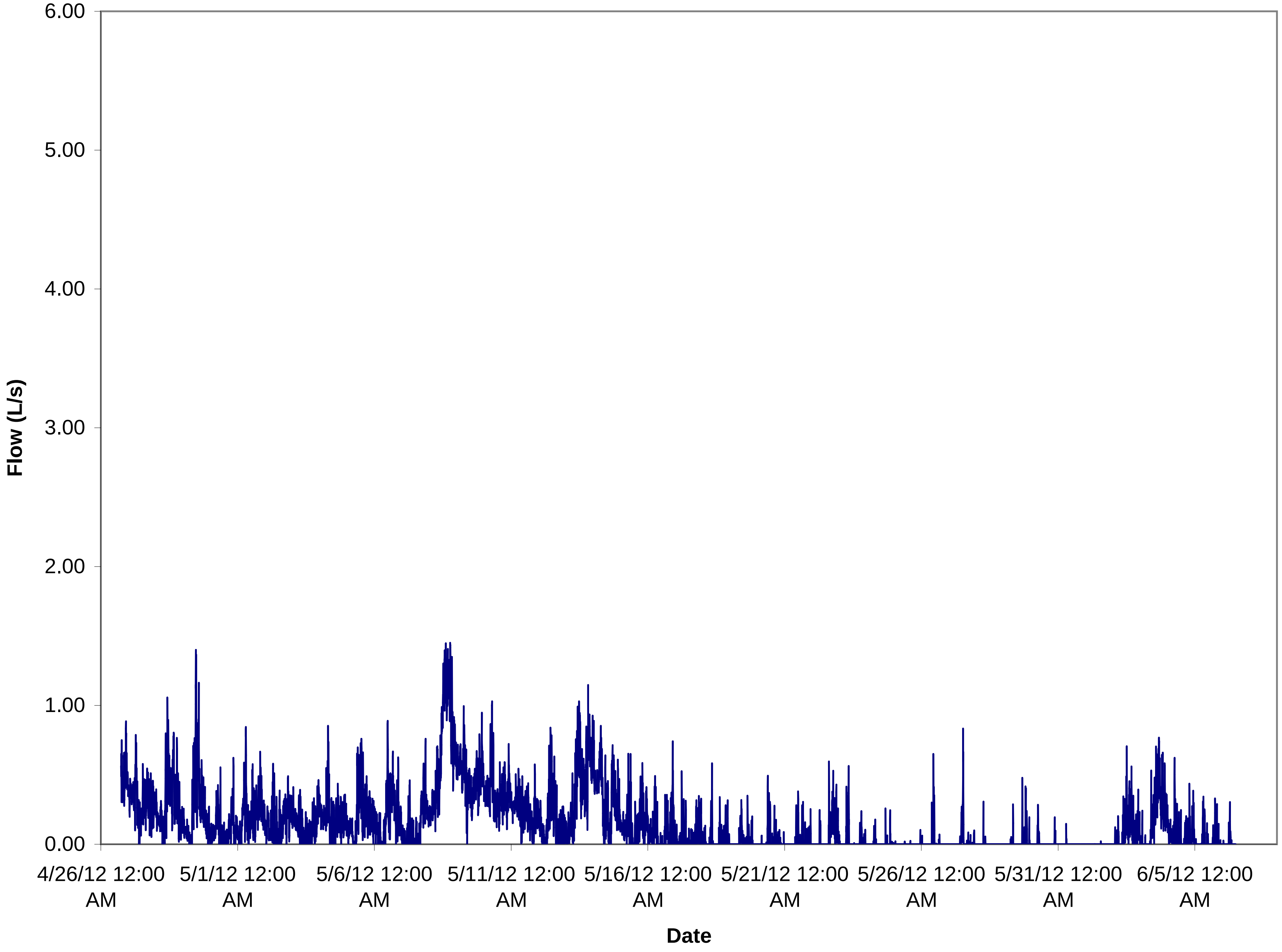
Monitor 5 - Extraneous Flow Hydrograph
Flow (L/s)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

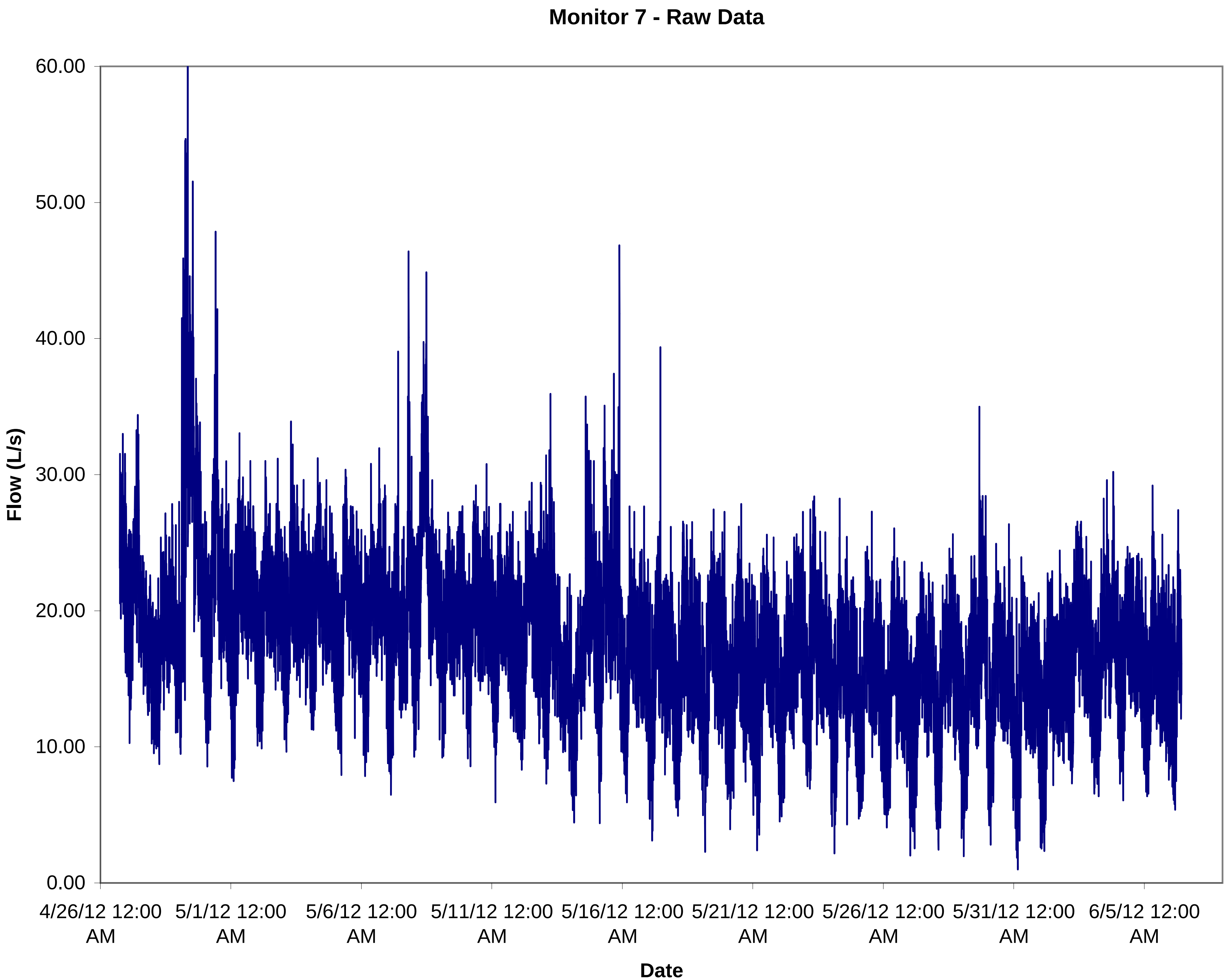


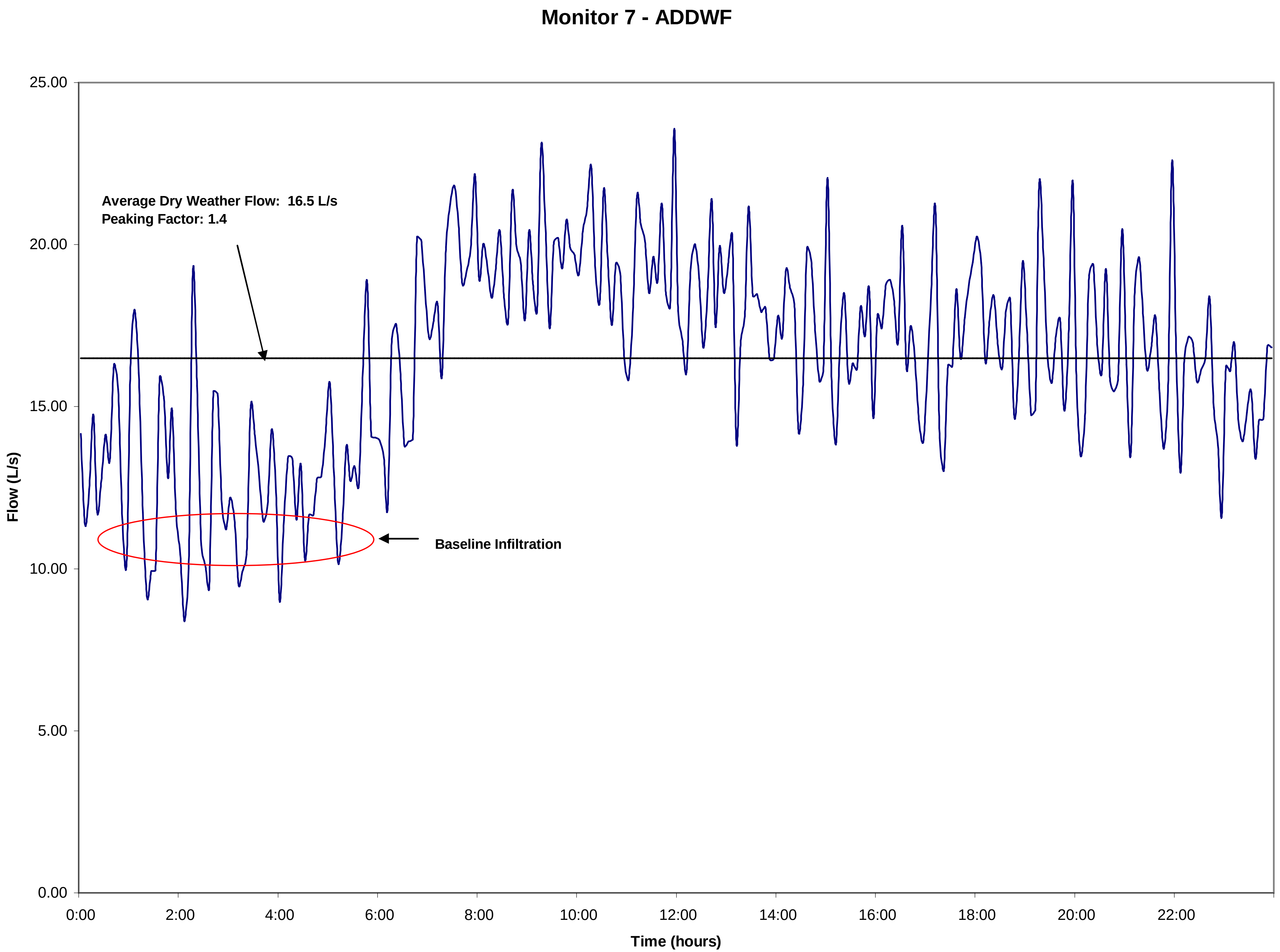
Monitor 6 - Raw Data
Flow (L/s)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

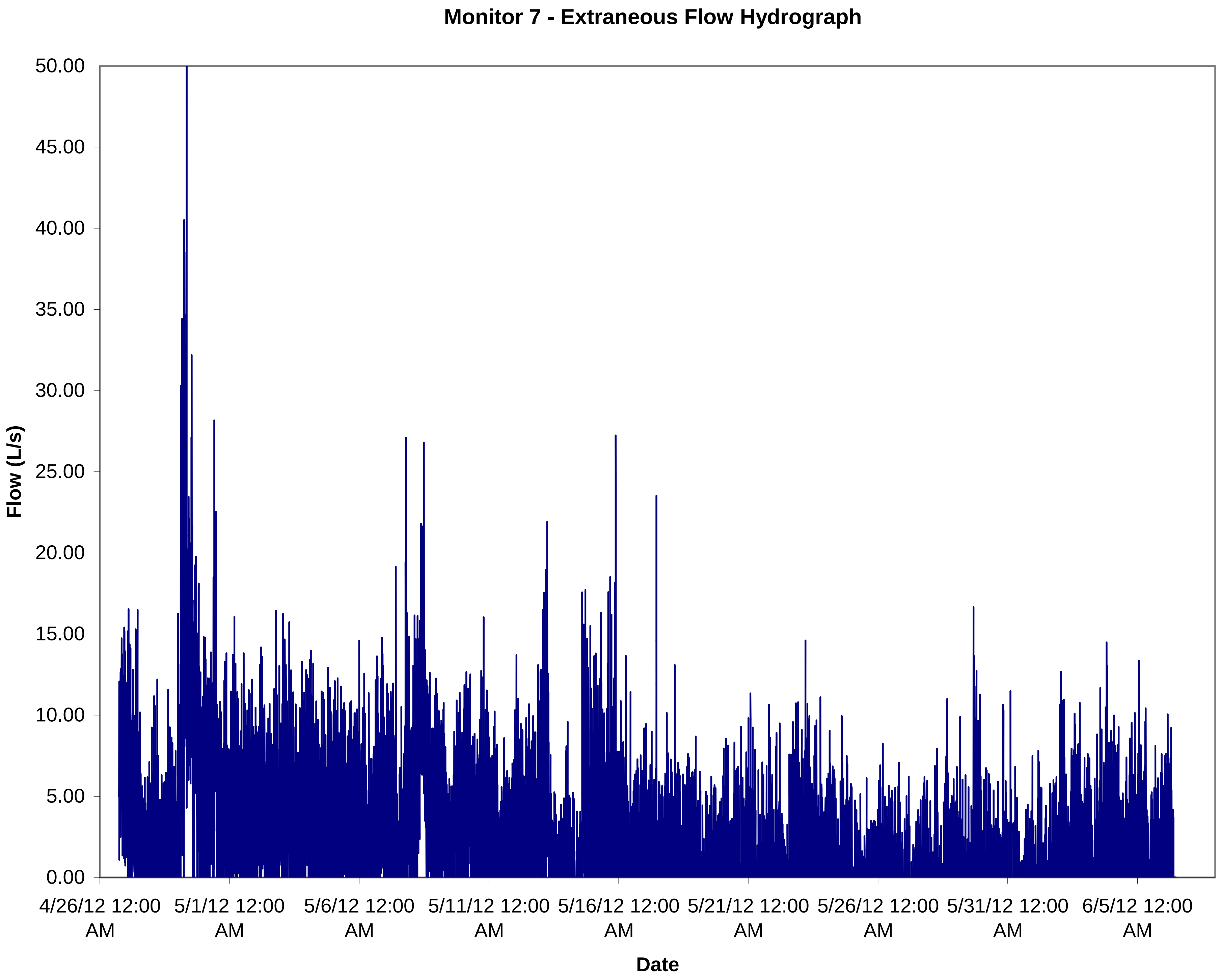

Monitor 6 - ADDWF
Average Dry Weather Flow: 0.8 L/s
Peaking Factor: 1.4
Baseline Infiltration
Flow (L/s)
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)

Monitor 6 - Extraneous Flow Hydrograph




Monitor 7 - Raw Data
Flow (L/s)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date


Monitor 7 - ADDWF
Average Dry Weather Flow: 16.5 L/s
Peaking Factor: 1.4
Baseline Infiltration
Flow (L/s)
25.00
20.00
15.00
10.00
5.00
0.00
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time (hours)


Monitor 7 - Extraneous Flow Hydrograph
Flow (L/s)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
4/26/12 12:00 AM
5/1/12 12:00 AM
5/6/12 12:00 AM
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
Date

Village of Winchester
Wet Weather Extraneous Flow Summary

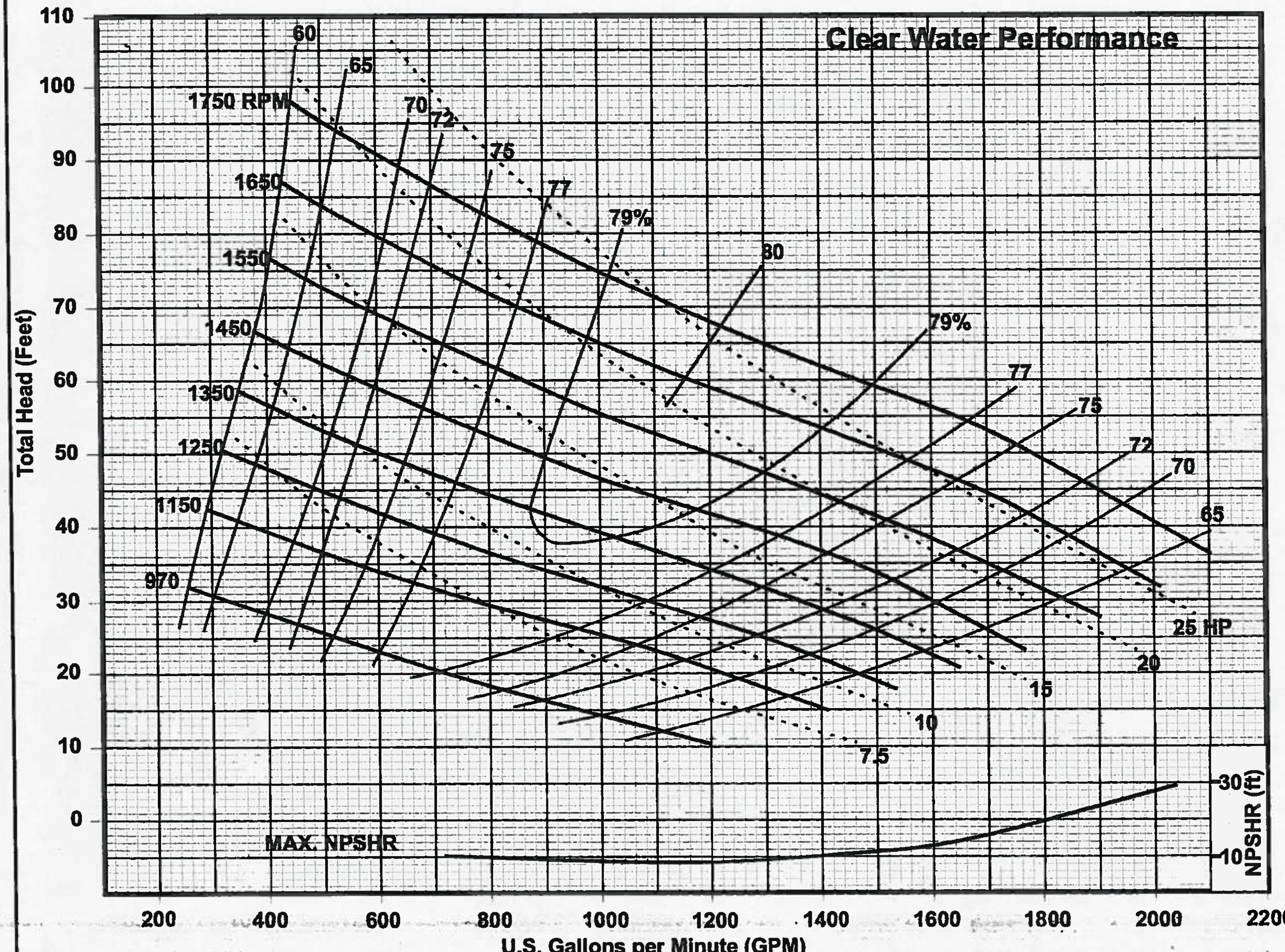
Monitor	Date	Rainfall Duration (hrs)	Sewer Duration (hrs)	Volume (m^3)	Rainfall (mm)	Area (ha)	Rainfall Volume (m^3)	% Infiltration	Infiltration Rate (L/s/ha)	Average WW (L/s)	Peak Flow	Peaking Factor
1	May 8, 2012	8	18.5	15.8	14.7	12	1866.9	0.8%	0.020	0.24	2.87	12.1
	June 1-2, 2012	7	27	1.9	10.1	12	1282.7	0.1%	0.002	0.02	0.75	38.4
	June 3, 2012	3	10	1.6	15.5	12	1968.5	0.1%	0.004	0.04	1.76	39.6
								Average	0.008	0.10	1.79	17.9
2	May 8, 2012	8	18.5	21.7	14.7	12.3	1808.1	1.2%	0.026	0.33	0.96	2.9
	June 1-2, 2012	7	27	5.2	10.1	12.3	1242.3	0.4%	0.004	0.05	0.42	7.9
	June 3, 2012	3	10	4.1	15.5	12.3	1906.5	0.2%	0.009	0.11	0.66	5.8
								Average	0.013	0.16	0.68	4.1
3	May 8, 2012	8	18.5	17	14.7	5.6	823.2	2.1%	0.046	0.26	1.55	6.1
	June 1-2, 2012	7	27	24.6	10.1	5.6	565.6	4.3%	0.045	0.25	4.68	18.5
	June 3, 2012	3	10	9.7	15.5	5.6	868	1.1%	0.048	0.27	5.20	19.3
								Average	0.046	0.26	3.81	14.7
4	May 8, 2012	8	18.5	168.6	14.7	49.3	7247.1	2.3%	0.051	2.53	17.09	6.8
	June 1-2, 2012	7	27	125.6	10.1	49.3	4979.3	2.5%	0.026	1.29	13.32	10.3
	June 3, 2012	3	10	74.7	15.5	49.3	7641.5	1.0%	0.042	2.08	14.76	7.1
								Average	0.040	1.97	15.06	7.7
5	May 8, 2012	8	18.5	83.2	14.7	14.3	2102.1	4.0%	0.087	1.25	3.95	3.2
	June 1-2, 2012	7	27	53.9	10.1	14.3	1444.3	3.7%	0.039	0.55	15.47	27.9
	June 3, 2012	3	10	32.2	15.5	14.3	2216.5	1.5%	0.063	0.89	4.00	4.5
								Average	0.063	0.90	7.81	8.7
6	May 8, 2012	8	18.5	54.7	14.7	6.6	970.2	5.6%	0.1244	0.82	1.45	1.8
	June 1-2, 2012	7	27	8.3	10.1	6.6	666.6	1.2%	0.0129	0.09	0.71	8.3
	June 3, 2012	3	10	13.4	15.5	6.6	1023	1.3%	0.0564	0.37	0.77	2.1
								Average	0.065	0.43	0.98	2.3
7	May 8, 2012	8	10.3	328.2	14.7	134.2	19727.4	1.7%	0.0660	8.85	26.80	3.0
	June 1-2, 2012	7	27	184.9	10.1	134.2	13554.2	1.4%	0.0142	1.90	12.68	6.7
	June 3, 2012	3	10	107.2	15.5	134.2	20801	0.5%	0.0222	2.98	14.48	4.9
								Average	0.034	4.58	17.99	3.9

APPENDIX ‘E’

Pump Curves

WEMCO PUMP HIDROSTAL MODEL E5K-S

WEIR SPECIALTY PUMPS
440 W. 800 S. Salt Lake City, Utah 84110
Phone: (801) 359-8731 Fax: (801) 355-9303



6.0" Suction
5.0" Discharge
11" Impeller Diameter
4.00" Max Sphere Size

$$BHP = \frac{GPM \times FT \times SG}{3960 \times Efficiency}$$

WEIR SPECIALTY PUMPS

The brake horsepower and efficiency shown is for pumps with properly installed and lubricated packing. Pumps with mechanical seals will require additional horsepower and the factory may be contacted for these values. Certified tests are performed using Hydraulic Institute acceptance level A.

Rev. 02
September 2005

P25-D106

E5K-S

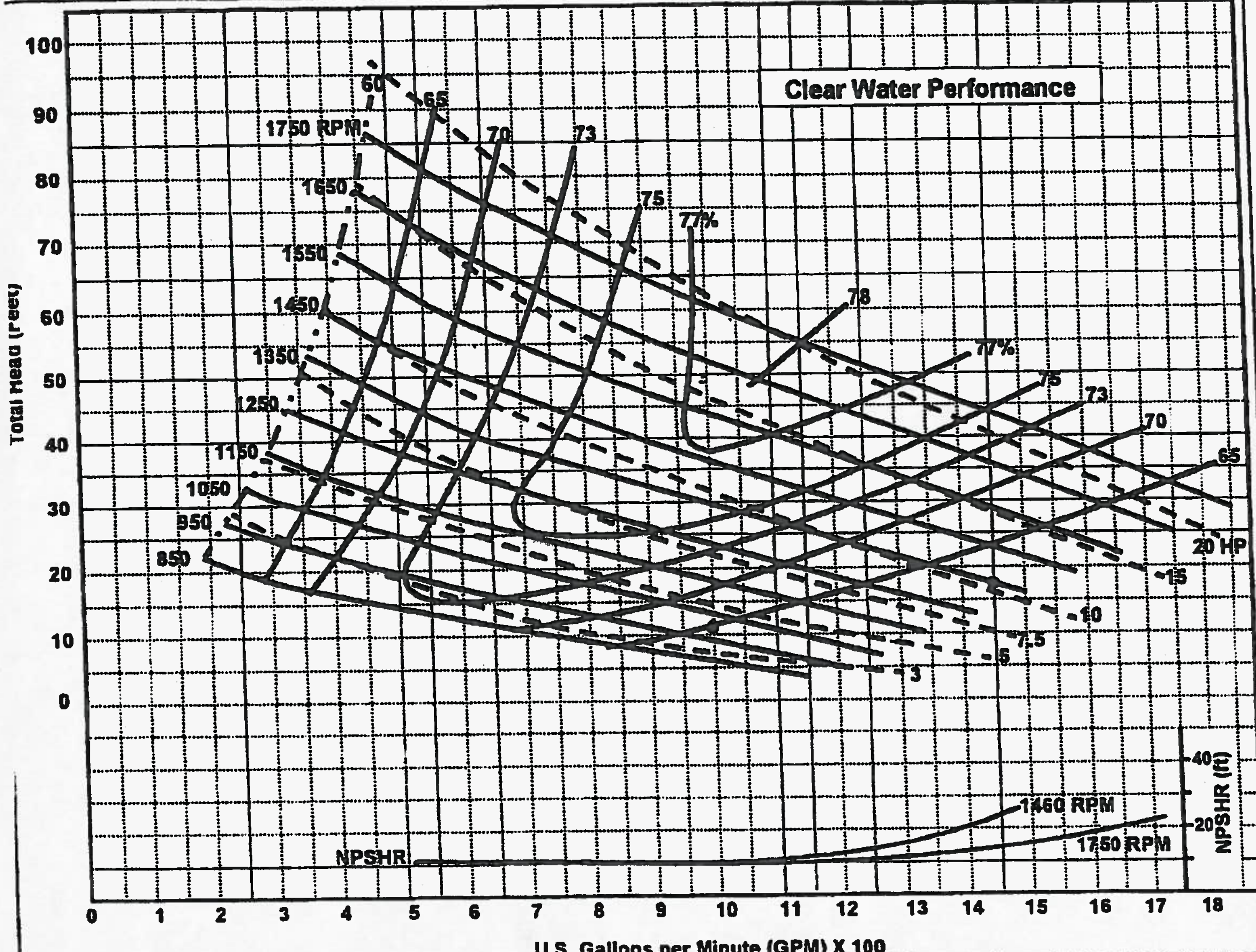
Ottawa Street Pump 1 & 2 with VFD.

EXISTING PUMP OTTAWA ST.

WEMCO

MODEL E5K-H
HIDROSTAL PUMP

Weir-EnviroTech
PUMPS CANADA
2360 Millrace Court Mississauga, Ontario L5N 1W2
Phone: (905) 813-8190 Fax: (905) 813-8170



6.0" Suction
5.0" Discharge
Variable RPM
11" Impeller Diameter

4.00" Max Sphere Size
Reference Curves:
June 1, 1997

$$BHP = \frac{GPM \times FT \times SG}{3960 \times Efficiency}$$

$$KW = \frac{M^3/hr \times M \times SG}{367 \times Efficiency}$$

The brake horsepower and efficiency shown is for pumps with properly installed and lubricated packing. Pumps with mechanical seals will require additional horsepower and the factory may be consulted for these values. Certified tests are performed using Hydraulic Institute acceptance level A.

Variable

P25-D105

E5K-H

Ottawa Street Pump #3 NO VFD

FLYGT	PERFORMANCE CURVE	PRODUCT: CP3085.183	TYPE: MT
DATE: 2012-06-29	PROJECT:	CURVE NO: 63-434-00-5303	ISSUE: 3

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.84	0.79	0.68
MOTOR EFFICIENCY	77.0 %	78.5 %	77.5 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	3	hp
STARTING CURRENT ...	17	A
RATED CURRENT ...	3.3	A
RATED SPEED	1695	rpm
TOT.MOM.OF INERTIA ...	0.034	kgm2
NO. OF BLADES	1	

IMPELLER DIAMETER: 160 mm

MOTORTYPE	STATOR	REV
15-10-4AL	63Y	10

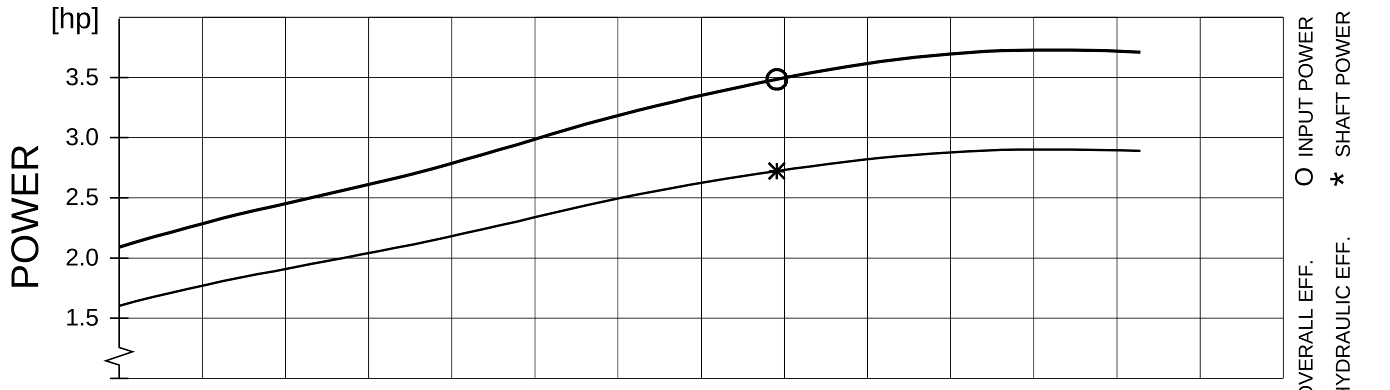
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	4

GEARTYPE	RATIO
---	---

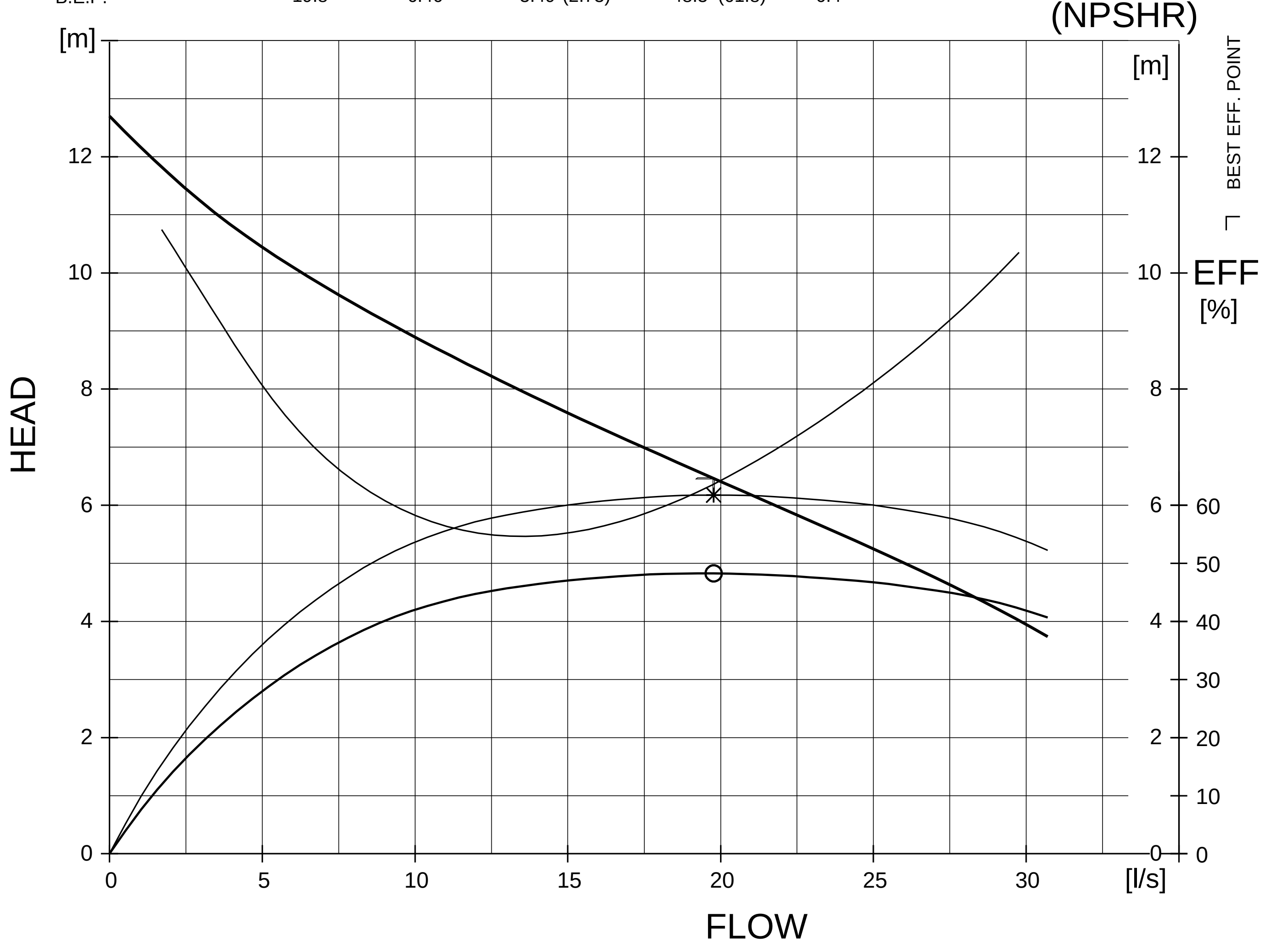
COMMENTS

INLET/OUTLET: -/ 80 mm

IMP. THROUGHLET: 76 mm



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [hp]	EFF [%]	(NPSHR)[m]
B.E.P.	19.8	6.46	3.49 (2.73)	48.3 (61.8)	6.4



FLYPS3.1.6.6 (20090313)

(NPSHR) = (NPSH3) + margins

Performance with clear water and rating data at 40 °C

FLYGT CURVE

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
CP3140.180	HT

DATE	PROJECT	CURVE NO	ISSUE
2011-07-08		63-481-00-3855	2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.85	0.81	0.72
MOTOR EFFICIENCY	83.5 %	84.5 %	83.5 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	11.2	kW
STARTING CURRENT ...	87	A
RATED CURRENT ...	15	A
RATED SPEED	1745	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER 248 mm

MOTORTYPE	STATOR	REV
25-11-4AA	52D	11

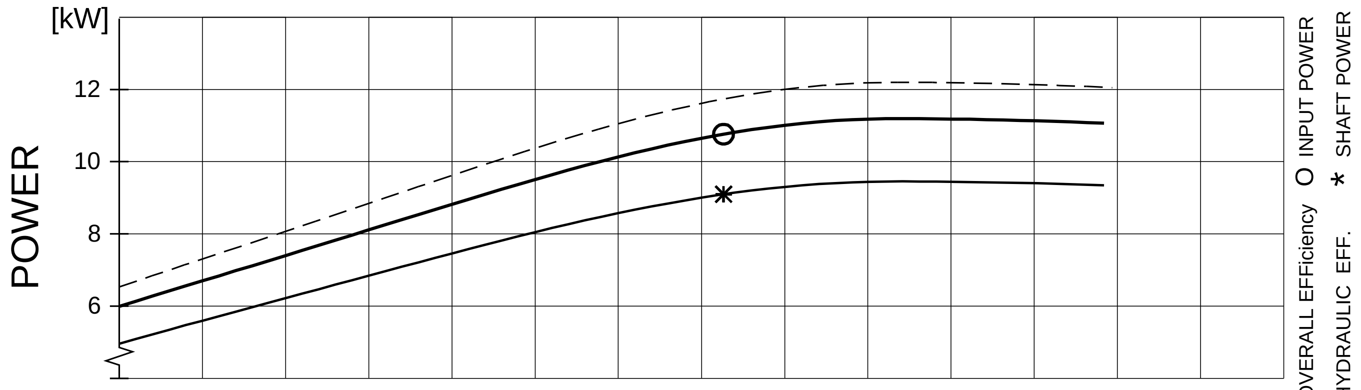
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	4

GEARTYPE	RATIO
---	---

COMMENTS
NEVA CLOG

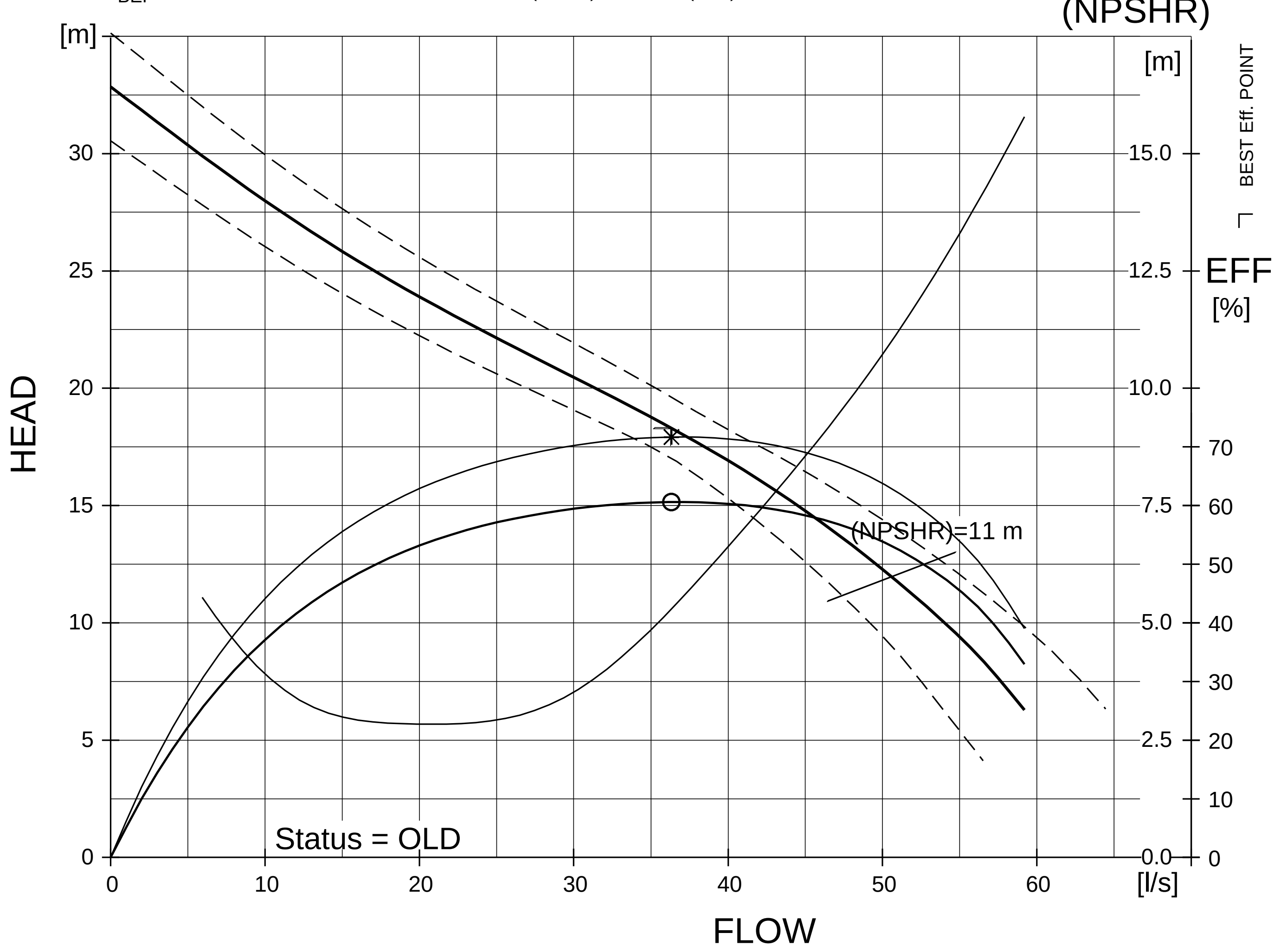
INLET/OUTLET
-/100 mm

IMP. THROUGHLET
76 mm



DUTY POINTs :	FLOW [l/s]	HEAD [m]	POWER [kW]*	EFF. [%] *	(NPSHR)[m]	GUARANTEE
BEP	36.3	18.3	10.8 (9.10)	60.6 (71.7)	5.3	ISO 9906/annex A.1

O OVERALL EFFiciency * HYDRAULIC EFF. ⌐ BEST Eff. POINT



unix AUTHOR: quality1 PECU rev:17.16 /SACU

(NPSHR) = (NPSH3) + margins

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

FLYGT

ISO CURVE

PERFORMANCE CURVE

PRODUCT	TYPE
DP3045.181	MT

DATE	PROJECT	CURVE NO	ISSUE
2011-07-08		63-234-00-3164	1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.84	0.77	0.65
MOTOR EFFICIENCY	77.5 %	77.5 %	74.0 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	1.8	hp
STARTING CURRENT ...	15	A
RATED CURRENT ...	2.0	A
RATED SPEED	3390	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	6	

IMPELLER DIAMETER 87 mm

MOTORTYPE	STATOR	REV
12-08-2BB	05Y	10

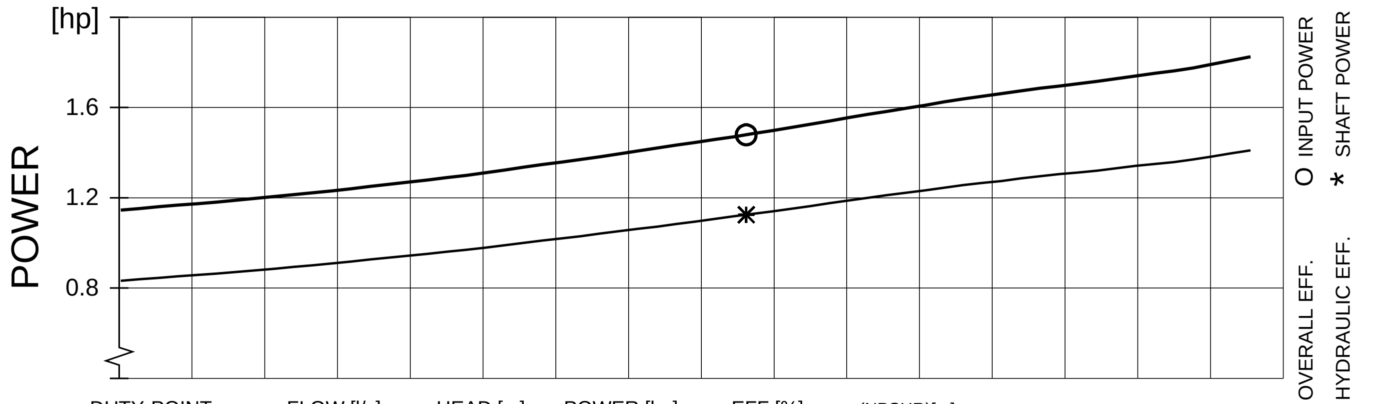
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	2

GEARTYPE	RATIO
---	---

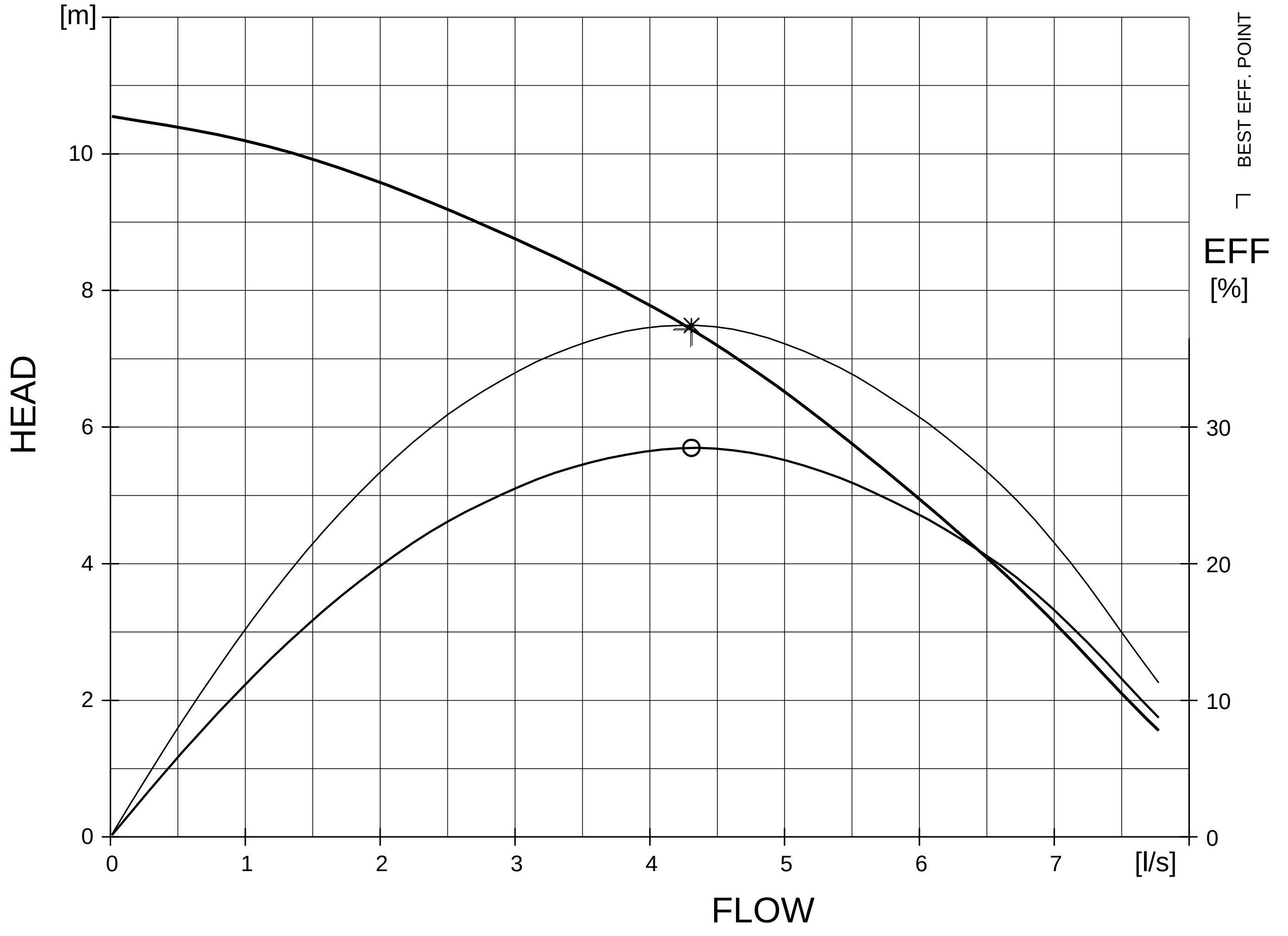
COMMENTS

INLET/OUTLET -/ 50 mm

IMP. THROUGHLET 48 mm



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [hp]	EFF [%]	(NPSHR)[m]
B.E.P.	4.31	7.43	1.48 (1.13)	28.5 (37.4)	



FLYPS3.1.6.6 (20090313)

Performance with clear water and rating data at 40 °C

CURVE

APPENDIX ‘F’

Existing Peak Wet Weather Flow Summary Table and Schematic

FlexTable: Conduit Table (Winchester.swc)

Active Scenario: Peaked Wet Weather Pumped - Existing

Current Time: 0.000 hours

Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
182	0.002	250.0	30.75	25.56	-5.19	120.3	71.62	71.55	71.49	71.63	71.54	71.38	71.29
186	0.002	250.0	30.07	28.08	-2.00	107.1	71.72	71.67	71.62	71.72	71.63	71.47	71.38
177	0.003	250.0	31.20	32.85	1.66	95.0	71.21	71.11	71.01	71.27	71.07	71.02	70.82
185	0.003	250.0	30.06	31.86	1.80	94.4	71.73	71.73	71.72	71.77	71.72	71.52	71.47
160	0.003	250.0	32.40	34.68	2.28	93.4	71.01	70.86	70.70	71.07	70.76	70.82	70.51
184	0.003	250.0	30.06	32.70	2.64	91.9	71.87	71.79	71.73	71.93	71.77	71.68	71.52
178	0.003	250.0	30.75	35.17	4.42	87.4	71.39	71.29	71.21	71.46	71.25	71.21	71.00
188	0.003	250.0	29.40	33.85	4.45	86.9	72.10	72.02	71.94	72.17	72.01	71.92	71.76
96	0.004	250.0	29.02	35.80	6.78	81.1	77.93	77.87	77.80	78.01	77.88	77.76	77.63
97	0.004	250.0	29.39	39.32	9.93	74.7	77.79	77.53	77.27	77.88	77.36	77.63	77.11
45	0.004	200.0	11.45	20.18	8.73	56.7	72.52	72.47	72.43	72.61	72.52	72.41	72.32
126	0.001	600.0	73.25	141.63	68.38	51.7	69.79	69.77	69.76	70.08	70.05	69.48	69.45
15	0.001	250.0	7.68	19.89	12.20	38.6	70.09	70.07	70.06	70.23	70.20	69.98	69.95
109	0.001	600.0	78.20	204.77	126.57	38.2	69.12	69.11	69.10	69.46	69.44	68.86	68.84
143	0.002	450.0	43.16	113.96	70.80	37.9	69.96	69.89	69.81	70.22	70.07	69.77	69.62
110	0.001	600.0	78.89	234.46	155.58	33.6	69.02	69.00	68.98	69.38	69.34	68.78	68.74
141	0.002	450.0	41.86	125.78	83.92	33.3	70.19	70.08	69.98	70.46	70.25	70.01	69.80
98	0.028	250.0	29.69	98.71	69.02	30.1	77.18	75.94	74.71	77.33	74.87	77.08	74.62
142	0.003	450.0	42.75	145.10	102.35	29.5	69.97	69.97	69.96	70.25	70.22	69.80	69.77
9a	0.001	250.0	5.92	20.73	14.81	28.6	71.41	71.40	71.38	71.57	71.54	71.32	71.29
100	0.002	600.0	73.17	267.78	194.61	27.3	69.79	69.81	69.79	70.16	70.08	69.56	69.48
47	0.004	200.0	5.53	21.00	15.48	26.3	73.10	72.98	72.85	73.23	72.98	73.03	72.78
107	0.002	600.0	76.34	290.20	213.86	26.3	69.33	69.25	69.17	69.72	69.56	69.12	68.96
108	0.002	600.0	76.39	292.07	215.68	26.2	69.17	69.12	69.12	69.56	69.46	68.96	68.86
103	0.002	600.0	74.95	294.99	220.04	25.4	69.47	69.40	69.33	69.86	69.72	69.26	69.12
140	0.003	450.0	40.06	159.79	119.73	25.1	70.64	70.46	70.28	70.94	70.58	70.49	70.13
48	0.004	200.0	5.31	21.95	16.64	24.2	73.37	73.24	73.10	73.51	73.23	73.31	73.03
223	0.004	200.0	4.71	19.66	14.95	24.0	73.87	73.75	73.64	74.00	73.77	73.80	73.57
35	0.004	200.0	4.58	20.10	15.53	22.8	70.24	70.04	69.83	70.38	69.97	70.18	69.77
46	0.006	200.0	5.99	26.34	20.35	22.7	72.84	72.67	72.52	72.98	72.63	72.78	72.43
51	0.004	200.0	4.41	19.59	15.18	22.5	70.52	70.39	70.26	70.66	70.40	70.46	70.20
99	0.057	250.0	29.94	141.51	111.57	21.2	74.69	72.19	69.79	74.87	69.86	74.62	69.61
101	0.004	600.0	74.75	372.71	297.96	20.1	69.59	69.52	69.47	70.01	69.86	69.41	69.26
12	0.003	250.0	6.50	32.97	26.46	19.7	70.78	70.61	70.44	70.95	70.61	70.70	70.36
156	0.001	300.0	5.22	28.60	23.38	18.2	71.28	71.25	71.23	71.49	71.44	71.19	71.14
422	0.001	200.0	1.67	9.44	7.77	17.7	74.01	73.97	73.92	74.15	74.07	73.95	73.87
11	0.004	250.0	6.27	36.91	30.64	17.0	71.06	70.91	70.78	71.24	70.95	70.99	70.70
52	0.004	200.0	3.35	19.80	16.46	16.9	70.66	70.59	70.52	70.80	70.66	70.60	70.46
14	0.006	250.0	7.68	45.85	38.17	16.8	70.25	70.11	70.09	70.43	70.16	70.18	69.91
10	0.004	250.0	6.13	38.08	31.95	16.1	71.36	71.21	71.06	71.54	71.24	71.29	70.99
55	0.004	200.0	3.14	19.85	16.71	15.8	71.09	70.97	70.85	71.24	71.00	71.04	70.80
224	0.008	200.0	4.76	30.14	25.38	15.8	73.62	73.36	73.10	73.77	73.25	73.57	73.05
53	0.004	200.0	3.28	21.00	17.72	15.6	70.82	70.74	70.66	70.97	70.80	70.77	70.60
5	0.002	250.0	3.49	24.88	21.39	14.0	72.64	72.62	72.60	72.83	72.79	72.58	72.54
450	0.002	250.0	3.65	26.25	22.60	13.9	71.21	71.12	71.11	71.40	71.21	71.15	70.96
CO-4	0.004	250.0	5.11	37.61	32.50	13.6	71.02	71.02	71.02	71.21	71.21	70.96	70.96
56	0.004	200.0	2.95	21.78	18.83	13.5	71.34	71.21	71.09	71.49	71.24	71.29	71.04
8	0.004	250.0	4.89	36.35	31.46	13.4	71.98	71.82	71.66	72.17	71.85	71.92	71.60
58	0.004	200.0	2.73	20.70	17.97	13.2	71.58	71.47	71.37	71.73	71.52	71.53	71.32
CO-1	0.010	600.0	78.89	614.01	535.12	12.8	68.88	68.87	68.87	69.33	69.33	68.73	68.73
222	0.003	200.0	2.35	18.56	16.22	12.6	74.22	74.05	73.89	74.37	74.04	74.17	73.84
9	0.005	250.0	4.97	40.61	35.64	12.2	71.66	71.52	71.41	71.85	71.57	71.60	71.32
158	0.002	300.0	5.61	45.87	40.26	12.2	70.80	70.69	70.64	71.03	70.81	70.73	70.51
18	0.004	200.0	2.69	21.98	19.30	12.2	72.30	72.13	72.10	72.45	72.12	72.25	71.92
60	0.003	200.0	2.14	17.49	15.36	12.2	71.99	71.91	71.84	72.14	71.99	71.94	71.79
7	0.004	250.0	4.37	35.84	31.47	12.2	72.29	72.13	71.98	72.48	72.17	72.23	71.92
161	0.002	200.0	1.92	15.83	13.91	12.1	71.32	71.18	71.04	71.47	71.20	71.27	71.00
13	0.008	250.0	6.50	54.23	47.73	12.0	70.42	70.33	70.25	70.61	70.43	70.36	70.18
21	0.004	200.0	2.34	19.60	17.26	11.9	72.85	72.70	72.56	73.01	72.71	72.81	72.51
34	0.003	250.0	3.66	31.70	28.04	11.6	72.86	72.69	72.53	73.05	72.72	72.80	72.47
19	0.005	200.0	2.57	22.58	20.01	11.4	72.56	72.43	72.30	72.71	72.45	72.51	72.25
33	0.003	250.0	3.37	30.07	26.69	11.2	73.04	72.95	72.86	73.23	73.05	72.98	72.80
59	0.005	200.0	2.66	24.02	21.36	11.1	71.83	71.70	71.58	71.99	71.73	71.79	71.53
449	0.003	250.0	3.33	30.14	26.81	11.1	71.47	71.34	71.21	71.66	71.40	71.41	71.15
448	0.002	250.0	2.98	28.32	25.34	10.5	71.72	71.59	71.47	71.91	71.66	71.66	71.41
22	0.004	200.0	2.16	20.71	18.55	10.4	73.19	73.02	72.85	73.35	73.01	73.15	72.81
32	0.003	250.0	3.21	30.92	27.71	10.4	73.20	73.13	73.05	73.40	73.25	73.15	73.00
6	0.004	250.0	3.69	36.30	32.61	10.2	72.59	72.44	72.29	72.79	72.48	72.54	72.23
61	0.004	200.0	2.07	21.32	19.26	9.7	72.19	72.09	71.99	72.35	72.14	72.15	71.94
198	0.001	200.0	1.08	11.80	10.73	9.1	73.43	73.39	73.34	73.59	73.50	73.39	73.30
221	0.003	200.0	1.71	19.40	17.69	8.8	74.50	74.38	74.26	74.66	74.42	74.46	74.22
31	0.003	250.0	2.47	30.33	27.86	8.1	73.44	73.35	73.26	73.64	73.46	73.39	73.21
4	0.004	250.0	2.96	36.87	33.91	8.0	72.91	72.77	72.64	73.11	72.83	72.86	72.58
44	0.005	200.0	1.79	22.53	20.74	7.9	72.96	72.73	72.52	73.12	72.67	72.92	72.47
3	0.003	250.0	2.70	34.98	32.28	7.7	73.20	73.05	72.91	73.40	73.11	73.15	72.86
62	0.004	200.0	1.54	20.66	19.12	7.4	72.47	72.34	72.21	72.63	72.37	72.43	72.17
159	0.007	200.0	2.02	27.40	25.38	7.4	71.03	70.79	70.64	71.20	70.71	71.00	70.51
83	0.003	200.0	1.40	19.07	17.67	7.3	74.67	74.58	74.50	74.83	74.66	74.63	74.46
447	0.004	200.0	1.47	20.61	19.14	7.1	72.49	72.29	72.10	72.65	72.26	72.45	72.06
43	0.005	200.0	1.59	23.01	21.42	6.9	73.11	73.03	72.96	73.27	73.12	73.07	72.92
CO-3	0.060	300.0	16.02	236.87	220.84	6.8	69.82	69.81	69.79	70.07	70.04	69.77	69.74
127	0.004	200.0	1.42	21.31	19.89	6.7	70.18	70.02	69.86	70.35	70.02	70.15	69.82
157	0.007	300.0	5.30	83.06	77.75	6.4	71.19	70.99	70.80	71.44	71.03	71.14	70.73
165	0.004	200.0	1.33	20.98	19.65	6.4	71.62	71.46	71.32	71.78	71.47	71.58	71.27
1	0.002	250.0	1.85	29.32	27.47	6.3	73.66	73.56	73.46	73.87	73.67	73.62	73.42
200	0.003	200.0	1.04	17.26	16.23	6.0	70.66	70.59	70.52	70.83	70.69	70.63	70.49
139	0.003	200.0	1.14	19.16	18.01	6.0	70.56	70.38	70.20	70.73	70.37	70.53	70.17
167	0.003	200.0	1.07	18.03	16.96	6.0	72.12	72.09	72.05	72.29	72.22	72.09	72.02
30	0.002	250.0	1.69	29.59	27.90	5.7	73.71	73.57	73.44	73.92	73.64	73.67	73.39
129	0.004	200.0	1.08	19.74	18.66	5.5	70.54	70.36	70.18	70.71	70.35	70.51	70.15
416	0.003	250.0	1.79	32.78	30.99	5.5	73.29	73.24	73.19	73.50	73.40	73.25	73.15

Active Scenario: Peaked Wet Weather Pumped - Existing

Current Time: 0.000 hours

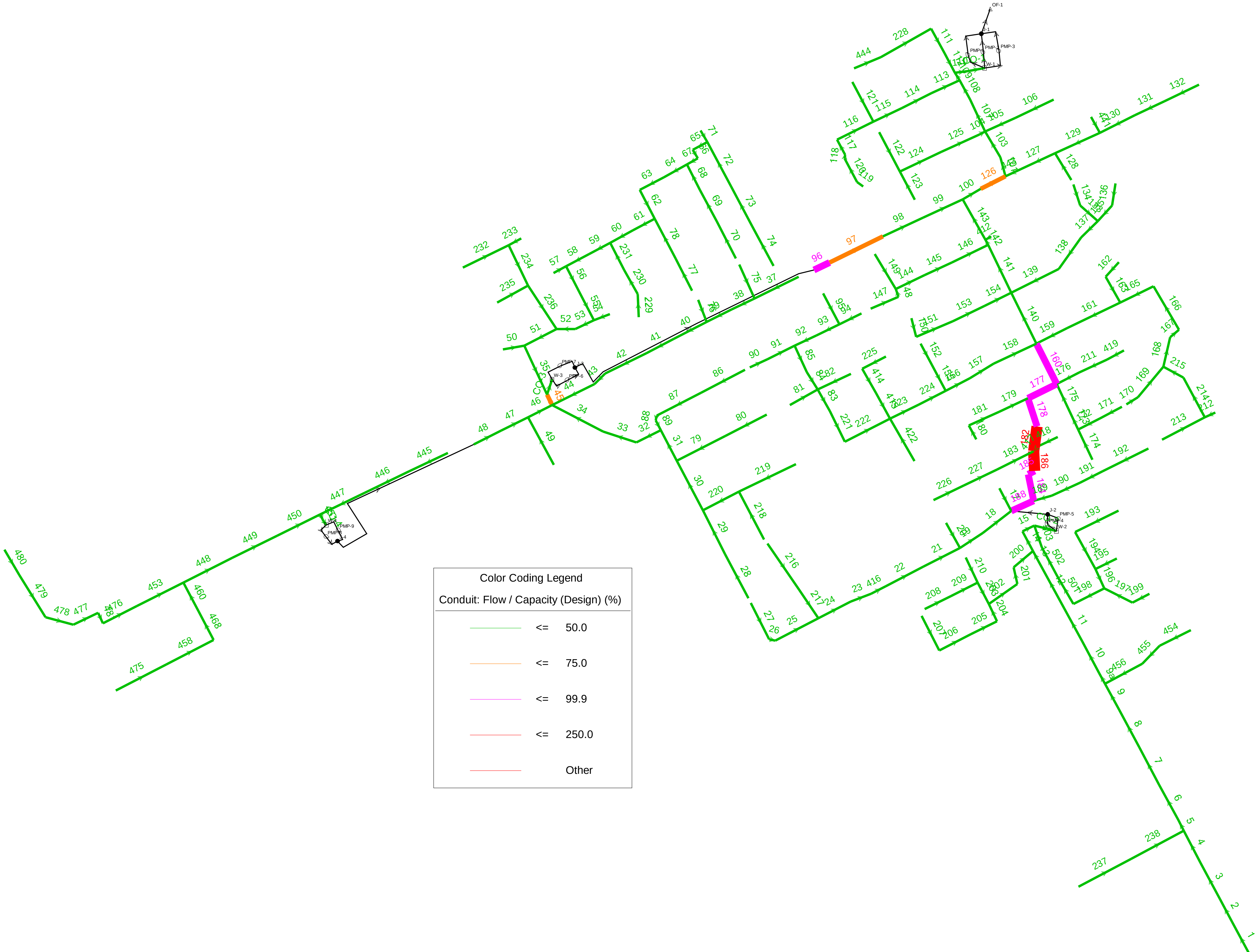
Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
201	0.003	200.0	1.03	18.95	17.92	5.4	70.82	70.76	70.71	70.99	70.87	70.79	70.67
24	0.003	250.0	1.53	30.18	28.65	5.1	73.67	73.57	73.48	73.88	73.69	73.63	73.44
501	0.005	200.0	1.13	22.40	21.27	5.0	73.33	73.18	73.03	73.50	73.20	73.30	73.00
116	0.004	200.0	1.04	20.77	19.73	5.0	76.23	76.07	75.90	76.40	76.07	76.20	75.87
2	0.005	250.0	2.12	43.05	40.93	4.9	73.46	73.32	73.20	73.67	73.40	73.42	73.15
446	0.004	200.0	1.01	20.73	19.72	4.9	72.88	72.68	72.49	73.05	72.65	72.85	72.45
443	0.008	200.0	1.45	30.03	28.57	4.8	69.85	69.71	69.59	70.02	69.74	69.82	69.54
453	0.002	250.0	1.23	26.09	24.86	4.7	71.91	71.81	71.72	72.12	71.92	71.87	71.67
42	0.009	200.0	1.48	31.68	30.19	4.7	73.97	73.53	73.11	74.14	73.27	73.94	73.07
85	0.004	200.0	0.91	20.01	19.09	4.6	75.06	74.95	74.84	75.23	75.01	75.03	74.81
84	0.005	200.0	0.99	22.21	21.22	4.5	74.84	74.74	74.67	75.01	74.82	74.81	74.62
138	0.004	200.0	0.91	20.81	19.89	4.4	71.04	70.88	70.73	71.21	70.90	71.01	70.70
166	0.006	200.0	1.14	26.21	25.06	4.4	72.05	71.72	71.62	72.22	71.57	72.02	71.37
460	0.003	250.0	1.37	31.46	30.10	4.3	71.90	71.81	71.72	72.12	71.93	71.87	71.68
CO-2	0.120	250.0	8.94	206.00	197.06	4.3	69.99	69.96	69.93	70.20	70.14	69.95	69.89
202	0.005	200.0	0.99	23.03	22.03	4.3	71.23	71.06	70.89	71.40	71.06	71.20	70.86
468	0.003	250.0	1.37	31.92	30.55	4.3	72.09	71.99	71.90	72.30	72.12	72.05	71.87
23	0.004	250.0	1.66	38.99	37.33	4.3	73.48	73.38	73.29	73.69	73.50	73.44	73.25
412	0.001	200.0	0.32	7.49	7.17	4.3	69.96	69.97	69.96	70.00	69.99	69.80	69.79
236	0.004	200.0	0.88	20.73	19.85	4.2	71.36	71.15	70.94	71.53	71.11	71.33	70.91
130	0.004	200.0	0.82	19.43	18.61	4.2	70.81	70.68	70.54	70.99	70.71	70.79	70.51
113	0.017	200.0	1.81	43.32	41.51	4.2	73.23	72.68	72.14	73.40	72.31	73.20	72.11
168	0.007	200.0	1.03	26.90	25.86	3.8	72.53	72.32	72.12	72.70	72.29	72.50	72.09
481	0.004	200.0	0.81	21.41	20.60	3.8	72.37	72.37	72.37	72.30	72.20	72.10	72.00
114	0.018	200.0	1.64	43.59	41.96	3.8	74.42	73.82	73.23	74.59	73.40	74.39	73.20
40	0.009	200.0	1.06	30.24	29.18	3.5	76.15	75.83	75.51	76.32	75.68	76.12	75.48
66	0.005	200.0	0.80	22.95	22.16	3.5	75.09	75.04	74.99	75.26	75.16	75.06	74.96
115	0.017	200.0	1.44	43.10	41.66	3.4	75.52	74.97	74.42	75.69	74.59	75.49	74.39
456	0.006	200.0	0.87	26.33	25.46	3.3	72.02	71.75	71.47	72.20	71.65	72.00	71.45
137	0.005	200.0	0.74	22.53	21.79	3.3	71.26	71.15	71.04	71.44	71.21	71.24	71.01
196	0.004	200.0	0.67	20.70	20.03	3.3	73.43	73.43	73.43	71.99	71.82	71.79	71.62
458	0.003	250.0	1.01	32.07	31.06	3.1	72.46	72.30	72.14	72.68	72.36	72.43	72.11
63	0.019	200.0	1.41	45.68	44.27	3.1	73.62	73.09	72.55	73.80	72.73	73.60	72.53
120	0.008	200.0	0.91	29.95	29.05	3.0	77.13	76.91	76.68	77.31	76.86	77.11	76.66
65	0.006	200.0	0.75	24.92	24.17	3.0	75.30	75.21	75.11	75.48	75.29	75.28	75.09
118	0.009	200.0	0.91	30.34	29.44	3.0	76.68	76.65	76.62	76.86	76.80	76.66	76.60
189	0.004	200.0	0.64	21.34	20.70	3.0	71.94	71.87	71.87	72.12	71.96	71.92	71.76
64	0.019	200.0	1.33	44.68	43.35	3.0	74.61	74.12	73.62	74.79	73.80	74.59	73.60
215	0.005	200.0	0.63	22.23	21.59	2.9	72.74	72.64	72.53	72.92	72.71	72.72	72.51
183	0.004	200.0	0.58	21.35	20.77	2.7	71.86	71.69	71.62	72.04	71.69	71.84	71.49
38	0.004	200.0	0.57	21.07	20.50	2.7	76.82	76.72	76.61	77.00	76.79	76.80	76.59
117	0.010	200.0	0.91	33.55	32.64	2.7	76.62	76.44	76.25	76.80	76.43	76.60	76.23
204	0.004	200.0	0.55	20.21	19.67	2.7	71.37	71.30	71.23	71.55	71.40	71.35	71.20
454	0.004	200.0	0.55	20.35	19.81	2.7	72.88	72.75	72.61	73.06	72.79	72.86	72.59
89	0.002	250.0	0.75	27.81	27.07	2.7	73.29	73.26	73.24	73.51	73.46	73.26	73.21
220	0.003	250.0	0.81	30.80	29.99	2.6	73.97	73.86	73.75	74.19	73.97	73.94	73.72
478	0.003	200.0	0.46	18.03	17.57	2.6	72.46	72.37	72.37	72.64	72.47	72.44	72.27
111	0.005	200.0	0.61	23.86	23.25	2.6	72.76	72.61	72.46	72.94	72.64	72.74	72.44
214	0.005	200.0	0.58	22.71	22.14	2.5	73.18	72.96	72.74	73.36	72.92	73.16	72.72
131	0.004	200.0	0.52	20.81	20.29	2.5	71.86	71.72	71.59	72.04	71.77	71.84	71.57
477	0.003	250.0	0.81	32.34	31.54	2.5	72.37	72.37	72.37	72.52	72.35	72.27	72.10
219	0.001	250.0	0.52	21.00	20.48	2.5	74.13	74.05	73.97	74.35	74.19	74.10	73.94
92	0.004	200.0	0.50	20.47	19.97	2.5	76.31	76.22	76.12	76.49	76.30	76.29	76.10
39	0.008	200.0	0.74	29.86	29.13	2.5	76.61	76.38	76.15	76.79	76.32	76.59	76.12
475	0.003	250.0	0.76	31.04	30.27	2.5	72.77	72.61	72.46	72.99	72.68	72.74	72.43
67	0.010	200.0	0.80	32.41	31.61	2.5	74.86	74.74	74.61	75.04	74.79	74.84	74.59
502	0.022	200.0	1.20	49.05	47.85	2.4	73.02	72.27	71.52	73.20	71.70	73.00	71.50
132	0.004	200.0	0.49	21.00	20.52	2.3	72.18	72.02	71.86	72.36	72.04	72.16	71.84
216	0.002	250.0	0.68	29.14	28.47	2.3	74.20	74.05	73.90	74.42	74.12	74.17	73.87
217	0.003	250.0	0.68	30.40	29.72	2.2	73.90	73.81	73.72	74.12	73.94	73.87	73.69
455	0.009	200.0	0.71	31.95	31.24	2.2	72.55	72.31	72.07	72.73	72.25	72.53	72.05
205	0.004	200.0	0.46	20.98	20.52	2.2	71.64	71.52	71.40	71.82	71.58	71.62	71.38
41	0.031	200.0	1.27	57.77	56.49	2.2	75.50	74.55	73.97	75.68	73.77	75.48	73.57
234	0.005	200.0	0.49	22.57	22.08	2.2	71.78	71.57	71.36	71.96	71.53	71.76	71.33
238	0.004	200.0	0.45	20.87	20.42	2.1	73.12	72.88	72.64	73.30	72.81	73.10	72.61
503	0.033	200.0	1.26	59.99	58.73	2.1	71.52	70.75	69.99	71.70	70.15	71.50	69.95
25	0.003	250.0	0.63	30.06	29.43	2.1	73.91	73.78	73.67	74.13	73.88	73.88	73.63
194	0.004	200.0	0.44	21.00	20.56	2.1	73.43	73.43	73.43	72.34	71.99	72.14	71.79
476	0.006	250.0	0.90	45.61	44.70	2.0	72.37	72.15	71.92	72.60	72.15	72.35	71.90
479	0.003	200.0	0.34	17.36	17.02	2.0	72.74	72.60	72.46	72.92	72.64	72.72	72.44
79	0.003	250.0	0.58	29.96	29.38	1.9	73.74	73.60	73.46	73.97	73.69	73.72	73.44
133	0.004	200.0	0.37	19.54	19.17	1.9	71.45	71.36	71.28	71.63	71.46	71.43	71.26
72	0.011	200.0	0.63	33.94	33.31	1.9	76.53	75.98	75.44	76.71	75.62	76.51	75.42
175	0.010	200.0	0.60	33.11	32.51	1.8	72.28	71.96	71.64	72.46	71.82	72.26	71.62
93	0.004	200.0	0.38	20.94	20.56	1.8	76.52	76.41	76.31	76.70	76.49	76.50	76.29
179	0.005	200.0	0.40	22.40	22.00	1.8	71.45	71.30	71.21	71.63	71.33	71.43	71.13
134	0.003	200.0	0.29	16.53	16.23	1.8	71.56	71.50	71.45	71.74	71.63	71.54	71.43
232	0.002	200.0	0.24	13.32	13.09	1.8	71.89	71.80	71.78	72.07	71.90	71.87	71.70
203	0.006	200.0	0.41	25.64	25.23	1.6	71.52	71.37	71.23	71.70	71.40	71.50	71.20
154	0.015	200.0	0.65	40.27	39.62	1.6	71.36	70.90	70.44	71.54	70.62	71.34	70.42
231	0.007	200.0	0.45	28.04	27.59	1.6	73.01	72.78	72.56	73.19	72.74	72.99	72.54
49	0.004	200.0	0.33	20.80	20.47	1.6	73.29	73.07	72.85	73.47	73.03	73.27	72.83
106	0.005	200.0	0.37	23.20	22.83	1.6	72.19	71.97	71.76	72.37	71.94	72.17	71.74
206	0.004	200.0	0.33	20.73	20.40	1.6	71.93	71.78	71.64	72.11	71.82	71.91	71.62
91	0.004	200.0	0.31	20.15	19.83	1.5	75.32	75.20	75.09	75.50	75.27	75.30	75.07
445	0.005	200.0	0.35	22.80	22.46	1.5	73.29	73.08	72.88	73.47	73.05	73.27	72.85
145	0.020	200.0	0.69	45.83	45.13	1.5	75.15	74.55	73.96	75.33	74.14	75.13	73.94
163	0.005	200.0	0.34	23.14	22.80	1.5	71.56	71.41	71.32	71.74	71.44	71.54	71.24
125	0.030	200.0	0.81	56.77	55.95	1.4	72.77	71.51	70.25	72.95	70.43	72.75	70.23
176	0.009	200.0	0.44	30.75	30.31	1.4	72.21	71.98	71.76	72.39	71.94	72.19	71.74
211	0.007	200.0	0.39	27.66	27.26	1.4	72.65	72.43	72.21	72.83	72.39	72.63	72.19

FlexTable: Conduit Table (Winchester.swc)
Active Scenario: Peaked Wet Weather Pumped - Existing

Current Time: 0.000 hours

Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
37	0.004	200.0	0.29	20.55	20.26	1.4	77.21	77.01	76.82	77.39	77.00	77.19	76.80
146	0.037	200.0	0.89	63.38	62.49	1.4	73.96	72.43	70.91	74.14	71.09	73.94	70.89
173	0.010	200.0	0.46	32.92	32.46	1.4	72.67	72.47	72.28	72.85	72.46	72.65	72.26
193	0.005	200.0	0.32	23.48	23.16	1.4	73.43	73.43	73.43	72.84	72.34	72.64	72.14
105	0.010	200.0	0.45	32.86	32.41	1.4	71.76	71.42	71.09	71.94	71.27	71.74	71.07
73	0.008	200.0	0.39	28.84	28.45	1.4	77.23	76.88	76.53	77.41	76.71	77.21	76.51
80	0.002	250.0	0.40	29.34	28.94	1.4	73.97	73.86	73.74	74.20	73.97	73.95	73.72
190	0.015	200.0	0.53	40.34	39.81	1.3	72.89	72.41	71.94	73.07	72.12	72.87	71.92
121	0.004	200.0	0.25	19.47	19.22	1.3	75.92	75.76	75.60	76.10	75.78	75.90	75.58
29	0.005	250.0	0.56	43.50	42.94	1.3	74.24	73.97	73.71	74.47	73.94	74.22	73.69
135	0.004	200.0	0.26	20.93	20.66	1.3	71.43	71.34	71.26	71.61	71.44	71.41	71.24
78	0.016	200.0	0.53	42.08	41.55	1.3	75.41	74.65	73.90	75.59	74.08	75.39	73.88
415	0.010	200.0	0.41	32.54	32.13	1.3	75.15	74.86	74.57	75.33	74.75	75.13	74.55
480	0.003	200.0	0.21	16.93	16.72	1.2	72.90	72.82	72.74	73.08	72.92	72.88	72.72
87	0.007	250.0	0.58	48.17	47.59	1.2	74.02	73.69	73.36	74.25	73.59	74.00	73.34
69	0.009	200.0	0.37	30.98	30.61	1.2	76.75	76.42	76.10	76.93	76.28	76.73	76.08
104	0.045	200.0	0.81	69.37	68.56	1.2	70.25	69.95	69.65	70.43	69.83	70.23	69.63
209	0.006	200.0	0.29	25.14	24.85	1.2	71.92	71.74	71.56	72.10	71.74	71.90	71.54
169	0.005	200.0	0.26	23.70	23.43	1.1	72.93	72.72	72.53	73.12	72.70	72.92	72.50
144	0.019	200.0	0.49	44.80	44.31	1.1	76.34	75.74	75.15	76.53	75.33	76.33	75.13
192	0.005	200.0	0.25	23.23	22.98	1.1	74.18	73.92	73.66	74.37	73.85	74.17	73.65
230	0.008	200.0	0.31	29.94	29.64	1.0	73.47	73.24	73.01	73.66	73.19	73.46	72.99
74	0.004	200.0	0.21	20.58	20.37	1.0	77.58	77.40	77.23	77.77	77.41	77.57	77.21
26	0.002	250.0	0.24	23.51	23.27	1.0	73.95	73.94	73.93	74.18	74.16	73.93	73.91
136	0.004	200.0	0.20	20.07	19.87	1.0	71.59	71.51	71.43	71.78	71.61	71.58	71.41
124	0.030	200.0	0.57	57.23	56.66	1.0	75.60	74.18	72.77	75.79	72.95	75.59	72.75
68	0.021	200.0	0.47	47.86	47.38	1.0	76.09	75.48	74.87	76.28	75.06	76.08	74.86
181	0.003	200.0	0.18	18.35	18.18	1.0	71.65	71.55	71.45	71.84	71.63	71.64	71.43
191	0.015	200.0	0.39	40.36	39.97	1.0	73.66	73.27	72.89	73.85	73.07	73.65	72.87
237	0.002	200.0	0.15	15.84	15.69	1.0	73.39	73.25	73.12	73.58	73.30	73.38	73.10
213	0.010	200.0	0.32	33.38	33.06	1.0	74.23	73.73	73.22	74.42	73.41	74.22	73.21
414	0.010	200.0	0.31	33.24	32.92	0.9	75.73	75.44	75.15	75.91	75.33	75.71	75.13
162	0.004	200.0	0.20	21.40	21.20	0.9	71.73	71.64	71.56	71.91	71.74	71.71	71.54
227	0.020	200.0	0.42	46.58	46.16	0.9	73.35	72.60	71.86	73.54	72.04	73.34	71.84
419	0.004	200.0	0.19	21.65	21.46	0.9	72.81	72.73	72.65	73.00	72.83	72.80	72.63
153	0.024	200.0	0.45	50.40	49.96	0.9	73.02	72.19	71.36	73.21	71.54	73.01	71.34
81	0.004	200.0	0.18	20.45	20.27	0.9	74.89	74.77	74.67	75.08	74.83	74.88	74.63
77	0.013	200.0	0.31	37.41	37.11	0.8	76.34	75.87	75.41	76.53	75.59	76.33	75.39
207	0.004	200.0	0.17	20.88	20.71	0.8	72.27	72.11	71.95	72.46	72.14	72.26	71.94
148	0.004	200.0	0.16	19.99	19.83	0.8	76.49	76.46	76.43	76.68	76.62	76.48	76.42
70	0.008	200.0	0.23	29.76	29.53	0.8	77.43	77.09	76.75	77.62	76.93	77.42	76.73
50	0.004	200.0	0.15	19.80	19.65	0.8	70.78	70.70	70.62	70.97	70.81	70.77	70.61
112	0.081	200.0	0.69	93.29	92.60	0.7	72.45	70.65	69.02	72.64	69.04	72.44	68.84
197	0.010	200.0	0.23	32.02	31.79	0.7	73.43	73.43	73.43	72.43	71.82	72.23	71.62
155	0.016	200.0	0.30	41.03	40.73	0.7	73.36	72.90	72.43	73.55	72.62	73.35	72.42
128	0.004	200.0	0.15	20.81	20.67	0.7	71.44	71.29	71.14	71.63	71.33	71.43	71.13
228	0.010	250.0	0.42	59.79	59.36	0.7	74.00	73.41	72.82	74.23	73.05	73.98	72.80
122	0.011	200.0	0.24	34.13	33.88	0.7	76.59	76.10	75.61	76.78	75.80	76.58	75.60
218	0.003	250.0	0.21	30.12	29.91	0.7	74.29	74.15	74.01	74.53	74.25	74.28	74.00
75	0.004	200.0	0.14	20.75	20.60	0.7	77.43	77.28	77.13	77.62	77.32	77.42	77.12
225	0.010	200.0	0.23	32.81	32.59	0.7	76.66	76.39	76.12	76.85	76.31	76.65	76.11
226	0.010	200.0	0.22	32.49	32.27	0.7	74.02	73.69	73.35	74.21	73.54	74.01	73.34
95	0.004	200.0	0.14	20.73	20.59	0.7	76.82	76.68	76.54	77.01	76.73	76.81	76.53
123	0.004	200.0	0.14	20.45	20.31	0.7	75.86	75.74	75.61	76.05	75.80	75.85	75.60
149	0.009	200.0	0.21	31.25	31.05	0.7	77.81	77.44	77.06	78.00	77.25	77.80	77.05
229	0.007	200.0	0.18	27.08	26.90	0.7	73.79	73.63	73.47	73.98	73.66	73.78	73.46
195	0.010	200.0	0.22	32.98	32.76	0.7	73.43	73.43	73.43	72.48	71.99	72.28	71.79
28	0.005	250.0	0.28	42.97	42.69	0.7	74.76	74.50	74.24	75.00	74.47	74.75	74.22
174	0.009	200.0	0.21	31.65	31.44	0.7	73.29	72.98	72.67	73.48	72.85	73.28	72.65
208	0.006	200.0	0.16	25.43	25.27	0.6	72.26	72.09	71.92	72.45	72.10	72.25	71.90
90	0.004	200.0	0.13	21.13	21.00	0.6	75.52	75.42	75.32	75.71	75.50	75.51	75.30
17	0.005	200.0	0.13	22.26	22.12	0.6	72.19	72.12	72.10	72.38	72.14	72.18	71.94
235	0.015	200.0	0.23	39.80	39.56	0.6	72.39	71.87	71.36	72.58	71.53	72.38	71.33
172	0.008	200.0	0.17	29.52	29.35	0.6	73.05	72.86	72.67	73.24	72.85	73.04	72.65
71	0.004	200.0	0.11	19.80	19.69	0.6	75.54	75.49	75.44	75.73	75.63	75.53	75.43
171	0.007	200.0	0.16	28.37	28.21	0.5	73.51	73.28	73.05	73.70	73.24	73.50	73.04
151	0.026	200.0	0.29	52.73	52.45	0.5	75.10	74.06	73.02	75.29	73.21	75.09	73.01
147	0.009	200.0	0.16	31.23	31.07	0.5	77.05	76.78	76.50	77.24	76.69	77.04	76.49
212	0.002	200.0	0.07	13.45	13.39	0.5	73.22	73.20	73.18	73.41	73.37	73.21	73.17
444	0.012	200.0	0.18	36.54	36.36	0.5	74.72	74.36	74.00	74.91	74.18	74.71	73.98
82	0.010	200.0	0.15	32.27	32.12	0.5	75.86	75.50	75.14	76.05	75.33	75.85	75.13
20	0.014	200.0	0.17	38.31	38.14	0.4	73.95	73.55	73.16	74.14	73.35	73.94	73.15
94	0.011	200.0	0.15	33.77	33.62	0.4	77.04	76.77	76.52	77.23	76.70	77.03	76.50
27	0.009	250.0	0.24	54.93	54.69	0.4	74.76	74.37	73.97	75.00	74.21	74.75	73.96
417	0.005	200.0	0.09	22.19	22.10	0.4	71.62	71.62	71.62	71.60	71.54	71.40	71.34
76	0.004	200.0	0.09	21.27	21.18	0.4	76.39	76.29	76.19	76.58	76.38	76.38	76.18
150	0.018	200.0	0.18	43.93	43.75	0.4	75.84	75.49	75.14	76.03	75.33	75.83	75.13
86	0.015	250.0	0.30	72.97	72.68	0.4	75.52	74.77	74.02	75.76	74.25	75.51	74.00
57	0.004	200.0	0.07	20.43	20.36	0.4	71.44	71.38	71.34	71.63	71.52	71.43	71.32
152	0.019	200.0	0.15	44.84	44.68	0.3	74.26	73.81	73.36	74.45	73.55	74.25	73.35
88	0.105	250.0	0.58	192.31	191.73	0.3	73.32	73.29	73.29	73.56	72.54	73.31	72.29
180	0.003	200.0	0.05	18.42	18.37	0.3	71.75	71.70	71.65	71.94	71.84	71.74	71.64
54	0.005	200.0	0.07	23.04	22.97	0.3	72.92	72.83	72.75	73.11	72.94	72.91	72.74
418	0.010	200.0	0.09	32.87	32.78	0.3	71.91	71.68	71.62	72.10	71.65	71.90	71.45
199	0.021	200.0	0.12	47.15	47.03	0.3	73.43	73.43	73.43	73.23	72.43	73.03	72.23
210	0.010	200.0	0.07	32.27	32.20	0.2	72.67	72.40	72.13	72.86	72.32	72.66	72.12
170	0.020	200.0	0.08	45.89	45.81	0.2	73.46	73.19	72.93	73.66	73.12	73.46	72.92
441	0.016	200.0	0.06	40.94	40.88	0.2	71.09	70.80	70.54	71.28	70.71	71.08	70.51
233	0.015	200.0	0.05	39.52	39.47	0.1	72.12	71.91	71.78	72.32	71.90	72.12	71.70
119	0.014	200.0	0.00	39.02	39.02	0.0	77.33	77.23	77.13	77.53	77.31	77.33	77.11
451	-0.004	250.0	5.11	-38.90	-44.02	-13.1	71.11	71.11	71.11	71.15	71.21	70.90	70.96

Active Scenario: Peaked Wet Weather Pumped - Existing



APPENDIX ‘G’

Future Peak Wet Weather Flow Summary Table and Schematic

FlexTable: Conduit Table (Winchester.swc)

Active Scenario: Future - Peak Wet Weather Pumped

Current Time: 0.000 hours

Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
45	0.004	200.0	47.90	20.18	-27.72	237.4	73.02	72.76	72.51	72.61	72.52	72.41	72.32
47	0.004	200.0	40.96	21.00	-19.96	195.0	74.83	74.36	73.88	73.23	72.98	73.03	72.78
48	0.004	200.0	40.74	21.95	-18.80	185.7	75.79	75.31	74.83	73.51	73.23	73.31	73.03
96	0.004	250.0	60.89	35.80	-25.09	170.1	78.98	78.79	78.61	78.01	77.88	77.76	77.63
46	0.006	200.0	41.43	26.34	-15.08	157.3	73.88	73.45	73.02	72.98	72.63	72.78	72.43
97	0.004	250.0	61.26	39.32	-21.94	155.8	78.61	77.97	77.33	77.88	77.36	77.63	77.11
450	0.002	250.0	35.42	26.25	-9.18	135.0	71.56	71.39	71.22	71.40	71.21	71.15	70.96
182	0.002	250.0	30.75	25.56	-5.19	120.3	71.62	71.55	71.49	71.63	71.54	71.38	71.29
186	0.002	250.0	30.07	28.08	-2.00	107.1	71.72	71.67	71.62	71.72	71.63	71.47	71.38
CO-4	0.004	250.0	36.89	37.61	0.72	98.1	71.16	71.16	71.16	71.21	71.21	70.96	70.96
177	0.003	250.0	31.20	32.85	1.66	95.0	71.21	71.11	71.01	71.27	71.07	71.02	70.82
185	0.003	250.0	30.06	31.86	1.80	94.4	71.73	71.73	71.72	71.77	71.72	71.52	71.47
160	0.003	250.0	32.40	34.68	2.28	93.4	71.01	70.86	70.70	71.07	70.76	70.82	70.51
184	0.003	250.0	30.06	32.70	2.64	91.9	71.87	71.79	71.73	71.93	71.77	71.68	71.52
178	0.003	250.0	30.75	35.17	4.42	87.4	71.39	71.29	71.21	71.46	71.25	71.21	71.00
188	0.003	250.0	29.40	33.85	4.45	86.9	72.10	72.02	71.94	72.17	72.01	71.92	71.76
126	0.001	600.0	105.12	141.63	36.51	74.2	69.86	69.85	69.83	70.08	70.05	69.48	69.45
98	0.028	250.0	61.56	98.71	37.15	62.4	77.23	75.99	74.76	77.33	74.87	77.08	74.62
109	0.001	600.0	110.07	204.77	94.70	53.8	69.17	69.16	69.15	69.46	69.44	68.86	68.84
110	0.001	600.0	110.76	234.46	123.71	47.2	69.07	69.05	69.03	69.38	69.34	68.78	68.74
99	0.057	250.0	61.81	141.51	79.70	43.7	74.73	72.23	69.86	74.87	69.86	74.62	69.61
100	0.002	600.0	105.04	267.78	162.74	39.2	69.86	69.89	69.86	70.16	70.08	69.56	69.48
15	0.001	250.0	7.68	19.89	12.20	38.6	70.09	70.07	70.06	70.23	70.20	69.98	69.95
143	0.002	450.0	43.16	113.96	70.80	37.9	69.96	69.89	69.86	70.22	70.07	69.77	69.62
107	0.002	600.0	108.21	290.20	181.99	37.3	69.37	69.29	69.21	69.72	69.56	69.12	68.96
108	0.002	600.0	108.26	292.07	183.81	37.1	69.21	69.18	69.17	69.56	69.46	68.96	68.86
103	0.002	600.0	106.82	294.99	188.17	36.2	69.51	69.44	69.37	69.86	69.72	69.26	69.12
141	0.002	450.0	41.86	125.78	83.92	33.3	70.19	70.08	69.98	70.46	70.25	70.01	69.80
142	0.003	450.0	42.75	145.10	102.35	29.5	69.97	69.97	69.96	70.25	70.22	69.80	69.77
101	0.004	600.0	106.62	372.71	266.09	28.6	69.63	69.55	69.51	70.01	69.86	69.41	69.26
9a	0.001	250.0	5.92	20.73	14.81	28.6	71.41	71.40	71.38	71.57	71.54	71.32	71.29
140	0.003	450.0	40.06	159.79	119.73	25.1	70.64	70.46	70.28	70.94	70.58	70.49	70.13
35	0.004	200.0	4.84	20.10	15.27	24.1	70.25	70.04	69.87	70.38	69.97	70.18	69.77
223	0.004	200.0	4.71	19.66	14.95	24.0	73.87	73.75	73.64	74.00	73.77	73.80	73.57
51	0.004	200.0	4.41	19.59	15.18	22.5	70.52	70.39	70.26	70.66	70.40	70.46	70.20
CO-3	0.060	300.0	52.74	236.87	184.13	22.3	69.87	69.85	69.84	70.07	70.04	69.77	69.74
12	0.003	250.0	6.50	32.97	26.46	19.7	70.78	70.61	70.44	70.95	70.61	70.70	70.36
156	0.001	300.0	5.22	28.60	23.38	18.2	71.28	71.25	71.23	71.49	71.44	71.19	71.14
CO-1	0.010	600.0	110.76	614.01	503.25	18.0	68.90	68.90	68.90	69.33	69.33	68.73	68.73
422	0.001	200.0	1.67	9.44	7.77	17.7	74.01	73.97	73.92	74.15	74.07	73.95	73.87
11	0.004	250.0	6.27	36.91	30.64	17.0	71.06	70.91	70.78	71.24	70.95	70.99	70.70
449	0.003	250.0	5.11	30.14	25.03	17.0	71.57	71.57	71.56	71.66	71.40	71.41	71.15
52	0.004	200.0	3.35	19.80	16.46	16.9	70.66	70.59	70.52	70.80	70.66	70.60	70.46
448	0.002	250.0	4.76	28.32	23.56	16.8	71.73	71.60	71.57	71.91	71.66	71.66	71.41
14	0.006	250.0	7.68	45.85	38.17	16.8	70.25	70.11	70.09	70.43	70.16	70.18	69.91
10	0.004	250.0	6.13	38.08	31.95	16.1	71.36	71.21	71.06	71.54	71.24	71.29	70.99
55	0.004	200.0	3.14	19.85	16.71	15.8	71.09	70.97	70.85	71.24	71.00	71.04	70.80
224	0.008	200.0	4.76	30.14	25.38	15.8	73.62	73.36	73.10	73.77	73.25	73.57	73.05
53	0.004	200.0	3.28	21.00	17.72	15.6	70.82	70.74	70.66	70.97	70.80	70.77	70.60
34	0.003	250.0	4.68	31.70	27.02	14.8	73.02	73.02	73.02	73.05	72.72	72.80	72.47
33	0.003	250.0	4.40	30.07	25.67	14.6	73.04	73.06	73.02	73.23	73.05	72.98	72.80
5	0.002	250.0	3.49	24.88	21.39	14.0	72.64	72.62	72.60	72.83	72.79	72.58	72.54
32	0.003	250.0	4.23	30.92	26.69	13.7	73.21	73.14	73.06	73.40	73.25	73.15	73.00
56	0.004	200.0	2.95	21.78	18.83	13.5	71.34	71.21	71.09	71.49	71.24	71.29	71.04
8	0.004	250.0	4.89	36.35	31.46	13.4	71.98	71.82	71.66	72.17	71.85	71.92	71.60
58	0.004	200.0	2.73	20.70	17.97	13.2	71.58	71.47	71.37	71.73	71.52	71.53	71.32
222	0.003	200.0	2.35	18.56	16.22	12.6	74.22	74.05	73.89	74.37	74.04	74.17	73.84
9	0.005	250.0	4.97	40.61	35.64	12.2	71.66	71.52	71.41	71.85	71.57	71.60	71.32
158	0.002	300.0	5.61	45.87	40.26	12.2	70.80	70.69	70.64	71.03	70.81	70.73	70.51
18	0.004	200.0	2.69	21.98	19.30	12.2	72.30	72.13	72.10	72.45	72.12	72.25	71.92
60	0.003	200.0	2.14	17.49	15.36	12.2	71.99	71.91	71.84	72.14	71.99	71.94	71.79
7	0.004	250.0	4.37	35.84	31.47	12.2	72.29	72.13	71.98	72.48	72.17	72.23	71.92
161	0.002	200.0	1.92	15.83	13.91	12.1	71.32	71.18	71.04	71.47	71.20	71.27	71.00
13	0.008	250.0	6.50	54.23	47.73	12.0	70.42	70.33	70.25	70.61	70.43	70.36	70.18
21	0.004	200.0	2.34	19.60	17.26	11.9	72.85	72.70	72.56	73.01	72.71	72.81	72.51
31	0.003	250.0	3.49	30.33	26.84	11.5	73.45	73.36	73.27	73.64	73.46	73.39	73.21
19	0.005	200.0	2.57	22.58	20.01	11.4	72.56	72.43	72.30	72.71	72.45	72.51	72.25
59	0.005	200.0	2.66	24.02	21.36	11.1	71.83	71.70	71.58	71.99	71.73	71.79	71.53
481	0.004	200.0	2.26	21.41	19.15	10.5	72.39	72.39	72.39	72.30	72.20	72.10	72.00
22	0.004	200.0	2.16	20.71	18.55	10.4	73.19	73.02	72.85	73.35	73.01	73.15	72.81
453	0.002	250.0	2.69	26.09	23.40	10.3	71.93	71.82	71.73	72.12	71.92	71.87	71.67
478	0.003	200.0	1.84	18.03	16.19	10.2	72.48	72.40	72.39	72.64	72.47	72.44	72.27
6	0.004	250.0	3.69	36.30	32.61	10.2	72.59	72.44	72.29	72.79	72.48	72.54	72.23
61	0.004	200.0	2.07	21.32	19.26	9.7	72.19	72.09	71.99	72.35	72.14	72.15	71.94
479	0.003	200.0	1.63	17.36	15.72	9.4	72.76	72.62	72.48	72.92	72.64	72.72	72.44
30	0.002	250.0	2.71	29.59	26.88	9.2	73.72	73.58	73.45	73.92	73.64	73.67	73.39
198	0.001	200.0	1.08	11.80	10.73	9.1	73.43	73.39	73.34	73.59	73.50	73.39	73.30
221	0.003	200.0	1.71	19.40	17.69	8.8	74.50	74.38	74.26	74.66	74.42	74.46	74.22
4	0.004	250.0	2.96	36.87	33.91	8.0	72.91	72.77	72.64	73.11	72.83	72.86	72.58
44	0.005	200.0	1.79	22.53	20.74	7.9	73.02	73.02	73.02	73.12	72.67	72.92	72.47
3	0.003	250.0	2.70	34.98	32.28	7.7	73.20	73.05	72.91	73.40	73.11	73.15	72.86
62	0.004	200.0	1.54	20.66	19.12	7.4	72.47	72.34	72.21	72.63	72.37	72.43	72.17
159	0.007	200.0	2.02	27.40	25.38	7.4	71.03	70.79	70.64	71.20	70.71	71.00	70.51
83	0.003	200.0	1.40	19.07	17.67	7.3	74.67	74.58	74.50	74.83	74.66	74.63	74.46
447	0.004	200.0	1.47	20.61	19.14	7.1	72.49	72.29	72.10	72.65	72.26	72.45	72.06
43	0.005	200.0	1.59	23.01	21.42	6.9	73.11	73.03	73.02	73.27	73.12	73.07	72.92
477	0.003	250.0	2.18	32.34	30.17	6.7	72.39	72.39	72.39	72.52	72.35	72.27	72.10
127	0.004	200.0	1.42	21.31	19.89	6.7	70.18	70.02	69.86	70.35	70.02	70.15	69.82
157	0.007	300.0	5.30	83.06	77.75	6.4	71.19	70.99	70.80	71.44	71.03	71.14	70.73
165	0.004	200.0	1.33	20.98	19.65	6.4	71.62	71.46	71.32	71.78	71.47	71.58	71.27
1	0.002	250.0	1.85	29.32	27.47	6.3	73.66	73.56	73.46	73.87	73.67	73.62	73.42

FlexTable: Conduit Table (Winchester.swc)
Active Scenario: Future - Peak Wet Weather Pumped

Current Time: 0.000 hours

Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
200	0.003	200.0	1.04	17.26	16.23	6.0	70.66	70.59	70.52	70.83	70.69	70.63	70.49
139	0.003	200.0	1.14	19.16	18.01	6.0	70.56	70.38	70.20	70.73	70.37	70.53	70.17
167	0.003	200.0	1.07	18.03	16.96	6.0	72.12	72.09	72.05	72.29	72.22	72.09	72.02
129	0.004	200.0	1.08	19.74	18.66	5.5	70.54	70.36	70.18	70.71	70.35	70.51	70.15
416	0.003	250.0	1.79	32.78	30.99	5.5	73.29	73.24	73.19	73.50	73.40	73.25	73.15
201	0.003	200.0	1.03	18.95	17.92	5.4	70.82	70.76	70.71	70.99	70.87	70.79	70.67
476	0.006	250.0	2.36	45.61	43.25	5.2	72.39	72.16	71.94	72.60	72.15	72.35	71.90
460	0.003	250.0	1.61	31.46	29.85	5.1	71.90	71.81	71.73	72.12	71.93	71.87	71.68
24	0.003	250.0	1.53	30.18	28.65	5.1	73.67	73.57	73.48	73.88	73.69	73.63	73.44
468	0.003	250.0	1.61	31.92	30.30	5.0	72.09	72.00	71.90	72.30	72.12	72.05	71.87
501	0.005	200.0	1.13	22.40	21.27	5.0	73.33	73.18	73.03	73.50	73.20	73.30	73.00
116	0.004	200.0	1.04	20.77	19.73	5.0	76.23	76.07	75.90	76.40	76.07	76.20	75.87
2	0.005	250.0	2.12	43.05	40.93	4.9	73.46	73.32	73.20	73.67	73.40	73.42	73.15
446	0.004	200.0	1.01	20.73	19.72	4.9	72.88	72.68	72.49	73.05	72.65	72.85	72.45
443	0.008	200.0	1.45	30.03	28.57	4.8	69.85	69.71	69.63	70.02	69.74	69.82	69.54
42	0.009	200.0	1.48	31.68	30.19	4.7	73.97	73.53	73.11	74.14	73.27	73.94	73.07
85	0.004	200.0	0.91	20.01	19.09	4.6	75.06	74.95	74.84	75.23	75.01	75.03	74.81
84	0.005	200.0	0.99	22.21	21.22	4.5	74.84	74.74	74.67	75.01	74.82	74.81	74.62
138	0.004	200.0	0.91	20.81	19.89	4.4	71.04	70.88	70.73	71.21	70.90	71.01	70.70
166	0.006	200.0	1.14	26.21	25.06	4.4	72.05	71.72	71.62	72.22	71.57	72.02	71.37
CO-2	0.120	250.0	8.94	206.00	197.06	4.3	69.99	69.96	69.93	70.20	70.14	69.95	69.89
220	0.003	250.0	1.33	30.80	29.47	4.3	73.98	73.87	73.76	74.19	73.97	73.94	73.72
202	0.005	200.0	0.99	23.03	22.03	4.3	71.23	71.06	70.89	71.40	71.06	71.20	70.86
23	0.004	250.0	1.66	38.99	37.33	4.3	73.48	73.38	73.29	73.69	73.50	73.44	73.25
412	0.001	200.0	0.32	7.49	7.17	4.3	69.96	69.97	69.96	70.00	69.99	69.80	69.79
236	0.004	200.0	0.88	20.73	19.85	4.2	71.36	71.15	70.94	71.53	71.11	71.33	70.91
130	0.004	200.0	0.82	19.43	18.61	4.2	70.81	70.68	70.54	70.99	70.71	70.79	70.51
113	0.017	200.0	1.81	43.32	41.51	4.2	73.23	72.68	72.14	73.40	72.31	73.20	72.11
168	0.007	200.0	1.03	26.90	25.86	3.8	72.53	72.32	72.12	72.70	72.29	72.50	72.09
114	0.018	200.0	1.64	43.59	41.96	3.8	74.42	73.82	73.23	74.59	73.40	74.39	73.20
458	0.003	250.0	1.17	32.07	30.90	3.7	72.46	72.30	72.15	72.68	72.36	72.43	72.11
40	0.009	200.0	1.06	30.24	29.18	3.5	76.15	75.83	75.51	76.32	75.68	76.12	75.48
66	0.005	200.0	0.80	22.95	22.16	3.5	75.09	75.04	74.99	75.26	75.16	75.06	74.96
115	0.017	200.0	1.44	43.10	41.66	3.4	75.52	74.97	74.42	75.69	74.59	75.49	74.39
456	0.006	200.0	0.87	26.33	25.46	3.3	72.02	71.75	71.47	72.20	71.65	72.00	71.45
137	0.005	200.0	0.74	22.53	21.79	3.3	71.26	71.15	71.04	71.44	71.21	71.24	71.01
196	0.004	200.0	0.67	20.70	20.03	3.3	73.43	73.43	73.43	71.99	71.82	71.79	71.62
63	0.019	200.0	1.41	45.68	44.27	3.1	73.62	73.09	72.55	73.80	72.73	73.60	72.53
120	0.008	200.0	0.91	29.95	29.05	3.0	77.13	76.91	76.68	77.31	76.86	77.11	76.66
65	0.006	200.0	0.75	24.92	24.17	3.0	75.30	75.21	75.11	75.48	75.29	75.28	75.09
118	0.009	200.0	0.91	30.34	29.44	3.0	76.68	76.65	76.62	76.86	76.80	76.66	76.60
189	0.004	200.0	0.64	21.34	20.70	3.0	71.94	71.87	71.87	72.12	71.96	71.92	71.76
64	0.019	200.0	1.33	44.68	43.35	3.0	74.61	74.12	73.62	74.79	73.80	74.59	73.60
215	0.005	200.0	0.63	22.23	21.59	2.9	72.74	72.64	72.53	72.92	72.71	72.72	72.51
183	0.004	200.0	0.58	21.35	20.77	2.7	71.86	71.69	71.62	72.04	71.69	71.84	71.49
475	0.003	250.0	0.85	31.04	30.19	2.7	72.77	72.61	72.46	72.99	72.68	72.74	72.43
219	0.001	250.0	0.57	21.00	20.43	2.7	74.13	74.05	73.98	74.35	74.19	74.10	73.94
38	0.004	200.0	0.57	21.07	20.50	2.7	76.82	76.72	76.61	77.00	76.79	76.80	76.59
117	0.010	200.0	0.91	33.55	32.64	2.7	76.62	76.44	76.25	76.80	76.43	76.60	76.23
204	0.004	200.0	0.55	20.21	19.67	2.7	71.37	71.30	71.23	71.55	71.40	71.35	71.20
454	0.004	200.0	0.55	20.35	19.81	2.7	72.88	72.75	72.61	73.06	72.79	72.86	72.59
89	0.002	250.0	0.75	27.81	27.07	2.7	73.29	73.26	73.24	73.51	73.46	73.26	73.21
111	0.005	200.0	0.61	23.86	23.25	2.6	72.76	72.61	72.46	72.94	72.64	72.74	72.44
214	0.005	200.0	0.58	22.71	22.14	2.5	73.18	72.96	72.74	73.36	72.92	73.16	72.72
131	0.004	200.0	0.52	20.81	20.29	2.5	71.86	71.72	71.59	72.04	71.77	71.84	71.57
92	0.004	200.0	0.50	20.47	19.97	2.5	76.31	76.22	76.12	76.49	76.30	76.29	76.10
39	0.008	200.0	0.74	29.86	29.13	2.5	76.61	76.38	76.15	76.79	76.32	76.59	76.12
67	0.010	200.0	0.80	32.41	31.61	2.5	74.86	74.74	74.61	75.04	74.79	74.84	74.59
502	0.022	200.0	1.20	49.05	47.85	2.4	73.02	72.27	71.52	73.20	71.70	73.00	71.50
29	0.005	250.0	1.06	43.50	42.44	2.4	74.25	73.98	73.72	74.47	73.94	74.22	73.69
132	0.004	200.0	0.49	21.00	20.52	2.3	72.18	72.02	71.86	72.36	72.04	72.16	71.84
216	0.002	250.0	0.68	29.14	28.47	2.3	74.20	74.05	73.90	74.42	74.12	74.17	73.87
217	0.003	250.0	0.68	30.40	29.72	2.2	73.90	73.81	73.72	74.12	73.94	73.87	73.69
455	0.009	200.0	0.71	31.95	31.24	2.2	72.55	72.31	72.07	72.73	72.25	72.53	72.05
205	0.004	200.0	0.46	20.98	20.52	2.2	71.64	71.52	71.40	71.82	71.58	71.62	71.38
41	0.031	200.0	1.27	57.77	56.49	2.2	75.50	74.55	73.97	75.68	73.77	75.48	73.57
234	0.005	200.0	0.49	22.57	22.08	2.2	71.78	71.57	71.36	71.96	71.53	71.76	71.33
238	0.004	200.0	0.45	20.87	20.42	2.1	73.12	72.88	72.64	73.30	72.81	73.10	72.61
503	0.033	200.0	1.26	59.99	58.73	2.1	71.52	70.75	69.99	71.70	70.15	71.50	69.95
25	0.003	250.0	0.63	30.06	29.43	2.1	73.91	73.78	73.67	74.13	73.88	73.88	73.63
194	0.004	200.0	0.44	21.00	20.56	2.1	73.43	73.43	73.43	72.34	71.99	72.14	71.79
218	0.003	250.0	0.63	30.12	29.49	2.1	74.31	74.17	74.03	74.53	74.25	74.28	74.00
50	0.004	200.0	0.41	19.80	19.39	2.1	70.79	70.71	70.63	70.97	70.81	70.77	70.61
79	0.003	250.0	0.58	29.96	29.38	1.9	73.74	73.60	73.46	73.97	73.69	73.72	73.44
133	0.004	200.0	0.37	19.54	19.17	1.9	71.45	71.36	71.28	71.63	71.46	71.43	71.26
72	0.011	200.0	0.63	33.94	33.31	1.9	76.53	75.98	75.44	76.71	75.62	76.51	75.42
28	0.005	250.0	0.79	42.97	42.19	1.8	74.77	74.51	74.25	75.00	74.47	74.75	74.22
175	0.010	200.0	0.60	33.11	32.51	1.8	72.28	71.96	71.64	72.46	71.82	72.26	71.62
93	0.004	200.0	0.38	20.94	20.56	1.8	76.52	76.41	76.31	76.70	76.49	76.50	76.29
179	0.005	200.0	0.40	22.40	22.00	1.8	71.45	71.30	71.21	71.63	71.33	71.43	71.13
134	0.003	200.0	0.29	16.53	16.23	1.8	71.56	71.50	71.45	71.74	71.63	71.54	71.43
232	0.002	200.0	0.24	13.32	13.09	1.8	71.89	71.80	71.78	72.07	71.90	71.87	71.70
480	0.003	200.0	0.29	16.93	16.64	1.7	72.90	72.82	72.76	73.08	72.92	72.88	72.72
203	0.006	200.0	0.41	25.64	25.23	1.6	71.52	71.37	71.23	71.70	71.40	71.50	71.20
154	0.015	200.0	0.65	40.27	39.62	1.6	71.36	70.90	70.44	71.54	70.62	71.34	70.42
231	0.007	200.0	0.45	28.04	27.59	1.6	73.01	72.78	72.56	73.19	72.74	72.99	72.54
49	0.004	200.0	0.33	20.80	20.47	1.6	73.88	73.88	73.88	73.47	73.03	73.27	72.83
106	0.005	200.0	0.37	23.20	22.83	1.6	72.19	71.97	71.76	72.37	71.94	72.17	71.74
206	0.004	200.0	0.33	20.73	20.40	1.6	71.93	71.78	71.64	72.11	71.82	71.91	71.62
91	0.004	200.0	0.31	20.15	19.83	1.5	75.32	75.20	75.09	75.50	75.27	75.30	75.07
445	0.005	200.0	0.35	22.80	22.46	1.5	73.29	73.08	72.88	73.47	73.05	73.27	72.85

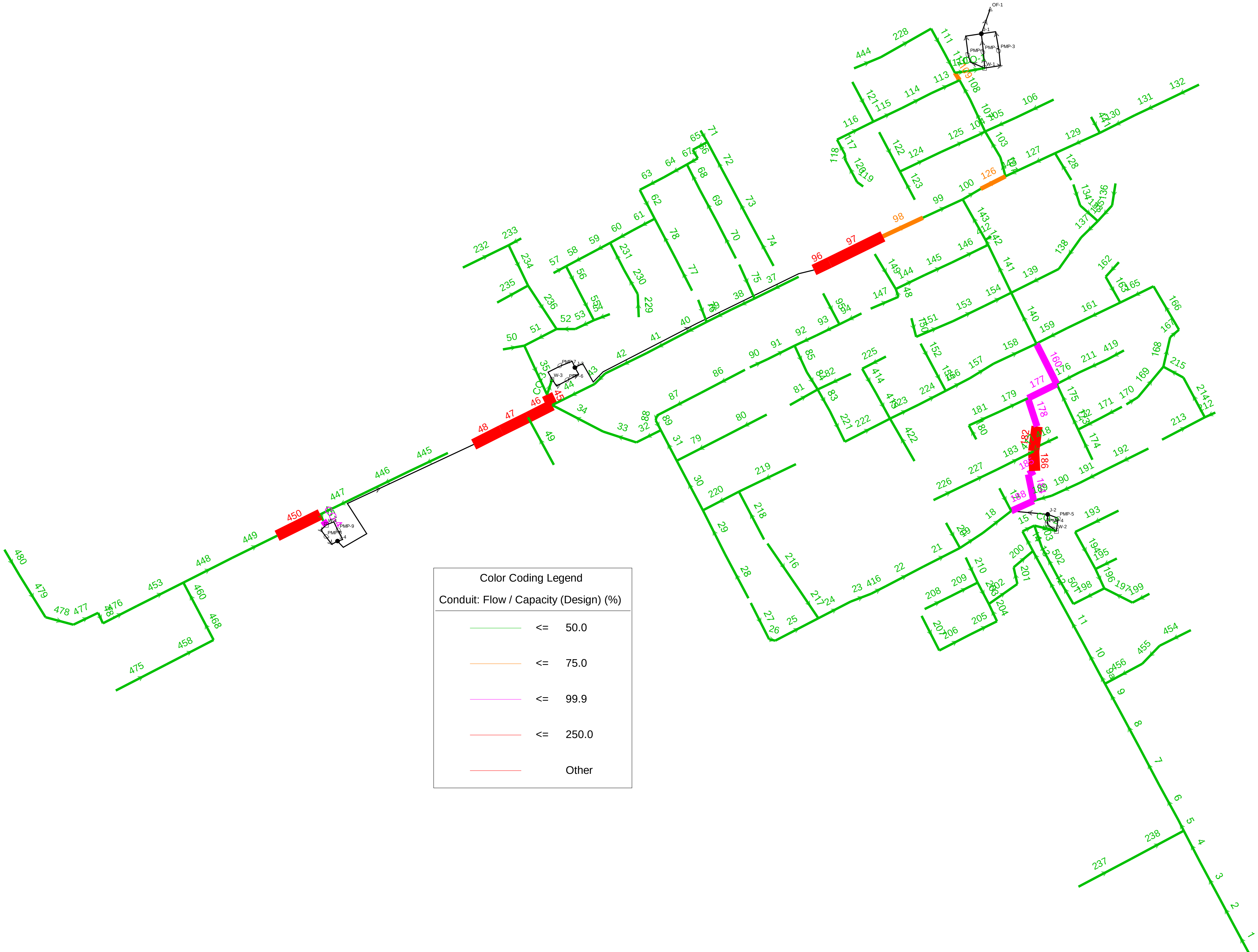
FlexTable: Conduit Table (Winchester.swc)

Active Scenario: Future - Peak Wet Weather Pumped

Current Time: 0.000 hours

Label	Slope (m/m)	Diameter (mm)	Flow (L/s)	Capacity (Full Flow) (L/s)	Capacity (Excess Full Flow) (L/s)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (m)	Hydraulic Grade Line (Middle) (m)	Hydraulic Grade Line (Out) (m)	Elevation Crown (Start) (m)	Elevation Crown (Stop) (m)	Invert (Start) (m)	Invert (Stop) (m)
145	0.020	200.0	0.69	45.83	45.13	1.5	75.15	74.55	73.96	75.33	74.14	75.13	73.94
163	0.005	200.0	0.34	23.14	22.80	1.5	71.56	71.41	71.32	71.74	71.44	71.54	71.24
125	0.030	200.0	0.81	56.77	55.95	1.4	72.77	71.51	70.25	72.95	70.43	72.75	70.23
176	0.009	200.0	0.44	30.75	30.31	1.4	72.21	71.98	71.76	72.39	71.94	72.19	71.74
211	0.007	200.0	0.39	27.66	27.26	1.4	72.65	72.43	72.21	72.83	72.39	72.63	72.19
37	0.004	200.0	0.29	20.55	20.26	1.4	77.21	77.01	76.82	77.39	77.00	77.19	76.80
146	0.037	200.0	0.89	63.38	62.49	1.4	73.96	72.43	70.91	74.14	71.09	73.94	70.89
173	0.010	200.0	0.46	32.92	32.46	1.4	72.67	72.47	72.28	72.85	72.46	72.65	72.26
193	0.005	200.0	0.32	23.48	23.16	1.4	73.43	73.43	73.43	72.84	72.34	72.64	72.14
105	0.010	200.0	0.45	32.86	32.41	1.4	71.76	71.42	71.09	71.94	71.27	71.74	71.07
73	0.008	200.0	0.39	28.84	28.45	1.4	77.23	76.88	76.53	77.41	76.71	77.21	76.51
80	0.002	250.0	0.40	29.34	28.94	1.4	73.97	73.86	73.74	74.20	73.97	73.95	73.72
190	0.015	200.0	0.53	40.34	39.81	1.3	72.89	72.41	71.94	73.07	72.12	72.87	71.92
121	0.004	200.0	0.25	19.47	19.22	1.3	75.92	75.76	75.60	76.10	75.78	75.90	75.58
135	0.004	200.0	0.26	20.93	20.66	1.3	71.43	71.34	71.26	71.61	71.44	71.41	71.24
78	0.016	200.0	0.53	42.08	41.55	1.3	75.41	74.65	73.90	75.59	74.08	75.39	73.88
415	0.010	200.0	0.41	32.54	32.13	1.3	75.15	74.86	74.57	75.33	74.75	75.13	74.55
87	0.007	250.0	0.58	48.17	47.59	1.2	74.02	73.69	73.36	74.25	73.59	74.00	73.34
69	0.009	200.0	0.37	30.98	30.61	1.2	76.75	76.42	76.10	76.93	76.28	76.73	76.08
104	0.045	200.0	0.81	69.37	68.56	1.2	70.25	69.95	69.65	70.43	69.83	70.23	69.63
209	0.006	200.0	0.29	25.14	24.85	1.2	71.92	71.74	71.56	72.10	71.74	71.90	71.54
169	0.005	200.0	0.26	23.70	23.43	1.1	72.93	72.72	72.53	73.12	72.70	72.92	72.50
144	0.019	200.0	0.49	44.80	44.31	1.1	76.34	75.74	75.15	76.53	75.33	76.33	75.13
192	0.005	200.0	0.25	23.23	22.98	1.1	74.18	73.92	73.66	74.37	73.85	74.17	73.65
230	0.008	200.0	0.31	29.94	29.64	1.0	73.47	73.24	73.01	73.66	73.19	73.46	72.99
74	0.004	200.0	0.21	20.58	20.37	1.0	77.58	77.40	77.23	77.77	77.41	77.57	77.21
26	0.002	250.0	0.24	23.51	23.27	1.0	73.95	73.94	73.93	74.18	74.16	73.93	73.91
136	0.004	200.0	0.20	20.07	19.87	1.0	71.59	71.51	71.43	71.78	71.61	71.58	71.41
124	0.030	200.0	0.57	57.23	56.66	1.0	75.60	74.18	72.77	75.79	72.95	75.59	72.75
68	0.021	200.0	0.47	47.86	47.38	1.0	76.09	75.48	74.87	76.28	75.06	76.08	74.86
181	0.003	200.0	0.18	18.35	18.18	1.0	71.65	71.55	71.45	71.84	71.63	71.64	71.43
191	0.015	200.0	0.39	40.36	39.97	1.0	73.66	73.27	72.89	73.85	73.07	73.65	72.87
237	0.002	200.0	0.15	15.84	15.69	1.0	73.39	73.25	73.12	73.58	73.30	73.38	73.10
213	0.010	200.0	0.32	33.38	33.06	1.0	74.23	73.73	73.22	74.42	73.41	74.22	73.21
414	0.010	200.0	0.31	33.24	32.92	0.9	75.73	75.44	75.15	75.91	75.33	75.71	75.13
162	0.004	200.0	0.20	21.40	21.20	0.9	71.73	71.64	71.56	71.91	71.74	71.71	71.54
227	0.020	200.0	0.42	46.58	46.16	0.9	73.35	72.60	71.86	73.54	72.04	73.34	71.84
419	0.004	200.0	0.19	21.65	21.46	0.9	72.81	72.73	72.65	73.00	72.83	72.80	72.63
153	0.024	200.0	0.45	50.40	49.96	0.9	73.02	72.19	71.36	73.21	71.54	73.01	71.34
81	0.004	200.0	0.18	20.45	20.27	0.9	74.89	74.77	74.67	75.08	74.83	74.88	74.63
77	0.013	200.0	0.31	37.41	37.11	0.8	76.34	75.87	75.41	76.53	75.59	76.33	75.39
207	0.004	200.0	0.17	20.88	20.71	0.8	72.27	72.11	71.95	72.46	72.14	72.26	71.94
148	0.004	200.0	0.16	19.99	19.83	0.8	76.49	76.46	76.43	76.68	76.62	76.48	76.42
70	0.008	200.0	0.23	29.76	29.53	0.8	77.43	77.09	76.75	77.62	76.93	77.42	76.73
112	0.081	200.0	0.69	93.29	92.60	0.7	72.45	70.65	69.07	72.64	69.04	72.44	68.84
197	0.010	200.0	0.23	32.02	31.79	0.7	73.43	73.43	73.43	72.43	71.82	72.23	71.62
155	0.016	200.0	0.30	41.03	40.73	0.7	73.36	72.90	72.43	73.55	72.62	73.35	72.42
128	0.004	200.0	0.15	20.81	20.67	0.7	71.44	71.29	71.14	71.63	71.33	71.43	71.13
228	0.010	250.0	0.42	59.79	59.36	0.7	74.00	73.41	72.82	74.23	73.05	73.98	72.80
122	0.011	200.0	0.24	34.13	33.88	0.7	76.59	76.10	75.61	76.78	75.80	76.58	75.60
75	0.004	200.0	0.14	20.75	20.60	0.7	77.43	77.28	77.13	77.62	77.32	77.42	77.12
225	0.010	200.0	0.23	32.81	32.59	0.7	76.66	76.39	76.12	76.85	76.31	76.65	76.11
226	0.010	200.0	0.22	32.49	32.27	0.7	74.02	73.69	73.35	74.21	73.54	74.01	73.34
95	0.004	200.0	0.14	20.73	20.59	0.7	76.82	76.68	76.54	77.01	76.73	76.81	76.53
123	0.004	200.0	0.14	20.45	20.31	0.7	75.86	75.74	75.61	76.05	75.80	75.85	75.60
149	0.009	200.0	0.21	31.25	31.05	0.7	77.81	77.44	77.06	78.00	77.25	77.80	77.05
229	0.007	200.0	0.18	27.08	26.90	0.7	73.79	73.63	73.47	73.98	73.66	73.78	73.46
195	0.010	200.0	0.22	32.98	32.76	0.7	73.43	73.43	73.43	72.48	71.99	72.28	71.79
174	0.009	200.0	0.21	31.65	31.44	0.7	73.29	72.98	72.67	73.48	72.85	73.28	72.65
208	0.006	200.0	0.16	25.43	25.27	0.6	72.26	72.09	71.92	72.45	72.10	72.25	71.90
90	0.004	200.0	0.13	21.13	21.00	0.6	75.52	75.42	75.32	75.71	75.50	75.51	75.30
17	0.005	200.0	0.13	22.26	22.12	0.6	72.19	72.12	72.10	72.38	72.14	72.18	71.94
235	0.015	200.0	0.23	39.80	39.56	0.6	72.39	71.87	71.36	72.58	71.53	72.38	71.33
172	0.008	200.0	0.17	29.52	29.35	0.6	73.05	72.86	72.67	73.24	72.85	73.04	72.65
71	0.004	200.0	0.11	19.80	19.69	0.6	75.54	75.49	75.44	75.73	75.63	75.53	75.43
171	0.007	200.0	0.16	28.37	28.21	0.5	73.51	73.28	73.05	73.70	73.24	73.50	73.04
151	0.026	200.0	0.29	52.73	52.45	0.5	75.10	74.06	73.02	75.29	73.21	75.09	73.01
147	0.009	200.0	0.16	31.23	31.07	0.5	77.05	76.78	76.50	77.24	76.69	77.04	76.49
212	0.002	200.0	0.07	13.45	13.39	0.5	73.22	73.20	73.18	73.41	73.37	73.21	73.17
444	0.012	200.0	0.18	36.54	36.36	0.5	74.72	74.36	74.00	74.91	74.18	74.71	73.98
82	0.010	200.0	0.15	32.27	32.12	0.5	75.86	75.50	75.14	76.05	75.33	75.85	75.13
20	0.014	200.0	0.17	38.31	38.14	0.4	73.95	73.55	73.16	74.14	73.35	73.94	73.15
94	0.011	200.0	0.15	33.77	33.62	0.4	77.04	76.77	76.52	77.23	76.70	77.03	76.50
27	0.009	250.0	0.24	54.93	54.69	0.4	74.76	74.37	73.97	75.00	74.21	74.75	73.96
417	0.005	200.0	0.09	22.19	22.10	0.4	71.62	71.62	71.62	71.60	71.54	71.40	71.34
76	0.004	200.0	0.09	21.27	21.18	0.4	76.39	76.29	76.19	76.58	76.38	76.38	76.18
150	0.018	200.0	0.18	43.93	43.75	0.4	75.84	75.49	75.14	76.03	75.33	75.83	75.13
86	0.015	250.0	0.30	72.97	72.68	0.4	75.52	74.77	74.02	75.76	74.25	75.51	74.00
57	0.004	200.0	0.07	20.43	20.36	0.4	71.44	71.38	71.34	71.63	71.52	71.43	71.32
152	0.019	200.0	0.15	44.84	44.68	0.3	74.26	73.81	73.36	74.45	73.55	74.25	73.35
88	0.105	250.0	0.58	192.31	191.73	0.3	73.32	73.29	73.29	73.56	72.54	73.31	72.29
180	0.003	200.0	0.05	18.42	18.37	0.3	71.75	71.70	71.65	71.94	71.84	71.74	71.64
54	0.005	200.0	0.07	23.04	22.97	0.3	72.92	72.83	72.75	73.11	72.94	72.91	72.74
418	0.010	200.0	0.09	32.87	32.78	0.3	71.91	71.68	71.62	72.10	71.65	71.90	71.45
199	0.021	200.0	0.12	47.15	47.03	0.3	73.43	73.43	73.43	73.23	72.43	73.03	72.23
210	0.010	200.0	0.07	32.27	32.20	0.2	72.67	72.40	72.13	72.86	72.32	72.66	72.12
170	0.020	200.0	0.08	45.89	45.81	0.2	73.46	73.19	72.93	73.66	73.12	73.46	72.92
441	0.016	200.0	0.06	40.94	40.88	0.2	71.09	70.80	70.54	71.28	70.71	71.08	70.51
233	0.015	200.0	0.05	39.52	39.47	0.1	72.12	71.91	71.78	72.32	71.90	72.12	71.70
119	0.014	200.0	0.00	39.02	39.02	0.0	77.33	77.23	77.13	77.53	77.31	77.33	77.11
451	-0.004	250.0	36.89	-38.90	-75.79	-94.8	71.22	71.19	71.16	71.15	71.21	70.90	70.96

Active Scenario: Future - Peak Wet Weather Pumped



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ENGINEERS · ARCHITECTS · PLANNERS

MEMORANDUM

To: Dan Belleau
Director of Public Works
Township of North Dundas

From: Mark Buchanan, P.Eng.

Re: Village of Winchester – Main Street West Pumping Station Assessment

Date: June 16, 2017

Job No.: 27448-01

CC: Angela Rutley, Township of North Dundas
Calvin Pol, Township of North Dundas

Background

The Township of North Dundas (Township) retained the services of J.L. Richards & Associates Limited (JLR) in the spring of 2017 to complete a Municipal Class Environmental Assessment for expansion of the Winchester Sewage Lagoons. During this project the Township requested that JLR assess the capacity of the existing Main Street West Pumping Station (PS), based on current development and operation of the pumping station, a proposed gas station/car wash site and future development envisioned as part of the Class EA.

In 2012, prior to this assessment, the Township requested that JLR investigate the wastewater capacity in the west end for a future gas station/car wash located at the intersection of Hwy #31 and Main Street. This investigation is summarized in a memorandum titled Village of Winchester – Future Gas Station Impact on West End Sewer System (JLR, October 11, 2012). It was concluded at that time that the Main Street West PS undergo a pump upgrade prior to accepting any additional wastewater flows from the proposed gas station or other development.

The west end wastewater collection system begins at the intersection of Hwy #31 and Main Street where sewage is conveyed via gravity to the Main Street West PS. Collected sewage is then pumped approximately 350 m along Main Street and discharges to a gravity sewer that conveys the flow to the Bailey Street PS. A 150 mm diameter forcemain from the Bailey Street PS discharges to a gravity sewer approximately 625 m east along Main Street. From this point wastewater flows by gravity to the Ottawa Street PS where it is then pumped to the treatment Lagoon (refer to the attached sketch in Appendix ‘A’).

In discussion with Township staff, we understand that since the 2012 investigation, the Main Street West PS submersible pump impellers were replaced to address on-going clogging issues attributed infrequent use allowing debris and rags to settle in the wet well. The Main Street West PS was originally designed to pump 3.4 L/s at 4.5 m total dynamic head (TDH) and can be upgraded to accommodate up to 12.3 L/s.

The following information was used in this assessment:

- Current Main Street West PS pump curve;
- Main Street West PS operational data from 2014 to 2016, (2 years of instantaneous flows from 2015 to 2016);
- Updated Projected Sanitary Sewer Connections (0-10 Years and 10-20 Years);
- West Service Area Development Projects Memorandum with Village comments dated September 27, 2012;
- Peak wastewater flows expected from the proposed gas station and car wash;
- Pump Station Design Brief dated March 2005 (Main Street West); and
- Ministry of Environment and Climate Change (MOECC), Amended Certificate of Approval (C of A) dated May 16, 2005.

Current Operations Review

Current operations of the Main Street West PS were reviewed, comparing instantaneous pumped flows, the manufacturer pump curve and the MOECC C of A as summarized in Table 1.

Table 1: Main Street West Pumping Station Operational Review

Main Street West PS	Data
Average Daily Instantaneous Pumped Flow	1.16 L/s
Manufacturer Pump Curve Duty Point	3.4 L/s @ 4.5 m TDH
MOECC C of A	3.5 L/s

The average daily instantaneous pumped flow of 1.16 L/s is significantly less than the pump duty point of 3.4 L/s at 4.5 m of total dynamic head (TDH) obtained from the manufacturer's pump curve. The Ontario Clean Water Agency (OCWA) advised that the average daily instantaneous pumped flow is calculated based on wet well volume and pump run time and is not measured with a flow meter. OCWA reviewed and confirmed that the average instantaneous pumped flow is being calculated properly. It is understood that the Main Street West SP is operating at a lower capacity following the recently impeller upgrades to address the pump clogging/ragging issue. Beyond the impeller upgrade, no information has been provided to suggest that the pumping system has been significantly modified that would result in an increased TDH to pump flow to the outlet and in turn lower the pumping flow rates.

From Main Street West PS Design Brief (Stantec, March 2005) the Design Point of 3.5 L/s at 4.5 m of TDH matches the pump flow rate indicated in the MOECC C of A and the duty point of the current pump curve (within 0.1 L/s), however, the operational data does not match the design point or current pump curve. It is unknown why there is a 2.34 L/s discrepancy between the design and operational flow rates recorded at the pumping station, but it is recommended that further investigation be undertaken as part of any future pump upgrade.

Flow Projections

Three years of daily sewage flow data from 2014 to 2016 along with daily instantaneous flows were reviewed. Peak wastewater generated from the existing service area was estimated based on the 15 m^3/day of average daily flow recorded at the Main Street West PS and peaked by a factor of (Manning peaking factor) based on the service population. The peak flow of 0.93 L/s anticipated from the proposed gas station and car wash was added to the existing flow (refer to Appendix 'B' for correspondence). In addition, wastewater flows from existing development not connected (committed capacity) and future development areas provided by the Township for the on-going sewage Lagoon Class Environmental Assessment were also added to the existing flow (refer to Appendix 'C' for future development areas). For future development lands the sewage flows were estimated at the commercial rate of 28,000 L/ha/day as recommended in the MOECC Sewage Design Guidelines, 2008. A peak factor of 1.5 was applied to commercial flows. Sewage flows are summarized in the following table (for complete details refer to Appendix 'D').

Table 2: Estimated Peak Wastewater Flows

Development	Estimated Peak Flow (L/s)
Existing	0.69
Proposed Gas Station and Car Wash	0.93
Sub-Total	1.62
Existing Development to be Connected (Committed Capacity)	
Residential	1.13
Restaurant – Country Kitchen	0.28
Motel	0.57
Sub-Total	1.98
Total	3.60
Future Development	
Areas 2 to 6, and 9 to 12	12.58
Total	16.18

From the forgoing review, the combined peak flow of 1.62 L/s from the existing development and proposed gas station and car wash exceed the current pumping rate of 1.16 L/s. Therefore, it is recommended that the pumping station be updated to its design capacity of 3.4 L/s prior to servicing the proposed gas station and car wash and any future development.

A majority of the future development could be serviced by upgrading the existing pumping station to its design capacity of 12.3 L/s. The capacity of receiving downstream sewers and pumping stations would need to be reviewed and confirmed as part this potential upgrade.

Servicing the total estimated peak flow of 16.18 L/s associated with future development would likely require a more extensive pumping station upgrade consisting of a larger wet well and submersible pumps.

Conclusion and Recommendations

Future sewage generation rates to be collected at the Main Street West PS were reviewed based on the pumping station design, current measured flows, committed capacity for existing unconnected development and future development.

The following recommendations are provided for the Township's consideration:

- The existing pumping station should be upgraded to its design capacity of 3.4 L/s prior to servicing the proposed gas station and car wash and any future development;
- The discrepancy between the current pumping rate of 1.16 L/s and design rate of 3.4 L/s should be investigated as part of any future pumping station upgrade;
- Upgrading the station to its design capacity of 12.3 L/s can service a majority of the future development, however, extensive pumping station upgrades are required to service the estimated peak flow of 16.18 L/s; and
- The capacity of the receiving downstream sanitary collection system should be reviewed and confirmed prior to any Main Street West PS upgrades.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by: Reviewed by:

Mark Buchanan, P.Eng. Sarah Gore, P.Eng.

MB/jd
Encl.

APPENDIX 'A'


OTTAWA ST
BAILEY ST
MAIN WEST
Legend
459 MH Number
200 Sewer Diameter
Sanitary Pumping Station
Sanitary Manhole
Forcemain
Gravity
OUTFALL
0 50 100 200 300 400 Meters
1:4,000

APPENDIX ‘B’

Mark Buchanan

From:	Mary Lynn Plummer <mplummer@northdundas.com>
Sent:	March 30, 2017 2:19 PM
To:	Mark Buchanan
Cc:	Sarah Gore; Dan Belleau; arutley@northdundas.com; 'Calvin Pol'
Subject:	FW: Pioneer - Winchester

Good afternoon,

Please see below: Email regarding Pioneer Gas flows for the Carwash and Convenience store. I believe all we need is updated flow or population projections for the service area?
Let me know.

Thanks,
Mary Lynn

From: cpol@northdundas.com [mailto:cpol@northdundas.com]
Sent: Thursday, March 30, 2017 1:28 PM
To: MaryLynn Plummer <mplummer@northdundas.com>; Angela Rutley <arutley@northdundas.com>
Subject: Fw: Pioneer - Winchester

As requested.

From: Janet Paul <Janet.Paul@pioneer.ca>
Sent: Thursday, March 30, 2017 1:16 PM
To: cpol@northdundas.com
Subject: Pioneer - Winchester

Hi Calvin,

Further to your request regarding sanitary flows our engineer has provided the following updated breakdown for our location post development. Please note the car wash flows have decreased as we are proposing a different wash package.

Convenience store/Gas bar – 9998 l/day.
Converting to l/sec and applying a peaking factor of 4 this becomes 0.46 l/sec

Car Wash -170 vehicles/day x 240 litres/vehicle = 40,800 litres/day
Convert to L/sec : 40,800/86400 = **0.47 L/sec.**

Please let me know if you have any questions or require additional information.

Regards,

Janet Paul | Development Project Manager
Pioneer Energy
A Division of Parkland Industries Ltd.
1122 International Blvd., Suite 700, Burlington, ON L7L 6Z8
Telephone: 905 633-3480

janet.paul@pioneer.ca

APPENDIX ‘C’

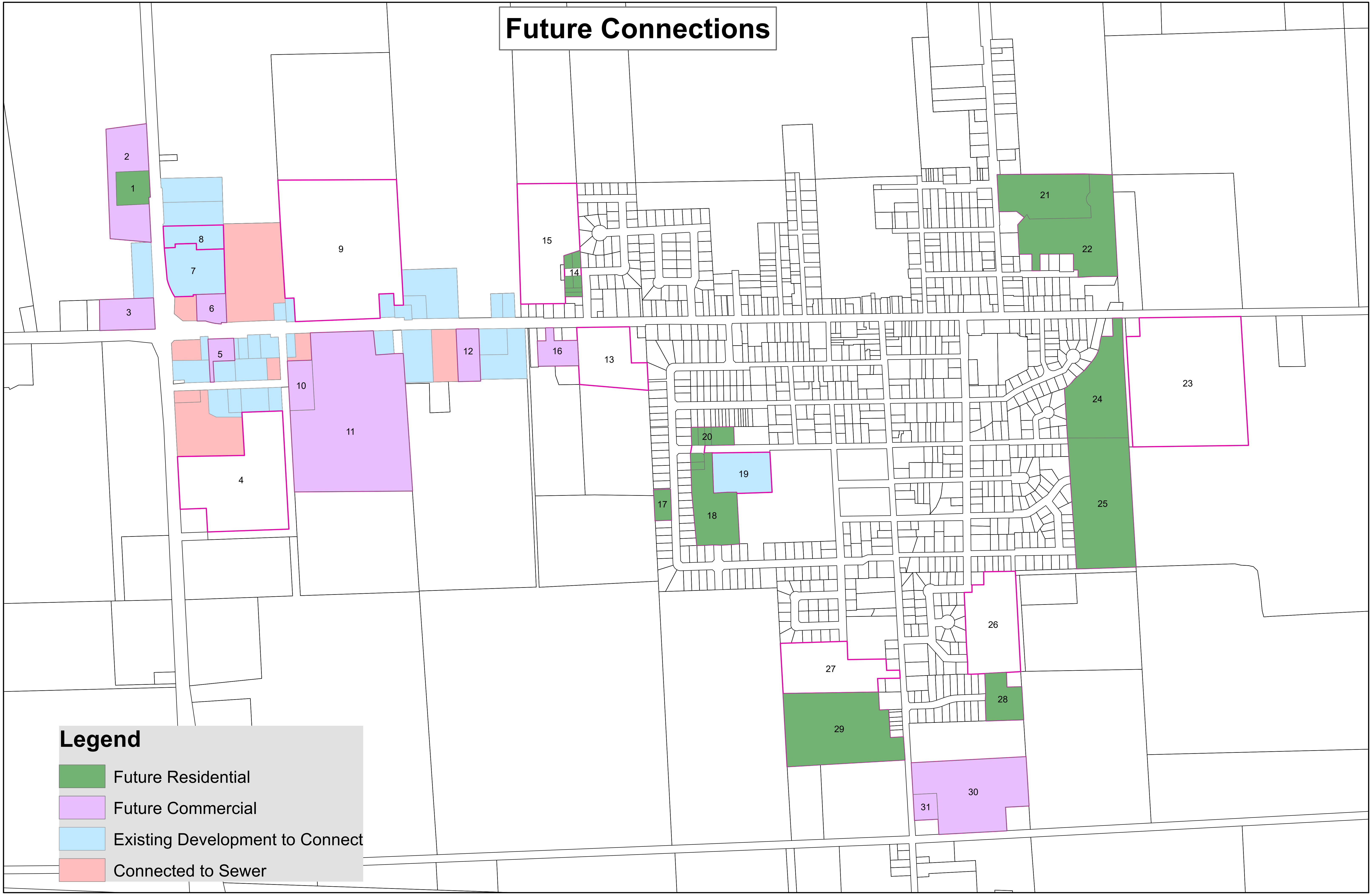
PROJECTED SANITARY SEWER CONNECTIONS

(0-10 Years and 10-20 Years)

Development Area	Description	# of Lots or Area	# of Units Connected to Existing System	Short-Term (0 – 10 Years)	Long-Term (10-20 Years)
A	Area A – Connected Before the west end pump station	8	see existing flow		
A	Area A Existing – Not Connected Before the west end pump station	28	0	14	14
1	Commercial – Pioneer Gas Restaurant /Car Wash	1	0	0.93 l/sec	0
2	Commercial #31 Strip	1	0	0	2.22 ha
3	Commercial #43/#31 corner	1	0	0.97 ha	0
4	Industrial/Commercial John Deere	1	0	0	0
5	Commercial – Main Street South side	1	0	0.45 ha	0
6	Commercial – Main Street North side	1	0	0.2 ha	0
7	Motel	1	0	0	14 units
8	Restaurant – Country Kitchen	1	0	0	7 units
9	Commercial/Residential	1	0	0	0
10	Commercial	1	0	0	0.88 ha
11	Commercial	1	0	0	10.9 ha
12	Commercial	1	0	0	0.8 ha
	SANITARY SEWER FLOW FUTURE GROWTH (KNOWN AND POTENTIAL)				
13	Residential Infill/Apartment in-houses/other throughout village	15	0	7	8
14	Winfields Subdivision.	6	0	6	0
15	Residential – Winfields Phase 2	1	0	0	0
16	Commercial	1	0	0	0.75 ha

17	Residential	4	0	4	0
18	New Dundas Manor (use existing flow)	1	Existing	0	0
19	Old Dundas Manor Building and Property	1	0	1.19 ha	0
20	Guy Racine Subdivision - Phase 3	8	0	8	0
21	PHD Health Care Seniors Complex	1	0	0	22 units (est.) (54 residents)-
22	Winchester Meadows Subdivision	26	0	18 Semi's (2x) 8 Singles	0
23	Vacant Residential	1	-	0	0
24	Woods Development High Density Apartments	2	0	48 Apt. units 21 Condo Townhomes	0
25	Woods Development Singles & Semi & Townhomes	34	-		19 singles 13 semis (x2) 2 towns (x5)-
26	Residential - Barnhart	1	0	-	0
27	Residential - M. Lafortune Investments	1	0	0	0
28	Residential Wintonia Dr. / James St	10 1 1	0	10 singles 4 unit townhouse 6 unit townhouse	-
29	Residential Esper Lane	3 5 6	-		15 units towns 22 units towns 29 units towns
30	Commercial	1	-	-	4.34 ha
31	Commercial	1		0.40 ha	

Prepared by the Planning Department: May 30, 2017 (Version #3)


Future Connections
1
2
3
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10
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25
26
27
28
29
30
31
Legend
Future Residential
Future Commercial
Existing Development to Connect
Connected to Sewer

APPENDIX ‘D’

Township of North Dundas
Main St. West Pumping Station Assessment
Sewage Flow Estimate

Development	Units	Commercial /Industrial Area (ha)	Average Flow (L/s)	Peak Flow (L/s)
Existing	8		0.17	0.69
Gas Station Car Wash				0.93
			Sub-Total	1.62
Future Development to be Connected (Committed)				
Residential	28		0.28	1.13
Restaurant - Country Kitchen	7		0.07	0.28
Motel	14		0.14	0.57
			Sub-Total	1.98
			Total	3.60
Future Commerical/Industrial				
Area 2		2.22	0.72	1.08
Area 3		0.97	0.31	0.47
Area 4		0	0.00	0.00
Area 5		0.45	0.15	0.22
Area 6		0.2	0.06	0.10
Area 9		0	0.00	0.00
Area 10		0.88	0.29	0.43
Area 11		10.9	3.53	5.30
Area 12		0.8	0.26	0.39
Infiltration		16.42		4.60
			Sub-Total	12.58
			Total	16.18

Parameters		
Existing Average Day	15	m^3/day from 2014-2016 data
Unit Density	2.5	people/unit
Daily Demand	350	L/cap/day
Manning Peaking Factor	4	
Infiltration	0.28	L/s/ha
Commerical/Industrial	28,000	L/ha/day
C/I Peaking Factor	1.5	

Technical Memorandum

To: Director, Client Services and Permissions Branch, MOECC

From: Shawn Qu, P.Eng., Ontario Clean Water Agency (OCWA)

cc: Stephane Barbarie (OCWA)

Date: June 25, 2018

Project: Pump Upgrade at Winchester Sewage Pumping Station No. 4

Subject: Supporting Information for ECA Amendment Application (ECA # 4037-6CAMCT)

1 Project Background

The Winchester Sewage Pumping Station (SPS) No.4 was design by Stantec in 2005 and constructed in 2006 to meet the serviceability of the west portion of the community of Winchester in the Township of North Dundas. The SPS No. 4 was designed to accommodate a maximum flow rate of 12.3 L/s; however, as the initial development (Phase 1) only had a projected flow rate of 3.29 L/s, to avoid potential odour issues, two sewage pumps with a rated capacity of 3.5 L/s each were selected and installed in the wet well in 2006. The low pumping rate corresponded to a velocity of 0.38 m/s in the forcemain, which resulted in solids deposition in the forcemain.

With the gradual development in the service area of the SPS No.4, the sewage flow to the SPS has increased over the years, and the existing two pumps appear insufficient to handle the sewage coming into the wet well. As a result, the existing pumps will need to be upgraded to new larger pumps to accommodate the increased flow and alleviate solids deposition in the forcemain. The existing Environmental Compliance Approval (ECA) will need to be amended to reflect the information of the proposed pumps.

2 Existing System

The existing SPS No.4 is located on Main Street approximately 500 meters east of County Road 31, and consists of a 2.44 m diameter wet well and an aboveground building housing the control equipment. The wet well is equipped with two submersible sewage pumps (one duty and one standby), each rated at 3.5 L/s against a total dynamic head of 4.5 m. Raw sewage enters the wet well via a 250 mm sanitary sewer and then is pump to a downstream sanitary manhole via 348 meters of 100 mm diameter sanitary forcemain. The SPS No.4 is governed by an existing ECA (No. 4037-6CAMCT) issued on May 16, 2005. A copy of the ECA is attached in Appendix A.

The most recent flow information of the SPS No.4 between May 2017 and May 2018 is shown in the Table 1 below. The Peak Flows were calculated using the Average Daily Flows multiply by a peaking factor of 4. The Average Pumping Rate was calculated using the Total Monthly Flow divided by the pump run hours.

Table 1: Flow Information of SPS No.4

DATE	TOTAL MONTHLY FLOW (M^3)	AVERAGE DAILY FLOW (L/D)	PEAK FLOW (L/S)	AVERAGE PUMPING RATE (L/S)
May 2017	966.0	31163	1.44	1.32
June 2017	662.4	22079	1.02	1.01
July 2017	846.6	27309	1.26	1.12
August 2017	809.8	26122	1.21	1.58
September 2017	772.1	25739	1.19	1.70
October 2017	862.8	27,832	1.29	1.61
November2017	1282.1	42,737	1.98	1.38
December 2017	1678.2	54,135	2.51	0.69
January 2018	1016.1	32,778	1.52	1.30
February 2018	1117.9	39,925	1.85	1.68
March 2018	1403.0	45,257	2.10	1.61
April 2018	2095.4	69,847	3.23	1.34
May 2018	1191.4	38,432	1.78	1.23

As shown above, the existing pumps in the wet well were only able to pump at a maximum rate of 1.70 L/s during May 2017 to May 2018. The low pumping rates translated to low flow velocities in the forcemain and caused solids settling in the pipe, which in turn would increase the head loss and reduce pumping capacity. The pumps are probably de-rated due to their age (12 years), which also contributes to the low pumping rate.

Table 1 also shows that, most of the time, the peak flows coming into the SPS have exceeded the maximum pumping rate; therefore, pump upgrade is required at this SPS.

3 Proposed Work

As per existing Design Brief prepared by Stantec Consulting Ltd. dated March 2005 (see Appendix B), the wet well of the SPS No.4 has the capacity to manage a maximum flow of 12.3 L/s; however, due to the capacity limitation of the downstream sewage pumping station (SPS No.3) at the corner of Bailey Street and Main Street, the maximum flow that can be pumped from the SPS No.4 is restricted to 7.0 L/s.

To be conservative and not overwhelming downstream SPS No.3, a pumping rate of 6.0 L/s is proposed at the SPS No.4. As the maximum peak flow experienced at SPS No.4 was around 3.23 L/s (Table 1), this proposed pumping rate should be able to handle the existing peak flow and provide enough capacity for additional flows of future development. The pumping volumes and control level spacing are summarized in the Table 2 below.

Table 2: Pumping Volumes and Control Level Spacing

DESIGN PARAMETERS	VALUES
Design Flow Q (L/s)	6.0
Lag pump volume = 0.06 × Q (m^3)	0.36
Corresponding control level spacing (m)	0.077
Lead pump volume = 0.15 × Q (m^3)	0.90
Corresponding control level spacing (m)	0.19

The geodetic elevations for the control levels to meet the new pumping rate of 6.0 L/s are listed in Table 3.

Table 3: Geodetic Evaluations

REFERENCE	GEODETIC ELEVATION (M)
Incoming sewer invert	70.96
High level alarm	70.68
Start lag level	70.53
Start lead level	70.45
Stop all pumps level	70.26
Low level alarm	70.16
Bottom of we well	69.86

A system analysis was performed to size the sewage pumps for the proposed pumping rate. The analysis indicated that a pumping rate of 6.0 L/s corresponds to a total dynamic head of (TDH) of 7.5 m. TDH is calculated using the following parameters:

- Equivalent length of 75 mm and 100 mm diameter pipes, between pump and downstream manhole, are 30 m and 358 m respectively, including allowance for fittings.
- Friction factor and static head are for three conditions:
  - Low flow condition: C=120 and static head (at stop both pump level) = 73.50-70.26 = 3.24 m,
  - Average flow condition: C=130 and static head (at median pumping volume level) = 73.50 – 70.36 = 3.14 m, and
  - High flow condition: C= 140 and static head (at sewer invert) = 73.50-70.96 = 2.54 m.

Details of the TDH calculations are summarized in the Table 4 below.

Table 4: Total Dynamic Head Calculations

PARAMETER	VALUES		
Flow Conditions	Minimum Flow	Average Flow	Maximum Flow
Friction C	120	130	140
Q (L/s)	6.0	6.0	6.0
Total Equivalent Length for 75 mm	30	30	30

PARAMETER	VALUES		
SS Forcemain (m)			
Total Equivalent Length for 100 mm PVC Forcemain (m)	358	358	358
Safety Factor	1.10	1.10	1.10
Friction Loss (m)	4.23	3.65	3.18
Static Head (m)	3.24	3.1	2.54
Total Dynamic Head (TDH)	7.47	6.79	5.72
Velocity (m/s)	0.74	0.74	0.74

The flow velocity within the 100 mm diameter forcemain is calculated to be 0.74 m/s, meeting the minimum requirement of 0.6 m/s as per the MOECC Design Guidelines for Sewage Works (2008). Therefore the new pump would reduce solids deposition in the forcemain.

OCWA reached out to the pump supplier, Xylem Inc., with the above information to size the new pump. The most suitable submersible sewage pump, meeting the above requirements without changing the existing piping and controls, is the Flygt NP 3069 SH 3, which has a rated capacity of 5.95L/s and a TDH of 13 m. A copy of the pump specifications is attached in Appendix C. As the forcemain outlets to a sanitary sewer manhole, the additional head will be diminished in the manhole. Alternately, the additional head can be reduced or eliminated by chocking the valves in the discharging line.

This ECA amendment application only pertains to the pump upgrade, the remaining equipment and characteristics of the SPS No.4 stay the same as existing.

APPENDIX A

MOECC ECA (4037-6CAMCT)

Ministry of the Environment | Ministère de l'Environnement

Ontario

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 4037-6CAMCT

RECEIVED MAY 24 2005

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Winchester Sewage Pumping Station
South Side of Main Street
North Dundas Township, United Counties of Stormont, Dundas & Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Sewage Pumping Station

- a ***sanitary sewage pumping station No.4*** with an initial capacity of 3.5 L/s to be constructed on south site of Main Street, approximately 500 m east of County Road No 31, consisting of a 2.44 m diameter wet well equipped with two (2) submersible pumps, one for duty and another for standby, each pump rated at 3.5 L/s against a total dynamic head of 4.5 m, complete with control panel, ultrasonic transducer and back up float switches, air vents, access ladder, discharge piping, by-pass connection, valves and all other appurtenances necessary to have a complete and operable pumping station, discharging to the proposed forcemain;

- the existing ***sanitary sewage pumping station No.3*** at the corner of Bailey Street and Main Street to be modified by replacing the pump impellers and discharge piping of the existing two (2) submersible pumps (one for duty and another for standby). After the modification, the pumping station has a rated capacity of 31.4 L/s at a total dynamic head of 25 m;

Sanitary Forcemain

- a 100 mm diameter ***sanitary forcemain*** from sewage pumping station No.4 to be constructed on Main Street, discharging to an existing sanitary manhole on Main Street;

in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry;

all in accordance with the application dated March 10, 2005 and received on March 18, 2005, and all supporting documentation and information, including design brief, final plans and specifications prepared by Stantec Consulting Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2. "*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

3. "*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

4. "*District Manager*" means the District Manager of the Kingston District Office of the Ministry;

5. "*Ministry*" means the Ontario Ministry of the Environment;

6. "*Owner*" means The Corporation of the Township of North Dundas and includes its successors and assignees;

7. "*Regional Director*" means the Regional Director of the Eastern Region of the Ministry;

8. "*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

9. "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below.

TERMS AND CONDITIONS

1 GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application

shall take precedence unless it is clear that the purpose of the document was to amend the application

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works*.

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations,

including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows.

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner's* operation of the *Works*

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7036-4JWPUE issued on May 2, 2000

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3 The name of the appellant;
4 The address of the appellant;
5 The Certificate of Approval number;
6 The date of the Certificate of Approval;
7 The name of the Director;
8 The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and
Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

Ministry of the Environment
Ministère de l'Environnement
Ontario

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1985-6CAMAT

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Main Street
North Dundas Township, United Counties of Stormont, Dundas and Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- ***sanitary sewers*** to be constructed on County Road No.31 and Main Street (County Road No.43), in the Township of North Dundas, United Counties of Stormont, Dundas and Glengarry;

all in accordance with the application dated March 10, 2005 and received March 18, 2005, including final plans and specifications prepared by Stantec Consulting Ltd..

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means The Corporation of the Township of North Dundas, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1 <u>GENERAL CONDITIONS</u>

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. <u>EXPIRY OF APPROVAL</u>

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

The reasons for the imposition of these terms and conditions are as follows.

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this Certificate the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

In accordance with Section 100 of the <u>Ontario Water Resources Act</u>, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the <u>Ontario Water Resources Act</u>, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to <u>each</u> portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon.

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and
Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

APPENDIX B

Stantec Design Brief (March 2005)

TOWNSHIP OF NORTH DUNDAS WINCHESTER SEWAGE SYSTEM EXPANSION AND PUMPSTATION MODIFICATION

Stantec

PUMP STATION DESIGN BRIEF

Project Number: 1634-00533

Prepared by:

Stantec Consulting Ltd.
400-1505 Laperriere Avenue
Ottawa, Ontario
K1Z 7T1

Prepared for:

Township of North Dundas
636 St. Lawrence Street,
P.O. Box. 489
Winchester, Ontario
K0C 2K0

March, 2005

TOWNSHIP OF NORTH DUNDAS
WINCHESTER SEWAGE SYSTEM EXPANSION AND PUMPSTATION MODIFICATION

Table of Contents

LIST OF APPENDICES

1.0 Introduction

1.1 PURPOSE OF APPLICATION

The purpose of this application is to amend the existing Certificate of Approval (Sewage) No. 7036-4JWPUE dated May 3rd, 2000 (refer to Appendix I), for the construction of a proposed sewage pumping station, forcemain, and modification of an existing sewage pumping station. These upgrades and/or modifications are required for serviceability of the west portion of the community of Winchester.

Although the civil works (i.e. inlet gravity sewer, wet well and forcemain) are designed to service the ultimate population within the drainage area, the mechanical works associated with this application (i.e. the sewage pumps) are to be selected to service a proposed commercial development located at the intersection of County Road 31 and Main Street and an existing commercial property located on the east side of County Road 31, approximately 250 meters north of the intersection.

On behalf of the Owner, The Corporation of the Township of North Dundas, the Ontario Clean Water Agency (OCWA) has been retained as the Operating Authority for the Sewage Collection and Treatment Facilities. As outlined in the Sanitary Servicing Assessment Report prepared by Stantec Consulting Ltd. on June 25, 2005, the treatment facilities can accommodate the additional flows associated with the additional population to be serviced by the new gravity sewer. An application for the proposed sanitary sewer has been submitted under a separate cover.

1.2 EXISTING SEWAGE COLLECTION, PUMPING AND TREATMENT SYSTEM

The Community of Winchester sewage collection and treatment system consists of the following:

- Approximately 5 km of gravity sewers, with diameters ranging between 200 and 300 mm diameter.
- A sewage pumping station located on St-Lawrence Street, servicing the south portion of Winchester; no sewage from the new sewage drainage area will be transferred to this station.
- Two (2) existing sewage pump stations, the first is located near the intersection of Main Street and Bailey Avenue (referred to as Pumping Station No.3) and the second near the intersection of Ottawa Street and Dufferin Street (referred to as Ottawa Street Pump Station). The rated capacity of Pumping Station No.3 is 24.39 L/s and based on the proposed flows will require some upgrade. Ottawa Street Pump Station has a rated capacity of 90L/s which is capable to proposed flows, considering a peak hour factor of 3.54.

- A waste stabilization pond, consisting of five cells, partial aeration, phosphorus removal facilities, and pumping facilities discharging to the Henderson Drain. Treated effluent eventually reaches the Castor River and the South Nation River. The Lagoon's rated capacity is 2,220 m^3/d. Final Effluent is discharged during the Spring and Fall seasons.

2.0 Sewage Collection and Pumping System

2.1 SERVICED AREA AND DESIGN FLOW RATES

The area to be ultimately serviced by the new sewage pumping station will include the west portion of the Community of Winchester, Dawley Drive, the future development located west of Highway #31 and approximately 500 meters north of Main Street along County Road 31. This area consists into the following (refer to Figure 1):

- A commercial area, located at the corner of Highway #31 and Main Street, including the existing Dean's Food Store and the proposed Tim Hortons.
- An area located north of Main Street, along the east side of Highway #31, consisting of an existing motel and restaurant.
- A residential and commercial development along Dawley Drive and on Main Street from Highway #31 to the proposed pumping station.
- A new development located along the extension of Main Street, west of Highway #31.

For the initial phase of development, Tim Hortons, the motel and restaurant (Country Kitchen) will be serviced. The corresponding total peak hour flow is 3.29 L/s, as stated in Appendix II. For initial development pump selection, we consider a flow rate of 3.5 L/s, which is the minimum flow generated by a commercial quality submersible pump (ITT FLYGT). Smaller domestic use pumps developing lower flow rates are available, however would not be suitable for the intense service conditions associated with a municipal system.

The ultimate service sewage flow within this drainage area is established to be12.3 L/s at peak hour. The new sewage pumping station wet well is to be designed to accommodate that flow.

2.2 GRAVITY SEWER

Under a separate cover, an application for a Certificate of Approval has been submitted to the MOE for the installation of a sanitary sewer for the serviceability of the following areas:

- Approximately 555 meters of 250 mm diameter gravity sewer on Main Street, between County Road 31 and the proposed sewage pumping station;
- Approximately 300 meters of 200 mm diameter gravity sewer on Main Street, east of the proposed pumping station, toward Bailey Street;
- Approximately 248 meters of 200 mm diameter gravity sewer along Highway #31, north of Tim Hortons.

The detailed design calculations are included under Appendix II. As per the MOE Guidelines, minimal slope have been retained, in order to limit excavation depth near pumping station. Flow rate generated by the commercial area for the first years of development is 3.29 L/s.

2.3 SEWAGE PUMPING STATION NO. 4 WET WELL

The preferred location of the proposed sewage pumping station is the Winchester Well No.4 site, which is currently owned by the Municipality. This site is located on Main Street approximately 500 meters east of County Road 31. This well pump station is no longer in operation however the facility still exists. Three phase power supply and telemetry facilities available on site are to be re-used to service the new Winchester Sewage Pumping Station No.4.

The wet well design is based on the ultimate population flow, which is 12.3 L/s. Station diameter is to be 2.44 meters (8'). The station cross-sectional area is 4.67 m^2. The corresponding pumping volumes and control level spacing is as follow:

Design flow Q	12.3 L/s

<u>Lag pump volume</u>

= 0.06 X Q	0.74 m^3
Control level spacing	0.16 m

<u>Lead pump volume</u>

= 0.15 X Q (m^3)	1.84 m^3
Control level spacing	0.39 m

The spacing between the incoming gravity sewer invert and the bottom of the wet well is established as follow:

= 150 mm between incoming sewer invert and start lag pump level
\+ 160 mm between start lag and start lead pump levels
\+ 390 mm between start lead and stop pump levels
\+ 100 mm between stop all pump level and low level alarm float level
\+ 300 mm low level alarm float level and bottom of wet well (typical value for submersible pumps)
= 1,100 mm between incoming sewer invert and bottom of wet well.

In order to meet the ultimate population requirements, the geodetic elevations of wet well are as follow:

Reference	Geodetic Elevation (m)
Top of wet well:	76.80
Finished ground level:	76.50
Intermediate platform:	73.80
Incoming sewer invert:	70.96
Bottom of wet well:	69.86

2.4 SEWAGE PUMPING STATION NO. 4 PUMP SELECTION TO SERVICE INITIAL PHASE OF DEVELOPMENT

The target design flow for pump selection is the fifteen-year design flow, i.e. 3.4 L/s. This flow is inferior to the ultimate pumping station capacity, but is sufficient to meet the proposed phase 1 needs (set at 3.29 L/s, as shown in Appendix II). A higher pump flow rate would have longer pump cycle duration, and would generate nauseous odors at the station and as such the shorter pump cycles associated with a smaller pump will avoid potential odor problems. For pumping volumes and control level spacing considerations, we rounded up the flow to 3.5 L/s, are the following:

Design flow Q	3.5 L/s
Lag pump volume = 0.06 X Q	0.21 m^3
Corresponding control level spacing	0.045 m
Lead pump volume = 0.15 X Q	0.52 m^3
Corresponding control level spacing	0.11 m

The geodetic elevations for the control levels, to meet the phase 1 design requirements, are as follow:

Reference	Geodetic Elevation (m)
Incoming sewer invert:	71.45
High level alarm float:	70.57
Start lag level:	70.42
Start lead level:	70.37
Stop all pumps level:	70.26
Low level alarm (stop all pumps):	70.16
Bottom of wet well:	69.86

A system analysis was performed to size the sewage pumps for this application. The system curve indicates that a flow of 3.4 L/s corresponds to a total dynamic head (**TDH**) of 4.50 m. The smallest available heavy duty ITT FLYGT submersible sewage pump (ie. model CP3045.180 HT with a 74 mm diameter impeller and 50 mm diameter discharge) is capable of handling the proposed flow rate.

Total dynamic head is calculated using the following design parameters (pump curve calculations are included under Appendix III):

- Equivalent length of 100 mm diameter pipe, between pump and gravity sewer manhole = 549 m, including allowance for fittings.
- Friction factor and static head are reviewed for three conditions
  - Low flow conditions: C = 120 and static head (at stop both pump level) = 73.50 – 70.26 m = 3.24 m,
  - Average flow conditions: C = 130 and static head (at median pumping volume level) = 73.50 – 70.31m = 3.19 m;
  - High flow conditions: C = 120 and static head (at sewer invert) = 73.50 – 71.45 m = 2.05 m. Pump motor is to be sized to meet this condition.

The flow velocity within the 100 mm diameter forcemain (0.38 m/s) is inferior to the self-cleaning velocity of 0.8 m/s. A forcemain bypass piping and valve assembly will be provided at the station, to facilitate forcemain-cleaning procedures in the first years of the development. Long-term flow rate will be sufficient to achieve the self-cleaning velocity.

The existing 60 A, 600v/3ph/60Hz electrical entrance will provide enough capacity to meet the new sewage pump starting load (12 A).

No standby power generator is to be installed at the station at this stage; instead, a manual transfer switch and an exterior wall mounted receptacle will be provided to connect a portable generator. Existing telemetry facilities will be programmed to send an alarm signal to the plant operator in case of a high level alarm and in case of loss of power. Volume provided within the wet well and the sewer, between the stop pump level and the lowest basement, is sufficient to provide two hours of retention volume.

The existing natural gas feed line along Main Street is servicing the pump building heater. The Municipality will install at a later date a natural gas powered generator outside the building, to meet the ultimate population sewer pump power requirements.

Characteristics of Sewage Pumping Station No. 4 pumps are the following:

- Cross-sectional area for a 2.44 m diameter wet well = 4.67 m^2
- Pump model: ITT FLYGT CP3045.180 HT, with 2 HP 600v/3ph/60Hz motor and 74 mm diameter impeller.
- Pump performance, 3.4 L/s at a total dynamic head of 4.5 m.
- Control level device: Milltronics MultiRanger.

- Minimum water level for pump operation (according to ITT FLYGT) = 260 mm.
- Discharge piping and valves: 75 mm diameter elbows, riser, ball valve, and gate valve.
- Forcemain: 100 mm diameter, 343 m long, with 45° elbows
- Discharge at gravity sewer manhole: Geodetic Elevation = 73.50 m

Pump curve is shown in Appendix IV.

2.5 MODIFICATIONS TO SEWAGE PUMPING STATION PUMP NO.3 AT BAILEY STREET

The existing sewage pumping station at the corner of Bailey Street and Main Street (hereafter designated as Pumping Station No.3) was upgraded in 2000, in order to service the various developments within the station drainage area. Each of the two 15 HP (11.2 kW) sewage pumps can develop the peak hour design flow rate of 24.39 L/s. A 40 kW diesel generator has been installed in 2002 to service the station.

The new sewage pumping station at Winchester Well No. 4 site will discharge the fifteen-year design flow (i.e. 3.0 L/s) to the existing Pumping Station No.3. Minor mechanical modifications at Pumping Station No.3, including the replacement of pump impeller and discharge piping will be sufficient to handle the above additional flow. No electrical upgrade is required at this time. Based on our preliminary review, major upgrades will be required at Pumping Station No.3 when the proposed Winchester Well No.4 sewage Pump Station is upgraded for ultimate flow.

Characteristics of the Pumping Station No.3 are the following:

- Cross-sectional area = 2.13 m X 2.13 m = 4.54 m^2
- Pump model: ITT FLYGT CP3140.180 HT,
- with 15 HP 600v/3ph/60Hz motor and 248 mm diameter impeller.
- Actual pump performance, as per Certificate of Approval No. 7036-4JWPUE dated May 2nd, 2000: 24.39 L/s at a total dynamic head of 71 ft (21.64 m)
- The Certificate has a typo error (71 m).
- Control level device: Milltronics MultiRanger.
- Minimum water level for pump operation (according to ITT FLYGT) = 260 mm.
- Discharge piping and valves: 100 mm diameter elbows, riser, ball valve, and gate valve.
- Forcemain: 150 mm diameter, 611 m long, with eight 45° elbows
- Discharge at gravity sewer manhole: Geodetic Elevation = 79.25 m

The revised pump design flow is 31.4 L/s (= 24.39 L/s from existing committed area plus 7.0 L/s from new station).

The proposed modifications consist into the following:

- Replacing the existing 248 mm diameter impeller with a 265 mm diameter impeller (referenced under Curve No. 63-480-00-3855, see Appendix V).
- Replacing the existing 100 mm diameter discharge piping and valve assembly by 150 mm diameter facilities.
- Adjusting control level elevations at ultrasonic transducer to meet new flow requirements.
- Adjusting platform and trash basket to meet new requirements; platform will be relocated above the revised high level alarm level, in order to avoid flooding under normal operation conditions.

The design pumping volumes and corresponding elevations are the following:

Design flow Q 31.4 L/s

<u>Lag pump volume</u>

= 0.06 X Q 1.88 m^3
Control level spacing 0.41 m

<u>Lead pump volume</u>

= 0.15 X Q (m^3) 4.71 m^3
Control level spacing 1.04 m

The revised geodetic elevations for Pumping Station No.3 are as follows:

Reference	Geodetic Elevation (m)
Top of station:	75.82
Ground Level:	75.67
Overflow invert:	73.97
Revised platform elevation:	70.60
High level alarm float:	70.43
Start lag level:	70.33
Original platform elevation:	70.18
Start lead level:	69.92
Incoming sewer invert:	69.70
Stop all pumps level:	68.88
Low level alarm (stop all pumps):	68.84
Bottom of wet well:	68.58

Total dynamic head was calculated using the following design parameters (refer to Appendix VI for detailed calculations):

- Equivalent length of 150 mm diameter pipe, between pump and gravity sewer manhole = 69 m, including allowance for fittings.
- Friction factor and static head are reviewed for three conditions
    - Low flow conditions: C = 120 and static head (at stop both pump level) = 79.25 m – 68.88 m = 10.37 m, with one pump.
    - Q = 30.0 L/s at TDH = 25.0 m.
    - Average flow conditions: C = 130 and static head (at median pumping volume level) = 79.25 m – (69.92 m + 68.88 m)/2 = 9.85 m, with one pump.
    - Q = 31.4 L/s at TDH = 25.0 m.
    - High flow conditions: C = 120 and static head (at overflow level) = 79.25 –73.97 m = 5.28 m, with both pumps in operation.
    - Q = 44.0 L/s at TDH = 28.0 m, with two pumps (22.0 L/s per pump).

2.6 WINCHESTER LAGOON RESIDUAL CAPACITY

The available Winchester residual capacity is adequate to accept the supplementary flow from the new sewage collection system. The Winchester Lagoons has a total capacity of 2,220 m^3/d. The average daily flow rate monitored in 2003 and 2004 were 1,647 and 1,547 m^3/d respectively. The sewage collection system expansion toward the west end of Winchester can therefore take place.

The existing Winchester main sewage pumping station has a capacity of 90 L/s at peak hour. The station has been designed to match the lagoon capacity (2,220 m^3/d, or 25.5 L/s), with a 3.54 peak factor. The actual main pumping station is adequate to service the additional commercial area (supplementary flow of 3.5 L/s), without any modification.

3.0 DRAWINGS

The drawings showing the implementation of the improvements to the works are included under separate cover.

Stantec Consulting Ltd.

Jean Hebert, M.A.Sc., ing., P.Eng.
Environment Engineer

APPENDIX I

CERTIFICATE OF APPROVAL (SEWAGE)

NO. 7036-4JWPUE DATED MAY 3RD, 2000

APPENDIX I

CERTIFICATE OF APPROVAL (SEWAGE) NO.

7036-4JWPUE DATED MAY 3RD, 2000

TOWNSHIP OF North Dundas

February 5, 2001

Ministry of the Environment
2 St. Clair Avenue, West Floor 12A
Toronto, Ontario M4V 1L5

Attention: Mr. Mohamed Dhalla, P. Eng
Director
Section 53, Ontario Water Resources Act

Reference: *Main Street Pumping Station*
Township of North Dundas

Dear Mr. Dhalla:

The Main Street Pumping Station is a Township owned facility that was originally constructed in the early 1970's. Both the municipality and OCWA (the agency responsible for operating the facility on behalf of the municipality) have attempted in vain to locate the "Certificate of Approval" for the original construction. The said pumping station now requires upgrading as a result of a new subdivision development.

In early 2000 the Developer that requires the pumping station upgrade submitted an "Application for Approval" for the upgrade to your Ministry. This resulted in your Ministry issuing "Certificate of Approval" Number 7036-4 JWPUE (copy attached). The said "Certificate of Approval" was issued to the Developer.

It has been brought to our attention that because the municipality owns the station, the aforementioned certificate should correctly have been issued to the municipality, not the numbered company owned by the Developer (i.e. indeed when the application was submitted to your Ministry, specific mention should have been made that the developer applying for the certificate was doing so acting as an agent for the municipality).

At this time, therefore, we are requesting that "Certificate of Approval" Number 7036-4 JWPUE be amended to reflect that fact that the Township of North Dundas is the owner of the works. To this end we are enclosing a cheque in the amount of $200.00 that we understand is required to cover the administrative processing costs.

Please do not hesitate to call if you have any questions or require additional clarification.

Sincerely,

Howard F. Smith
Clerk Administrator
Township of North Dundas

encl.

RECEIVED
MAY 10 2000

CERTIFICATE OF APPROVAL
MUNICIPAL AND ~~PRIVATE SEWAGE WORKS~~
NUMBER 7036-4JWPUE

Ministry of the Environment | Ministère de l'Environnement
tario

1332484 Ontario Inc.
R.R. #1
South Mountain, Ontario
K0E 1W0

te Location: Winchester Pumping Station, South Side of Main Street, in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

pgrading the existing sewage pumping station by replacing the existing pumps with two(2) new submersible wage pumps (one duty, one standby), each pump capable of handling 24.39 L/s against a total dynamic head f 71m;

l in accordance with the Application for Approval of Municipal and Private Water and Sewage Works and Guy-Racine Subdivision, Upgrade to Winchester Pump Station Report", dated November 1999, as prepared nd submitted for approval by Novatech Engineering Consultants Ltd.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as mended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after eceipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, R.S.O. 990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

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. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

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4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Secretary* vironmental Appeal Board 00 Yonge St., 12th Floor). Box 2382 ronto, Ontario P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

e above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 2nd day of May, 2000

THIS IS A TRUE COPY OF THE ORIGINAL NOTICE MAILED

ON May 3rd, 2000

SIGNED

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

District Manager, MOE Cornwall
Mr. Greg MacDonald, P.Eng., Novatech Engineering Consultants Ltd.

APPENDIX II

GRAVITY SEWER DESIGN flow rates

SANITARY SEWER CALCULATION SHEET

Manning's n = 0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INDUST			INST		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	# UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	**TOTAL FLOW (l/s)**	LENGTH (m)	ACTUAL DIA. (mm)	NOM. DIA. (mm)	SLOPE (%)	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	Q/Qcap (%)
County Road 31	101	102	0.00	0.00	0	0.00	0	4.00	0.00	1.50	1.50			0.00		0.00	0.35	1.50	1.50	0.42	**0.77**	60.00	0.20	200	0.28	17.35	0.55	4.4%
County Road 31	102	103	0.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	100.00	0.20	200	0.28	17.35	0.55	4.4%
County Road 31	103	104	0.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	65.00	0.20	200	0.28	17.35	0.55	4.4%
County Road 31	104	401	0.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	22.00	0.20	200	0.28	17.35	0.55	4.4%
Main Street	409	408	1.77	3.00	9	1.77	9	4.00	0.15	0.00	0.00			0.00		0.00	0.00	1.77	1.77	0.50	**0.64**	95.00	0.20	200	0.50	23.19	0.74	2.8%
Main Street	408	407	3.21	2.00	6	4.98	15	4.00	0.24	0.00	0.00			0.00		0.00	0.00	3.21	4.98	1.39	**1.64**	23.00	0.20	200	0.40	20.74	0.66	7.9%
Main Street	407	406	1.34	2.00	6	6.31	21	4.00	0.34	0.00	0.00			0.00		0.00	0.00	1.34	6.31	1.77	**2.11**	125.00	0.20	200	0.40	20.74	0.66	10.2%
Main Street	400	401	0.00	0.00	0	0.00	0	4.00	0.00	0.81	2.31			0.00		0.00	0.53	0.81	2.31	0.65	**1.18**	60.00	0.25	250	0.22	27.89	0.57	4.2%
Main Street	401	402	0.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	120.00	0.25	250	0.22	27.89	0.57	4.2%
Main Street	402	403	0.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	120.00	0.25	250	0.22	27.89	0.57	4.2%
Main Street	403	404	0.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	99.00	0.25	250	0.22	27.89	0.57	4.2%
Main Street	404	405	0.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	99.00	0.25	250	0.22	27.89	0.57	4.2%
Main Street	405	406	0.00	0.00	0	6.31	21	4.00	0.34	0.00	2.31			0.00		0.00	0.53	0.00	8.62	2.41	**3.29**	99.00	0.25	250	0.22	27.89	0.57	11.8%
Main Street	406	PS	0.00	0.00	0	6.31	21	4.00	0.34	0.00	2.31			0.00		0.00	0.53	0.00	8.62	2.41	**3.29**	13.00	0.25	250	0.22	27.89	0.57	11.8%

DESIGN PARAMETERS

Average Daily Flow =	350 l/p/day	Industrial Peak Factor =	as per MOE Graph
Comm/Inst Flow =	5000 L/ha/da	Extraneous Flow =	0.28 L/s/ha
Industrual Flow =	3500 L/ha/da	Minimum Velocity =	0.60 m/s
Max Res. Peak Factor =	4.00	Mannings n =	0.013
Commerical / Inst peak Factor =	4.00	Persons per Unit =	3.0 persons/unit

Designed: MPT	PROJECT: **Winchester Sanitary Sewer Extension - Phase 1**		
Checked: JH	LOCATION: **Township of North Dundas**		
Dwg. Reference:	File Ref.:	Date: 9-Mar-05	Sheet No. 1 OF 1

APPENDIX III

FLOW AND HEAD LOW CALCULATIONS FOR

SEWAGE PUMPING STATION NO.4 ON MAIN STREET

Main Street Sewage Pumping Station, located at Winchester Well No.4 Site
Initial flow = 3.5 L/s, servicing limited commercial area

Minimum flow condition, at stop pump level, with maximum friction factor (C = 120)

Q	(L/s)	0.0	1.0	2.0	3.0	4.0
Friction C		120	120	120	120	120
Length - 100 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 100 mm FM	(m)	0.00	0.16	0.59	1.26	2.14
Static head	(m)	3.24	3.24	3.24	3.24	3.24
TDH	(m)	3.24	3.40	3.83	4.50	5.38
Velocity within 150 mm FM	(m/s)	0.00	0.13	0.25	0.38	0.51

Average flow condition, at median pumping level, with average friction factor (C = 130)

Q	(L/s)	0.0	2.0	3.0	3.5	3.7
Friction C		130	130	130	130	130
Length - 150 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 150 mm FM	(m)	0.00	0.51	1.08	1.44	1.60
Static head	(m)	3.19	3.19	3.19	3.19	3.19
TDH	(m)	3.19	3.70	4.27	4.63	4.79
Velocity within 150 mm FM	(m/s)	0.00	0.25	0.38	0.45	0.47

Maximum flow condition, at invert level, with minimum friction factor (C = 140)

Q	(L/s)	0.0	3.0	4.0	5.0	6.0
Friction C		140	140	140	140	140
Length - 150 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 150 mm FM	(m)	0.00	0.94	1.61	2.44	3.42
Static head	(m)	2.05	2.05	2.05	2.05	2.05
TDH	(m)	2.05	2.99	3.66	4.49	5.47
Velocity within 150 mm FM	(m/s)	0.00	0.38	0.51	0.64	0.76

Compiled by:

APPENDIX IV

PUMP CURVE AT SEWAGE PUMPING STATION NO.4
ON MAIN STREET

FLYGT — PERFORMANCE CURVE

PRODUCT	CP3045.180	TYPE	HT
DATE	2005-03-11	PROJECT	
CURVE NO	63-254-00-3464	ISSUE	2

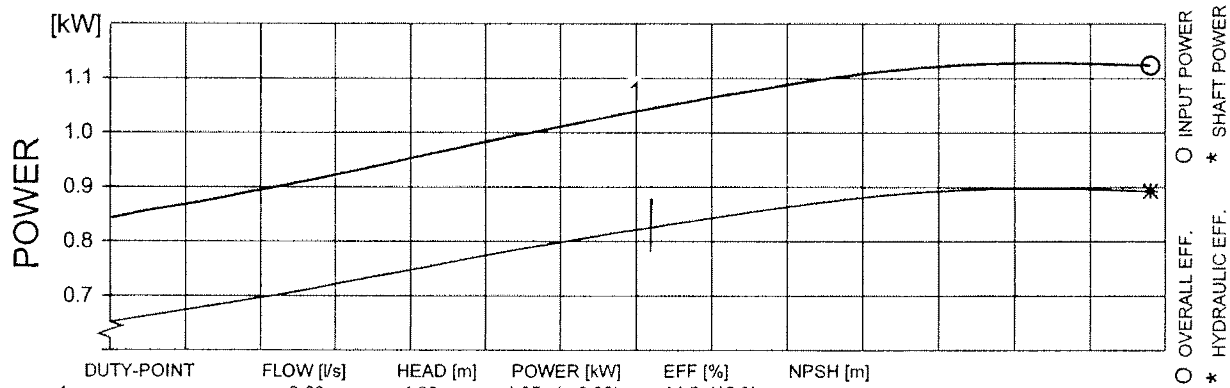
	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.87	0.82	0.71
MOTOR EFFICIENCY	79.0 %	80.0 %	78.0 %
GEAR EFFICIENCY	---	---	---

COMMENTS

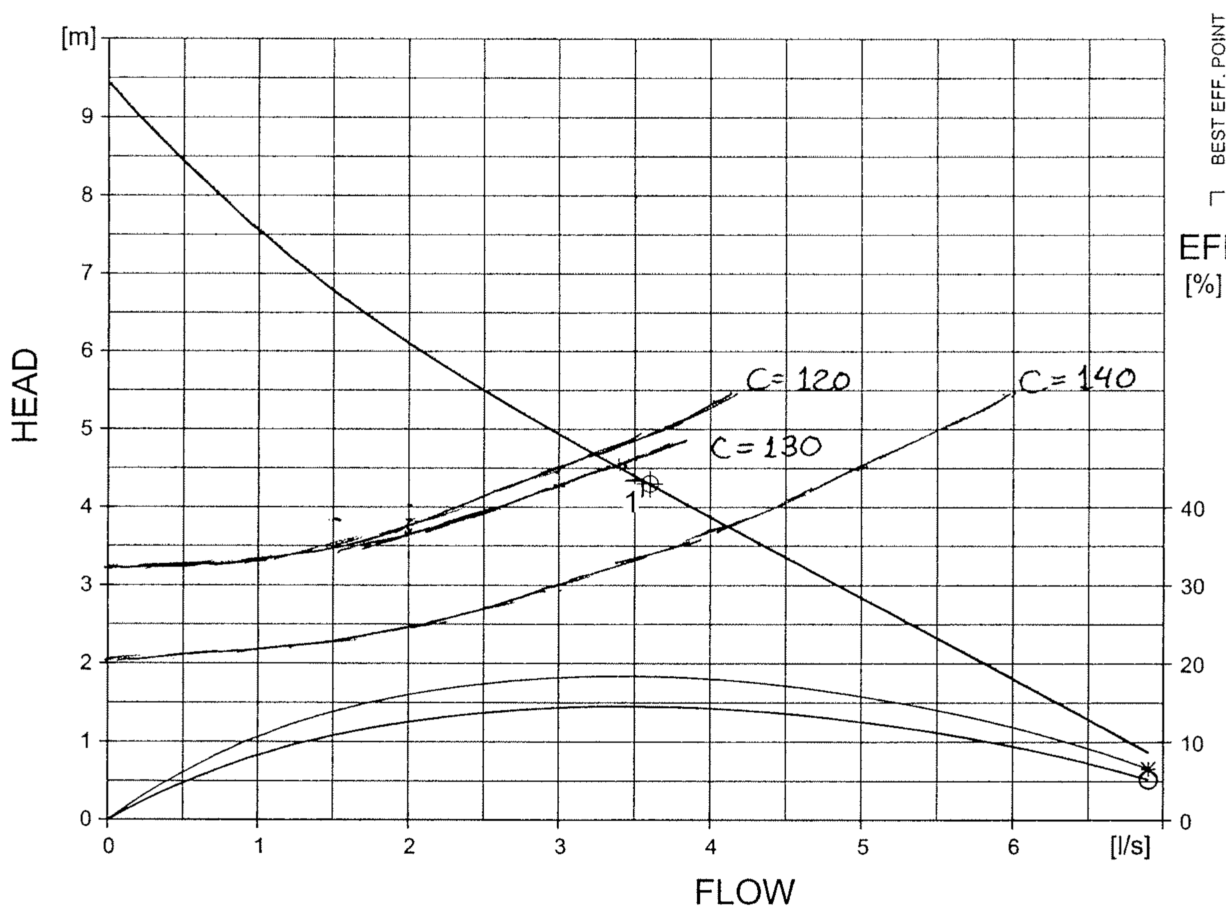
INLET/OUTLET	- / 50 mm
IMP. THROUGHLET	46 mm

MOTOR SHAFT POWER	1.3	kW
STARTING CURRENT ...	12	A
RATED CURRENT ...	1.8	A
RATED SPEED	3405	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER	74 mm		
MOTORTYPE	12-08-2AA	STATOR 05Y	REV 10
FREQ. 60 Hz	PHASES 3	VOLTAGE 600 V	POLES 2
GEARTYPE	---	RATIO	---



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [kW]	EFF [%]	NPSH [m]
1	3.60	4.30	1.05 (0.83)	14.5 (18.3)	
B.E.P.	3.55	4.34	1.05 (0.83)	14.5 (18.4)	



FLYPS2.11 (20010918)

Performance with clear water and rating data at 40 °C

FLYGT CURVE

APPENDIX V

PUMP CURVE AT BAILEY STREET SEWAGE PUMPING STATION

Station No.3 at corner of Bailey Street and Main Street
Pump impeller and discharge piping replaced
in order to increase flow rate from 24.39 to 31.4 L/s

Minimum flow condition, at stop pump level, with maximum friction factor (C = 120)

Q	(L/s)	0.0	20.0	25.0	30.0	30.7	35.0
Friction C		120	120	120	120	120	120
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	7.00	10.60	14.88	15.54	19.82
Static head	(m)	10.37	10.37	10.37	10.37	10.37	10.37
TDH	(m)	10.37	17.37	20.97	25.25	25.91	30.19
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.74	1.98
TDH	(ft)	34.0	57.0	68.8	82.9	85.0	99.1

Average flow condition, at median pumping level, with average friction factor (C = 130)

Q	(L/s)	0.0	20.0	25.0	30.0	31.4	32.5
Friction C		130	130	130	130	130	130
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	6.04	9.14	12.83	13.96	14.88
Static head	(m)	9.85	9.85	9.85	9.85	9.85	9.85
TDH	(m)	9.85	15.89	18.99	22.68	23.81	24.73
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.78	1.84
TDH	(ft)	32.3	52.1	62.3	74.4	78.1	81.1

Maximum flow condition, at overflow level, with minimum friction factor (C = 140)

							Two pumps : = 2 X 22 L/s
Q	(L/s)	0.0	20.0	25.0	30.0	31.4	44.0
Friction C		140	140	140	140	140	140
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	5.26	7.96	11.18	12.16	22.78
Static head	(m)	5.28	5.28	5.28	5.28	5.28	5.28
TDH	(m)	5.28	10.54	13.24	16.46	17.44	28.06
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.78	2.49
TDH	(ft)	17.3	34.6	43.4	54.0	57.2	92.0

Compiled by

APPENDIX VI

FLOW AND HEAD LOW CALCULATIONS FOR
BAILEY STREET SEWAGE PUMPING STATION

FLYGT	PERFORMANCE CURVE	PRODUCT CP3140.180	TYPE HT
DATE 2004-06-21	PROJECT	CURVE NO 63-480-00-3855	ISSUE 1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.85	0.81	0.72
MOTOR EFFICIENCY	84.0 %	84.5 %	83.0 %
GEAR EFFICIENCY	---	---	---

MOTOR SHAFT POWER	11.2	kW
STARTING CURRENT ...	85	A
RATED CURRENT ...	15	A
RATED SPEED	1745	rpm
TOT.MOM.OF INERTIA ...	0.15	kgm2
NO. OF BLADES	1	

COMMENTS

INLET/OUTLET: - /100 mm

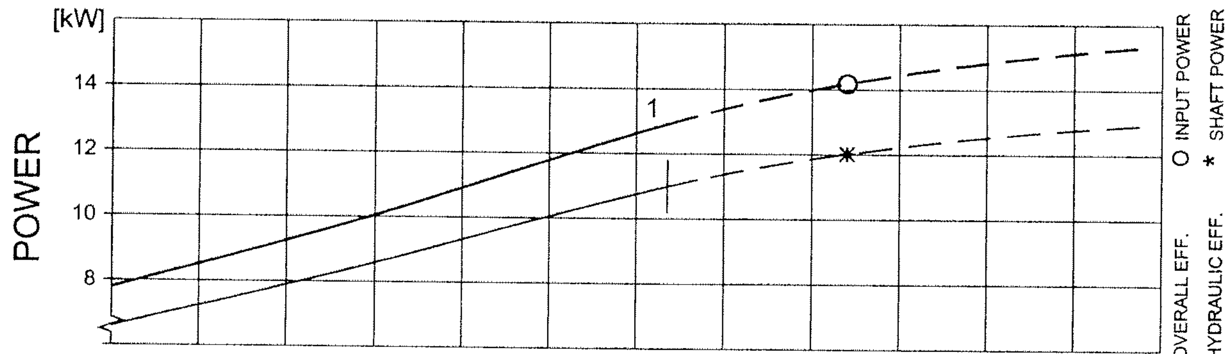
IMP. THROUGHLET: 76 mm

IMPELLER DIAMETER: 265 mm

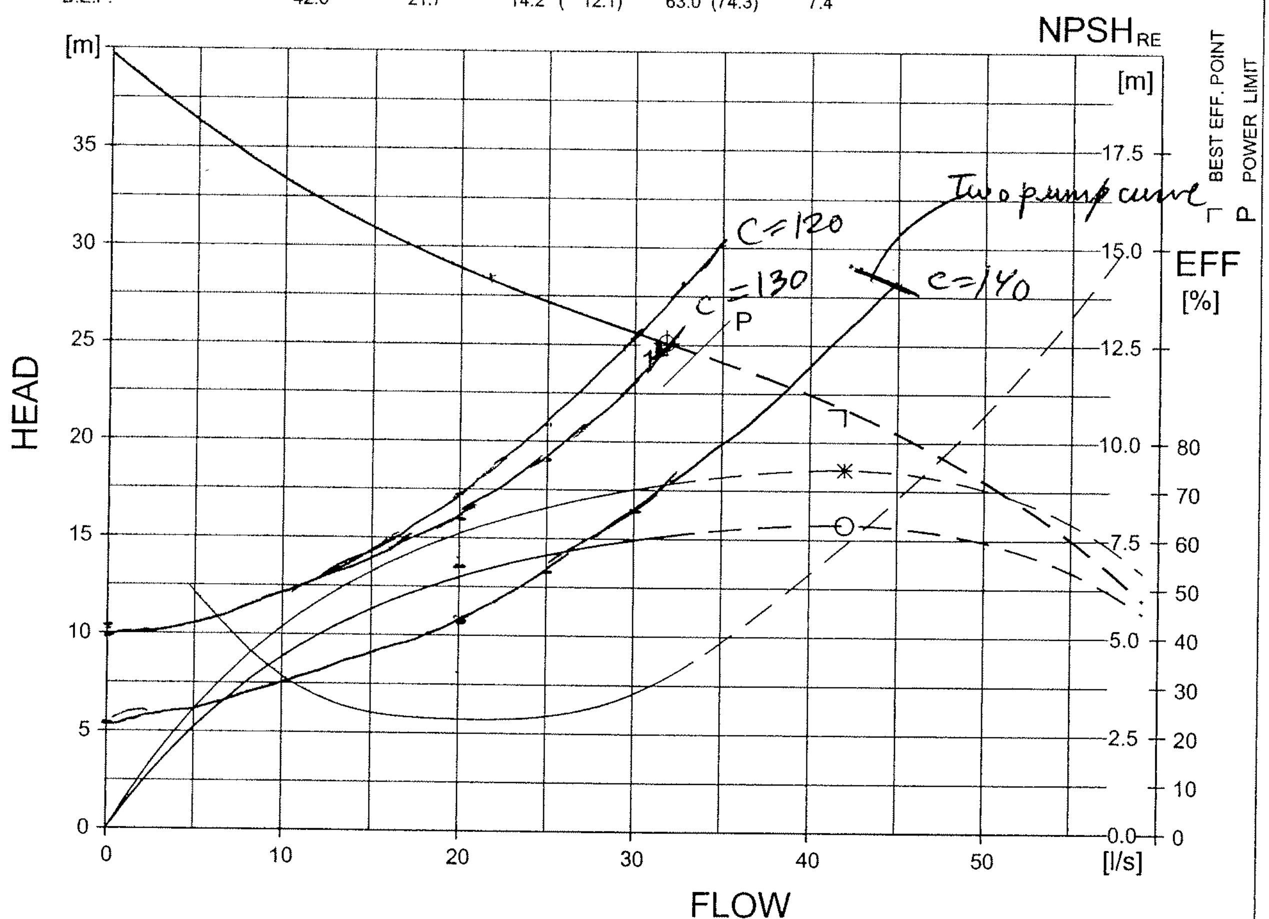
MOTORTYPE	STATOR	REV
25-11-4AA	52D	10

FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	4

GEARTYPE	RATIO
---	---



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [kW]	EFF [%]	NPSH [m]
1	31.8	25.1	13.0 (11.0)	60.6 (71.2)	4.0
B.E.P.	42.0	21.7	14.2 (12.1)	63.0 (74.3)	7.4



FLYPS2.11 (20010918)

Performance with clear water and rating data at 40 °C

FLYGT CURVE

APPENDIX C

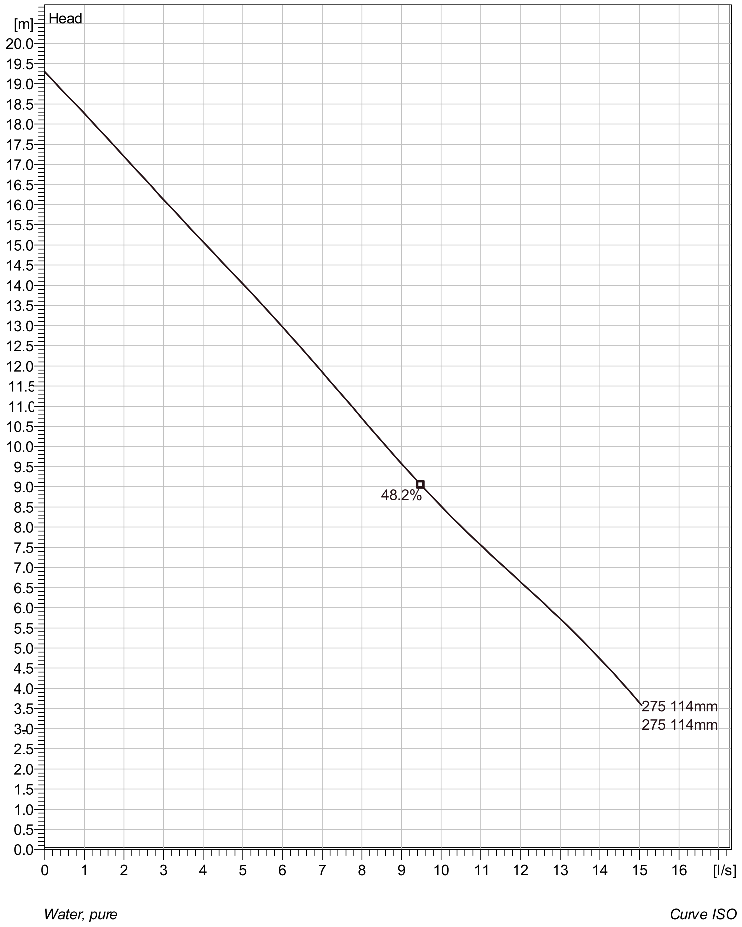
Specifications of the Proposed Pump

xylem

NP 3069 SH 3~ Adaptive 275

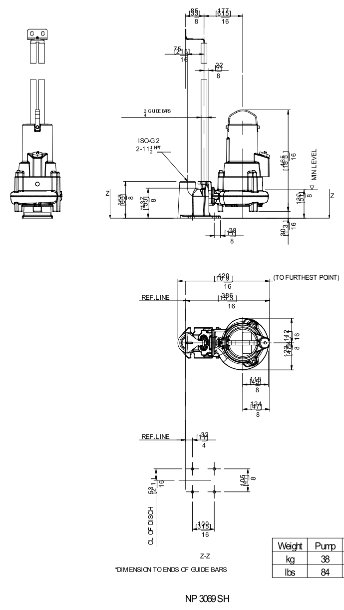
Technical specification

FLYGT



Note: Picture might not correspond to the current configuration.

Installation: P - Semi permanent, Wet



Weight	Pump	Stand
kg	38	7
lbs	84	15

General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	50 mm
Suction Flange Diameter	100 mm
Impeller diameter	114 mm
Number of blades	2

Motor

Motor #	N3069.160 13-08-2BB-W 2.7hp Standard
Stator variant	4
Frequency	60 Hz
Rated voltage	600 V
Number of poles	2
Phases	3~
Rated power	2.7 hp
Rated current	2.9 A
Starting current	15 A
Rated speed	3315 rpm
Power factor	
1/1 Load	0.86
3/4 Load	0.81
1/2 Load	0.71
Motor efficiency	
1/1 Load	78.1 %
3/4 Load	80.4 %
1/2 Load	80.4 %

Configuration

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

NP 3069 SH 3~ Adaptive 275

Performance curve

Pump

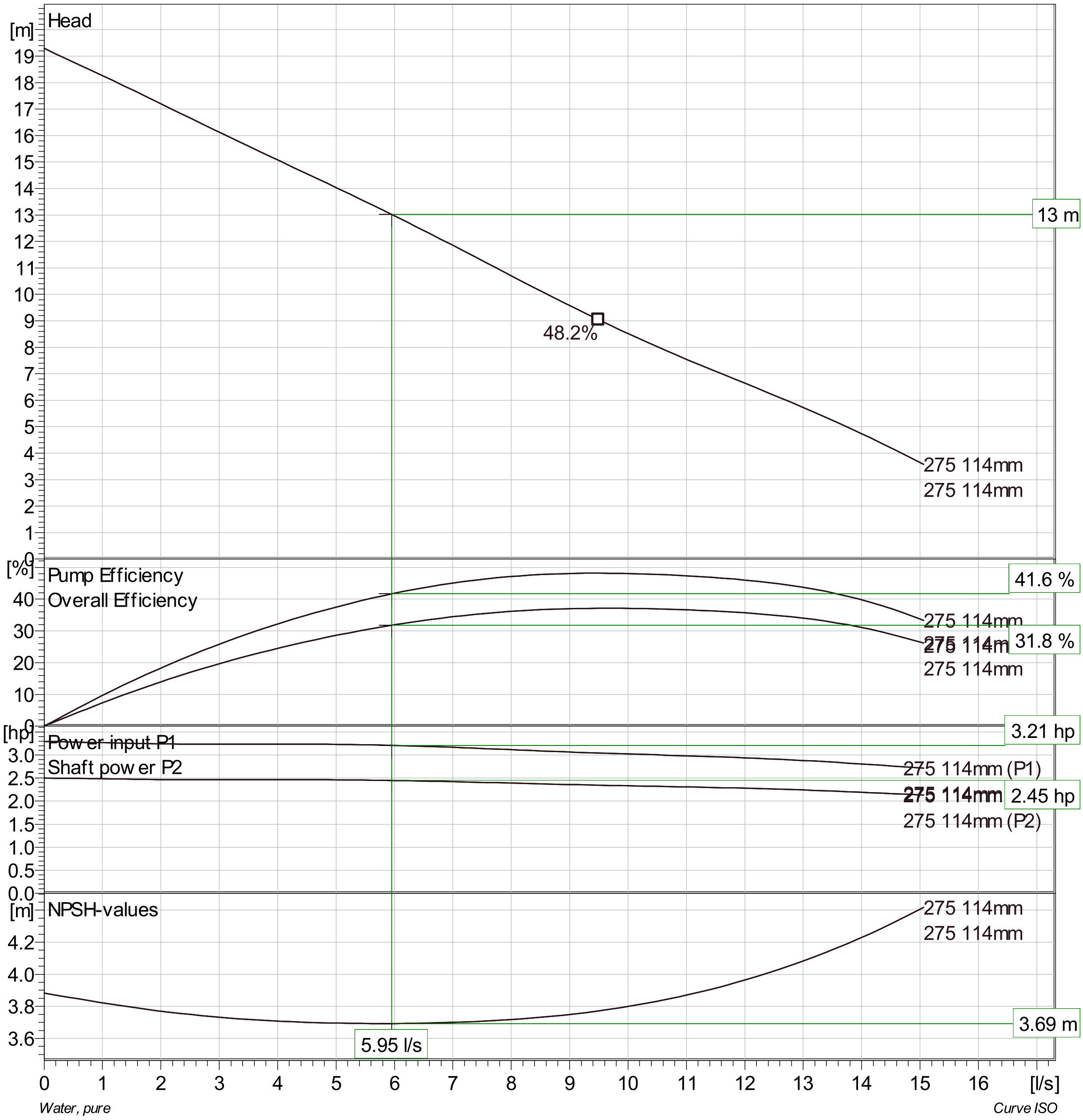
Discharge Flange Diameter	50 mm
Suction Flange Diameter	100 mm
Impeller diameter	114 mm
Number of blades	2

Motor

Motor #	N3069.160 13-08-2BB-W 2.7hp
Stator variant	4
Frequency	60 Hz
Rated voltage	600 V
Number of poles	2
Phases	3~
Rated power	2.7 hp
Rated current	2.9 A
Starting current	15 A
Rated speed	3315 rpm

Power factor	
1/1 Load	0.86
3/4 Load	0.81
1/2 Load	0.71

Motor efficiency	
1/1 Load	78.1 %
3/4 Load	80.4 %
1/2 Load	80.4 %



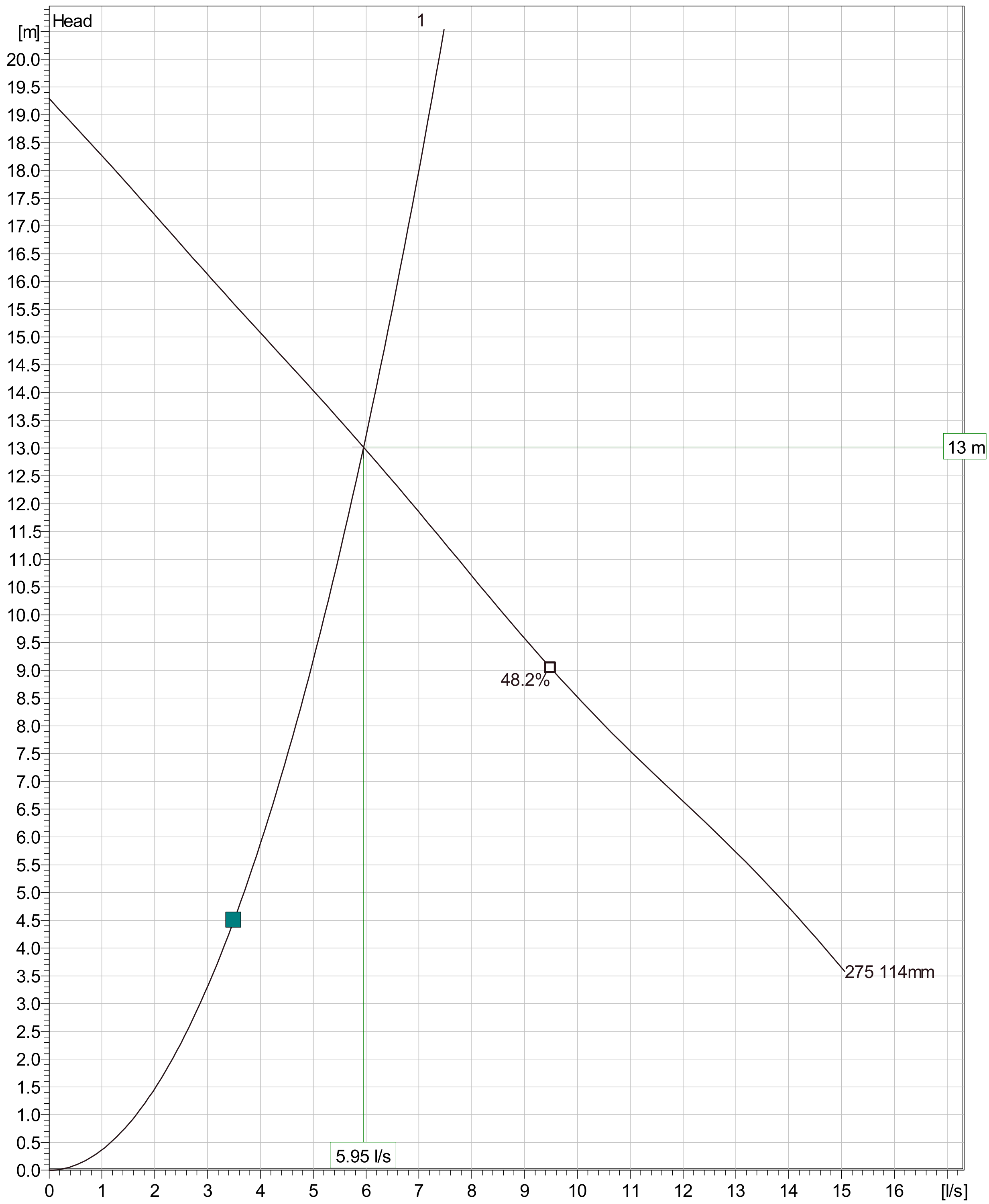
Duty point		Guarantee
Flow	**Head**	
3.5 l/s	4.5 m	No

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

xylem

NP 3069 SH 3~ Adaptive 275

Duty Analysis



Water, pure

Curve issue 3

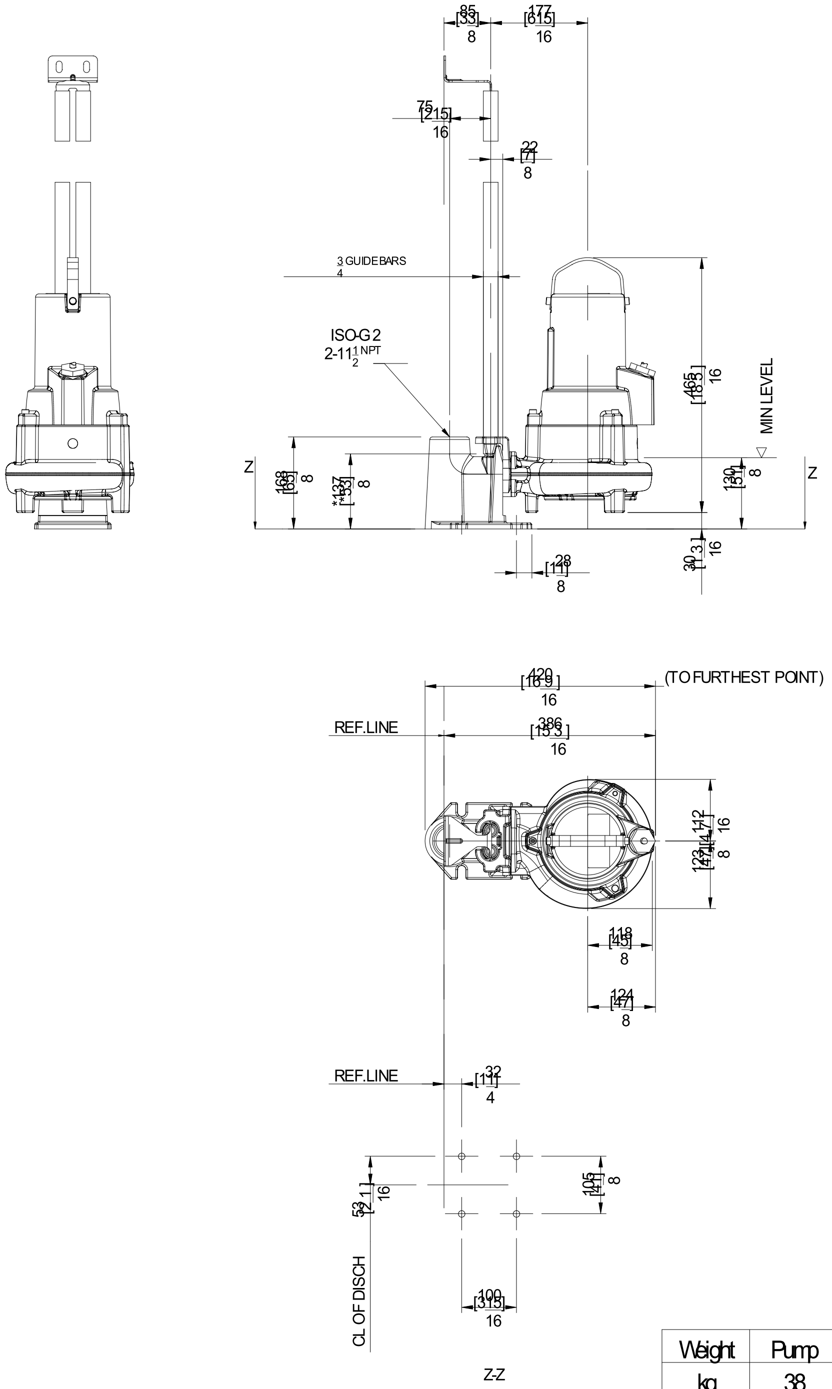
Curve ISO

Pumps running /System	Individual pump Flow	Head	Shaft power	Total Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	5.95 l/s	13 m	2.45 hp	5.95 l/s	13 m	2.45 hp	41.6 %	0.000112 kWh/l	3.69 m

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

NP 3069 SH 3~ Adaptive 275

Dimensional drawing



*DIMENSION TO ENDS OF GUIDE BARS

Weight	Pump	Stand
kg	38	7
lbs	84	15

NP 3069 SH

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

MEMORANDUM

J.L. Richards
& Associates Limited
700 - 1565 Carling Avenue
Ottawa, ON Canada
K1Z 8R1
Tel: 613 728 3571
Fax: 613 728 6012

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

To: Mr. Dan Belleau
Director of Public Works
Township of North Dundas
636 St. Lawrence Street
P.O. Box 489
Winchester, ON K0C 2K0

From: Nicolas Bialik, E.I.T.
Ivan Dzeparoski, P.Eng.
Mark Buchanan, P.Eng.

Re: Township of North Dundas –Winchester Wastewater Capacity Assessment

Date: June 14, 2019

JLR No.: 28553-001

CC: Sarah Gore – J.L. Richards & Associates Ltd.

OBJECTIVE

The purpose of this study is to assess the remaining wastewater capacity of the Main Street West Sewage Pumping Station (SPS), Bailey Street SPS and trunk gravity sewers in Winchester, Ontario. The findings of this assessment will allow the Township and the potential Developer to make an informed decision on the number of units, if any, that can be serviced as part of an initial development phase. Refer to Figure 1 of Attachment ‘A’ for an overview of Winchester’s communal wastewater system. Specifically, this study includes the following:

- Summary of the existing wastewater treatment and collection system;
- Review of three years (2016-2018) of historical flow data to establish existing peak flow to the Main Street West SPS and Bailey Street SPS to estimate the remaining pumping capacity;
- Review of the existing Main Street West SPS and Bailey Street SPS pump data to verify that pump operation corresponds to the pumping station’s rated capacity;
- Review of the existing 2012 hydraulic wastewater model and update of the model based on recent and expected system upgrades, which include:
  - Increased pumping capacity at the Main Street West SPS;
  - 12 unit apartment under construction along Main Street;
  - Connection of one existing home on Main Street West, currently on private service; and
  - Connection of two businesses on Dawley Drive that have paid capital charge and are awaiting connection;
- Review of the remaining downstream theoretical sewer capacity based on the updated model;
- Comparison of rated pump capacity to simulated pumped peak flows in the model to recommend remaining wastewater capacity of the Main Street West SPS and Bailey Street SPS; and
- Final recommendation on the available wastewater capacity, if any to accommodate an initial phase of the proposed Wellings development.

BACKGROUND

In 2012, the Township of North Dundas (Township) retained JLR to develop a hydraulic wastewater model of the Winchester communal wastewater collection system. At the time, the system serviced nearly 2,500 residents and consisted of approximately 20 kilometres of gravity sewers and forcemains, 250 maintenance holes, four SPSs (one main and three sub-area SPSs) and a wastewater treatment lagoon system. Around that time, a significant development known as Hyde Park was proposed on the west side of the Village and fronting along Main Street West. The development was to discharge to gravity sewers fronting the site and relied on downstream sewers and three pumping stations (Main Street West SPS, Bailey Street SPS and Ottawa Street SPS) to convey the wastewater flow to the treatment lagoons. A new developer, Wellings, recently obtained the property formerly known as Hyde Park. Based on discussions with the Township, the proposed development is to consist of townhouse units with a small portion of commercial development.

Beginning in 2017, JLR has been assisting the Township to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for the Winchester Sewage Treatment System Upgrades. A notice of project completion was issued on April 29, 2019 and the final Phase 2 Report recently completed the mandatory 30-day review period. It is understood that the proposed future Wellings development was <u>not included</u> in the 20-year growth projections in this Class EA, as it was not made available to JLR at the time.

This current study excludes the assessment of the available capacity at the Ottawa Street SPS and wastewater treatment lagoon. It has been assumed that for both of these, sufficient capacity is available. Given that the Wellings Development was not accounted for during the Class EA, the Township would need to investigate allocating the remaining Ottawa Street SPS pumping capacity and lagoon treatment capacity to the initial phase of the proposed development in advance of the growth projections identified as part of the Class EA.

REVIEW OF THE EXISTING WASTEWATER COLLECTION SYSTEM

The wastewater infrastructure in the Town of Winchester, as shown in Figure 1, consists of the following:

- Winchester Sewage Treatment System (lagoons);
- Ottawa Street Sewage Pumping Station (SPS No. 1) – Main SPS;
- St-Lawrence Street Sewage Pumping Station (SPS No. 2);
- Bailey Street Sewage Pumping Station (SPS No. 3);
- Main Street West Sewage Pumping Station (SPS No. 4);
- Over twenty (20) kilometres of gravity sewers and forcemains;
- Over 250 maintenance holes.

The Main Street West SPS was constructed in 2005 and consists of a 2.44 m diameter wet well (approximately 6.6 m below grade) with a 250 mm diameter inlet gravity sewer, 100 mm diameter forcemain and duplex submersible pumps that operate in duty/standby configuration. The forcemain outlets to an existing 200 mm diameter gravity sewer along Main Street that conveys wastewater flow to the Bailey Street SPS. In 2017, a capacity assessment of the pumping station was completed to evaluate additional peak flow generated by a proposed gas station and car wash development. Complete details are summarized in the memorandum Village of Winchester – Main Street West SPS Assessment (JLR, June 16, 2017). In 2019, the rated pumping capacity was increased from 3.5 to 6 L/s at 13 m of total dynamic head (TDH) in accordance with the Ministry of the Environment Conservation and Parks (MECP) Amended Environmental Compliance Approval (ECA) issued March 19, 2019. Refer to Attachment 'B' for a copy of this ECA. It is our understanding from correspondences with the Ontario Clean Water Agency (OCWA) that the increased pumping capacity was triggered by construction of a new gas station and car wash located along Highway No. 31 that drains to the Main Street West SPS. Refer to Attachment 'C' for a copy of OCWA Technical Memorandum 18-002 (OCWA, June 2018).

Originally constructed in 1971, the Bailey Street SPS consists of a 2.1 by 2.1 m wet well (approximately 7.1 m below grade) with a 200 mm diameter gravity inlet sewer, 150 mm diameter forcemain and duplex submersible pumps that operate in duty/standby configuration. The forcemain outlets to a 250 mm diameter gravity sewer at the intersection of

Main Street and Louise Street that conveys flow toward the Ottawa Street SPS. In 2005, the pump impellers and discharge piping were replaced to increase the rated pumping capacity to 31.4 L/s at a TDH of 25 m. Refer to Attachment 'B' for a copy of the most recent amended ECA.

The current Ottawa Street SPS was constructed in 1988 and consists of a wet well/dry well configuration with a 600 mm diameter inlet gravity sewer, 350 mm diameter forcemain and three (3) sewage pumps each rated for 90 L/s that operate in duty/lag/standby configuration. The forcemain discharges to the stabilization lagoon with a rated treatment capacity of 2,200 m^3/day in accordance with the MECP amended Certificate of Approval issued October 22, 2010. As noted previously, capacity assessments of the Ottawa Street SPS and the treatment lagoon system were not completed as part of this study.

A summary of the rated capacities of the Bailey Street SPS and Main Street West SPS are provided in Table 1.

Table 1: Summary of Bailey Street SPS and Main Street SPS

Pumping Station	ECA No.	Pump Operation (1)	TDH (m) (1)	Rated Capacity (L/s) (1)
Bailey Street SPS	4037-6CAMCT (2005)	Two submersible pumps - duty/standby	25	31.4
Main Street West SPS	9743-B9ALZN (2019)	Two submersible pumps - duty/standby	13	6 (2)

(1) According to the referenced ECAs.

(2) Rated capacity according to current ECA; OCWA staff advised that the proposed pump upgrades associated with the referenced ECA have not been installed at this time. The SPS is currently rated for 3.5 L/s.

BAILEY STREET SPS & MAIN STREET WEST SPS – HISTORICAL REVIEW AND CAPACITY ASSESSMENT

HISTORICAL REVIEW (2016-2018)

For this review, OCWA provided three (3) years (2016-2018) of the following data:

- Daily volume of sewage received at the pump stations, in m^3; and
- Daily run time of the pumps at the pump stations, in hours.

To calculate the peak daily flow for each SPS, the maximum daily flow over the three-year period was multiplied by a peaking factor of 1.4. This peaking factor was developed as part the Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012). The remaining wastewater capacity for each SPS was estimated based on the assumption that an upgrade would be required if the flows exceeded 90% of the theoretical SPS capacity based on each station's ECA. Data received from each SPS is summarized in Table 2.

Table 2: Summary of Historical Data (2016-2018) from the Bailey Street SPS and Main Street West SPS

Sewage Pumping Station	TDH (m)	Rated Capacity (L/s)	Average Daily Flow (L/s)	Standard Deviation (L/s)		Peak Daily Flow (L/s)	Remaining SPS Capacity at the ECA Rated Capacity (L/s)	
							100%	90%
Bailey Street SPS	25	31.4	2.62	+/-	1.16	**14.75 (2)**	16.65	**13.51**
Main Street West SPS	13	6 (1)	0.32	+/-	0.23	**5.25 (3)**	0.75	**0.15**

Notes:

(1) OCWA advised that the proposed pump upgrades associated with the referenced ECA have not been installed at this time. The SPS is currently rated for 3.5 L/s. However, for the purpose of this assessment, the upgraded capacity of 6 L/s was considered.

(2) Maximum daily flow (MDF) of 10.54 L/s occurred on May 6, 2017. The next highest flow recorded at the Bailey Street SPS was 10.52 L/s on April 7, 2017. Peak daily flow (PDF) was estimated by multiplying MDF by a peaking factor of 1.4, developed as part of the Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012).

(3) MDF of 3.75 L/s occurred on April 10, 2018. The next highest flow recorded at the Main Street West SPS was 2.12 L/s on April 16, 2018. PDF was estimated by multiplying MDF by a peaking factor of 1.4, similar to note 2.

Upon review of the Bailey Street SPS data, the following observations were made:

- Based on visual inspection of the data, no outliers were identified.
- The daily volume of sewage received in 2017 was on average ~ 55 m^3 (0.63 L/s) and ~105 m^3 (1.2 L/s) higher than the volume of sewage received in 2016 and 2018, respectively. This is reasonable given that, as OCWA noted, 2017 was a very wet year, while 2018 was a very dry year. This shows that sewer inflow and infiltration (I&I) may affect the flow received at the Bailey Street SPS by as much as 20% or more, assuming 2016 is considered an average wet weather year.
- The pump run time during 2017 was on average 0.5 hours longer than in both 2016 and 2018. This is reasonable considering the increased flow to the SPS.
- Given the absence of data outliers and the comparable relationship between yearly flows and wet weather events, it is expected that there is approximately 13.5 L/s of remaining capacity at the Bailey Street SPS based on a review of the available historical flow data. It is worth noting that Table 2 is based on current data and does not account for current pump operation, new development and future connections included as part of the model update.

Upon review of the Main Street West SPS data, the following observations were made:

- Based on visual inspection of the data, several outliers were observed in the data, especially from November 2017 to August 2018, which has a significant effect on the overall assessment of the historical flows. Pump run times during this period were observed to be in some cases 0 hours and in others well above 24 hours. Furthermore, most of the peak inflows were observed in this period, which has been documented as having very dry weather. OCWA noted that a car wash/gas station was built within the last few years in the SPS catchment area, which may have induced this variability in the data.
- The daily volume of sewage received at the Main Street West SPS averaged 14.8 m^3 (0.17 L/s), 30.9 m^3 (0.36 L/s) and 36.0 m^3 (0.42 L/s) from 2016 to 2018, respectively.
- **Considering the variability in the flow data provided, it is anticipated that the upgraded Main Street SPS will be operating at or very near its rated capacity. We expect there is approximately 0.15 L/s of remaining capacity at the Main Street West SPS, based on the review of the available historical flow data and the**

implementation of the proposed pump upgrades. It is worth noting that Table 2 is based on current data and does not account for new development and future connections included as part of the model update.

PUMPING STATION RATED CAPACITY ASSESSMENT

This section provides a summary of three years of pump operation data from the Bailey Street SPS and Main Street West SPS, and compares this data to the ECA rated capacity of each SPS.

To determine the average pumped flow rate for each year at each pumping station, it was assumed that a direct correlation exists between the daily pump run time and the average effluent flow. Therefore, the daily pumped flow rate was calculated by dividing the daily volume of sewage received at the SPS by the daily run time of the SPS pumps. Table 3 summarizes the average daily pumped flow rates calculated for 2016, 2017 and 2018 for each SPS.

Table 3: Summary of Average Daily Pumped Flow Rates from 2016 to 2018

SPS	ECA Rated Capacity (L/s)	Daily Pumped Flow Rate (L/s)		
		2016	2017	2018
Bailey Street [1]	31.4	26.42	26.35	19.52
Main Street West [2]	6[3] (3.5 L/s)	1.06	1.25	1.29

[1] The average pumped flow rate at the Bailey Street SPS from 2016 to 2018 was 24.08 +/- 4.21 L/s.
[2] The average pumped flow rate at the Main Street West SPS from 2016 to 2018 was 1.20 +/- 0.36 L/s.
[3] The Main Street West SPS currently operates at a capacity of 3.5 L/s.

Upon review of the available data, the following observations can be made:

- The Bailey Street SPS's average pumped flow rate appears to have declined by approximately 7 L/s from 2017 to 2018, which may suggest a change or degradation in pump operation.
- The Bailey Street SPS's current pumped flow rate is approximately 12 L/s (31 - 19 L/s) lower than the SPS rated capacity.
- The Main Street West SPS appears to operate lower than its current rated capacity of 3.5 L/s, as observed and documented in Technical Memorandum 18-002 (OCWA, June 2018) that recommended a pump upgrade at the SPS (refer to Attachment 'C').
- **Based on current operation, the expected Bailey Street SPS remaining pump capacity is approximately 4.29 L/s (19.52 x 90% - 14.75 L/s) using the estimated peak flow rate of 14.75 L/s summarized in Table 2. It is worth noting that Table 2 and Table 3 are based on current data and do not account for new development and future connections included as part of the model update.**

Based on the available historical data, additional investigation at the Bailey Street SPS is warranted to assess the reduced pumping capacity in effort to restore the SPS closer to its rated capacity.

HYDRAULIC WASTEWATER MODEL

The hydraulic wastewater model (Model) was constructed in the SewerCAD® platform based on available as-constructed drawings and pumping information at the time. Modelling parameters were developed based on flow monitoring data gathered in the spring of 2012 to evaluate theoretical sewer conveyance capacities under existing and future development conditions. For complete details, refer to the Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012).

WASTEWATER MODEL UPDATE

The existing model was updated to reflect changes to the wastewater system summarized as follows:

- Increased the rated pumping capacity at the Main Street West SPS from 3.5 to 6 L/s;
- Addition of a 12 unit apartment building currently under construction along Main Street West;
- Connection of one of existing home on Main Street West currently on private service; and
- Connection of two business on Dawley Drive that are awaiting connection to the wastewater system.

Assumptions and Modelling Criteria

The following assumptions and criteria were used to update model to represent current sanitary servicing conditions for the new residential and commercial users:

- Available capacity in the pipes has been assumed not to exceed 90% of the theoretical maximum rated capacity of existing wastewater infrastructure (i.e. pumping station and gravity sewer);
- Sanitary sewer loading allocated to the 12-unit apartment building, existing residential home and two businesses has been calculated using the best available information either provided by Township, MECP Sewer Guidelines, or the Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012);
- The proposed future development shall connect to the existing gravity sewers along Main Street West and outlet to the Main Street West SPS.

Table 4 below summarizes the sanitary peak flows updated in the model for the Main Street West collection area:

Table 4: Peak Flow from recent Developments discharging into Main Street West Sanitary Sewer

Land Use	Population / Units (1)	Average Flow (2)	Peaking Factor (3)	Peak Flow
Residential – 12 unit Apartment Building	21.6	350 L/cap/day	4.0	0.350 L/s
Residential – 1 Existing Single Family House	3.4	350 L/cap/day	4.0	0.055 L/s
Commercial – Two Businesses	2.38	1,600 L	1.4	0.062 L/s
			Total Peak Flow (L/s):	**0.467 L/s**

1. Based on 1.8 person/unit for the apartment unit and 3.4 person unit for single homes; 2.38 units accounted for the business development;
2. Residential and commercial flows based on the domestic sewage flows presented in MECP design guidelines and connection rates provided by the Township, that we understand is based on the Ontario Building Code (OBC), respectively;
3. Residential and Commercial Peaking factors per the MECP design guidelines and Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012), respectively.

The updated model was used to assess the remaining theoretical trunk sewer capacity and review pump operations at the Main Street West SPS and Bailey Street SPS.

Simulation Results and Sewer Capacity Assessment

The hydraulic analysis of the wastewater collection system has been carried out as a steady state analysis where the flow and depth in the pipes were considered to be constant. The peak flow rates presented in Table 4 were added in the model at the following maintenance hole (MH) locations along the Main Street West sewage system:

1) MH 431 – Collects peak flow from the apartment building;
2) MH 433 – Collects peak flow from the existing single family home; and
3) MH 459 – Collects peak flow from the two businesses.

The conveyance capacity of the pipe network has been assessed at the locations downstream of the aforementioned receiving MHs and also in the receiving trunk sewer system downstream of the Main Street West SPS and Bailey Street SPS. Model results are summarized on Figures 2 and 3 in Attachment 'A'.

Table 5 below provides a summary of the pipe network theoretical conveyance capacity along Main Street West downstream of the aforementioned receiving MHs while Table 6 provides summary of the pipe analyses downstream of both Sewage Pumping Stations.

Table 5: Theoretical Conveyance Capacity Simulation Results – Downstream of MHs 431, 433 and 459

Pipe Reach (MH to MH)	Location[1]	Pipe Diameter (mm)	Full Pipe Capacity (L/s)	Simulated Peak Flow (L/s)	Simulated Available Pipe Capacity (Excess Full Flow) (L/s)	90% of Theoretical Full Flow Capacity [2] (L/s)
Main Street West						
431 - 432	East of MSWSPS	200	22.80	0.70	22.11	19.82
432 - 433	East of MSWSPS	200	20.73	1.36	19.37	17.30
433 - 434	East of MSWSPS	200	20.61	1.87	18.74	16.68
Dawley Drive						
459 - 450	West of MSWSPS	250	32.07	1.23	30.84	27.63
450 - 445	West of MSWSPS	250	31.92	1.67	30.24	27.06
445 - 438	West of MSWSPS	250	31.46	1.67	29.79	26.64
Main Street West						
438 - 437	West of MSWSPS	250	28.32	4.82	23.50	20.67
437 - 436	West of MSWSPS	250	30.14	5.17	24.97	21.96
436 - 434	West of MSWSPS	250	26.25	5.49	20.76	18.14
Inflow in the Main Street West SPS						
434 - 435	MSWSPS	250	38.90	7.36	31.54	27.65
435 – W4	MSWSPS	250	37.61	7.36	30.25	26.49

[1] MSWSPS – Main Street West SPS

[2] Available pipe flow capacity has been calculated using the 90% of the theoretical full pipe capacity minus the simulated peak flow.

The simulation results indicate that the 90% theoretical full flow capacity ranges from approximately 27 to 16 L/s for the receiving wastewater collection system tributary to the Main Street West SPS. Based on the model results, the gravity sanitary sewers are not the limiting constraint since their remaining residual capacity is expected to exceed the Main

Street West SPS design capacity of 12.3 L/s as summarized in the Township of North Dundas Winchester Sewage System Expansion and Pump Station Modification, Pump Station Design Brief (Stantec, March 2005).

Table 6: Theoretical Conveyance Capacity Simulation Results Downstream of Main Street West SPS and Bailey Street SPS

Pipe Reach	Pipe Diameter (mm)	Full Pipe Capacity (L/s)	Simulated Peak Flow in the Pipe (L/s)	Simulated Available Pipe Capacity (Excess Full Flow) (L/s)	90% of Theoretical Full Flow Capacity[1] (L/s)
Sanitary Sewers downstream of Main Street West SPS along Main Street West					
40-39	200	21.95	6.30	15.64	13.46
39-38	200	21.00	6.53	14.48	12.37
38-37	200	26.34	6.99	19.35	16.72
37-41	200	20.18	13.46	6.72	**4.70**
Inflow in the Bailey Street SPS					
41-W3	300	236.87	18.3	218.57	194.88
Sanitary Sewers downstream of Bailey Street SPS Forcemain					
Main Street West					
28-27	250	35.80	29.02	6.78	**3.20**
27-26	250	39.32	29.39	9.93	**6.00**
26-25	250	98.71	29.69	69.02	59.15
25-24	250	141.51	29.94	111.57	97.42
24-132	600	267.78	73.17	194.61	167.83
132-429	600	141.63	73.25	68.38	54.22
Ottawa Street					
429-135	600	372.71	74.75	297.96	260.69
135-134	600	294.99	74.95	220.04	190.54
134-139	600	290.20	76.34	213.86	184.84
139-140	600	292.07	76.39	215.68	186.47
140-160	600	204.77	78.20	126.57	106.09
160-903	600	234.46	78.89	155.58	132.12
Inflow in the Ottawa Street SPS					
903-W1	600	614.01	78.89	535.12	473.72
[1] Available pipe flow capacity has been calculated using the 90% of the theoretical full pipe capacity minus the simulated peak flow.					

Review of the simulation, we have identified three sewer sections that have limited residual capacity summarized as follows (refer to Figures 2 and 3):

- MH 27-41 at 4.7 L/s residual capacity located near the Bailey Street SPS
- MH 28-27 at 3.2 L/s located immediately downstream of the Bailey Street forcemain
- MH 27-26 at 6.0 L/s located immediately downstream of the Bailey Street forcemain

The simulated pumped flow from the Bailey Street SPS is approximately 29 L/s, which remains comparable the ECA rated capacity of 31.4 L/s. Therefore, sewer sections from MH 28 to 27 and 27 to 26, located immediately downstream of the Bailey Street SPS, are not expect to be limiting sewer constraints until upgrades are proposed at the Bailey Street SPS or direct connection of future develop to these sewer sections.

It is anticipate that the sewer section from MH 27 to 41 is the limiting downstream sewer constraint, which can reasonably accommodate an additional 4.7 L/s of peak flow.

MODELLED PUMP CAPACITY COMPARISON

In addition to assessing the pump performance based on available historical data, the simulated pump results were compared to the ECA rated capacity. As previously discussed, the capacity of the Main Street West SPS was recently increased from 3.5 to 6 L/s, however, the proposed pump upgrade has not been implemented at this time. OCWA provided the pump curve for the proposed upgrade, which was input and simulated in the model.

The following table provides a comparison between the SPS rated capacities presented in the ECA documents and the simulated model results:

Table 7: ECA and Simulated Model Result Comparison for Bailey Street SPS and Main Street West SPS

Sewage Pumping Station	ECA Pumping Station Information				Model Results		
	ECA	Pump Operation	TDH (m)	Rated Capacity (L/s)	Pump Type	TDH (m)	Pump Outflow (L/s)
Bailey Street	4037-6CAMCT	Two submersible pumps – duty/standby	25	31.4	FLYGT CP3140.180 HT	20.64	28.88
Main Street West	9743-B9ALZN	Two submersible pumps – duty/standby	13	6.0	FLYGT NP3069.060 SH	11.58	8.6
					Theoretical Pump	7.5	6.0

Simulation results for the Bailey Street SPS remain comparable to the rated capacity listed in the ECA document and consistent with the Township of North Dundas, Village of Winchester Sanitary Sewer System Capacity Assessment Report (JLR, December 2012).

Initial simulation of the proposed pump upgrade at the Main Street West SPS appears to indicate that the pump will slightly exceeded the ECA rated capacity by 2.6 L/s and may warrant additional investigation, system modification prior to implementation or an amended ECA. The increased pumping rate is attributed to a lower system TDH requirement than available from the selected pump curve. Therefore, this wastewater assessment was completed based on a theoretical pump curve that matched the ECA rated capacity of 6 L/s.

An opportunity may exist to request an amended ECA for the Main Street SPS to increase the rated pump capacity to match the selected pump with the systems TDH requirement.

REMAINING SPS CAPACITY ASSESSMENT

This section provides an assessment of the remaining SPS capacity based on the expected peak flow received at the Bailey Street SPS and Main Street West SPS wet wells and 90% of their current operating capacity. Current operation of the Main Street SPS has been assessed based on the upgraded ECA rated capacity. Table 8 below summarizes and compares the expected peak flow to the wet wells based on the available historical data, simulated peak flow from the updated model and theoretical peak flow. The theoretical peak flow has been estimated based on the historical data and the addition of the theoretical peak flows calculated for the new development/sewer connections (refer to Table 4):

Table 8: Total Inflow into the Bailey Street SPS and Main Street West SPS

Sewage Pumping Station	Peak Inflow into Sewage Pumping Station (L/s)			ECA Rated Capacity (L/s)	90% of Current Operating Capacity	Remaining SPS Capacity (L/s)
	Historical Data	Simulated Peak Flow	Theoretical Peak Flow			
Bailey Street SPS	14.75	18.30	15.22	31.4	17.57	2.35
Main Street West SPS	5.25	7.36	5.72	6.0	5.40	0

The simulated peak flow contained in the updated model appear to represent a conservative value when compared to the estimated peak flow developed from available historical data. Therefore, a theoretical peak flow was assessed at each SPS based on the historical data and the addition of the theoretical peak flows calculated for the new development/sewer connections.

Based on the forgoing assessment the Main Street West SPS is at or nearing its upgraded rated capacity with no readily available capacity to accommodate additional wastewater flow. Upgrades are likely warranted to accommodate additional wastewater flow, up to the Main Street West SPS ultimate design capacity of 12.3 L/s as summarized in the Township of North Dundas Winchester Sewage System Expansion and Pump Station Modification, Pump Station Design Brief (Stantec, March 2005).

The Bailey Street SPS appears to nearing its current operating capacity; however, additional investigation appears warranted to assess the reduced pumping capacity in effort to restore the SPS closer to its rated capacity.

CONCLUSION & RECOMMENDATIONS

Based on the foregoing wastewater assessment we have concluded the following:

- The Main Street West SPS is at or nearing its upgraded ECA rated capacity of 6 L/s with no readily available capacity to accommodate additional wastewater flow.
- The Bailey Street SPS appears to nearing 90% of its current operating capacity of 17.5 L/s based on the estimated theoretical peak flow of approximately 15.2 L/s. This operating capacity is less than its ECA rated capacity of 31.4 L/s.
- The sanitary sewers tributary to the Main Street West SPS are expected to have sufficient residual capacity to accommodate future development up to the Main Street West SPS ultimate design capacity of 12 L/s.
- The sanitary sewer section from MH 37 to 41 is the limiting downstream sewer constraint, which can reasonably accommodate an additional 4.7 L/s of peak flow.

For the Township's consideration, we offer the following recommendations:

- Simulation results of the proposed pump upgrade at the Main Street West SPS appears to indicate that the pump will slightly exceeded the ECA rated capacity (i.e., 6 L/s) by 2.6 L/s and may warrant additional investigation, system modification prior to implementation or an amended ECA;
- An opportunity may exist to request an amended ECA for the Main Street West SPS to increase the rated pump capacity to match the selected pump with the systems TDH requirement.
- Additional investigation at the Bailey Street SPS is warranted to assess the reduced pumping capacity in an effort to restore the SPS closer to its rated capacity of 31.4 L/s.
- Review available sewer capacity as part of any sewage pumping station upgrade.
- Review and confirm downstream sewer capacities prior to implementing SPS upgrades.
- Conduct a field survey to confirm the modelled truck sewer inverts and slopes, prior to undertaking potential sewer upgrades.

Should you have any questions, please do not hesitate to contact the undersigned.

J.L. RICHARDS & ASSOCIATES LIMITED

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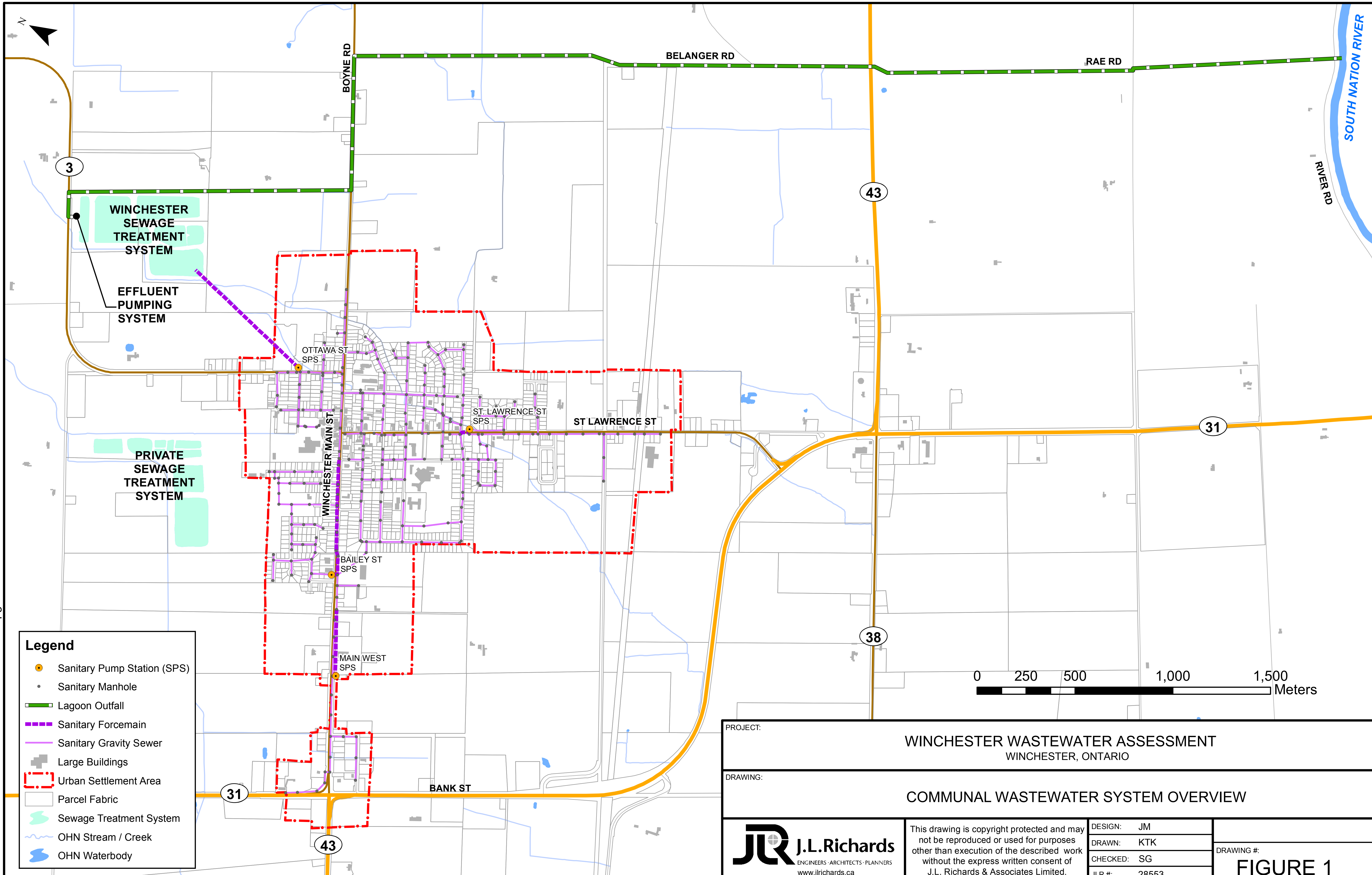
Attachment 'A'

FIGURES



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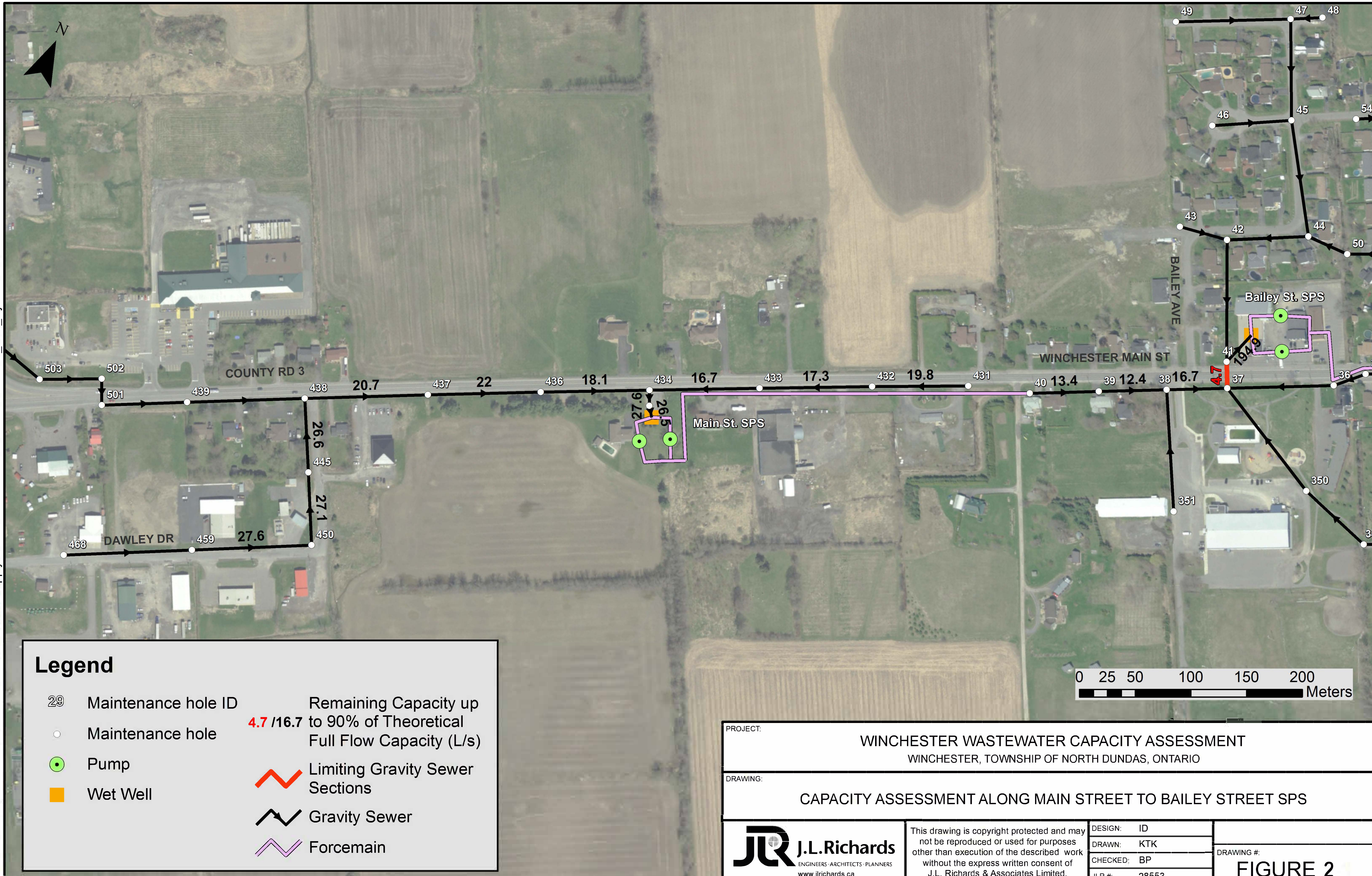

PROJECT:

WINCHESTER WASTEWATER CAPACITY ASSESSMENT

WINCHESTER, TOWNSHIP OF NORTH DUNDAS, ONTARIO

DRAWING:

CAPACITY ASSESSMENT ALONG MAIN STREET TO BAILEY STREET SPS

J.L.Richards
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DESIGN:	ID
DRAWN:	KTK
CHECKED:	BP
JLR #:	28553

DRAWING #:
FIGURE 2

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Plot Date: June 7, 2019 2:40:32 PM

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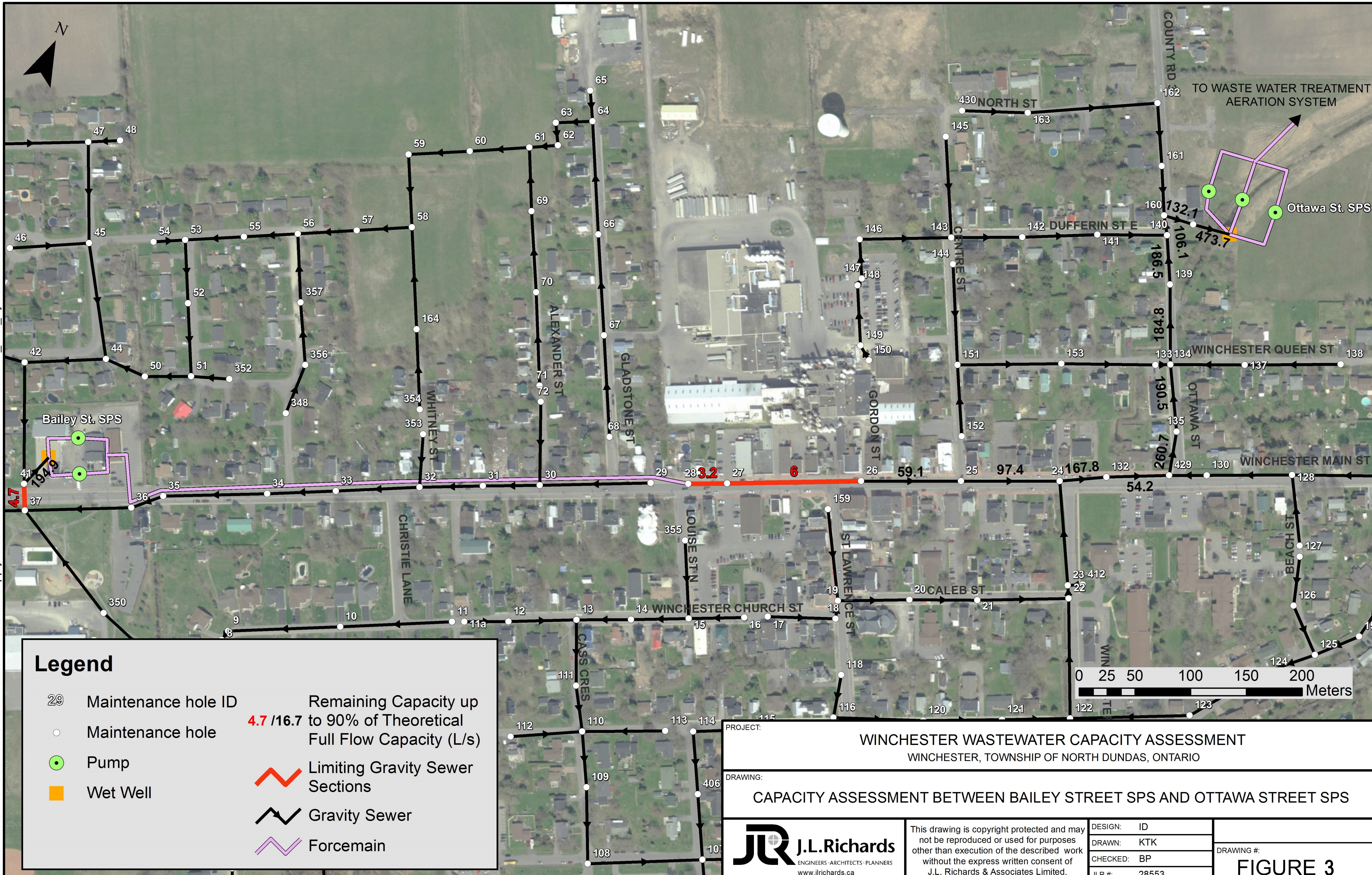

PROJECT:

WINCHESTER WASTEWATER CAPACITY ASSESSMENT
WINCHESTER, TOWNSHIP OF NORTH DUNDAS, ONTARIO

DRAWING:

CAPACITY ASSESSMENT BETWEEN BAILEY STREET SPS AND OTTAWA STREET SPS

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DESIGN:	ID
DRAWN:	KTK
CHECKED:	BP
JLR #:	28553

DRAWING #: FIGURE 3

Plot Date: June 7, 2019 2:37:36 PM

Attachment ‘B’

MECP ENVIRONMENTAL COMPLIANCE APPROVALS

Bailey Street SPS
Main Street West SPS

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 9743-B9ALZN
Issue Date: March 19, 2019

The Corporation of the Township of North Dundas
636 St. Lawrence Street
Winchester, Ontario
K0C 2K0

Site Location: Winchester Sewage Pumping Station No. 4
South Side of Main Street
North Dundas Township, United Counties of Stormont, Dundas and Glengarry

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

alteration, usage and operation of existing municipal sewage works, for the transmission of sanitary sewage via pumping station ultimately discharging to the Winchester Lagoons for treatment and disposal as follows:

Classification of Collection System: Separate Sewer System

Proposed Works:

Sanitary Sewage Pumping Stations

Sewage Pumping Station No. 4

- replacement of both pumps to raise each pump rating to 6 litres per second at a Total Dynamic Head (TDH) of 13 metres;
- located on south site of Main Street, approximately 500 metres east of County Road No.31, consisting of a 2.44 metres diameter wet well equipped with two (2) submersible pumps, one for duty and another for standby, discharging to the forcemain described below;

Existing Works:

Sanitary Sewage Pumping Stations

Sewage Pumping Station No. 3

- located at the corner of Bailey Street and Main Street consisting of two (2) submersible pumps, one for duty and another for standby. The pumping station has a rated capacity of 31.4 litres per second at a total dynamic head of 25 metres;

Sanitary Forcemain

- a 100 mm diameter ***sanitary forcemain*** from sewage pumping station No.4 located on Main Street, discharging to an existing sanitary manhole on Main Street in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry;

including all other mechanical system, electrical system, instrumentation and control system, standby power system, piping, pumps, valves and appurtenances essential for the proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this environmental compliance approval and any schedules attached to it, and the application;

2. "BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demands;

3. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

4. "District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works are geographically located;

5. "EPA" means the *Environmental Protection Act* , R.S.O. 1990, c.E.19, as amended;

6. "Equivalent Equipment" means alternate piece(s) of equipment that meets the design requirements and performance specifications of the piece(s) of equipment to be substituted;

7. "Existing Works" means those portions of the Works included in the Approval that have been constructed previously;

8. "Limited Operational Flexibility" (LOF) means the conditions that the Owner shall follow in order to

undertake any modification that is pre-authorized as part of this Approval;

9. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

10. "Normal Operating Condition" means the condition when a pumping station is operating within its design capacity;

11. "Operating Agency" means the Owner or the entity that is authorized by the Owner for the management, operation, maintenance, or alteration of the Works in accordance with this Approval;

12. "Owner" means The Corporation of the Township of North Dundas and its successors and assignees;

13. "OWRA" means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

14. "Professional Engineer" means a person entitled to practice as a Professional Engineer in the Province of Ontario under a licence issued under the Professional Engineers Act;

15. "Proposed Works" means those portions of the Works included in the Approval that are under construction or to be constructed;

16. "Sanitary Sewers" means pipes that collect and convey wastewater from residential, commercial, institutional and industrial buildings, and some infiltration and inflow from extraneous sources such as groundwater and surface runoff through means other than stormwater catch basins;

17. "Separate Sewer Systems" means wastewater collection systems that comprised of Sanitary Sewers while runoff from precipitation and snowmelt are separately collected in Storm Sewers;

18. "Storm Sewers" means pipes that collect and convey runoff resulting from precipitation and snowmelt (including infiltration and inflow);

19. "Works" means the approved sewage works, and includes Proposed Works, Existing Works and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. The Owner shall design, construct, operate and maintain the Works in accordance with the conditions of this Approval.

3. Where there is a conflict between a provision of any document referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence.

2. CHANGE OF OWNER AND OPERATING AGENCY

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of address of Owner;

    b. change of Owner, including address of new owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* , as amended, shall be included in the notification;

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , as amended, shall be included in the notification.

2. The Owner shall notify the District Manager, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of address of Operating Agency;

    b. change of Operating Agency, including address of new Operating Agency.

3. In the event of any change in ownership of the Works, the Owner shall notify the succeeding owner in writing, of the existence of this Approval, and forward a copy of the notice to the

District Manager.

4. The Owner shall ensure that all communications made pursuant to this condition refer to the environmental compliance approval number.

3. CONSTRUCTION OF PROPOSED WORKS

1. All Proposed Works in this Approval shall be constructed and installed and must commence operation within five (5) years of issuance of this Approval, after which time the Approval ceases to apply in respect of any portions of the Works not in operation. In the event that the construction, installation and/or operation of any portion of the Proposed Works is anticipated to be delayed beyond the time period stipulated, the Owner shall submit to the Director an application to amend the Approval to extend this time period, at least six (6) months prior to the end of the period. The amendment application shall include the reason(s) for the delay and whether there is any design change(s).

2. Within thirty (30) days of commencement of construction, the Owner shall prepare and submit to the District Manager a schedule for the completion of construction and commissioning operation of the Proposed Works. The Owner shall notify the District Manager within thirty (30) days of the commissioning operation of any Proposed Works. Upon completion of construction of the Proposed Works, the Owner shall prepare and submit a statement to the District Manager, certified by a Professional Engineer, that the Proposed Works is constructed in accordance with this Approval.

3. Within one (1) year of completion of construction of the Proposed Works, a set of record drawings of the Works shall be prepared or updated. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be readily accessible for reference at the Works.

4. OPERATION AND MAINTENANCE

1. The Owner shall ensure that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate staffing and training, including training in all procedures and other requirements of this Approval and the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

2. The Owner shall update/maintain the operations manual for the Works within six (6) months of completion of construction of the Proposed Works, that includes, but not necessarily limited to, the following information:

   a. operating procedures for the Works under Normal Operating Conditions;

b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

d. procedures for the inspection and calibration of monitoring equipment;

e. operating procedures for the Works to handle situations outside Normal Operating Conditions and emergency situations such as a structural, mechanical or electrical failure, or an unforeseen flow condition;

f. a spill prevention and contingency plan, consisting of procedures and contingency plans, including notification to the District Manager, to reduce the risk of spills of pollutants and prevent, eliminate or ameliorate any adverse effects that result or may result from spills of pollutants;

g. procedures for receiving, responding and recording public complaints, including recording any followup actions taken.

3. The Owner shall maintain the operations manual up-to-date and make the manual readily accessible for reference at the Works.

5. MONITORING AND RECORDING

1. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following documents and all analysis shall be conducted by an accredited laboratory or as directed by the District Manager:

a. the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended;

b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended;

c. the publication "Standard Methods for the Examination of Water and Wastewater", as amended.

6. LIMITED OPERATIONAL FLEXIBILITY

1. The Owner may make pre-authorized modifications to the sewage pumping stations in Works in accordance with the document “Limited Operational Flexibility - Protocol for Pre-Authorized Modifications to Municipal Sewage Works” Pumping Stations (Schedule B), as amended, subject to the following:

a. the scope and technical aspects of the modifications are in line with those delineated in

Schedule B and conform with the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended, Ministry's regulations, policies, guidelines, and industry engineering standards;

b. where the pre-authorized modification requires notification, a "Notice of Modifications to Sewage Works" (Schedule B), as amended shall be completed with declarations from a Professional Engineer and the Owner and retained on-site prior to the scheduled implementation date. All supporting information including technical memorandum, engineering plans and specifications, as applicable and appropriate to support the declarations that the modifications conform with LOF shall remain on-site for future inspection.

2. The following modifications are not pre-authorized under Limited Operational Flexibility:

   a. Modifications that involve an increase in capacity of the pumping station;

   b. Modifications that require changes to be made to the emergency response, spill prevention and contingency plan; or

   c. Modifications that are required pursuant to an order issued by the Ministry.

7. REPORTING

1. The Owner shall, within fifteen (15) days of occurrence of a spill within the meaning of Part X of the EPA, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation, in addition to fulfilling the requirements under the EPA and O. Reg. 675/98 "Classification and Exemption of Spills and Reporting of Discharges".

2. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

8. RECORD KEEPING

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule A

1. Application for Environmental Compliance Approval, dated July 24, 2018 and received on July 31, 2018, submitted by Ontario Clean Water Agency on behalf of The Corporation of the Township of North Dundas;

2. Technical Memorandum, Pump Upgrade at Winchester Sewage Pumping Station No. 4, dated July 20, 2018, prepared by Ontario Clean Water Agency;

3. Response to Information Request -MECP Ref# 4441-B37NNJ, Winchester Sewage Pumping Station No. 4, dated February 21, 2019, prepared by Ontario Clean Water Agency.

Schedule B

Limited Operational Flexibility

Protocol for Pre-Authorized Modifications to Municipal Sewage Works - Pumping Station

1. General

    1. Pre-authorized modifications are permitted only where Limited Operational Flexibility has already been granted in the Approval and only permitted to be made at the pumping stations in the Works, subject to the conditions of the Approval.

    2. Where there is a conflict between the types and scope of pre-authorized modifications listed in this document, and the Approval where Limited Operational Flexibility has been granted, the Approval shall take precedence.

    3. The Owner shall consult the District Manager on any proposed modifications that may fall within the scope and intention of the Limited Operational Flexibility but is not listed explicitly or included as an example in this document.

    4. The Owner shall ensure that any pre-authorized modifications will not:

        a. adversely affect the hydraulic profile of the sanitary sewage system;

        b. result in new Overflow locations, or any potential increase in frequency or quantity of Overflow.

2. Modifications that do not require pre-authorization:

    1. Sewage works that are exempt from Ministry approval requirements;

    2. Modifications to the electrical system, instrumentation and control system.

3. Pre-authorized modifications that do not require preparation of "Notice of Modification to Sewage Works"

    1. Normal or emergency maintenance activities, such as repairs, renovations, refurbishments and replacements with Equivalent Equipment, or other improvements to an existing approved piece of equipment of a treatment process do not require pre-authorization. Examples of these activities are:

        a. Repairing a piece of equipment and putting it back into operation, including replacement of minor components such as belts, gear boxes, seals, bearings;

   b. Repairing a piece of equipment by replacing a major component of the equipment such as motor, with the same make and model or another with the same or very close power rating but the capacity of the pump or blower will still be essentially the same as originally designed and approved;

   c. Replacing the entire piece of equipment with Equivalent Equipment.

2. Improvements to equipment efficiency or treatment do not require pre-authorization. Examples of these activities are:

   a. Adding variable frequency drive to pumps;

   b. Adding flow measurement or other control device.

4. Pre-Authorized Modifications that require preparation of "Notice of Modification to Sewage Works"

   1. Pumping Stations

      a. Replacement, realignment of existing sewers including manholes, valves, gates, weirs and associated appurtenances provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved.

      b. Extension or partition of wetwell to increase retention time for emergency response and improve station maintenance and pump operation;

      c. Replacement or installation of inlet screens to the wetwell;

      d. Replacement or installation of flowmeters, construction of station bypass;

      e. Replacement, reconfiguration or addition of pumps and modifications to pump suctions and discharge pipings provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head or an increase in the peak pumping rate of the pumping station as originally designed;

      f. Replacement, realignment of existing forcemain(s) including valves, gates, and associated appurtenances provided that the modifications will not reduce the flow capacity or increase the total dynamic head and transient in the forcemain.

   2. Chemical Systems in Pumping Stations

      a. Replacement and relocation of chemical storage tanks for existing chemical systems only, provided that the tanks are sited with effective spill containment;

b. Replacement of existing chemical dosing pumps provided that the modifications will not result in a reduction in the firm capacity that the dosing pumps are originally designed to handle.

c. Use of an alternate chemical provided that it is a non-proprietary product and is a commonly used alternative to the chemical approved in the Works, provided that the existing chemical storage tanks, chemical dosing pumps, feed pipes and controls are also upgraded, as necessary.

3. Standby Power System

a. Replacement or installation of standby power system, including feed from alternate power grid, emergency power generator, fuel supply and storage systems, provided that the existing standby power generation capacity is not reduced.

This page contains an image of the form entitled "Notice of Modification to Sewage Works". A digital copy can be obtained from the District Manager.

Ontario

Ministry of the Environment, Conservation and Parks

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA ON-SITE PRIOR TO THE SCHEDULED IMPLEMENTATION DATE.

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number and issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:

1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:

1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Has been designed in accordance with the Limited Operational Flexibility as described in the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name (Print)	PEO License Number
Signature	Date (mm/dd/yy)
Name of Employer	

Part 4 – Declaration by Owner

I hereby declare that:

1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. This modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name of Owner Representative (Print)	Owner representative's title (Print)
Owner Representative's Signature	Date (mm/dd/yy)

EAPB Form July 26, 2018

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 regarding general provisions is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted.

2. Condition 2 regarding change of Owner and Operating Agency is included to ensure that the Ministry records are kept accurate and current with respect to ownership and Operating Agency of the Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Condition 3 regarding construction of Proposed Works is included to ensure that the Works are constructed in accordance with the Approval and that record drawings of the Works "as constructed" are updated and maintained for future references.

4. Condition 4 regarding operation and maintenance is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works.

5. Condition 5 regarding monitoring and recording is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained.

6. Condition 6 regarding Limited Operational Flexibility is included to ensure that the Works are constructed, maintained and operated in accordance with the Approval, and that any pre-approved modification will not negatively impact on the performance of the Works.

7. Condition 7 regarding reporting is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for this Approval.

8. Condition 8 regarding record keeping is included to require that all records are required for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4037-6CAMCT issued on May 16, 2005

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the

Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 19th day of March, 2019

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

RU/
c: Area Manager, MECP Cornwall
c: District Manager, DWECD, MECP Ottawa
James Su, Ontario Clean Water Agency

Ministry of the Environment | Ministère de l'Environnement

Ontario

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 4037-6CAMCT

RECEIVED MAY 2 4 2005

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Winchester Sewage Pumping Station
South Side of Main Street
North Dundas Township, United Counties of Stormont, Dundas & Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Sewage Pumping Station

- a ***sanitary sewage pumping station No.4*** with an initial capacity of 3.5 L/s to be constructed on south site of Main Street, approximately 500 m east of County Road No 31, consisting of a 2.44 m diameter wet well equipped with two (2) submersible pumps, one for duty and another for standby, each pump rated at 3.5 L/s against a total dynamic head of 4.5 m, complete with control panel, ultrasonic transducer and back up float switches, air vents, access ladder, discharge piping, by-pass connection, valves and all other appurtenances necessary to have a complete and operable pumping station, discharging to the proposed forcemain;

- the existing ***sanitary sewage pumping station No.3*** at the corner of Bailey Street and Main Street to be modified by replacing the pump impellers and discharge piping of the existing two (2) submersible pumps (one for duty and another for standby) After the modification, the pumping station has a rated capacity of 31.4 L/s at a total dynamic head of 25 m;

Sanitary Forcemain

- a 100 mm diameter ***sanitary forcemain*** from sewage pumping station No.4 to be constructed on Main Street, discharging to an existing sanitary manhole on Main Street;

in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry;

all in accordance with the application dated March 10, 2005 and received on March 18, 2005, and all supporting documentation and information, including design brief, final plans and specifications prepared by Stantec Consulting Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1 "*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2 "*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

3. "*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

4. "*District Manager*" means the District Manager of the Kingston District Office of the Ministry;

5. "*Ministry*" means the Ontario Ministry of the Environment;

6. "*Owner*" means The Corporation of the Township of North Dundas and includes its successors and assignees;

7 "*Regional Director*" means the Regional Director of the Eastern Region of the Ministry;

8 "*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

9. "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below.

TERMS AND CONDITIONS

1 GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application

shall take precedence unless it is clear that the purpose of the document was to amend the application

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works*.

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations,

including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows.

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner's* operation of the *Works*.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7036-4JWPUE issued on May 2, 2000

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

Ministry of the Environment
Ministère de l'Environnement
Ontario

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1985-6CAMAT

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Main Street
North Dundas Township, United Counties of Stormont, Dundas and Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- ***sanitary sewers*** to be constructed on County Road No.31 and Main Street (County Road No.43), in the Township of North Dundas, United Counties of Stormont, Dundas and Glengarry;

all in accordance with the application dated March 10, 2005 and received March 18, 2005, including final plans and specifications prepared by Stantec Consulting Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means The Corporation of the Township of North Dundas, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below

TERMS AND CONDITIONS

1 GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. <u>EXPIRY OF APPROVAL</u>

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this Certificate the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

In accordance with Section 100 of the <u>Ontario Water Resources Act</u>, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the <u>Ontario Water Resources Act</u>, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to <u>each</u> portion appealed.

The Notice should also include:

3 The name of the appellant;
4 The address of the appellant;
5 The Certificate of Approval number;
6 The date of the Certificate of Approval;
7 The name of the Director;
8 The municipality within which the works are located;

And the Notice should be signed and dated by the appellant

This Notice must be served upon

The Secretary* Environmental Review Tribunal 2300 Yonge St, 12th Floor P O Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P Eng
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and
Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

Attachment ‘C’

OCWA Technical Memorandum

Technical Memorandum

To:	Director, Client Services and Permissions Branch, MOECC
From:	Shawn Qu, P.Eng., Ontario Clean Water Agency (OCWA)
cc:	Stephane Barbarie (OCWA)
Date:	June 25, 2018
Project:	Pump Upgrade at Winchester Sewage Pumping Station No. 4
Subject:	Supporting Information for ECA Amendment Application (ECA # 4037-6CAMCT)

1 Project Background

The Winchester Sewage Pumping Station (SPS) No.4 was design by Stantec in 2005 and constructed in 2006 to meet the serviceability of the west portion of the community of Winchester in the Township of North Dundas. The SPS No. 4 was designed to accommodate a maximum flow rate of 12.3 L/s; however, as the initial development (Phase 1) only had a projected flow rate of 3.29 L/s, to avoid potential odour issues, two sewage pumps with a rated capacity of 3.5 L/s each were selected and installed in the wet well in 2006. The low pumping rate corresponded to a velocity of 0.38 m/s in the forcemain, which resulted in solids deposition in the forcemain.

With the gradual development in the service area of the SPS No.4, the sewage flow to the SPS has increased over the years, and the existing two pumps appear insufficient to handle the sewage coming into the wet well. As a result, the existing pumps will need to be upgraded to new larger pumps to accommodate the increased flow and alleviate solids deposition in the forcemain. The existing Environmental Compliance Approval (ECA) will need to be amended to reflect the information of the proposed pumps.

2 Existing System

The existing SPS No.4 is located on Main Street approximately 500 meters east of County Road 31, and consists of a 2.44 m diameter wet well and an aboveground building housing the control equipment. The wet well is equipped with two submersible sewage pumps (one duty and one standby), each rated at 3.5 L/s against a total dynamic head of 4.5 m. Raw sewage enters the wet well via a 250 mm sanitary sewer and then is pump to a downstream sanitary manhole via 348 meters of 100 mm diameter sanitary forcemain. The SPS No.4 is governed by an existing ECA (No. 4037-6CAMCT) issued on May 16, 2005. A copy of the ECA is attached in Appendix A.

The most recent flow information of the SPS No.4 between May 2017 and May 2018 is shown in the Table 1 below. The Peak Flows were calculated using the Average Daily Flows multiply by a peaking factor of 4. The Average Pumping Rate was calculated using the Total Monthly Flow divided by the pump run hours.

Table 1: Flow Information of SPS No.4

DATE	TOTAL MONTHLY FLOW (M^3)	AVERAGE DAILY FLOW (L/D)	PEAK FLOW (L/S)	AVERAGE PUMPING RATE (L/S)
May 2017	966.0	31163	1.44	1.32
June 2017	662.4	22079	1.02	1.01
July 2017	846.6	27309	1.26	1.12
August 2017	809.8	26122	1.21	1.58
September 2017	772.1	25739	1.19	1.70
October 2017	862.8	27,832	1.29	1.61
November2017	1282.1	42,737	1.98	1.38
December 2017	1678.2	54,135	2.51	0.69
January 2018	1016.1	32,778	1.52	1.30
February 2018	1117.9	39,925	1.85	1.68
March 2018	1403.0	45,257	2.10	1.61
April 2018	2095.4	69,847	3.23	1.34
May 2018	1191.4	38,432	1.78	1.23

As shown above, the existing pumps in the wet well were only able to pump at a maximum rate of 1.70 L/s during May 2017 to May 2018. The low pumping rates translated to low flow velocities in the forcemain and caused solids settling in the pipe, which in turn would increase the head loss and reduce pumping capacity. The pumps are probably de-rated due to their age (12 years), which also contributes to the low pumping rate.

Table 1 also shows that, most of the time, the peak flows coming into the SPS have exceeded the maximum pumping rate; therefore, pump upgrade is required at this SPS.

3 Proposed Work

As per existing Design Brief prepared by Stantec Consulting Ltd. dated March 2005 (see Appendix B), the wet well of the SPS No.4 has the capacity to manage a maximum flow of 12.3 L/s; however, due to the capacity limitation of the downstream sewage pumping station (SPS No.3) at the corner of Bailey Street and Main Street, the maximum flow that can be pumped from the SPS No.4 is restricted to 7.0 L/s.

To be conservative and not overwhelming downstream SPS No.3, a pumping rate of 6.0 L/s is proposed at the SPS No.4. As the maximum peak flow experienced at SPS No.4 was around 3.23 L/s (Table 1), this proposed pumping rate should be able to handle the existing peak flow and provide enough capacity for additional flows of future development. The pumping volumes and control level spacing are summarized in the Table 2 below.

Table 2: Pumping Volumes and Control Level Spacing

DESIGN PARAMETERS	VALUES
Design Flow Q (L/s)	6.0
Lag pump volume = 0.06 × Q (m^3)	0.36
Corresponding control level spacing (m)	0.077
Lead pump volume = 0.15 × Q (m^3)	0.90
Corresponding control level spacing (m)	0.19

The geodetic elevations for the control levels to meet the new pumping rate of 6.0 L/s are listed in Table 3.

Table 3: Geodetic Evaluations

REFERENCE	GEODETIC ELEVATION (M)
Incoming sewer invert	70.96
High level alarm	70.68
Start lag level	70.53
Start lead level	70.45
Stop all pumps level	70.26
Low level alarm	70.16
Bottom of we well	69.86

A system analysis was performed to size the sewage pumps for the proposed pumping rate. The analysis indicated that a pumping rate of 6.0 L/s corresponds to a total dynamic head of (TDH) of 7.5 m. TDH is calculated using the following parameters:

- Equivalent length of 75 mm and 100 mm diameter pipes, between pump and downstream manhole, are 30 m and 358 m respectively, including allowance for fittings.
- Friction factor and static head are for three conditions:
  - Low flow condition: C=120 and static head (at stop both pump level) = 73.50-70.26 = 3.24 m,
  - Average flow condition: C=130 and static head (at median pumping volume level) = 73.50 – 70.36 = 3.14 m, and
  - High flow condition: C= 140 and static head (at sewer invert) = 73.50-70.96 = 2.54 m.

Details of the TDH calculations are summarized in the Table 4 below.

Table 4: Total Dynamic Head Calculations

PARAMETER	VALUES		
Flow Conditions	Minimum Flow	Average Flow	Maximum Flow
Friction C	120	130	140
Q (L/s)	6.0	6.0	6.0
Total Equivalent Length for 75 mm	30	30	30

PARAMETER	VALUES		
SS Forcemain (m)			
Total Equivalent Length for 100 mm PVC Forcemain (m)	358	358	358
Safety Factor	1.10	1.10	1.10
Friction Loss (m)	4.23	3.65	3.18
Static Head (m)	3.24	3.1	2.54
Total Dynamic Head (TDH)	7.47	6.79	5.72
Velocity (m/s)	0.74	0.74	0.74

The flow velocity within the 100 mm diameter forcemain is calculated to be 0.74 m/s, meeting the minimum requirement of 0.6 m/s as per the MOECC Design Guidelines for Sewage Works (2008). Therefore the new pump would reduce solids deposition in the forcemain.

OCWA reached out to the pump supplier, Xylem Inc., with the above information to size the new pump. The most suitable submersible sewage pump, meeting the above requirements without changing the existing piping and controls, is the Flygt NP 3069 SH 3, which has a rated capacity of 5.95L/s and a TDH of 13 m. A copy of the pump specifications is attached in Appendix C. As the forcemain outlets to a sanitary sewer manhole, the additional head will be diminished in the manhole. Alternately, the additional head can be reduced or eliminated by chocking the valves in the discharging line.

This ECA amendment application only pertains to the pump upgrade, the remaining equipment and characteristics of the SPS No.4 stay the same as existing.

APPENDIX A
MOECC ECA (4037-6CAMCT)

Ministry of the Environment
Ministère de l'Environnement
Ontario

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 4037-6CAMCT

RECEIVED
MAY 2 4 2005

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Winchester Sewage Pumping Station
South Side of Main Street
North Dundas Township, United Counties of Stormont, Dundas & Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Sewage Pumping Station

- a ***sanitary sewage pumping station No.4*** with an initial capacity of 3.5 L/s to be constructed on south site of Main Street, approximately 500 m east of County Road No 31, consisting of a 2.44 m diameter wet well equipped with two (2) submersible pumps, one for duty and another for standby, each pump rated at 3.5 L/s against a total dynamic head of 4.5 m, complete with control panel, ultrasonic transducer and back up float switches, air vents, access ladder, discharge piping, by-pass connection, valves and all other appurtenances necessary to have a complete and operable pumping station, discharging to the proposed forcemain;

- the existing ***sanitary sewage pumping station No.3*** at the corner of Bailey Street and Main Street to be modified by replacing the pump impellers and discharge piping of the existing two (2) submersible pumps (one for duty and another for standby). After the modification, the pumping station has a rated capacity of 31.4 L/s at a total dynamic head of 25 m;

Sanitary Forcemain

- a 100 mm diameter ***sanitary forcemain*** from sewage pumping station No.4 to be constructed on Main Street, discharging to an existing sanitary manhole on Main Street;

in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry;

all in accordance with the application dated March 10, 2005 and received on March 18, 2005, and all supporting documentation and information, including design brief, final plans and specifications prepared by Stantec Consulting Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2. "*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

3. "*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

4. "*District Manager*" means the District Manager of the Kingston District Office of the Ministry;

5. "*Ministry*" means the Ontario Ministry of the Environment;

6. "*Owner*" means The Corporation of the Township of North Dundas and includes its successors and assignees;

7. "*Regional Director*" means the Regional Director of the Eastern Region of the Ministry;

8. "*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

9. "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below.

TERMS AND CONDITIONS

1 GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application

shall take precedence unless it is clear that the purpose of the document was to amend the application

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works*, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate*, and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works*.

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works*.

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works*, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works*;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works*;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations,

including notification of the *District Manager*; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works*. Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows.

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate*.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry*. Such a manual is an integral part of the operation of the *Works*. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner*'s operation of the *Works*.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7036-4JWPUE issued on May 2, 2000

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

Ministry of the Environment
Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 1985-6CAMAT

The Corporation of the Township of North Dundas
PO Box 489
Winchester, Ontario
K0C 2K0

Site Location: Main Street
North Dundas Township, United Counties of Stormont, Dundas and Glengarry, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

- ***sanitary sewers*** to be constructed on County Road No.31 and Main Street (County Road No.43), in the Township of North Dundas, United Counties of Stormont, Dundas and Glengarry;

all in accordance with the application dated March 10, 2005 and received March 18, 2005, including final plans and specifications prepared by Stantec Consulting Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply

(1) "*Certificate*" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*, and includes any schedules;

(2) "*Owner*" means The Corporation of the Township of North Dundas, and includes its successors and assignees; and

(3) "*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below

TERMS AND CONDITIONS

1 GENERAL CONDITIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

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6 The date of the Certificate of Approval;
7 The name of the Director;
8 The municipality within which the works are located;

And the Notice should be signed and dated by the appellant

This Notice must be served upon

The Secretary* Environmental Review Tribunal 2300 Yonge St , 12th Floor P O Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act

DATED AT TORONTO this 16th day of May, 2005

A. Ahmed

Aziz Ahmed, P Eng
Director
Section 53, *Ontario Water Resources Act*

NH/

c: District Manager, MOE Kingston District Office and
Cornwall Area Office
Jean Hebert, P.Eng., Stantec Consulting Ltd.

APPENDIX B

Stantec Design Brief (March 2005)

TOWNSHIP OF NORTH DUNDAS WINCHESTER SEWAGE SYSTEM EXPANSION AND PUMPSTATION MODIFICATION

PUMP STATION DESIGN BRIEF

Project Number: 1634-00533

Prepared by:

Stantec Consulting Ltd.
400-1505 Laperriere Avenue
Ottawa, Ontario
K1Z 7T1

Prepared for:

Township of North Dundas
636 St. Lawrence Street,
P.O. Box. 489
Winchester, Ontario
K0C 2K0

March, 2005

TOWNSHIP OF NORTH DUNDAS
WINCHESTER SEWAGE SYSTEM EXPANSION AND PUMPSTATION MODIFICATION

Table of Contents

LIST OF APPENDICES

1.0 Introduction

1.1 PURPOSE OF APPLICATION

The purpose of this application is to amend the existing Certificate of Approval (Sewage) No. 7036-4JWPUE dated May 3rd, 2000 (refer to Appendix I), for the construction of a proposed sewage pumping station, forcemain, and modification of an existing sewage pumping station. These upgrades and/or modifications are required for serviceability of the west portion of the community of Winchester.

Although the civil works (i.e. inlet gravity sewer, wet well and forcemain) are designed to service the ultimate population within the drainage area, the mechanical works associated with this application (i.e. the sewage pumps) are to be selected to service a proposed commercial development located at the intersection of County Road 31 and Main Street and an existing commercial property located on the east side of County Road 31, approximately 250 meters north of the intersection.

On behalf of the Owner, The Corporation of the Township of North Dundas, the Ontario Clean Water Agency (OCWA) has been retained as the Operating Authority for the Sewage Collection and Treatment Facilities. As outlined in the Sanitary Servicing Assessment Report prepared by Stantec Consulting Ltd. on June 25, 2005, the treatment facilities can accommodate the additional flows associated with the additional population to be serviced by the new gravity sewer. An application for the proposed sanitary sewer has been submitted under a separate cover.

1.2 EXISTING SEWAGE COLLECTION, PUMPING AND TREATMENT SYSTEM

The Community of Winchester sewage collection and treatment system consists of the following:

- Approximately 5 km of gravity sewers, with diameters ranging between 200 and 300 mm diameter.
- A sewage pumping station located on St-Lawrence Street, servicing the south portion of Winchester; no sewage from the new sewage drainage area will be transferred to this station.
- Two (2) existing sewage pump stations, the first is located near the intersection of Main Street and Bailey Avenue (referred to as Pumping Station No.3) and the second near the intersection of Ottawa Street and Dufferin Street (referred to as Ottawa Street Pump Station). The rated capacity of Pumping Station No.3 is 24.39 L/s and based on the proposed flows will require some upgrade. Ottawa Street Pump Station has a rated capacity of 90L/s which is capable to proposed flows, considering a peak hour factor of 3.54.

- A waste stabilization pond, consisting of five cells, partial aeration, phosphorus removal facilities, and pumping facilities discharging to the Henderson Drain. Treated effluent eventually reaches the Castor River and the South Nation River. The Lagoon's rated capacity is 2,220 m^3/d. Final Effluent is discharged during the Spring and Fall seasons.

2.0 Sewage Collection and Pumping System

2.1 SERVICED AREA AND DESIGN FLOW RATES

The area to be ultimately serviced by the new sewage pumping station will include the west portion of the Community of Winchester, Dawley Drive, the future development located west of Highway #31 and approximately 500 meters north of Main Street along County Road 31. This area consists into the following (refer to Figure 1):

- A commercial area, located at the corner of Highway #31 and Main Street, including the existing Dean's Food Store and the proposed Tim Hortons.
- An area located north of Main Street, along the east side of Highway #31, consisting of an existing motel and restaurant.
- A residential and commercial development along Dawley Drive and on Main Street from Highway #31 to the proposed pumping station.
- A new development located along the extension of Main Street, west of Highway #31.

For the initial phase of development, Tim Hortons, the motel and restaurant (Country Kitchen) will be serviced. The corresponding total peak hour flow is 3.29 L/s, as stated in Appendix II. For initial development pump selection, we consider a flow rate of 3.5 L/s, which is the minimum flow generated by a commercial quality submersible pump (ITT FLYGT). Smaller domestic use pumps developing lower flow rates are available, however would not be suitable for the intense service conditions associated with a municipal system.

The ultimate service sewage flow within this drainage area is established to be12.3 L/s at peak hour. The new sewage pumping station wet well is to be designed to accommodate that flow.

2.2 GRAVITY SEWER

Under a separate cover, an application for a Certificate of Approval has been submitted to the MOE for the installation of a sanitary sewer for the serviceability of the following areas:

- Approximately 555 meters of 250 mm diameter gravity sewer on Main Street, between County Road 31 and the proposed sewage pumping station;
- Approximately 300 meters of 200 mm diameter gravity sewer on Main Street, east of the proposed pumping station, toward Bailey Street;
- Approximately 248 meters of 200 mm diameter gravity sewer along Highway #31, north of Tim Hortons.

The detailed design calculations are included under Appendix II. As per the MOE Guidelines, minimal slope have been retained, in order to limit excavation depth near pumping station. Flow rate generated by the commercial area for the first years of development is 3.29 L/s.

2.3 SEWAGE PUMPING STATION NO. 4 WET WELL

The preferred location of the proposed sewage pumping station is the Winchester Well No.4 site, which is currently owned by the Municipality. This site is located on Main Street approximately 500 meters east of County Road 31. This well pump station is no longer in operation however the facility still exists. Three phase power supply and telemetry facilities available on site are to be re-used to service the new Winchester Sewage Pumping Station No.4.

The wet well design is based on the ultimate population flow, which is 12.3 L/s. Station diameter is to be 2.44 meters (8'). The station cross-sectional area is 4.67 m^2. The corresponding pumping volumes and control level spacing is as follow:

Design flow Q	12.3 L/s

<u>Lag pump volume</u>

= 0.06 X Q	0.74 m^3
Control level spacing	0.16 m

<u>Lead pump volume</u>

= 0.15 X Q (m^3)	1.84 m^3
Control level spacing	0.39 m

The spacing between the incoming gravity sewer invert and the bottom of the wet well is established as follow:

= 150 mm between incoming sewer invert and start lag pump level
+ 160 mm between start lag and start lead pump levels
+ 390 mm between start lead and stop pump levels
+ 100 mm between stop all pump level and low level alarm float level
+ 300 mm low level alarm float level and bottom of wet well (typical value for submersible pumps)
= 1,100 mm between incoming sewer invert and bottom of wet well.

In order to meet the ultimate population requirements, the geodetic elevations of wet well are as follow:

Reference	Geodetic Elevation (m)
Top of wet well:	76.80
Finished ground level:	76.50
Intermediate platform:	73.80
Incoming sewer invert:	70.96
Bottom of wet well:	69.86

2.4 SEWAGE PUMPING STATION NO. 4 PUMP SELECTION TO SERVICE INITIAL PHASE OF DEVELOPMENT

The target design flow for pump selection is the fifteen-year design flow, i.e. 3.4 L/s. This flow is inferior to the ultimate pumping station capacity, but is sufficient to meet the proposed phase 1 needs (set at 3.29 L/s, as shown in Appendix II). A higher pump flow rate would have longer pump cycle duration, and would generate nauseous odors at the station and as such the shorter pump cycles associated with a smaller pump will avoid potential odor problems. For pumping volumes and control level spacing considerations, we rounded up the flow to 3.5 L/s, are the following:

Design flow Q	3.5 L/s
Lag pump volume = 0.06 X Q	0.21 m^3
Corresponding control level spacing	0.045 m
Lead pump volume = 0.15 X Q	0.52 m^3
Corresponding control level spacing	0.11 m

The geodetic elevations for the control levels, to meet the phase 1 design requirements, are as follow:

Reference	Geodetic Elevation (m)
Incoming sewer invert:	71.45
High level alarm float:	70.57
Start lag level:	70.42
Start lead level:	70.37
Stop all pumps level:	70.26
Low level alarm (stop all pumps):	70.16
Bottom of wet well:	69.86

A system analysis was performed to size the sewage pumps for this application. The system curve indicates that a flow of 3.4 L/s corresponds to a total dynamic head (TDH) of 4.50 m. The smallest available heavy duty ITT FLYGT submersible sewage pump (ie. model CP3045.180 HT with a 74 mm diameter impeller and 50 mm diameter discharge) is capable of handling the proposed flow rate.

Total dynamic head is calculated using the following design parameters (pump curve calculations are included under Appendix III):

- Equivalent length of 100 mm diameter pipe, between pump and gravity sewer manhole = 549 m, including allowance for fittings.
- Friction factor and static head are reviewed for three conditions
  - Low flow conditions: C = 120 and static head (at stop both pump level) = 73.50 – 70.26 m = 3.24 m,
  - Average flow conditions: C = 130 and static head (at median pumping volume level) = 73.50 – 70.31m = 3.19 m;
  - High flow conditions: C = 120 and static head (at sewer invert) = 73.50 – 71.45 m = 2.05 m. Pump motor is to be sized to meet this condition.

The flow velocity within the 100 mm diameter forcemain (0.38 m/s) is inferior to the self-cleaning velocity of 0.8 m/s. A forcemain bypass piping and valve assembly will be provided at the station, to facilitate forcemain-cleaning procedures in the first years of the development. Long-term flow rate will be sufficient to achieve the self-cleaning velocity.

The existing 60 A, 600v/3ph/60Hz electrical entrance will provide enough capacity to meet the new sewage pump starting load (12 A).

No standby power generator is to be installed at the station at this stage; instead, a manual transfer switch and an exterior wall mounted receptacle will be provided to connect a portable generator. Existing telemetry facilities will be programmed to send an alarm signal to the plant operator in case of a high level alarm and in case of loss of power. Volume provided within the wet well and the sewer, between the stop pump level and the lowest basement, is sufficient to provide two hours of retention volume.

The existing natural gas feed line along Main Street is servicing the pump building heater. The Municipality will install at a later date a natural gas powered generator outside the building, to meet the ultimate population sewer pump power requirements.

Characteristics of Sewage Pumping Station No. 4 pumps are the following:

- Cross-sectional area for a 2.44 m diameter wet well = 4.67 m^2
- Pump model: ITT FLYGT CP3045.180 HT, with 2 HP 600v/3ph/60Hz motor and 74 mm diameter impeller.
- Pump performance, 3.4 L/s at a total dynamic head of 4.5 m.
- Control level device: Milltronics MultiRanger.

- Minimum water level for pump operation (according to ITT FLYGT) = 260 mm.
- Discharge piping and valves: 75 mm diameter elbows, riser, ball valve, and gate valve.
- Forcemain: 100 mm diameter, 343 m long, with 45° elbows
- Discharge at gravity sewer manhole: Geodetic Elevation = 73.50 m

Pump curve is shown in Appendix IV.

2.5 MODIFICATIONS TO SEWAGE PUMPING STATION PUMP NO.3 AT BAILEY STREET

The existing sewage pumping station at the corner of Bailey Street and Main Street (hereafter designated as Pumping Station No.3) was upgraded in 2000, in order to service the various developments within the station drainage area. Each of the two 15 HP (11.2 kW) sewage pumps can develop the peak hour design flow rate of 24.39 L/s. A 40 kW diesel generator has been installed in 2002 to service the station.

The new sewage pumping station at Winchester Well No. 4 site will discharge the fifteen-year design flow (i.e. 3.0 L/s) to the existing Pumping Station No.3. Minor mechanical modifications at Pumping Station No.3, including the replacement of pump impeller and discharge piping will be sufficient to handle the above additional flow. No electrical upgrade is required at this time. Based on our preliminary review, major upgrades will be required at Pumping Station No.3 when the proposed Winchester Well No.4 sewage Pump Station is upgraded for ultimate flow.

Characteristics of the Pumping Station No.3 are the following:

- Cross-sectional area = 2.13 m X 2.13 m = 4.54 m^2
- Pump model: ITT FLYGT CP3140.180 HT,
- with 15 HP 600v/3ph/60Hz motor and 248 mm diameter impeller.
- Actual pump performance, as per Certificate of Approval No. 7036-4JWPUE dated May 2nd, 2000: 24.39 L/s at a total dynamic head of 71 ft (21.64 m)
- The Certificate has a typo error (71 m).
- Control level device: Milltronics MultiRanger.
- Minimum water level for pump operation (according to ITT FLYGT) = 260 mm.
- Discharge piping and valves: 100 mm diameter elbows, riser, ball valve, and gate valve.
- Forcemain: 150 mm diameter, 611 m long, with eight 45° elbows
- Discharge at gravity sewer manhole: Geodetic Elevation = 79.25 m

The revised pump design flow is 31.4 L/s (= 24.39 L/s from existing committed area plus 7.0 L/s from new station).

The proposed modifications consist into the following:

- Replacing the existing 248 mm diameter impeller with a 265 mm diameter impeller (referenced under Curve No. 63-480-00-3855, see Appendix V).
- Replacing the existing 100 mm diameter discharge piping and valve assembly by 150 mm diameter facilities.
- Adjusting control level elevations at ultrasonic transducer to meet new flow requirements.
- Adjusting platform and trash basket to meet new requirements; platform will be relocated above the revised high level alarm level, in order to avoid flooding under normal operation conditions.

The design pumping volumes and corresponding elevations are the following:

Design flow Q 31.4 L/s

<u>Lag pump volume</u>

= 0.06 X Q 1.88 m^3
Control level spacing 0.41 m

<u>Lead pump volume</u>

= 0.15 X Q (m^3) 4.71 m^3
Control level spacing 1.04 m

The revised geodetic elevations for Pumping Station No.3 are as follows:

Reference	Geodetic Elevation (m)
Top of station:	75.82
Ground Level:	75.67
Overflow invert:	73.97
Revised platform elevation:	70.60
High level alarm float:	70.43
Start lag level:	70.33
Original platform elevation:	70.18
Start lead level:	69.92
Incoming sewer invert:	69.70
Stop all pumps level:	68.88
Low level alarm (stop all pumps):	68.84
Bottom of wet well:	68.58

Total dynamic head was calculated using the following design parameters (refer to Appendix VI for detailed calculations):

- Equivalent length of 150 mm diameter pipe, between pump and gravity sewer manhole = 69 m, including allowance for fittings.
- Friction factor and static head are reviewed for three conditions
  - Low flow conditions: C = 120 and static head (at stop both pump level) = 79.25 m – 68.88 m = 10.37 m, with one pump.
  - Q = 30.0 L/s at TDH = 25.0 m.
  - Average flow conditions: C = 130 and static head (at median pumping volume level) = 79.25 m – (69.92 m + 68.88 m)/2 = 9.85 m, with one pump.
  - Q = 31.4 L/s at TDH = 25.0 m.
  - High flow conditions: C = 120 and static head (at overflow level) = 79.25 –73.97 m = 5.28 m, with both pumps in operation.
  - Q = 44.0 L/s at TDH = 28.0 m, with two pumps (22.0 L/s per pump).

2.6 WINCHESTER LAGOON RESIDUAL CAPACITY

The available Winchester residual capacity is adequate to accept the supplementary flow from the new sewage collection system. The Winchester Lagoons has a total capacity of 2,220 m^3/d. The average daily flow rate monitored in 2003 and 2004 were 1,647 and 1,547 m^3/d respectively. The sewage collection system expansion toward the west end of Winchester can therefore take place.

The existing Winchester main sewage pumping station has a capacity of 90 L/s at peak hour. The station has been designed to match the lagoon capacity (2,220 m^3/d, or 25.5 L/s), with a 3.54 peak factor. The actual main pumping station is adequate to service the additional commercial area (supplementary flow of 3.5 L/s), without any modification.

3.0 DRAWINGS

The drawings showing the implementation of the improvements to the works are included under separate cover.

Stantec Consulting Ltd.

Jean Hebert

Jean Hebert, M.A.Sc., ing., P.Eng.
Environment Engineer

APPENDIX I

CERTIFICATE OF APPROVAL (SEWAGE)

NO. 7036-4JWPUE DATED MAY 3RD, 2000

APPENDIX I

CERTIFICATE OF APPROVAL (SEWAGE) NO.

7036-4JWPUE DATED MAY 3RD, 2000

TOWNSHIP OF
North Dundas

February 5, 2001

Ministry of the Environment
2 St. Clair Avenue, West Floor 12A
Toronto, Ontario M4V 1L5

Attention: Mr. Mohamed Dhalla, P. Eng
Director
Section 53, Ontario Water Resources Act

Reference: *Main Street Pumping Station*
Township of North Dundas

Dear Mr. Dhalla:

The Main Street Pumping Station is a Township owned facility that was originally constructed in the early 1970's. Both the municipality and OCWA (the agency responsible for operating the facility on behalf of the municipality) have attempted in vain to locate the "Certificate of Approval" for the original construction. The said pumping station now requires upgrading as a result of a new subdivision development.

In early 2000 the Developer that requires the pumping station upgrade submitted an "Application for Approval" for the upgrade to your Ministry. This resulted in your Ministry issuing "Certificate of Approval" Number 7036-4 JWPUE (copy attached). The said "Certificate of Approval" was issued to the Developer.

It has been brought to our attention that because the municipality owns the station, the aforementioned certificate should correctly have been issued to the municipality, not the numbered company owned by the Developer (i.e. indeed when the application was submitted to your Ministry, specific mention should have been made that the developer applying for the certificate was doing so acting as an agent for the municipality).

At this time, therefore, we are requesting that "Certificate of Approval" Number 7036-4 JWPUE be amended to reflect that fact that the Township of North Dundas is the owner of the works. To this end we are enclosing a cheque in the amount of $200.00 that we understand is required to cover the administrative processing costs.

Please do not hesitate to call if you have any questions or require additional clarification.

Sincerely,

Howard F. Smith
Clerk Administrator
Township of North Dundas

encl.

RECEIVED
MAY 10 2000

CERTIFICATE OF APPROVAL
MUNICIPAL AND ~~PRIVATE SEWAGE WORKS~~
NUMBER 7036-4JWPUE

Ministry of the Environment
Ministère de l'Environnement
tario

1332484 Ontario Inc.
R.R. #1
South Mountain, Ontario
K0E 1W0

te Location: Winchester Pumping Station, South Side of Main Street, in the Township of North Dundas, United Counties of Stormont, Dundas & Glengarry

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

pgrading the existing sewage pumping station by replacing the existing pumps with two(2) new submersible ewage pumps (one duty, one standby), each pump capable of handling 24.39 L/s against a total dynamic head f 71m;

l in accordance with the Application for Approval of Municipal and Private Water and Sewage Works and Guy-Racine Subdivision, Upgrade to Winchester Pump Station Report", dated November 1999, as prepared nd submitted for approval by Novatech Engineering Consultants Ltd.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as mended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after eceipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, R.S.O. 990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

e Secretary*
vironmental Appeal Board
00 Yonge St., 12th Floor
O. Box 2382
ronto, Ontario
P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

e above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 2nd day of May, 2000

THIS IS A TRUE COPY OF THE ORIGINAL NOTICE MAILED

ON May 3RD, 2000

SIGNED

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

c/

District Manager, MOE Cornwall
Mr. Greg MacDonald, P.Eng., Novatech Engineering Consultants Ltd.

APPENDIX II

GRAVITY SEWER DESIGN flow rates

RESIDENTIAL AREA AND POPULATION							COMM		INDUST			INST		C+I+I	INFILTRATION					
A	# UNITS	POP.	CUMULATIVE		PEAK	PEAK	AREA	ACCU.	AREA	ACCU.	PEAK	AREA	ACCU.	PEAK	TOTAL	ACCU.	INFILT.	TOTAL	LENGTH	ACTUAL
			AREA	POP.	FACT.	FLOW		AREA		AREA	FACTOR		AREA	FLOW	AREA	AREA	FLOW	FLOW		DIA.
)			(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(per MOE)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)
.00	0.00	0	0.00	0	4.00	0.00	1.50	1.50			0.00		0.00	0.35	1.50	1.50	0.42	**0.77**	60.00	0.20
.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	100.00	0.20
.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	65.00	0.20
.00	0.00	0	0.00	0	4.00	0.00	0.00	1.50			0.00		0.00	0.35	0.00	1.50	0.42	**0.77**	22.00	0.20
.77	3.00	9	1.77	9	4.00	0.15	0.00	0.00			0.00		0.00	0.00	1.77	1.77	0.50	**0.64**	95.00	0.20
.21	2.00	6	4.98	15	4.00	0.24	0.00	0.00			0.00		0.00	0.00	3.21	4.98	1.39	**1.64**	23.00	0.20
.34	2.00	6	6.31	21	4.00	0.34	0.00	0.00			0.00		0.00	0.00	1.34	6.31	1.77	**2.11**	125.00	0.20
.00	0.00	0	0.00	0	4.00	0.00	0.81	2.31			0.00		0.00	0.53	0.81	2.31	0.65	**1.18**	60.00	0.25
.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	120.00	0.25
.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	120.00	0.25
.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	99.00	0.25
.00	0.00	0	0.00	0	4.00	0.00	0.00	2.31			0.00		0.00	0.53	0.00	2.31	0.65	**1.18**	99.00	0.25
.00	0.00	0	6.31	21	4.00	0.34	0.00	2.31			0.00		0.00	0.53	0.00	8.62	2.41	**3.29**	99.00	0.25
.00	0.00	0	6.31	21	4.00	0.34	0.00	2.31			0.00		0.00	0.53	0.00	8.62	2.41	**3.29**	13.00	0.25

DESIGN PARAMETERS

50 l/p/day	Industrial Peak Factor =	as per MOE Graph	
000 L/ha/da	Extraneous Flow =	0.28	L/s/ha
500 L/ha/da	Minimum Velocity =	0.60	m/s
00	Mannings n =	0.013	
00	Persons per Unit =	3.0	persons/unit

Designed: MPT	PROJECT: **Winchester Sanitary Sewer Extension - Pha**	
Checked: JH	LOCATION: **Township of North Dundas**	
Dwg. Reference:	File Ref.:	Date: 9-Mar-05

APPENDIX III

FLOW AND HEAD LOW CALCULATIONS FOR

SEWAGE PUMPING STATION NO.4 ON MAIN STREET

Main Street Sewage Pumping Station, located at Winchester Well No.4 Site
Initial flow = 3.5 L/s, servicing limited commercial area

Minimum flow condition, at stop pump level, with maximum friction factor (C = 120)

Q	(L/s)	0.0	1.0	2.0	3.0	4.0
Friction C		120	120	120	120	120
Length - 100 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 100 mm FM	(m)	0.00	0.16	0.59	1.26	2.14
Static head	(m)	3.24	3.24	3.24	3.24	3.24
TDH	(m)	3.24	3.40	3.83	4.50	5.38
Velocity within 150 mm FM	(m/s)	0.00	0.13	0.25	0.38	0.51

Average flow condition, at median pumping level, with average friction factor (C = 130)

Q	(L/s)	0.0	2.0	3.0	3.5	3.7
Friction C		130	130	130	130	130
Length - 150 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 150 mm FM	(m)	0.00	0.51	1.08	1.44	1.60
Static head	(m)	3.19	3.19	3.19	3.19	3.19
TDH	(m)	3.19	3.70	4.27	4.63	4.79
Velocity within 150 mm FM	(m/s)	0.00	0.25	0.38	0.45	0.47

Maximum flow condition, at invert level, with minimum friction factor (C = 140)

Q	(L/s)	0.0	3.0	4.0	5.0	6.0
Friction C		140	140	140	140	140
Length - 150 mm dia. FM	(m)	549	549	549	549	549
Safety factor		1.03	1.03	1.03	1.03	1.03
Diameter	(mm)	100	100	100	100	100
Friction loss - 150 mm FM	(m)	0.00	0.94	1.61	2.44	3.42
Static head	(m)	2.05	2.05	2.05	2.05	2.05
TDH	(m)	2.05	2.99	3.66	4.49	5.47
Velocity within 150 mm FM	(m/s)	0.00	0.38	0.51	0.64	0.76

Compiled by:

APPENDIX IV

PUMP CURVE AT SEWAGE PUMPING STATION NO.4
ON MAIN STREET

FLYGT	PERFORMANCE CURVE	PRODUCT	TYPE
		CP3045.180	HT
DATE	PROJECT	CURVE NO	ISSUE
2005-03-11		63-254-00-3464	2

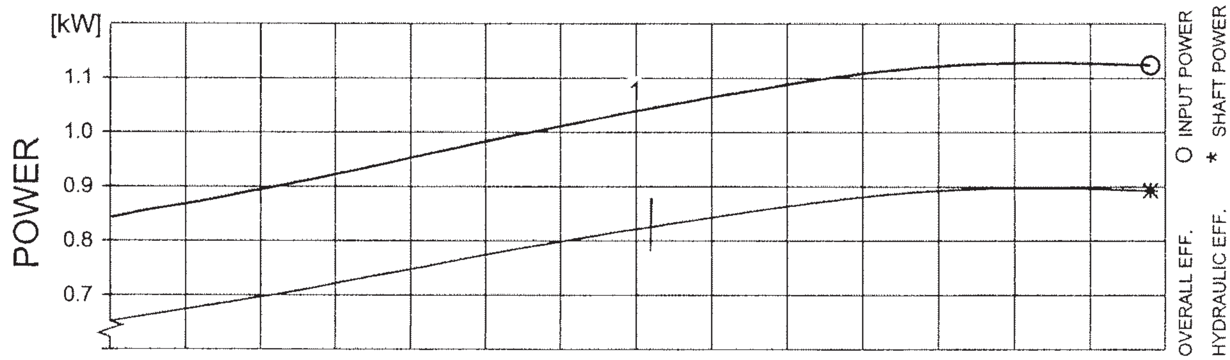
	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.87	0.82	0.71
MOTOR EFFICIENCY	79.0 %	80.0 %	78.0 %
GEAR EFFICIENCY	---	---	---

COMMENTS

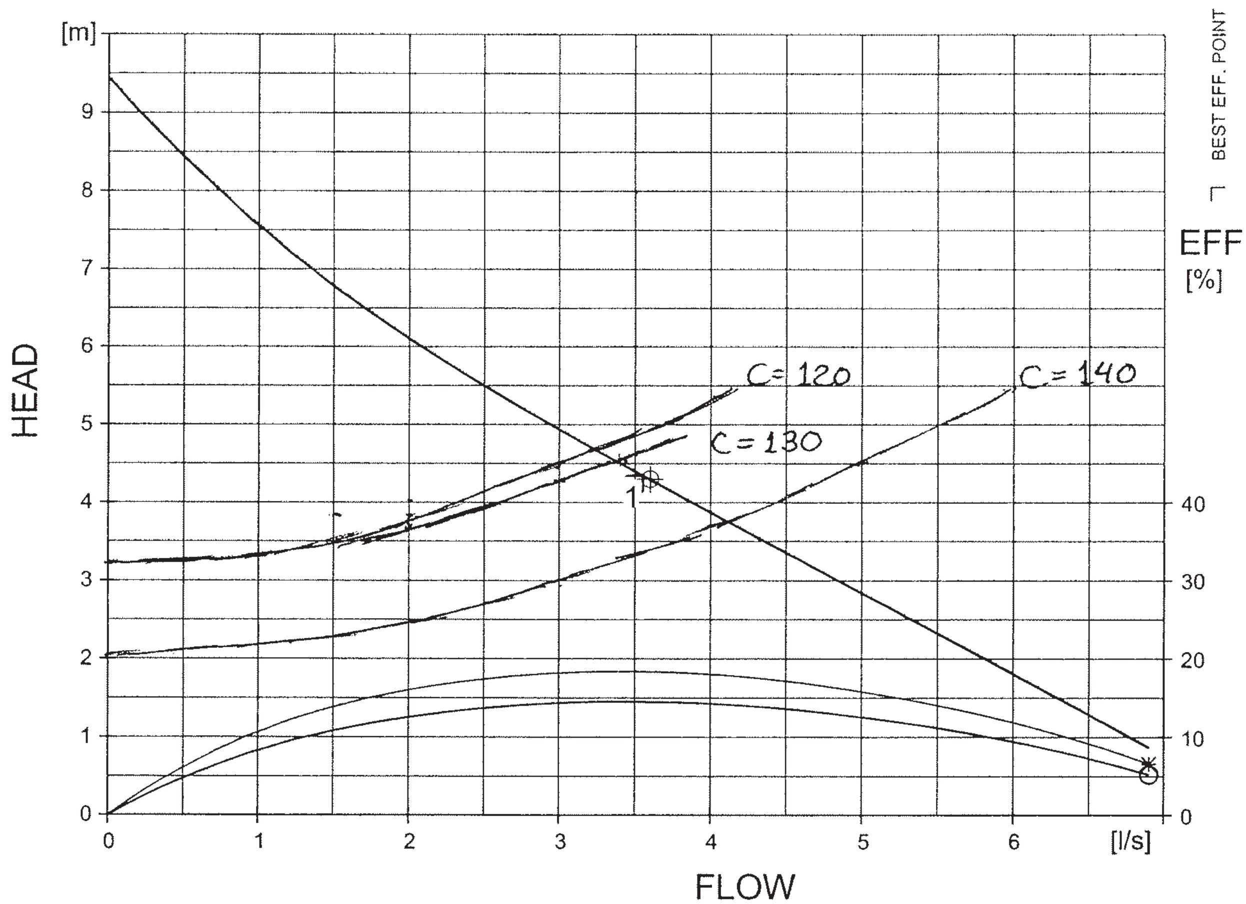
INLET/OUTLET	IMP. THROUGHLET
- / 50 mm	46 mm

MOTOR SHAFT POWER	1.3	kW
STARTING CURRENT ...	12	A
RATED CURRENT ...	1.8	A
RATED SPEED	3405	rpm
TOT.MOM.OF INERTIA ...	---	
NO. OF BLADES	1	

IMPELLER DIAMETER			
74 mm			
MOTORTYPE		STATOR	REV
12-08-2AA		05Y	10
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	2
GEARTYPE		RATIO	
---		---	



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [kW]	EFF [%]	NPSH [m]
1	3.60	4.30	1.05 (0.83)	14.5 (18.3)	
B.E.P.	3.55	4.34	1.05 (0.83)	14.5 (18.4)	



FLYPS2.11 (20010918)

Performance with clear water and rating data at 40 °C

FLYGT CURVE

APPENDIX V

PUMP CURVE AT BAILEY STREET SEWAGE PUMPING STATION

Station No.3 at corner of Bailey Street and Main Street
Pump impeller and discharge piping replaced
in order to increase flow rate from 24.39 to 31.4 L/s

Minimum flow condition, at stop pump level, with maximum friction factor (C = 120)

Q	(L/s)	0.0	20.0	25.0	30.0	30.7	35.0
Friction C		120	120	120	120	120	120
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	7.00	10.60	14.88	15.54	19.82
Static head	(m)	10.37	10.37	10.37	10.37	10.37	10.37
TDH	(m)	10.37	17.37	20.97	25.25	25.91	30.19
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.74	1.98
TDH	(ft)	34.0	57.0	68.8	82.9	85.0	99.1

Average flow condition, at median pumping level, with average friction factor (C = 130)

Q	(L/s)	0.0	20.0	25.0	30.0	31.4	32.5
Friction C		130	130	130	130	130	130
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	6.04	9.14	12.83	13.96	14.88
Static head	(m)	9.85	9.85	9.85	9.85	9.85	9.85
TDH	(m)	9.85	15.89	18.99	22.68	23.81	24.73
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.78	1.84
TDH	(ft)	32.3	52.1	62.3	74.4	78.1	81.1

Maximum flow condition, at overflow level, with minimum friction factor (C = 140)

							Two pumps : = 2 X 22 L/s
Q	(L/s)	0.0	20.0	25.0	30.0	31.4	44.0
Friction C		140	140	140	140	140	140
Length - 150 mm dia. FM	(m)	635.9	635.9	635.9	635.9	635.9	635.9
Safety factor		1.05	1.05	1.05	1.05	1.05	1.05
Diameter	(mm)	150	150	150	150	150	150
Friction loss - 150 mm FM	(m)	0.00	5.26	7.96	11.18	12.16	22.78
Static head	(m)	5.28	5.28	5.28	5.28	5.28	5.28
TDH	(m)	5.28	10.54	13.24	16.46	17.44	28.06
Velocity within 150 mm FM	(m/s)	0.00	1.13	1.41	1.70	1.78	2.49
TDH	(ft)	17.3	34.6	43.4	54.0	57.2	92.0

Compiled by

APPENDIX VI

FLOW AND HEAD LOW CALCULATIONS FOR
BAILEY STREET SEWAGE PUMPING STATION

FLYGT	PERFORMANCE CURVE	PRODUCT CP3140.180	TYPE HT
DATE 2004-06-21	PROJECT	CURVE NO 63-480-00-3855	ISSUE 1

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.85	0.81	0.72
MOTOR EFFICIENCY	84.0 %	84.5 %	83.0 %
GEAR EFFICIENCY	---	---	---

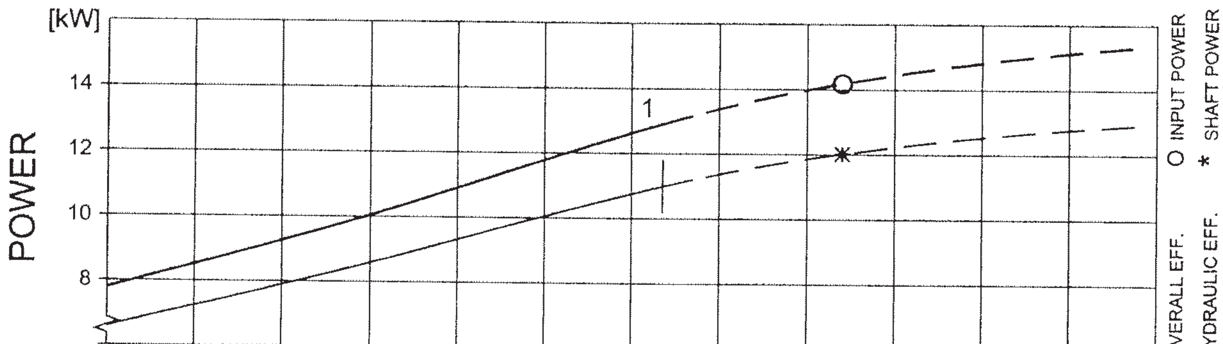
MOTOR SHAFT POWER	11.2	kW
STARTING CURRENT ...	85	A
RATED CURRENT ...	15	A
RATED SPEED	1745	rpm
TOT.MOM.OF INERTIA ...	0.15	kgm2
NO. OF BLADES	1	

COMMENTS

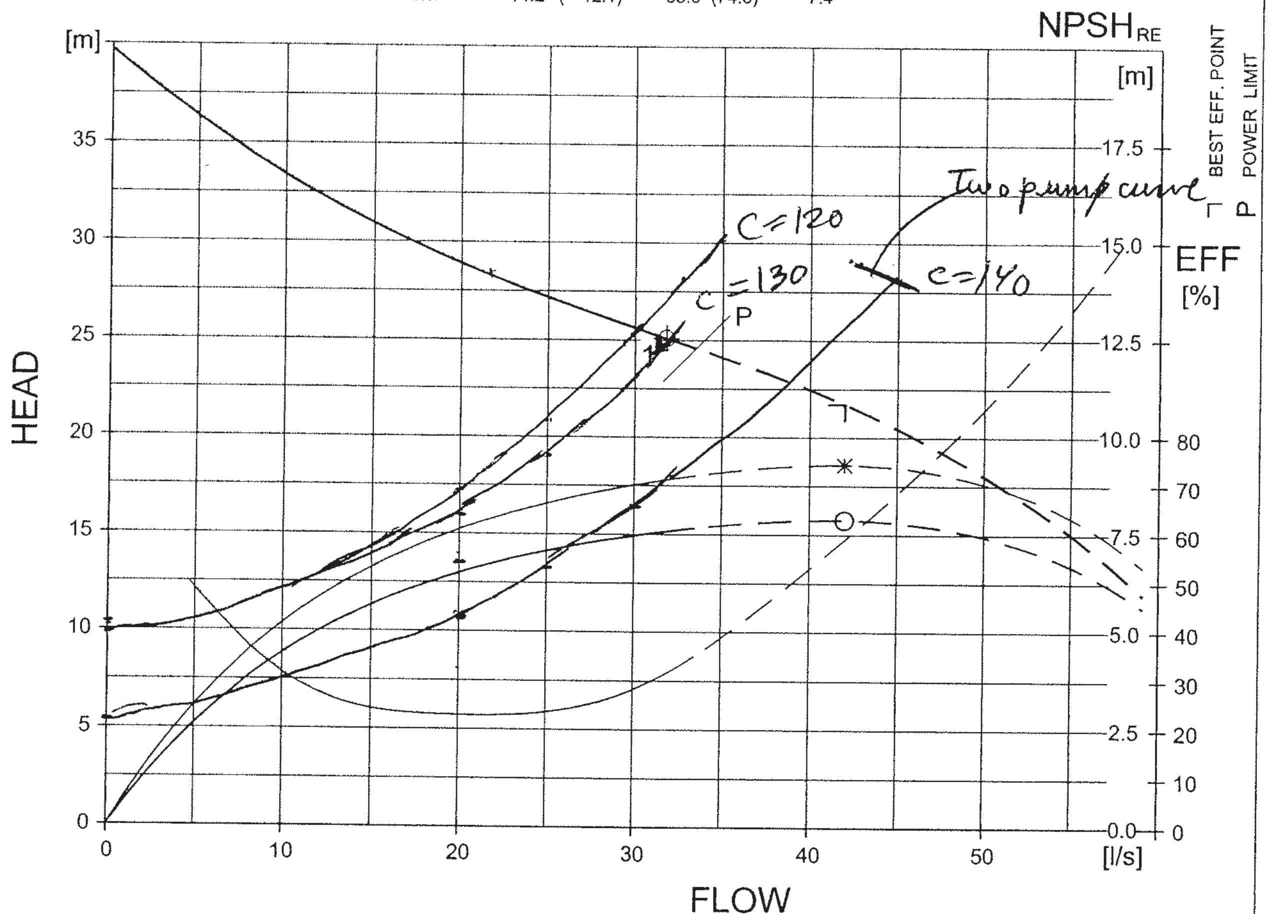
INLET/OUTLET: - /100 mm

IMP. THROUGHLET: 76 mm

IMPELLER DIAMETER			
265 mm			
MOTORTYPE		STATOR	REV
25-11-4AA		52D	10
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	600 V	4
GEARTYPE		RATIO	
---		---	



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [kW]	EFF [%]	NPSH [m]
1	31.8	25.1	13.0 (11.0)	60.6 (71.2)	4.0
B.E.P.	42.0	21.7	14.2 (12.1)	63.0 (74.3)	7.4



FLYPS2.11 (20010918)

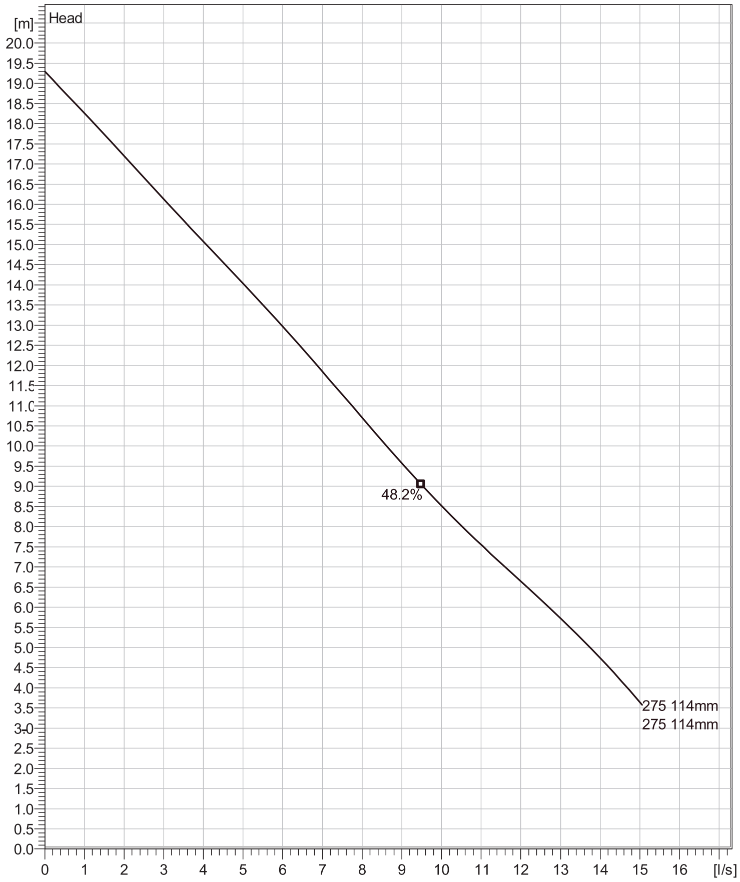
Performance with clear water and rating data at 40 °C

FLYGT CURVE

APPENDIX C
Specifications of the Proposed Pump

NP 3069 SH 3~ Adaptive 275

Technical specification



Water, pure

Curve ISO

Note: Picture might not correspond to the current configuration.

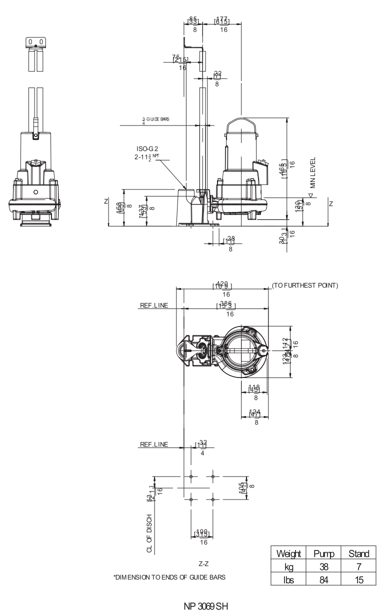
General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	50 mm
Suction Flange Diameter	100 mm
Impeller diameter	114 mm
Number of blades	2

Installation: P - Semi permanent, Wet



Motor

Motor #	N3069.160 13-08-2BB-W 2.7hp Standard
Stator variant	4
Frequency	60 Hz
Rated voltage	600 V
Number of poles	2
Phases	3~
Rated power	2.7 hp
Rated current	2.9 A
Starting current	15 A
Rated speed	3315 rpm
Power factor	
1/1 Load	0.86
3/4 Load	0.81
1/2 Load	0.71
Motor efficiency	
1/1 Load	78.1 %
3/4 Load	80.4 %
1/2 Load	80.4 %

Configuration

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

NP 3069 SH 3~ Adaptive 275

Performance curve

Pump

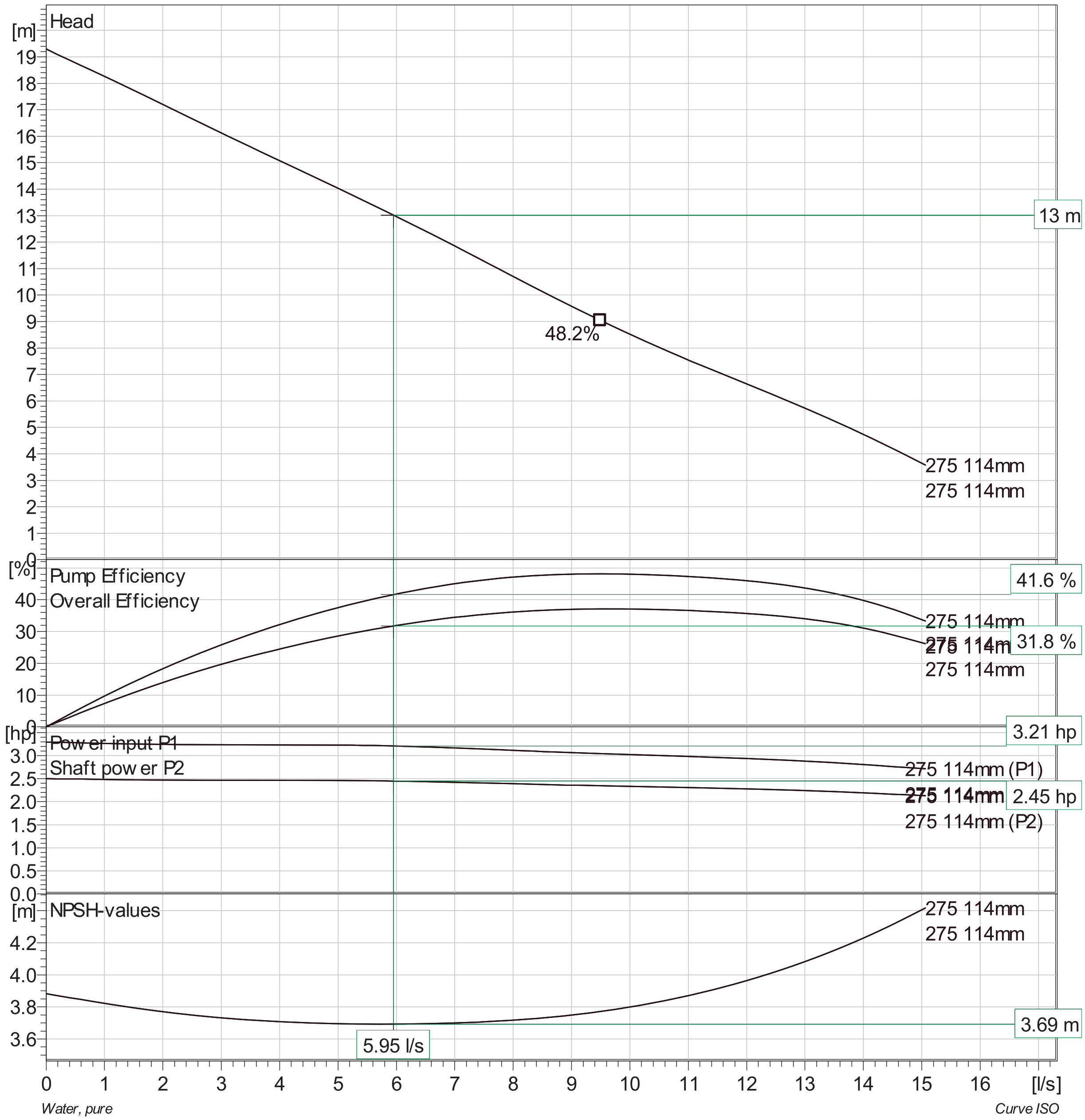
Discharge Flange Diameter	50 mm
Suction Flange Diameter	100 mm
Impeller diameter	114 mm
Number of blades	2

Motor

Motor #	N3069.160 13-08-2BB-W 2.7hp
Stator variant	4
Frequency	60 Hz
Rated voltage	600 V
Number of poles	2
Phases	3~
Rated power	2.7 hp
Rated current	2.9 A
Starting current	15 A
Rated speed	3315 rpm

Power factor	
1/1 Load	0.86
3/4 Load	0.81
1/2 Load	0.71

Motor efficiency	
1/1 Load	78.1 %
3/4 Load	80.4 %
1/2 Load	80.4 %



Duty point		Guarantee
Flow	**Head**	
3.5 l/s	4.5 m	No

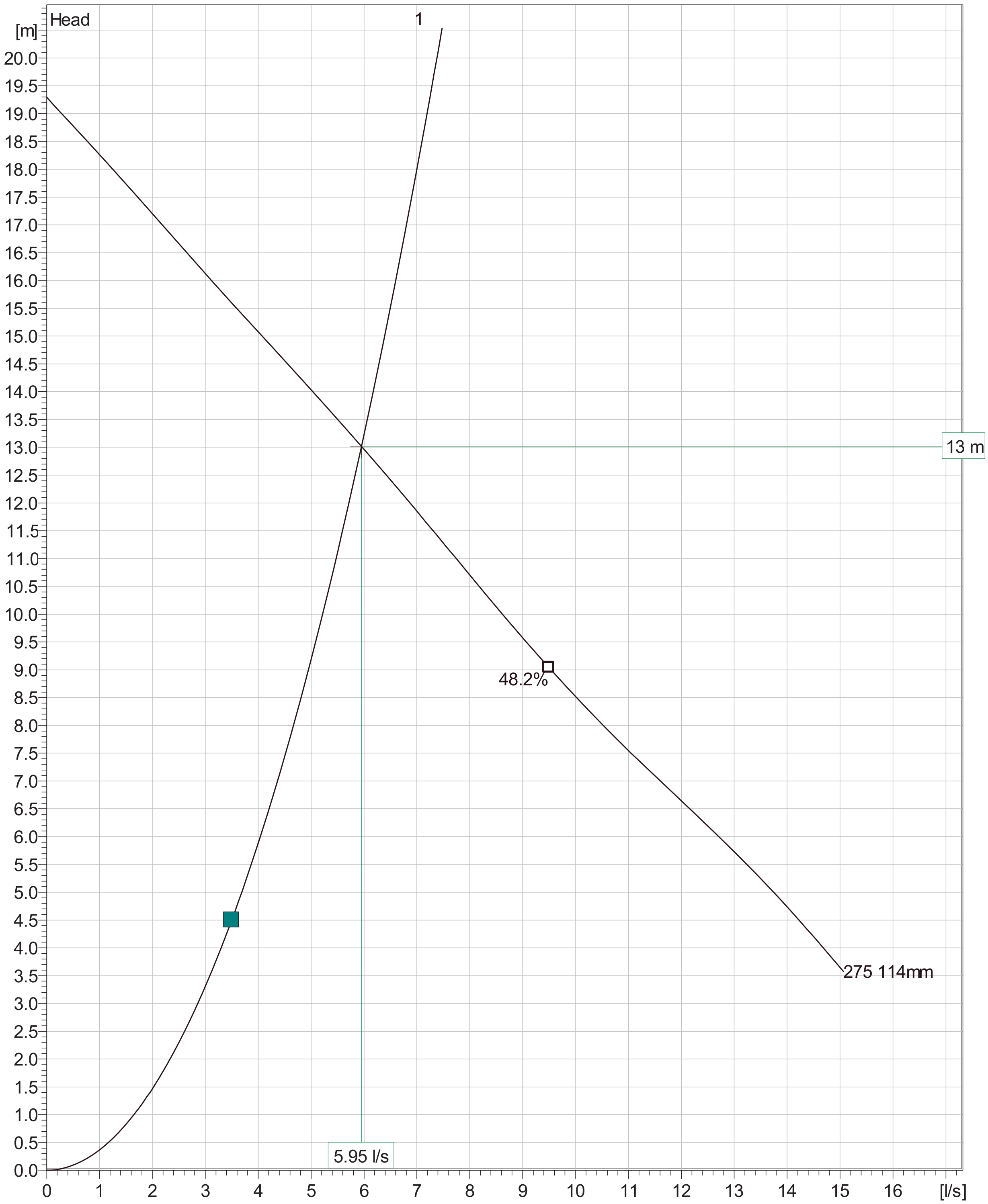
Project	Project ID	Created by	Created on	Last update
			1/25/2018	

xylem

NP 3069 SH 3~ Adaptive 275

Duty Analysis

FLYGT



Water, pure *Curve ISO*

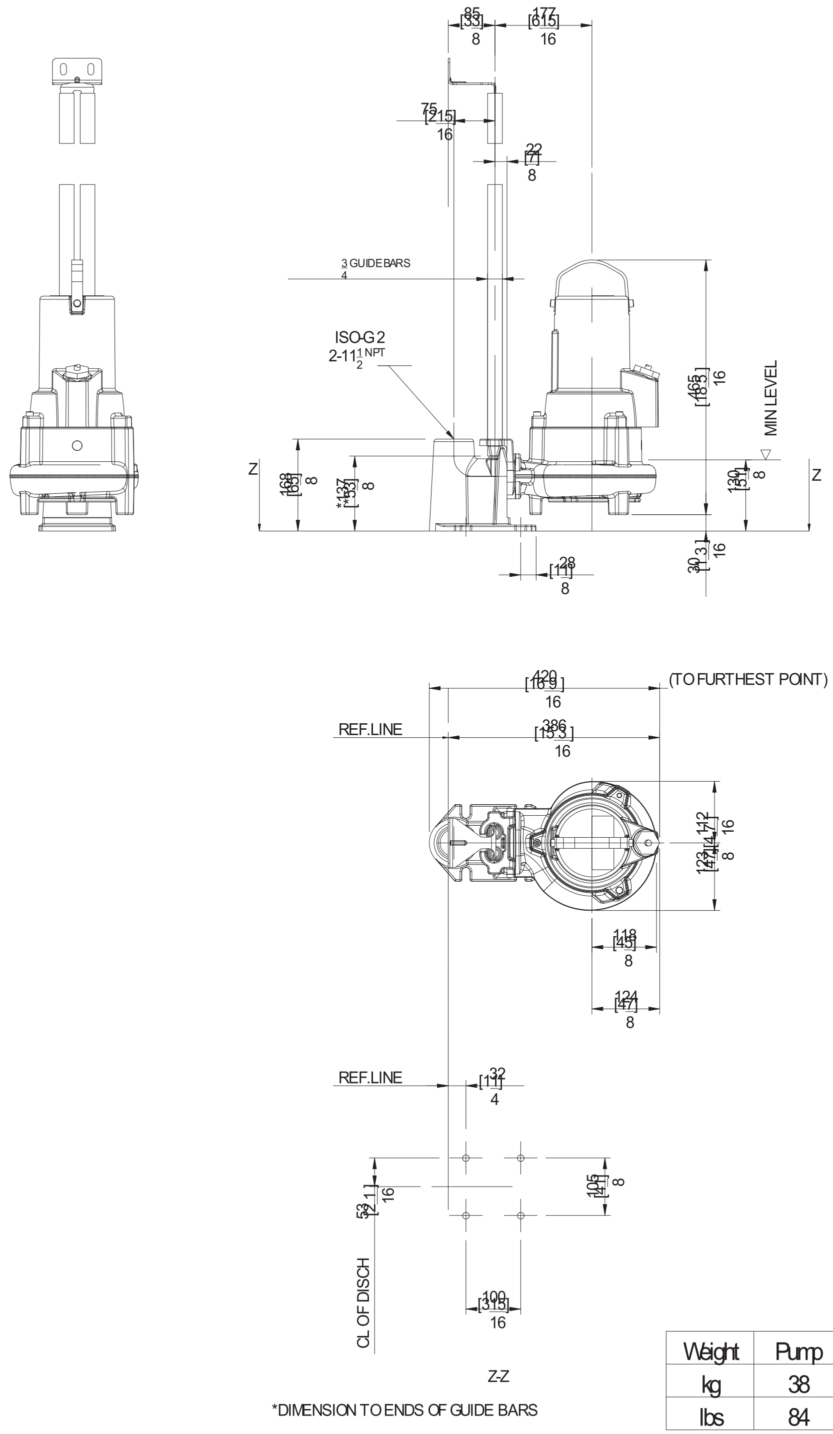
Curve issue 3

Pumps running /System	Individual pump Flow	Head	Shaft power	Total Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	5.95 l/s	13 m	2.45 hp	5.95 l/s	13 m	2.45 hp	41.6 %	0.000112 kWh/l	3.69 m

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

NP 3069 SH 3~ Adaptive 275

Dimensional drawing



Weight	Pump	Stand
kg	38	7
lbs	84	15

NP 3069 SH

Project	Project ID	Created by	Created on	Last update
			1/25/2018	

MEMORANDUM

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

TO:	Calvin Pol, BES, MCIP, RPP Director of Planning, Building and By-Law Enforcement Township of North Dundas	DATE:	February 14, 2020
		JOB NO.:	28855-000
FROM:	Jordan Morrissette, M.Eng., P.Eng.	CC:	Angela Rutley, Township of North Dundas Dan Belleau, Township of North Dundas Dave Markell, Ontario Clean Water Agency Sarah Gore, P.Eng., J.L. Richards & Associates Limited Mark Buchanan, P.Eng., J.L. Richards & Associates Limited
RE:	**North Dundas Drinking Water Supply System Capacity Expansion Class EA Technical Memorandum No. 1 Population Growth and Development Projections (Rev. 1) DRAFT**		

INTRODUCTION

The purpose of this Memorandum is to assist in establishing proposed 20 year population projections for the Village of Winchester and the Village of Chesterville within the Township of North Dundas (Township) by determining their potential development opportunities for growth. The 20 year population projections will serve as the basis for establishing the drinking water supply system requirements for the North Dundas Drinking Water Supply System Capacity Expansion Class Environmental Assessment (Class EA).

EXISTING POPULATION AND GROWTH SCENARIOS (WINCHESTER AND CHESTERVILLE)

A review of available 2016 Census information indicates that the population in 2016 within Winchester and Chesterville was approximately 2,394 and 1,677 persons, respectively. It is noted that based on 2011 Census information, the population was 2,460 people in Winchester and 1,448 people in Chesterville, representing an annual percentage growth rate of approximately -0.5% and 3.1%, respectively over the five (5) year period. Due to the development anticipated within both villages over the next 20+ years, the following growth scenarios are proposed to be used for the Class EA:

Low Growth Scenario

- Winchester: Projected annual growth rate of 1.5% from 2016 to 2019. Projected population growth from 2019 to 2039 based on the future potential development within Winchester provided by the Township (refer to Table 1) not including Phase 2 to Phase 5 of the proposed Wellings of Winchester development (Area 11);
- Chesterville: Projected at an annual growth rate of 3.5% from 2016 to 2019 and at an annual growth rate of 1.5% from 2019 to 2039.

High Growth Scenario

- Winchester: Projected annual growth rate of 1.5% from 2016 to 2019. Projected population growth from 2019 to 2039 based on the future potential development within Winchester provided by the Township (refer to Table 1) including Phase 2 to Phase 5 of the proposed Wellings of Winchester development (Area 11);

- Chesterville: Projected at an annual growth rate of 3.5% from 2016 to 2019 and at an annual growth rate of 3.5% from 2019 to 2039.

POPULATION PROJECTIONS FOR WINCHESTER

In order to determine the potential population increase in Winchester for the Low Growth and High Growth Scenarios, an updated list of potential development areas and their associated types of land-use was obtained from the Township. Table 1 provides a description of the future potential developments in Winchester and the total projected units and/or commercial area estimated. The areas identified in Table 1 are illustrated in Figure M1-1.

TABLE 1: WINCHESTER FUTURE POTENTIAL DEVELOPMENT[1]

Area	Description	Total Projected Units or Residents	Commercial Area
A	Existing – Not Connected	28	-
1	Pioneer Gas Restaurant / Car Wash	Constructed	-
2A	Commercial #31 Strip	-	1.13 ha
2B	Commercial #31 Strip	-	1.22 ha
3	Commercial #43 / #31 corner	-	0.97 ha
4	Industrial/Commercial John Deere	-	6.17 ha
5	Commercial – Main Street South side	-	0.45 ha
6	Commercial – Main Street North side	-	(0.33 L/s)
7	Motel	14	-
8	Restaurant – Country Kitchen	7	-
9A	Commercial/Residential	-	5.07 ha
9B	Commercial/Residential	-	Buildout[2]
10	Commercial	Mini storage	0.88 ha
11A	Wellings of Winchester + Commercial (Phase 1)	68 (refer to Table 2)	2.28 ha
11B	Wellings of Winchester (Phase 2 to Phase 5)	432 (refer to Table 3)	
12	Commercial	-	0.8 ha
13	Residential Infill/Apartment in-houses	15	-
14	Winfields Subdivision	9	-
15	Residential – Winfields Phase 2	-	Buildout[2]
16	Commercial	-	0.75 ha
17	Residential (connected)	connected	-
18	New Dundas Manor[3]	-	-
19	Old Dundas Manor Building and Property	-	1.19 ha
20	Guy Racine Subdivision - Phase 3	8	-
21A	Seniors Complex	54 residents	-
21B	Development	36	-
22A	Winchester Meadows Subdivision	22	-
22B	Winchester Meadows Subdivision	22	-
23	Vacant Residential	-	Buildout[2]
24A	Woods Development	78	-
24B	High Density Apartments	21	-
25A	Woods Development	19	-
25B	Singles & Semis & Townhomes	36	-

Area	Description	Total Projected Units or Residents	Commercial Area
26	Residential – Barnhart	-	Buildout[2]
27	Residential - M. Lafortune Investments	-	Buildout[2]
28A	Residential	2	-
28B	Wintonia Drive / James Street	10	-
29A	Residential	15	-
29B	Esper Lane	51	-
30	Commercial	-	4.34 ha
31	Commercial	-	0.40 ha
	LOW GROWTH SCENARIO[4]	**393 units + 68 units Wellings + 54 residents**	**25.65 ha + 0.33 L/s**
	HIGH GROWTH SCENARIO[5]	**393 units + 500 units Wellings + 54 residents**	**25.65 ha + 0.33 L/s**

1. List of potential development areas and their associated types of land-use were provided by the Township.
2. Additional development areas are available; these development areas are projected beyond a 20-year period.
3. The flow from the new Dundas Manor is anticipated to remain the same as the flow from existing Dundas Manor.
4. Low Growth Scenario includes Phase 1 of the Wellings of Winchester Development only.
5. High Growth Scenario includes Phase 1 to Phase 5 of the Wellings of Winchester Development.

Although, the Township's Official Plan (based on 2016 Census information) indicates a household occupancy of 2.45 persons per unit within the United Counties of Stormont, Dundas and Glengarry, the Township has reported that based on more recent information available, the household occupancy to be used for the Class EA is 2.5 persons per unit. The Township has also identified that the Wellings of Winchester development will have a different household occupancy since the proposed development is intended to be for seniors. Table 2 and Table 3 below presents Phase 1 potential population increase for Wellings of Winchester development (Area 11) as well as the total potential population increase for Phase 2 to Phase 5.

TABLE 2: POTENTIAL POPULATION INCREASE (PHASE 1) - WELLINGS OF WINCHESTER

Unit	Number of Residential Units	Household Occupancy (Persons per unit)	Potential Population Increase
1 - bedroom	42	1.17	49
2 - bedroom	26	1.62	42
TOTAL	**68**		**91**

TABLE 3: POTENTIAL POPULATION INCREASE (PHASE 2 TO PHASE 5) - WELLINGS OF WINCHESTER

Unit	Number of Residential Units	Household Occupancy (Persons per unit)	Potential Population Increase
1 - bedroom	286	1.17	335
2 - bedroom	146	1.62	237
TOTAL	**432**		**572**

Using the number of total projected units and residents (Table 1) and the different household occupancy for Phase 1 of the Wellings of Winchester development (Table 2), the total potential population increase for the Low Growth Scenario is summarized in Table 4 below.

TABLE 4: POTENTIAL POPULATION INCREASE IN WINCHESTER (LOW GROWTH SCENARIO)

Number of Residential Units	Household Occupancy (Persons per unit)	Number of People (based on units)	Number of Additional Residents (Seniors Complex)	Potential Population Increase
393	2.5	983	54	1,037
68	See Table 2	91	-	91
461	-	1,074	54	1,128

1. The above equivalent population is based on the Low Growth Scenario which does not include Phase 2 to Phase 5 of Area 11 – Wellings of Winchester Development.

Using the above information, the 2039 population projections for the Low Growth and High Growth Scenarios in Winchester were determined and presented in Table 5.

TABLE 5: POPULATION PROJECTIONS IN WINCHESTER (2016 – 2039)

	Low Growth Scenario		High Growth Scenario	
Year	Projected Population Increase (Persons)	Population Projected (Low Growth Scenario)	Projected Population Increase (Persons)	Population Projected (High Growth Scenario)
2016	-	2,394[1]	-	2,394[1]
2019	108[2]	2,502	108[2]	2,502
2039	1,128[3]	3,630	1,128[4] + 572[5]	4,202

1. Population based on the 2016 Census Information for Winchester.
2. 2019 population increase is based on an assumed annual growth rate of 1.5%.
3. Based on the potential population increase for Low Growth Scenario identified in Table 4.
4. Based on the potential population increase for Low Growth Scenario (including Phase 1 of the Wellings of Winchester development) identified in Table 4.
5. Based on the potential population increase for Phase 2 to Phase 5 of the Wellings of Winchester development identified in Table 3.

POPULATION PROJECTIONS FOR CHESTERVILLE

As determined in consultation with the Township, Table 6 illustrates the projected population for the Low Growth and High Growth Scenarios for Chesterville to 2039 based on annual growth rates of 1.5% and 3.5% respectively.

TABLE 6: POPULATION PROJECTIONS IN CHESTERVILLE (2016 – 2039)

	Low Growth Scenario		High Growth Scenario	
Year	**Annual Projected Growth Rate (%)**	**Population Projected (Low Growth Scenario)**	**Annual Projected Growth Rate (%)**	**Population Projected (High Growth Scenario)**
2016	-	1,677[1]	-	1,677[1]
2019	3.5[2]	1,853	3.5[2]	1,853
2039	1.5[2]	2,409	3.5[2]	3,027

1. Population based on the 2016 Census Information for Chesterville.
2. 2019 population increase is based on an assumed annual growth rate of 3.5%.
3. Low annual growth rate (1.5%) and high annual growth rate (3.5%) developed in consultation with the Township.

TOTAL PROJECTED POPULATION FOR CLASS EA

As summarized in Table 7, the total projected population for Winchester and Chesterville based on the Low Growth and High Growth Scenarios are 6,039 and 7,229 people, respectively. These population projections will be used to determine water supply requirements for the drinking water system as part of the Class EA.

TABLE 7: TOTAL POPULATION PROJECTIONS IN WINCHESTER AND CHESTERVILLE (2039)

Village	2019 Total Population	Total Projected Population (Low Growth Scenario)	Total Projected Population (High Growth Scenario)
Winchester	2,502	3,630	4,202
Chesterville	1,853	2,409	3,027
TOTAL	**4,355**	**6,039**	**7,229**

Prepared by

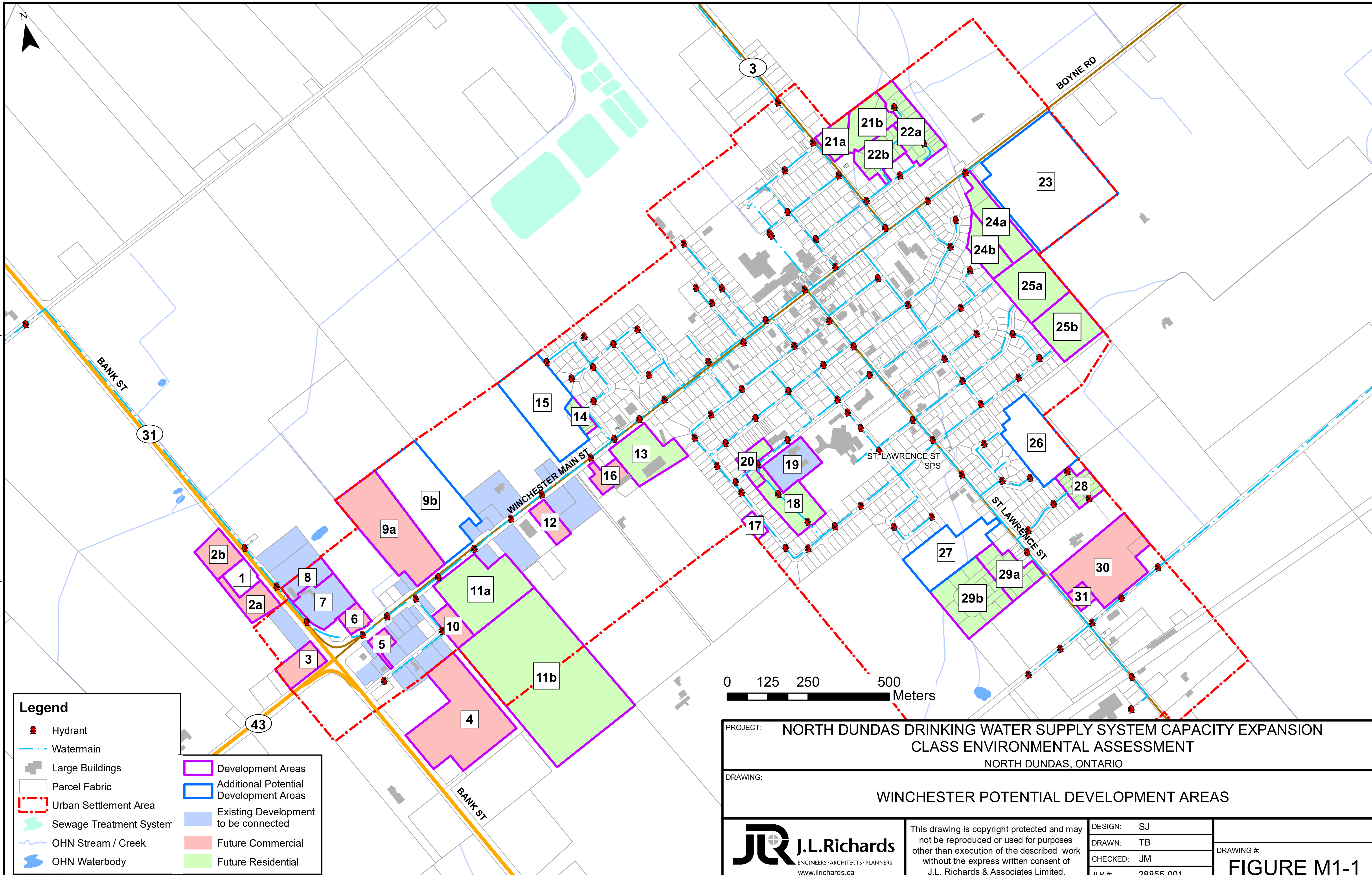
J.L. RICHARDS & ASSOCIATES LIMITED

Sara Jamaliniya, M.Eng.

Reviewed by

J.L. RICHARDS & ASSOCIATES LIMITED

Jordan Morrissette, M.Eng., P.Eng.



PROJECT: NORTH DUNDAS DRINKING WATER SUPPLY SYSTEM CAPACITY EXPANSION
CLASS ENVIRONMENTAL ASSESSMENT
NORTH DUNDAS, ONTARIO

DRAWING: WINCHESTER POTENTIAL DEVELOPMENT AREAS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	SJ
DRAWN:	TB
CHECKED:	JM
JLR #:	28855-001

DRAWING #: FIGURE M1-1

File Location: P:\28000\28855-000 - North Dundas Municipal Class EA\5-Production\1-Civil\28855 DevelopmentAreas.mxd

Plot Date: Friday, February 14, 2020 2:10:30 PM

TECHNICAL MEMORANDUM

J.L. Richards
& Associates Limited
700 - 1565 Carling Avenue
Ottawa, ON Canada
K1Z 8R1
Tel: 613 728 3571
Fax: 613 728 6012

To: Khurram Turino, M.Eng., P.Eng.
Director of Public Works
Township of North Dundas

From: Annie Williams, P.Eng.
Mark Buchanan, P.Eng.

Re: **Township of North Dundas**
Water and Wastewater Servicing Study

Date: December 16, 2020

JLR No.: 28855-001

CC: Angela Rutley, Township of North Dundas
Mary-Lynn Plummer, Township of North Dundas

BACKGROUND

J.L. Richards & Associates Limited (JLR) carried out a Water and Wastewater Servicing Study for the Township of North Dundas (Township) to assess the ability of existing infrastructure to support future growth and development. The findings of this servicing study indicate that municipal infrastructure works, including but not limited to the items listed below, are required to fully service the anticipated future development throughout the Township:

- Watermains and appurtenances to connect to existing and proposed future developments;
- Forcemains and sanitary sewers to connect to existing and proposed future developments;
- Watermain capacity upgrades to accommodate increased demand;
- Sanitary sewer capacity upgrades to accommodate increased demand;
- Upgrades to existing pumping station(s);
- New sewage pumping stations; and
- Additional water tank storage.

The purpose of this memorandum is to assess the impact of projected future development on the existing water and wastewater infrastructure in the Township, identify conceptual-level upgrade requirements to accommodate this growth, and prepare an opinion of probable cost (OPC) of the conceptual-level upgrades. Generally, the methodology associated with this study comprises the following:

- Consult with the Township to confirm the expected development areas for near term, mid term, long term and build-out scenarios;
- Estimate future water and sanitary system flows based on projected future development identified by the Township;
- Update existing water and sanitary system models based on the projected future flows;
- Identify conceptual-level upgrades required for major infrastructure (i.e., trunk sewers, pumping stations, lagoon) for the future scenarios; and
- Prepare a conceptual-level (Level ‘D’) OPC for all major infrastructure upgrades.

It is important to note that the results of this study are *highly* dependent on the extent and rate of growth that the Township is projecting and also on the assumptions used in determining future water and wastewater flows associated with this growth. In some cases, both the growth rate combined with the assumptions made regarding the type of growth and application of standard guidelines may be perceived as conservative estimates of the timing for implementation of the resulting infrastructure – which may in fact be the case. However, with the lack of any other information related to growth rate, extent and type, the application of standard guidelines was deemed appropriate for the purposes of this assignment. If the Township can provide additional site specific information, it is possible that the timing for implementation of the required infrastructure upgrades and expansions to support the future growth could be extended further out.

PROJECTED FUTURE DEVELOPMENT

Based on Census data, the population of the Township was reported as 2,394 for Winchester and 1,677 for Chesterville in 2016, giving a total population of 4,071 in 2016. The existing 2019 population was calculated based on a 1.5% average annual growth rate for Winchester and a 3.5% average annual growth rate for Chesterville. The future growth projections in Winchester were established with the Township based on the number of anticipated units for future residential areas and the land area in hectares for the future commercial areas. The projected population increase associated with future residential development was calculated based on a residential population density of 2.5 persons/unit. Note the Wellings of Winchester development had a more specific population projection as explained in the next section. For the build-out scenario, the number of projected residential units is currently unknown, so a population density of 35 persons/ha was assigned based on parcel area that is comparable to Winchester's existing density. The future growth projections in Chesterville were estimated using the 3.5% average annual growth rate based on the 2016 population (equal to approximately 59 additional people per year) up to the long term scenario, and the build-out scenario was assumed to remain unchanged from the long term scenario.

Refer to the "North Dundas Drinking Water Supply System Capacity Expansion Class EA Technical Memorandum No. 1 – Population Growth and Development Projections (Rev. 1)" (JLR, February 14, 2020) in Attachment 1 that provides a detailed summary of the future development areas and their corresponding populations. Figures No. 1 to 4 depict the future development area locations over the near, mid, long term and build-out planning horizon.

Future commercial development was not included in the population projections, but their anticipated water demands were accounted for in the assessment as presented in the next section. It is important to note that guidelines for commercial water consumption values, when limited information is available, are generally more conservative to account for unknown types of development and the large variation in use; therefore, there may be opportunities to refine the projected flows with further details as part of a Master Plan. This could potentially have a significant impact on the timing for capital works projects. It was also assumed that the population of all existing developments would remain constant under future scenarios. Based on these assumptions, the projected populations for each scenario were estimated and are summarized in Table 1 below.

Table 1: Population Projections

Scenario	Winchester		Chesterville	Total	
	Number of Added Units	Population Increase From Previous Scenario	Population Increase From Previous Scenario	Population	Population Increase From Existing (2019)
Existing *(2019)*	n/a	n/a	n/a	**4,355**	n/a
Near Term *(1-5 year)*	273	509	294	**5,158**	803
Mid Term *(5-10 year)*	220	450	293	**5,901**	1,546
Long Term *(10-20 year)*	403	750	587	**7,238**	2,883
Build-Out *(20+ year)*	(20.56 ha)	1,161	0	**8,399**	4,044

WATER DISTRIBUTION SYSTEM – FLOW PROJECTIONS

EXISTING CONDITIONS

JLR developed a new hydraulic water model for the Township (Winchester and Chesterville) in support of the Water Supply Expansion Municipal Class EA. Refer to the memorandum "Township of North Dundas – Hydraulic Water Model" (JLR, August 28, 2020).

From the above-noted memorandum, the modelled water demands for existing conditions were based on monthly average day demand data provided by the Township over the past five (5) years (2015 – 2019). The demands were distributed throughout the Township based on parcel count. Peaking factors from the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems (2008), herein referred to as the MECP Design Guidelines, were used to estimate the total maximum day and peak hour demand. Two (2) high water users were accounted for in Winchester: Lactalis (formerly Parmalat) and the Winchester District Memorial Hospital. The peak hour demand for Lactalis is unchanged from the maximum day demand as this value is understood to remain consistent and represents the upper limit of water demand from the Lactalis site. Table 2 summarizes the existing water demands in the model.

Table 2: Existing (2019) Water Demand Summary

Water User	Water Demand Scenario		
	Average Day (L/s)	Maximum Day (L/s)	Peak Hour (L/s)
Lactalis (formerly Parmalat)	14.68	22.02	22.02
Winchester District Memorial Hospital	0.70	1.05	1.90
Township of North Dundas (Winchester & Chesterville, including high water users)	27.90	55.80	66.08

FUTURE CONDITIONS

The design parameters used to calculate the future water demands are summarized in Table 3. All design parameters are in accordance with the MECP Design Guidelines or other assumptions are made where necessary. The MECP does not specify peaking factors for commercial areas, hence the City of Ottawa Design Guidelines for Water Distribution (July 2010) were used.

Table 3: Future Water Demand Design Parameters

Future Water Flow Projection – Design Parameters		
Parameter	Residential	Commercial
Population Density (per unit)*	2.5 person/unit	n/a
Population Density (per hectare)	35 person/ha	n/a
Average Day Flow	350 L/cap/day	28,000 L/ha/day
Maximum Day Flow	2.0 x Average Day	1.5 x Average Day
Peak Hour Flow	1.5 x Maximum Day	1.8 x Maximum Day

*The Wellings of Winchester development (Phases 1-5) was assigned a population density of 1.17 person/unit for 1-bedroom units and 1.62 person/unit for 2-bedroom units.

For Chesterville, the population growth (additional number of people) was assigned the residential average day flow of 350 L/cap/day, and this additional consumption was added to the existing demands.

It is noted that some specific areas were exceptions to the aforementioned design parameters, summarized as follows:

- The Wellings of Winchester (development 11) include a total of 500 units within all five (5) phases. These units were assigned more specific population densities based on their 1-bedroom and 2-bedroom unit counts. Phases 1-2 (development 11a) are incorporated in the near term scenario, Phase 3 (development 11b) is incorporated in the mid term scenario, and Phases 4-5 (development 11c) are incorporated in the long term scenario.
- Area A (which includes several individual residential units) within the long term scenario was divided and proportionally assigned to the nearest representative model node based on unit count.
- The high water user Lactalis was assigned a future average day demand of 16.2 L/s (1,400 m^3/d) and a future maximum day and peak hour demand of 24.3 L/s (2,100 m^3/d). These demands remained the same for all future scenarios. The peak hour demand is unchanged from the maximum day demand as this value is understood to remain consistent and represents the upper limit of water demand from the Lactalis site.

Based on these design parameters and the existing and projected water demands under near term (1-5 year), mid term (5-10 year), long term (10-20 year) and build-out (20+ year), the following water demand projections were calculated:

Table 4: Water Demand Projections

Demand Scenario	Average Day L/s *(m^3/day)*	Maximum Day L/s *(m^3/day)*	Peak Hour L/s *(m^3/day)*
Existing *(2019)*	27.90 *(2,410.6)*	55.80 *(4,821.1)*	66.08 *(5,709.3)*
Near Term *(1-5 year)*	34.23 *(2,957.7)*	66.92 *(5,782.3)*	82.33 *(7,113.3)*
Mid Term *(5-10 year)*	40.48 *(3,497.7)*	77.80 *(6,722.3)*	100.11 *(8,649.2)*
Long Term *(10-20 year)*	49.79 *(4,301.6)*	94.47 *(8,162.2)*	126.85 *(10,960.2)*
Build-out *(20+ year)*	54.49 *(4,708.1)*	102.98 *(8,897.7)*	140.43 *(12,133.2)*

It is noted that the type of units expected within various residential areas and the specific type of commercial use expected within future commercial lands can have a significant influence on the water demands projected for the future scenarios. With limited information currently available regarding the details of future developments, design guideline values for the projected flows have been used to identify various upgrades. Based on our experience, guideline values are generally considered conservative to account for unknowns when limited information is available and there may be opportunity to refine the projected demand details as part of a future assignment.

WATER DISTRIBUTION SYSTEM – WATER MODELLING

The hydraulic water model was used to assess the water distribution system under existing, near term, mid term, long term, and build-out demand conditions, and to determine if capacity upgrades to the existing watermains will be required to accommodate the anticipated growth.

EXISTING CONDITIONS

The hydraulic water model was updated to reflect the 'existing' conditions of the current water distribution system. It was then used to simulate the performance of the current system under existing flow conditions. The following operating conditions were assumed for these simulations:

- The existing average day scenario assumes that no pumps are operating, while the Winchester elevated storage tank level is at 113.17 m (tower start elevation provided from OCWA) and the Chesterville elevated storage tank level is at 110.77 m.
- The existing maximum day plus fire flow scenario assumes that several pumps (in Winchester: Well 1, Well 5, Well 6, Well 7B, Reservoir Duty Pump 1; and in Chesterville: Well 5, Well 6, Reservoir High Capacity Pump 3) are operating, while the Winchester elevated storage tank level is at 113.17 m and the Chesterville elevated storage tank level is at 110.77 m. In addition, the Winchester reservoir level is at 78.81 m and the Chesterville reservoir level is at 71.80 m.
- The existing peak hour scenario assumes that several pumps (in Winchester: Well 1, Well 5, Well 6, Well 7B, Reservoir Duty Pump 1; and in Chesterville: Well 5, Well 6, Reservoir Duty Pump 1) are operating, while the Winchester elevated storage tank level is at 113.17 m and the Chesterville elevated storage tank level is at 110.77 m. In addition, the Winchester reservoir level is at 78.81 m and the Chesterville reservoir level is at 71.80 m.

Note that under the average day, maximum day and peak hour scenarios, the following MECP Design Guidelines are applicable:

- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi), and in occupied areas shall not exceed 552 kPa (80 psi).
- Maximum Day: Pressure is to be within the range of 345 kPa (50 psi) and 480 kPa (70 psi).
- Maximum Day + Fire Flow: Residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi).
- Peak Hour: Pressure is to be above 275 kPa (40 psi).

A fire flow rate of 45 L/s has been targeted for this study as a reasonable level of service to meet the minimum water supply flow rate in accordance with the Ontario Building Code for a typical two storey single family home.

A summary of the results of these simulations is provided in Table 5.

Table 5: Hydraulic Water Model Results – Existing Conditions

Demand Scenario	General Results	Notes
Average Day	Good. Pressure Range: 248(36) – 418 (61) kPa (psi)	These results are for the junctions and hydrants in the Winchester and Chesterville pressure zones only. All pumps are off in this simulation. Only two (2) hydrants experience pressures below 275 kPa and there are no customer connections in the vicinity of these hydrants.
Maximum Day + Fire Flow	Good. Fire Flow Availability: 26-314 L/s	These results are for the hydrants in the Winchester and Chesterville pressure zones only. Normal pumps are operating in this simulation, with the exception of the Chesterville reservoir where only one high capacity pump is operating. There are twenty-one (21) hydrants which are currently expected to have lower fire flow availability (less than 45 L/s). These hydrants are located along dead-end watermains or at the outer extents of the distribution system. All other nodes have expected fire flow availability in excess of 45 L/s.
Peak Hour	Good. Pressure Range: 276(40) – 548 (79) kPa (psi)	These results are for the junctions and hydrants in the Winchester and Chesterville pressure zones only. Normal pumps are operating in this simulation. All nodes experience pressures above 275 kPa.

FUTURE CONDITIONS

The future near term, mid term, long term, and build-out water demands were added to the model under average day, maximum day and peak hour conditions, in accordance with the locations and units identified in Figures No. 1 to 4. In addition to using the same operating conditions as those used in the existing conditions simulations (described above), the following assumptions were made for the future model simulations:

- A 200 mm diameter PVC watermain loop was modelled within each future residential development area. Assumed future watermains were extended from existing dead end streets or the most likely connection points. Continuous looping through several phases of large residential developments was also assumed where applicable. Future residential demands were assigned to a single representative junction node within the development parcel. Elevations for these junction nodes were based on existing topography obtained from satellite imagery.
- Future commercial demands were assigned to the nearest junction node in the model along the existing watermain network.
- A 300 mm diameter PVC watermain was modelled in all future scenarios to create a loop between Main Street West and Fred Street, through the future Wellings of Winchester residential development. This will provide expected fire flows to achieve targeted rate of 45 L/s and increase water supply redundancy on the west side of Winchester. Currently the west side of Winchester is serviced by a single 200 mm diameter watermain. A watermain break of potential future maintenance would impair water service to the west service area for the west area for the duration of the repair or maintenance. For reference the City of Ottawa requires that 50 units or more to be looped by redundant water service in the event of a potential water break or maintenance.

- A 300 mm diameter watermain upgrade was modelled on St. Lawrence Street between Gypsy Lane and Main Street West / Gordon Street in the mid term, long term, and build-out scenarios, to provide a larger diameter trunk connection between the Winchester reservoir and the elevated storage tank. An increase in the Township's storage capacity is warranted in the mid term scenario and this upgrade will allow for increased pumping capacity between the Winchester reservoir and the elevated storage tank. A new storage tank with equivalent operating levels was modelled at the Winchester Reservoir site and the existing booster pump was used for the presented simulation results, in order to maintain a consistent pump curve for comparison. When the water storage is expanded with the assumed construction of a new at-grade storage tank, the booster pump is expected to be upgraded as well. Water storage and distribution system upgrades are discussed in more detail in later sections.

Note that for the maximum day demand + fire flow simulations, the results are first presented for all scenarios without the Wellings of Winchester loop to Fred Street and without any upgrade on St. Lawrence Street, in order to establish a base line to assess watermain upgrades. The results with the assumptions listed above are presented afterwards, followed by the results for a final simulation (as later described) under build-out conditions.

The following tables summarize the model results for the Winchester and Chesterville pressure zones based on the percentage of junctions in the model within each stated pressure range or available fire flow range, in order to compare system performance across the existing and future development scenarios. Model schematics for all scenarios are included in Attachment 2.

<u>Average Day Demand</u>

Table 6 presents the average day simulation results for existing and future scenarios.

Table 6: Hydraulic Water Model Results - Average Day Demand

Average Day Demand							
Pressure (kPa)		**Existing**	**Future**			
From	**To**		**Near Term**	**Mid Term**	**Long Term**	**Build-out**
			1-5 year	*5-10 year*	*10-20 year*	*20+ year*
	<=275	0.5%	0.5%	0.5%	0.5%	0.5%
>275	<=350	26.5%	26.6%	27.1%	29.9%	30.3%
>350	<=480	73.0%	72.9%	72.4%	69.6%	69.3%
>480	<=550	0.0%	0.0%	0.0%	0.0%	0.0%
>550	<=700	0.0%	0.0%	0.0%	0.0%	0.0%
>700		0.0%	0.0%	0.0%	0.0%	0.0%

Under average day demand, system pressures under future conditions are expected to decrease slightly from existing conditions due to increased demands, but are mostly anticipated to remain comparable to existing conditions and above the minimum recommended pressure of 275 kPa (40 psi), in accordance with the MECP Design Guidelines. Only two (2) hydrants do not achieve 275 kPa: hydrant H-194 along the transmission main from Well #7 (topographical high point), and hydrant H-174 near Well #6. No customers are connected to the water distribution system in the vicinity of these two hydrants.

Peak Hour Demand

Table 7 presents the peak hour simulation results for existing and future scenarios.

Table 7: Hydraulic Water Model Results – Peak Hour Demand

Peak Hour Demand							
Pressure (kPa)		Existing	Future				
From	To		Near Term	Mid Term	Long Term	Build-out	
			1-5 year	*5-10 year*	*10-20 year*	*20+ year*	
	<=275	0.0%	0.3%	0.3%	0.3%	0.5%	
>275	<=350	17.5%	20.4%	19.7%	24.6%	26.5%	
>350	<=480	79.4%	76.2%	80.1%	75.2%	73.0%	
>480	<=550	3.2%	3.1%	0.0%	0.0%	0.0%	
>550	<=700	0.0%	0.0%	0.0%	0.0%	0.0%	
>700		0.0%	0.0%	0.0%	0.0%	0.0%	

Under peak hour demand, overall system pressures under future conditions are expected to decrease slightly from existing conditions due to increased demands, but are mostly anticipated to remain comparable to existing conditions and above the minimum recommended pressure of 275 kPa (40 psi), in accordance with the MECP Design Guidelines. The pressure results are seen to increase slightly in the mid term scenario due to the watermain upgrade on St. Lawrence Street. Junction node J-263 (Lactalis) yields a consistent model pressure result of less than 275 kPa under future scenarios, due to the high water demand assigned to this node which is located at a dead-end 150 mm diameter water service. It is recommended that the Lactalis water service configuration and details be reviewed for any opportunities to refine the model to more accurately represent the site servicing at this facility. The two hydrants which experienced low pressures in the average day demand simulation (H-194 and H-174) are expected to experience pressures slightly above but close to 275 kPa, and no customers are connected to the water distribution system in the vicinity of these two hydrants.

Maximum Day Demand + Fire Flow

Table 8 presents the maximum day plus fire flow simulation results for existing and future scenarios, assuming that there is no 300 mm diameter watermain loop between Main Street West and Fred Street through the Wellings of Winchester, and assuming that there is no 300 mm diameter watermain upgrade on St. Lawrence Street. This table establishes a base line of available fire flows throughout the Township assuming that future growth is accommodated solely by the existing water distribution system and watermain extensions required for residential development.

Table 8: Hydraulic Water Model Results – Maximum Day Demand + Fire Flow Without Loop to Fred Street or St. Lawrence Street Upgrade

Maximum Day Demand + Fire Flow							
Available Fire Flow (L/s)		Existing	Future			
From	To		Near Term 1-5 year	Mid Term 5-10 year	Long Term 10-20 year	Build-out 20+ year
	<=30	2.3%	2.2%	2.2%	3.0%	2.9%
>30	<=45	7.3%	6.6%	7.8%	13.2%	12.5%
>45	<=75	41.7%	40.5%	39.0%	36.2%	32.9%
>75	<=100	22.0%	23.8%	22.9%	18.7%	22.5%
>100	<=150	20.2%	18.9%	21.6%	23.0%	23.3%
>150	<=250	6.0%	7.5%	6.1%	5.5%	5.4%
>250		0.5%	0.4%	0.4%	0.4%	0.4%

It is noted that the existing water distribution system is not expected to provide adequate water storage starting in the mid term scenario as calculated in accordance with the MECP Design Guidelines, and the available fire flow is severely limited in some areas (such as the Wellings of Winchester) without the connection to Fred Street.

Table 9 presents the maximum day plus fire flow simulation results for existing and future scenarios, assuming the installation of a 300 mm diameter watermain loop between Main Street West and Fred Street through the Wellings of Winchester starting in the near term, and assuming the construction of a 300 mm diameter watermain upgrade on St. Lawrence Street to accompany the increased storage at the Winchester Reservoir (discussed in the next sections).

Table 9: Hydraulic Water Model Results – Maximum Day Demand + Fire Flow With Loop to Fred Street (Near Term +) and St. Lawrence Street Upgrade (Mid Term +)

Maximum Day Demand + Fire Flow						
Available Fire Flow (L/s)		Existing	Future			
From	To		Near Term 1-5 year	Mid Term 5-10 year	Long Term 10-20 year	Build-out 20+ year
	<=30	2.3%	1.8%	1.7%	2.6%	2.5%
>30	<=45	7.3%	6.2%	6.1%	6.0%	5.0%
>45	<=75	41.7%	36.1%	33.8%	32.8%	29.2%
>75	<=100	22.0%	23.8%	22.5%	21.3%	22.9%
>100	<=150	20.2%	22.5%	17.3%	21.7%	25.0%
>150	<=250	6.0%	9.3%	14.7%	12.3%	12.1%
>250		0.5%	0.4%	3.9%	3.4%	3.3%

Under maximum day demand, fire flow availability under future conditions is expected to remain comparable to existing conditions. There are some hydrants which are expected to have fire flow availabilities less than 45 L/s. These hydrants are located along dead-end watermains or at the outer extents of the distribution system. In comparison to the base line results presented in Table 8, the fire flows are improved with the connection to Fred Street and the St. Lawrence Street watermain upgrade.

Table 10 presents the maximum day plus fire flow simulation results for the build-out scenario, assuming the installation of a full 300 mm diameter watermain loop within Winchester. This includes the loop to Fred Street and the St. Lawrence Street watermain upgrade as mentioned previously, but also includes a 300 mm diameter watermain upgrade on Main Street West and the 300 mm diameter watermain upgrade on Fred Street, as discussed in the next section.

Table 10: Hydraulic Water Model Results – Maximum Day Demand + Fire Flow With Full 300 mm diameter Watermain Loop in Winchester

Maximum Day Demand + Fire Flow		
Available Fire Flow (L/s)		Future
From	To	Build-out *20+ year*
	<=30	2.1%
>30	<=45	5.4%
>45	<=75	28.3%
>75	<=100	19.6%
>100	<=150	18.8%
>150	<=250	20.8%
>250		5.0%

Table 10 shows that the full 300 mm diameter watermain loop in Winchester will improve the available fire flows. It is noted that the increased storage capacity at the Winchester Reservoir would also be accompanied by a pump upgrade, which could increase the available fire flows experienced throughout Winchester.

POTENTIAL WATERMAIN UPGRADES

The current water distribution system in Winchester includes a 200 mm diameter PVC watermain along Main Street West. Any disruption along this length of watermain would result in a significant reduction in the level of service experienced in the west end of Winchester, since this watermain is the sole feed from the elevated tank to the west end. A 300 mm diameter watermain upgrade along Main Street West from approximately 100 m east of Dawley Drive to Gordon Street would be a beneficial upgrade to the Winchester system as a whole. This work could be done in conjunction with the proposed sanitary sewer forcemain construction along Main Street West as described in the wastewater section. This upgrade would provide improved fire flow availability to all areas in the west end, such as the future Wellings of Winchester residential development. Additionally, the potential loop from Main Street West to Fred Street through the Wellings of Winchester would provide a redundant water supply to the west end.

There is an existing asbestos cement watermain along St. Lawrence Street in Winchester ranging from 150 mm in diameter to 200 mm in diameter. This watermain could be upgraded to a 300 mm diameter watermain between Gypsy Lane and Main Street West / Gordon Street, providing a larger diameter trunk connection between the Winchester reservoir and the elevated storage tank. An increase in the Township's storage capacity (accompanied with a booster pump upgrade) is warranted in the mid term scenario and this upgrade will allow for increased pumping capacity between the Winchester reservoir and the elevated storage tank.

There is an existing 150 mm diameter asbestos cement watermain and an existing 200 mm diameter PVC watermain along Fred Street. This watermain could be upgraded to a 300 mm diameter watermain between the easement (approximately 100 m east of Christie Lane) and St. Lawrence Street, which would complete an overall 300 mm diameter trunk watermain loop throughout Winchester if combined with the aforementioned watermain upgrades.

While the foregoing model results indicate that the existing distribution system is expected to provide a comparable level of service under the assessed future development conditions, it is recommended that a Water Distribution System Master Plan be developed to evaluate and select the preferred trunk water servicing routes and options. Since additional water storage is required to address a future storage deficit, a Master Plan would be beneficial in the selection of the preferred water storage configuration and location as it relates to the distribution system. Subject to the appropriate Municipal Class Environmental Assessment (Schedule B Class EA), a future at-grade water storage reservoir and booster pump upgrade is anticipated to address the future water storage requirements while potentially increasing system redundancy and supplementing fire flow availability.

Figures 5 to 9 depicts the aforementioned potential watermain upgrades and anticipated timing.

WATER STORAGE – CAPACITY REVIEW

For water storage, both Winchester and Chesterville have an elevated storage tank and an at-grade storage reservoir. Table 11 summarizes the existing storage within the Township.

Table 11: Existing Water Storage Capacity

Storage Facility	Existing Capacity (m^3)
Winchester Water Tower	2,300
Winchester Storage Reservoir	400
Winchester Storage Capacity	***2,700***
Chesterville Water Tower	567.5
Chesterville Storage Reservoir	407
Chesterville Storage Underground Suction Well	122
Chesterville Storage Capacity	***1,096.5***
Total Storage Capacity	3,796.5

According to MECP Design Guidelines, the storage volume requirements are calculated as follows:

Total Treated Water Storage Requirement = A + B + C

A = Fire Storage
B = Equalization Storage (25% of max day demand)
C = Emergency Storage (25% of [A + B])

Table 12 and Table 13 summarize the estimated water storage requirements under the existing and future scenarios based on the MECP Design Guidelines. The storage capacities were assessed for Winchester and Chesterville separately because it is understood that their storage facilities are not used interchangeably to supply both systems (i.e., the Winchester elevated tank does not provide storage to Chesterville).

The equivalent populations in Winchester were taken as the actual populations as per the growth projections for each future scenario. For the build-out population, the four (4) future residential areas were assigned with a population density of 35 persons/ha while the single future commercial area's average day water demand was converted to an equivalent population based on 350 L/cap/day. Also added was the Lactalis property by using its parcel area (6.2 ha) and converting it to an equivalent residential population assuming 35 persons/ha. The total equivalent populations as presented in the table were used to interpolate the required fire flows and durations from Table 8-1 of the MECP Design Guidelines, hence the fire storage (A) could be calculated. The equalization storage (B) was calculated based on the demands in Winchester only. From the deficit calculation which deducts the existing storage presented in Table 11 from the required storage presented in Table 12, it can be seen that additional storage capacity will be required in the mid term scenario.

Table 12: Estimated Water Storage Requirements (Winchester)

Scenario	Equivalent Pop'n	Fire (A)	Equalization (B)	Emergency (C)	Total Required Storage	Surplus/ (Deficit)
	No. ppl	m^3	m^3	m^3	m^3	m^3
Existing (2019)	2719	762	1023	446	2231	469
Near Term (1-5)	3228	817	1212	507	2536	164
Mid Term (5-10)	3678	865	1396	565	2826	(126)
Long Term (10-20)	4428	959	1653	653	3264	(564)
Build-out (20+)	5590	1425	1837	816	4078	(1378)

For this Study the preferred serving option is a second at-grade storage tank at the Winchester Reservoir site with the same operating levels as the existing at-grade tank. The existing site allocated space for future reservoir addition. A Schedule B Class EA will be required to determine the preferred water storage option and configuration. Based on preliminary calculations and assuming an equivalent tank height to the existing Winchester at-grade storage tank, a 19 m tank diameter would provide an additional storage volume of approximately 1,400 m^3, which would satisfy the anticipated build-out storage requirement. Although the previously presented model results were based on the existing booster pump at the reservoir to provide a similar comparison across scenarios, it is expected that the booster pump would be upgraded in conjunction with the new storage tank. This upgrade would increase the pumping capacity from the reservoir to the elevated tank, and could improve fire flows throughout Winchester.

The equivalent populations in Chesterville were taken as the actual populations assuming a 3.5% average annual growth rate up to the long term scenario. The build-out population was assumed to be unchanged from the long term population. There are no high water users in Chesterville. The total equivalent populations as presented in the table were used to interpolate the required fire flows and durations from Table 8-1 of the MECP Design Guidelines, hence the fire storage (A) could be calculated. The equalization storage (B) was calculated based on the demands in Chesterville only. From the deficit calculation which deducts the existing storage presented in Table 11 from the required storage presented in Table 13, it can be seen that additional storage capacity will be required in the near term scenario.

Table 13: Estimated Water Storage Requirements (Chesterville)

Scenario	Equivalent Pop'n	Fire (A)	Equalization (B)	Emergency (C)	Total Required Storage	Surplus/ (Deficit)
	No. ppl	m^3	m^3	m^3	m^3	m^3
Existing (2019)	1853	650	182	208	1040	56
Near Term (1-5)	2147	700	233	233	1167	(70)
Mid Term (5-10)	2440	732	285	254	1270	(174)
Long Term (10-20)	3027	795	388	296	1478	(382)
Build-out (20+)	3027	795	388	296	1478	(382)

The additional storage facility will be either a new water tower or an increased storage capacity at the Chesterville Reservoir and Pumping Station. A Schedule B Class EA will be required to determine and refine the preferred water storage option and configuration. Based on preliminary calculations, a 9.75 m tank diameter and a 6 m tank height would provide an additional storage volume of approximately 450 m^3, which would satisfy the anticipated build-out storage requirement.

SUMMARY OF WATER DISTRIBUTION SYSTEM REVIEW

A summary of the results from the above model simulations and water storage tank capacity reviews is provided in Table 14.

Table 14: Conceptual-Level Upgrades to Water System based on Water Distribution System Review

WATER DISTRIBUTION SYSTEM ASSESSMENT CONCLUSIONS		Projected Timeline	Municipal Class Environmental Requirements
Type	**Description**		
Watermain Extension Loop	300 mm diameter watermain connection between Main St. West and Fred St, through the future Wellings of Winchester development.	0 to 5 years	Schedule B – Acquire property to establish new road allowance
Watermain Upgrade	300 mm diameter watermain upgrade on St. Lawrence Street between the Winchester Reservoir and Pumping Station and Gordon Street (current extent of 300 mm diameter watermain from the Winchester elevated tank).	5 to 10 years (to accompany storage and pump upgrade)	Schedule A+ – Notify residences of upgrade in established road allowance
Watermain Network Recommendation	Upgrades to provide a 300 mm diameter trunk watermain loop in Winchester (includes Main Street West and Fred Street).	Build-out	Schedule A+ – Notify residences of upgrade in established road allowance
Water Storage & Pump Upgrades	Additional water storage and booster pump upgrade in Winchester to accommodate mid term, long term, and build-out water demand scenarios. It has been assumed that one (1) new 1,400 m^3 water storage tank will be built within the mid term.	5 to 10 years	Schedule B – Expand water storage and increase pumping capacity.
Water Storage Upgrades	Additional water storage in Chesterville to accommodate near term, mid term, long term, and build-out water demand scenarios. It has been assumed that one (1) new 450 m^3 water storage tank will be built within the near term.	0 to 5 years	Schedule B – Expand water storage and increase pumping capacity.

SANITARY SYSTEM - FLOW PROJECTIONS AND SERVICING REVIEW

The current sanitary sewer system was simulated the Township existing SewerCAD® model under existing to 5 year, 5 to 10 year, 10 to 20 year and Build-out 20+ year sewage flow demand conditions, to determine if capacity upgrades of the existing sewers and other related infrastructure are required.

SANITARY SYSTEM – FLOW PROJECTIONS

The table below summarizes the design parameters used to calculate the sanitary sewer flow demands for the projected future developments and phasing contained in Attachment 1. Design parameters are in accordance with recommendations contained in the MECP Sewer Design Guidelines and City of Ottawa Sewer Design Guidelines.

Table 15: Sanitary System Design Parameters

RESIDENTIAL:	
Average Flow	350 L/cap/day
Peaking Factor (minimum 2, maximum of 4)	$1 + \frac{14}{4 + \sqrt{\frac{Population}{1000}}}$
INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL (ICI):	
Average Flow	28,000 L/ha/day
Peaking Factor	1.4
INFILTRATION:	
Peak Extraneous Flow (Collection System)	0.28 L/ha/s
Extraneous Flow (Treatment System)	90 L/cap/day

Based on the above table, the following sanitary sewer flows were determined for each projected future development:

Table 16: Projected Sanitary Sewer Flows

Development	Type / Magnitude of Development	Peak Residential Flow	Peak ICI Flow	Extraneous Flow	Cumulative Total Flow
		L/s	L/s	L/s	L/s
TIMING – EXISTING TO 5 YEARS:					
5 – Main St. South Side	Commercial – 0.42 ha	-	0.19	0.12	**0.31**
6 – Main St. North Side	Commercial – 0.20 ha	0.33	0.25	0.15	**0.73**
10 – Dawley Dr.	Commercial – 0.81 ha	-	0.37	0.23	**0.60**
11A – Wellings PH 1 - 2	Residential – 150 units	3.24	-	1.89	**5.13**
11A – Wellings PH 1 - 2	Commercial – 2.28 ha	1.03	-	0.64	**1.67**
12 – Main St. South Side	Commercial – 0.77 ha	-	0.35	0.22	**0.57**
13 – Main St. South Side	Residential Infill – 15 units	0.62	-	0.67	**1.29**
14 – Winfields Subdivision	Residential – 9 units	0.37	-	0.13	**0.51**
18 – New Dundas Manor	Commercial – 1.94 ha	-	0.88	0.54	**1.42**
20 – Guy Racine PH 3	Residential – 8 units	0.32	-	0.20	**0.53**
21B – Queen St.	Residential – 36 units	1.46	-	0.48	**1.94**
22A – Winchester Meadows	Residential – 22 units	0.89	-	0.62	**1.51**
24B – High Density Apt.	Residential – 21 units	0.86	-	0.38	**1.24**
28A & B – Wintonia Dr. / James St.	Residential – 12 units	0.49	-	0.29	**0.78**
SUB-TOTAL – EXISTING TO 5 YEARS		**9.61**	**2.04**	**6.56**	**18.23**
TIMING – 5 TO 10 YEARS:					
2A – HWY #31	Commercial – 1.13 ha	-	0.51	0.32	**0.83**
3 – HWYs #31 and 43	Commercial – 1.12 ha	-	0.51	0.31	**0.82**
4 – HWY #31 John Deere	Commercial – 6.17 ha	-	2.80	1.73	**4.53**
11B – Wellings PH 3	Residential – 86 units	1.85	-	0.81	**2.66**
19 – Old Dundas Manor	Commercial – 1.19 ha	-	0.71	0.44	**1.15**
22B – Winchester Meadows	Residential – 22 units	0.89	-	0.42	**1.31**
24A – Woods Development	Residential – 78 units	3.16	-	0.56	**3.72**
25A – Woods Development	Residential – 19 units	0.78	-	0.77	**1.55**
29A – St. Lawrence St.	Residential – 15 units	0.62	-	0.48	**1.10**
SUB-TOTAL – 5 TO 10 YEARS		**7.30**	**4.53**	**5.84**	**17.67**

TIMING – 10 TO 20 YEARS:					
A – Existing Not Connected	Residential/Commercial – 28 units	1.13	1.44	3.28	**5.85**
2B – HWY #31	Commercial – 1.22 ha	-	0.55	0.34	**0.89**
7 – Motel Property	Residential – 14 units	0.57	-	0.52	**1.09**
8 – Country Kitchen	Residential – 7 units	0.29	-	0.24	**0.53**
9A – Main St. North Side	Commercial – 5.07 ha	-	2.30	1.42	**3.72**
11C – Wellings PH 4 to 5	Residential – 264 units	5.64	-	2.42	**8.06**
16 – Main St. South Side	Commercial – 0.74 ha	-	0.34	0.21	**0.54**
21A – Seniors Complex	Residential – 54 residents	0.88	-	0.24	**1.12**
25B – Fred St.	Residential – 36 units	1.46	-	0.69	**2.15**
29B – Esper Lane	Residential – 51 units	2.07	-	0.93	**3.00**
30 – St. Lawrence St.	Commercial – 4.56 ha	-	2.07	1.28	**3.35**
31 – St. Lawrence St.	Commercial – 0.41 ha	-	0.19	0.11	**0.30**
SUB-TOTAL – 10 TO 20 YEARS		**12.04**	**6.89**	**11.68**	**30.60**
TIMING – BUILD-OUT 20+ YEARS:					
9B – Main St. North Side	Commercial – 5.53 ha	-	2.51	1.55	**4.06**
15 – Winfields PH 2	Residential – 4.31 ha	2.46	-	1.21	**3.67**
23 – Main St. East	Residential – 9.80 ha	5.59	-	2.74	**8.33**
26 – Anne St.	Residential – 3.36 ha	1.91	-	0.94	**2.85**
27 – St. Lawrence St.	Residential – 3.09 ha	1.77	-	0.87	**2.64**
SUB-TOTAL – 10 TO 20 YEARS		**11.73**	**2.51**	**7.31**	**18.91**

SEWAGE PUMPING STATIONS – EXISTING SUMMARY

There are three sub-area Sewage Pumping Stations (SPS) within the Village of Winchester that pump wastewater from low lying service areas into gravity sewers located downstream at higher elevations. These gravity sewers convey the flows to either an additional sub-area pumping station or to the Ottawa Street SPS (the main SPS). Figure 1 illustrates the location of each station. The following section provides a general description of each of the sub-area pumping stations followed by a summary table listing the existing capacity at each SPS.

St. Lawrence Street Sanitary Pumping Station

The St. Lawrence Street SPS is located at 583 A St. Lawrence Street and receives wastewater from upstream gravity sewers located south of Fred Street. The C of A for the St. Lawrence Street SPS was not available; however, based on the pump curve, the PS is equipped with 3 hp pump(s) each with a best efficiency point of 19.8 L/s at 6.46 m Total Dynamic Head (TDH). The pumping rate is confirmed by the flows from a previous

OCWA draw down test (21.2 L/s). The PS is equipped with a mechanical bar screen to protect pumps from large debris. The wet well is also equipped with floats that are used to start and stop the pumps depending on the level of raw sewage within the wet well; an alarm is also triggered at a high level setpoint. Wastewater is pumped via a 150 mm diameter forcemain that outlets near the intersection of Fred Street and St. Lawrence Street to upstream gravity collection system.

Bailey Avenue Sanitary Pumping Station

The Bailey Avenue SPS is located at 586 Main Street and receives wastewater from upstream gravity sewers, including flows pumped from the Main Street West PS. According to the ECA, the Bailey Avenue SPS is equipped with two submersible pumps and has a firm pumping capacity of 31.4 L/s at a TDH of 25 m. The pumping rate is confirmed by the flows from a previous OCWA draw down test (29.2 L/s). This PS is also equipped with a mechanical bar screen to protect pumps from large debris. Floats have been installed in the wet well to control starting and stopping of the pumps depending on the level of wastewater within the wet well; an alarm is also triggered at a high level setpoint. Wastewater is pumped via a 150 mm diameter forcemain outlets near the intersection of Main Street and Louise Street to upstream gravity collection system.

Main Street West Sanitary Pumping Station

The Main Street SPS is located on the south side of Main Street, approximately 500 m east of County Road No. 31, and receives wastewater from various properties in the west service area. According to current ECA the Main Street West SPS is equipped with two submersible pumps and has a firm pumping capacity of 6 L/s at a TDH of 13 m, however, OCWA advised the duplex pump arrange includes a larger 6 L/s pump and smaller 3.5 L/s pump. OCWA advised that a January 2020 draw down test yielded an operating pump rate of 4.5 L/s. Prior to installation of the 6 L/s pump, the Township has reported that the pump impellers were recently replaced to address on-going clogging issues due to settling of debris and rags within the wet well. The wet well has a diameter of 2.44 m and the inlet is equipped with a trash basket for removal of debris. An ultrasonic transducer and backup floats are provided for pump control and alarms. Wastewater is pumped via a 100 mm diameter 350 m long forcemain to an upstream maintenance hole along Main Street where it is conveyed to the Bailey Avenue SPS for further pumping.

Ottawa Street Sanitary Pumping Station

The main sewage pumping station (Ottawa Street PS) is located at 475 Ottawa Street near the intersection of Dufferin Street and Ottawa Street. The pumping station receives raw wastewater from the entire collection system and pumps it via a 1,300 m long 350 mm diameter forcemain to the inlet structure at the sewage treatment lagoon. According to the current ECA, the pumping station is equipped with three sewage pumps rated at 90 L/s each; however, based on a previous assessment completed by Stantec Consulting Limited in 2006, the actual pump capacities may be somewhat less (72 L/s). Nevertheless, it is assumed that two pumps operated simultaneously can provide a flow of at least 90 L/s, and therefore, a firm capacity of 90 L/s is used for this Study. The station is also equipped with a standby generator located within a separate building that is reportedly able to provide sufficient power to run two pumps simultaneously. According to the ECA, the emergency standby diesel generator is rated at 50 kW; however, from the previous assessment (Stantec, 2006), the nameplate reportedly rates the equipment at 77 kW.

The PS is equipped with a manually cleaned bar screen with bars spaced at 6 cm. The wet well is equipped with ultrasonic transducer for level monitoring and control. A magnetic flowmeter is used to measure the flowrate and volume of wastewater discharged to the lagoon. A summary of the pumping system equipment as presented in the Winchester Operations Manual is provided in Table 4.1.

Table 17: Ottawa St. Sewage Pumping Station Equipment and Capacity

Component	Size/Capacity (1)	
Pumps	Number:	3
	Capacity:	70 L/s
	Type:	Wemco Hydrostal Pump
	Model:	E5K-1-E2M-
	TDH:	15.5 m
	Speed:	1750 RPM
Motors	Number:	3
	Size:	25 HP
	Type:	Hawker Pump Motor – L284T6
	Electrical	575 V, 23.2 A, 60 Hz
Diesel-generator	Capacity:	50 kW (based on C of A)

Notes:
1. Information details as reported in Winchester Operations Manual

The foregoing description of each existing SPS is summarized in the following table.

Table 18: Summary of Existing Sewage Pumping Stations

Pumping Station	ECA No.	Pump Operation (1)	TDH (m) (1)	Rated Capacity (L/s) (1)	Operational (L/s)
Main St. West SPS	9743-B9ALZN (2019)	Two submersible pumps - duty/standby	13	6 (2)	4.5 (2)
Bailey Ave. SPS	4037-6CAMCT (2005)	Two submersible pumps - duty/standby	25	31.4	29.2
St. Lawrence St. SPS		Two submersible pumps - duty/standby	6.46	19.8	21.2
Ottawa St. SPS	5312-88TK5R (2010)	Three dry pit sewage pumps	-	90	72 (single pump)

(1) According to the referenced ECAs.
(2) Rated capacity according to current ECA; OCWA staff advised there is a larger (6 L/s) and smaller (3.5 L/s) pumps installed. January 2020 pump test estimated 4.5 L/s pumping rate.

SANITARY SEWER SYSTEM – CAPACITY REVIEW

The Township's current SewerCAD® model previously prepared and updated by JLR (refer to Township of North Dundas – Winchester Wastewater Capacity Assessment, June 14, 2019) was used to assess the capacity of the sanitary sewer system under the development scenarios, incorporating the projected flows from Table 15. For this review, the following assumptions/exclusions were made:

- The existing sanitary sewer design model previously developed by JLR was updated with new development scenarios identified by the Township;
- An increase in the size of the sewer was assumed to be needed if the flow estimated by the model exceeded the theoretical full flowing capacity of the existing sewer;
- New development areas remain tributary to the nearest availability sanitary sewer; and
- Pipe sizing for sewer replacements used for the conceptual-level OPC assumed that the existing pipe slope is maintained, except for Main Street West sewer upgrades that are described in Options 3A and 3B below.

WASTEWATER COLLECTION SYSTEM – CAPACITY REVIEW

A review the wastewater collection system capacity that included gravity sewers and pumping stations was completed to compare the existing capacities to the demands estimated by the sanitary sewer model and projected sanitary sewer flows from Table 16. Based on the review, it is anticipated that certain gravity sewer sections, namely along Main Street West and all four (4) SPS will require an upgrade and/or expansion to meet the future build-out flow demands. Anticipated gravity sewer upgrades are triggered when the projected peak flow exceed the sewer's theoretical conveyance capacity. Similarly, pumping station upgrades are triggered when projected peak flows exceed the rated pumping capacity. Model results are contained in Attachment No. 3. A list of wastewater system upgrades applied in the model are summarized in the following section.

WASTEWATER SERVICING OPTIONS

Based on the anticipated growth areas and existing servicing constraints, particularly in the west end, wastewater servicing options were developed to assess future pumping station, forcemain and sewer upgrades, summarized as follows (refer to Figures 5 to 9):

Option 1 – Upgrade Existing Wastewater System

Maintains the existing configuration of the wastewater system by upgrading sewers and SPS in their current location.

Option 2A – Upgrade Main St. West SPS and extend forcemain along Main Street East of Gladstone Street

Similar to Option 1, however, the proposed capacity upgrades to the Main St. West SPS include extending the forcemain along Main Street to outlet east of Gladstone Street, the same forcemain outlet location as the Bailey Avenue SPS. Gravity sewers upgrades are required downstream of the extended Main St. Option 2A allows wastewater collected at the Main St. West SPS to bypass the existing Bailey Avenue SPS and mitigate future capacity upgrades required at this station by Option 1.

Option 2B – Upgrade Main St. West SPS and reroute forcemain to Clarence Street

Similar to Option 2A, however, the Main St. West SPS forcemain would be extended along Main Street, through the Community Centre property, the Christie Lane easement and along Clarence Street to Louise Street (refer to Figure 5). The rerouted forcemain will require upgrades to the existing Clarence St. sanitary sewers. Option 2B allows wastewater collected at the Main St. West SPS to bypass the existing Bailey Avenue SPS and mitigate future capacity upgrades required at this station by Option 1.

Option 3A – Relocated Main St. West SPS and Decommission Bailey Avenue SPS (Main Street Outlet)

The intent of this option is to simplify wastewater operations in the west end by maintaining a single SPS instead of two SPS (i.e., Main St. West and Bailey Ave. SPS). Similar to Option 2A, however, the Main St. West SPS would be relocated approximately 300 m east along Main Street west. The relocated SPS would allow gravity sewers to be extended from the east and west along Main Street to centralize pumping from a single pumping station and allow future decommissioning of the Bailey Avenue SPS. Gravity sewers would be extended the same distance to convey wastewater to the new SPS location. Also, the wet well depth would be increased to allow future gravity sewers to be extend at a deeper elevation along Main Street from Bailey Avenue SPS to this new SPS. Timing of the future gravity sewers could be coordinated to align with anticipate condition/equipment replacement at the Bailey Avenue SPS.

Option 3B – Relocated Main St. West SPS and Decommission Bailey Avenue SPS (Clearance Street Outlet)

Similar to Option 3A, however, the Main St. West SPS forcemain would follow the same route as described in Option 2B and outlet at the intersection of Clearance Street and Louise Street (refer to Figure 5).

Each potential wastewater servicing option was simulated in the existing SewerCAD® model. For each option a summary table lists expected sanitary sewer upgrade and highlights in orange the anticipated timing of upgrades:

Option 1: Maintain Existing Configuration and Upgrade Collection System

Gravity sewer upgrades are anticipated in four areas throughout the system at various times and consist of upgrading the existing pipe diameter at the current location (refer to Figures 5 to 9 for sewer upgrade locations).

Table 19: Option 1 - Gravity Sewer Upgrades

Street	Existing			Project Peak Flow (L/s)			
	Dia. (mm)	Length (m)	Theoretical Conveyance Capacity (L/s)	0-5 years	5-10 years	10-20 years	Build-out
Bailey Ave. MH 37 - 41	200	24	20	28	36	50	53
Main St. W MH 40 - 37	200	177	21 to 26	19 to 20	27 to 28	41 to 42	44 to 45
Main St. W MH 28 - 26	250	155	35 to 39	33	41 to 42	55 to 56	62
Main St. W MH 437 – 434	250	200	26 to 30	15 to 16	23	37	37 to 40
Easement b/w May St. and York St.	250	51	22	17	18	24	29

For the 10 to 20 year and build-out sewer upgrades anticipated along the Easement between May Street and York Street, additional field investigation is warranted to confirm the sewer invert elevations along with future review of the projected peak wastewater flows to confirm peak sewage flow in this sewer section. At this location the expected flow exceeds the pipes theoretical conveyance capacity, however, the hydraulic grade level (HGL or water level in the pipe), is 1 cm below the sewer obvert elevation (top of pipe). Therefore, it is expected the future peak flow will remain within the sewer and may not warrant a sewer upgrade. Refer to Figure 5 for sewer upgrade locations.

Pumping station upgrades are expected at all locations under build-out conditions with timing of upgrades highlighted in orange.

Table 20: Option 1 - Pumping Station Upgrades

Pumping Station	Rated Capacity (L/s)	Projected Peak Flow (L/s)				Peak Flow Capacity Surplus/(Deficit) (L/s) at Build-out
		0-5 years	5-10 years	10-20 years	Build-out	
Main Street	6	19	27	41	44	(38)
Bailey Ave.	31.4	32	41	55	62	(31)
St. Lawrence	21	11	12	18	24	(3)
Ottawa Street	90	72	87	109	127	(37)

Main St. West SPS and Baily Avenue SPS will require significant upgrades to accommodate the projected wastewater flow. It is anticipated that new, enlarged pumping stations and wet wells will be required at both locations along with upgrade forcemains. Bailey Avenue SPS upgrades will require additional investigation to assess the feasibility to double the current rated pumping capacity on the existing constrained site in close proximity to neighbouring residential development. It is recommended that St. Lawrence Street SPS upgrades be reassessed in the 10 to 20 year time frame to confirm that the projected peak flow warrant upgrades as the rated capacity is 3 L/s of the projected build-out peak flow rate. Similarly, Ottawa SPS upgrades are anticipated in the 10 to 20 year time frame and are expected to include upgrade pumping and electrical equipment to accommodate the increased peak flow, based on a capacity deficit of 37 L/s compared to the 90 L/s rated capacity.

Option 2A or 2B: Upgrade Main St. West SPS and bypass Bailey Avenue SPS

Option 2A reduces the number of gravity sewer upgrades required in Option 1 by extending the upgraded Main St. West SPS forcemain approximately 1,150 m along Main Street, east of Gladstone Street, which bypasses the Bailey Avenue SPS. The proposed outlet Maintenance Hole (MH) would be the same as the current Bailey Avenue SPS forcemain outlet. The timing of associated gravity sewer upgrades of this option are summarized as follows:

Table 21: Option 2A - Gravity Sewer Upgrades Main St. West SPS outlet to Main Street, east of Gladstone Street

Street	Existing			Project Peak Flow (L/s)			
	Dia. (mm)	Length (m)	Theoretical Conveyance Capacity (L/s)	0-5 years	5-10 years	10-20 years	Build-out
Main St. W MH 28 - 26	250	155	35 to 39	33	41 to 42	55 to 56	62
Main St. W MH 437 - 434	250	200	26 to 30	15 to 16	23	37	37 to 40
Easement b/w May St. and York St.	250	51	22	17	18	24	29

Option 2B has a comparable number of gravity sewer upgrades, but requires an approximately 1,500 m long forcemain from Main St. West SPS to the intersection of Clarence Street and Louise Street. In addition, the new forcemain alignment would travel through the existing community centre property and along the walking path easement between residential units along Christine Lane (refer to Figure 5). It is recommended that further investigation be completed to assess the viability of the proposed forcemain route, particularly spatial constraints in the easement that already contains a buried sanitary sewer.

Table 22: Option 2B - Gravity Sewer Upgrades Main Street West SPS outlet to Clarence Street and Louise Street

Street	Existing			Project Peak Flow (L/s)			
	Dia. (mm)	Length (m)	Theoretical Conveyance Capacity (L/s)	0-5 years	5-10 years	10-20 years	Build-out
Clarence St. MH 105 - 102	300	207	29 to 83	24	32	46	49
Main St. W MH 437 - 434	250	200	26 to 30	15 to 16	23	37	37 to 40
Easement b/w May St. and York St.	250	51	22	17	18	24	29

Pumping station upgrades for Options 2A and 2B are the same, with Bailey Street SPS not requiring future capacity upgrades. This is one less pumping station upgrade than outlined for Option 1. Bailey Avenue SPS's maximum rated capacity would be reduced and future end of service life equipment replacements could be designed to meet the lower capacity requirements.

Table 23: Options 2A and 2B – Pumping Station Upgrades Summary

Pumping Station	Rated Capacity (L/s)	Projected Peak Flow (L/s)				Peak Flow Capacity Surplus/(Deficit) (L/s)
		0-5 years	5-10 years	10-20 years	Build-out	
Main St.	6	19	27	41	44	(38)
Bailey Ave.	31.4	14	15	15	19	12
St. Lawrence	21	11	12	18	24	(3)
Ottawa St.	90	72	87	109	127	(37)

Options 3A or 3B: Upgrade Main Street SPS and Decommission Bailey Avenue SPS

Option 3A is similar to Option 2A, but with new deeper gravity sewers installed along Main Street West between Bailey Avenue SPS and the new upgrade Main Street SPS. Installation of the gravity sewers would centralize wastewater collection at one SPS in the west end of town and allow Bailey Avenue SPS to be decommissioned in the future. New and regraded sanitary sewers would consist of extending the existing 300 mm dia. Main Street West sewers 286 m to a new Main St. W SPS location along with regrading and deepening approximately 260 m of sewers located between Bailey Ave. SPS and the relocated Main St. West SPS (refer to Figure 5).

Timing of the Bailey Avenue SPS decommission could be coordinated with end of service life of the building and equipment. However, further geotechnical investigation is recommended to review the feasibility of Option 3A based on soil type, bedrock excavation and groundwater. It is anticipated that 260 m of the new gravity sewers would be constructed approximately 6 to 7 m below grade, which is at or near the limits of conventional open trench installation. The feasibility of excavation, engineered trench shoring requirements, bedrock removal and/or groundwater constraints should be assessed to confirm feasibility and refine opinions of probable construction costs.

Table 24: Option 3A - Gravity Sewer Upgrades Main Street West SPS outlet to Main Street, east of Gladstone Street

Street	Existing			Project Peak Flow (L/s)			
	Dia. (mm)	Length (m)	Theoretical Conveyance Capacity (L/s)	0-5 years	5-10 years	10-20 years	Build-out
Main St. W MH 28 - 26	250	155	35 to 39	33	41 to 42	55 to 56	62
Main St. W MH 437 – 434	250	200	26 to 30	15 to 16	23	37	37 to 40
Easement b/w May St. and York St.	250	51	22	17	18	24	29
New/Regraded Sewer Upgrades							
Extend Main St. W. to Relocated SPS	300	286	63	19	27	41	44
Main St. W. from Bailey Ave. to Relocated SPS	250	260	39	14	15	15	19

Options 3B gravity sewer upgrades are similar to Option 3A, however, the Main Street SPS forcemain outlet is located at the Clarence Street and Louise Street intersection, as described in Option 2B.

Table 25: Option 3B - Gravity Sewer Upgrades Main Street West SPS outlet to Clarence Street and Louise Street

Street	Existing			Project Peak Flow (L/s)			
	Dia. (mm)	Length (m)	Theoretical Conveyance Capacity (L/s)	0-5 years	5-10 years	10-20 years	Build-out
Clarence St. MH 105 - 102	300	207	29 to 83	24	32	46	49
Main St. W MH 437 – 434	250	200	26 to 30	15 to 16	23	37	37 to 40
Easement b/w May St. and York St.	250	51	22	17	18	24	29
New/Regraded Sewer Upgrades							
Extend Main St. W. to Relocated SPS	300	286	63	19	27	41	44
Main St. W. from Bailey Ave. to Relocated SPS	250	260	39	14	15	15	19

Options 3A and 3B pumping station upgrades are the same as Options 2A and 2B, however the Main Street SPS needs to be relocated and requires a deeper wet well to drain the new gravity sewers. It is proposed to relocate the SPS approximately 286 m east to mitigate the wet well depth and length of deep gravity sewers to allow Bailey Avenue SPS to be decommissioned in the future. Land acquisition for the new SPS needs to be reviewed as part of this option along with the additional geotechnical considerations summarized under Option 3A gravity sewers to confirm construction feasibility.

Table 26: Options 3A and 3B – Pumping Station Upgrades Summary

Pumping Station	Rated Capacity (L/s)	Projected Peak Flow (L/s)				Peak Flow Capacity Surplus/(Deficit) (L/s)
		0-5 years	5-10 years	10-20 years	Build-out	
Main St.	6	19	27	55	62	(56)
Bailey Ave.	31.4	14	15	N/A	N/A	N/A
St. Lawrence	21	11	12	18	24	(3)
Ottawa St.	90	72	87	109	127	(37)

SEWAGE TREATMENT SYSTEM – CAPACITY REVIEW

In early 2019, JLR, along with the Township of North Dundas (Township) and Ontario Clean Water Agency (OCWA) completed a Municipal Class Environmental Assessment (Class EA) associated with upgrades to the Winchester Sewage Treatment System (STS). The STS consists of a seasonally discharged lagoon-based system (lagoon), including three primary facultative treatment cells operated in parallel (Cells 1, 2 and 3), one polishing cell (Cell No. 4), and one post-aeration cell (Cell No. 5). The lagoon treatment system has a C of A rated capacity of 2,220 m^3/day (C of A No. 5312-88TK5R).

At the time of the Class EA, population projections were reviewed with the Township and it was determined that the population within Winchester was anticipated to increase by approximately 948 people by 2038. Based on a population of 2,394 and an average day flow of 1,381 m^3/d, the estimated per capita flow at the time of the report was approximately 577 L/cap/day inclusive of inflow and infiltration (I&I). The 20-year design average day flow (ADF) for the Winchester STS assumed that the ratio of wastewater flow from future residential and commercial developments would remain similar to the proportion of residential and commercial flows that were previously generated. The Class EA recommended a specialized treatment study and upgrades to overcome existing operational constraints of the wastewater treatment system's rated capacity in the short term 0-5 year period.

As part of the current servicing study, population projections were re-developed based on new information available from the Township, and the average wastewater flows for various phasing (0-5 years, 5-10 years, 20 years, and 20+ years) were determined. The following table identifies the wastewater ADF for each phase, which includes residential (350 L/cap/day), commercial (28,000 L/ha/day) and a typical I&I flow (90 L/cap/day).

Table 27: Sewage Treatment System Future Capacity Comparison

Phasing	Projected Population Increase (Persons)	Projected increase ADF (m^3/d)	Existing ADF (m^3/d)	Projected Wastewater ADF[1] (m^3/d)	Rated Capacity (m^3/d)[2]	Treatment Capacity Surplus/ (Deficit) (m^3/d)
0-5 Years	539	347	1,381	1,728	2,220	492
5-10 Years	989	824		2,205		15
10-20 Years	1740	1,580		2,961		(741)
20+ Years	2464	1,898		3,279		(1059)

1. The projected wastewater ADF is estimated based on an assumed current average day flow of 1,381 m^3/d which is an average of the annual average day wastewater flow from 2012-2016.
2. The Winchester Sewage Treatment System Class EA (JLR, 2019) recommended a specialized treatment study to overcome existing operational constraints of the wastewater treatment system's rated capacity in the short term 0-5 year period.

It is noted that based on the higher projected population increase for the servicing study compared to the Class EA, the above suggests that the capacity of the lagoon could be exceeded during the 10-20 Year period if the projected development and connections are realized within this timeframe. As noted elsewhere in this study, it is recommended that the Township review the actual growth and wastewater flows generated on a periodic basis and re-evaluate the need and timing for capacity increases to the STS. Generally, capacity upgrades are triggered when a treatment facility reaches approximately 80% of the current functional or production capacity. This early identification allows time to accommodate the required planning and design between the anticipated need and the implementation of the upgrades. It is recommended that any short term lagoon upgrades necessary to overcome existing operational constraints be coordinated with expected long-term capacity upgrades to accommodate the growth projections.

At a high level potential future options overcome existing treatment constraints and to increase lagoon treatment capacity consist of adding end of pipe treatment such as a Moving Bed Bioreactor (MBBR) or Submerged Attached Growth Reactor (SAGR) systems and/or increase existing the lagoon area. OCWA advised that deepening the lagoon to increase storage capacity likely is not a feasible option as bedrock was encountered during the original lagoon construction.

It is important to note that the results of this study are *highly* dependent on the extent and rate of growth that the Township is projecting and also on the assumptions used in determining resulting future wastewater flows associated with this growth. As the Township receives more site specific information, it is possible that the projected wastewater flows could be refined and timing for implementation of the required infrastructure upgrades/expansion to support the future growth could be extended further out.

SUMMARY OF SANITARY SYSTEM REVIEW

A summary of the conclusions resulting from the above sanitary sewer model simulations, and SPS capacity review are provided in Table 28.

Table 28: Conceptual-Level Upgrades to Sanitary System

SANITARY SYSTEM UPGRADES		Projected Timeline	OPC Included in Study?	Municipal Class Environmental Requirements
Type	**Description**			
Sewage Pumping Station Upgrades	Options 1, 2A and 2B – Main St. SPS, increase capacity (current ECA capacity 6 L/s) to accommodate the build-out demand scenario (44 L/s from 6 L/s). It is assumed that a forcemain upgrade along with a new pumping station and wet well are required.	0 - 5 years	Yes	Schedule B – Increase sewage pumping station capacity that requires new building/wet well
	Option 1 – Bailey Ave. SPS, increase capacity (current ECA capacity 31 L/s) to accommodate the build-out demand scenario (62 L/s from 31 L/s). It is assumed that a forcemain upgrade along with a new pumping station and wet well are required.	0 - 5 years	Yes	Schedule B – Increase sewage pumping station capacity that requires new building/wet well
	Options 1 to 3 – Ottawa St. SPS, increase capacity (current ECA capacity 90 L/s) to accommodate the build-out demand scenario (127 L/s from 90 L/s). It is assumed equipment upgrades can be accommodated in the existing building footprint and forcemain.	10 to 20 Years	Yes	Schedule A+ – Notify residences of upgrade contained in existing building and wet well
	Options 2A and 2B – Bailey Ave. SPS building and equipment replacement at end of service life	0 - 5 years	Yes	Schedule A – Equipment replacement in existing facility
	Options 3A and 3B – New Main St. SPS rated for 62 L/s. New forcemain to either Main St. W. or Clarence St. and decommission Bailey Ave. SPS. Likely requires land acquisition for new Main St. SPS location.	0 - 5 years	Yes	Schedule B – Increase sewage pumping station capacity that requires new building/wet well
Sanitary Sewer Capacity Upgrades	Option 1 – Bailey Ave: Upgrade 24 m section of sanitary sewer with 300 mm dia. sewer	0 - 5 years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Option 1 – Main St. W: Upgrade 177 m section of sanitary sewer with 300 mm dia. sewer	5 to 10 Years	Yes	

	Options 1, 2A and 3A – Main St. W, Bailey Ave. SPS outlet sewers: Upgrade 155 m section of sanitary sewer with 300 mm dia. sewer	5 to 10 Years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Options 1 to 3 – Main St. W. upstream of Main St. SPS: Upgrade 200 m section of sanitary sewer with 300 mm dia. sewer	10 to 20 Years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Options 1 to 3 – Easement: Upgrade 51 m section of sanitary sewer with 300 mm dia. Sewer. To be confirmed in future based on field survey and actual future wastewater flows	10 to 20 Years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Options 2B and 3B – Clarence St.: Upgrade 207 m section of sanitary sewer with 450 mm dia. sewer	5 to 10 Years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Options 3A and 3B – New 286 m of regraded 300 mm dia. sanitary sewers extension along Main St. W.	0 - 5 years	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
	Options 3A and 3B – New 260 m of regraded deep (~7m) 250 mm dia. sanitary from Bailey Ave. SPS to relocated Main St. SPS.	10 to 20 years* Coordinate with Bailey Ave. SPS equipment replacement	Yes	Schedule A+ – Notify residences of upgrade in established road allowance
Sewage Treatment System	A specialized treatment upgrades to overcome existing operational constraints of the wastewater treatment systems to achieve the rated capacity in the short term 0-5 year period.	0 to 5 Years	Yes	Completed 2019 Schedule B
	Increase lagoon treatment capacity by adding/expanding end of pipe treatment such as a Moving Bed Bioreactor (MBBR), or Submerged Attached Growth Reactor (SAGR) systems and/or increase the existing lagoon area. Timing and remaining treatment capacity to be periodically reviewed in the future based on receiving wastewater flow as growth occurs.	10 to 20 Years	Yes	Schedule C – Increase rated capacity of wastewater treatment system

SUMMARY OF ASSUMPTIONS FOR PREPARING OPINIONS OF PROBABLE COST

An Opinion of Probable Cost (OPC) with a Class 'D' (Indicative Estimate) level of accuracy was developed for the conceptual-level upgrades required to service the projected future developments. The OPC was developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers.

In preparing the OPC, the following assumptions were made:

- The estimated costs for various items are order-of-magnitude only and are based on the experience and current (2020) unit prices in the construction industry.
- All costs, including those for future years, are expressed in 2020 dollars and exclude HST. If these costs are to be used for long-range cash-flow projections, the implications for potential future trends of inflation and interest must be applied accordingly.
- Conceptual level of order-of-magnitude OPC may range by ± 30%. The scope of the required upgrades are to be confirmed through a Master Plan and/or Municipal Class EA, followed by preliminary and detailed design; costs will vary depending on the scope considered for implementation.
- The estimated costs do not include engineering costs.
- Estimated costs for various items were obtained from the City of Ottawa Master Spec Code List (December, 2018).
- Bedrock and groundwater levels were assumed deeper than the excavations, and therefore, no costs for rock removal, water taking and discharge have been included in the OPC.

This OPC is based on our best professional judgement and experience at the time, which may not reflect actual construction costs that are dependent on available labour, equipment, materials, market conditions or Contractor's method of pricing at the time of tendering. Where appropriate, Class Environmental Assessments should be completed to better understand the scope (cost, magnitude, timeline) of the required upgrades.

Table 29 below provides an overview of the conceptual-level upgrades considered within the OPC to service the development scenarios. Figures 5 to 9 provide an overview of the conceptual-level upgrades of the water distribution and sanitary systems as well as the location of the existing water and wastewater treatment systems.

Table 29: Opinions of Probable Cost for Conceptual-Level Upgrades

CONCEPTUAL LEVEL UPGRADES		Class 'D' Opinion of Probable Cost
Type	**Description**	
UPGRADES 0 to 5 Years		
Sanitary Sewer Capacity Upgrades	Option 1 – Bailey Ave: Upgrade 24 m section of sanitary sewer with 300 mm dia. sewer	$50,000
	Options 3A and 3B – New 286 m of regraded 300 mm dia. sanitary sewers extension along Main St. W.	$450,000
Sewage Pumping Station Upgrades	Options 1 – Main St. SPS, increase capacity (current ECA capacity 6 L/s) to accommodate the build-out demand scenario (44 L/s from 6 L/s). Upgrade anticipated to include a new forcemain, new pumping station and wet well.	$2.5M - $3.5M
	Option 2A – Same Main St. SPS upgrade as Option 1, but forcemain outlet extended along Main St., east of Gladstone St.	$3.1M – $4.1M
	Option 2B – Same Main St. SPS upgrade as Option 1, but forcemain outlet extended to intersection of Clarence St. and Louise St.	$3.5M - $4.5M
	Option 1 – Bailey Ave. SPS, increase capacity (current ECA capacity 31 L/s) to accommodate the build-out demand scenario (62 L/s from 31 L/s). Upgrade anticipated to include a new forcemain, new pumping station and wet well. .	$3.75M - $4.75M
	Options 2A and 2B – Bailey Ave. SPS building and equipment replacement at end of service life	$750,000
	Options 3A – New Main St. SPS rated for 62 L/s. New forcemain outlet extended along Main St. east of Gladstone St. Decommission Bailey Ave. SPS. Likely requires land acquisition for new Main St. SPS location.	$5M - $6M
	Options 3B – New Main St. SPS rated for 62 L/s. New forcemain outlet extended to intersection of Clarence St. and Louise St. Decommission Bailey Ave. SPS. Likely requires land acquisition for new Main St. SPS location.	$5.5M - $6.5M

Sewage Treatment System	Specialized treatment upgrades to overcome existing operational constraints of the wastewater treatment systems to achieve the rated capacity. Opportunity to coordinate upgrades with 10 to 20 year treatment capacity upgrades	$7M
Watermain Upgrades	New 300 mm dia. watermain loop approximately 1,030 m (excluding 750 m through new development property) of 300 mm diameter watermain connection between Main St. West and Fred St.	$750,000
Watermain Storage and Pumping Station Upgrades	Chesterville Reservoir - 450 m^3 water storage expansion and pumping station upgrade	$1M
UPGRADES 5 to 10 Years		
Sanitary Sewer Capacity Upgrades	Option 1 – Main St. W: Upgrade 177 m section of sanitary sewer with 300 mm dia. sewer	$250,000
	Options 1, 2A and 3A – Main St. W, Bailey Ave. SPS outlet sewers: Upgrade 155 m section of sanitary sewer with 300 mm dia. sewer	$200,000
	Options 2B and 3B – Clarence St.: Upgrade 207 m section of sanitary sewer with 450 mm dia. sewer	$275,000
Watermain Upgrades	St. Lawrence St. 300 mm dia. watermain upgrade between the Winchester Reservoir and Pumping Station and Gordon Street (current extent of 300 mm diameter watermain from the Winchester elevated tank). Accompanies Winchester water storage and pumping station upgrades.	$1.5M
Water Storage and Pumping Station	Water storage expansion of 1,400 m^3 and booster pump upgrade at the Winchester Reservoir and Pumping Station.	$2M
UPGRADES 10 to 20 Years		
Sanitary Sewer Capacity Upgrades	Options 1 to 3 – Main St. W. upstream of Main St. SPS: Upgrade 200 m section of sanitary sewer with 300 mm dia. sewer	$250,000
	Options 1 to 3 – Easement: Upgrade 51 m section of sanitary sewer with 300 mm dia. Sewer. To be confirmed in future based on field survey and actual future wastewater flows	$75,000

	Options 3A and 3B – New 260 m of regraded deep (~7m) 250 mm dia. sanitary from Bailey Ave. SPS to relocated Main St. SPS.	$600,000
Sewage Pumping Station Upgrades	Options 1 to 3 – Ottawa St. SPS, increase capacity (current ECA capacity 90 L/s) to accommodate the build-out demand scenario (127 L/s from 90 L/s). It is assumed equipment upgrades can be accommodated in the existing building footprint and forcemain.	$750,000
Sewage Treatment System	Increase lagoon treatment capacity by adding end of pipe treatment such as a Moving Bed Bioreactor (MBBR) or Submerged Attached Growth Reactor (SAGR) systems and/or increase existing lagoon depth to increase storage volume. Timing and remaining treatment capacity to be periodically reviewed in the future based on receiving wastewater flow as growth occurs.	$15M
UPGRADES BUILD-OUT		
Watermain upgrades	Main St W. upgrade watermain to 300 mm dia. from Wellings of Winchester to St. Lawrence St. Establishes a trunk watermain loop through Winchester to improve fire flow availability.	$1.5M
	Fred St. upgrade watermain to 300 mm dia from Fred St. easement connection to St. Lawrence St. Establishes a trunk watermain loop through Winchester to improve fire flow availability.	$500,000
TOTAL OVERALL CONCEPTUAL-LEVEL OPC		$35M - $38M

Based on review of the OPCs, it is expected that Option 2A would provide the most economical option to accommodate the projected build-out future development (refer to Figure 10). The following table provides an OPC summary associated with Option 2A.

Table 30: Option 2A - Opinions of Probable Cost for Conceptual-Level Upgrades

CONCEPTUAL LEVEL UPGRADES		Class 'D' Opinion of Probable Cost
Type	**Description**	
UPGRADES 0 to 5 Years		
Sewage Pumping Station Upgrades	Option 2A – Same Main St. SPS upgrade as Option 1, but forcemain outlet extended along Main St., east of Gladstone St.	$3.1M – $4.1M
	Options 2A – Bailey Ave. SPS building and equipment replacement at end of service life	$750,000
Sewage Treatment System	Specialized treatment upgrades to overcome existing operational constraints of the wastewater treatment systems to achieve the rated capacity. Opportunity to coordinate upgrades with 10 to 20 year treatment capacity upgrades	$7M
Watermain Upgrades	New 300 mm dia. watermain loop approximately 1030 m (excluding 750 m through new development property) of 300 mm diameter watermain connection between Main St. West and Fred St.	$750,000
Watermain Storage and Pumping Station Upgrades	Chesterville Reservoir - 450 m^3 water storage expansion and pumping station upgrade	$1M
UPGRADES 5 to 10 Years		
Sanitary Sewer Capacity Upgrades	Option 2A – Main St. W, Bailey Ave. SPS outlet sewers: Upgrade 155 m section of sanitary sewer with 300 mm dia. sewer	$200,000
Watermain Upgrades	St. Lawrence St. 300 mm dia. watermain upgrade between the Winchester Reservoir and Pumping Station and Gordon Street (current extent of 300 mm diameter watermain from the Winchester elevated tank). Accompanies Winchester water storage and pumping station upgrades.	$1.5M

Water Storage and Pumping Station	Water storage expansion of 1,400 m^3 and booster pump upgrade at the Winchester Reservoir and Pumping Station.	$2M
UPGRADES 10 to 20 Years		
Sanitary Sewer Capacity Upgrades	Option 2A – Main St. W. upstream of Main St. SPS: Upgrade 200 m section of sanitary sewer with 300 mm dia. sewer	$250,000
	Option 2A – Easement: Upgrade 51 m section of sanitary sewer with 300 mm dia. Sewer. To be confirmed in future based on field survey and actual future wastewater flows	$75,000
Sewage Pumping Station Upgrades	Option 2A – Ottawa St. SPS, increase capacity (current ECA capacity 90 L/s) to accommodate the build-out demand scenario (127 L/s from 90 L/s). It is assumed equipment upgrades can be accommodated in the existing building footprint and forcemain.	$750,000
Sewage Treatment System	Increase lagoon treatment capacity by adding end of pipe treatment such as a Moving Bed Bioreactor (MBBR) or Submerged Attached Growth Reactor (SAGR) systems and/or increase existing lagoon depth to increase storage volume. Timing and remaining treatment capacity to be periodically reviewed in the future based on receiving wastewater flow as growth occurs.	$15M
UPGRADES BUILD-OUT		
Watermain Upgrades	Main St W. upgrade watermain to 300 mm dia. from Wellings of Winchester to St. Lawrence St. establishes a trunk watermain loop through Winchester to improve fire flow availability.	$1.5M
	Fred St. upgrade watermain to 300 mm dia from Fred St. easement connection to St. Lawrence St. establishes a trunk watermain loop through Winchester to improve fire flow availability.	$500,000
TOTAL OVERALL CONCEPTUAL-LEVEL OPC		$34.4M - $35.4M

KEY CONSIDERATIONS FROM DESKTOP REVIEW

Based on the findings of the desktop water and wastewater servicing review, a list of recommendations and key considerations are summarized as follows:

Water Servicing

- The Lactalis water service configuration and details be reviewed for any future opportunities to refine the Township's water model to more accurately represent the site servicing at this facility.

- A Water Distribution System Master Plan be developed to evaluate and select preferred trunk water servicing routes and options. Since additional water storage is required to address a future storage deficit, a Master Plan would be beneficial in the selection of the preferred water storage configuration and location as it relates to the distribution system.

Wastewater Servicing

- The St. Lawrence Street SPS upgrades be reassessed in the 10 to 20 year time frame to confirm that the upgrades remain warranted as the projected build-out peak flow rate is within 3 L/s of the current rated capacity.

- Option 2A is expected to be the most economical option to accommodate the build-out wastewater flow from the identified future development areas.

- Under Option 1 the Bailey Avenue SPS upgrades will require additional investigation to assess the feasibility to double the current rated pumping capacity to 62 L/s on the existing constrained site and in close proximity to neighbouring residential development.

- Options 2B and 3B further investigation of the proposed forcemain route through the Christie Lane easement should be completed to assess the viability, particularly spatial constraints as the easement already contains a buried sanitary sewer.

- For the 20 year and build-out sewer upgrade anticipated along the easement between May Street and York Street additional field investigation is warranted to confirm the sewer invert elevations along with future refinement of the projected peak wastewater flows.

- Options 3A and 3B further geotechnical investigation is recommended to review the feasibility of excavation, engineered trench shoring requirements, potential bedrock removal and/or groundwater constraints and refine opinions of probable construction costs. It is anticipated that 260 m of the new gravity sewers would be constructed approximately 6 to 7 m below grade, which is at or near the limits of conventional open trench installation.

- Short term lagoon upgrades necessary to overcome existing operational constraints be coordinated with expected long-term capacity upgrades to accommodate the growth projections. The Township should continue to review the actual growth and wastewater flows generated on a periodic basis and re-evaluate the need and timing for capacity increases to the STS. Additional investigation is required to assess constraints of increasing lagoon depth, treatment requirements and increased discharge period in order to achieve the anticipate build-out treatment capacity.

It is noted that the type of units expected within various residential areas and the type of commercial use expected within future commercial lands have a significant influence on the water demands and wastewater flows projected for the development scenarios. With limited information regarding the details of the intended future developments, design guideline values for the projected flows have been used to identify the various upgrades. Based on our experience, guideline values tend to be more conservative to account for unknowns when limited information is available, and therefore, there may be opportunities to refine the projected flows with further details as information becomes more available.

Furthermore, the upgrades identified through this review and their associated costs are largely attributed to future developments that are currently non-committed. Therefore, as these infrastructure upgrades are development driven, it would be expected that the majority of the costs to upgrade the infrastructure would be borne by the developers.

It is recommended that the Village undertake a more in-depth Master Plan for their water and wastewater systems to further define the projected future developments, the projected flows (both water and wastewater) and the resulting infrastructure upgrade requirements and the timing for those upgrades based on additional information. A more in-depth capacity assessment review of the STS could also be undertaken to determine the potential expandability of the STS based on projected demands and to assess constraints based on increase lagoon depth, treatment objectives and release rates. As noted, since additional water storage is required to address a future storage deficit, a Master Plan would be beneficial in the selection of the preferred water storage configuration and the specific location as it relates to the distribution system. A Master Plan would also assist in establishing additional capital costs and timing that could be used to ensure that any Development Charges By-law is appropriate to accommodate sustainable growth within the Township.

J.L. RICHARDS & ASSOCIATES LIMITED

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Civil Engineer

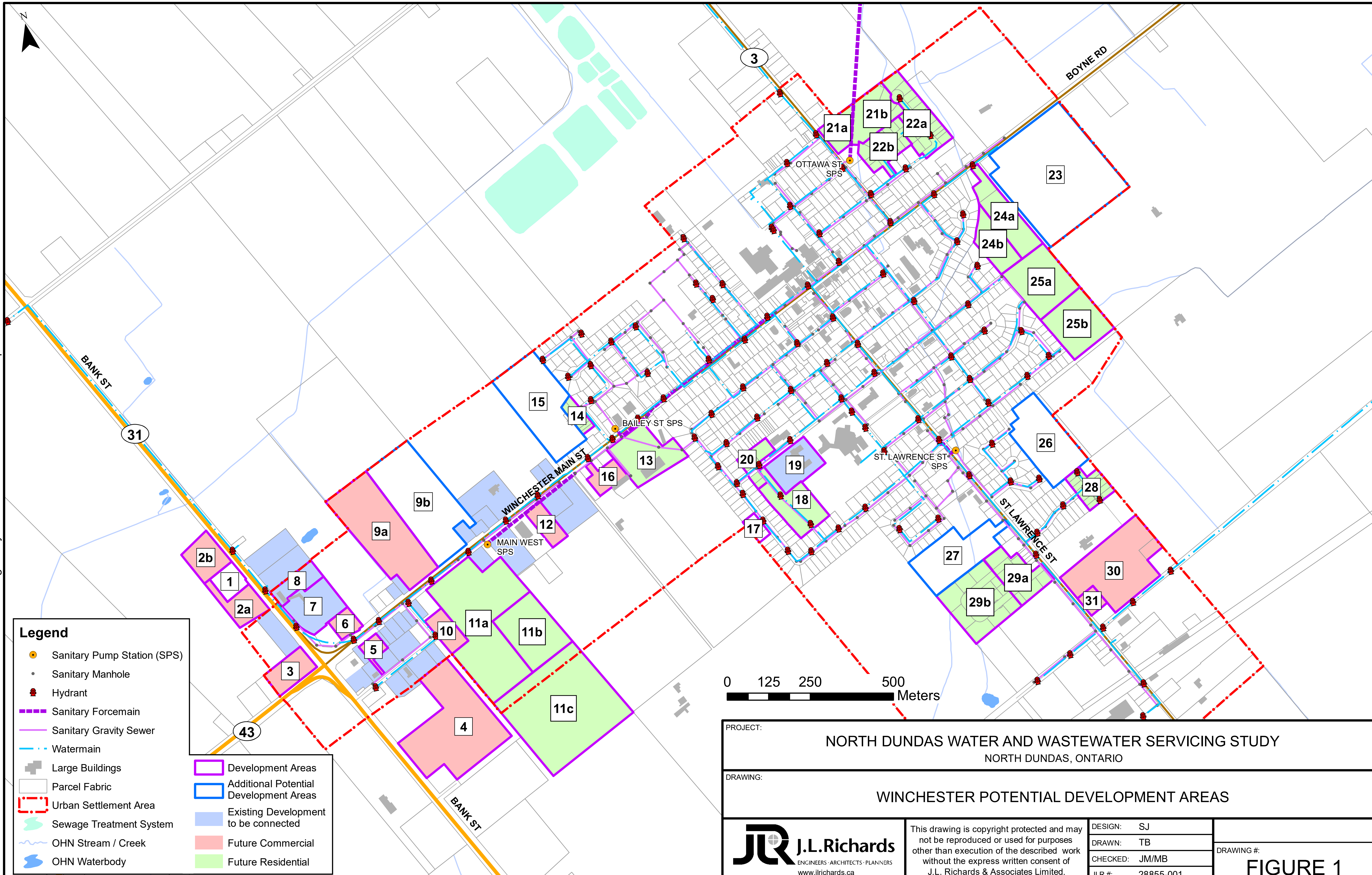
Prepared by:

Mark Buchanan, P.Eng.
Associate, Senior Civil Engineer

Reviewed by:

Matt Morkem, P.Eng.
Associate, Senior Civil Engineer

AW/MB:jd
Attach.



PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

WINCHESTER POTENTIAL DEVELOPMENT AREAS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
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DESIGN:	SJ
DRAWN:	TB
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:

FIGURE 1

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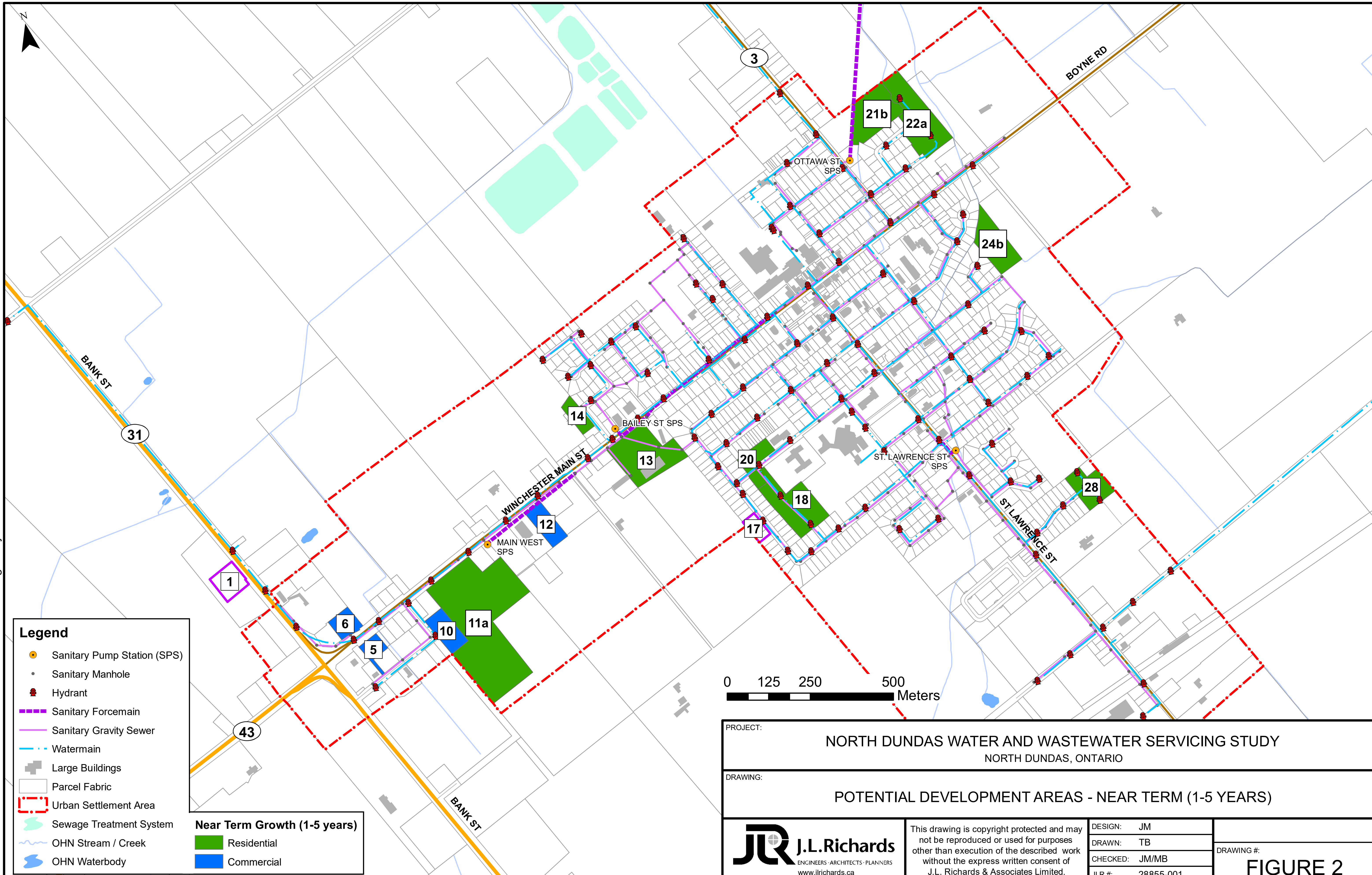

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - NEAR TERM (1-5 YEARS)

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JLR #:	28855-001

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FIGURE 2

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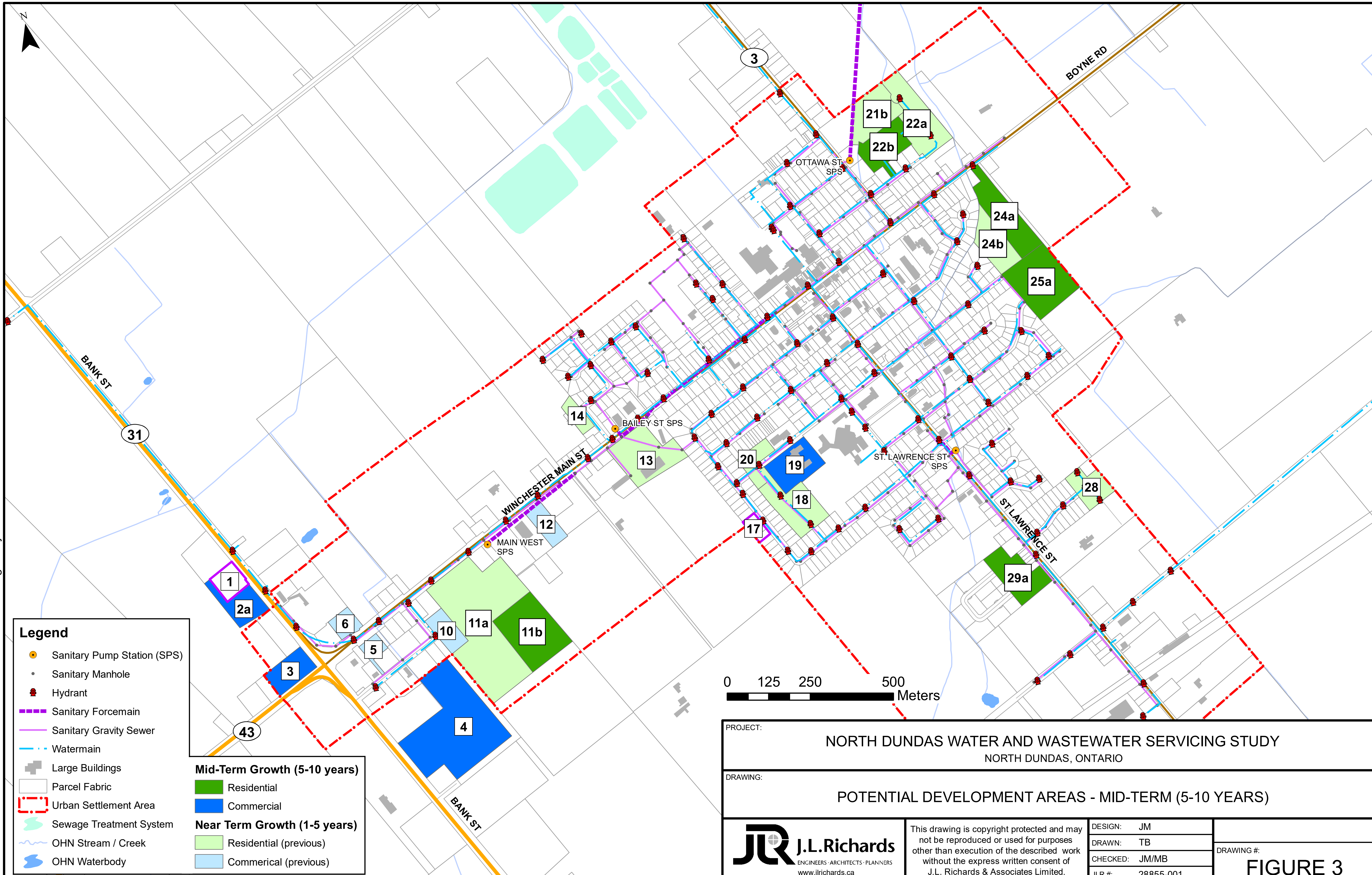

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - MID-TERM (5-10 YEARS)

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JLR #:	28855-001

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FIGURE 3

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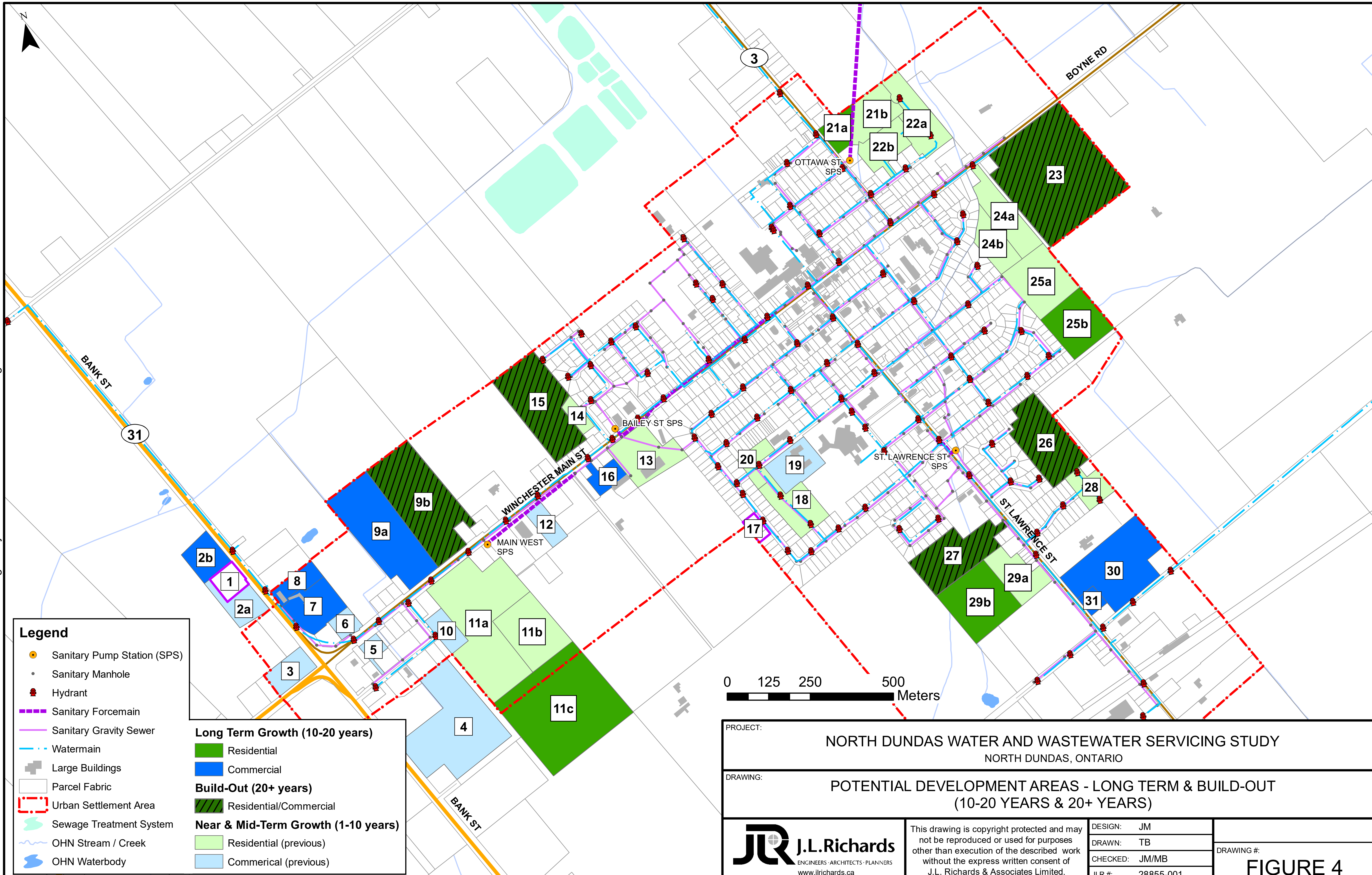

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - LONG TERM & BUILD-OUT (10-20 YEARS & 20+ YEARS)

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DRAWN:	TB
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JLR #:	28855-001

DRAWING #: FIGURE 4

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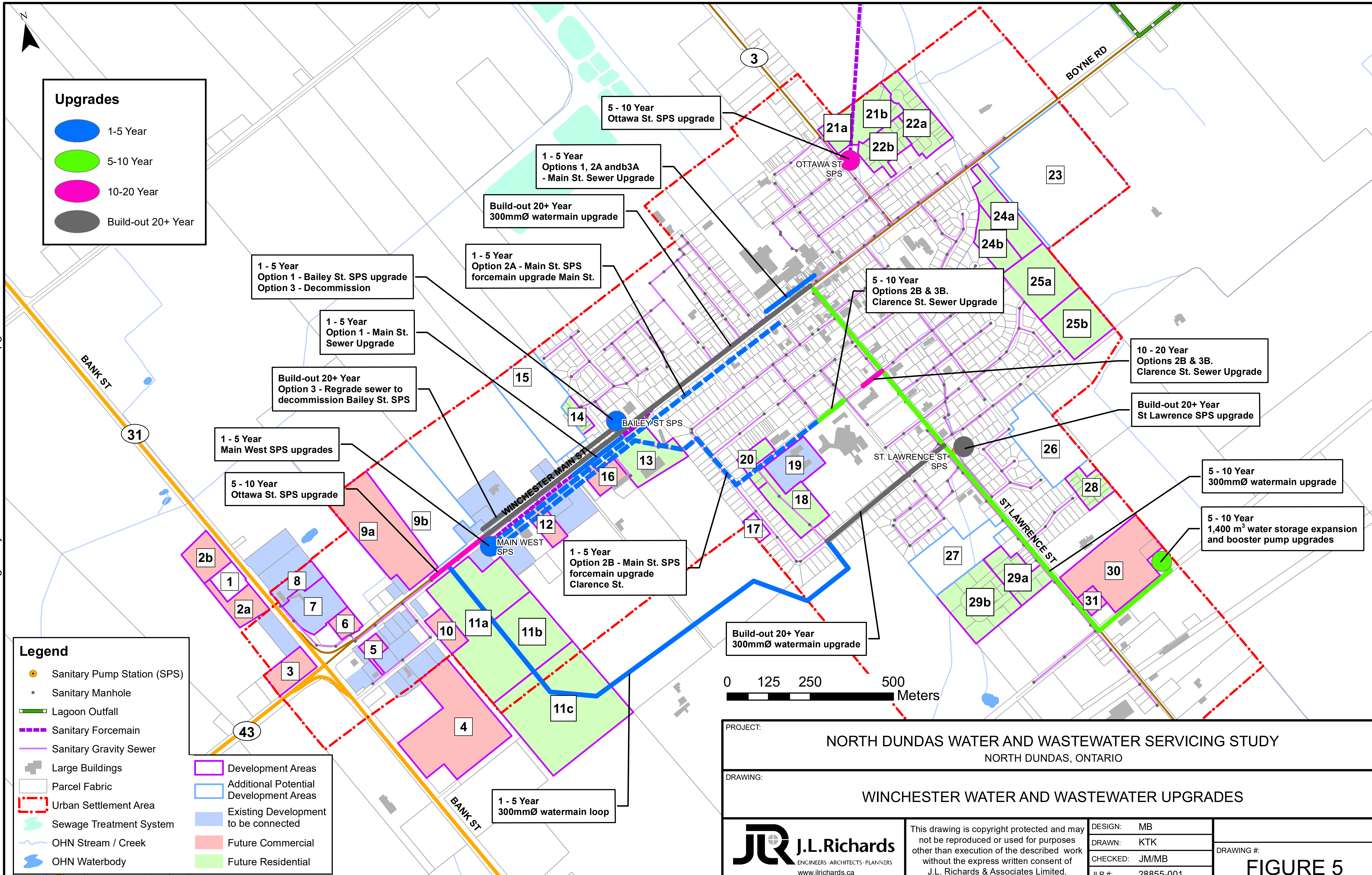

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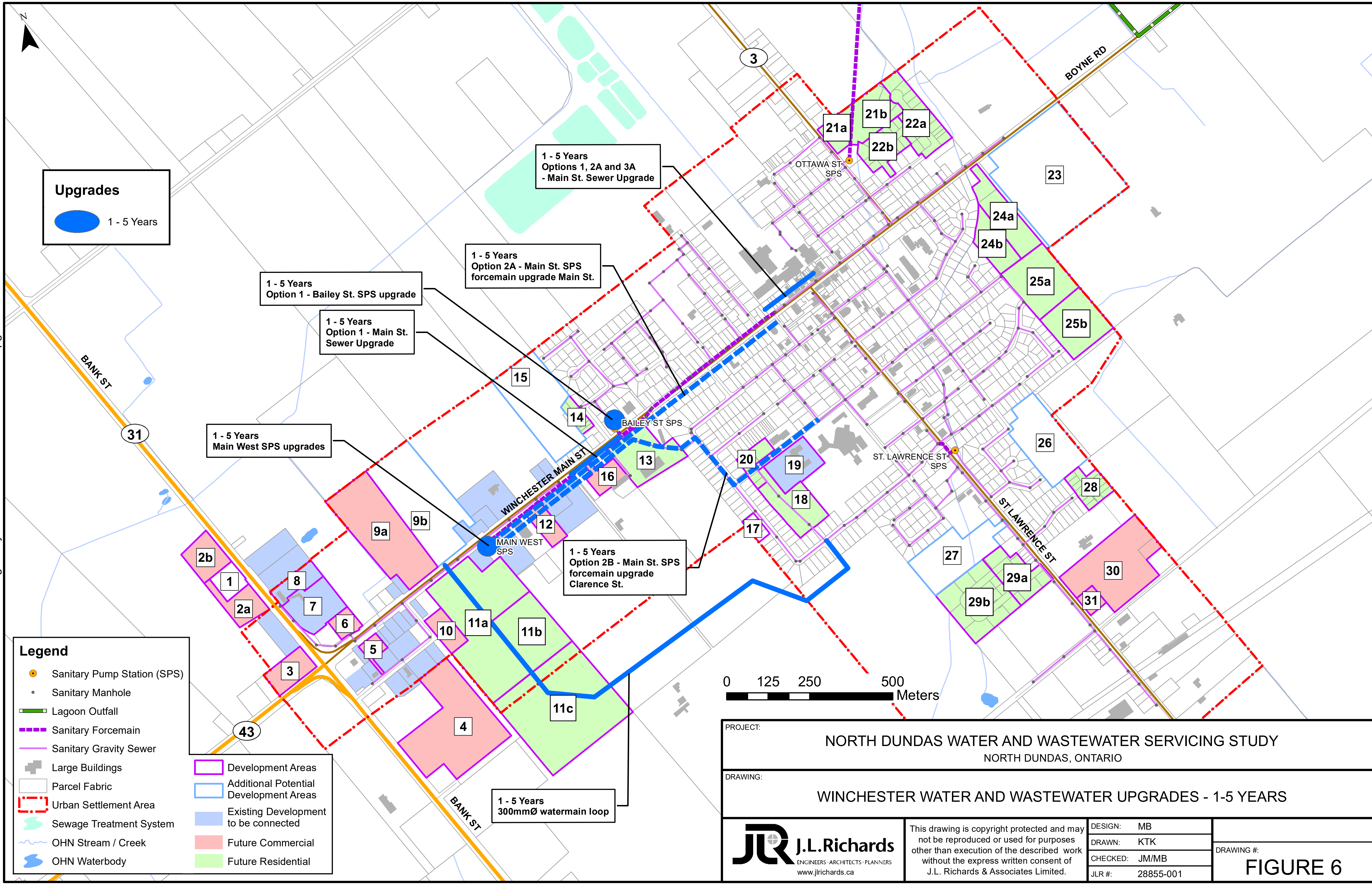

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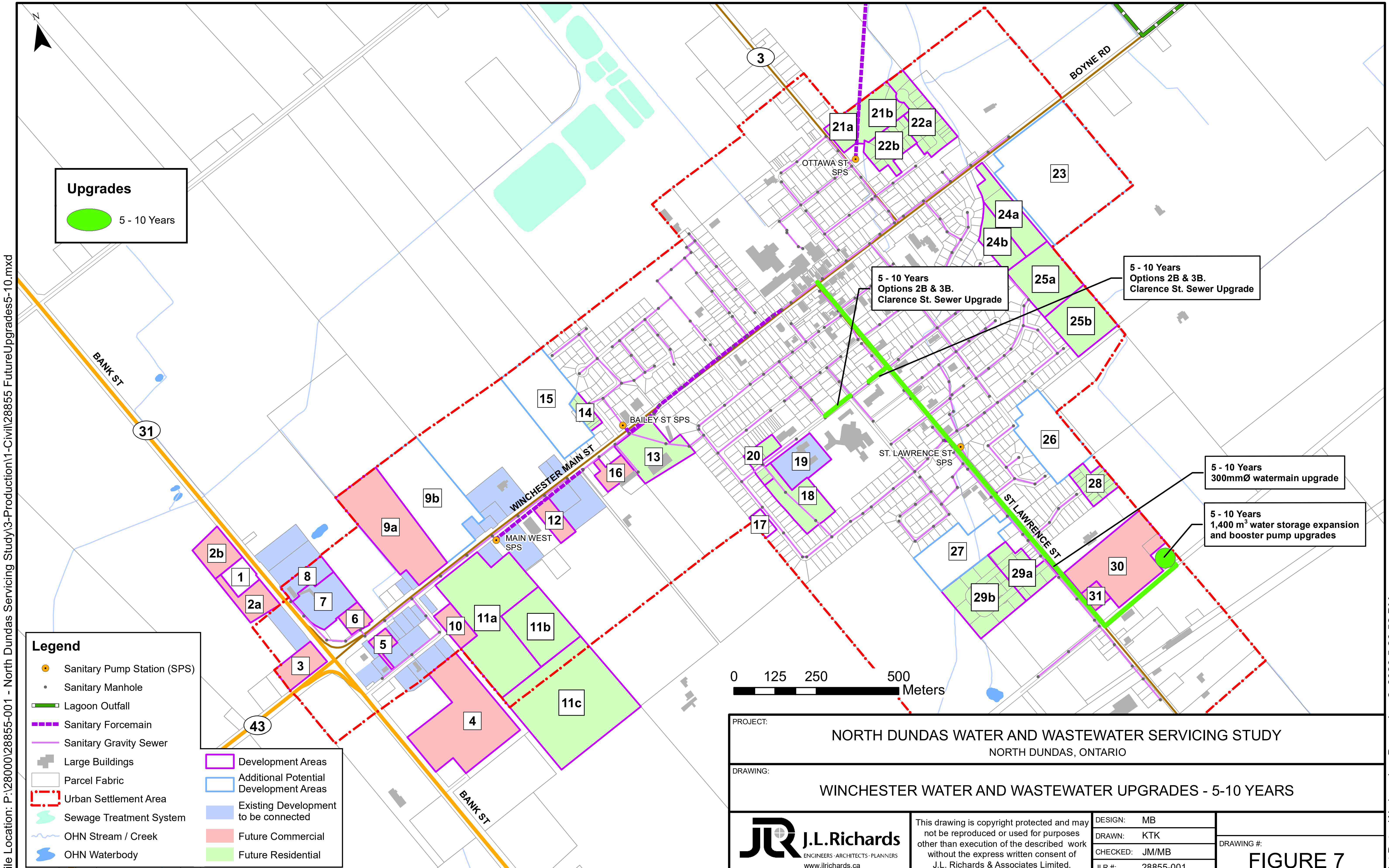

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:

WINCHESTER WATER AND WASTEWATER UPGRADES - 5-10 YEARS

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DESIGN:	MB
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CHECKED:	JM/MB
JLR #:	28855-001

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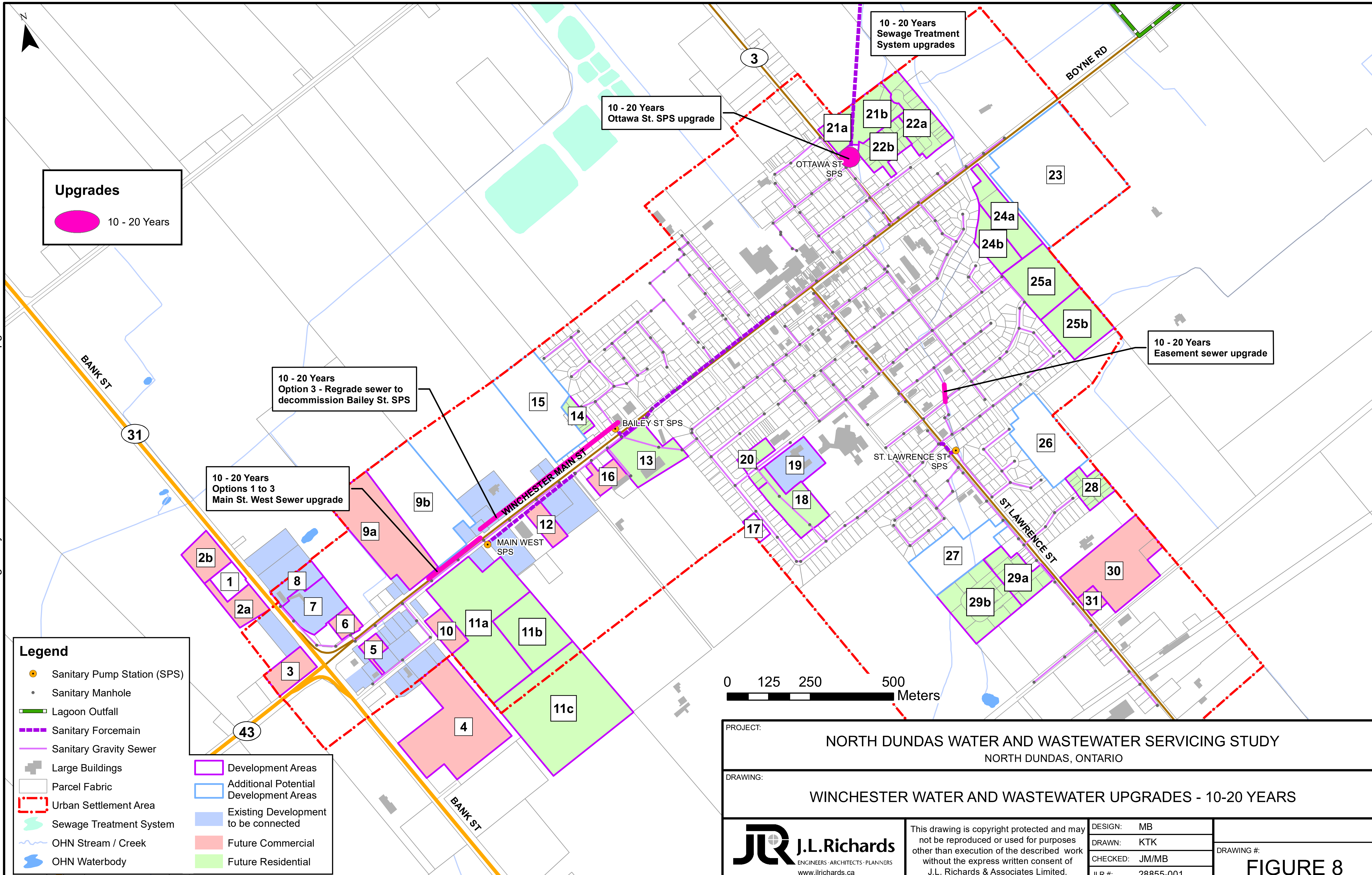
FIGURE 7



PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

WINCHESTER WATER AND WASTEWATER UPGRADES - 10-20 YEARS

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FIGURE 8

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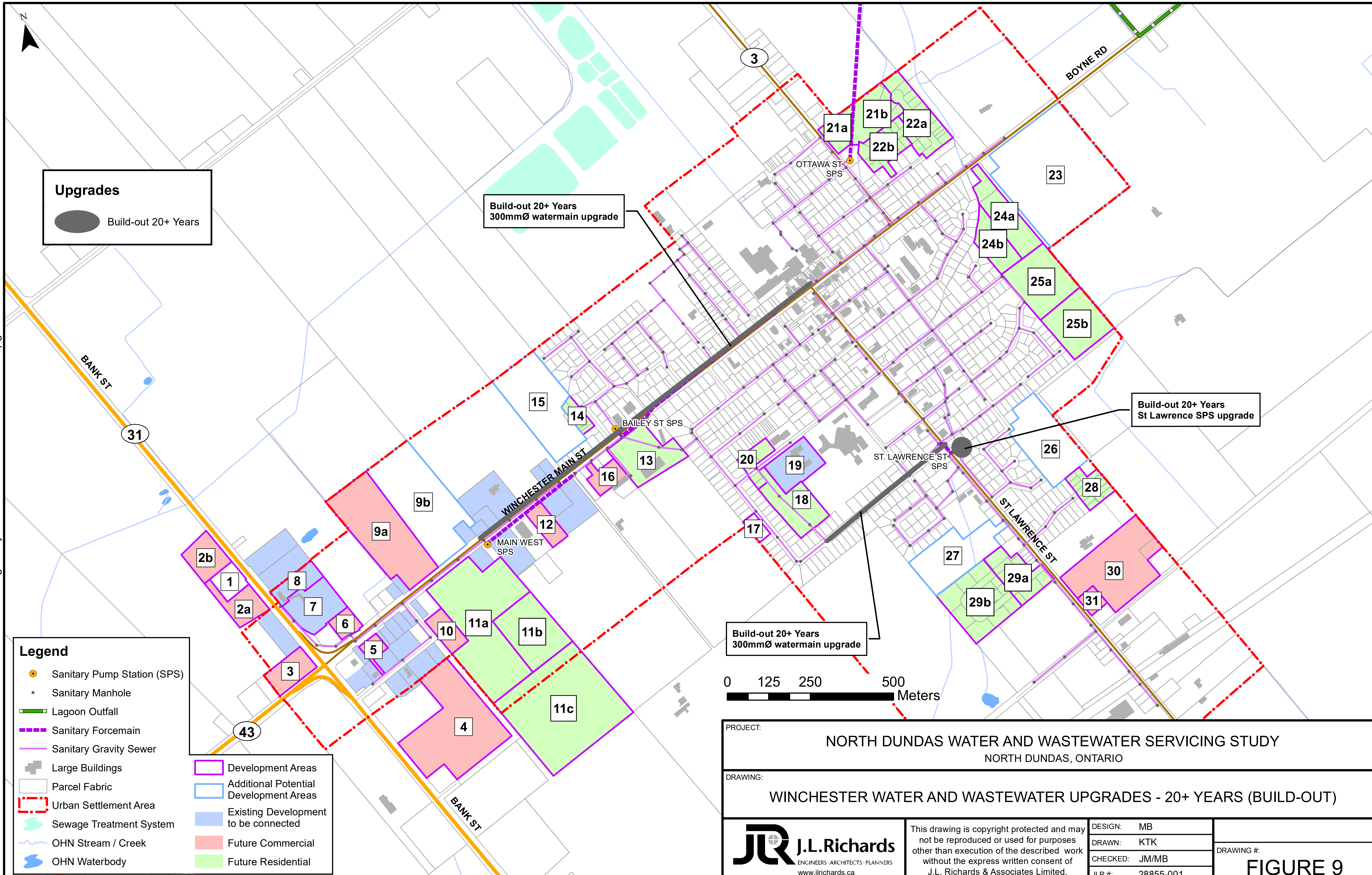

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

WINCHESTER WATER AND WASTEWATER UPGRADES - 20+ YEARS (BUILD-OUT)

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JLR #:	28855-001

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FIGURE 9

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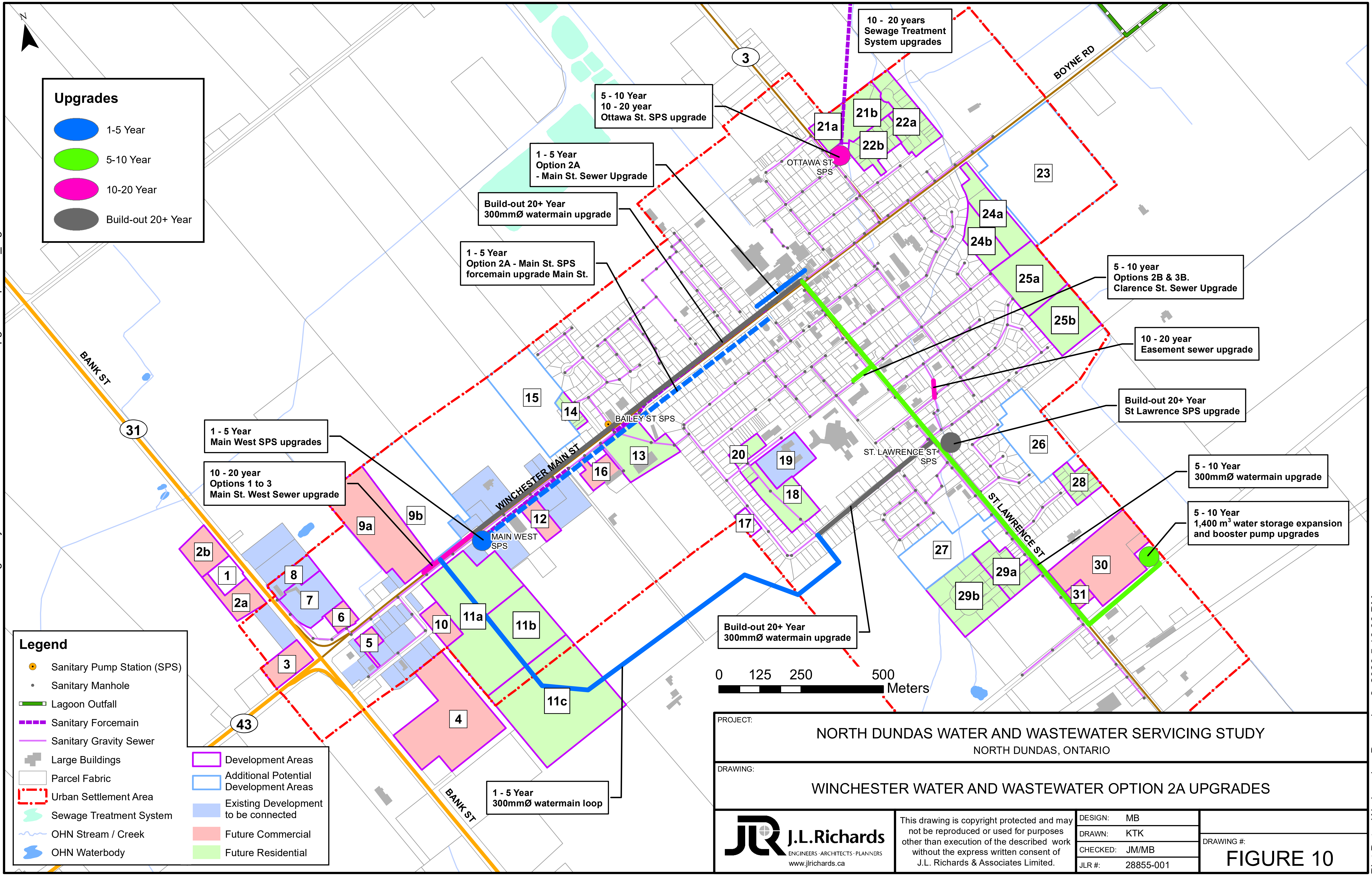

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Plot Date: Wednesday, December 2, 2020 5:16:00 PM

Attachment 1

GROWTH PROJECTIONS MEMORANDUM

J.L. Richards
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864 Lady Ellen Place
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MEMORANDUM

TO:	Calvin Pol, BES, MCIP, RPP Director of Planning, Building and By-Law Enforcement Township of North Dundas	DATE:	February 14, 2020
		JOB NO.:	28855-000
FROM:	Jordan Morrissette, M.Eng., P.Eng.	CC:	Angela Rutley, Township of North Dundas Dan Belleau, Township of North Dundas Dave Markell, Ontario Clean Water Agency Sarah Gore, P.Eng., J.L. Richards & Associates Limited Mark Buchanan, P.Eng., J.L. Richards & Associates Limited
RE:	**North Dundas Drinking Water Supply System Capacity Expansion Class EA Technical Memorandum No. 1 Population Growth and Development Projections (Rev. 1) DRAFT**		

INTRODUCTION

The purpose of this Memorandum is to assist in establishing proposed 20 year population projections for the Village of Winchester and the Village of Chesterville within the Township of North Dundas (Township) by determining their potential development opportunities for growth. The 20 year population projections will serve as the basis for establishing the drinking water supply system requirements for the North Dundas Drinking Water Supply System Capacity Expansion Class Environmental Assessment (Class EA).

EXISTING POPULATION AND GROWTH SCENARIOS (WINCHESTER AND CHESTERVILLE)

A review of available 2016 Census information indicates that the population in 2016 within Winchester and Chesterville was approximately 2,394 and 1,677 persons, respectively. It is noted that based on 2011 Census information, the population was 2,460 people in Winchester and 1,448 people in Chesterville, representing an annual percentage growth rate of approximately -0.5% and 3.1%, respectively over the five (5) year period. Due to the development anticipated within both villages over the next 20+ years, the following growth scenarios are proposed to be used for the Class EA:

Low Growth Scenario

- Winchester: Projected annual growth rate of 1.5% from 2016 to 2019. Projected population growth from 2019 to 2039 based on the future potential development within Winchester provided by the Township (refer to Table 1) not including Phase 2 to Phase 5 of the proposed Wellings of Winchester development (Area 11);
- Chesterville: Projected at an annual growth rate of 3.5% from 2016 to 2019 and at an annual growth rate of 1.5% from 2019 to 2039.

High Growth Scenario

- Winchester: Projected annual growth rate of 1.5% from 2016 to 2019. Projected population growth from 2019 to 2039 based on the future potential development within Winchester provided by the Township (refer to Table 1) including Phase 2 to Phase 5 of the proposed Wellings of Winchester development (Area 11);

- Chesterville: Projected at an annual growth rate of 3.5% from 2016 to 2019 and at an annual growth rate of 3.5% from 2019 to 2039.

POPULATION PROJECTIONS FOR WINCHESTER

In order to determine the potential population increase in Winchester for the Low Growth and High Growth Scenarios, an updated list of potential development areas and their associated types of land-use was obtained from the Township. Table 1 provides a description of the future potential developments in Winchester and the total projected units and/or commercial area estimated. The areas identified in Table 1 are illustrated in Figure M1-1.

TABLE 1: WINCHESTER FUTURE POTENTIAL DEVELOPMENT[1]

Area	Description	Total Projected Units or Residents	Commercial Area
A	Existing – Not Connected	28	-
1	Pioneer Gas Restaurant / Car Wash	Constructed	-
2A	Commercial #31 Strip	-	1.13 ha
2B	Commercial #31 Strip	-	1.22 ha
3	Commercial #43 / #31 corner	-	0.97 ha
4	Industrial/Commercial John Deere	-	6.17 ha
5	Commercial – Main Street South side	-	0.45 ha
6	Commercial – Main Street North side	-	(0.33 L/s)
7	Motel	14	-
8	Restaurant – Country Kitchen	7	-
9A	Commercial/Residential	-	5.07 ha
9B	Commercial/Residential	-	Buildout[2]
10	Commercial	Mini storage	0.88 ha
11A	Wellings of Winchester + Commercial (Phase 1)	68 (refer to Table 2)	2.28 ha
11B	Wellings of Winchester (Phase 2 to Phase 5)	432 (refer to Table 3)	
12	Commercial	-	0.8 ha
13	Residential Infill/Apartment in-houses	15	-
14	Winfields Subdivision	9	-
15	Residential – Winfields Phase 2	-	Buildout[2]
16	Commercial	-	0.75 ha
17	Residential (connected)	connected	-
18	New Dundas Manor[3]	-	-
19	Old Dundas Manor Building and Property	-	1.19 ha
20	Guy Racine Subdivision - Phase 3	8	-
21A	Seniors Complex	54 residents	-
21B	Development	36	-
22A	Winchester Meadows Subdivision	22	-
22B	Winchester Meadows Subdivision	22	-
23	Vacant Residential	-	Buildout[2]
24A	Woods Development	78	-
24B	High Density Apartments	21	-
25A	Woods Development	19	-
25B	Singles & Semis & Townhomes	36	-

Area	Description	Total Projected Units or Residents	Commercial Area
26	Residential – Barnhart	-	Buildout[2]
27	Residential - M. Lafortune Investments	-	Buildout[2]
28A	Residential	2	-
28B	Wintonia Drive / James Street	10	-
29A	Residential	15	-
29B	Esper Lane	51	-
30	Commercial	-	4.34 ha
31	Commercial	-	0.40 ha
	LOW GROWTH SCENARIO[4]	**393 units + 68 units Wellings + 54 residents**	**25.65 ha + 0.33 L/s**
	HIGH GROWTH SCENARIO[5]	**393 units + 500 units Wellings + 54 residents**	**25.65 ha + 0.33 L/s**

1. List of potential development areas and their associated types of land-use were provided by the Township.
2. Additional development areas are available; these development areas are projected beyond a 20-year period.
3. The flow from the new Dundas Manor is anticipated to remain the same as the flow from existing Dundas Manor.
4. Low Growth Scenario includes Phase 1 of the Wellings of Winchester Development only.
5. High Growth Scenario includes Phase 1 to Phase 5 of the Wellings of Winchester Development.

Although, the Township's Official Plan (based on 2016 Census information) indicates a household occupancy of 2.45 persons per unit within the United Counties of Stormont, Dundas and Glengarry, the Township has reported that based on more recent information available, the household occupancy to be used for the Class EA is 2.5 persons per unit. The Township has also identified that the Wellings of Winchester development will have a different household occupancy since the proposed development is intended to be for seniors. Table 2 and Table 3 below presents Phase 1 potential population increase for Wellings of Winchester development (Area 11) as well as the total potential population increase for Phase 2 to Phase 5.

TABLE 2: POTENTIAL POPULATION INCREASE (PHASE 1) - WELLINGS OF WINCHESTER

Unit	Number of Residential Units	Household Occupancy (Persons per unit)	Potential Population Increase
1 - bedroom	42	1.17	49
2 - bedroom	26	1.62	42
TOTAL	**68**		**91**

TABLE 3: POTENTIAL POPULATION INCREASE (PHASE 2 TO PHASE 5) - WELLINGS OF WINCHESTER

Unit	Number of Residential Units	Household Occupancy (Persons per unit)	Potential Population Increase
1 - bedroom	286	1.17	335
2 - bedroom	146	1.62	237
TOTAL	**432**		**572**

Using the number of total projected units and residents (Table 1) and the different household occupancy for Phase 1 of the Wellings of Winchester development (Table 2), the total potential population increase for the Low Growth Scenario is summarized in Table 4 below.

TABLE 4: POTENTIAL POPULATION INCREASE IN WINCHESTER (LOW GROWTH SCENARIO)

Number of Residential Units	Household Occupancy (Persons per unit)	Number of People (based on units)	Number of Additional Residents (Seniors Complex)	Potential Population Increase
393	2.5	983	54	1,037
68	See Table 2	91	-	91
461	-	1,074	54	1,128

1. The above equivalent population is based on the Low Growth Scenario which does not include Phase 2 to Phase 5 of Area 11 – Wellings of Winchester Development.

Using the above information, the 2039 population projections for the Low Growth and High Growth Scenarios in Winchester were determined and presented in Table 5.

TABLE 5: POPULATION PROJECTIONS IN WINCHESTER (2016 – 2039)

	Low Growth Scenario		High Growth Scenario	
Year	Projected Population Increase (Persons)	Population Projected (Low Growth Scenario)	Projected Population Increase (Persons)	Population Projected (High Growth Scenario)
2016	-	2,394[1]	-	2,394[1]
2019	108[2]	2,502	108[2]	2,502
2039	1,128[3]	3,630	1,128[4] + 572[5]	4,202

1. Population based on the 2016 Census Information for Winchester.
2. 2019 population increase is based on an assumed annual growth rate of 1.5%.
3. Based on the potential population increase for Low Growth Scenario identified in Table 4.
4. Based on the potential population increase for Low Growth Scenario (including Phase 1 of the Wellings of Winchester development) identified in Table 4.
5. Based on the potential population increase for Phase 2 to Phase 5 of the Wellings of Winchester development identified in Table 3.

POPULATION PROJECTIONS FOR CHESTERVILLE

As determined in consultation with the Township, Table 6 illustrates the projected population for the Low Growth and High Growth Scenarios for Chesterville to 2039 based on annual growth rates of 1.5% and 3.5% respectively.

TABLE 6: POPULATION PROJECTIONS IN CHESTERVILLE (2016 – 2039)

	Low Growth Scenario		High Growth Scenario	
Year	**Annual Projected Growth Rate (%)**	**Population Projected (Low Growth Scenario)**	**Annual Projected Growth Rate (%)**	**Population Projected (High Growth Scenario)**
2016	-	1,677[1]	-	1,677[1]
2019	3.5[2]	1,853	3.5[2]	1,853
2039	1.5[2]	2,409	3.5[2]	3,027

1. Population based on the 2016 Census Information for Chesterville.
2. 2019 population increase is based on an assumed annual growth rate of 3.5%.
3. Low annual growth rate (1.5%) and high annual growth rate (3.5%) developed in consultation with the Township.

TOTAL PROJECTED POPULATION FOR CLASS EA

As summarized in Table 7, the total projected population for Winchester and Chesterville based on the Low Growth and High Growth Scenarios are 6,039 and 7,229 people, respectively. These population projections will be used to determine water supply requirements for the drinking water system as part of the Class EA.

TABLE 7: TOTAL POPULATION PROJECTIONS IN WINCHESTER AND CHESTERVILLE (2039)

Village	2019 Total Population	Total Projected Population (Low Growth Scenario)	Total Projected Population (High Growth Scenario)
Winchester	2,502	3,630	4,202
Chesterville	1,853	2,409	3,027
TOTAL	**4,355**	**6,039**	**7,229**

Prepared by

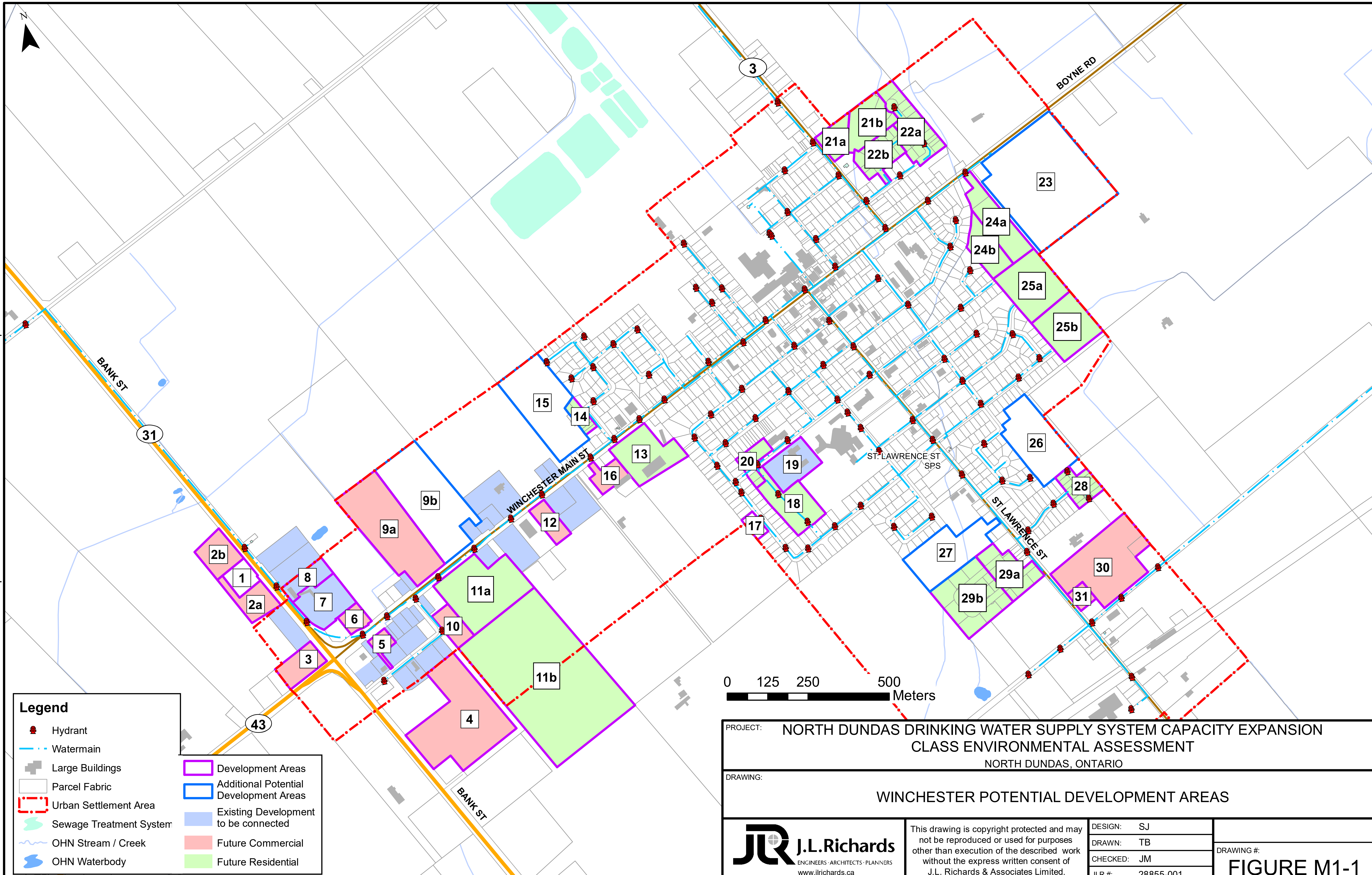
J.L. RICHARDS & ASSOCIATES LIMITED

Sara Jamaliniya, M.Eng.

Reviewed by

J.L. RICHARDS & ASSOCIATES LIMITED

Jordan Morrissette, M.Eng., P.Eng.



PROJECT: NORTH DUNDAS DRINKING WATER SUPPLY SYSTEM CAPACITY EXPANSION
CLASS ENVIRONMENTAL ASSESSMENT
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER POTENTIAL DEVELOPMENT AREAS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	SJ
DRAWN:	TB
CHECKED:	JM
JLR #:	28855-001

DRAWING #:
FIGURE M1-1

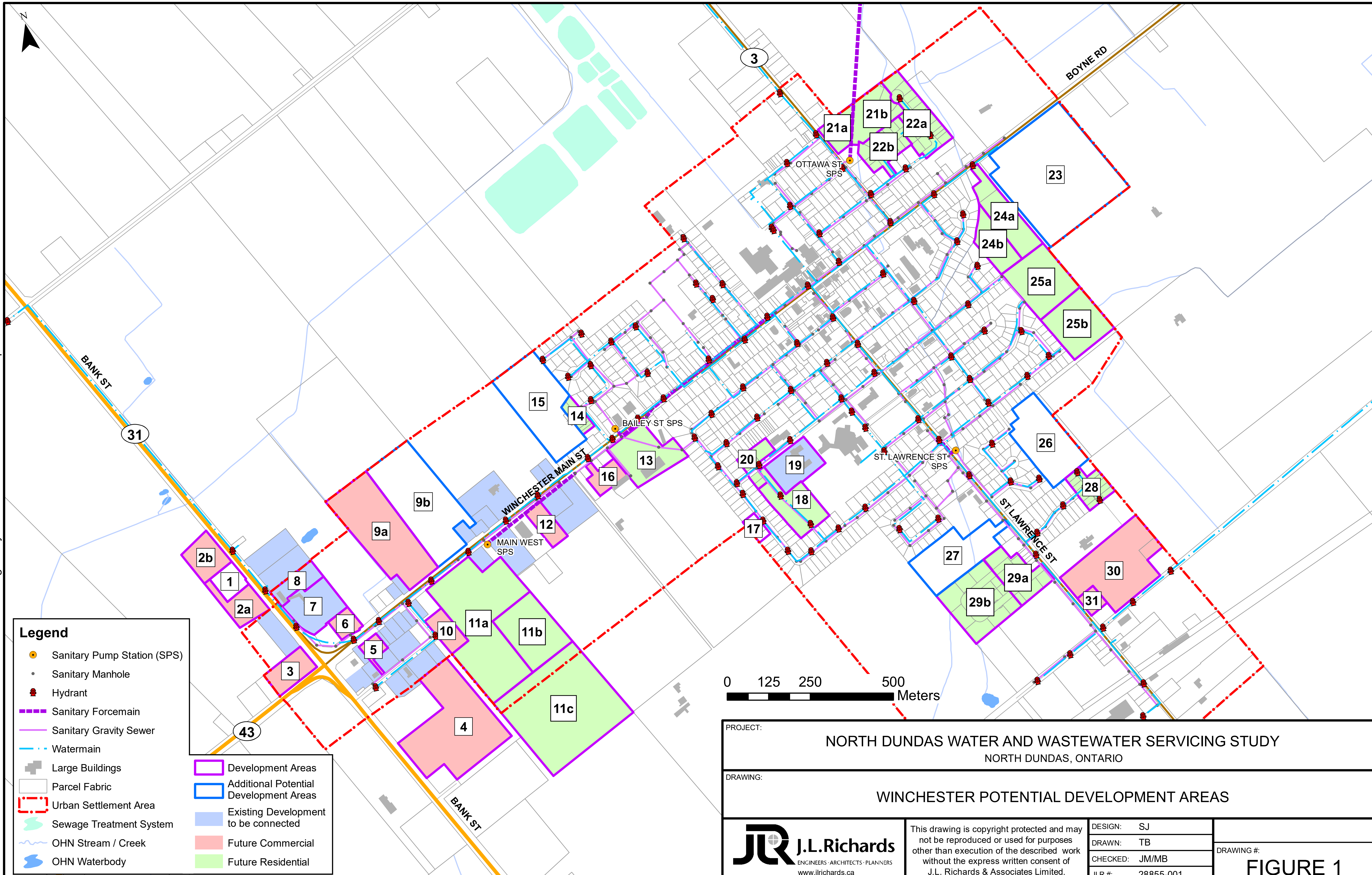
File Location: P:\28000\28855-000 - North Dundas Municipal Class EA\5-Production\1-Civil\28855 DevelopmentAreas.mxd

Plot Date: Friday, February 14, 2020 2:10:30 PM

TABLE 1: WINCHESTER FUTURE POTENTIAL DEVELOPMENT [1]

Area	Description	Total Projected Units or Residents	Commercial Area	Phasing (Years)
				Near Term (1-5 Years), Mid-Term (5-10 Years), Long-Term (10-20 Years) or Build-Out (20+ Years)
A	Existing – Not Connected	28	-	10 – 20
1	Pioneer Gas Restaurant / Car Wash	Constructed	-	Connected
2A	Commercial #31 Strip	-	1.13 ha	5 – 10
2B	Commercial #31 Strip	-	1.22 ha	10 – 20
3	Commercial #43 / #31 corner	-	0.97 ha	5 – 10
4	Industrial/Commercial John Deere	-	6.17 ha	5 – 10
5	Commercial – Main Street South side	-	0.45 ha	1 - 5
6	Commercial – Main Street North side	(0.33 L/s)	0.20 ha	1 - 5
7	Motel	14	-	10 - 20
8	Restaurant – Country Kitchen	7	-	10 - 20
9A	Commercial/Residential	-	5.07 ha	10 - 20
9B	Commercial/Residential	-	5.53 ha	20+
10	Commercial	-	0.88 ha	1 - 5
11A	Wellings of Winchester (Phase 1 and Phase 2)	150	2.28 ha	1 - 5
11B	Wellings of Winchester (Phase 3)	86	-	5 – 10
11C	Wellings of Winchester (Phase 4 to Phase 5)	264 [2]	-	10 – 20
12	Commercial	-	0.80 ha	1 – 5
13	Residential Infill / Apartment in-houses	15	-	1 – 5
14	Winfields Subdivision	9	-	1 – 5
15	Residential – Winfields Phase 2	4.31 ha	-	20+
16	Commercial	-	0.75 ha	10 – 20
17	Residential	Connected	-	Connected
18	New Dundas Manor [3]	-	-	1 – 5
19	Old Dundas Manor Building and Property	-	1.19 ha	5 – 10
20	Guy Racine Subdivision (Phase 3)	8	-	1 – 5
21A	Seniors Complex	54 residents	-	10 – 20
21B	Development	36	-	1 – 5
22A	Winchester Meadows Subdivision	22	-	1 – 5
22B	Winchester Meadows Subdivision	22	-	5 – 10
23	Vacant Residential	9.80 ha	-	20+
24A	Woods Development	78	-	5 – 10
24B	High Density Apartments	21	-	1 - 5
25A	Woods Development	19	-	5 - 10
25B	Singles & Semis & Townhomes	36	-	10 - 20
26	Residential – Barnhart	3.36 ha	-	20+
27	Residential - M. Lafortune Investments	3.09 ha	-	20+
28A	Residential	2	-	1 – 5
28B	Wintonia Drive / James Street	10	-	1 – 5
29A	Residential	15	-	5 – 10
29B	Esper Lane	51	-	10 – 20
30	Commercial	-	4.34 ha	10 – 20
31	Commercial	-	0.40 ha	10 – 20
	Near Term (1-5 Years)	**273 Units + 0.33 L/s**	**4.61 ha**	**-**
	Mid-Term (5-10 Years)	**220 Units**	**9.46 ha**	**-**
	Long-Term (10-20 Years)	**400 Units + 54 Residents**	**11.78 ha**	**-**
	Buildout (20+ Years)	**20.56 ha**	**5.53 ha**	**-**

1. List of potential development areas and their associated types of land-use were provided by the Township.
2. Additional 30 units assumed for Phase 4 and Phase 5 for Wellings of Winchester (total number of units for Phase 1 to Phase 5 is 500).
3. The flow from the new Dundas Manor is anticipated to remain the same as the flow from existing Dundas Manor.



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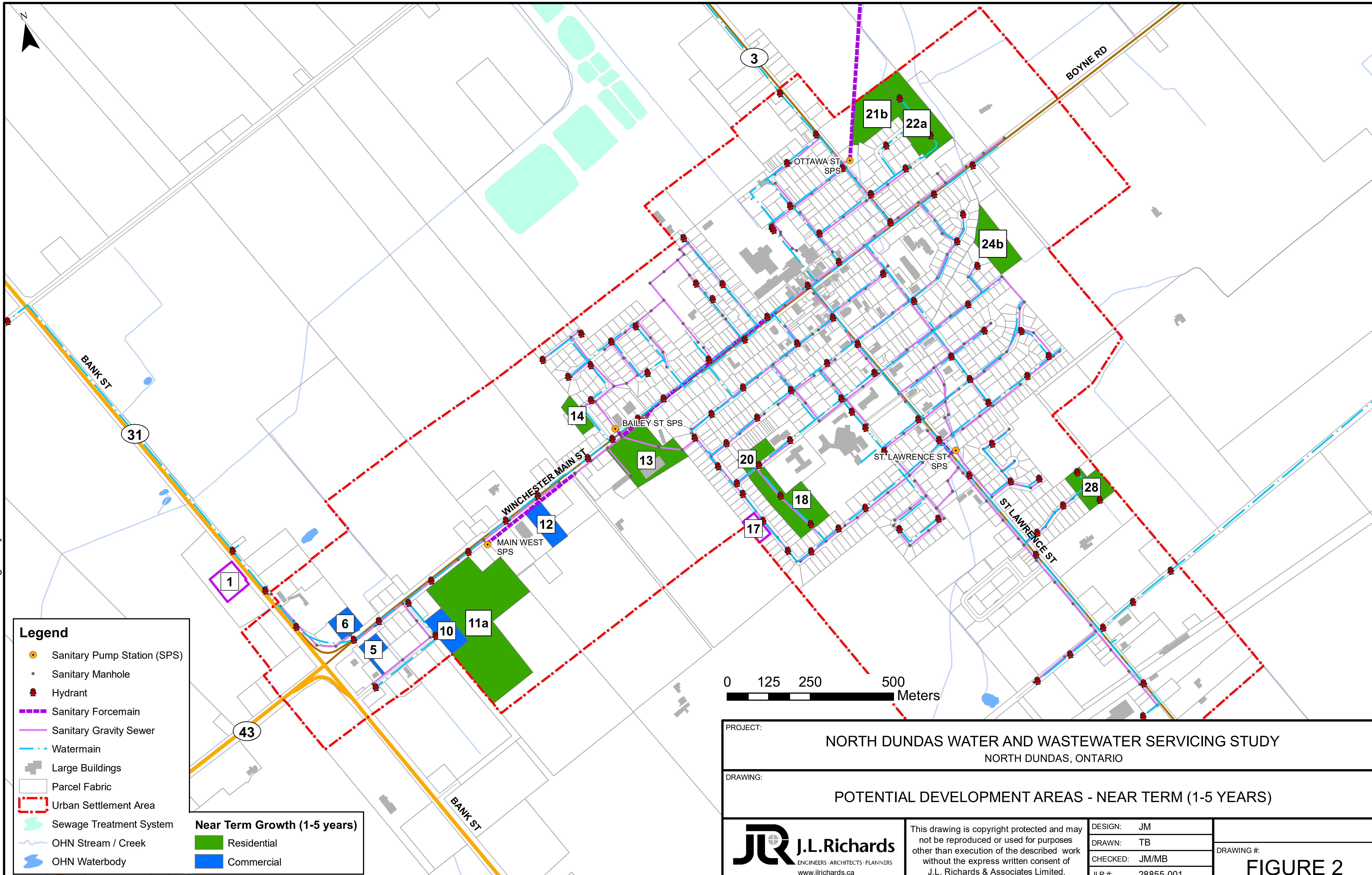

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY

NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - NEAR TERM (1-5 YEARS)

J.L.Richards

ENGINEERS · ARCHITECTS · PLANNERS

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DESIGN:	JM
DRAWN:	TB
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:

FIGURE 2

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 NearTerm.mxd

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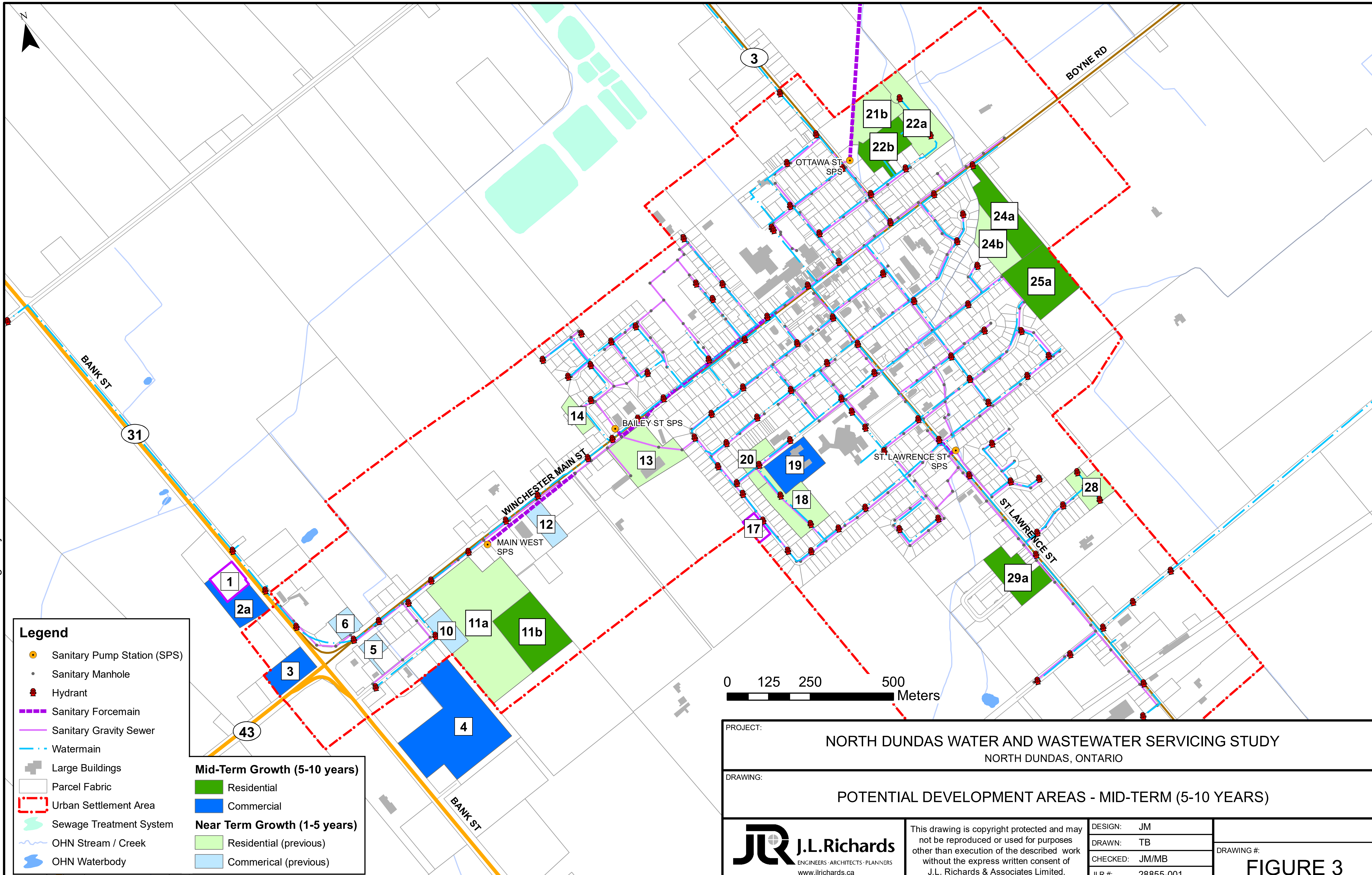

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - MID-TERM (5-10 YEARS)

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JLR #:	28855-001

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FIGURE 3

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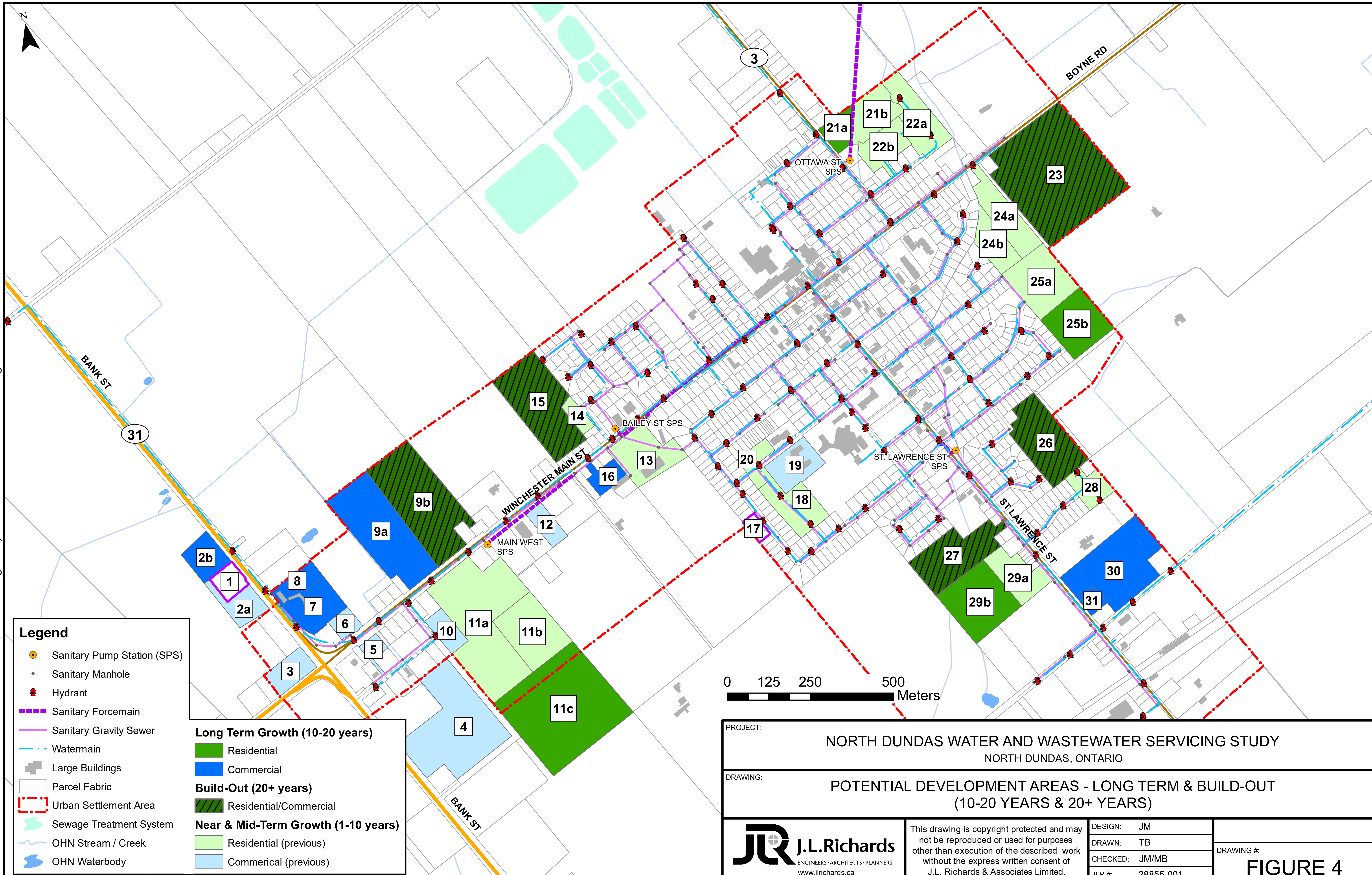

Legend

- Sanitary Pump Station (SPS)
- Sanitary Manhole
- Hydrant
- Sanitary Forcemain
- Sanitary Gravity Sewer
- Watermain
- Large Buildings
- Parcel Fabric
- Urban Settlement Area
- Sewage Treatment System
- OHN Stream / Creek
- OHN Waterbody

Long Term Growth (10-20 years)

- Residential
- Commercial

Build-Out (20+ years)

- Residential/Commercial

Near & Mid-Term Growth (1-10 years)

- Residential (previous)
- Commerical (previous)

PROJECT:

NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:

POTENTIAL DEVELOPMENT AREAS - LONG TERM & BUILD-OUT
(10-20 YEARS & 20+ YEARS)

J.L.Richards
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DESIGN:	JM
DRAWN:	TB
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 4

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 LongTerm.mxd

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Attachment 2

HYDRAULIC WATER MODEL SCHEMATICS

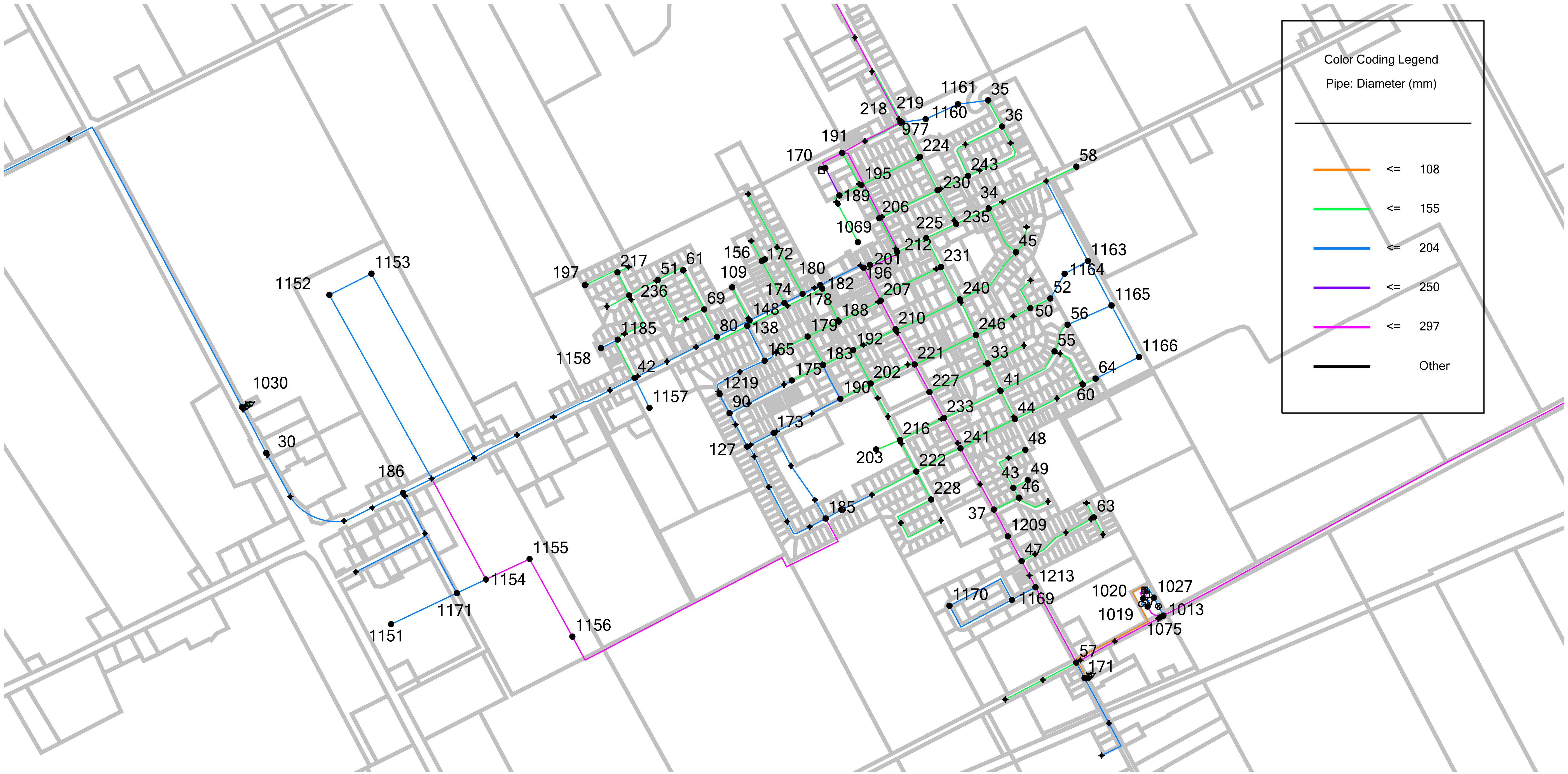
North Dundas Hydraulic Water Model Overall Schematic

North Dundas Hydraulic Water Model Schematic

Junction IDs

North Dundas Hydraulic Water Model Schematic

Winchester Junction IDs



North Dundas Hydraulic Water Model Schematic

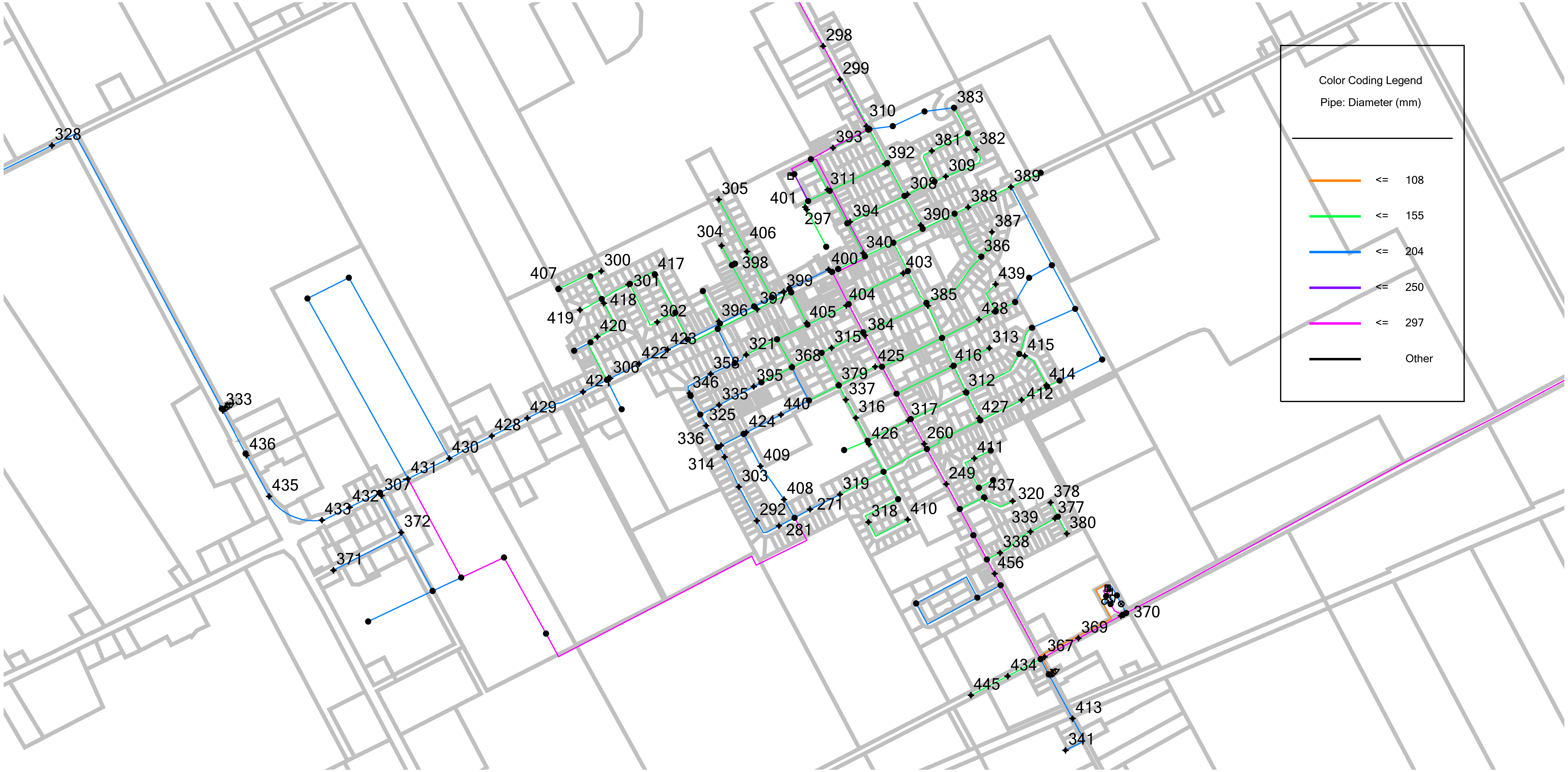
Chesterville Junction IDs

North Dundas Hydraulic Water Model Schematic

Hydrant IDs

North Dundas Hydraulic Water Model Schematic

Winchester Hydrant IDs



North Dundas Hydraulic Water Model Schematic

Chesterville Hydrant IDs

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
30	J-1	369	30	J-1	369	30	J-1	368	30	J-1	366	30	J-1	365
33	J-101	367	33	J-101	366	33	J-101	366	33	J-101	365	33	J-101	364
34	J-102	365	34	J-102	365	34	J-102	365	34	J-102	364	34	J-102	363
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42	J-11	360	42	J-11	359	42	J-11	359	42	J-11	357	42	J-11	356
43	J-111	367	43	J-111	367	43	J-111	367	43	J-111	366	43	J-111	365
44	J-112	348	44	J-112	347	44	J-112	347	44	J-112	346	44	J-112	345
45	J-113	371	45	J-113	371	45	J-113	371	45	J-113	370	45	J-113	369
46	J-114	364	46	J-114	364	46	J-114	364	46	J-114	363	46	J-114	362
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113	J-187	366	113	J-187	365	113	J-187	364	113	J-187	360	113	J-187	360
114	J-188	366	114	J-188	365	114	J-188	364	114	J-188	360	114	J-188	360
115	J-189	373	115	J-189	372	115	J-189	370	115	J-189	366	115	J-189	366
117	J-191	377	117	J-191	376	117	J-191	374	117	J-191	370	117	J-191	370
118	J-192	372	118	J-192	371	118	J-192	369	118	J-192	365	118	J-192	365
119	J-193	382	119	J-193	380	119	J-193	379	119	J-193	375	119	J-193	375
120	J-194	394	120	J-194	393	120	J-194	391	120	J-194	388	120	J-194	388
121	J-195	371	121	J-195	370	121	J-195	368	121	J-195	365	121	J-195	365
125	J-199	378	125	J-199	376	125	J-199	375	125	J-199	371	125	J-199	371
127	J-20	352	127	J-20	352	127	J-20	351	127	J-20	350	127	J-20	349
128	J-200	374	128	J-200	373	128	J-200	371	128	J-200	367	128	J-200	367
132	J-204	379	132	J-204	378	132	J-204	376	132	J-204	373	132	J-204	373
133	J-205	368	133	J-205	366	133	J-205	365	133	J-205	361	133	J-205	361
135	J-207	375	135	J-207	373	135	J-207	372	135	J-207	368	135	J-207	368

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
136	J-208	392	136	J-208	390	136	J-208	389	136	J-208	385	136	J-208	385
137	J-209	371	137	J-209	369	137	J-209	368	137	J-209	364	137	J-209	364
138	J-21	331	138	J-21	331	138	J-21	330	138	J-21	329	138	J-21	328
139	J-210	380	139	J-210	379	139	J-210	377	139	J-210	373	139	J-210	373
145	J-217	397	145	J-217	396	145	J-217	394	145	J-217	391	145	J-217	391
147	J-219	399	147	J-219	398	147	J-219	396	147	J-219	392	147	J-219	392
148	J-22	331	148	J-22	331	148	J-22	330	148	J-22	329	148	J-22	328
150	J-222	381	150	J-222	379	150	J-222	378	150	J-222	374	150	J-222	374
151	J-225	385	151	J-225	383	151	J-225	382	151	J-225	378	151	J-225	378
152	J-226	383	152	J-226	382	152	J-226	380	152	J-226	376	152	J-226	376
153	J-227	382	153	J-227	381	153	J-227	379	153	J-227	375	153	J-227	375
154	J-228	385	154	J-228	383	154	J-228	382	154	J-228	378	154	J-228	378
156	J-23	320	156	J-23	319	156	J-23	319	156	J-23	318	156	J-23	317
157	J-230	385	157	J-230	384	157	J-230	382	157	J-230	378	157	J-230	378
158	J-231	379	158	J-231	378	158	J-231	376	158	J-231	372	158	J-231	372
159	J-232	386	159	J-232	385	159	J-232	384	159	J-232	380	159	J-232	380
161	J-234	376	161	J-234	374	161	J-234	373	161	J-234	369	161	J-234	369
162	J-235	376	162	J-235	374	162	J-235	373	162	J-235	369	162	J-235	369
164	J-239	373	164	J-239	372	164	J-239	370	164	J-239	366	164	J-239	366
165	J-24	333	165	J-24	332	165	J-24	332	165	J-24	331	165	J-24	330
166	J-240	394	166	J-240	393	166	J-240	392	166	J-240	388	166	J-240	388
168	J-242	374	168	J-242	372	168	J-242	371	168	J-242	367	168	J-242	367
169	J-243	378	169	J-243	377	169	J-243	375	169	J-243	371	169	J-243	371
170	J-244	338	170	J-244	338	170	J-244	338	170	J-244	338	170	J-244	338
171	J-245	351	171	J-245	351	171	J-245	351	171	J-245	350	171	J-245	349
172	J-25	320	172	J-25	319	172	J-25	319	172	J-25	318	172	J-25	317
173	J-26	352	173	J-26	351	173	J-26	351	173	J-26	349	173	J-26	348
174	J-27	315	174	J-27	314	174	J-27	314	174	J-27	313	174	J-27	312
175	J-28	343	175	J-28	342	175	J-28	342	175	J-28	341	175	J-28	339
178	J-30	314	178	J-30	313	178	J-30	313	178	J-30	312	178	J-30	311
179	J-31	326	179	J-31	325	179	J-31	325	179	J-31	324	179	J-31	323
180	J-34	315	180	J-34	315	180	J-34	314	180	J-34	313	180	J-34	312
182	J-36	315	182	J-36	315	182	J-36	314	182	J-36	313	182	J-36	312
183	J-37	339	183	J-37	338	183	J-37	338	183	J-37	336	183	J-37	335
185	J-39	351	185	J-39	351	185	J-39	350	185	J-39	349	185	J-39	348
186	J-4	368	186	J-4	367	186	J-4	366	186	J-4	364	186	J-4	363
188	J-41	319	188	J-41	319	188	J-41	318	188	J-41	317	188	J-41	316
189	J-42	322	189	J-42	322	189	J-42	322	189	J-42	321	189	J-42	321
190	J-43	344	190	J-43	344	190	J-43	343	190	J-43	342	190	J-43	341
191	J-44	339	191	J-44	339	191	J-44	339	191	J-44	339	191	J-44	339
192	J-45	325	192	J-45	324	192	J-45	324	192	J-45	323	192	J-45	322
195	J-48	325	195	J-48	324	195	J-48	324	195	J-48	324	195	J-48	324
196	J-49	312	196	J-49	312	196	J-49	312	196	J-49	311	196	J-49	310
197	J-5	379	197	J-5	379	197	J-5	378	197	J-5	377	197	J-5	375
201	J-53	315	201	J-53	314	201	J-53	314	201	J-53	313	201	J-53	312
202	J-54	338	202	J-54	338	202	J-54	338	202	J-54	337	202	J-54	336
203	J-55	342	203	J-55	341	203	J-55	341	203	J-55	340	203	J-55	339
206	J-58	327	206	J-58	327	206	J-58	327	206	J-58	326	206	J-58	326
207	J-59	317	207	J-59	317	207	J-59	316	207	J-59	315	207	J-59	315
210	J-62	332	210	J-62	332	210	J-62	332	210	J-62	331	210	J-62	330
212	J-65	332	212	J-65	332	212	J-65	331	212	J-65	330	212	J-65	330
216	J-69	345	216	J-69	345	216	J-69	345	216	J-69	344	216	J-69	343
217	J-7	378	217	J-7	377	217	J-7	377	217	J-7	375	217	J-7	374
218	J-70	356	218	J-70	356	218	J-70	356	218	J-70	355	218	J-70	355
219	J-72	356	219	J-72	356	219	J-72	355	219	J-72	355	219	J-72	355
221	J-74	349	221	J-74	349	221	J-74	348	221	J-74	347	221	J-74	346
222	J-75	353	222	J-75	352	222	J-75	352	222	J-75	351	222	J-75	350
224	J-78	359	224	J-78	359	224	J-78	359	224	J-78	359	224	J-78	359
225	J-79	367	225	J-79	367	225	J-79	366	225	J-79	366	225	J-79	365
227	J-80	360	227	J-80	359	227	J-80	359	227	J-80	358	227	J-80	357
228	J-81	365	228	J-81	365	228	J-81	365	228	J-81	363	228	J-81	363
230	J-83	378	230	J-83	378	230	J-83	378	230	J-83	377	230	J-83	377
231	J-84	375	231	J-84	375	231	J-84	374	231	J-84	373	231	J-84	373
233	J-87	362	233	J-87	362	233	J-87	362	233	J-87	361	233	J-87	360
235	J-89	364	235	J-89	364	235	J-89	364	235	J-89	363	235	J-89	362
236	J-9	376	236	J-9	376	236	J-9	375	236	J-9	374	236	J-9	372
240	J-93	378	240	J-93	377	240	J-93	377	240	J-93	376	240	J-93	375
241	J-94	370	241	J-94	370	241	J-94	370	241	J-94	369	241	J-94	368
243	J-96	364	243	J-96	364	243	J-96	363	243	J-96	363	243	J-96	363
246	J-99	382	246	J-99	382	246	J-99	381	246	J-99	380	246	J-99	379
248	H-1	366	248	H-1	365	248	H-1	364	248	H-1	360	248	H-1	360
249	H-10	375	249	H-10	375	249	H-10	375	249	H-10	374	249	H-10	373
250	H-100	377	250	H-100	376	250	H-100	374	250	H-100	370	250	H-100	370
251	H-101	374	251	H-101	373	251	H-101	371	251	H-101	367	251	H-101	367
252	H-102	418	252	H-102	416	252	H-102	415	252	H-102	411	252	H-102	411
253	H-103	393	253	H-103	391	253	H-103	390	253	H-103	386	253	H-103	386

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
254	H-104	370	254	H-104	368	254	H-104	367	254	H-104	363	254	H-104	363
255	H-105	380	255	H-105	378	255	H-105	377	255	H-105	373	255	H-105	373
256	H-106	372	256	H-106	371	256	H-106	369	256	H-106	365	256	H-106	365
257	H-107	388	257	H-107	386	257	H-107	385	257	H-107	381	257	H-107	381
258	H-108	369	258	H-108	368	258	H-108	366	258	H-108	362	258	H-108	362
259	H-109	361	259	H-109	360	259	H-109	358	259	H-109	354	259	H-109	354
260	H-11	370	260	H-11	370	260	H-11	370	260	H-11	369	260	H-11	368
261	H-110	360	261	H-110	359	261	H-110	357	261	H-110	353	261	H-110	353
262	H-111	373	262	H-111	372	262	H-111	370	262	H-111	366	262	H-111	366
263	H-112	375	263	H-112	373	263	H-112	372	263	H-112	368	263	H-112	368
264	H-113	377	264	H-113	375	264	H-113	374	264	H-113	370	264	H-113	370
265	H-114	370	265	H-114	368	265	H-114	367	265	H-114	363	265	H-114	363
266	H-115	372	266	H-115	370	266	H-115	369	266	H-115	365	266	H-115	365
267	H-116	375	267	H-116	374	267	H-116	372	267	H-116	368	267	H-116	368
268	H-117	374	268	H-117	373	268	H-117	371	268	H-117	367	268	H-117	367
269	H-118	381	269	H-118	380	269	H-118	378	269	H-118	374	269	H-118	374
270	H-119	380	270	H-119	379	270	H-119	377	270	H-119	373	270	H-119	373
271	H-12	352	271	H-12	352	271	H-12	351	271	H-12	350	271	H-12	349
272	H-120	373	272	H-120	372	272	H-120	370	272	H-120	366	272	H-120	366
273	H-121	373	273	H-121	372	273	H-121	370	273	H-121	366	273	H-121	366
274	H-122	374	274	H-122	373	274	H-122	371	274	H-122	368	274	H-122	368
275	H-123	381	275	H-123	379	275	H-123	378	275	H-123	374	275	H-123	374
276	H-124	392	276	H-124	390	276	H-124	389	276	H-124	385	276	H-124	385
277	H-125	383	277	H-125	382	277	H-125	380	277	H-125	376	277	H-125	376
278	H-126	380	278	H-126	379	278	H-126	377	278	H-126	373	278	H-126	373
279	H-128	377	279	H-128	375	279	H-128	374	279	H-128	370	279	H-128	370
280	H-129	396	280	H-129	394	280	H-129	393	280	H-129	389	280	H-129	389
281	H-13	352	281	H-13	351	281	H-13	351	281	H-13	349	281	H-13	348
282	H-130	387	282	H-130	386	282	H-130	384	282	H-130	380	282	H-130	380
283	H-131	353	283	H-131	352	283	H-131	351	283	H-131	349	283	H-131	349
284	H-132	365	284	H-132	365	284	H-132	364	284	H-132	362	284	H-132	362
285	H-133	354	285	H-133	353	285	H-133	352	285	H-133	350	285	H-133	350
286	H-134	357	286	H-134	356	286	H-134	355	286	H-134	353	286	H-134	353
287	H-135	362	287	H-135	361	287	H-135	361	287	H-135	358	287	H-135	358
288	H-136	376	288	H-136	375	288	H-136	373	288	H-136	370	288	H-136	370
289	H-137	380	289	H-137	379	289	H-137	377	289	H-137	374	289	H-137	374
290	H-138	372	290	H-138	371	290	H-138	370	290	H-138	366	290	H-138	366
291	H-139	367	291	H-139	366	291	H-139	364	291	H-139	361	291	H-139	361
292	H-14	344	292	H-14	343	292	H-14	343	292	H-14	342	292	H-14	340
293	H-140	368	293	H-140	366	293	H-140	365	293	H-140	361	293	H-140	361
294	H-141	371	294	H-141	370	294	H-141	368	294	H-141	365	294	H-141	365
295	H-142	373	295	H-142	371	295	H-142	370	295	H-142	366	295	H-142	366
296	H-143	387	296	H-143	386	296	H-143	385	296	H-143	381	296	H-143	381
297	H-144	316	297	H-144	315	297	H-144	315	297	H-144	315	297	H-144	315
298	H-145	344	298	H-145	344	298	H-145	344	298	H-145	343	298	H-145	343
299	H-146	349	299	H-146	349	299	H-146	349	299	H-146	348	299	H-146	348
300	H-147	377	300	H-147	377	300	H-147	376	300	H-147	375	300	H-147	373
301	H-148	371	301	H-148	370	301	H-148	370	301	H-148	368	301	H-148	367
302	H-149	362	302	H-149	362	302	H-149	361	302	H-149	360	302	H-149	359
303	H-15	342	303	H-15	341	303	H-15	341	303	H-15	339	303	H-15	338
304	H-150	323	304	H-150	323	304	H-150	323	304	H-150	321	304	H-150	320
305	H-151	333	305	H-151	333	305	H-151	333	305	H-151	331	305	H-151	331
306	H-152	360	306	H-152	359	306	H-152	359	306	H-152	357	306	H-152	356
307	H-153	367	307	H-153	367	307	H-153	366	307	H-153	364	307	H-153	362
308	H-154	370	308	H-154	370	308	H-154	369	308	H-154	369	308	H-154	369
309	H-155	363	309	H-155	363	309	H-155	363	309	H-155	363	309	H-155	362
310	H-156	356	310	H-156	356	310	H-156	356	310	H-156	355	310	H-156	355
311	H-157	325	311	H-157	324	311	H-157	324	311	H-157	324	311	H-157	324
312	H-158	362	312	H-158	361	312	H-158	361	312	H-158	360	312	H-158	359
313	H-159	362	313	H-159	361	313	H-159	361	313	H-159	360	313	H-159	359
314	H-16	350	314	H-16	349	314	H-16	349	314	H-16	347	314	H-16	346
315	H-160	319	315	H-160	318	315	H-160	318	315	H-160	317	315	H-160	316
316	H-161	332	316	H-161	331	316	H-161	331	316	H-161	330	316	H-161	329
317	H-162	362	317	H-162	362	317	H-162	362	317	H-162	361	317	H-162	360
318	H-163	366	318	H-163	366	318	H-163	366	318	H-163	364	318	H-163	363
319	H-164	346	319	H-164	345	319	H-164	345	319	H-164	343	319	H-164	342
320	H-165	356	320	H-165	356	320	H-165	356	320	H-165	355	320	H-165	354
321	H-166	332	321	H-166	332	321	H-166	331	321	H-166	330	321	H-166	329
322	H-167	377	322	H-167	375	322	H-167	374	322	H-167	370	322	H-167	370
323	H-168	382	323	H-168	381	323	H-168	379	323	H-168	375	323	H-168	375
324	H-169	385	324	H-169	383	324	H-169	382	324	H-169	378	324	H-169	378
325	H-17	356	325	H-17	355	325	H-17	355	325	H-17	353	325	H-17	352
326	H-170	370	326	H-170	369	326	H-170	368	326	H-170	364	326	H-170	364
327	H-171	379	327	H-171	378	327	H-171	376	327	H-171	372	327	H-171	372
328	H-172	362	328	H-172	362	328	H-172	361	328	H-172	359	328	H-172	358
329	H-173	319	329	H-173	319	329	H-173	318	329	H-173	316	329	H-173	315

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
330	H-174	268	330	H-174	267	330	H-174	266	330	H-174	264	330	H-174	263
331	H-175	325	331	H-175	324	331	H-175	323	331	H-175	321	331	H-175	320
333	H-177	368	333	H-177	368	333	H-177	367	333	H-177	365	333	H-177	364
334	H-178	366	334	H-178	366	334	H-178	366	334	H-178	366	334	H-178	365
335	H-18	353	335	H-18	352	335	H-18	352	335	H-18	351	335	H-18	350
336	H-180	352	336	H-180	352	336	H-180	351	336	H-180	350	336	H-180	349
337	H-181	339	337	H-181	339	337	H-181	338	337	H-181	337	337	H-181	336
338	H-182	360	338	H-182	359	338	H-182	359	338	H-182	358	338	H-182	357
339	H-183	345	339	H-183	345	339	H-183	345	339	H-183	344	339	H-183	343
340	H-184	336	340	H-184	336	340	H-184	336	340	H-184	335	340	H-184	334
341	H-185	355	341	H-185	355	341	H-185	355	341	H-185	354	341	H-185	353
342	H-186	323	342	H-186	323	342	H-186	323	342	H-186	323	342	H-186	322
343	H-187	368	343	H-187	368	343	H-187	368	343	H-187	368	343	H-187	368
344	H-188	294	344	H-188	294	344	H-188	294	344	H-188	293	344	H-188	293
345	H-189	353	345	H-189	352	345	H-189	352	345	H-189	352	345	H-189	352
346	H-19	357	346	H-19	356	346	H-19	356	346	H-19	355	346	H-19	353
347	H-190	341	347	H-190	341	347	H-190	341	347	H-190	341	347	H-190	341
348	H-191	378	348	H-191	378	348	H-191	378	348	H-191	378	348	H-191	378
349	H-192	372	349	H-192	372	349	H-192	372	349	H-192	372	349	H-192	371
350	H-193	311	350	H-193	311	350	H-193	310	350	H-193	310	350	H-193	310
351	H-194	248	351	H-194	248	351	H-194	248	351	H-194	248	351	H-194	248
352	H-195	293	352	H-195	293	352	H-195	293	352	H-195	293	352	H-195	293
353	H-196	342	353	H-196	342	353	H-196	342	353	H-196	341	353	H-196	341
354	H-197	384	354	H-197	384	354	H-197	384	354	H-197	383	354	H-197	383
355	H-198	392	355	H-198	392	355	H-198	391	355	H-198	391	355	H-198	391
356	H-199	340	356	H-199	340	356	H-199	340	356	H-199	340	356	H-199	340
357	H-2	366	357	H-2	365	357	H-2	364	357	H-2	360	357	H-2	360
358	H-20	343	358	H-20	343	358	H-20	342	358	H-20	341	358	H-20	340
359	H-200	315	359	H-200	315	359	H-200	315	359	H-200	314	359	H-200	314
360	H-201	391	360	H-201	391	360	H-201	391	360	H-201	391	360	H-201	390
361	H-202	364	361	H-202	363	361	H-202	363	361	H-202	363	361	H-202	363
362	H-203	365	362	H-203	363	362	H-203	362	362	H-203	358	362	H-203	358
363	H-204	370	363	H-204	369	363	H-204	367	363	H-204	363	363	H-204	363
364	H-205	372	364	H-205	371	364	H-205	369	364	H-205	365	364	H-205	365
365	H-207	401	365	H-207	401	365	H-207	401	365	H-207	401	365	H-207	401
366	H-208	402	366	H-208	402	366	H-208	402	366	H-208	402	366	H-208	401
367	H-209	354	367	H-209	354	367	H-209	354	367	H-209	353	367	H-209	352
368	H-21	339	368	H-21	338	368	H-21	338	368	H-21	336	368	H-21	335
369	H-210	357	369	H-210	357	369	H-210	357	369	H-210	356	369	H-210	355
370	H-211	369	370	H-211	368	370	H-211	368	370	H-211	367	370	H-211	366
371	H-212	358	371	H-212	357	371	H-212	357	371	H-212	355	371	H-212	353
372	H-213	362	372	H-213	361	372	H-213	361	372	H-213	359	372	H-213	357
373	H-214	399	373	H-214	398	373	H-214	396	373	H-214	392	373	H-214	392
374	H-215	395	374	H-215	394	374	H-215	392	374	H-215	388	374	H-215	388
375	H-216	384	375	H-216	382	375	H-216	381	375	H-216	377	375	H-216	377
376	H-217	369	376	H-217	367	376	H-217	366	376	H-217	362	376	H-217	362
377	H-218	352	377	H-218	351	377	H-218	351	377	H-218	350	377	H-218	349
378	H-219	350	378	H-219	350	378	H-219	350	378	H-219	349	378	H-219	348
379	H-22	338	379	H-22	338	379	H-22	338	379	H-22	337	379	H-22	336
380	H-220	356	380	H-220	355	380	H-220	355	380	H-220	354	380	H-220	353
381	H-221	370	381	H-221	369	381	H-221	369	381	H-221	369	381	H-221	369
382	H-222	378	382	H-222	378	382	H-222	378	382	H-222	377	382	H-222	377
383	H-223	375	383	H-223	375	383	H-223	375	383	H-223	375	383	H-223	374
384	H-23	333	384	H-23	333	384	H-23	333	384	H-23	332	384	H-23	331
385	H-24	378	385	H-24	377	385	H-24	377	385	H-24	376	385	H-24	375
386	H-25	371	386	H-25	371	386	H-25	371	386	H-25	370	386	H-25	369
387	H-26	376	387	H-26	376	387	H-26	375	387	H-26	374	387	H-26	374
388	H-27	367	388	H-27	367	388	H-27	367	388	H-27	366	388	H-27	365
389	H-28	377	389	H-28	377	389	H-28	377	389	H-28	376	389	H-28	375
390	H-29	368	390	H-29	368	390	H-29	367	390	H-29	366	390	H-29	366
391	H-3	377	391	H-3	376	391	H-3	374	391	H-3	370	391	H-3	370
392	H-30	359	392	H-30	359	392	H-30	359	392	H-30	359	392	H-30	359
393	H-31	336	393	H-31	336	393	H-31	336	393	H-31	336	393	H-31	335
394	H-32	327	394	H-32	327	394	H-32	327	394	H-32	326	394	H-32	326
395	H-33	343	395	H-33	342	395	H-33	342	395	H-33	341	395	H-33	339
396	H-34	328	396	H-34	327	396	H-34	327	396	H-34	325	396	H-34	324
397	H-35	318	397	H-35	318	397	H-35	318	397	H-35	316	397	H-35	315
398	H-36	320	398	H-36	319	398	H-36	319	398	H-36	318	398	H-36	317
399	H-37	314	399	H-37	314	399	H-37	314	399	H-37	313	399	H-37	312
400	H-38	312	400	H-38	312	400	H-38	311	400	H-38	311	400	H-38	310
401	H-39	317	401	H-39	317	401	H-39	317	401	H-39	316	401	H-39	316
402	H-4	341	402	H-4	340	402	H-4	339	402	H-4	337	402	H-4	337
403	H-40	369	403	H-40	368	403	H-40	368	403	H-40	367	403	H-40	366
404	H-41	317	404	H-41	317	404	H-41	316	404	H-41	315	404	H-41	315
405	H-42	319	405	H-42	319	405	H-42	318	405	H-42	317	405	H-42	316
406	H-43	317	406	H-43	317	406	H-43	316	406	H-43	315	406	H-43	314

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING

ID	Label	Pressure
407	H-44	379
408	H-45	347
409	H-46	345
410	H-47	376
411	H-48	366
412	H-49	344
413	H-5	350
414	H-50	354
415	H-51	363
416	H-52	367
417	H-53	368
418	H-54	376
419	H-55	377
420	H-56	371
421	H-57	362
422	H-58	360
423	H-59	357
424	H-60	353
425	H-61	349
426	H-62	347
427	H-63	348
428	H-64	368
429	H-65	366
430	H-66	365
431	H-67	363
432	H-68	369
433	H-69	362
434	H-7	366
435	H-70	364
436	H-71	369
437	H-72	365
438	H-73	365
439	H-74	369
440	H-75	349
441	H-76	398
442	H-77	299
443	H-78	303
444	H-79	364
445	H-8	370
446	H-80	364
447	H-81	359
448	H-82	366
449	H-83	363
450	H-84	341
451	H-85	369
452	H-86	373
453	H-87	377
454	H-88	371
455	H-89	329
456	H-9	362
457	H-90	330
458	H-91	340
459	H-92	374
460	H-93	382
461	H-94	394
462	H-95	380
463	H-96	383
464	H-97	379
465	H-98	379
466	H-99	381
977	J-246	356
982	J-247	367
983	J-248	367
1019	J-254	369
1030	J-257	368
1036	J-258	325
1050	J-260	323
1066	J-262	396
1069	J-263	304
1075	J-264	369
1185	J-288	368
1209	J-290	365
1213	J-291	361
1219	J-292	357

NEAR TERM

ID	Label	Pressure
407	H-44	379
408	H-45	347
409	H-46	345
410	H-47	375
411	H-48	365
412	H-49	344
413	H-5	350
414	H-50	353
415	H-51	362
416	H-52	366
417	H-53	368
418	H-54	376
419	H-55	376
420	H-56	371
421	H-57	362
422	H-58	359
423	H-59	356
424	H-60	352
425	H-61	349
426	H-62	347
427	H-63	347
428	H-64	367
429	H-65	365
430	H-66	365
431	H-67	362
432	H-68	368
433	H-69	361
434	H-7	366
435	H-70	363
436	H-71	369
437	H-72	365
438	H-73	364
439	H-74	368
440	H-75	349
441	H-76	397
442	H-77	298
443	H-78	303
444	H-79	363
445	H-8	369
446	H-80	363
447	H-81	358
448	H-82	365
449	H-83	361
450	H-84	340
451	H-85	368
452	H-86	372
453	H-87	376
454	H-88	370
455	H-89	329
456	H-9	362
457	H-90	330
458	H-91	340
459	H-92	373
460	H-93	380
461	H-94	393
462	H-95	379
463	H-96	382
464	H-97	378
465	H-98	377
466	H-99	380
977	J-246	356
982	J-247	365
983	J-248	365
1019	J-254	368
1030	J-257	368
1036	J-258	324
1050	J-260	323
1066	J-262	395
1069	J-263	300
1075	J-264	368
1154	J-270	343
1155	J-271	333
1156	J-272	333
1157	J-273	372
1158	J-274	382
1160	J-276	403

MID TERM

ID	Label	Pressure
407	H-44	378
408	H-45	346
409	H-46	344
410	H-47	375
411	H-48	365
412	H-49	344
413	H-5	350
414	H-50	353
415	H-51	362
416	H-52	366
417	H-53	367
418	H-54	375
419	H-55	376
420	H-56	370
421	H-57	361
422	H-58	359
423	H-59	356
424	H-60	352
425	H-61	348
426	H-62	346
427	H-63	347
428	H-64	366
429	H-65	365
430	H-66	364
431	H-67	362
432	H-68	367
433	H-69	361
434	H-7	366
435	H-70	363
436	H-71	368
437	H-72	365
438	H-73	364
439	H-74	368
440	H-75	348
441	H-76	395
442	H-77	298
443	H-78	302
444	H-79	361
445	H-8	369
446	H-80	361
447	H-81	356
448	H-82	363
449	H-83	360
450	H-84	338
451	H-85	366
452	H-86	370
453	H-87	374
454	H-88	368
455	H-89	328
456	H-9	362
457	H-90	329
458	H-91	340
459	H-92	371
460	H-93	379
461	H-94	391
462	H-95	377
463	H-96	380
464	H-97	376
465	H-98	376
466	H-99	378
977	J-246	356
982	J-247	364
983	J-248	364
1019	J-254	368
1030	J-257	367
1036	J-258	323
1050	J-260	323
1066	J-262	393
1069	J-263	300
1075	J-264	368
1151	J-267	347
1154	J-270	342
1155	J-271	332
1156	J-272	332
1157	J-273	372
1158	J-274	382

LONG TERM

ID	Label	Pressure
407	H-44	377
408	H-45	345
409	H-46	343
410	H-47	374
411	H-48	364
412	H-49	343
413	H-5	348
414	H-50	352
415	H-51	361
416	H-52	365
417	H-53	366
418	H-54	374
419	H-55	374
420	H-56	369
421	H-57	360
422	H-58	358
423	H-59	354
424	H-60	350
425	H-61	347
426	H-62	345
427	H-63	346
428	H-64	364
429	H-65	363
430	H-66	362
431	H-67	360
432	H-68	365
433	H-69	359
434	H-7	365
435	H-70	361
436	H-71	366
437	H-72	363
438	H-73	363
439	H-74	367
440	H-75	347
441	H-76	392
442	H-77	297
443	H-78	301
444	H-79	357
445	H-8	368
446	H-80	357
447	H-81	352
448	H-82	359
449	H-83	356
450	H-84	334
451	H-85	362
452	H-86	367
453	H-87	371
454	H-88	365
455	H-89	326
456	H-9	361
457	H-90	328
458	H-91	338
459	H-92	368
460	H-93	375
461	H-94	387
462	H-95	373
463	H-96	376
464	H-97	372
465	H-98	372
466	H-99	375
977	J-246	355
982	J-247	360
983	J-248	360
1019	J-254	367
1030	J-257	365
1036	J-258	321
1050	J-260	323
1066	J-262	389
1069	J-263	300
1075	J-264	367
1151	J-267	345
1152	J-268	389
1153	J-269	389
1154	J-270	340
1155	J-271	331
1156	J-272	331

BUILD OUT

ID	Label	Pressure
407	H-44	375
408	H-45	344
409	H-46	342
410	H-47	373
411	H-48	363
412	H-49	342
413	H-5	347
414	H-50	351
415	H-51	360
416	H-52	364
417	H-53	364
418	H-54	372
419	H-55	373
420	H-56	367
421	H-57	358
422	H-58	356
423	H-59	353
424	H-60	349
425	H-61	346
426	H-62	344
427	H-63	345
428	H-64	363
429	H-65	362
430	H-66	361
431	H-67	358
432	H-68	364
433	H-69	357
434	H-7	364
435	H-70	359
436	H-71	365
437	H-72	362
438	H-73	362
439	H-74	366
440	H-75	346
441	H-76	392
442	H-77	297
443	H-78	301
444	H-79	357
445	H-8	367
446	H-80	357
447	H-81	352
448	H-82	359
449	H-83	356
450	H-84	334
451	H-85	362
452	H-86	367
453	H-87	371
454	H-88	365
455	H-89	326
456	H-9	360
457	H-90	328
458	H-91	338
459	H-92	368
460	H-93	375
461	H-94	387
462	H-95	373
463	H-96	376
464	H-97	372
465	H-98	372
466	H-99	375
977	J-246	355
982	J-247	360
983	J-248	360
1019	J-254	366
1030	J-257	364
1036	J-258	320
1050	J-260	322
1066	J-262	389
1069	J-263	299
1075	J-264	366
1151	J-267	344
1152	J-268	388
1153	J-269	388
1154	J-270	339
1155	J-271	329
1156	J-272	329

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING		
ID	Label	Pressure

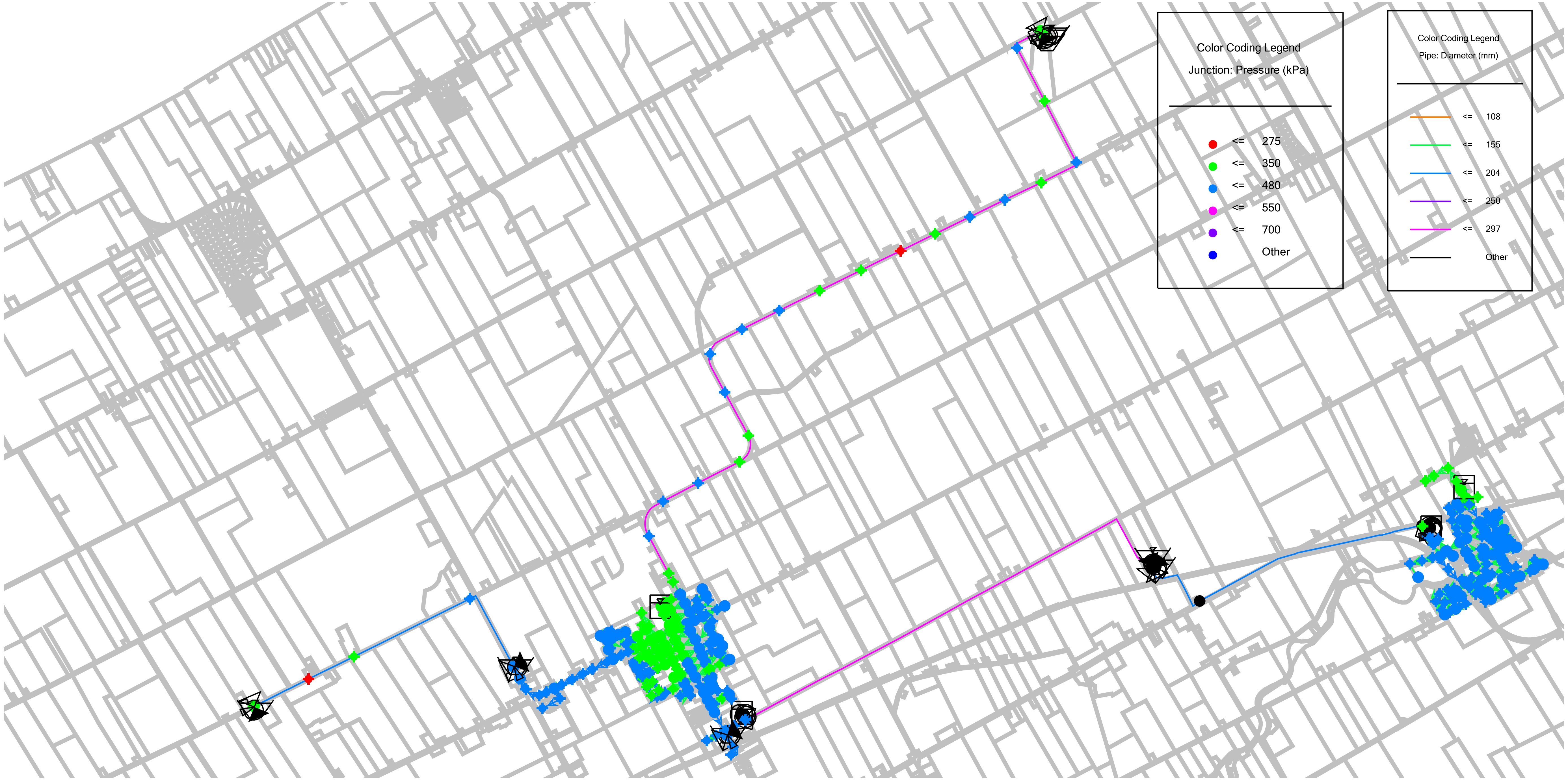
NEAR TERM		
ID	Label	Pressure
1161	J-277	403
1163	J-279	392
1164	J-280	392
1185	J-288	368
1209	J-290	364
1213	J-291	361
1219	J-292	356

MID TERM		
ID	Label	Pressure
1160	J-276	402
1161	J-277	402
1163	J-279	392
1164	J-280	392
1165	J-281	392
1169	J-285	392
1171	J-287	342
1185	J-288	367
1209	J-290	364
1213	J-291	361
1219	J-292	356

LONG TERM		
ID	Label	Pressure
1157	J-273	370
1158	J-274	380
1160	J-276	402
1161	J-277	402
1163	J-279	391
1164	J-280	391
1165	J-281	391
1166	J-282	386
1169	J-285	391
1170	J-286	400
1171	J-287	340
1185	J-288	366
1209	J-290	363
1213	J-291	360
1219	J-292	354

BUILD OUT		
ID	Label	Pressure
1157	J-273	369
1158	J-274	379
1159	J-275	398
1160	J-276	402
1161	J-277	402
1162	J-278	380
1163	J-279	390
1164	J-280	390
1165	J-281	390
1166	J-282	385
1167	J-283	360
1168	J-284	399
1169	J-285	390
1170	J-286	399
1171	J-287	339
1185	J-288	365
1205	J-289	370
1209	J-290	362
1213	J-291	359
1219	J-292	353

North Dundas Hydraulic Water Model
Existing Average Day Demand

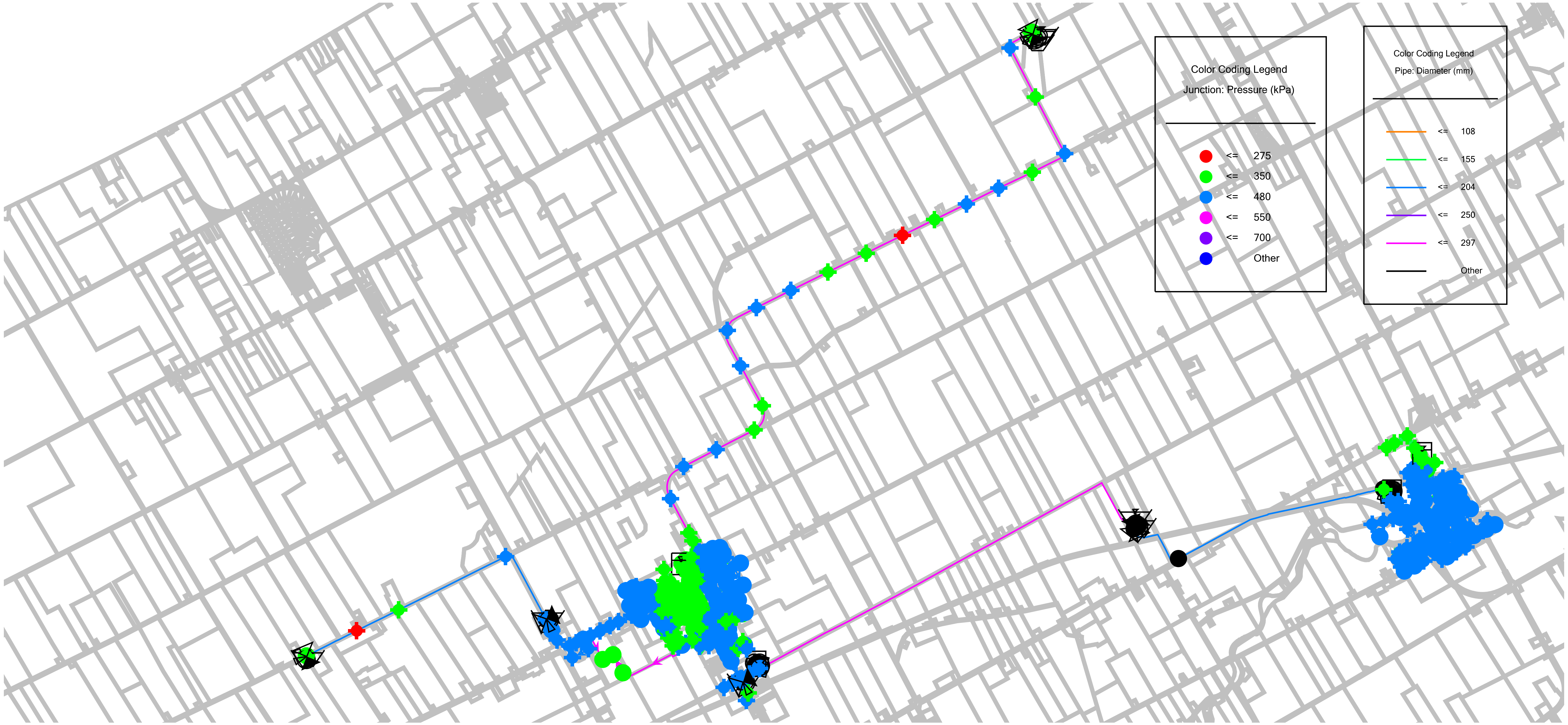


North Dundas Hydraulic Water Model

Existing Average Day Demand - Winchester

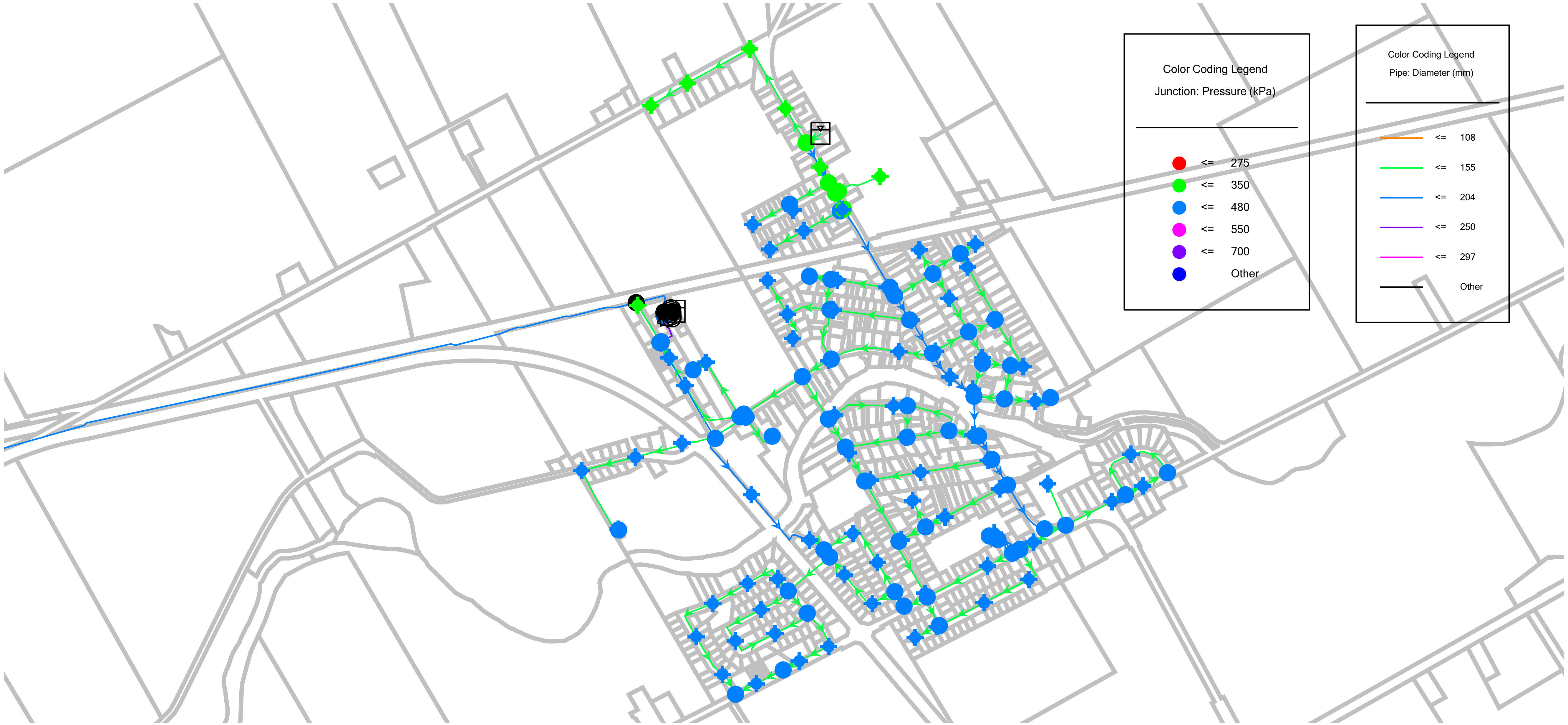
North Dundas Hydraulic Water Model
Existing Average Day Demand - Chesterville

North Dundas Hydraulic Water Model
Near Term (1-5 Year) Average Day Demand
With 300mm Main St - Fred St Loop



North Dundas Hydraulic Water Model
Near Term (1-5 Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop

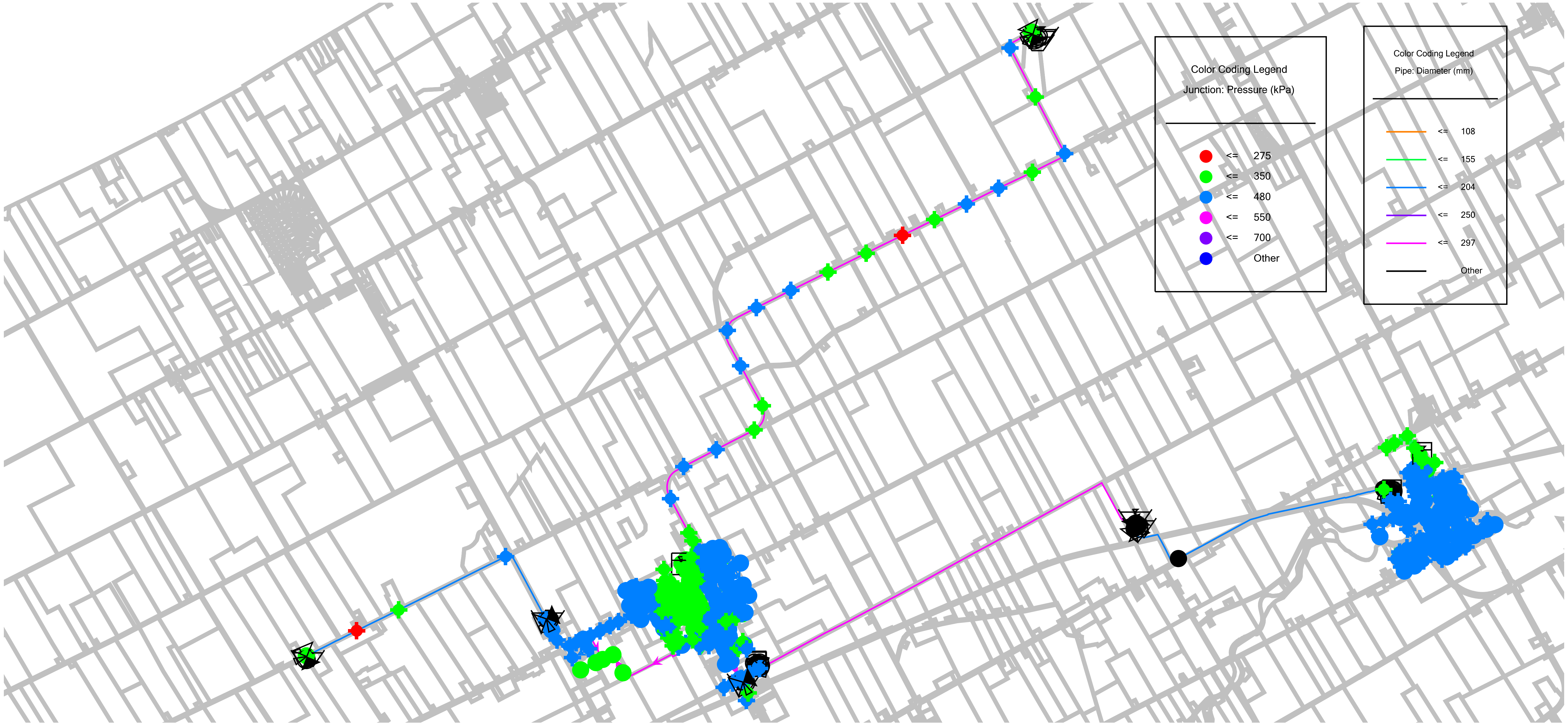
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Average Day Demand - Chesterville
With 300mm Main St - Fred St Loop



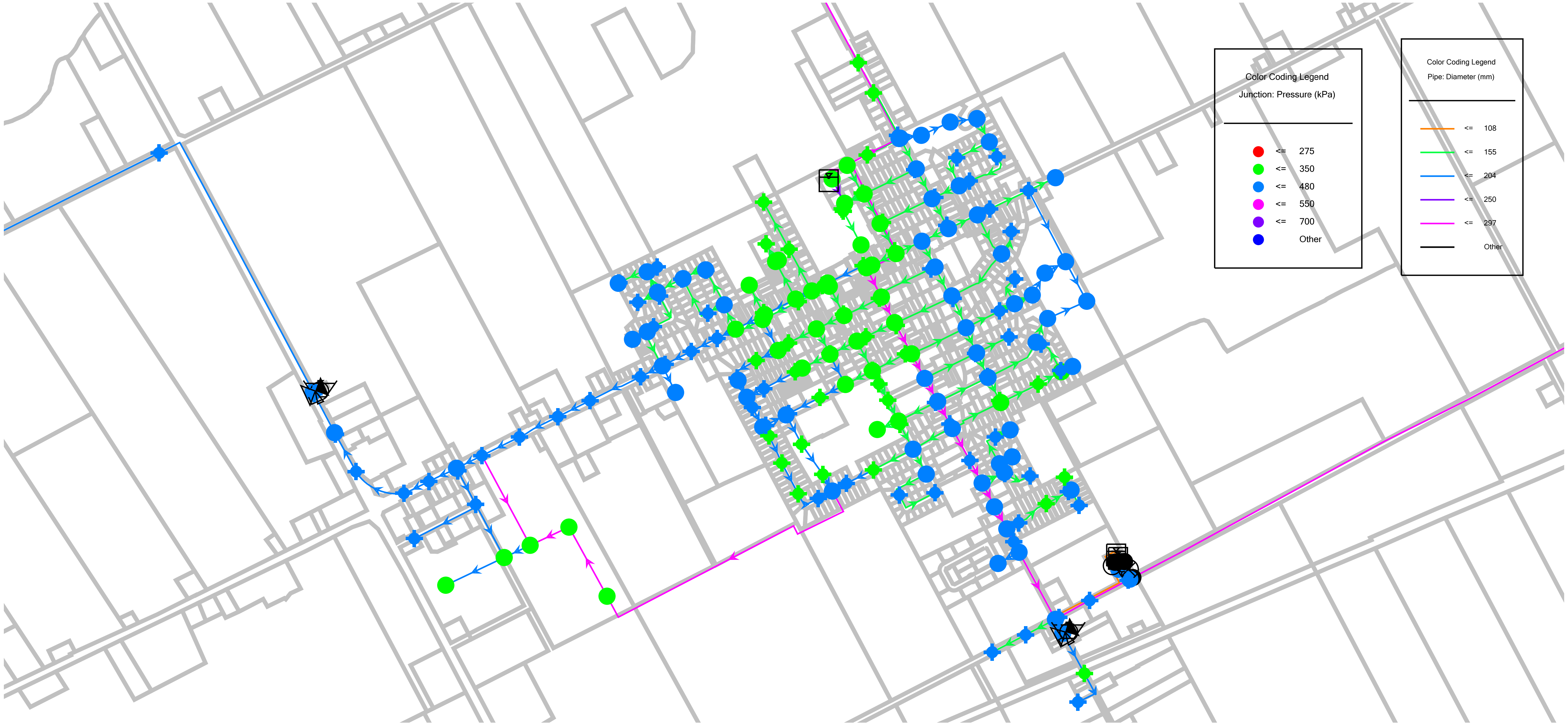
North Dundas Hydraulic Water Model

Mid Term (5-10 Year) Average Day Demand

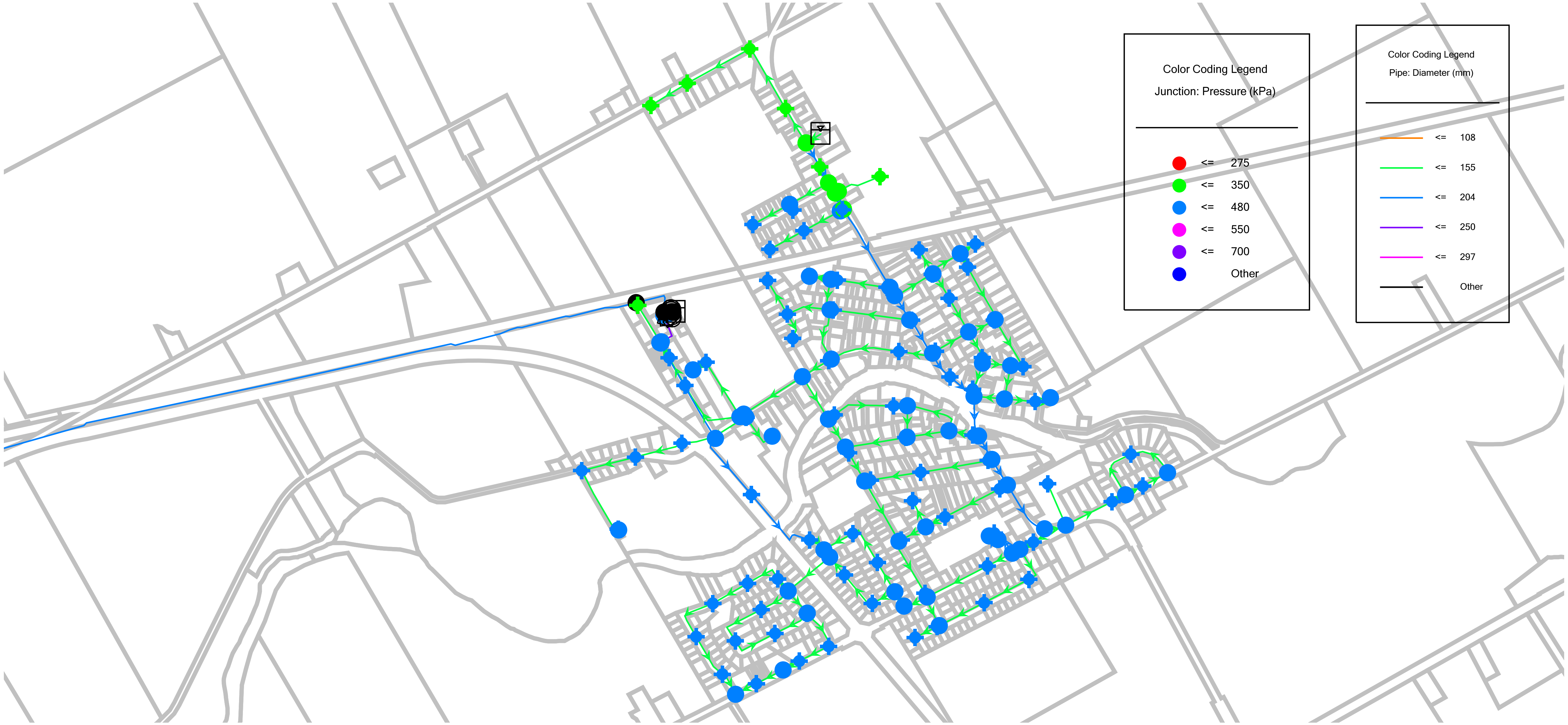
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



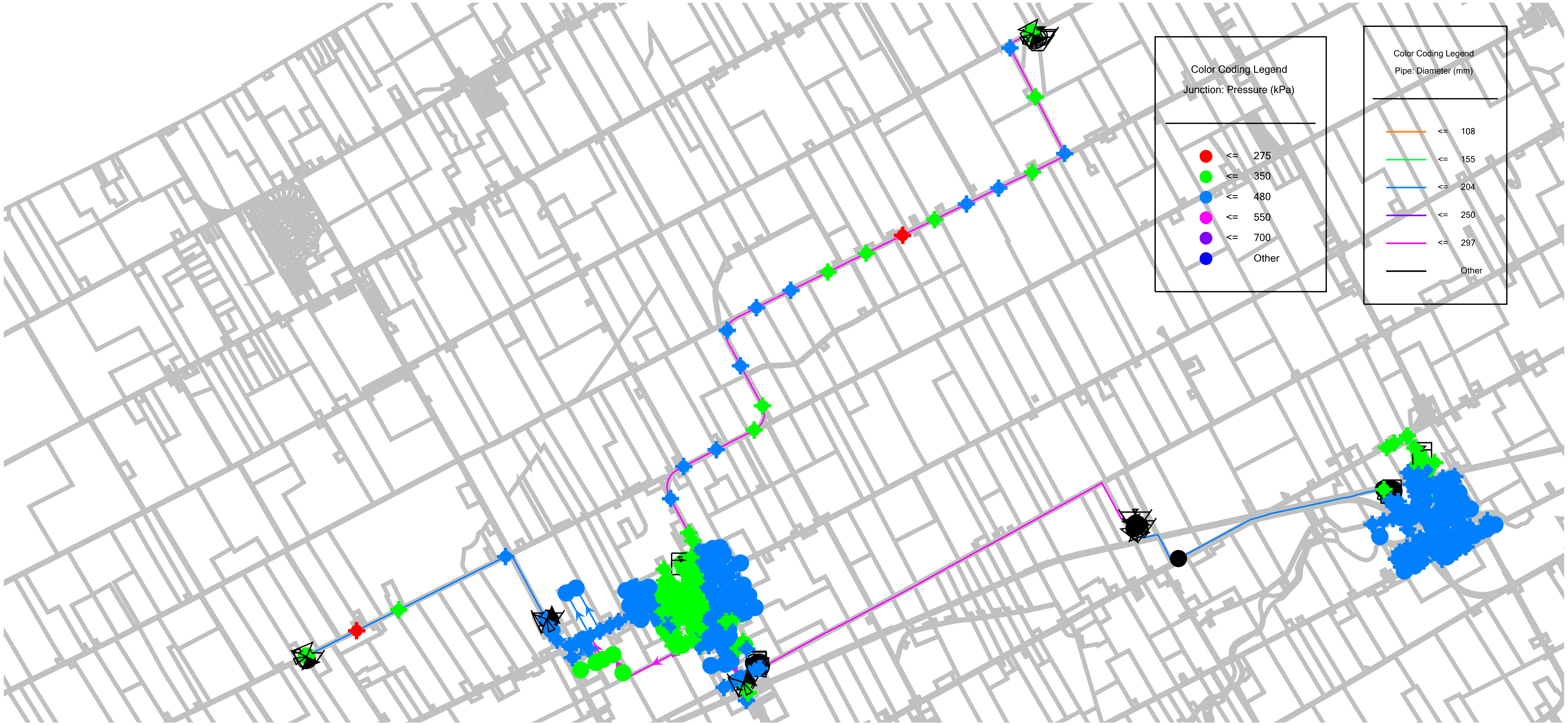
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



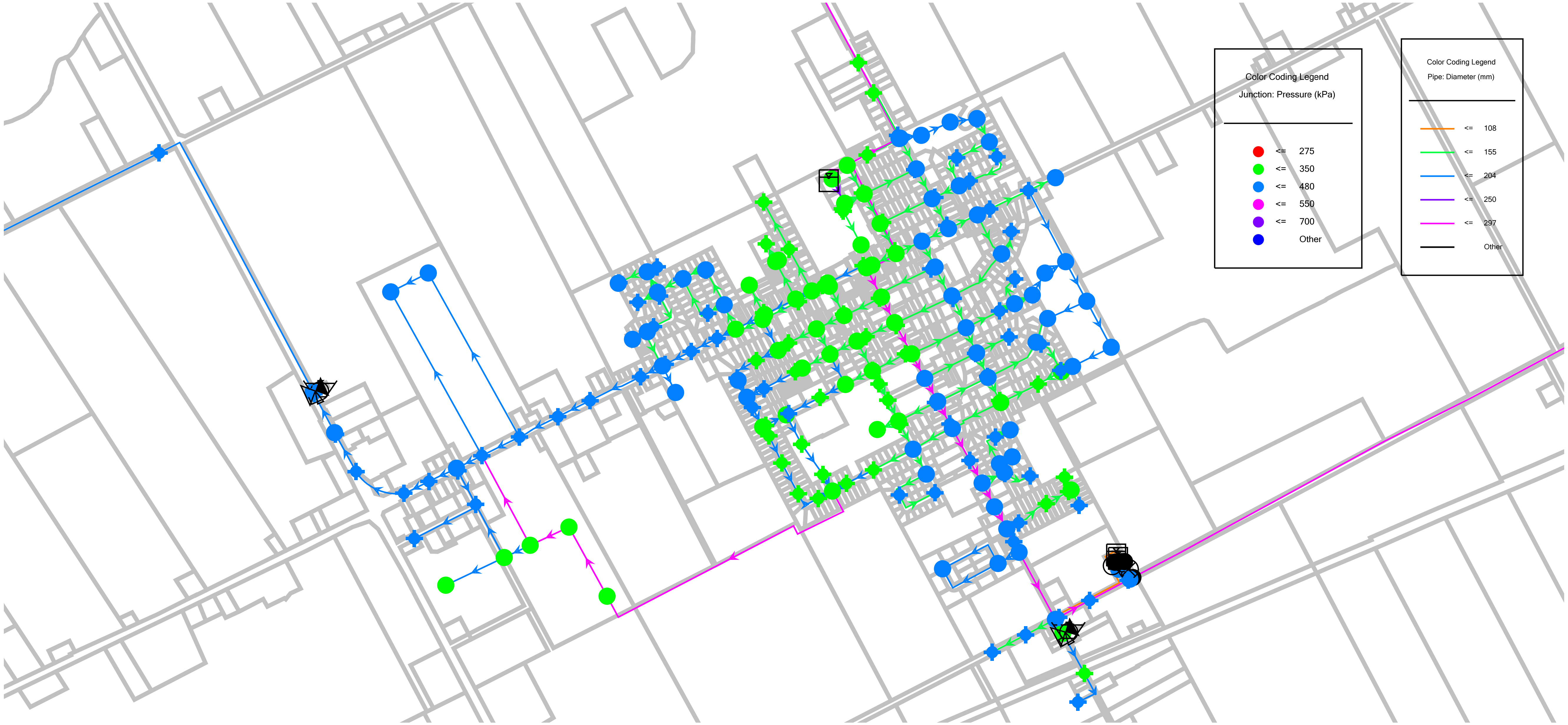
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Average Day Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



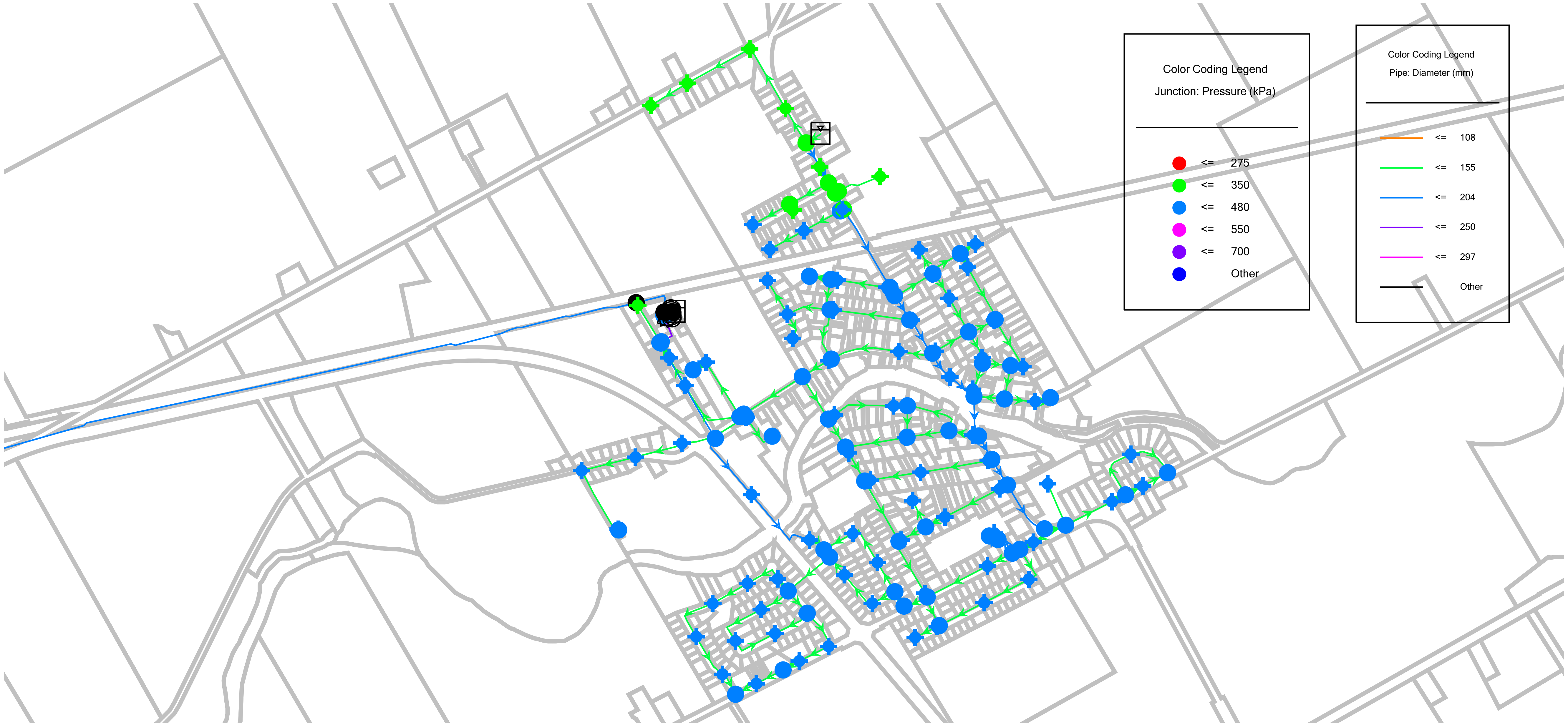
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Average Day Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



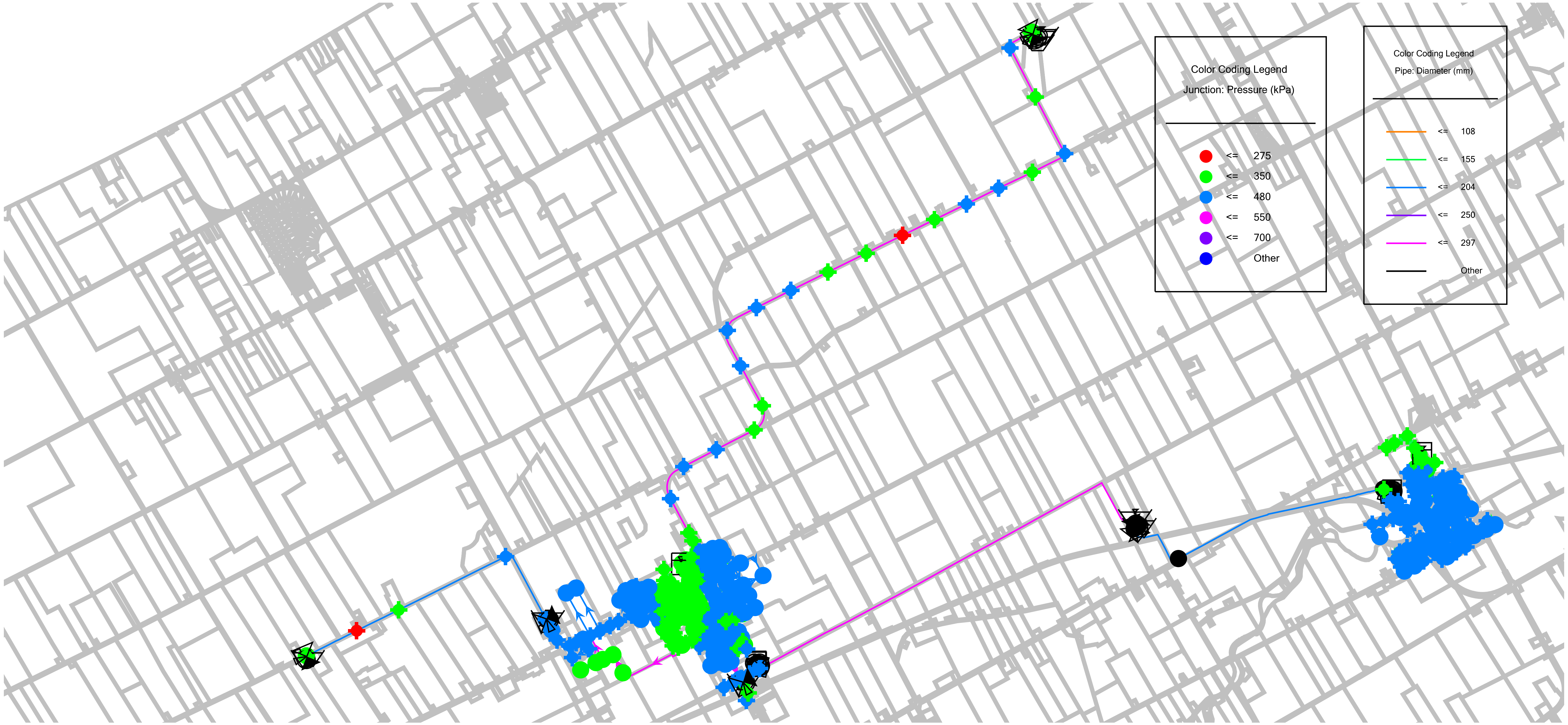
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



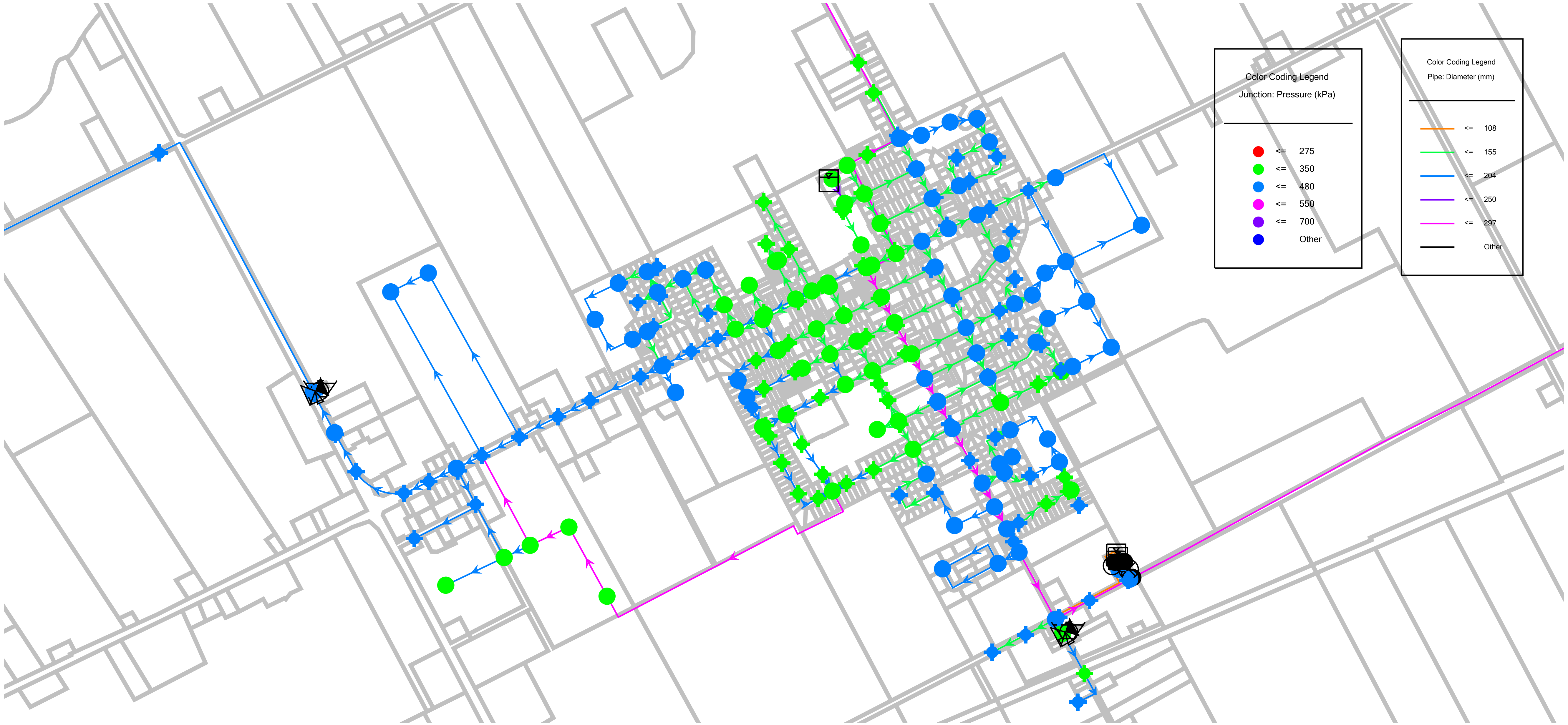
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Average Day Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



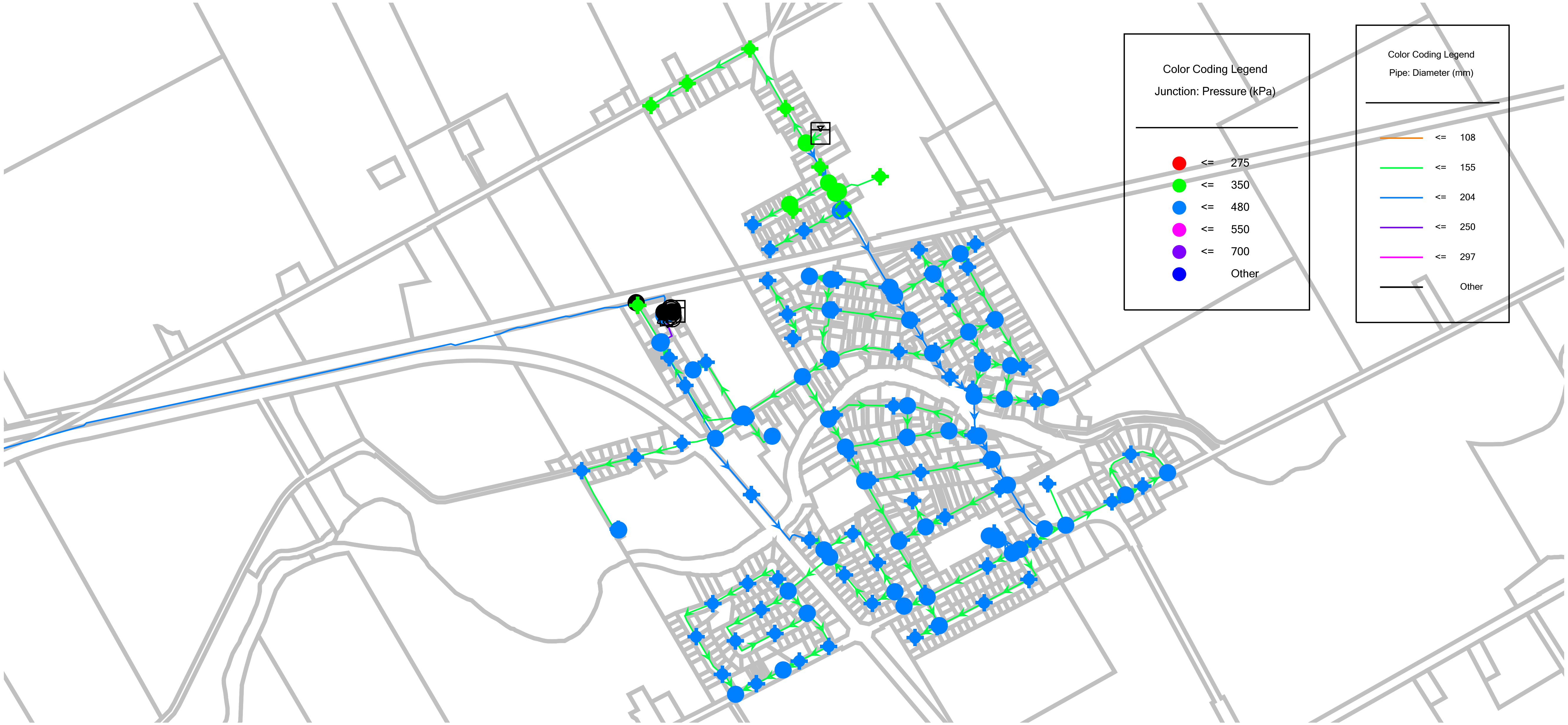
North Dundas Hydraulic Water Model
Build Out (20+ Year) Average Day Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model
Build Out (20+ Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model
Build Out (20+ Year) Average Day Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
30	J-1	388	30	J-1	380	30	J-1	379	30	J-1	370	30	J-1	366
33	J-101	382	33	J-101	378	33	J-101	378	33	J-101	373	33	J-101	370
34	J-102	370	34	J-102	369	34	J-102	372	34	J-102	369	34	J-102	366
35	J-103	377	35	J-103	376	35	J-103	378	35	J-103	376	35	J-103	376
36	J-104	380	36	J-104	378	36	J-104	380	36	J-104	378	36	J-104	378
37	J-105	440	37	J-105	436	37	J-105	394	37	J-105	388	37	J-105	383
41	J-109	382	41	J-109	377	41	J-109	374	41	J-109	369	41	J-109	366
42	J-11	369	42	J-11	364	42	J-11	366	42	J-11	360	42	J-11	356
43	J-111	439	43	J-111	436	43	J-111	393	43	J-111	387	43	J-111	383
44	J-112	370	44	J-112	366	44	J-112	360	44	J-112	355	44	J-112	352
45	J-113	377	45	J-113	375	45	J-113	379	45	J-113	375	45	J-113	373
46	J-114	436	46	J-114	433	46	J-114	391	46	J-114	384	46	J-114	380
47	J-116	467	47	J-116	464	47	J-116	396	47	J-116	389	47	J-116	382
48	J-117	429	48	J-117	425	48	J-117	383	48	J-117	377	48	J-117	373
49	J-118	435	49	J-118	431	49	J-118	389	49	J-118	383	49	J-118	378
50	J-119	374	50	J-119	368	50	J-119	372	50	J-119	368	50	J-119	365
51	J-12	379	51	J-12	374	51	J-12	377	51	J-12	371	51	J-12	367
52	J-120	375	52	J-120	369	52	J-120	373	52	J-120	369	52	J-120	365
55	J-123	386	55	J-123	382	55	J-123	377	55	J-123	371	55	J-123	368
56	J-124	384	56	J-124	380	56	J-124	373	56	J-124	369	56	J-124	365
57	J-125	530	57	J-125	528	57	J-125	405	57	J-125	397	57	J-125	391
58	J-126	366	58	J-126	366	58	J-126	370	58	J-126	366	58	J-126	363
60	J-129	369	60	J-129	364	60	J-129	359	60	J-129	353	60	J-129	350
61	J-13	376	61	J-13	372	61	J-13	374	61	J-13	368	61	J-13	364
63	J-131	457	63	J-131	454	63	J-131	385	63	J-131	378	63	J-131	368
64	J-132	376	64	J-132	372	64	J-132	367	64	J-132	361	64	J-132	357
66	J-135	369	66	J-135	368	66	J-135	369	66	J-135	369	66	J-135	368
69	J-14	361	69	J-14	357	69	J-14	360	69	J-14	354	69	J-14	350
70	J-140	385	70	J-140	383	70	J-140	379	70	J-140	367	70	J-140	367
72	J-142	381	72	J-142	379	72	J-142	375	72	J-142	362	72	J-142	362
73	J-143	381	73	J-143	379	73	J-143	375	73	J-143	362	73	J-143	362
74	J-144	377	74	J-144	375	74	J-144	371	74	J-144	358	74	J-144	358
76	J-146	377	76	J-146	375	76	J-146	371	76	J-146	359	76	J-146	359
77	J-147	388	77	J-147	386	77	J-147	382	77	J-147	369	77	J-147	369
79	J-149	372	79	J-149	370	79	J-149	366	79	J-149	353	79	J-149	353
80	J-15	357	80	J-15	353	80	J-15	355	80	J-15	350	80	J-15	346
81	J-150	378	81	J-150	376	81	J-150	372	81	J-150	360	81	J-150	360
82	J-151	377	82	J-151	376	82	J-151	372	82	J-151	359	82	J-151	359
83	J-152	377	83	J-152	376	83	J-152	372	83	J-152	359	83	J-152	359
85	J-154	394	85	J-154	393	85	J-154	389	85	J-154	376	85	J-154	376
87	J-157	369	87	J-157	367	87	J-157	363	87	J-157	350	87	J-157	350
89	J-159	384	89	J-159	382	89	J-159	378	89	J-159	365	89	J-159	365
90	J-16	365	90	J-16	361	90	J-16	362	90	J-16	357	90	J-16	354
91	J-160	354	91	J-160	353	91	J-160	351	91	J-160	345	91	J-160	345
92	J-162	373	92	J-162	372	92	J-162	368	92	J-162	356	92	J-162	356
93	J-163	324	93	J-163	324	93	J-163	323	93	J-163	319	93	J-163	319
95	J-165	379	95	J-165	377	95	J-165	373	95	J-165	359	95	J-165	359
96	J-167	375	96	J-167	373	96	J-167	370	96	J-167	358	96	J-167	358
97	J-168	382	97	J-168	380	97	J-168	376	97	J-168	363	97	J-168	363
100	J-170	421	100	J-170	419	100	J-170	416	100	J-170	403	100	J-170	403
101	J-171	340	101	J-171	339	101	J-171	337	101	J-171	331	101	J-171	331
102	J-172	380	102	J-172	378	102	J-172	374	102	J-172	361	102	J-172	361
103	J-173	375	103	J-173	374	103	J-173	370	103	J-173	359	103	J-173	359
104	J-174	370	104	J-174	369	104	J-174	365	104	J-174	354	104	J-174	354
105	J-175	377	105	J-175	375	105	J-175	372	105	J-175	360	105	J-175	360
106	J-176	346	106	J-176	345	106	J-176	343	106	J-176	336	106	J-176	336
107	J-177	346	107	J-177	345	107	J-177	343	107	J-177	336	107	J-177	336
108	J-178	357	108	J-178	356	108	J-178	354	108	J-178	346	108	J-178	346
109	J-18	344	109	J-18	341	109	J-18	343	109	J-18	338	109	J-18	335
110	J-180	351	110	J-180	350	110	J-180	347	110	J-180	340	110	J-180	340
111	J-182	378	111	J-182	376	111	J-182	373	111	J-182	360	111	J-182	360
112	J-183	381	112	J-183	379	112	J-183	375	112	J-183	363	112	J-183	363
113	J-187	369	113	J-187	368	113	J-187	364	113	J-187	353	113	J-187	353
114	J-188	369	114	J-188	367	114	J-188	364	114	J-188	353	114	J-188	353
115	J-189	381	115	J-189	379	115	J-189	375	115	J-189	362	115	J-189	362
117	J-191	380	117	J-191	379	117	J-191	375	117	J-191	363	117	J-191	363
118	J-192	378	118	J-192	376	118	J-192	372	118	J-192	359	118	J-192	359
119	J-193	385	119	J-193	383	119	J-193	380	119	J-193	367	119	J-193	367
120	J-194	398	120	J-194	396	120	J-194	392	120	J-194	380	120	J-194	380
121	J-195	374	121	J-195	372	121	J-195	369	121	J-195	357	121	J-195	357
125	J-199	381	125	J-199	379	125	J-199	376	125	J-199	363	125	J-199	363
127	J-20	362	127	J-20	358	127	J-20	359	127	J-20	353	127	J-20	350
128	J-200	378	128	J-200	376	128	J-200	373	128	J-200	360	128	J-200	360
132	J-204	382	132	J-204	380	132	J-204	377	132	J-204	365	132	J-204	365
133	J-205	370	133	J-205	369	133	J-205	366	133	J-205	354	133	J-205	354
135	J-207	379	135	J-207	377	135	J-207	373	135	J-207	361	135	J-207	361

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
136	J-208	395	136	J-208	393	136	J-208	390	136	J-208	377	136	J-208	377
137	J-209	373	137	J-209	372	137	J-209	369	137	J-209	356	137	J-209	356
138	J-21	339	138	J-21	335	138	J-21	338	138	J-21	332	138	J-21	329
139	J-210	383	139	J-210	381	139	J-210	378	139	J-210	366	139	J-210	366
145	J-217	400	145	J-217	399	145	J-217	395	145	J-217	383	145	J-217	383
147	J-219	402	147	J-219	400	147	J-219	397	147	J-219	384	147	J-219	384
148	J-22	338	148	J-22	335	148	J-22	337	148	J-22	332	148	J-22	329
150	J-222	384	150	J-222	382	150	J-222	379	150	J-222	366	150	J-222	366
151	J-225	388	151	J-225	387	151	J-225	383	151	J-225	370	151	J-225	370
152	J-226	386	152	J-226	385	152	J-226	381	152	J-226	369	152	J-226	369
153	J-227	385	153	J-227	383	153	J-227	380	153	J-227	368	153	J-227	368
154	J-228	388	154	J-228	387	154	J-228	383	154	J-228	370	154	J-228	370
156	J-23	326	156	J-23	323	156	J-23	326	156	J-23	321	156	J-23	318
157	J-230	388	157	J-230	386	157	J-230	383	157	J-230	371	157	J-230	371
158	J-231	382	158	J-231	381	158	J-231	377	158	J-231	365	158	J-231	365
159	J-232	389	159	J-232	388	159	J-232	384	159	J-232	372	159	J-232	372
161	J-234	380	161	J-234	378	161	J-234	374	161	J-234	361	161	J-234	361
162	J-235	379	162	J-235	378	162	J-235	374	162	J-235	361	162	J-235	361
164	J-239	377	164	J-239	375	164	J-239	372	164	J-239	359	164	J-239	359
165	J-24	341	165	J-24	337	165	J-24	339	165	J-24	334	165	J-24	331
166	J-240	397	166	J-240	396	166	J-240	392	166	J-240	380	166	J-240	380
168	J-242	377	168	J-242	375	168	J-242	372	168	J-242	359	168	J-242	359
169	J-243	381	169	J-243	379	169	J-243	376	169	J-243	363	169	J-243	363
170	J-244	338	170	J-244	338	170	J-244	338	170	J-244	338	170	J-244	338
171	J-245	526	171	J-245	524	171	J-245	401	171	J-245	393	171	J-245	387
172	J-25	326	172	J-25	323	172	J-25	326	172	J-25	321	172	J-25	318
173	J-26	362	173	J-26	357	173	J-26	359	173	J-26	353	173	J-26	350
174	J-27	322	174	J-27	318	174	J-27	321	174	J-27	316	174	J-27	313
175	J-28	352	175	J-28	348	175	J-28	350	175	J-28	344	175	J-28	341
178	J-30	320	178	J-30	317	178	J-30	320	178	J-30	315	178	J-30	313
179	J-31	334	179	J-31	330	179	J-31	333	179	J-31	328	179	J-31	325
180	J-34	321	180	J-34	318	180	J-34	321	180	J-34	317	180	J-34	315
182	J-36	322	182	J-36	318	182	J-36	321	182	J-36	317	182	J-36	315
183	J-37	348	183	J-37	344	183	J-37	346	183	J-37	340	183	J-37	338
185	J-39	362	185	J-39	357	185	J-39	358	185	J-39	352	185	J-39	349
186	J-4	382	186	J-4	374	186	J-4	374	186	J-4	366	186	J-4	362
188	J-41	326	188	J-41	323	188	J-41	326	188	J-41	321	188	J-41	319
189	J-42	322	189	J-42	321	189	J-42	322	189	J-42	321	189	J-42	321
190	J-43	354	190	J-43	350	190	J-43	351	190	J-43	346	190	J-43	344
191	J-44	340	191	J-44	340	191	J-44	341	191	J-44	340	191	J-44	340
192	J-45	334	192	J-45	330	192	J-45	333	192	J-45	328	192	J-45	326
195	J-48	326	195	J-48	325	195	J-48	326	195	J-48	326	195	J-48	325
196	J-49	317	196	J-49	315	196	J-49	318	196	J-49	315	196	J-49	313
197	J-5	387	197	J-5	383	197	J-5	385	197	J-5	379	197	J-5	375
201	J-53	318	201	J-53	316	201	J-53	320	201	J-53	317	201	J-53	316
202	J-54	349	202	J-54	345	202	J-54	347	202	J-54	342	202	J-54	340
203	J-55	358	203	J-55	354	203	J-55	352	203	J-55	347	203	J-55	346
206	J-58	329	206	J-58	328	206	J-58	330	206	J-58	329	206	J-58	328
207	J-59	323	207	J-59	320	207	J-59	324	207	J-59	320	207	J-59	319
210	J-62	340	210	J-62	337	210	J-62	341	210	J-62	337	210	J-62	335
212	J-65	335	212	J-65	334	212	J-65	337	212	J-65	334	212	J-65	333
216	J-69	363	216	J-69	358	216	J-69	357	216	J-69	351	216	J-69	350
217	J-7	386	217	J-7	381	217	J-7	384	217	J-7	377	217	J-7	374
218	J-70	358	218	J-70	357	218	J-70	358	218	J-70	357	218	J-70	356
219	J-72	358	219	J-72	357	219	J-72	358	219	J-72	357	219	J-72	356
221	J-74	360	221	J-74	356	221	J-74	359	221	J-74	355	221	J-74	353
222	J-75	371	222	J-75	367	222	J-75	364	222	J-75	359	222	J-75	358
224	J-78	361	224	J-78	361	224	J-78	362	224	J-78	361	224	J-78	360
225	J-79	371	225	J-79	370	225	J-79	373	225	J-79	370	225	J-79	368
227	J-80	375	227	J-80	371	227	J-80	372	227	J-80	367	227	J-80	365
228	J-81	384	228	J-81	379	228	J-81	377	228	J-81	371	228	J-81	373
230	J-83	380	230	J-83	379	230	J-83	381	230	J-83	380	230	J-83	379
231	J-84	381	231	J-84	378	231	J-84	382	231	J-84	378	231	J-84	377
233	J-87	382	233	J-87	378	233	J-87	376	233	J-87	371	233	J-87	368
235	J-89	368	235	J-89	367	235	J-89	370	235	J-89	367	235	J-89	365
236	J-9	384	236	J-9	380	236	J-9	382	236	J-9	376	236	J-9	372
240	J-93	385	240	J-93	382	240	J-93	386	240	J-93	382	240	J-93	380
241	J-94	404	241	J-94	400	241	J-94	387	241	J-94	382	241	J-94	379
243	J-96	366	243	J-96	365	243	J-96	366	243	J-96	365	243	J-96	364
246	J-99	393	246	J-99	389	246	J-99	392	246	J-99	387	246	J-99	385
248	H-1	369	248	H-1	368	248	H-1	364	248	H-1	352	248	H-1	352
249	H-10	431	249	H-10	427	249	H-10	398	249	H-10	392	249	H-10	387
250	H-100	380	250	H-100	379	250	H-100	375	250	H-100	363	250	H-100	363
251	H-101	378	251	H-101	376	251	H-101	373	251	H-101	360	251	H-101	360
252	H-102	421	252	H-102	419	252	H-102	416	252	H-102	403	252	H-102	403
253	H-103	396	253	H-103	394	253	H-103	391	253	H-103	378	253	H-103	378

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure	ID	Label	Pressure
254	H-104	379	254	H-104	377	254	H-104	373	254	H-104	359	254	H-104	359
255	H-105	389	255	H-105	387	255	H-105	383	255	H-105	370	255	H-105	370
256	H-106	381	256	H-106	379	256	H-106	375	256	H-106	362	256	H-106	362
257	H-107	397	257	H-107	395	257	H-107	391	257	H-107	377	257	H-107	377
258	H-108	378	258	H-108	376	258	H-108	372	258	H-108	359	258	H-108	359
259	H-109	370	259	H-109	368	259	H-109	364	259	H-109	351	259	H-109	351
260	H-11	402	260	H-11	398	260	H-11	387	260	H-11	381	260	H-11	378
261	H-110	369	261	H-110	367	261	H-110	363	261	H-110	350	261	H-110	350
262	H-111	381	262	H-111	379	262	H-111	375	262	H-111	362	262	H-111	362
263	H-112	384	263	H-112	382	263	H-112	378	263	H-112	365	263	H-112	365
264	H-113	389	264	H-113	387	264	H-113	383	264	H-113	370	264	H-113	370
265	H-114	379	265	H-114	376	265	H-114	373	265	H-114	359	265	H-114	359
266	H-115	379	266	H-115	377	266	H-115	374	266	H-115	361	266	H-115	361
267	H-116	379	267	H-116	377	267	H-116	374	267	H-116	361	267	H-116	361
268	H-117	378	268	H-117	376	268	H-117	373	268	H-117	360	268	H-117	360
269	H-118	385	269	H-118	383	269	H-118	380	269	H-118	367	269	H-118	367
270	H-119	384	270	H-119	382	270	H-119	379	270	H-119	366	270	H-119	366
271	H-12	363	271	H-12	358	271	H-12	359	271	H-12	353	271	H-12	350
272	H-120	377	272	H-120	376	272	H-120	372	272	H-120	359	272	H-120	359
273	H-121	377	273	H-121	376	273	H-121	372	273	H-121	359	273	H-121	359
274	H-122	377	274	H-122	375	274	H-122	372	274	H-122	360	274	H-122	360
275	H-123	383	275	H-123	382	275	H-123	378	275	H-123	366	275	H-123	366
276	H-124	395	276	H-124	393	276	H-124	390	276	H-124	377	276	H-124	377
277	H-125	386	277	H-125	384	277	H-125	381	277	H-125	369	277	H-125	369
278	H-126	383	278	H-126	381	278	H-126	378	278	H-126	366	278	H-126	366
279	H-128	380	279	H-128	378	279	H-128	374	279	H-128	362	279	H-128	362
280	H-129	399	280	H-129	397	280	H-129	394	280	H-129	381	280	H-129	381
281	H-13	362	281	H-13	358	281	H-13	359	281	H-13	353	281	H-13	350
282	H-130	390	282	H-130	389	282	H-130	385	282	H-130	373	282	H-130	373
283	H-131	354	283	H-131	353	283	H-131	351	283	H-131	345	283	H-131	345
284	H-132	367	284	H-132	366	284	H-132	364	284	H-132	357	284	H-132	357
285	H-133	356	285	H-133	355	285	H-133	352	285	H-133	345	285	H-133	345
286	H-134	358	286	H-134	357	286	H-134	355	286	H-134	347	286	H-134	347
287	H-135	364	287	H-135	363	287	H-135	361	287	H-135	353	287	H-135	353
288	H-136	379	288	H-136	377	288	H-136	374	288	H-136	362	288	H-136	362
289	H-137	383	289	H-137	381	289	H-137	378	289	H-137	366	289	H-137	366
290	H-138	375	290	H-138	374	290	H-138	370	290	H-138	359	290	H-138	359
291	H-139	369	291	H-139	368	291	H-139	365	291	H-139	353	291	H-139	353
292	H-14	354	292	H-14	350	292	H-14	351	292	H-14	345	292	H-14	342
293	H-140	370	293	H-140	369	293	H-140	366	293	H-140	354	293	H-140	354
294	H-141	374	294	H-141	372	294	H-141	369	294	H-141	357	294	H-141	357
295	H-142	375	295	H-142	374	295	H-142	371	295	H-142	358	295	H-142	358
296	H-143	390	296	H-143	389	296	H-143	385	296	H-143	373	296	H-143	373
297	H-144	311	297	H-144	309	297	H-144	309	297	H-144	309	297	H-144	309
298	H-145	346	298	H-145	346	298	H-145	347	298	H-145	346	298	H-145	345
299	H-146	351	299	H-146	350	299	H-146	351	299	H-146	350	299	H-146	350
300	H-147	385	300	H-147	381	300	H-147	383	300	H-147	377	300	H-147	373
301	H-148	379	301	H-148	374	301	H-148	377	301	H-148	371	301	H-148	367
302	H-149	370	302	H-149	366	302	H-149	368	302	H-149	362	302	H-149	359
303	H-15	352	303	H-15	347	303	H-15	349	303	H-15	343	303	H-15	340
304	H-150	330	304	H-150	327	304	H-150	330	304	H-150	325	304	H-150	322
305	H-151	340	305	H-151	337	305	H-151	340	305	H-151	335	305	H-151	332
306	H-152	369	306	H-152	364	306	H-152	366	306	H-152	360	306	H-152	356
307	H-153	382	307	H-153	373	307	H-153	373	307	H-153	366	307	H-153	362
308	H-154	372	308	H-154	371	308	H-154	373	308	H-154	371	308	H-154	370
309	H-155	366	309	H-155	365	309	H-155	366	309	H-155	365	309	H-155	364
310	H-156	358	310	H-156	357	310	H-156	358	310	H-156	357	310	H-156	357
311	H-157	326	311	H-157	325	311	H-157	326	311	H-157	326	311	H-157	325
312	H-158	381	312	H-158	377	312	H-158	374	312	H-158	369	312	H-158	366
313	H-159	377	313	H-159	373	313	H-159	373	313	H-159	368	313	H-159	366
314	H-16	360	314	H-16	355	314	H-16	357	314	H-16	351	314	H-16	348
315	H-160	327	315	H-160	324	315	H-160	327	315	H-160	322	315	H-160	320
316	H-161	346	316	H-161	342	316	H-161	342	316	H-161	337	316	H-161	335
317	H-162	382	317	H-162	378	317	H-162	376	317	H-162	371	317	H-162	368
318	H-163	384	318	H-163	380	318	H-163	377	318	H-163	372	318	H-163	377
319	H-164	357	319	H-164	353	319	H-164	353	319	H-164	347	319	H-164	344
320	H-165	428	320	H-165	425	320	H-165	383	320	H-165	376	320	H-165	372
321	H-166	341	321	H-166	337	321	H-166	339	321	H-166	333	321	H-166	331
322	H-167	385	322	H-167	383	322	H-167	379	322	H-167	367	322	H-167	367
323	H-168	396	323	H-168	394	323	H-168	390	323	H-168	377	323	H-168	377
324	H-169	388	324	H-169	387	324	H-169	383	324	H-169	370	324	H-169	370
325	H-17	365	325	H-17	361	325	H-17	362	325	H-17	357	325	H-17	354
326	H-170	373	326	H-170	372	326	H-170	368	326	H-170	357	326	H-170	357
327	H-171	383	327	H-171	381	327	H-171	377	327	H-171	365	327	H-171	365
328	H-172	386	328	H-172	378	328	H-172	377	328	H-172	368	328	H-172	363
329	H-173	349	329	H-173	340	329	H-173	339	329	H-173	330	329	H-173	326

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING		
ID	Label	Pressure
330	H-174	299
331	H-175	358
333	H-177	388
334	H-178	371
335	H-18	362
336	H-180	362
337	H-181	352
338	H-182	465
339	H-183	451
340	H-184	340
341	H-185	530
342	H-186	369
343	H-187	413
344	H-188	335
345	H-189	390
346	H-19	366
347	H-190	377
348	H-191	412
349	H-192	404
350	H-193	341
351	H-194	276
352	H-195	319
353	H-196	365
354	H-197	405
355	H-198	407
356	H-199	353
357	H-2	369
358	H-20	352
359	H-200	326
360	H-201	400
361	H-202	370
362	H-203	374
363	H-204	379
364	H-205	382
365	H-207	419
366	H-208	421
367	H-209	529
368	H-21	348
369	H-210	534
370	H-211	547
371	H-212	372
372	H-213	377
373	H-214	402
374	H-215	404
375	H-216	393
376	H-217	377
377	H-218	457
378	H-219	456
379	H-22	349
380	H-220	461
381	H-221	372
382	H-222	380
383	H-223	377
384	H-23	341
385	H-24	385
386	H-25	377
387	H-26	381
388	H-27	372
389	H-28	382
390	H-29	371
391	H-3	381
392	H-30	361
393	H-31	338
394	H-32	329
395	H-33	352
396	H-34	335
397	H-35	326
398	H-36	326
399	H-37	321
400	H-38	317
401	H-39	313
402	H-4	342
403	H-40	375
404	H-41	323
405	H-42	326
406	H-43	323

NEAR TERM		
ID	Label	Pressure
330	H-174	290
331	H-175	350
333	H-177	380
334	H-178	370
335	H-18	358
336	H-180	358
337	H-181	348
338	H-182	462
339	H-183	447
340	H-184	338
341	H-185	528
342	H-186	368
343	H-187	412
344	H-188	335
345	H-189	390
346	H-19	362
347	H-190	377
348	H-191	412
349	H-192	403
350	H-193	340
351	H-194	276
352	H-195	319
353	H-196	365
354	H-197	405
355	H-198	406
356	H-199	352
357	H-2	368
358	H-20	348
359	H-200	325
360	H-201	399
361	H-202	370
362	H-203	372
363	H-204	377
364	H-205	379
365	H-207	418
366	H-208	421
367	H-209	527
368	H-21	344
369	H-210	532
370	H-211	546
371	H-212	364
372	H-213	368
373	H-214	400
374	H-215	402
375	H-216	391
376	H-217	376
377	H-218	454
378	H-219	452
379	H-22	345
380	H-220	458
381	H-221	371
382	H-222	379
383	H-223	376
384	H-23	338
385	H-24	382
386	H-25	375
387	H-26	380
388	H-27	371
389	H-28	382
390	H-29	370
391	H-3	379
392	H-30	361
393	H-31	337
394	H-32	328
395	H-33	348
396	H-34	331
397	H-35	322
398	H-36	323
399	H-37	318
400	H-38	315
401	H-39	312
402	H-4	341
403	H-40	372
404	H-41	320
405	H-42	323
406	H-43	320

MID TERM		
ID	Label	Pressure
330	H-174	289
331	H-175	349
333	H-177	379
334	H-178	371
335	H-18	360
336	H-180	359
337	H-181	349
338	H-182	393
339	H-183	379
340	H-184	341
341	H-185	405
342	H-186	369
343	H-187	413
344	H-188	336
345	H-189	391
346	H-19	364
347	H-190	378
348	H-191	413
349	H-192	405
350	H-193	341
351	H-194	277
352	H-195	320
353	H-196	366
354	H-197	406
355	H-198	407
356	H-199	353
357	H-2	364
358	H-20	350
359	H-200	327
360	H-201	400
361	H-202	371
362	H-203	368
363	H-204	373
364	H-205	375
365	H-207	419
366	H-208	422
367	H-209	405
368	H-21	346
369	H-210	413
370	H-211	432
371	H-212	364
372	H-213	368
373	H-214	397
374	H-215	398
375	H-216	387
376	H-217	372
377	H-218	385
378	H-219	384
379	H-22	347
380	H-220	390
381	H-221	372
382	H-222	381
383	H-223	378
384	H-23	342
385	H-24	386
386	H-25	379
387	H-26	383
388	H-27	375
389	H-28	386
390	H-29	373
391	H-3	375
392	H-30	362
393	H-31	338
394	H-32	330
395	H-33	350
396	H-34	334
397	H-35	325
398	H-36	326
399	H-37	321
400	H-38	318
401	H-39	312
402	H-4	339
403	H-40	376
404	H-41	324
405	H-42	326
406	H-43	323

LONG TERM		
ID	Label	Pressure
330	H-174	281
331	H-175	340
333	H-177	370
334	H-178	370
335	H-18	354
336	H-180	353
337	H-181	344
338	H-182	386
339	H-183	372
340	H-184	339
341	H-185	397
342	H-186	368
343	H-187	412
344	H-188	335
345	H-189	390
346	H-19	358
347	H-190	377
348	H-191	412
349	H-192	404
350	H-193	340
351	H-194	276
352	H-195	319
353	H-196	365
354	H-197	405
355	H-198	406
356	H-199	352
357	H-2	353
358	H-20	344
359	H-200	326
360	H-201	399
361	H-202	370
362	H-203	355
363	H-204	360
364	H-205	362
365	H-207	418
366	H-208	421
367	H-209	397
368	H-21	340
369	H-210	405
370	H-211	424
371	H-212	356
372	H-213	361
373	H-214	384
374	H-215	385
375	H-216	373
376	H-217	359
377	H-218	378
378	H-219	377
379	H-22	342
380	H-220	383
381	H-221	371
382	H-222	379
383	H-223	376
384	H-23	338
385	H-24	382
386	H-25	375
387	H-26	380
388	H-27	371
389	H-28	382
390	H-29	370
391	H-3	363
392	H-30	361
393	H-31	337
394	H-32	329
395	H-33	344
396	H-34	328
397	H-35	320
398	H-36	321
399	H-37	316
400	H-38	315
401	H-39	312
402	H-4	332
403	H-40	372
404	H-41	320
405	H-42	321
406	H-43	318

BUILD OUT		
ID	Label	Pressure
330	H-174	276
331	H-175	336
333	H-177	366
334	H-178	370
335	H-18	351
336	H-180	350
337	H-181	342
338	H-182	379
339	H-183	363
340	H-184	337
341	H-185	391
342	H-186	368
343	H-187	412
344	H-188	334
345	H-189	390
346	H-19	355
347	H-190	376
348	H-191	411
349	H-192	403
350	H-193	340
351	H-194	275
352	H-195	318
353	H-196	364
354	H-197	404
355	H-198	406
356	H-199	352
357	H-2	353
358	H-20	341
359	H-200	325
360	H-201	399
361	H-202	369
362	H-203	355
363	H-204	360
364	H-205	362
365	H-207	418
366	H-208	420
367	H-209	391
368	H-21	338
369	H-210	399
370	H-211	418
371	H-212	352
372	H-213	356
373	H-214	384
374	H-215	385
375	H-216	373
376	H-217	359
377	H-218	368
378	H-219	366
379	H-22	340
380	H-220	372
381	H-221	370
382	H-222	379
383	H-223	376
384	H-23	336
385	H-24	380
386	H-25	373
387	H-26	377
388	H-27	369
389	H-28	379
390	H-29	369
391	H-3	363
392	H-30	360
393	H-31	337
394	H-32	328
395	H-33	341
396	H-34	325
397	H-35	317
398	H-36	318
399	H-37	314
400	H-38	313
401	H-39	312
402	H-4	332
403	H-40	370
404	H-41	318
405	H-42	319
406	H-43	316

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING		
ID	Label	Pressure
407	H-44	387
408	H-45	357
409	H-46	355
410	H-47	394
411	H-48	437
412	H-49	366
413	H-5	524
414	H-50	375
415	H-51	383
416	H-52	382
417	H-53	376
418	H-54	384
419	H-55	385
420	H-56	380
421	H-57	372
422	H-58	368
423	H-59	365
424	H-60	362
425	H-61	360
426	H-62	364
427	H-63	370
428	H-64	379
429	H-65	377
430	H-66	378
431	H-67	377
432	H-68	384
433	H-69	378
434	H-7	541
435	H-70	382
436	H-71	388
437	H-72	437
438	H-73	376
439	H-74	380
440	H-75	359
441	H-76	401
442	H-77	300
443	H-78	304
444	H-79	372
445	H-8	544
446	H-80	372
447	H-81	367
448	H-82	381
449	H-83	379
450	H-84	359
451	H-85	377
452	H-86	377
453	H-87	380
454	H-88	374
455	H-89	330
456	H-9	477
457	H-90	331
458	H-91	341
459	H-92	378
460	H-93	385
461	H-94	397
462	H-95	383
463	H-96	386
464	H-97	382
465	H-98	382
466	H-99	385
977	J-246	358
982	J-247	385
983	J-248	385
1019	J-254	548
1030	J-257	388
1036	J-258	358
1050	J-260	371
1066	J-262	399
1069	J-263	281
1075	J-264	548
1185	J-288	377
1209	J-290	454
1213	J-291	484
1219	J-292	366

NEAR TERM		
ID	Label	Pressure
407	H-44	383
408	H-45	353
409	H-46	351
410	H-47	390
411	H-48	434
412	H-49	362
413	H-5	523
414	H-50	371
415	H-51	379
416	H-52	378
417	H-53	372
418	H-54	380
419	H-55	381
420	H-56	375
421	H-57	366
422	H-58	364
423	H-59	360
424	H-60	358
425	H-61	356
426	H-62	360
427	H-63	366
428	H-64	372
429	H-65	370
430	H-66	371
431	H-67	368
432	H-68	376
433	H-69	369
434	H-7	539
435	H-70	373
436	H-71	380
437	H-72	433
438	H-73	370
439	H-74	374
440	H-75	355
441	H-76	400
442	H-77	299
443	H-78	303
444	H-79	371
445	H-8	543
446	H-80	371
447	H-81	365
448	H-82	379
449	H-83	377
450	H-84	357
451	H-85	376
452	H-86	375
453	H-87	379
454	H-88	372
455	H-89	329
456	H-9	474
457	H-90	330
458	H-91	341
459	H-92	376
460	H-93	383
461	H-94	395
462	H-95	381
463	H-96	385
464	H-97	381
465	H-98	380
466	H-99	383
977	J-246	357
982	J-247	383
983	J-248	383
1019	J-254	547
1030	J-257	380
1036	J-258	350
1050	J-260	370
1066	J-262	397
1069	J-263	272
1075	J-264	546
1154	J-270	349
1155	J-271	339
1156	J-272	339
1157	J-273	377
1158	J-274	386
1160	J-276	404

MID TERM		
ID	Label	Pressure
407	H-44	385
408	H-45	354
409	H-46	352
410	H-47	387
411	H-48	392
412	H-49	356
413	H-5	400
414	H-50	365
415	H-51	374
416	H-52	378
417	H-53	374
418	H-54	382
419	H-55	383
420	H-56	377
421	H-57	369
422	H-58	366
423	H-59	363
424	H-60	359
425	H-61	359
426	H-62	358
427	H-63	360
428	H-64	374
429	H-65	372
430	H-66	372
431	H-67	369
432	H-68	375
433	H-69	369
434	H-7	416
435	H-70	372
436	H-71	379
437	H-72	391
438	H-73	374
439	H-74	378
440	H-75	356
441	H-76	396
442	H-77	298
443	H-78	302
444	H-79	367
445	H-8	420
446	H-80	367
447	H-81	362
448	H-82	375
449	H-83	373
450	H-84	353
451	H-85	372
452	H-86	372
453	H-87	375
454	H-88	369
455	H-89	328
456	H-9	398
457	H-90	329
458	H-91	339
459	H-92	373
460	H-93	380
461	H-94	392
462	H-95	378
463	H-96	381
464	H-97	377
465	H-98	377
466	H-99	380
977	J-246	358
982	J-247	379
983	J-248	379
1019	J-254	434
1030	J-257	379
1036	J-258	349
1050	J-260	371
1066	J-262	394
1069	J-263	273
1075	J-264	432
1151	J-267	354
1154	J-270	350
1155	J-271	340
1156	J-272	340
1157	J-273	379
1158	J-274	389

LONG TERM		
ID	Label	Pressure
407	H-44	379
408	H-45	348
409	H-46	346
410	H-47	382
411	H-48	385
412	H-49	350
413	H-5	392
414	H-50	359
415	H-51	368
416	H-52	373
417	H-53	368
418	H-54	376
419	H-55	377
420	H-56	371
421	H-57	362
422	H-58	360
423	H-59	357
424	H-60	354
425	H-61	355
426	H-62	353
427	H-63	355
428	H-64	366
429	H-65	365
430	H-66	364
431	H-67	362
432	H-68	368
433	H-69	361
434	H-7	408
435	H-70	364
436	H-71	370
437	H-72	385
438	H-73	370
439	H-74	374
440	H-75	350
441	H-76	384
442	H-77	294
443	H-78	298
444	H-79	354
445	H-8	412
446	H-80	354
447	H-81	349
448	H-82	362
449	H-83	360
450	H-84	340
451	H-85	359
452	H-86	360
453	H-87	363
454	H-88	357
455	H-89	322
456	H-9	391
457	H-90	325
458	H-91	335
459	H-92	360
460	H-93	367
461	H-94	380
462	H-95	365
463	H-96	369
464	H-97	364
465	H-98	364
466	H-99	367
977	J-246	357
982	J-247	366
983	J-248	366
1019	J-254	426
1030	J-257	370
1036	J-258	340
1050	J-260	370
1066	J-262	381
1069	J-263	272
1075	J-264	424
1151	J-267	346
1152	J-268	391
1153	J-269	391
1154	J-270	342
1155	J-271	333
1156	J-272	333

BUILD OUT		
ID	Label	Pressure
407	H-44	375
408	H-45	345
409	H-46	343
410	H-47	392
411	H-48	381
412	H-49	347
413	H-5	386
414	H-50	356
415	H-51	365
416	H-52	370
417	H-53	364
418	H-54	372
419	H-55	373
420	H-56	367
421	H-57	358
422	H-58	356
423	H-59	353
424	H-60	351
425	H-61	352
426	H-62	352
427	H-63	352
428	H-64	362
429	H-65	361
430	H-66	360
431	H-67	357
432	H-68	363
433	H-69	357
434	H-7	402
435	H-70	360
436	H-71	366
437	H-72	380
438	H-73	367
439	H-74	371
440	H-75	348
441	H-76	384
442	H-77	294
443	H-78	298
444	H-79	354
445	H-8	406
446	H-80	354
447	H-81	349
448	H-82	362
449	H-83	360
450	H-84	340
451	H-85	359
452	H-86	360
453	H-87	363
454	H-88	357
455	H-89	322
456	H-9	385
457	H-90	325
458	H-91	335
459	H-92	360
460	H-93	367
461	H-94	380
462	H-95	365
463	H-96	369
464	H-97	364
465	H-98	364
466	H-99	367
977	J-246	357
982	J-247	366
983	J-248	366
1019	J-254	420
1030	J-257	366
1036	J-258	336
1050	J-260	370
1066	J-262	381
1069	J-263	272
1075	J-264	418
1151	J-267	342
1152	J-268	386
1153	J-269	386
1154	J-270	338
1155	J-271	328
1156	J-272	329

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING		
ID	Label	Pressure

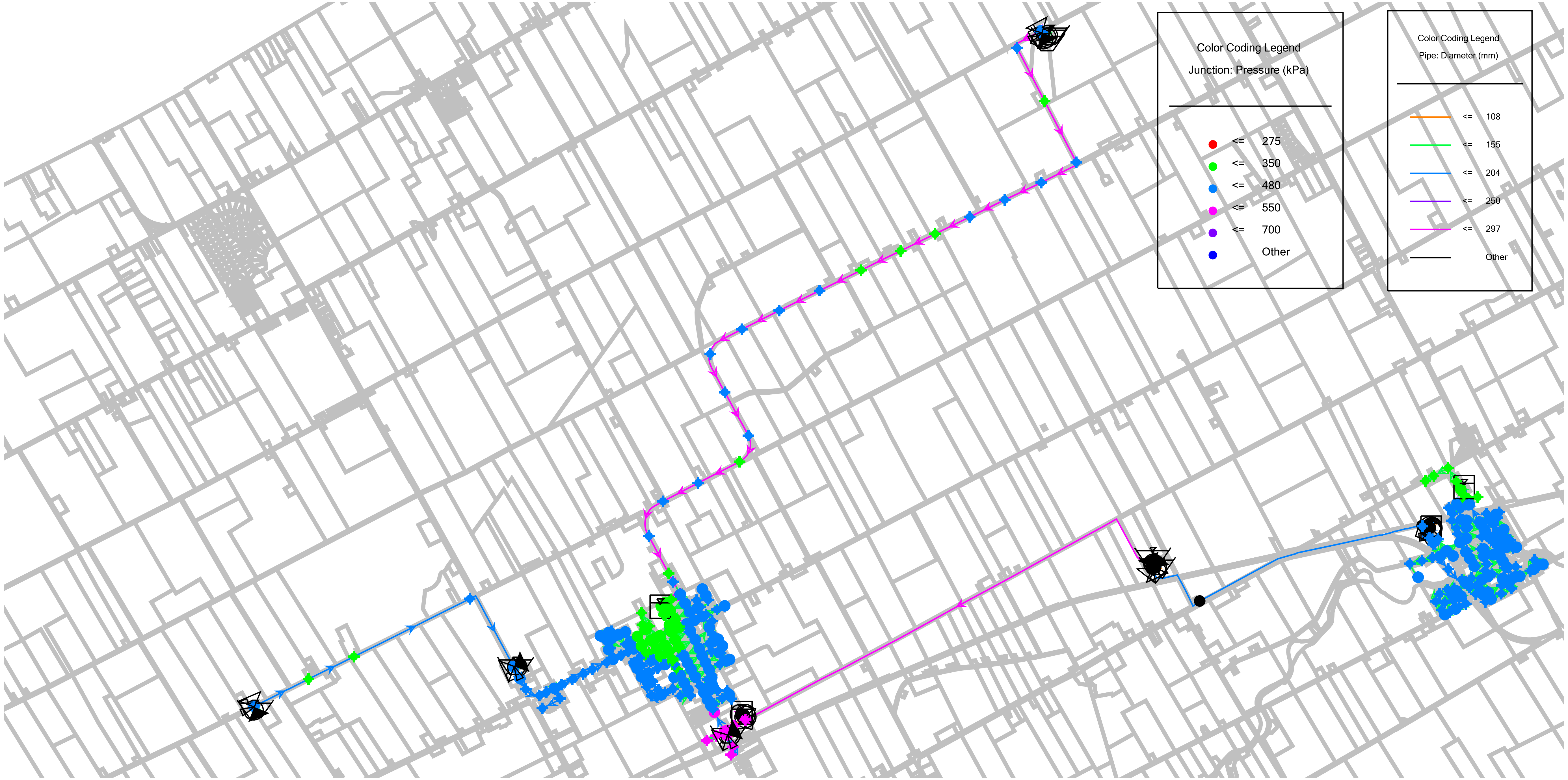
NEAR TERM		
ID	Label	Pressure
1161	J-277	404
1163	J-279	397
1164	J-280	397
1185	J-288	372
1209	J-290	450
1213	J-291	482
1219	J-292	362

MID TERM		
ID	Label	Pressure
1160	J-276	405
1161	J-277	405
1163	J-279	401
1164	J-280	401
1165	J-281	401
1169	J-285	430
1171	J-287	350
1185	J-288	374
1209	J-290	395
1213	J-291	399
1219	J-292	363

LONG TERM		
ID	Label	Pressure
1157	J-273	372
1158	J-274	382
1160	J-276	404
1161	J-277	404
1163	J-279	397
1164	J-280	397
1165	J-281	397
1166	J-282	393
1169	J-285	423
1170	J-286	433
1171	J-287	342
1185	J-288	368
1209	J-290	388
1213	J-291	392
1219	J-292	358

BUILD OUT		
ID	Label	Pressure
1157	J-273	369
1158	J-274	378
1159	J-275	398
1160	J-276	403
1161	J-277	403
1162	J-278	384
1163	J-279	394
1164	J-280	394
1165	J-281	394
1166	J-282	389
1167	J-283	378
1168	J-284	419
1169	J-285	416
1170	J-286	426
1171	J-287	338
1185	J-288	364
1205	J-289	388
1209	J-290	382
1213	J-291	385
1219	J-292	355

North Dundas Hydraulic Water Model
Existing Peak Hour Demand

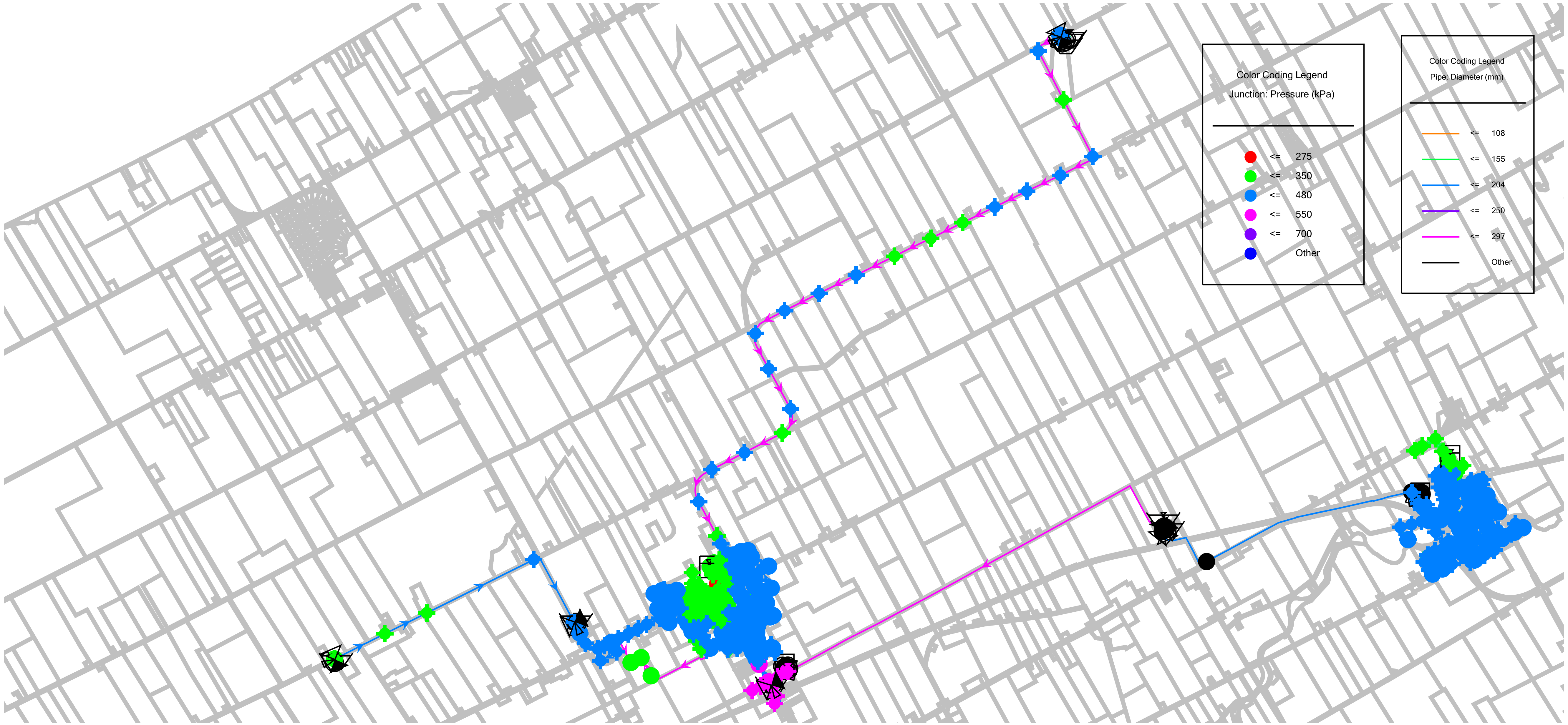


North Dundas Hydraulic Water Model
Existing Peak Hour Demand - Winchester

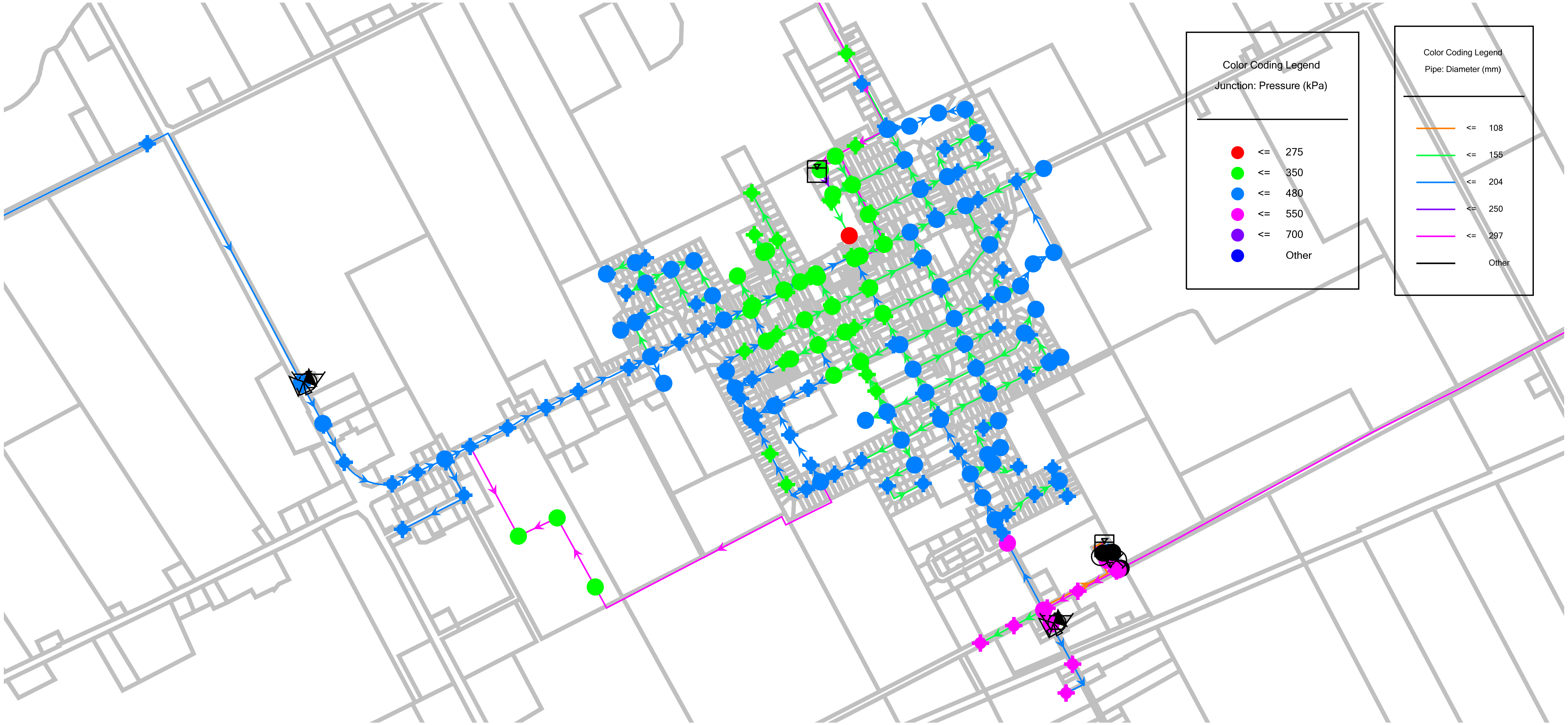
North Dundas Hydraulic Water Model

Existing Peak Hour Demand - Chesterville

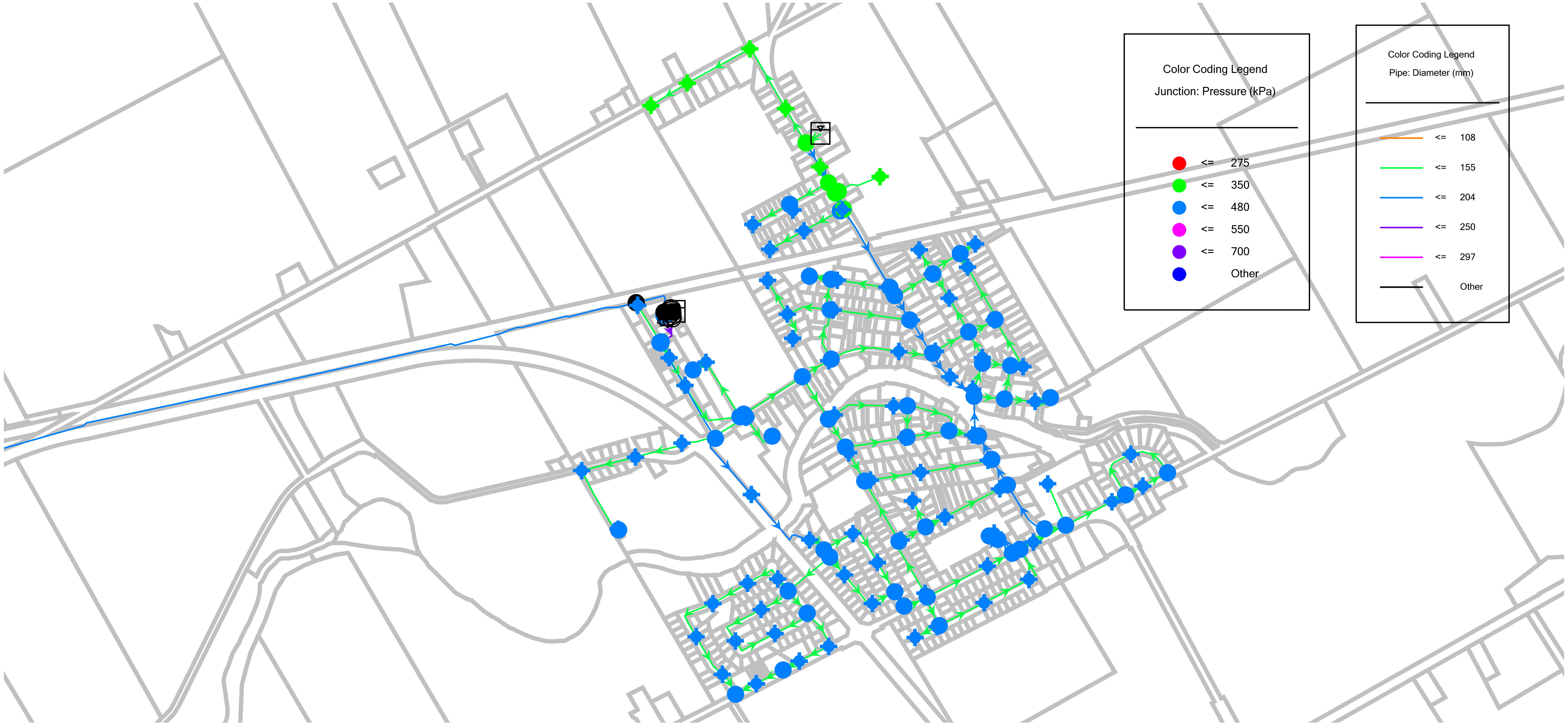
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Peak Hour Demand
With 300mm Main St - Fred St Loop



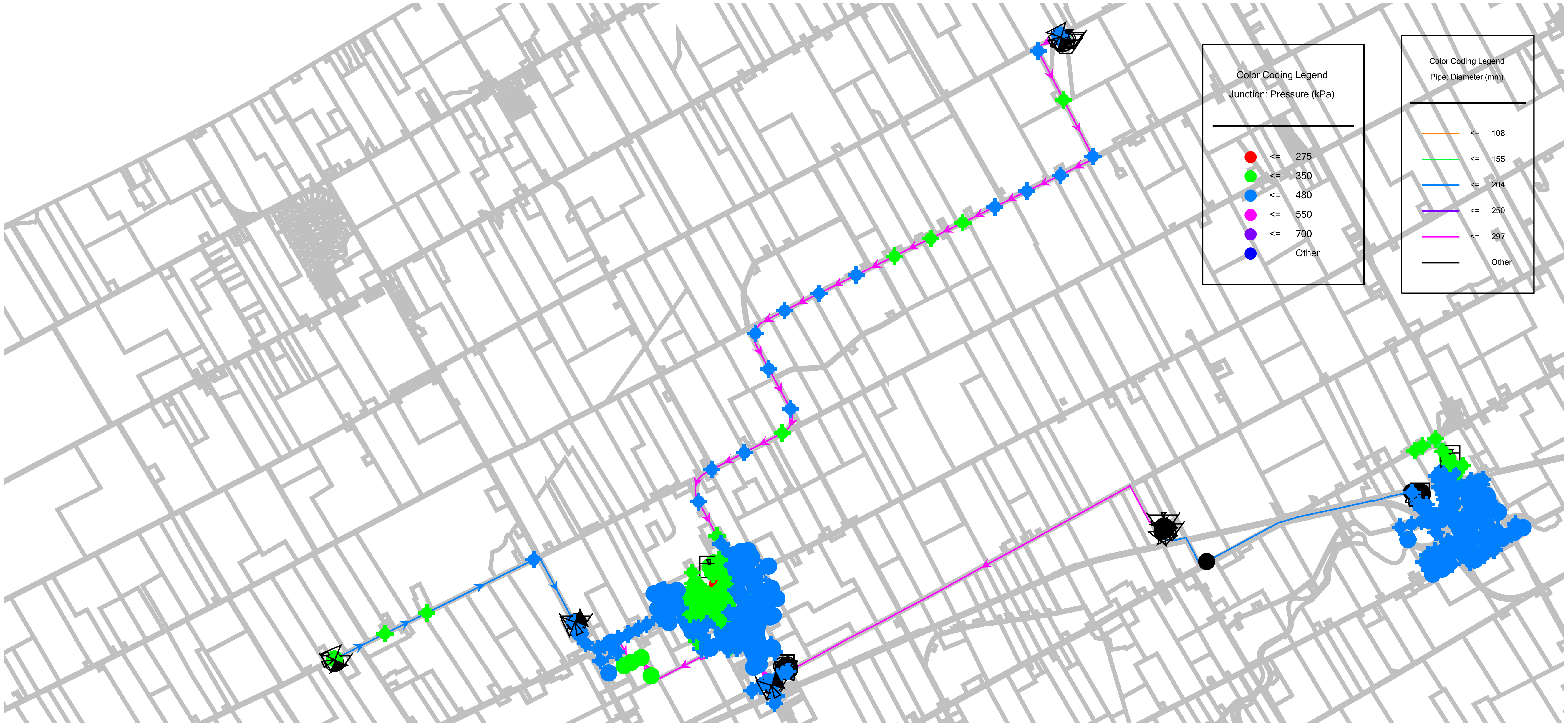
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Peak Hour Demand - Winchester
With 300mm Main St - Fred St Loop



North Dundas Hydraulic Water Model
Near Term (1-5 Year) Peak Hour Demand - Chesterville
With 300mm Main St - Fred St Loop



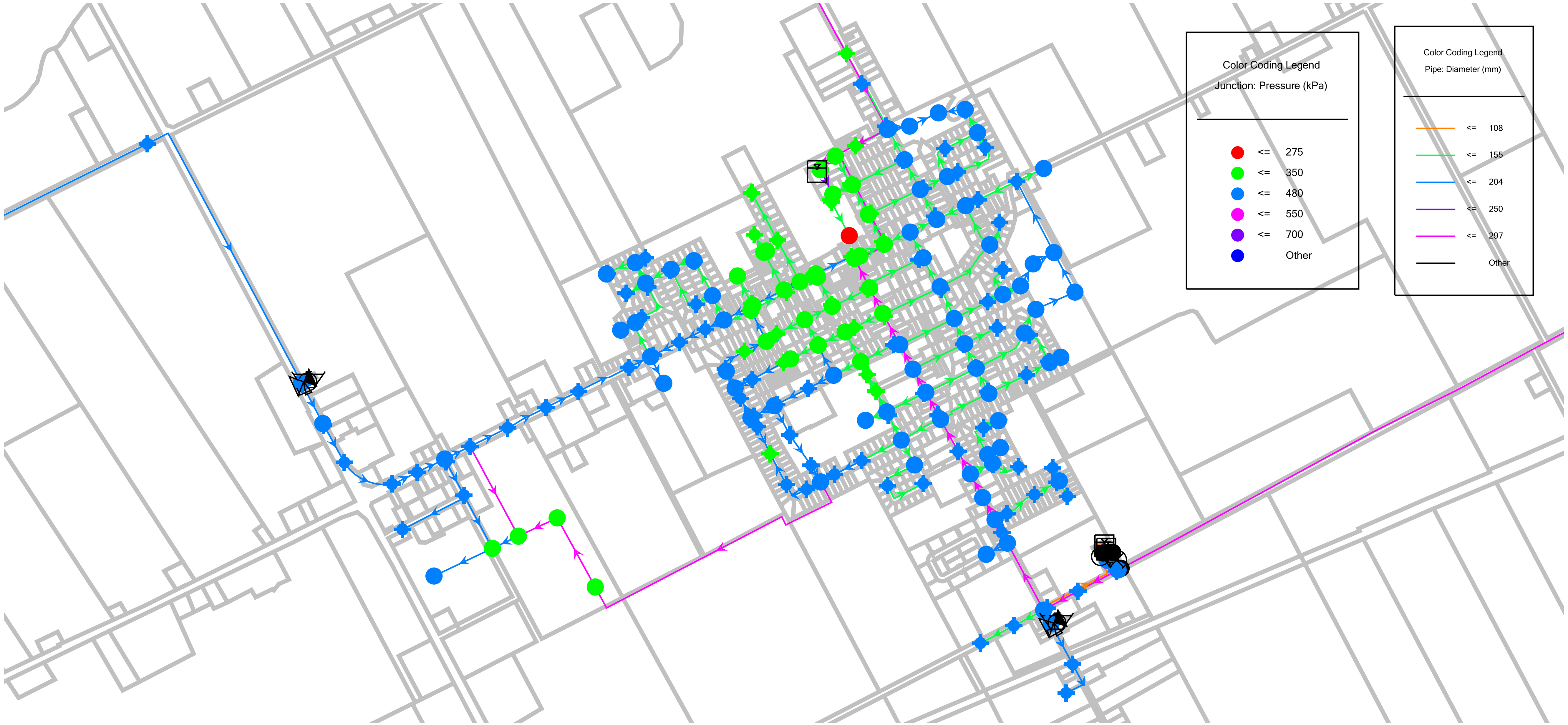
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Peak Hour Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model

Mid Term (5-10 Year) Peak Hour Demand - Winchester

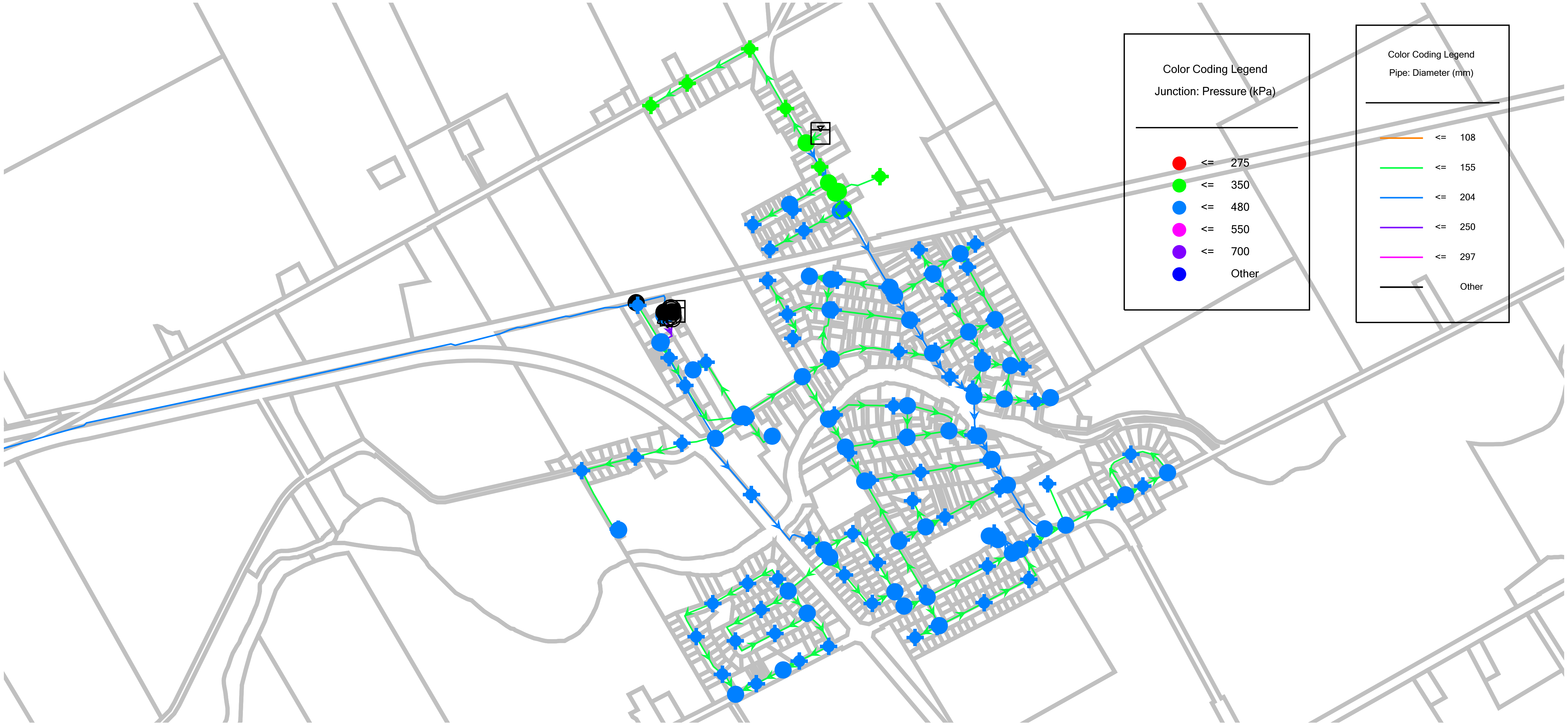
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



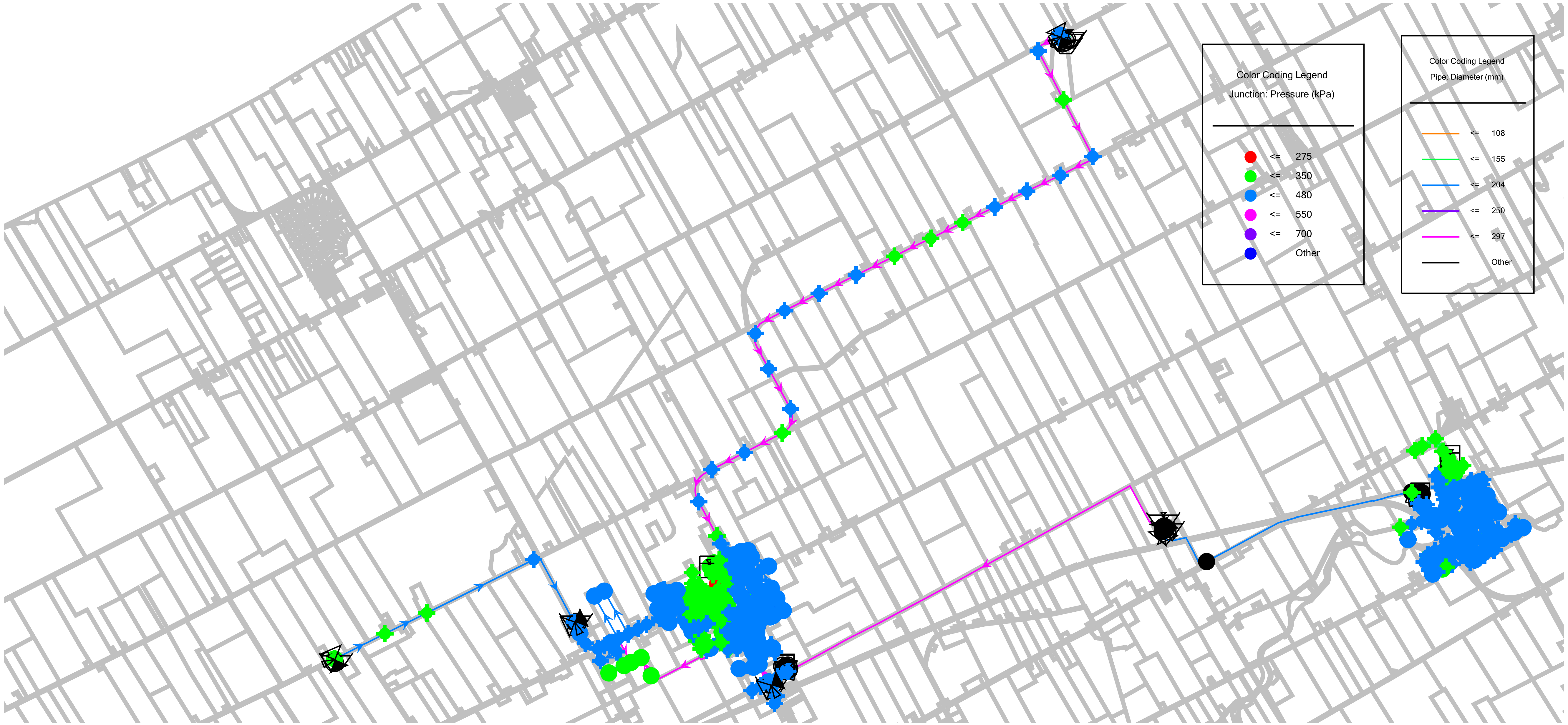
North Dundas Hydraulic Water Model

Mid Term (5-10 Year) Peak Hour Demand - Chesterville

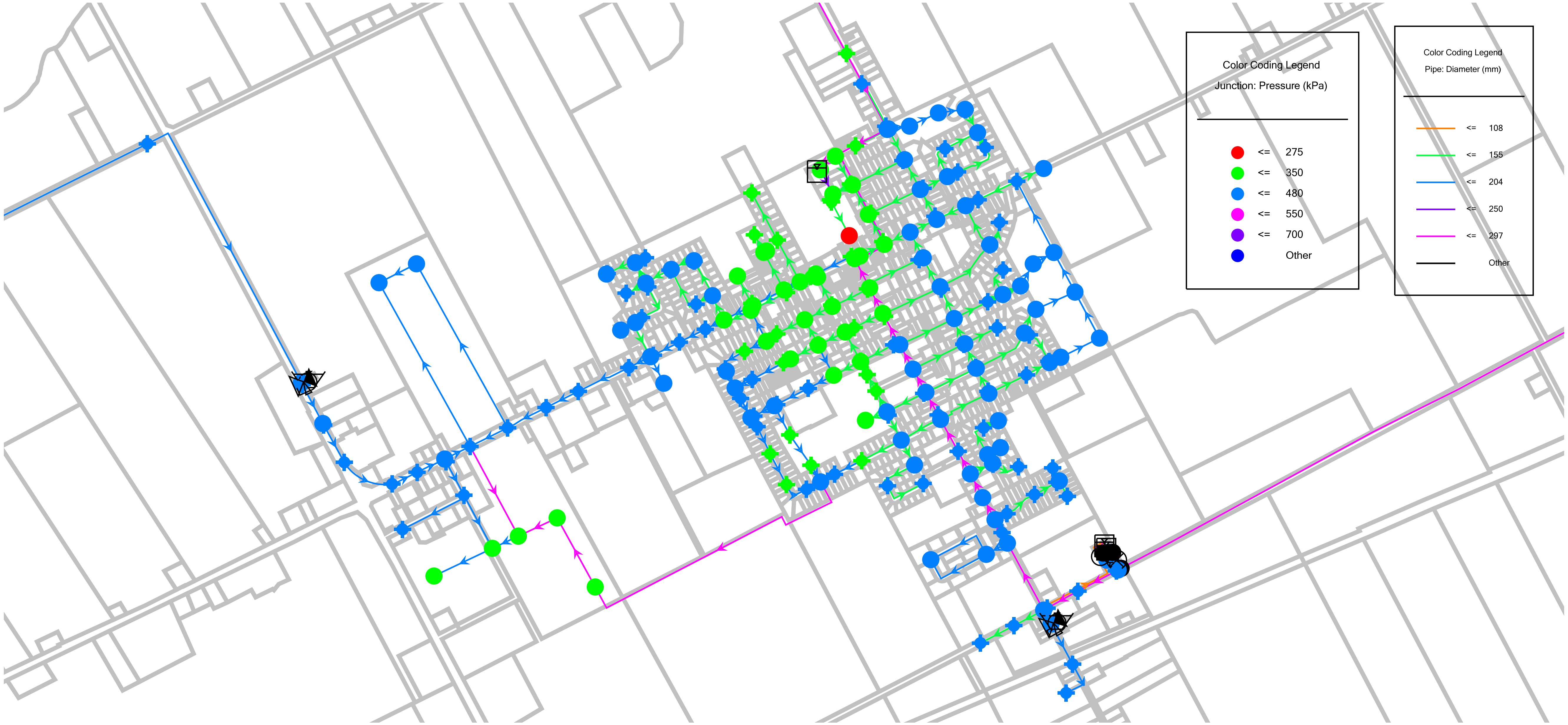
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



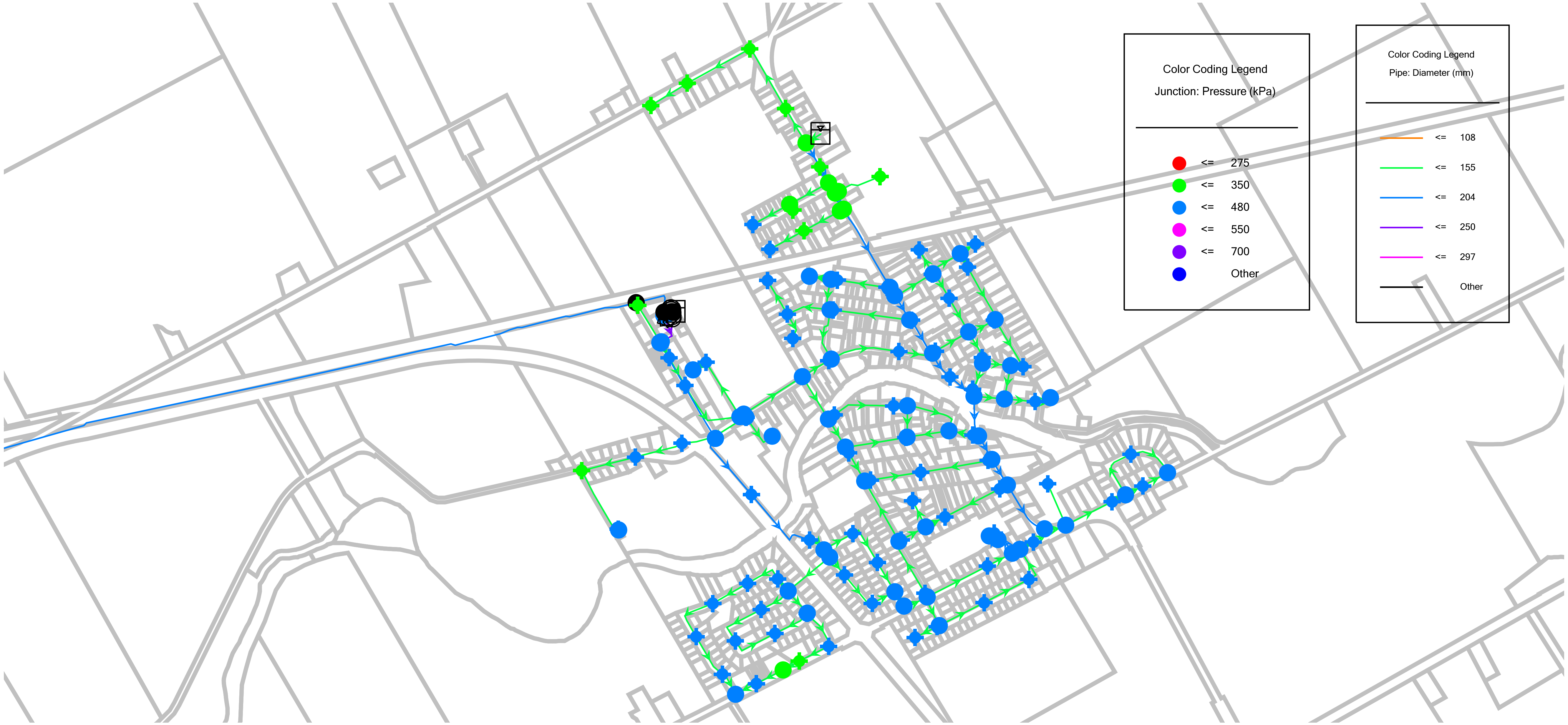
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Peak Hour Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



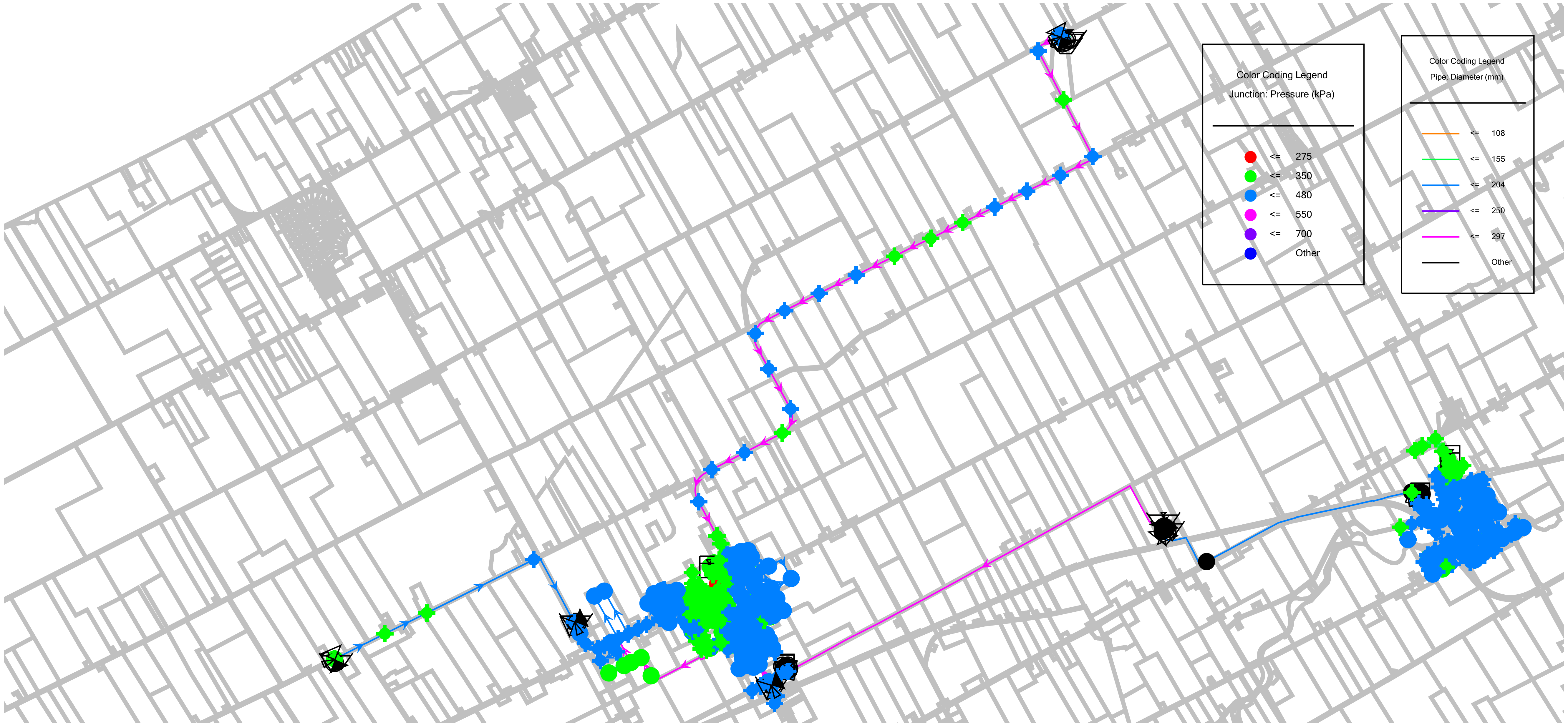
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Peak Hour Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



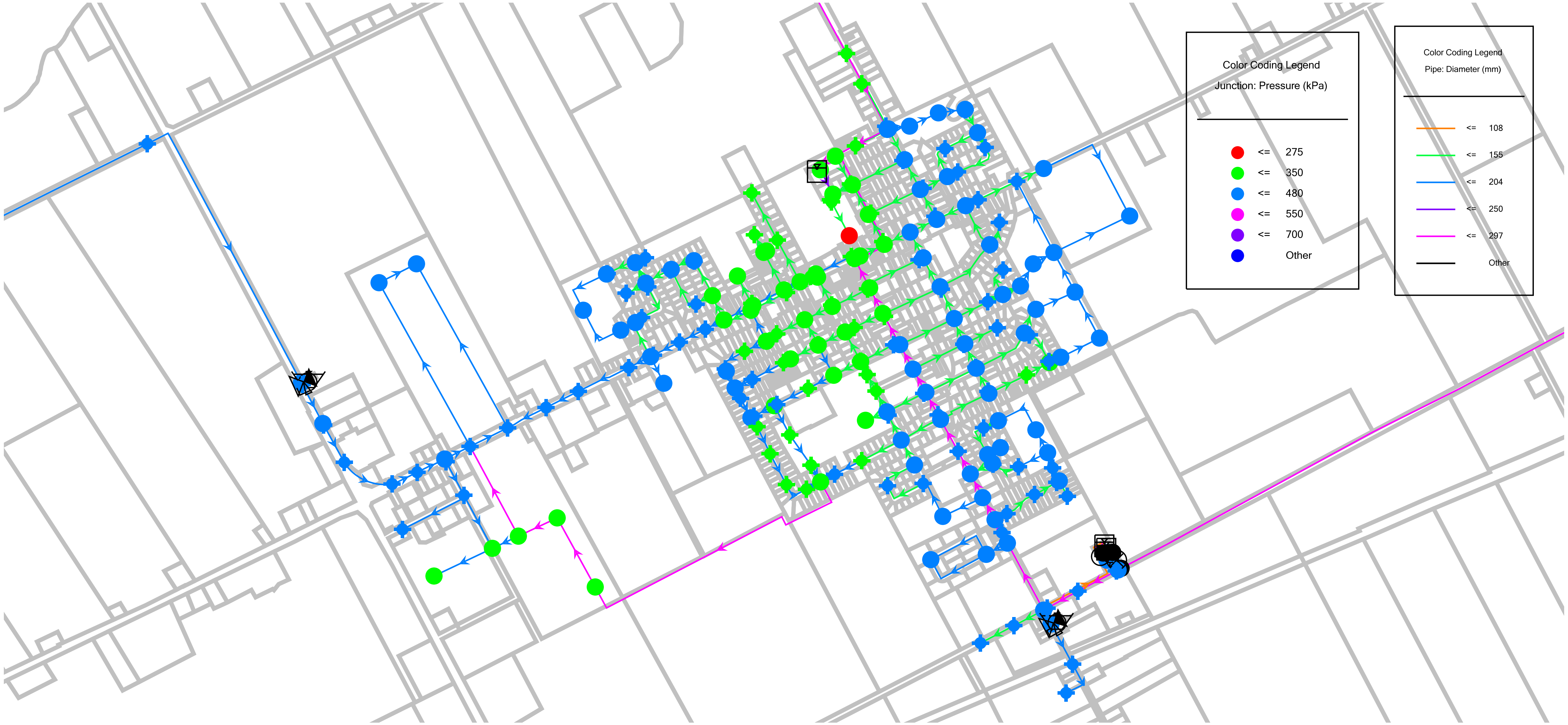
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Peak Hour Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



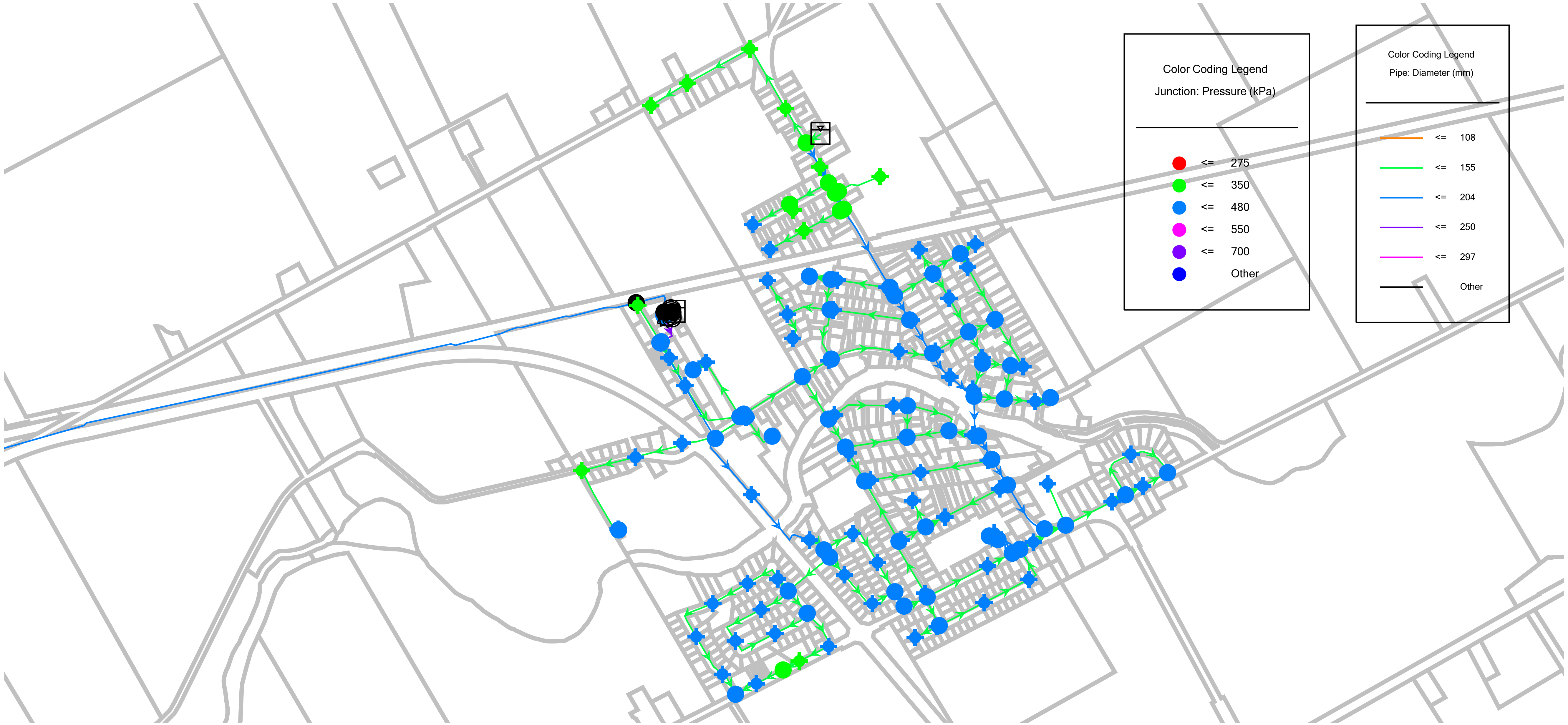
North Dundas Hydraulic Water Model
Build Out (20+ Year) Peak Hour Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model
Build Out (20+ Year) Peak Hour Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model
Build Out (20+ Year) Peak Hour Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - No Watermain Upgrades

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow
248	H-1	62.85	248	H-1	62.06	248	H-1	61.24	248	H-1	59.54	248	H-1	59.54
249	H-10	143.46	249	H-10	144.04	249	H-10	145.4	249	H-10	143.05	249	H-10	146.65
250	H-100	81.5	250	H-100	80.08	250	H-100	78.63	250	H-100	75.75	250	H-100	75.75
251	H-101	84.62	251	H-101	83.16	251	H-101	81.68	251	H-101	78.69	251	H-101	78.69
252	H-102	89.26	252	H-102	87.8	252	H-102	86.32	252	H-102	83.33	252	H-102	83.33
253	H-103	80.94	253	H-103	79.61	253	H-103	78.25	253	H-103	75.53	253	H-103	75.53
254	H-104	55.36	254	H-104	54.84	254	H-104	54.29	254	H-104	53.09	254	H-104	53.09
255	H-105	56.78	255	H-105	56.22	255	H-105	55.64	255	H-105	54.37	255	H-105	54.37
256	H-106	54.9	256	H-106	54.42	256	H-106	53.9	256	H-106	52.82	256	H-106	52.82
257	H-107	54.33	257	H-107	53.87	257	H-107	53.39	257	H-107	52.39	257	H-107	52.34
258	H-108	53.3	258	H-108	52.85	258	H-108	52.37	258	H-108	51.3	258	H-108	51.3
259	H-109	50.94	259	H-109	50.53	259	H-109	50.08	259	H-109	49.09	259	H-109	49.09
260	H-11	141.68	260	H-11	142.83	260	H-11	145.22	260	H-11	143.04	260	H-11	141.24
261	H-110	49.06	261	H-110	48.7	261	H-110	48.3	261	H-110	47.4	261	H-110	47.4
262	H-111	73.73	262	H-111	72.78	262	H-111	71.83	262	H-111	69.87	262	H-111	69.87
263	H-112	74.14	263	H-112	73.21	263	H-112	72.24	263	H-112	70.27	263	H-112	70.27
264	H-113	87.84	264	H-113	86.62	264	H-113	85.39	264	H-113	82.72	264	H-113	82.72
265	H-114	74.22	265	H-114	73.27	265	H-114	72.28	265	H-114	70.27	265	H-114	70.27
266	H-115	75.18	266	H-115	74.2	266	H-115	73.18	266	H-115	71.11	266	H-115	71.11
267	H-116	73.76	267	H-116	72.63	267	H-116	71.45	267	H-116	69.12	267	H-116	69.12
268	H-117	80.49	268	H-117	79.08	268	H-117	77.65	268	H-117	74.8	268	H-117	74.8
269	H-118	70.51	269	H-118	69.47	269	H-118	68.48	269	H-118	66.32	269	H-118	66.32
270	H-119	67.78	270	H-119	66.82	270	H-119	65.88	270	H-119	63.87	270	H-119	63.87
271	H-12	131.92	271	H-12	131.36	271	H-12	128.84	271	H-12	125.75	271	H-12	127.48
272	H-120	70.66	272	H-120	69.63	272	H-120	68.59	272	H-120	66.4	272	H-120	66.4
273	H-121	57.46	273	H-121	56.79	273	H-121	56.1	273	H-121	54.66	273	H-121	54.66
274	H-122	82.3	274	H-122	80.9	274	H-122	79.53	274	H-122	76.74	274	H-122	76.74
275	H-123	87.45	275	H-123	85.92	275	H-123	84.34	275	H-123	81.21	275	H-123	81.21
276	H-124	96.54	276	H-124	94.76	276	H-124	92.97	276	H-124	89.34	276	H-124	89.34
277	H-125	91.51	277	H-125	89.86	277	H-125	88.16	277	H-125	84.81	277	H-125	84.81
278	H-126	98.84	278	H-126	96.96	278	H-126	95.04	278	H-126	91.27	278	H-126	91.27
279	H-128	40.35	279	H-128	40.1	279	H-128	39.79	279	H-128	39.07	279	H-128	39.07
280	H-129	40.35	280	H-129	40.12	280	H-129	39.84	280	H-129	39.15	280	H-129	39.15
281	H-13	134.36	281	H-13	133.72	281	H-13	131.06	281	H-13	127.81	281	H-13	129.14
282	H-130	54.64	282	H-130	54.03	282	H-130	53.36	282	H-130	52	282	H-130	52
283	H-131	55.15	283	H-131	54.74	283	H-131	54.31	283	H-131	53.4	283	H-131	53.4
284	H-132	44.35	284	H-132	44.13	284	H-132	43.9	284	H-132	43.39	284	H-132	43.39
285	H-133	114.03	285	H-133	112.1	285	H-133	110.16	285	H-133	106.26	285	H-133	106.26
286	H-134	59.95	286	H-134	59.45	286	H-134	58.92	286	H-134	57.84	286	H-134	57.84
287	H-135	45.51	287	H-135	45.3	287	H-135	45.03	287	H-135	44.47	287	H-135	44.47
288	H-136	55.62	288	H-136	55.04	288	H-136	54.44	288	H-136	53.15	288	H-136	53.15
289	H-137	47.4	289	H-137	47.06	289	H-137	46.73	289	H-137	45.88	289	H-137	45.88
290	H-138	87.75	290	H-138	86.2	290	H-138	84.63	290	H-138	81.5	290	H-138	81.5
291	H-139	81.7	291	H-139	80.33	291	H-139	78.95	291	H-139	76.21	291	H-139	76.21
292	H-14	129.47	292	H-14	128.76	292	H-14	126.15	292	H-14	122.98	292	H-14	124.01
293	H-140	86.76	293	H-140	85.22	293	H-140	83.65	293	H-140	80.52	293	H-140	80.52
294	H-141	63.27	294	H-141	62.46	294	H-141	61.62	294	H-141	59.9	294	H-141	59.9
295	H-142	75.3	295	H-142	74.14	295	H-142	72.95	295	H-142	70.57	295	H-142	70.57
296	H-143	86.07	296	H-143	84.61	296	H-143	83.11	296	H-143	80.12	296	H-143	80.12
297	H-144	70.96	297	H-144	66.44	297	H-144	66.39	297	H-144	66.33	297	H-144	66.31
298	H-145	213.32	298	H-145	215.55	298	H-145	214.28	298	H-145	212.73	298	H-145	212.27
299	H-146	48.52	299	H-146	48.55	299	H-146	48.49	299	H-146	48.47	299	H-146	48.45
300	H-147	58.88	300	H-147	57.75	300	H-147	56.35	300	H-147	54.22	300	H-147	61.96
301	H-148	82.17	301	H-148	80.17	301	H-148	77.58	301	H-148	73.92	301	H-148	74.71
302	H-149	78.54	302	H-149	76.72	302	H-149	74.33	302	H-149	70.95	302	H-149	70.84
303	H-15	131.35	303	H-15	130.59	303	H-15	127.85	303	H-15	124.55	303	H-15	125.44
304	H-150	41.07	304	H-150	40.74	304	H-150	40.23	304	H-150	39.44	304	H-150	39.08
305	H-151	33.16	305	H-151	32.97	305	H-151	32.72	305	H-151	32.28	305	H-151	32.08
306	H-152	88.53	306	H-152	83.07	306	H-152	76.75	306	H-152	68.37	306	H-152	65.23
307	H-153	53.51	307	H-153	51.96	307	H-153	45.44	307	H-153	39.59	307	H-153	36.98
308	H-154	119.94	308	H-154	165.14	308	H-154	164.79	308	H-154	163.93	308	H-154	163.55
309	H-155	58.13	309	H-155	107.51	309	H-155	107.07	309	H-155	106.74	309	H-155	106.62
310	H-156	314.76	310	H-156	323.47	310	H-156	320.74	310	H-156	317.33	310	H-156	316.41
311	H-157	212.18	311	H-157	214.54	311	H-157	213.91	311	H-157	212.99	311	H-157	212.68
312	H-158	124.93	312	H-158	126.44	312	H-158	137.57	312	H-158	136.61	312	H-158	135.54
313	H-159	57.31	313	H-159	57.53	313	H-159	57.08	313	H-159	56.52	313	H-159	56.21
314	H-16	143.14	314	H-16	142.44	314	H-16	139.32	314	H-16	135.57	314	H-16	136.55
315	H-160	115.42	315	H-160	114.97	315	H-160	112.86	315	H-160	110.38	315	H-160	110.12
316	H-161	102.26	316	H-161	102.12	316	H-161	100.7	316	H-161	98.76	316	H-161	99.3
317	H-162	140.57	317	H-162	142.19	317	H-162	143.35	317	H-162	140.8	317	H-162	140.6
318	H-163	43.23	318	H-163	43.15	318	H-163	42.9	318	H-163	42.56	318	H-163	84.89
319	H-164	121.74	319	H-164	121.19	319	H-164	118.99	319	H-164	116.27	319	H-164	118.14
320	H-165	63.35	320	H-165	63.24	320	H-165	62.96	320	H-165	62.27	320	H-165	97.63
321	H-166	143.44	321	H-166	141.91	321	H-166	138.14	321	H-166	133.45	321	H-166	132.94
322	H-167	27.13	322	H-167	26.93	322	H-167	26.72	322	H-167	26.37	322	H-167	26.37

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - No Watermain Upgrades

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow
323	H-168	92.57	323	H-168	91.22	323	H-168	89.86	323	H-168	86.92	323	H-168	86.92
324	H-169	75.08	324	H-169	73.91	324	H-169	72.7	324	H-169	70.29	324	H-169	70.29
325	H-17	154.09	325	H-17	153.28	325	H-17	149.75	325	H-17	145.47	325	H-17	146.24
326	H-170	47.57	326	H-170	47.21	326	H-170	46.87	326	H-170	45.98	326	H-170	45.98
327	H-171	45.99	327	H-171	45.56	327	H-171	45.09	327	H-171	44.07	327	H-171	44.07
328	H-172	34.78	328	H-172	33.75	328	H-172	30.99	328	H-172	27.97	328	H-172	26.57
329	H-173	28.23	329	H-173	27.48	329	H-173	25.69	329	H-173	23.53	329	H-173	22.51
330	H-174	26.51	330	H-174	25.84	330	H-174	24.27	330	H-174	22.3	330	H-174	21.38
331	H-175	26.55	331	H-175	25.87	331	H-175	24.29	331	H-175	22.33	331	H-175	21.42
333	H-177	43.53	333	H-177	42.15	333	H-177	37.75	333	H-177	33.43	333	H-177	31.54
334	H-178	135.97	334	H-178	136.36	334	H-178	135.88	334	H-178	135.25	334	H-178	135.06
335	H-18	143.99	335	H-18	143.11	335	H-18	139.93	335	H-18	136.03	335	H-18	136.49
336	H-180	148.32	336	H-180	147.63	336	H-180	144.33	336	H-180	140.38	336	H-180	141.46
337	H-181	112.19	337	H-181	112.08	337	H-181	110.34	337	H-181	108.1	337	H-181	108.55
338	H-182	99.86	338	H-182	99.61	338	H-182	99.35	338	H-182	97.67	338	H-182	118.18
339	H-183	66.83	339	H-183	66.51	339	H-183	66.18	339	H-183	65.37	339	H-183	95.4
340	H-184	146.59	340	H-184	149.67	340	H-184	148.72	340	H-184	147.29	340	H-184	146.78
341	H-185	76.85	341	H-185	76.79	341	H-185	76.64	341	H-185	75.81	341	H-185	75.27
342	H-186	51.26	342	H-186	51.26	342	H-186	51.22	342	H-186	51.17	342	H-186	51.15
343	H-187	51.26	343	H-187	51.26	343	H-187	51.22	343	H-187	51.17	343	H-187	51.15
344	H-188	51.23	344	H-188	51.23	344	H-188	51.19	344	H-188	51.13	344	H-188	51.11
345	H-189	52.27	345	H-189	52.26	345	H-189	52.21	345	H-189	52.13	345	H-189	52.1
346	H-19	154.23	346	H-19	153.18	346	H-19	149.54	346	H-19	145.07	346	H-19	145.33
347	H-190	52.27	347	H-190	52.27	347	H-190	52.21	347	H-190	52.13	347	H-190	52.1
348	H-191	52.22	348	H-191	52.22	348	H-191	52.16	348	H-191	52.08	348	H-191	52.05
349	H-192	52.24	349	H-192	52.24	349	H-192	52.18	349	H-192	52.1	349	H-192	52.07
350	H-193	52.27	350	H-193	52.27	350	H-193	52.21	350	H-193	52.13	350	H-193	52.1
351	H-194	52.24	351	H-194	52.24	351	H-194	52.18	351	H-194	52.1	351	H-194	52.07
352	H-195	54.35	352	H-195	54.34	352	H-195	54.28	352	H-195	54.19	352	H-195	54.16
353	H-196	56.78	353	H-196	56.78	353	H-196	56.71	353	H-196	56.61	353	H-196	56.58
354	H-197	59.58	354	H-197	59.58	354	H-197	59.5	354	H-197	59.39	354	H-197	59.36
355	H-198	70.66	355	H-198	70.66	355	H-198	70.55	355	H-198	70.41	355	H-198	70.36
356	H-199	77.32	356	H-199	77.33	356	H-199	77.21	356	H-199	77.03	356	H-199	76.96
357	H-2	100.44	357	H-2	98.52	357	H-2	96.57	357	H-2	92.72	357	H-2	92.72
358	H-20	150.29	358	H-20	148.96	358	H-20	145.14	358	H-20	140.41	358	H-20	140.25
359	H-200	82.6	359	H-200	82.63	359	H-200	82.48	359	H-200	82.27	359	H-200	82.2
360	H-201	93.44	360	H-201	93.5	360	H-201	93.29	360	H-201	93.01	360	H-201	92.92
361	H-202	107.65	361	H-202	107.78	361	H-202	107.49	361	H-202	107.11	361	H-202	106.99
362	H-203	48.03	362	H-203	47.7	362	H-203	47.33	362	H-203	46.49	362	H-203	46.49
363	H-204	48.01	363	H-204	47.69	363	H-204	47.33	363	H-204	46.5	363	H-204	46.5
364	H-205	48.53	364	H-205	48.21	364	H-205	47.84	364	H-205	47	364	H-205	47
365	H-207	66.23	365	H-207	66.23	365	H-207	66.13	365	H-207	66.01	365	H-207	65.97
366	H-208	62.61	366	H-208	62.61	366	H-208	62.52	366	H-208	62.41	366	H-208	62.37
367	H-209	161.53	367	H-209	161.43	367	H-209	161.25	367	H-209	157.6	367	H-209	162.67
368	H-21	152.43	368	H-21	151.79	368	H-21	148.22	368	H-21	143.9	368	H-21	144.45
369	H-210	163.58	369	H-210	163.48	369	H-210	163.3	369	H-210	159.57	369	H-210	164.7
370	H-211	166.23	370	H-211	166.12	370	H-211	165.94	370	H-211	162.17	370	H-211	167.36
371	H-212	53.5	371	H-212	51.97	371	H-212	45.7	371	H-212	39.83	371	H-212	37.17
372	H-213	53.52	372	H-213	51.97	372	H-213	45.72	372	H-213	39.82	372	H-213	37.16
373	H-214	96.39	373	H-214	94.6	373	H-214	92.81	373	H-214	89.16	373	H-214	89.16
374	H-215	51.46	374	H-215	51.05	374	H-215	50.6	374	H-215	49.66	374	H-215	49.66
375	H-216	53.3	375	H-216	52.86	375	H-216	52.39	375	H-216	51.37	375	H-216	51.37
376	H-217	55.44	376	H-217	55	376	H-217	54.52	376	H-217	53.5	376	H-217	53.5
377	H-218	55.33	377	H-218	55.02	377	H-218	54.8	377	H-218	54.36	377	H-218	94.82
378	H-219	49.65	378	H-219	49.39	378	H-219	49.23	378	H-219	48.88	378	H-219	97.27
379	H-22	144.86	379	H-22	145.16	379	H-22	142.36	379	H-22	138.78	379	H-22	139.46
380	H-220	49.49	380	H-220	49.25	380	H-220	49.14	380	H-220	48.76	380	H-220	75.58
381	H-221	55.59	381	H-221	102.32	381	H-221	101.76	381	H-221	101.47	381	H-221	101.36
382	H-222	55.28	382	H-222	108.8	382	H-222	108.38	382	H-222	108.06	382	H-222	107.94
383	H-223	47.25	383	H-223	156.65	383	H-223	155.98	383	H-223	155.36	383	H-223	155.16
384	H-23	173.6	384	H-23	174.05	384	H-23	170.19	384	H-23	165.72	384	H-23	164.98
385	H-24	148.92	385	H-24	149.21	385	H-24	148.36	385	H-24	145.89	385	H-24	144.87
386	H-25	80.18	386	H-25	85.75	386	H-25	86.89	386	H-25	86.22	386	H-25	85.77
387	H-26	55.19	387	H-26	57.09	387	H-26	57.41	387	H-26	57.17	387	H-26	56.91
388	H-27	65.23	388	H-27	93.08	388	H-27	102.83	388	H-27	103.2	388	H-27	103.25
389	H-28	42.01	389	H-28	76.21	389	H-28	99.54	389	H-28	103.49	389	H-28	110.46
390	H-29	128.11	390	H-29	143.57	390	H-29	145.21	390	H-29	144.07	390	H-29	143.46
391	H-3	82.09	391	H-3	80.66	391	H-3	79.2	391	H-3	76.3	391	H-3	76.3
392	H-30	148.58	392	H-30	152.33	392	H-30	152.03	392	H-30	151.48	392	H-30	151.26
393	H-31	58.74	393	H-31	58.78	393	H-31	58.7	393	H-31	58.61	393	H-31	58.58
394	H-32	129.34	394	H-32	133.65	394	H-32	133.29	394	H-32	132.5	394	H-32	132.2
395	H-33	128.29	395	H-33	127.41	395	H-33	124.74	395	H-33	121.47	395	H-33	121.72
396	H-34	117.76	396	H-34	114.63	396	H-34	110.16	396	H-34	101.36	396	H-34	96.78
397	H-35	94.93	397	H-35	93.81	397	H-35	91.87	397	H-35	89.4	397	H-35	88.67
398	H-36	47.7	398	H-36	47.25	398	H-36	46.54	398	H-36	45.49	398	H-36	45.03

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - No Watermain Upgrades

EXISTING

ID	Label	Fire Flow
399	H-37	167.98
400	H-38	220.65
401	H-39	82.31
402	H-4	56.27
403	H-40	133.74
404	H-41	168.14
405	H-42	129.84
406	H-43	46.41
407	H-44	51.67
408	H-45	134.08
409	H-46	134.78
410	H-47	34.12
411	H-48	56.58
412	H-49	69.85
413	H-5	95.75
414	H-50	66.53
415	H-51	69.11
416	H-52	127.57
417	H-53	75.52
418	H-54	80.63
419	H-55	64.52
420	H-56	83.75
421	H-57	80.67
422	H-58	95.39
423	H-59	104.8
424	H-60	145.78
425	H-61	132.95
426	H-62	119.52
427	H-63	102.04
428	H-64	64.14
429	H-65	69.27
430	H-66	59.32
431	H-67	55.63
432	H-68	51.49
433	H-69	49.87
434	H-7	87.27
435	H-70	47.07
436	H-71	45.26
437	H-72	84.23
438	H-73	56.46
439	H-74	38.94
440	H-75	139.28
441	H-76	102.33
442	H-77	27.51
443	H-78	30.39
444	H-79	44.47
445	H-8	63.14
446	H-80	36.15
447	H-81	30.67
448	H-82	81.11
449	H-83	92.66
450	H-84	59.85
451	H-85	72.63
452	H-86	90.94
453	H-87	83.91
454	H-88	101.56
455	H-89	123.45
456	H-9	136.26
457	H-90	54.11
458	H-91	37.94
459	H-92	84.64
460	H-93	83.69
461	H-94	63.23
462	H-95	74.83
463	H-96	92.39
464	H-97	86.17
465	H-98	74.39
466	H-99	58.37

NEAR TERM

ID	Label	Fire Flow
399	H-37	160.51
400	H-38	218.98
401	H-39	77.31
402	H-4	55.86
403	H-40	134.11
404	H-41	167.61
405	H-42	128.64
406	H-43	46.05
407	H-44	50.82
408	H-45	133.43
409	H-46	134.08
410	H-47	34.07
411	H-48	56.48
412	H-49	69.87
413	H-5	95.62
414	H-50	66.53
415	H-51	69.14
416	H-52	130.96
417	H-53	73.78
418	H-54	78.61
419	H-55	63.2
420	H-56	81.3
421	H-57	75.47
422	H-58	89.61
423	H-59	98.74
424	H-60	145.14
425	H-61	134.14
426	H-62	119.83
427	H-63	102.52
428	H-64	59.58
429	H-65	64.47
430	H-66	55
431	H-67	54.13
432	H-68	49.96
433	H-69	48.33
434	H-7	87.16
435	H-70	45.61
436	H-71	43.82
437	H-72	84.12
438	H-73	84.72
439	H-74	51.52
440	H-75	138.69
441	H-76	100.41
442	H-77	27.47
443	H-78	30.36
444	H-79	44.33
445	H-8	63.05
446	H-80	35.99
447	H-81	30.44
448	H-82	80.14
449	H-83	91.3
450	H-84	59.4
451	H-85	71.75
452	H-86	89.33
453	H-87	82.49
454	H-88	99.58
455	H-89	121.59
456	H-9	136.21
457	H-90	53.82
458	H-91	37.87
459	H-92	83.13
460	H-93	82.22
461	H-94	62.46
462	H-95	73.67
463	H-96	90.65
464	H-97	84.62
465	H-98	73.23
466	H-99	57.66
1154	J-270	54.53
1155	J-271	54.62
1156	J-272	54.6
1157	J-273	82.47
1158	J-274	81.22
1160	J-276	238.43
1161	J-277	182.07

MID TERM

ID	Label	Fire Flow
399	H-37	150.49
400	H-38	206.79
401	H-39	77.25
402	H-4	55.42
403	H-40	132.9
404	H-41	163.85
405	H-42	125.76
406	H-43	45.46
407	H-44	49.7
408	H-45	130.71
409	H-46	131.26
410	H-47	33.91
411	H-48	56.23
412	H-49	78.52
413	H-5	95.29
414	H-50	79.19
415	H-51	97.83
416	H-52	130.24
417	H-53	71.63
418	H-54	76.01
419	H-55	61.5
420	H-56	78.22
421	H-57	69.41
422	H-58	82.89
423	H-59	91.59
424	H-60	141.92
425	H-61	131.85
426	H-62	118.58
427	H-63	110.24
428	H-64	53.94
429	H-65	58.72
430	H-66	49.52
431	H-67	46.15
432	H-68	43.77
433	H-69	42.53
434	H-7	86.88
435	H-70	40.42
436	H-71	39.04
437	H-72	83.89
438	H-73	94.28
439	H-74	55.45
440	H-75	135.51
441	H-76	98.48
442	H-77	27.47
443	H-78	30.35
444	H-79	44.09
445	H-8	62.95
446	H-80	35.87
447	H-81	30.25
448	H-82	79.15
449	H-83	89.89
450	H-84	58.91
451	H-85	70.85
452	H-86	87.68
453	H-87	81.11
454	H-88	97.57
455	H-89	119.71
456	H-9	136.26
457	H-90	53.56
458	H-91	37.77
459	H-92	81.59
460	H-93	80.74
461	H-94	61.67
462	H-95	72.48
463	H-96	88.91
464	H-97	83.05
465	H-98	72.04
466	H-99	56.95
1151	J-267	45.99
1154	J-270	46.09
1155	J-271	46.1
1156	J-272	46.1
1157	J-273	76.19
1158	J-274	78.24
1160	J-276	237.27

LONG TERM

ID	Label	Fire Flow
399	H-37	138.02
400	H-38	191.33
401	H-39	77.17
402	H-4	54.53
403	H-40	131.04
404	H-41	159.44
405	H-42	122.26
406	H-43	44.59
407	H-44	48.01
408	H-45	127.42
409	H-46	127.88
410	H-47	33.7
411	H-48	55.69
412	H-49	87.72
413	H-5	93.92
414	H-50	100.69
415	H-51	98.88
416	H-52	127.77
417	H-53	68.5
418	H-54	72.33
419	H-55	59.01
420	H-56	73.88
421	H-57	61.26
422	H-58	74.16
423	H-59	82.63
424	H-60	138.15
425	H-61	129.08
426	H-62	116.26
427	H-63	111.95
428	H-64	46.44
429	H-65	50.97
430	H-66	42.2
431	H-67	40.18
432	H-68	38.25
433	H-69	37.26
434	H-7	85.94
435	H-70	35.56
436	H-71	34.46
437	H-72	82.73
438	H-73	94.35
439	H-74	55.56
440	H-75	132.05
441	H-76	94.61
442	H-77	27.42
443	H-78	30.29
444	H-79	43.52
445	H-8	62.24
446	H-80	35.65
447	H-81	29.97
448	H-82	77.09
449	H-83	87.06
450	H-84	57.75
451	H-85	68.97
452	H-86	84.41
453	H-87	78.27
454	H-88	93.61
455	H-89	115.91
456	H-9	133.36
457	H-90	52.87
458	H-91	37.54
459	H-92	78.5
460	H-93	77.72
461	H-94	60.03
462	H-95	70.1
463	H-96	85.37
464	H-97	79.88
465	H-98	69.66
466	H-99	55.47
1151	J-267	40.05
1152	J-268	41.17
1153	J-269	41.31
1154	J-270	40.14
1155	J-271	40.14
1156	J-272	40.14
1157	J-273	67.85

BUILD OUT

ID	Label	Fire Flow
399	H-37	133.07
400	H-38	186.06
401	H-39	77.15
402	H-4	54.53
403	H-40	130.36
404	H-41	158.54
405	H-42	121.5
406	H-43	44.22
407	H-44	68.52
408	H-45	128.72
409	H-46	128.92
410	H-47	115.37
411	H-48	90.38
412	H-49	86.67
413	H-5	93.48
414	H-50	99.29
415	H-51	97.56
416	H-52	126.78
417	H-53	68.56
418	H-54	71.87
419	H-55	59.88
420	H-56	70.53
421	H-57	58.19
422	H-58	70.7
423	H-59	78.88
424	H-60	139.2
425	H-61	128.48
426	H-62	118.93
427	H-63	110.78
428	H-64	43.56
429	H-65	48.02
430	H-66	39.4
431	H-67	37.5
432	H-68	35.78
433	H-69	34.92
434	H-7	85.32
435	H-70	33.43
436	H-71	32.46
437	H-72	107.12
438	H-73	93.23
439	H-74	55.08
440	H-75	132.74
441	H-76	94.61
442	H-77	27.42
443	H-78	30.29
444	H-79	43.52
445	H-8	61.57
446	H-80	35.64
447	H-81	29.97
448	H-82	77.09
449	H-83	87.06
450	H-84	57.75
451	H-85	68.97
452	H-86	84.41
453	H-87	78.27
454	H-88	93.61
455	H-89	115.91
456	H-9	144.74
457	H-90	52.87
458	H-91	37.54
459	H-92	78.5
460	H-93	77.72
461	H-94	60.03
462	H-95	70.1
463	H-96	85.37
464	H-97	79.88
465	H-98	69.66
466	H-99	55.47
1151	J-267	37.37
1152	J-268	38.38
1153	J-269	38.51
1154	J-270	37.44
1155	J-271	37.44
1156	J-272	37.45
1157	J-273	64.72

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - No Watermain Upgrades

EXISTING		
ID	Label	Fire Flow

NEAR TERM		
ID	Label	Fire Flow
1163	J-279	78.95
1164	J-280	77.58

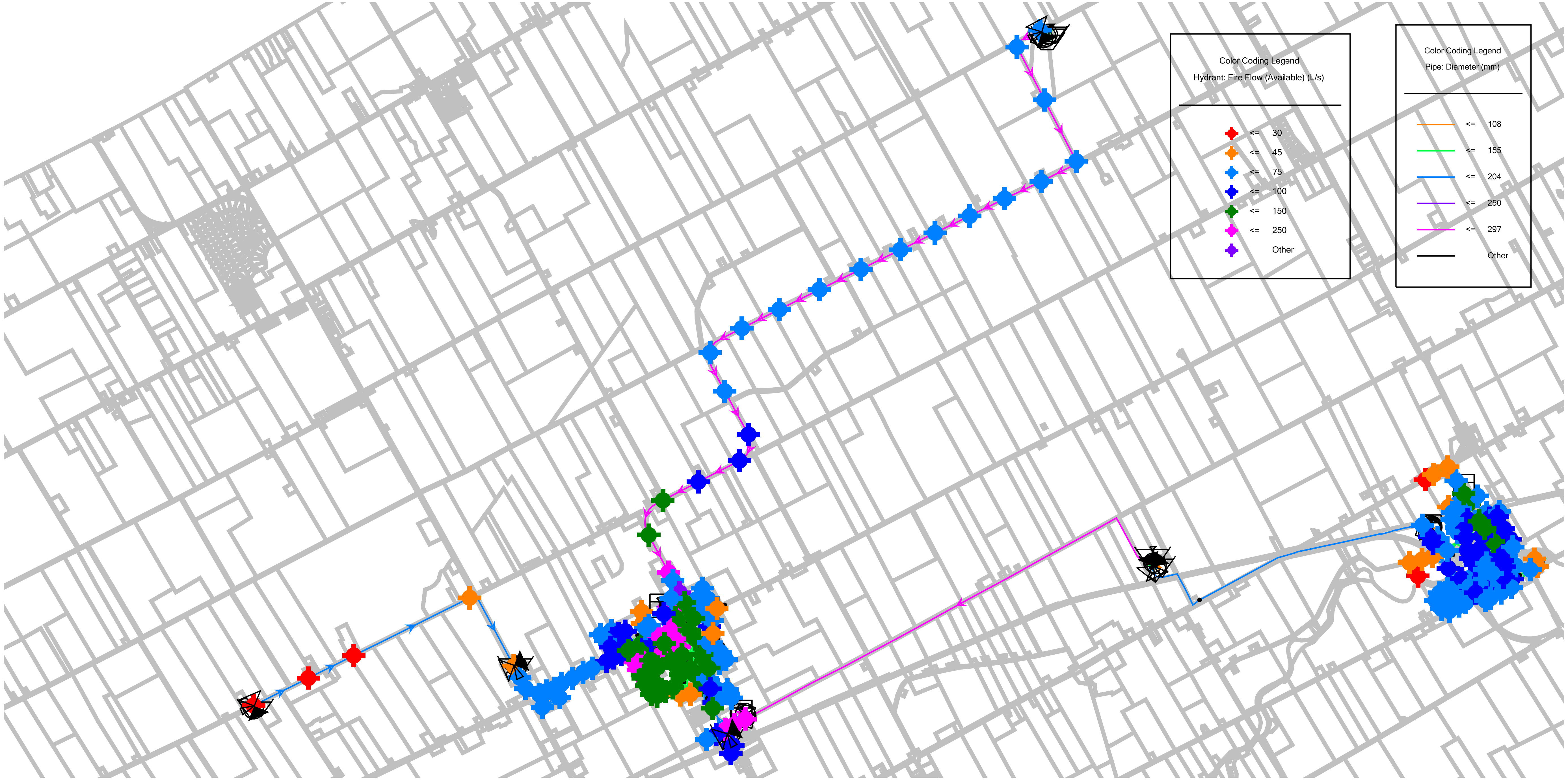
MID TERM		
ID	Label	Fire Flow
1161	J-277	181.29
1163	J-279	111.79
1164	J-280	106.54
1165	J-281	108.2
1169	J-285	128.13
1171	J-287	45.98

LONG TERM		
ID	Label	Fire Flow
1158	J-274	73.05
1160	J-276	235.74
1161	J-277	180.39
1163	J-279	119.27
1164	J-280	112.35
1165	J-281	115.89
1166	J-282	106.98
1169	J-285	125.55
1170	J-286	116.86
1171	J-287	40.04

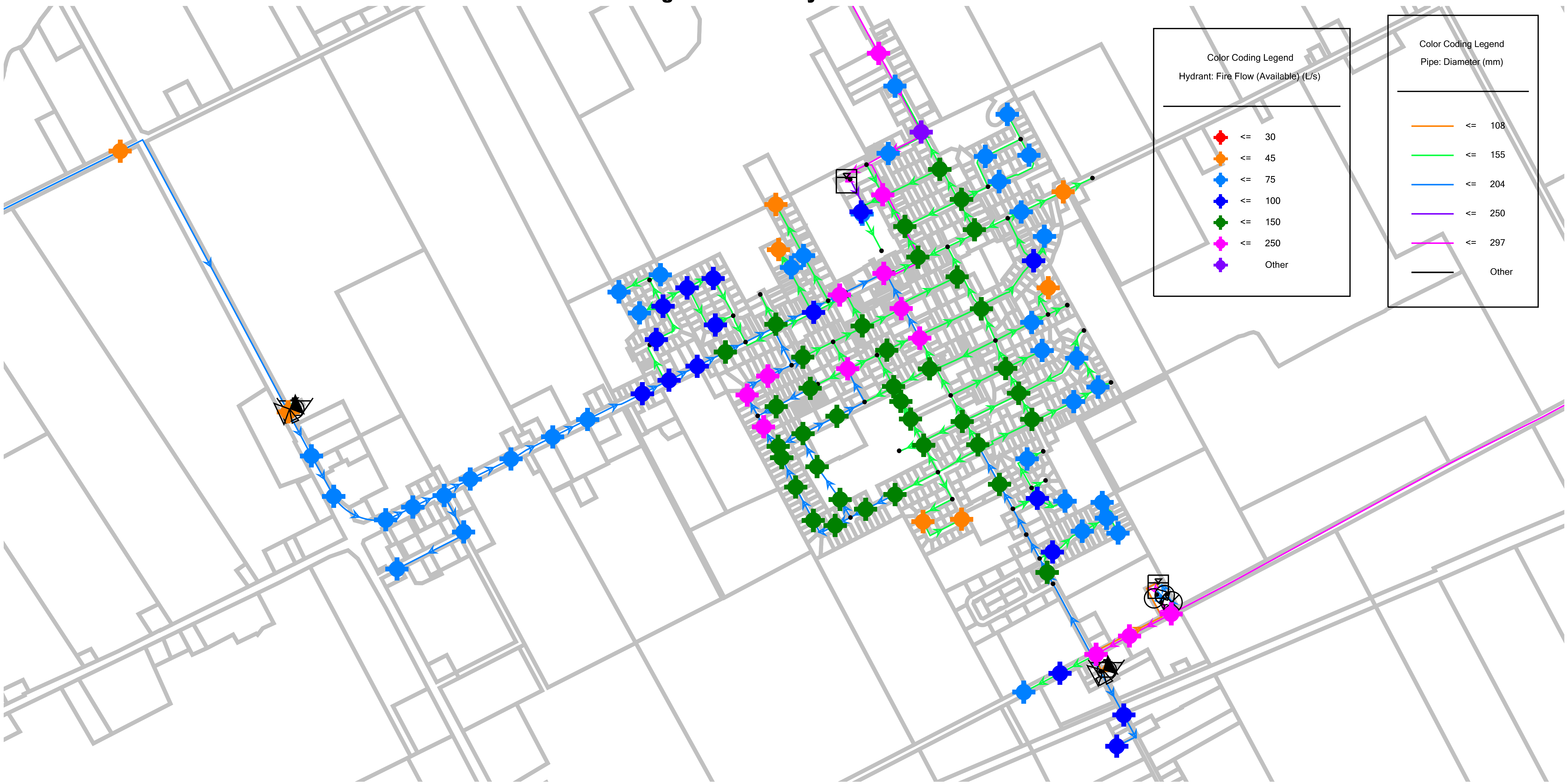
BUILD OUT		
ID	Label	Fire Flow
1158	J-274	70.25
1159	J-275	70.69
1160	J-276	235.32
1161	J-277	180.13
1162	J-278	97.07
1163	J-279	115.21
1164	J-280	110.64
1165	J-281	114.24
1166	J-282	105.44
1167	J-283	97.1
1168	J-284	128.02
1169	J-285	131.83
1170	J-286	121.24
1171	J-287	37.36
1205	J-289	99.47

North Dundas Hydraulic Water Model

Existing Maximum Day Demand + Fire Flow



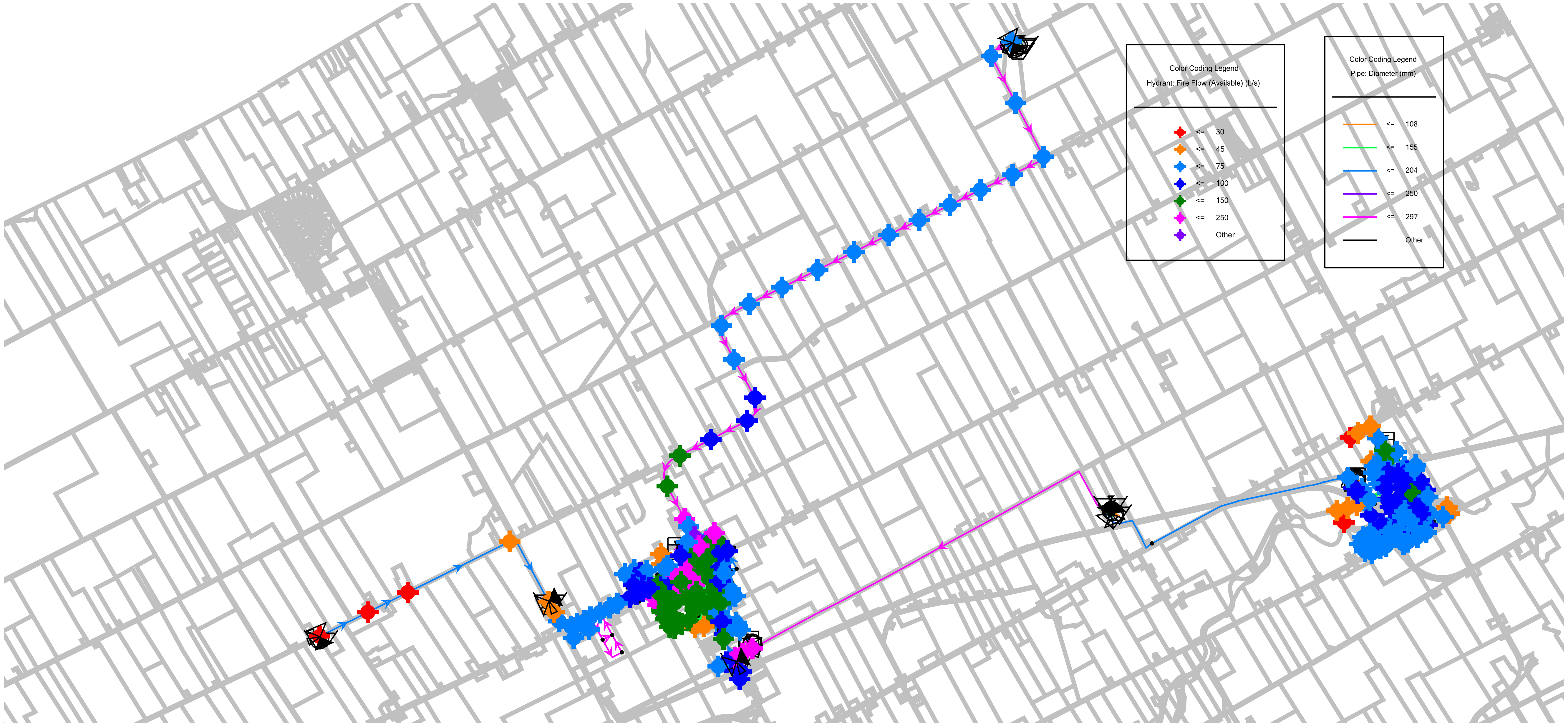
North Dundas Hydraulic Water Model
Existing Maximum Day Demand + Fire Flow - Winchester



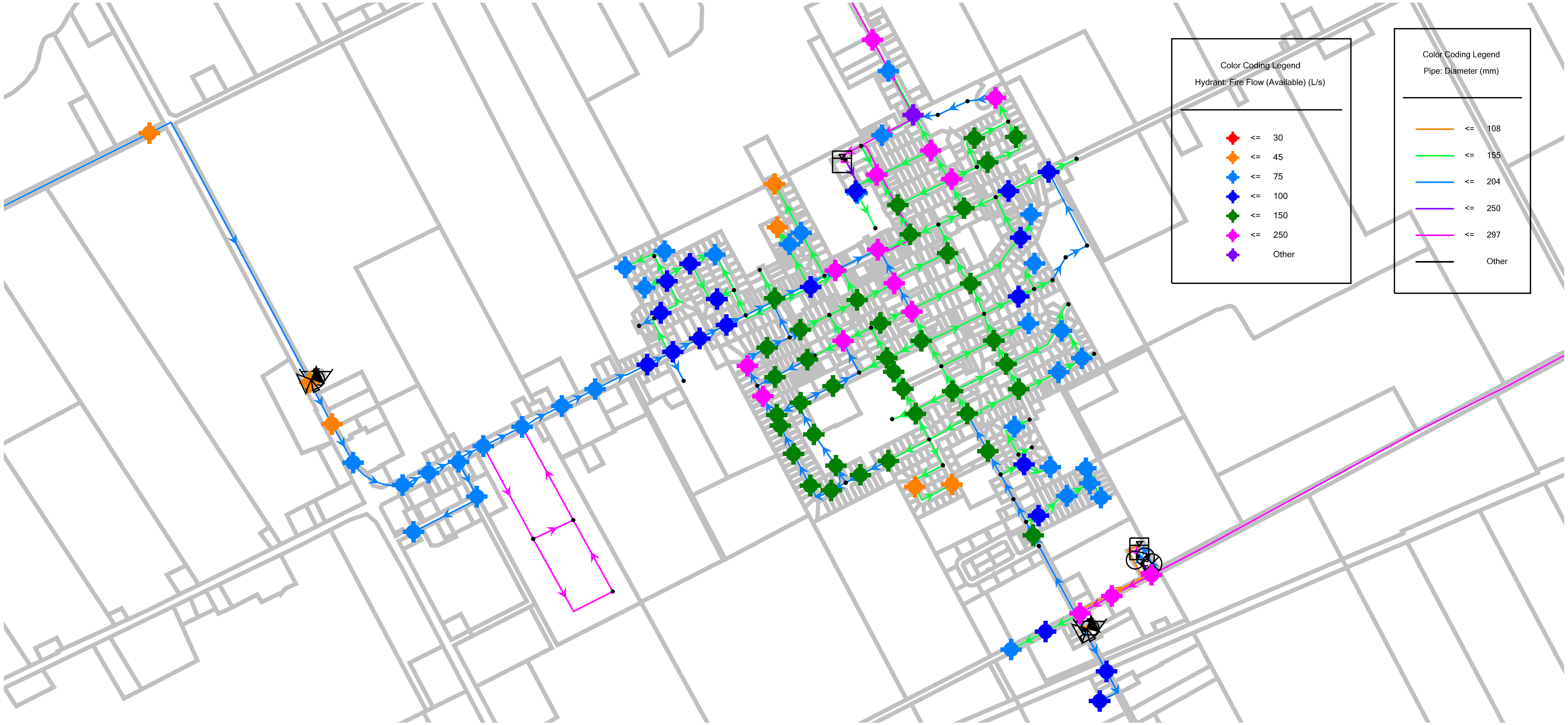
North Dundas Hydraulic Water Model

Existing Maximum Day Demand + Fire Flow - Chesterville

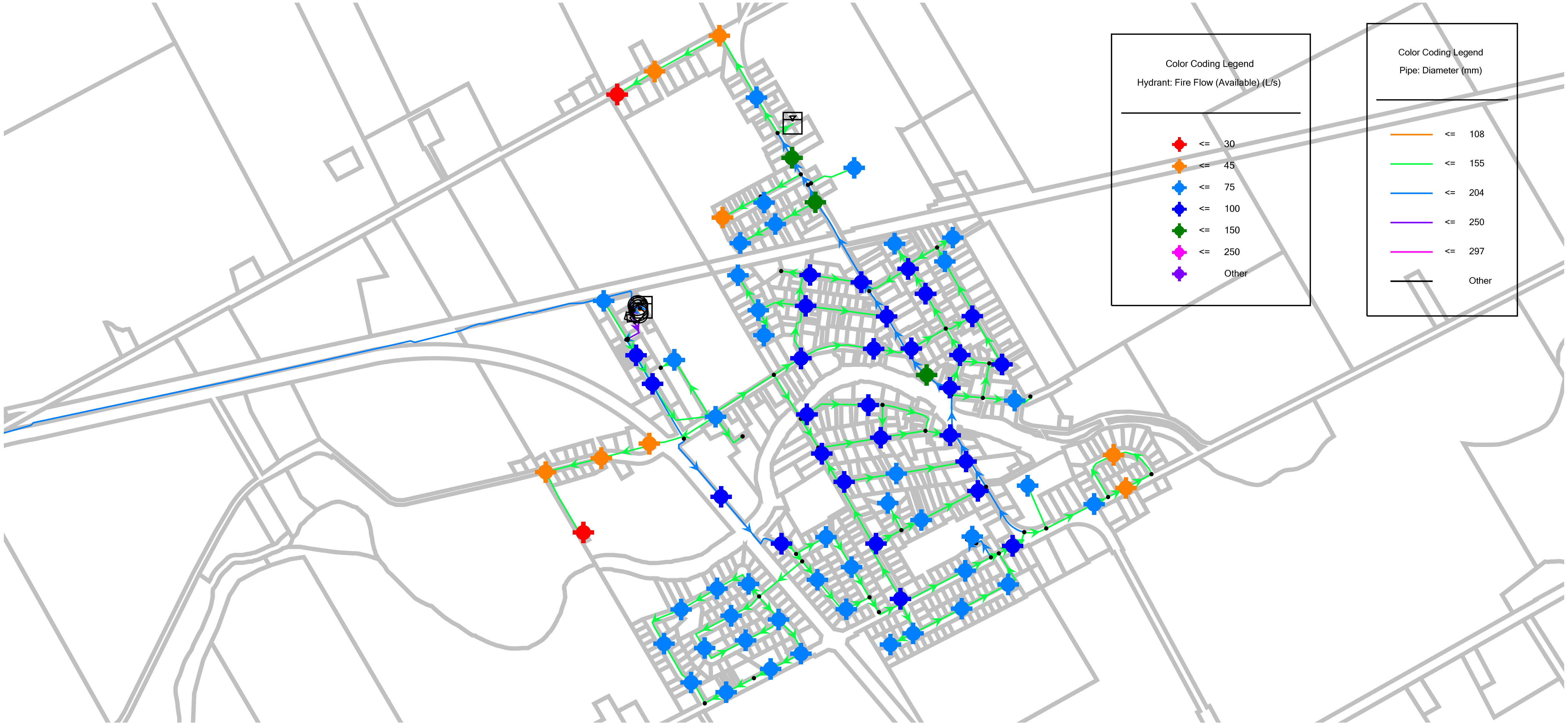
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow
No Watermain Upgrades



North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow - Winchester
No Watermain Upgrades



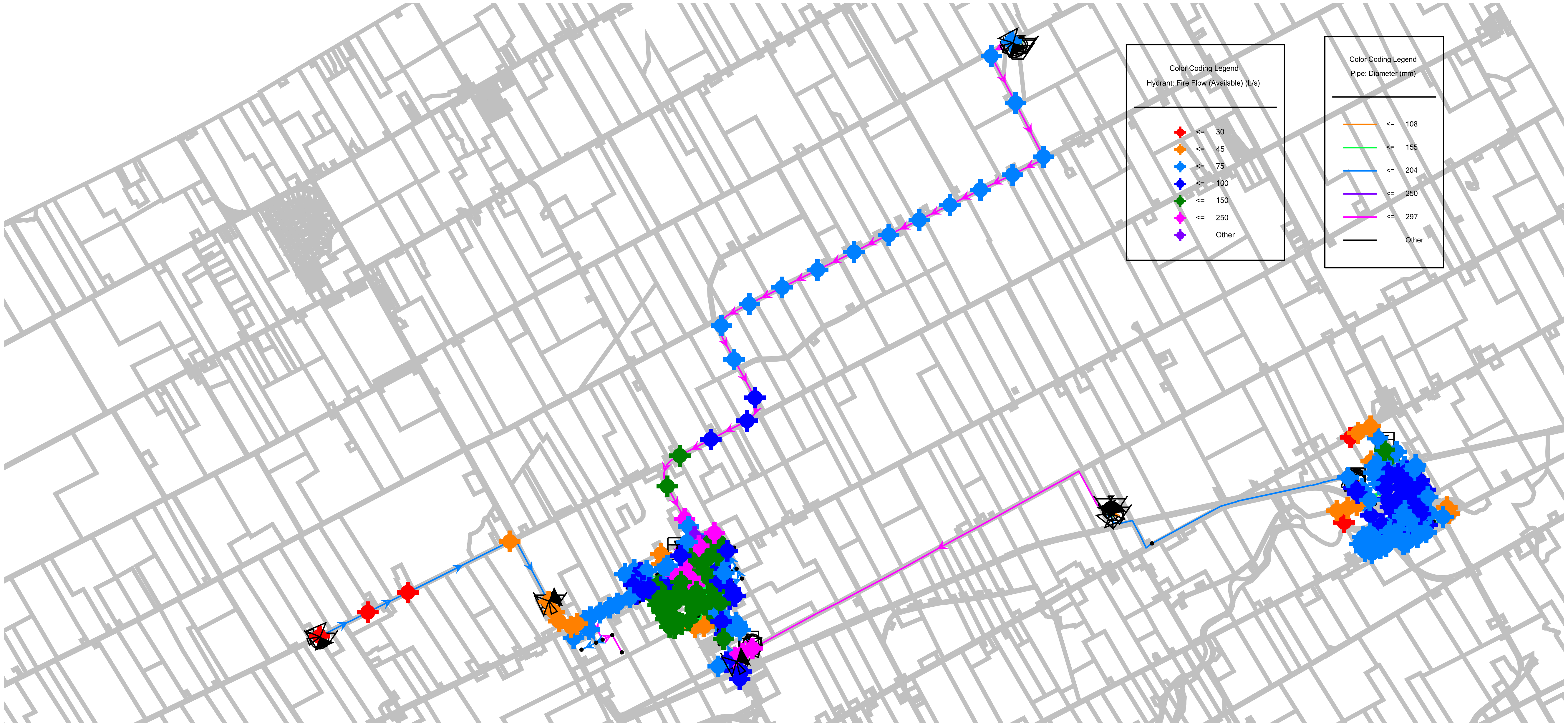
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow - Chesterville
No Watermain Upgrades



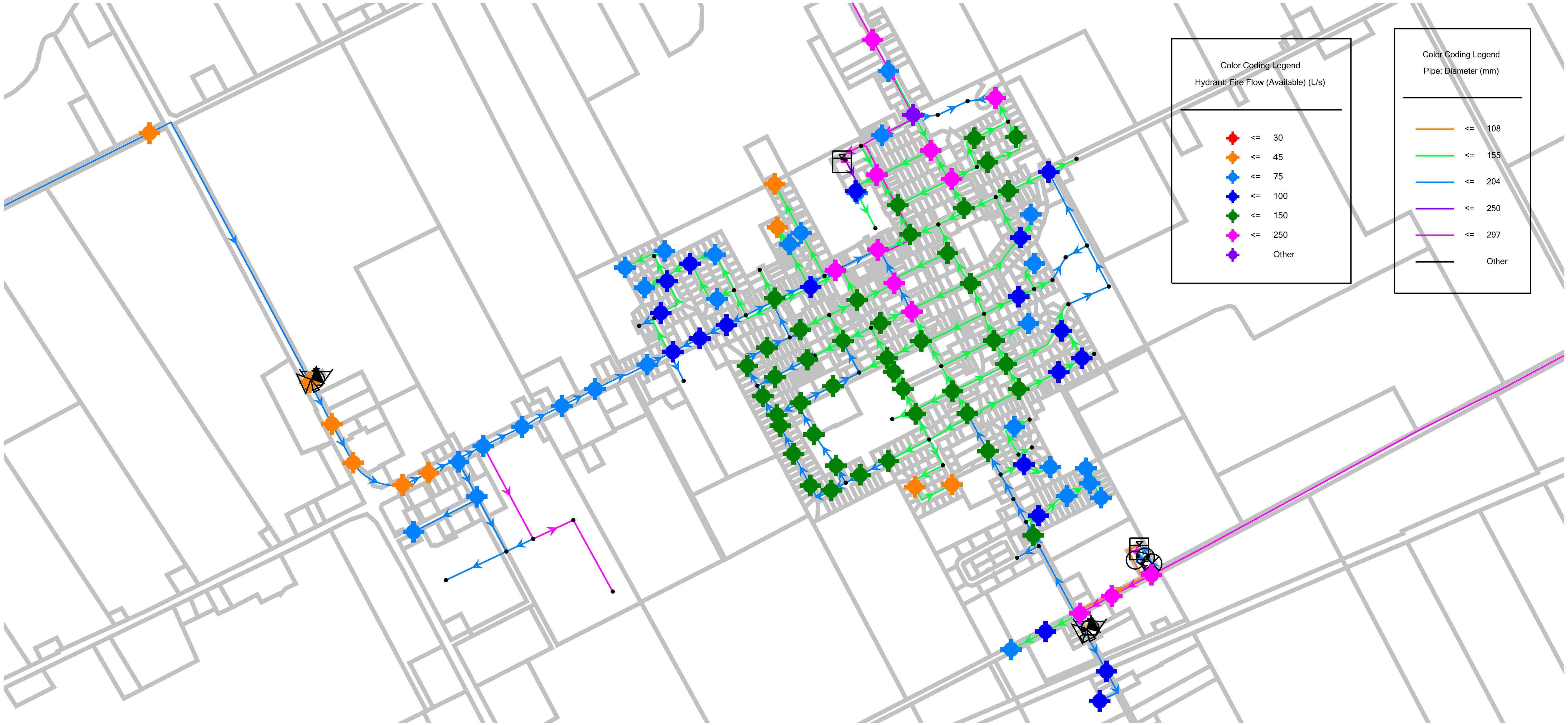
North Dundas Hydraulic Water Model

Mid Term (5-10 Year) Maximum Day Demand + Fire Flow

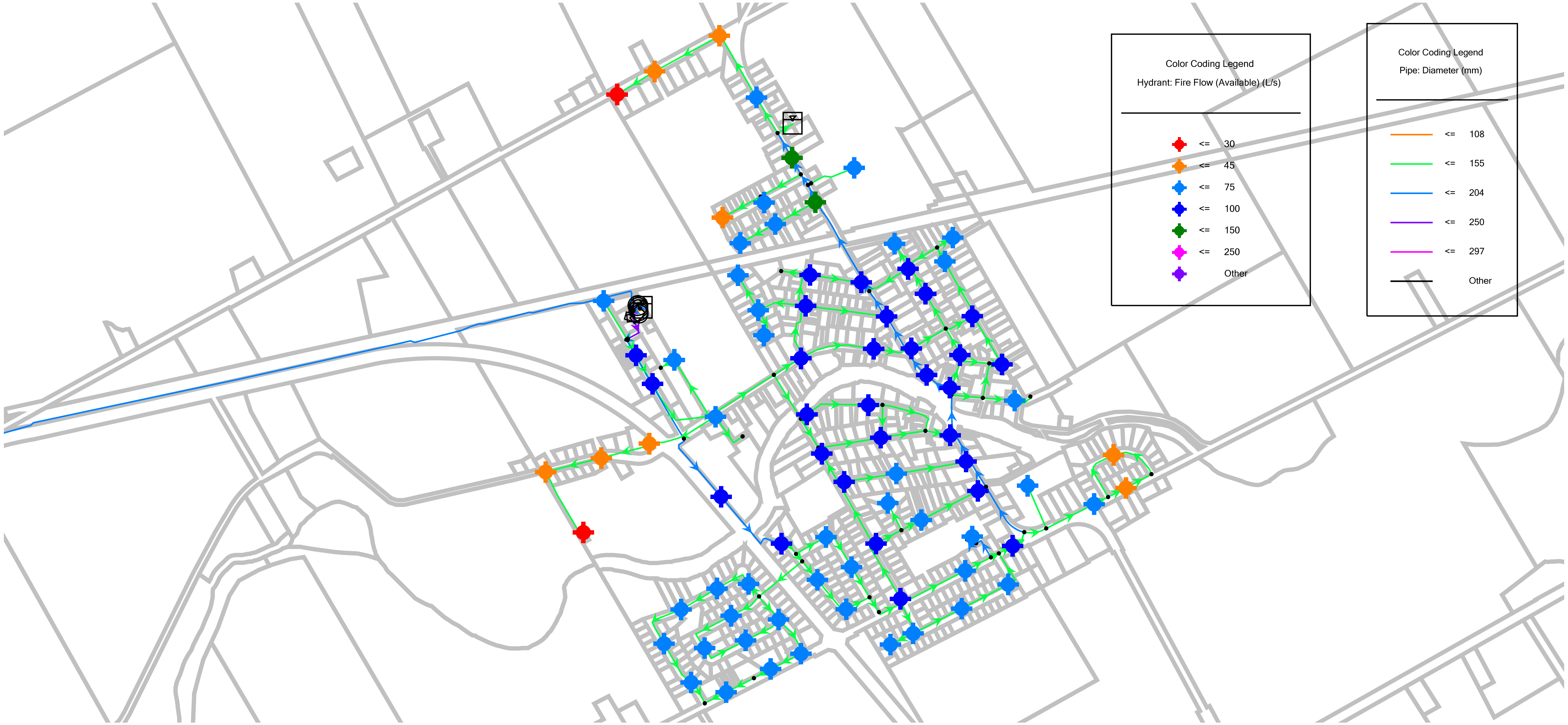
No Watermain Upgrades



North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow - Winchester
No Watermain Upgrades



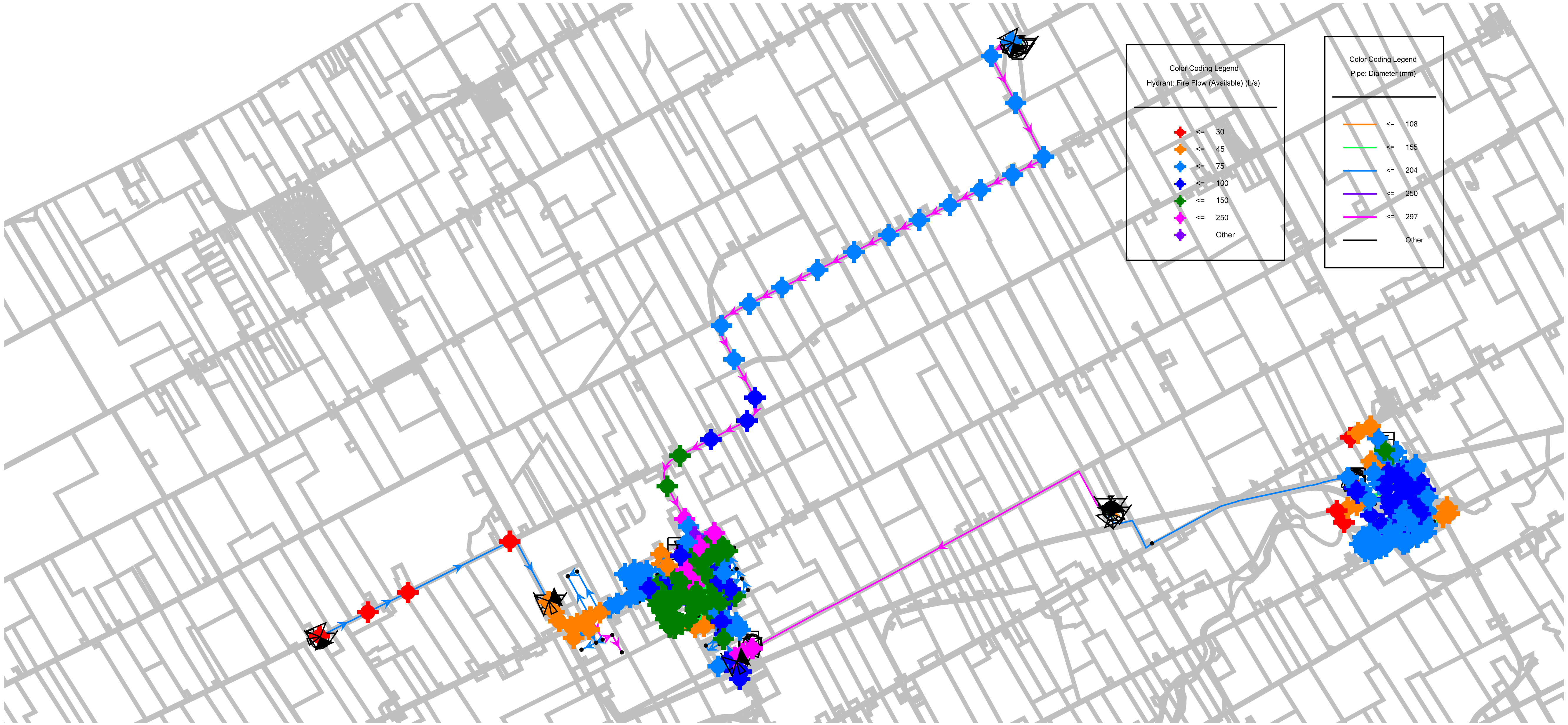
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow - Chesterville
No Watermain Upgrades



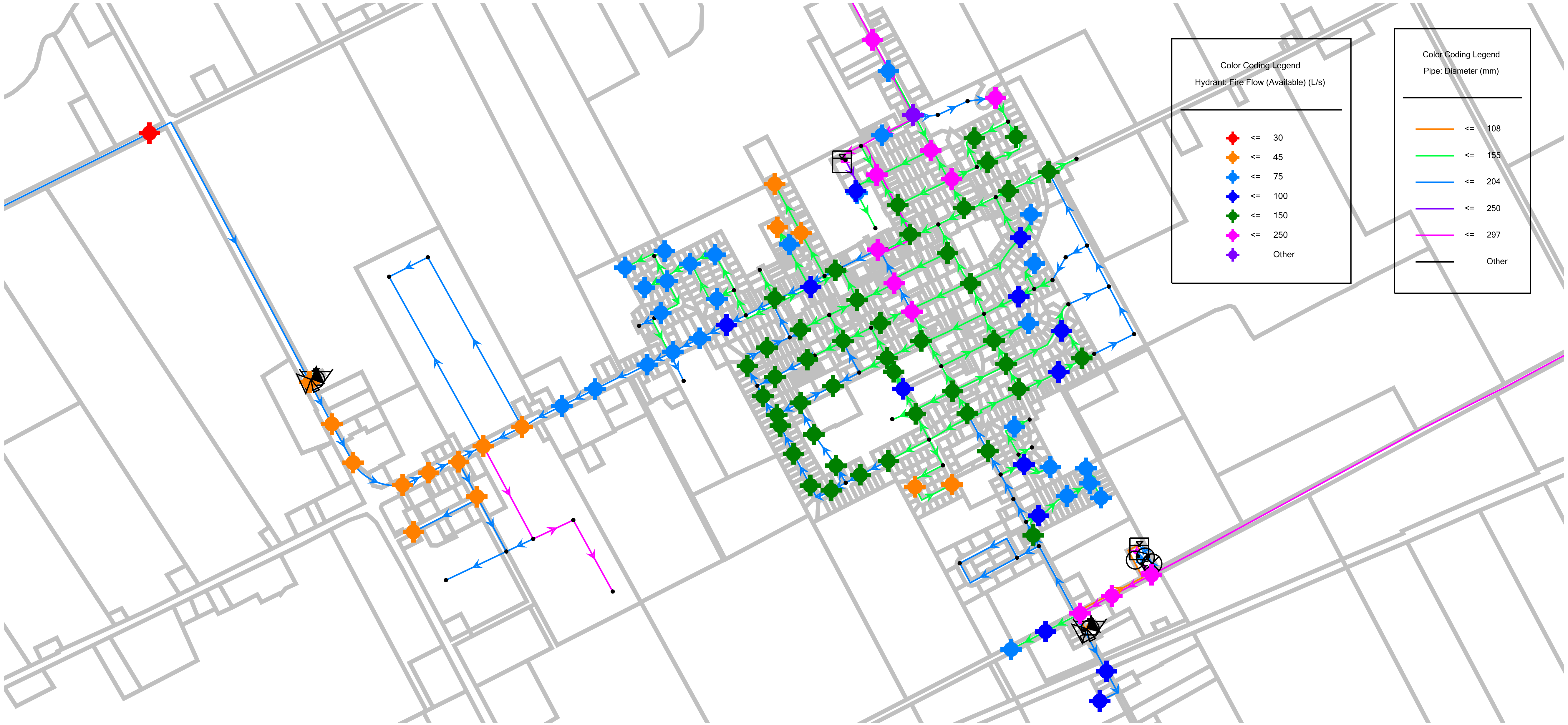
North Dundas Hydraulic Water Model

Long Term (10-20 Year) Maximum Day Demand + Fire Flow

No Watermain Upgrades



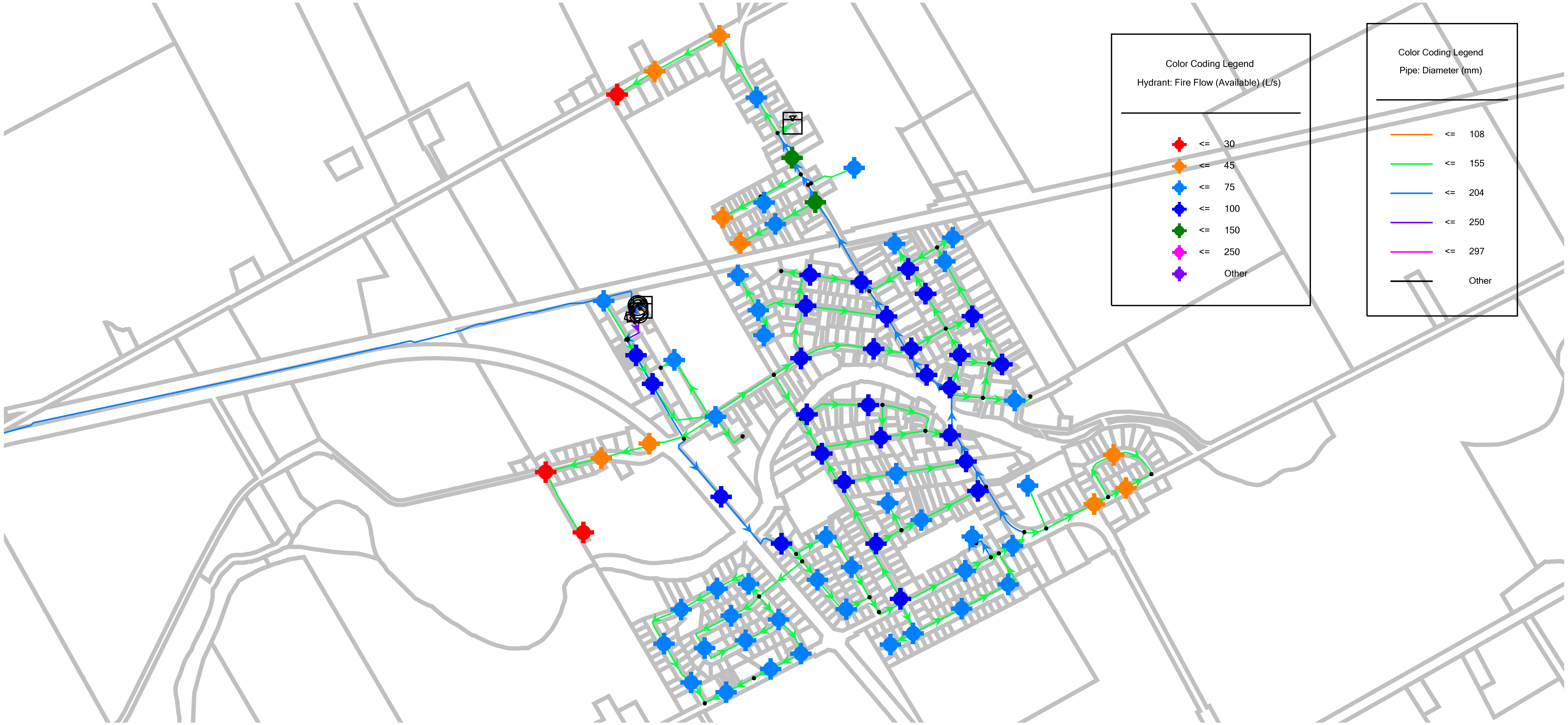
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Winchester
No Watermain Upgrades



North Dundas Hydraulic Water Model

Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Chesterville

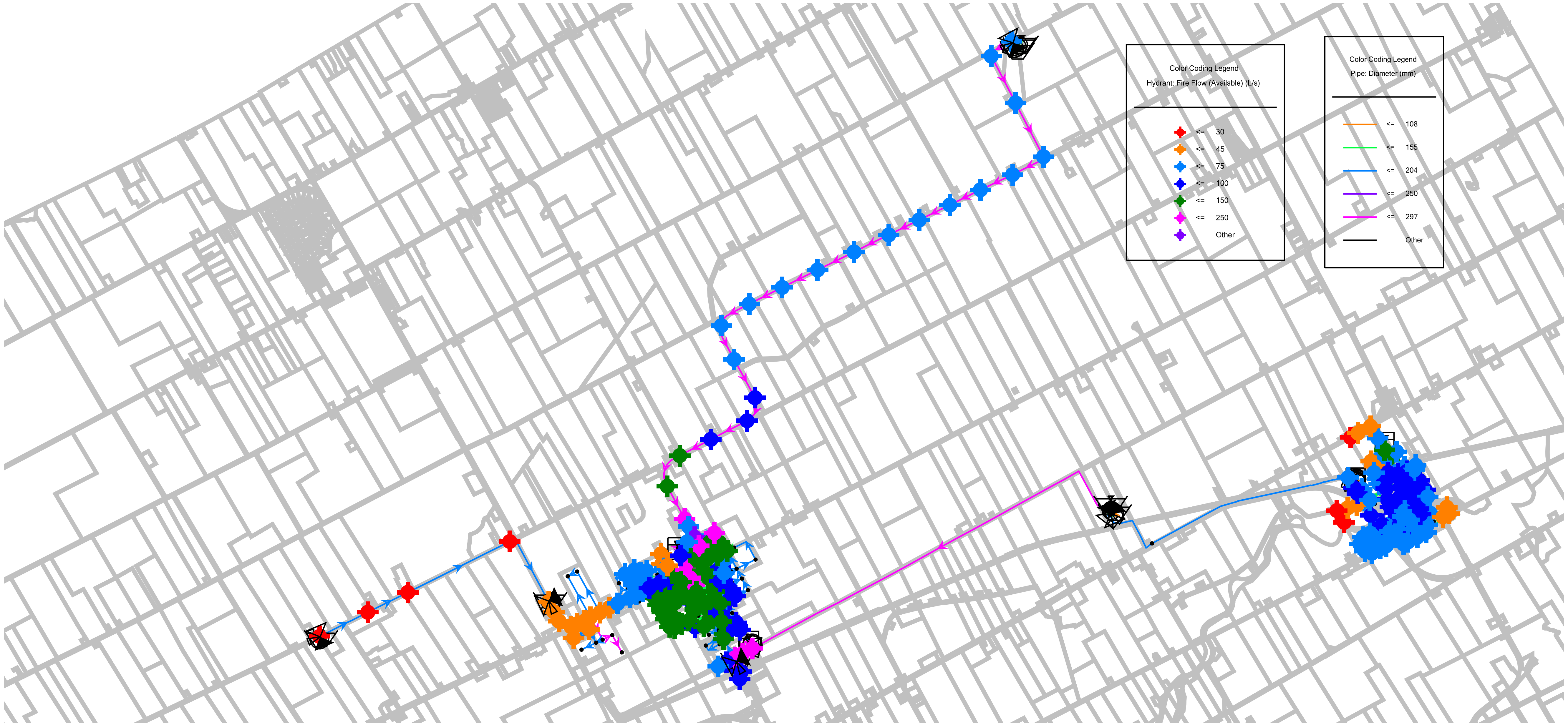
No Watermain Upgrades



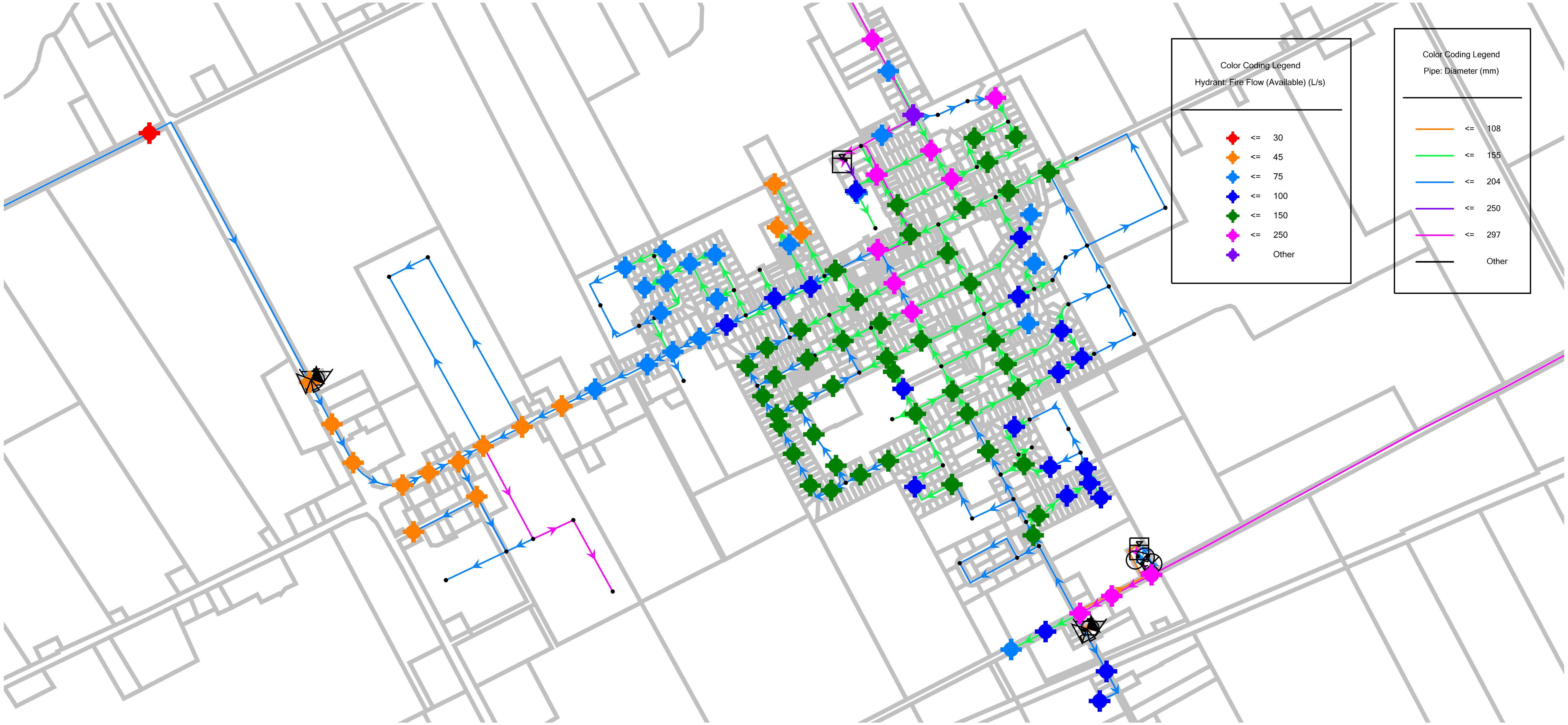
North Dundas Hydraulic Water Model

Build Out (20+ Year) Maximum Day Demand + Fire Flow

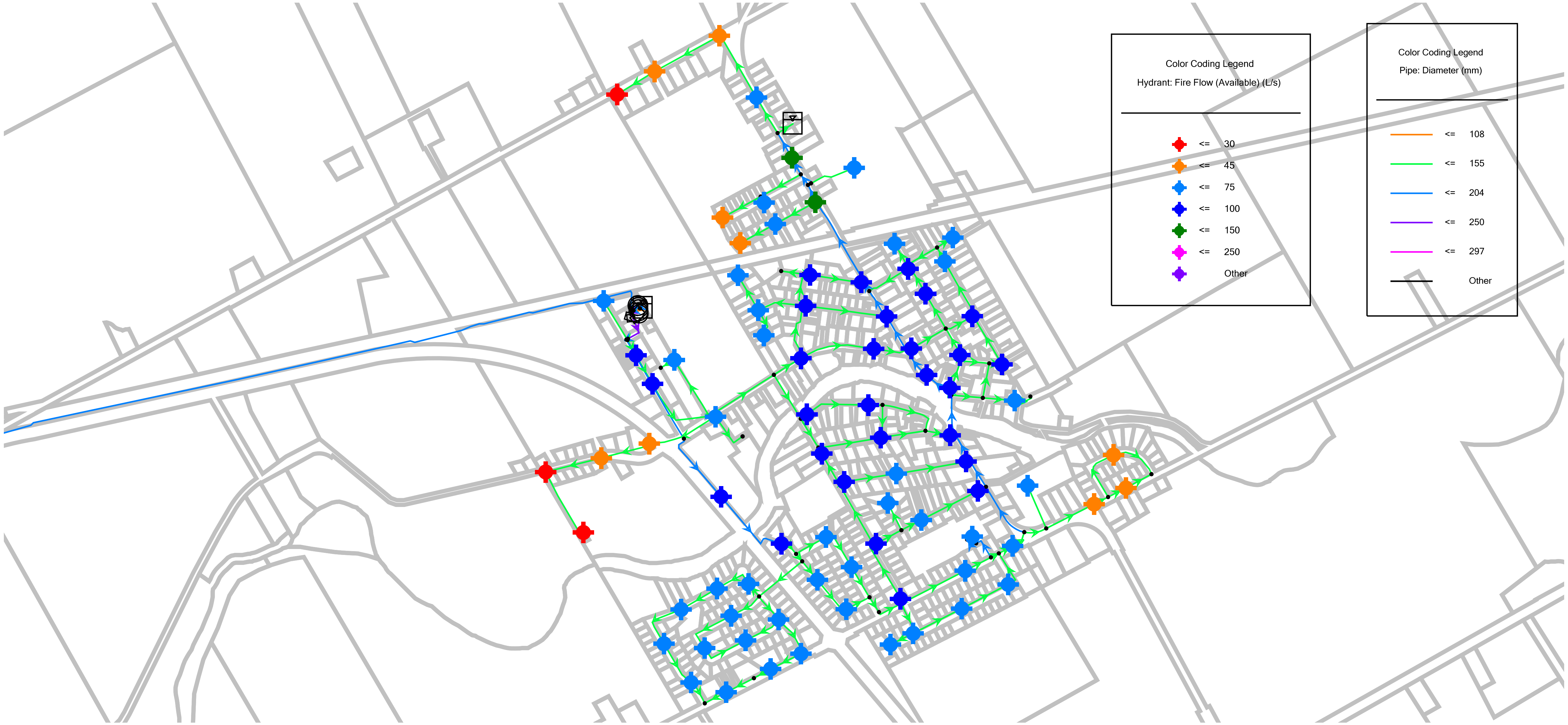
No Watermain Upgrades



North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow - Winchester
No Watermain Upgrades



North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow - Chesterville
No Watermain Upgrades



North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - With 300mm Main St - Fred St Loop (Near Term +) and 300mm St. Lawrence St Upgrade (Mid Term +)

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow
248	H-1	62.85	248	H-1	62.06	248	H-1	61.24	248	H-1	59.54	248	H-1	59.54
249	H-10	143.46	249	H-10	145.24	249	H-10	302.97	249	H-10	298.43	249	H-10	282.16
250	H-100	81.5	250	H-100	80.08	250	H-100	78.63	250	H-100	75.75	250	H-100	75.75
251	H-101	84.62	251	H-101	83.16	251	H-101	81.68	251	H-101	78.69	251	H-101	78.69
252	H-102	89.26	252	H-102	87.8	252	H-102	86.32	252	H-102	83.33	252	H-102	83.33
253	H-103	80.94	253	H-103	79.61	253	H-103	78.25	253	H-103	75.53	253	H-103	75.53
254	H-104	55.36	254	H-104	54.84	254	H-104	54.29	254	H-104	53.09	254	H-104	53.09
255	H-105	56.78	255	H-105	56.22	255	H-105	55.64	255	H-105	54.37	255	H-105	54.37
256	H-106	54.9	256	H-106	54.42	256	H-106	53.9	256	H-106	52.82	256	H-106	52.82
257	H-107	54.33	257	H-107	53.87	257	H-107	53.39	257	H-107	52.39	257	H-107	52.39
258	H-108	53.3	258	H-108	52.85	258	H-108	52.37	258	H-108	51.3	258	H-108	51.3
259	H-109	50.94	259	H-109	50.53	259	H-109	50.08	259	H-109	49.09	259	H-109	49.09
260	H-11	141.68	260	H-11	144.5	260	H-11	305.56	260	H-11	289.11	260	H-11	279.33
261	H-110	49.06	261	H-110	48.7	261	H-110	48.3	261	H-110	47.4	261	H-110	47.4
262	H-111	73.73	262	H-111	72.78	262	H-111	71.83	262	H-111	69.87	262	H-111	69.87
263	H-112	74.14	263	H-112	73.21	263	H-112	72.24	263	H-112	70.27	263	H-112	70.27
264	H-113	87.84	264	H-113	86.62	264	H-113	85.39	264	H-113	82.72	264	H-113	82.72
265	H-114	74.22	265	H-114	73.27	265	H-114	72.28	265	H-114	70.27	265	H-114	70.27
266	H-115	75.18	266	H-115	74.2	266	H-115	73.18	266	H-115	71.11	266	H-115	71.11
267	H-116	73.76	267	H-116	72.63	267	H-116	71.45	267	H-116	69.12	267	H-116	69.12
268	H-117	80.49	268	H-117	79.08	268	H-117	77.65	268	H-117	74.8	268	H-117	74.8
269	H-118	70.51	269	H-118	69.47	269	H-118	68.48	269	H-118	66.32	269	H-118	66.32
270	H-119	67.78	270	H-119	66.82	270	H-119	65.88	270	H-119	63.87	270	H-119	63.87
271	H-12	131.92	271	H-12	143.87	271	H-12	153.72	271	H-12	143.87	271	H-12	141.22
272	H-120	70.66	272	H-120	69.63	272	H-120	68.59	272	H-120	66.4	272	H-120	66.4
273	H-121	57.46	273	H-121	56.79	273	H-121	56.1	273	H-121	54.66	273	H-121	54.66
274	H-122	82.3	274	H-122	80.9	274	H-122	79.53	274	H-122	76.74	274	H-122	76.74
275	H-123	87.45	275	H-123	85.92	275	H-123	84.34	275	H-123	81.21	275	H-123	81.21
276	H-124	96.54	276	H-124	94.76	276	H-124	92.97	276	H-124	89.34	276	H-124	89.34
277	H-125	91.51	277	H-125	89.86	277	H-125	88.16	277	H-125	84.81	277	H-125	84.81
278	H-126	98.84	278	H-126	96.96	278	H-126	95.04	278	H-126	91.27	278	H-126	91.27
279	H-128	40.35	279	H-128	40.1	279	H-128	39.79	279	H-128	39.07	279	H-128	39.07
280	H-129	40.35	280	H-129	40.12	280	H-129	39.84	280	H-129	39.15	280	H-129	39.15
281	H-13	134.36	281	H-13	143.71	281	H-13	153.29	281	H-13	143.52	281	H-13	140.76
282	H-130	54.64	282	H-130	54.03	282	H-130	53.36	282	H-130	52	282	H-130	52
283	H-131	55.15	283	H-131	54.74	283	H-131	54.31	283	H-131	53.4	283	H-131	53.4
284	H-132	44.35	284	H-132	44.13	284	H-132	43.9	284	H-132	43.39	284	H-132	43.39
285	H-133	114.03	285	H-133	112.1	285	H-133	110.16	285	H-133	106.26	285	H-133	106.26
286	H-134	59.95	286	H-134	59.45	286	H-134	58.92	286	H-134	57.84	286	H-134	57.84
287	H-135	45.51	287	H-135	45.3	287	H-135	45.03	287	H-135	44.47	287	H-135	44.47
288	H-136	55.62	288	H-136	55.04	288	H-136	54.44	288	H-136	53.15	288	H-136	53.15
289	H-137	47.4	289	H-137	47.06	289	H-137	46.73	289	H-137	45.88	289	H-137	45.88
290	H-138	87.75	290	H-138	86.2	290	H-138	84.63	290	H-138	81.53	290	H-138	81.5
291	H-139	81.7	291	H-139	80.33	291	H-139	78.95	291	H-139	76.21	291	H-139	76.21
292	H-14	129.47	292	H-14	142.09	292	H-14	150.94	292	H-14	145.61	292	H-14	144.27
293	H-140	86.76	293	H-140	85.22	293	H-140	83.65	293	H-140	80.52	293	H-140	80.52
294	H-141	63.27	294	H-141	62.46	294	H-141	61.62	294	H-141	59.9	294	H-141	59.9
295	H-142	75.3	295	H-142	74.14	295	H-142	72.95	295	H-142	70.57	295	H-142	70.57
296	H-143	86.07	296	H-143	84.61	296	H-143	83.11	296	H-143	80.12	296	H-143	80.12
297	H-144	70.96	297	H-144	66.44	297	H-144	66.61	297	H-144	66.54	297	H-144	66.49
298	H-145	213.32	298	H-145	215.55	298	H-145	219.39	298	H-145	217.78	298	H-145	216.71
299	H-146	48.52	299	H-146	48.55	299	H-146	48.65	299	H-146	48.6	299	H-146	48.57
300	H-147	58.88	300	H-147	60.05	300	H-147	60.22	300	H-147	59.54	300	H-147	71.99
301	H-148	82.17	301	H-148	85.94	301	H-148	87.2	301	H-148	85.8	301	H-148	89.57
302	H-149	78.54	302	H-149	81.57	302	H-149	82.57	302	H-149	81.29	302	H-149	83.18
303	H-15	131.35	303	H-15	141.77	303	H-15	150.79	303	H-15	145.6	303	H-15	144.22
304	H-150	41.07	304	H-150	40.89	304	H-150	41.01	304	H-150	40.64	304	H-150	40.47
305	H-151	33.16	305	H-151	33.02	305	H-151	33.16	305	H-151	32.88	305	H-151	32.75
306	H-152	88.53	306	H-152	133.88	306	H-152	140.09	306	H-152	136.26	306	H-152	134.47
307	H-153	53.51	307	H-153	93.9	307	H-153	105	307	H-153	99.05	307	H-153	96.9
308	H-154	119.94	308	H-154	165.14	308	H-154	167.19	308	H-154	166.62	308	H-154	166.06
309	H-155	58.13	309	H-155	107.51	309	H-155	107.88	309	H-155	107.54	309	H-155	107.36
310	H-156	314.76	310	H-156	323.48	310	H-156	332.89	310	H-156	329.16	310	H-156	326.73
311	H-157	212.18	311	H-157	214.54	311	H-157	216.72	311	H-157	215.87	311	H-157	215.24
312	H-158	124.93	312	H-158	127.6	312	H-158	168.11	312	H-158	167.71	312	H-158	165.21
313	H-159	57.31	313	H-159	57.57	313	H-159	58.49	313	H-159	58.32	313	H-159	58.11
314	H-16	143.14	314	H-16	152.58	314	H-16	165.38	314	H-16	154.93	314	H-16	151.91
315	H-160	115.42	315	H-160	115.9	315	H-160	126.89	315	H-160	124.68	315	H-160	123.55
316	H-161	102.26	316	H-161	103.32	316	H-161	109.84	316	H-161	108.2	316	H-161	108.36
317	H-162	140.57	317	H-162	144.09	317	H-162	234.67	317	H-162	229.84	317	H-162	226.34
318	H-163	43.23	318	H-163	43.26	318	H-163	43.22	318	H-163	42.95	318	H-163	90.59
319	H-164	121.74	319	H-164	133.19	319	H-164	140.84	319	H-164	136.34	319	H-164	136.51
320	H-165	63.35	320	H-165	63.32	320	H-165	65.88	320	H-165	65.68	320	H-165	115.42
321	H-166	143.44	321	H-166	142.33	321	H-166	152.23	321	H-166	147.74	321	H-166	146.06
322	H-167	27.13	322	H-167	26.93	322	H-167	26.72	322	H-167	26.37	322	H-167	26.37
323	H-168	92.57	323	H-168	91.22	323	H-168	89.86	323	H-168	86.92	323	H-168	86.92
324	H-169	75.08	324	H-169	73.91	324	H-169	72.7	324	H-169	70.29	324	H-169	70.29
325	H-17	154.09	325	H-17	159.03	325	H-17	174.42	325	H-17	163.17	325	H-17	159.94
326	H-170	47.57	326	H-170	47.21	326	H-170	46.87	326	H-170	45.98	326	H-170	45.98
327	H-171	45.99	327	H-171	45.56	327	H-171	45.09	327	H-171	44.07	327	H-171	44.07
328	H-172	34.78	328	H-172	39.61	328	H-172	39.41	328	H-172	38.16	328	H-172	37.78
329	H-173	28.23	329	H-173	30.25	329	H-173	30.13	329	H-173	29.31	329	H-173	29.03
330	H-174	26.51	330	H-174	28.07	330	H-174	28	330	H-174	27.24	330	H-174	26.98
331	H-175	26.55	331	H-175	28.1	331	H-175	28.02	331	H-175	27.29	331	H-175	27.03
333	H-177	43.53	333	H-177	56.3	333	H-177	56.61	333	H-177	54.27	333	H-177	53.59
334	H-178	135.97	334	H-178	136.36	334	H-178	137.69	334	H-178	137.12	334	H-178	136.74
335	H-18	143.99	335	H-18	148.03	335	H-18	158.4	335	H-18	153.68	335	H-18	152.21
336	H-180	148.32	336	H-180	153.99	336	H-180	167.29	336	H-180	156.49	336	H-180	153.4
337	H-181	112.19	337	H-181	113.59	337	H-181	121.63	337	H-181	119.61	337	H-181	119.51

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - With 300mm Main St - Fred St Loop (Near Term +) and 300mm St. Lawrence St Upgrade (Mid Term +)

EXISTING			NEAR TERM			MID TERM			LONG TERM			BUILD OUT		
ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow	ID	Label	Fire Flow
338	H-182	99.86	338	H-182	99.86	338	H-182	127.74	338	H-182	126.08	338	H-182	157.63
339	H-183	66.83	339	H-183	66.58	339	H-183	68.81	339	H-183	68.56	339	H-183	112.1
340	H-184	146.59	340	H-184	149.67	340	H-184	153.21	340	H-184	152.06	340	H-184	151.1
341	H-185	76.85	341	H-185	76.8	341	H-185	75.61	341	H-185	75.31	341	H-185	75.01
342	H-186	51.26	342	H-186	51.26	342	H-186	51.32	342	H-186	51.29	342	H-186	51.27
343	H-187	51.26	343	H-187	51.26	343	H-187	51.29	343	H-187	51.29	343	H-187	51.28
344	H-188	51.23	344	H-188	51.23	344	H-188	51.29	344	H-188	51.26	344	H-188	51.24
345	H-189	52.27	345	H-189	52.26	345	H-189	52.36	345	H-189	52.31	345	H-189	52.29
346	H-19	154.23	346	H-19	156.93	346	H-19	168.98	346	H-19	163.77	346	H-19	162.1
347	H-190	52.27	347	H-190	52.27	347	H-190	52.36	347	H-190	52.31	347	H-190	52.29
348	H-191	52.22	348	H-191	52.22	348	H-191	52.31	348	H-191	52.27	348	H-191	52.24
349	H-192	52.24	349	H-192	52.24	349	H-192	52.31	349	H-192	52.26	349	H-192	52.26
350	H-193	52.27	350	H-193	52.27	350	H-193	52.36	350	H-193	52.31	350	H-193	52.29
351	H-194	52.24	351	H-194	52.24	351	H-194	52.3	351	H-194	52.29	351	H-194	52.26
352	H-195	54.35	352	H-195	54.34	352	H-195	54.41	352	H-195	54.4	352	H-195	54.37
353	H-196	56.78	353	H-196	56.78	353	H-196	56.89	353	H-196	56.85	353	H-196	56.81
354	H-197	59.58	354	H-197	59.58	354	H-197	59.71	354	H-197	59.66	354	H-197	59.62
355	H-198	70.66	355	H-198	70.66	355	H-198	70.91	355	H-198	70.81	355	H-198	70.73
356	H-199	77.32	356	H-199	77.33	356	H-199	77.65	356	H-199	77.52	356	H-199	77.42
357	H-2	100.44	357	H-2	98.52	357	H-2	96.57	357	H-2	92.72	357	H-2	92.72
358	H-20	150.29	358	H-20	150.55	358	H-20	161.74	358	H-20	156.78	358	H-20	155.05
359	H-200	82.6	359	H-200	82.63	359	H-200	83.01	359	H-200	82.85	359	H-200	82.73
360	H-201	93.44	360	H-201	93.5	360	H-201	94	360	H-201	93.78	360	H-201	93.63
361	H-202	107.65	361	H-202	107.78	361	H-202	108.51	361	H-202	108.2	361	H-202	107.98
362	H-203	48.03	362	H-203	47.7	362	H-203	47.33	362	H-203	46.49	362	H-203	46.49
363	H-204	48.01	363	H-204	47.69	363	H-204	47.33	363	H-204	46.5	363	H-204	46.5
364	H-205	48.53	364	H-205	48.21	364	H-205	47.84	364	H-205	47	364	H-205	47
365	H-207	66.23	365	H-207	66.23	365	H-207	66.43	365	H-207	66.35	365	H-207	66.29
366	H-208	62.61	366	H-208	62.61	366	H-208	62.77	366	H-208	62.71	366	H-208	62.66
367	H-209	161.53	367	H-209	161.75	367	H-209	256.28	367	H-209	250.35	367	H-209	250.96
368	H-21	152.43	368	H-21	155.98	368	H-21	171.08	368	H-21	166	368	H-21	164.48
369	H-210	163.58	369	H-210	163.8	369	H-210	255.24	369	H-210	249.56	369	H-210	250
370	H-211	166.23	370	H-211	166.45	370	H-211	256.98	370	H-211	251.76	370	H-211	252.11
371	H-212	53.5	371	H-212	73.48	371	H-212	86.29	371	H-212	83.68	371	H-212	82.62
372	H-213	53.52	372	H-213	90.97	372	H-213	108.6	372	H-213	102.31	372	H-213	100
373	H-214	96.39	373	H-214	94.6	373	H-214	92.81	373	H-214	89.16	373	H-214	89.16
374	H-215	51.46	374	H-215	51.05	374	H-215	50.6	374	H-215	49.66	374	H-215	49.66
375	H-216	53.3	375	H-216	52.86	375	H-216	52.39	375	H-216	51.37	375	H-216	51.37
376	H-217	55.44	376	H-217	55	376	H-217	54.52	376	H-217	53.5	376	H-217	53.5
377	H-218	55.33	377	H-218	55.05	377	H-218	55.67	377	H-218	55.48	377	H-218	110.57
378	H-219	49.65	378	H-219	49.4	378	H-219	49.82	378	H-219	49.62	378	H-219	115.19
379	H-22	144.86	379	H-22	147.97	379	H-22	167.28	379	H-22	163.46	379	H-22	162.65
380	H-220	49.49	380	H-220	49.26	380	H-220	49.67	380	H-220	49.48	380	H-220	81.3
381	H-221	55.59	381	H-221	102.32	381	H-221	102.45	381	H-221	102.14	381	H-221	102
382	H-222	55.28	382	H-222	108.8	382	H-222	109.15	382	H-222	108.82	382	H-222	108.65
383	H-223	47.25	383	H-223	156.65	383	H-223	157.68	383	H-223	156.98	383	H-223	156.59
384	H-23	173.6	384	H-23	174.96	384	H-23	308.59	384	H-23	293.63	384	H-23	285.64
385	H-24	148.92	385	H-24	149.53	385	H-24	164.77	385	H-24	163.24	385	H-24	161.39
386	H-25	80.18	386	H-25	85.77	386	H-25	89.22	386	H-25	89.12	386	H-25	88.68
387	H-26	55.19	387	H-26	57.1	387	H-26	57.99	387	H-26	57.95	387	H-26	57.79
388	H-27	65.23	388	H-27	93.1	388	H-27	106.78	388	H-27	108.04	388	H-27	108.19
389	H-28	42.01	389	H-28	76.23	389	H-28	104.79	389	H-28	110.82	389	H-28	119.29
390	H-29	128.11	390	H-29	143.6	390	H-29	149.79	390	H-29	149.28	390	H-29	148.46
391	H-3	82.09	391	H-3	80.66	391	H-3	79.2	391	H-3	76.3	391	H-3	76.3
392	H-30	148.58	392	H-30	152.33	392	H-30	153.54	392	H-30	153.02	392	H-30	152.66
393	H-31	58.74	393	H-31	58.78	393	H-31	58.89	393	H-31	58.84	393	H-31	58.79
394	H-32	129.34	394	H-32	133.65	394	H-32	135.18	394	H-32	134.74	394	H-32	134.26
395	H-33	128.29	395	H-33	130.93	395	H-33	138.35	395	H-33	134.62	395	H-33	133.37
396	H-34	117.76	396	H-34	124.5	396	H-34	130.71	396	H-34	127.4	396	H-34	125.5
397	H-35	94.93	397	H-35	94.03	397	H-35	96.7	397	H-35	95.04	397	H-35	94.18
398	H-36	47.7	398	H-36	47.52	398	H-36	47.68	398	H-36	47.27	398	H-36	46.97
399	H-37	167.98	399	H-37	171.32	399	H-37	190.21	399	H-37	184.4	399	H-37	181.3
400	H-38	220.65	400	H-38	220.42	400	H-38	267.91	400	H-38	260.23	400	H-38	255.39
401	H-39	82.31	401	H-39	77.31	401	H-39	77.52	401	H-39	77.44	401	H-39	77.37
402	H-4	56.27	402	H-4	55.86	402	H-4	55.42	402	H-4	54.53	402	H-4	54.53
403	H-40	133.74	403	H-40	134.19	403	H-40	142	403	H-40	140.76	403	H-40	139.6
404	H-41	168.14	404	H-41	167.76	404	H-41	219.42	404	H-41	214.55	404	H-41	211.23
405	H-42	129.84	405	H-42	128.64	405	H-42	137.98	405	H-42	135.13	405	H-42	133.63
406	H-43	46.41	406	H-43	46.18	406	H-43	46.37	406	H-43	45.95	406	H-43	45.74
407	H-44	51.67	407	H-44	52.31	407	H-44	52.33	407	H-44	51.81	407	H-44	82.09
408	H-45	134.08	408	H-45	144.73	408	H-45	154.63	408	H-45	144.75	408	H-45	141.95
409	H-46	134.78	409	H-46	146.77	409	H-46	156.83	409	H-46	151.33	409	H-46	148.49
410	H-47	34.12	410	H-47	34.12	410	H-47	34.09	410	H-47	33.86	410	H-47	143.33
411	H-48	56.58	411	H-48	56.54	411	H-48	57.8	411	H-48	57.65	411	H-48	102.77
412	H-49	69.85	412	H-49	70.03	412	H-49	82.62	412	H-49	94.2	412	H-49	93.08
413	H-5	95.75	413	H-5	95.69	413	H-5	97.53	413	H-5	96.72	413	H-5	96.1
414	H-50	66.53	414	H-50	66.66	414	H-50	83.22	414	H-50	109.62	414	H-50	107.94
415	H-51	69.11	415	H-51	69.28	415	H-51	105.13	415	H-51	107	415	H-51	105.48
416	H-52	127.57	416	H-52	131.95	416	H-52	155.05	416	H-52	152.89	416	H-52	150.93
417	H-53	75.52	417	H-53	78.13	417	H-53	78.94	417	H-53	77.79	417	H-53	79.74
418	H-54	80.63	418	H-54	84.75	418	H-54	85.9	418	H-54	84.54	418	H-54	89.39
419	H-55	64.52	419	H-55	66.19	419	H-55	66.54	419	H-55	65.72	419	H-55	68.65
420	H-56	83.75	420	H-56	90.25	420	H-56	91.66	420	H-56	90.02	420	H-56	89.14
421	H-57	80.67	421	H-57	129.9	421	H-57	135.31	421	H-57	131.65	421	H-57	129.84
422	H-58	95.39	422	H-58	136.35	422	H-58	143.07	422	H-58	139.21	422	H-58	137.1
423	H-59	104.8	423	H-59	142.27	423	H-59	150.2	423	H-59	146.07	423	H-59	143.57
424	H-60	145.78	424	H-60	154.47	424	H-60	168.2	424	H-60	157.4	424	H-60	154.3
425	H-61	132.95	425	H-61	135.3	425	H-61	181.16	425	H-61	177.93	425	H-61	175.73
426	H-62	119.52	426	H-62	121.62	426	H-62	135.31	426	H-62	133.1	426	H-62	135.82

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - With 300mm Main St - Fred St Loop (Near Term +) and 300mm St. Lawrence St Upgrade (Mid Term +)

EXISTING

ID	Label	Fire Flow
427	H-63	102.04
428	H-64	64.14
429	H-65	69.27
430	H-66	59.32
431	H-67	55.63
432	H-68	51.49
433	H-69	49.87
434	H-7	87.27
435	H-70	47.07
436	H-71	45.26
437	H-72	84.23
438	H-73	56.46
439	H-74	38.94
440	H-75	139.28
441	H-76	102.33
442	H-77	27.51
443	H-78	30.39
444	H-79	44.47
445	H-8	63.14
446	H-80	36.15
447	H-81	30.67
448	H-82	81.11
449	H-83	92.66
450	H-84	59.85
451	H-85	72.63
452	H-86	90.94
453	H-87	83.91
454	H-88	101.56
455	H-89	123.45
456	H-9	136.26
457	H-90	54.11
458	H-91	37.94
459	H-92	84.64
460	H-93	83.69
461	H-94	63.23
462	H-95	74.83
463	H-96	92.39
464	H-97	86.17
465	H-98	74.39
466	H-99	58.37

NEAR TERM

ID	Label	Fire Flow
427	H-63	103.19
428	H-64	124.48
429	H-65	125.94
430	H-66	117.07
431	H-67	109.72
432	H-68	82.94
433	H-69	75.79
434	H-7	87.21
435	H-70	65.99
436	H-71	60.7
437	H-72	84.35
438	H-73	84.77
439	H-74	51.52
440	H-75	145.19
441	H-76	100.41
442	H-77	27.47
443	H-78	30.36
444	H-79	44.33
445	H-8	63.06
446	H-80	35.99
447	H-81	30.44
448	H-82	80.14
449	H-83	91.3
450	H-84	59.4
451	H-85	71.75
452	H-86	89.33
453	H-87	82.49
454	H-88	99.58
455	H-89	121.59
456	H-9	136.78
457	H-90	53.82
458	H-91	37.87
459	H-92	83.13
460	H-93	82.22
461	H-94	62.46
462	H-95	73.67
463	H-96	90.65
464	H-97	84.62
465	H-98	73.23
466	H-99	57.66
1154	J-270	114
1155	J-271	115.99
1156	J-272	119.94
1157	J-273	114.07
1158	J-274	90.16
1160	J-276	238.43
1161	J-277	182.07
1163	J-279	78.98
1164	J-280	77.6

MID TERM

ID	Label	Fire Flow
427	H-63	125.09
428	H-64	130.51
429	H-65	130.46
430	H-66	121.97
431	H-67	113.66
432	H-68	88.18
433	H-69	79.07
434	H-7	87.29
435	H-70	67.33
436	H-71	61.37
437	H-72	97.1
438	H-73	99.85
439	H-74	56.17
440	H-75	155.59
441	H-76	98.48
442	H-77	27.47
443	H-78	30.35
444	H-79	44.09
445	H-8	59.68
446	H-80	35.87
447	H-81	30.25
448	H-82	79.15
449	H-83	89.89
450	H-84	58.91
451	H-85	70.85
452	H-86	87.68
453	H-87	81.11
454	H-88	97.57
455	H-89	119.71
456	H-9	271.36
457	H-90	53.56
458	H-91	37.77
459	H-92	81.59
460	H-93	80.74
461	H-94	61.67
462	H-95	72.48
463	H-96	88.91
464	H-97	83.05
465	H-98	72.04
466	H-99	56.95
1151	J-267	87.38
1154	J-270	115.88
1155	J-271	118.2
1156	J-272	122.9
1157	J-273	117.41
1158	J-274	91.49
1160	J-276	241.21
1161	J-277	183.57
1163	J-279	120.45
1164	J-280	114.04
1165	J-281	116.39
1169	J-285	195.26
1171	J-287	112.92

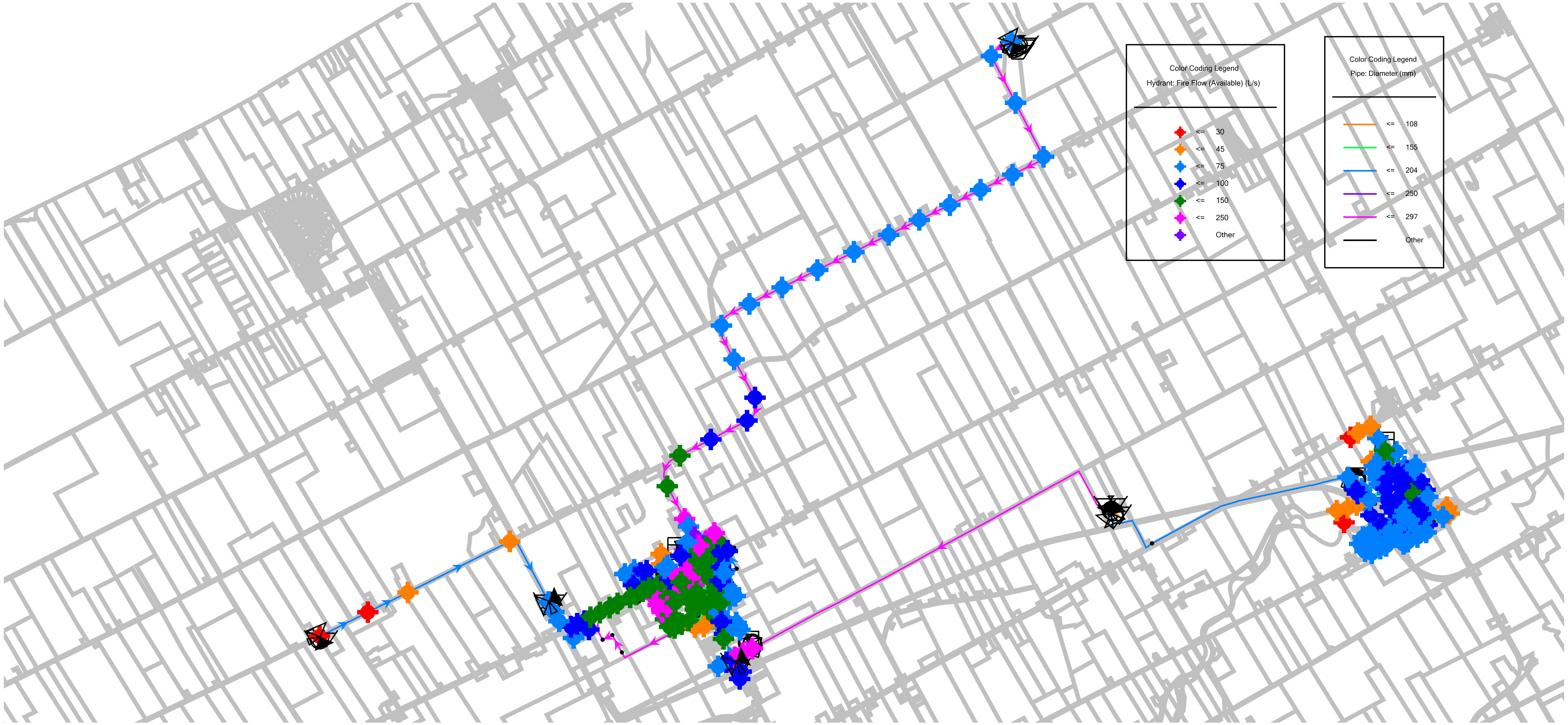
LONG TERM

ID	Label	Fire Flow
427	H-63	128.12
428	H-64	119.67
429	H-65	126.61
430	H-66	111.76
431	H-67	106.96
432	H-68	83.58
433	H-69	75.18
434	H-7	86.78
435	H-70	64.25
436	H-71	58.71
437	H-72	96.3
438	H-73	101.1
439	H-74	56.67
440	H-75	151.06
441	H-76	94.61
442	H-77	27.42
443	H-78	30.29
444	H-79	43.52
445	H-8	59.46
446	H-80	35.65
447	H-81	29.97
448	H-82	77.09
449	H-83	87.06
450	H-84	57.75
451	H-85	68.97
452	H-86	84.41
453	H-87	78.27
454	H-88	93.61
455	H-89	115.91
456	H-9	264.63
457	H-90	52.87
458	H-91	37.54
459	H-92	78.5
460	H-93	77.72
461	H-94	60.03
462	H-95	70.1
463	H-96	85.37
464	H-97	79.88
465	H-98	69.66
466	H-99	55.47
1151	J-267	84.52
1152	J-268	103.04
1153	J-269	103.19
1154	J-270	108.92
1155	J-271	111.05
1156	J-272	115.28
1157	J-273	114.69
1158	J-274	89.96
1160	J-276	239.63
1161	J-277	182.65
1163	J-279	132.15
1164	J-280	123.2
1165	J-281	128.35
1166	J-282	117.35
1169	J-285	191.51
1170	J-286	159.86
1171	J-287	106.25

BUILD OUT

ID	Label	Fire Flow
427	H-63	126.49
428	H-64	116.68
429	H-65	123.41
430	H-66	109.08
431	H-67	104.46
432	H-68	81.99
433	H-69	73.87
434	H-7	86.33
435	H-70	80.35
436	H-71	57.91
437	H-72	132.69
438	H-73	99.89
439	H-74	56.29
440	H-75	149.81
441	H-76	94.61
442	H-77	27.42
443	H-78	30.29
444	H-79	43.52
445	H-8	59.29
446	H-80	35.65
447	H-81	29.97
448	H-82	77.09
449	H-83	87.06
450	H-84	57.75
451	H-85	68.97
452	H-86	84.41
453	H-87	78.27
454	H-88	93.61
455	H-89	115.91
456	H-9	271.11
457	H-90	52.87
458	H-91	37.54
459	H-92	78.5
460	H-93	77.72
461	H-94	60.03
462	H-95	70.1
463	H-96	85.37
464	H-97	79.88
465	H-98	69.66
466	H-99	55.47
1151	J-267	83.42
1152	J-268	100.63
1153	J-269	100.55
1154	J-270	106.35
1155	J-271	108.39
1156	J-272	112.55
1157	J-273	113.42
1158	J-274	93.66
1159	J-275	87.69
1160	J-276	238.76
1161	J-277	182.12
1162	J-278	103.35
1163	J-279	126.71
1164	J-280	121.04
1165	J-281	126.13
1166	J-282	115.44
1167	J-283	113.88
1168	J-284	176.14
1169	J-285	190.96
1170	J-286	159.1
1171	J-287	103.79
1205	J-289	119.13

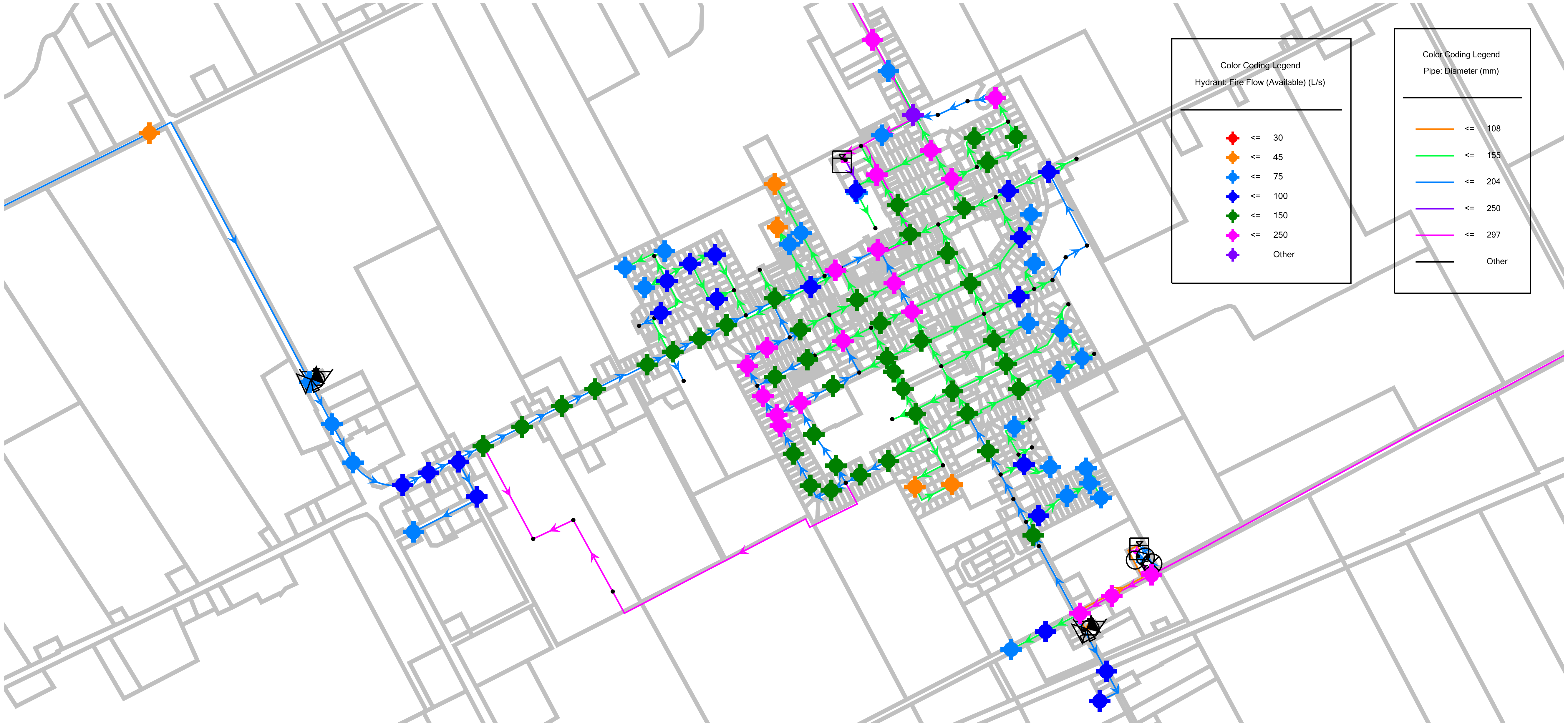
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow
With 300mm Main St - Fred St Loop



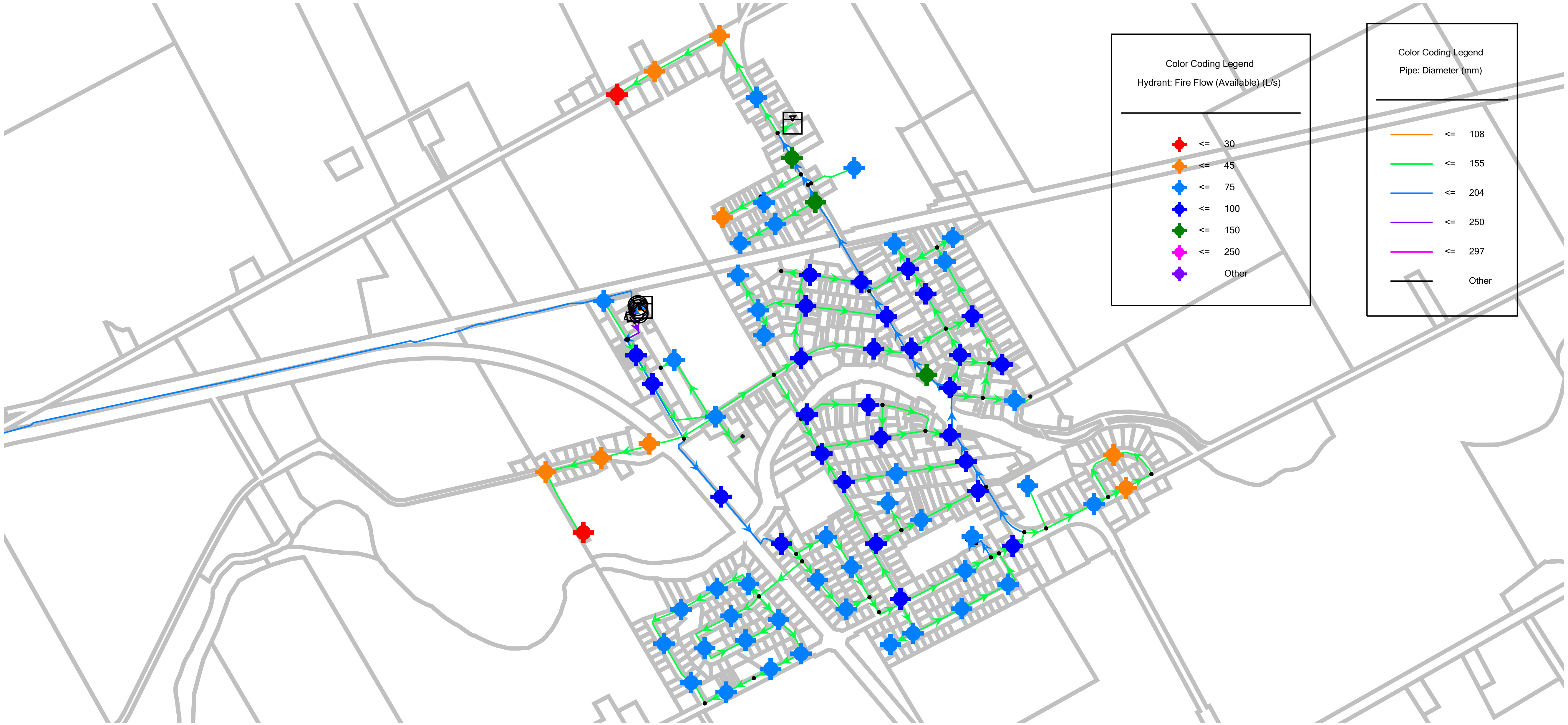
North Dundas Hydraulic Water Model

Near Term (1-5 Year) Maximum Day Demand + Fire Flow - Winchester

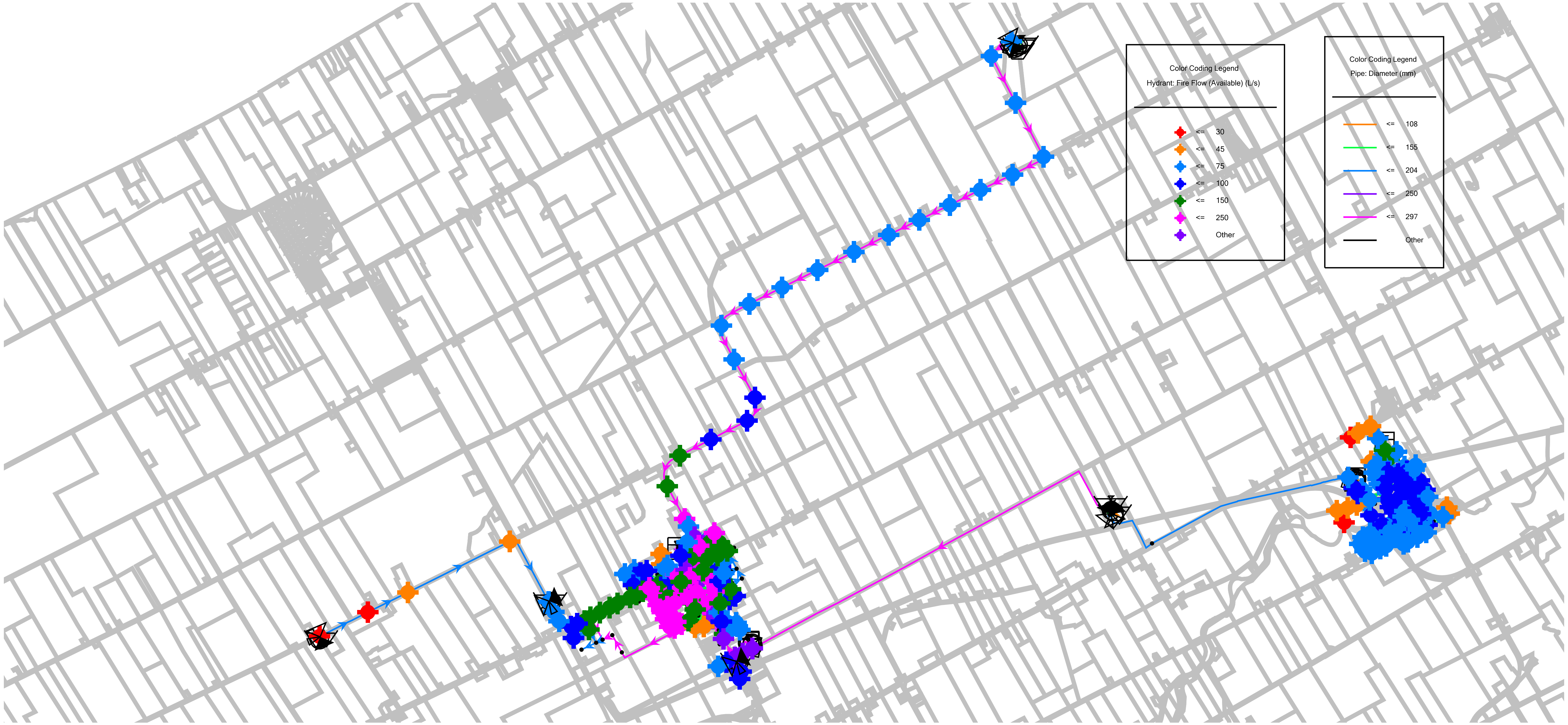
With 300mm Main St - Fred St Loop



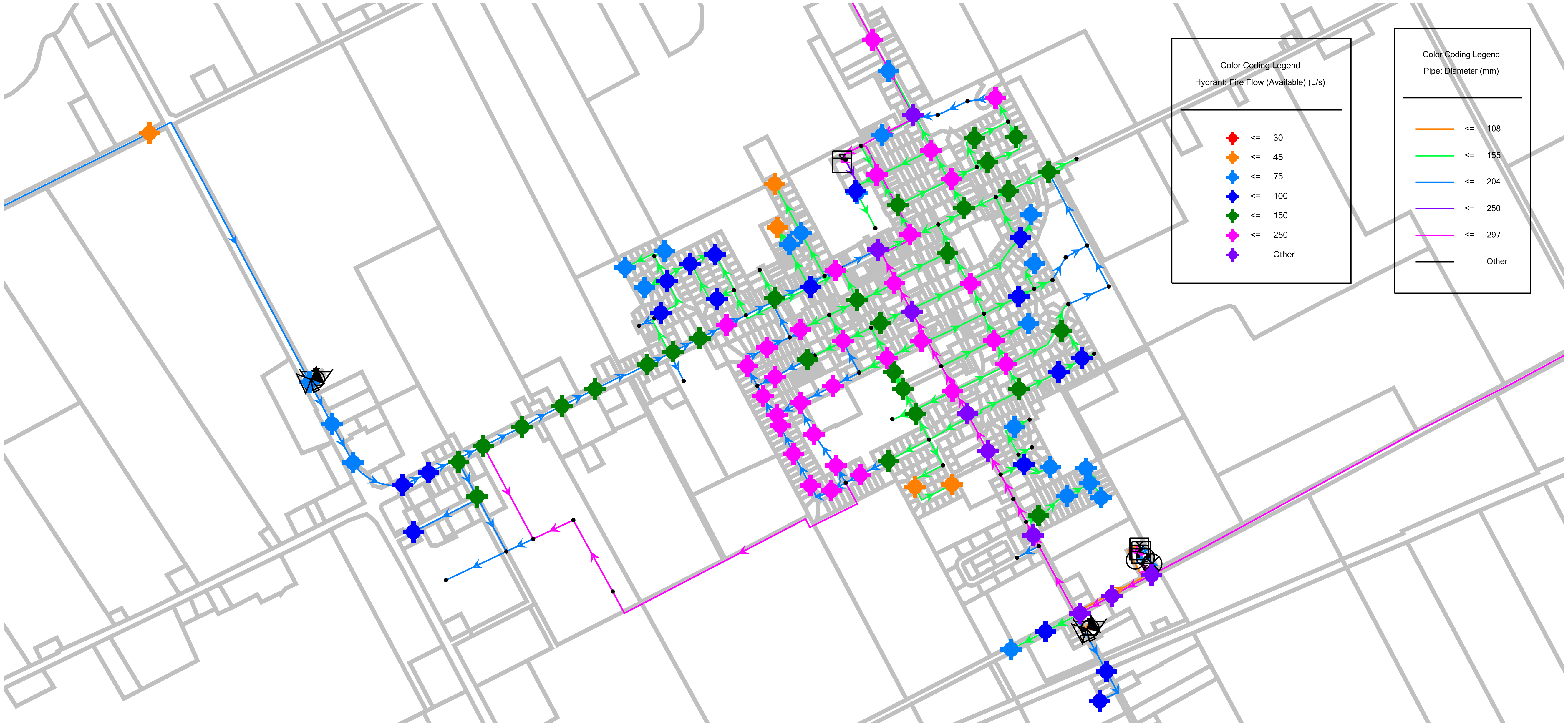
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow - Chesterville
With 300mm Main St - Fred St Loop



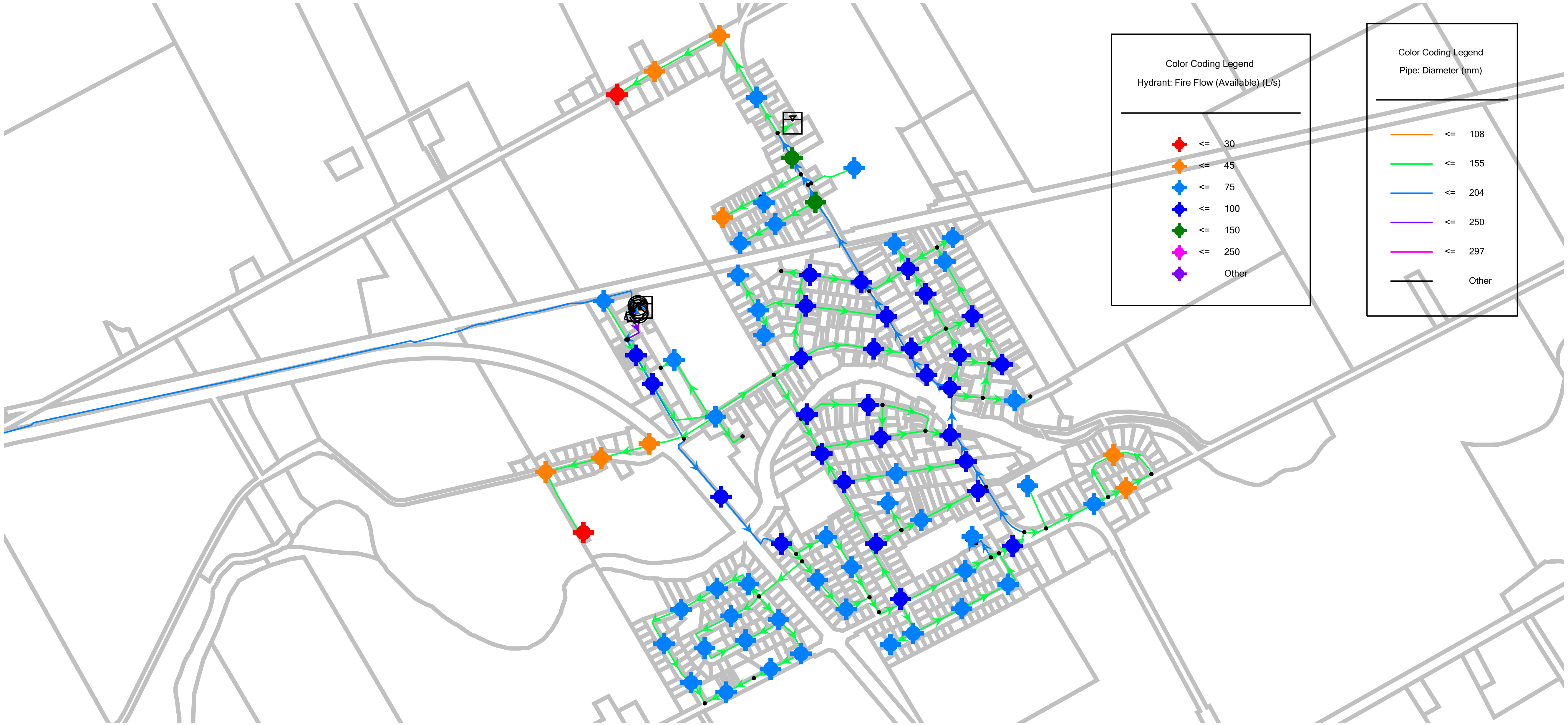
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



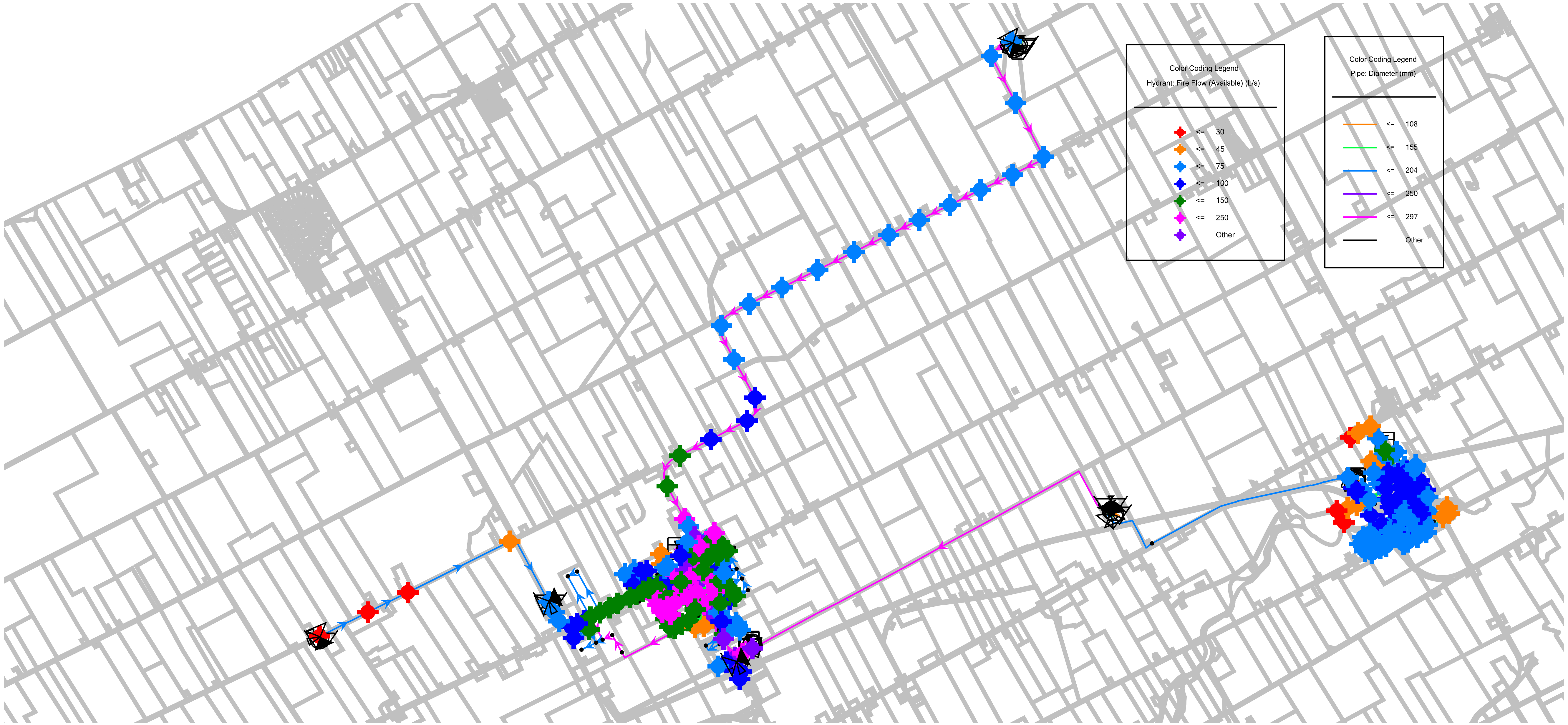
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



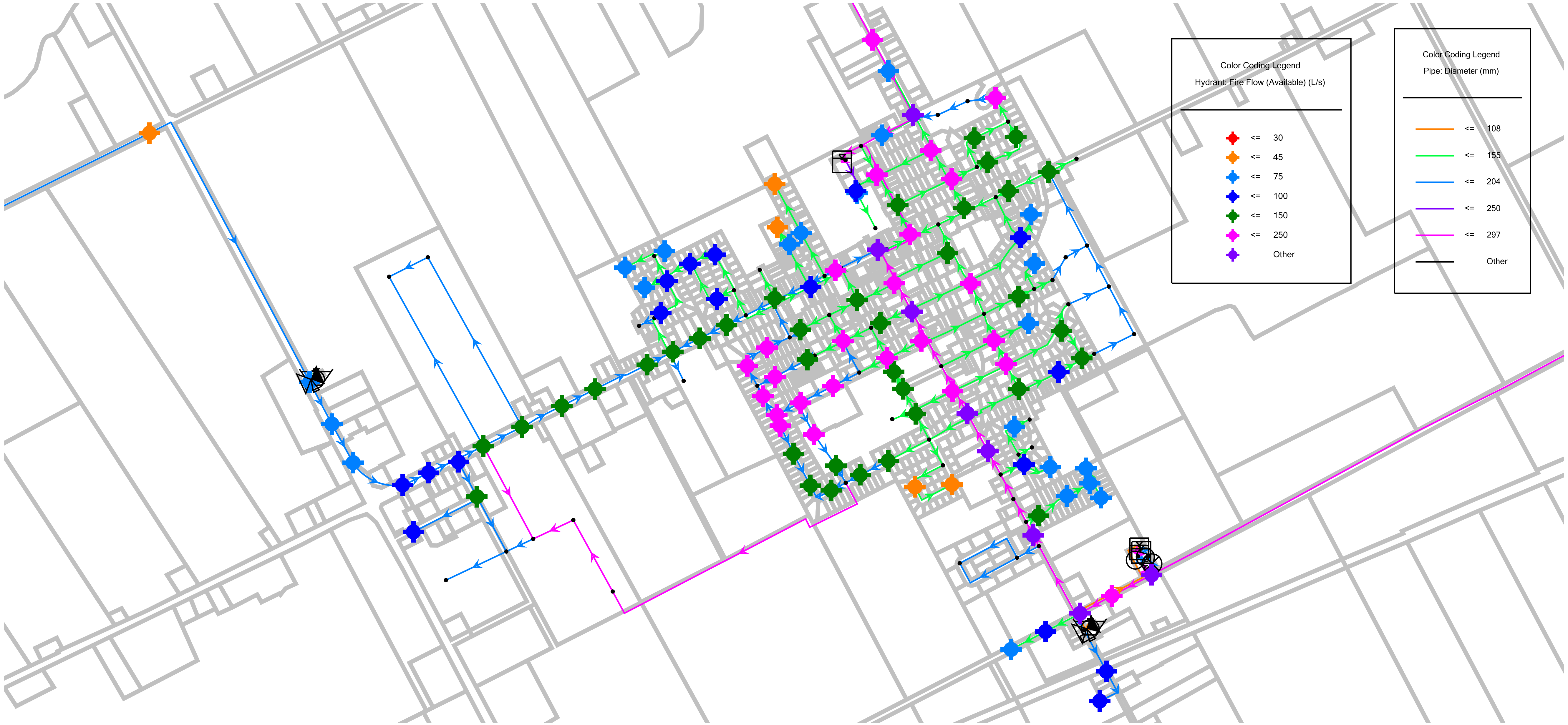
North Dundas Hydraulic Water Model

Long Term (10-20 Year) Maximum Day Demand + Fire Flow

With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



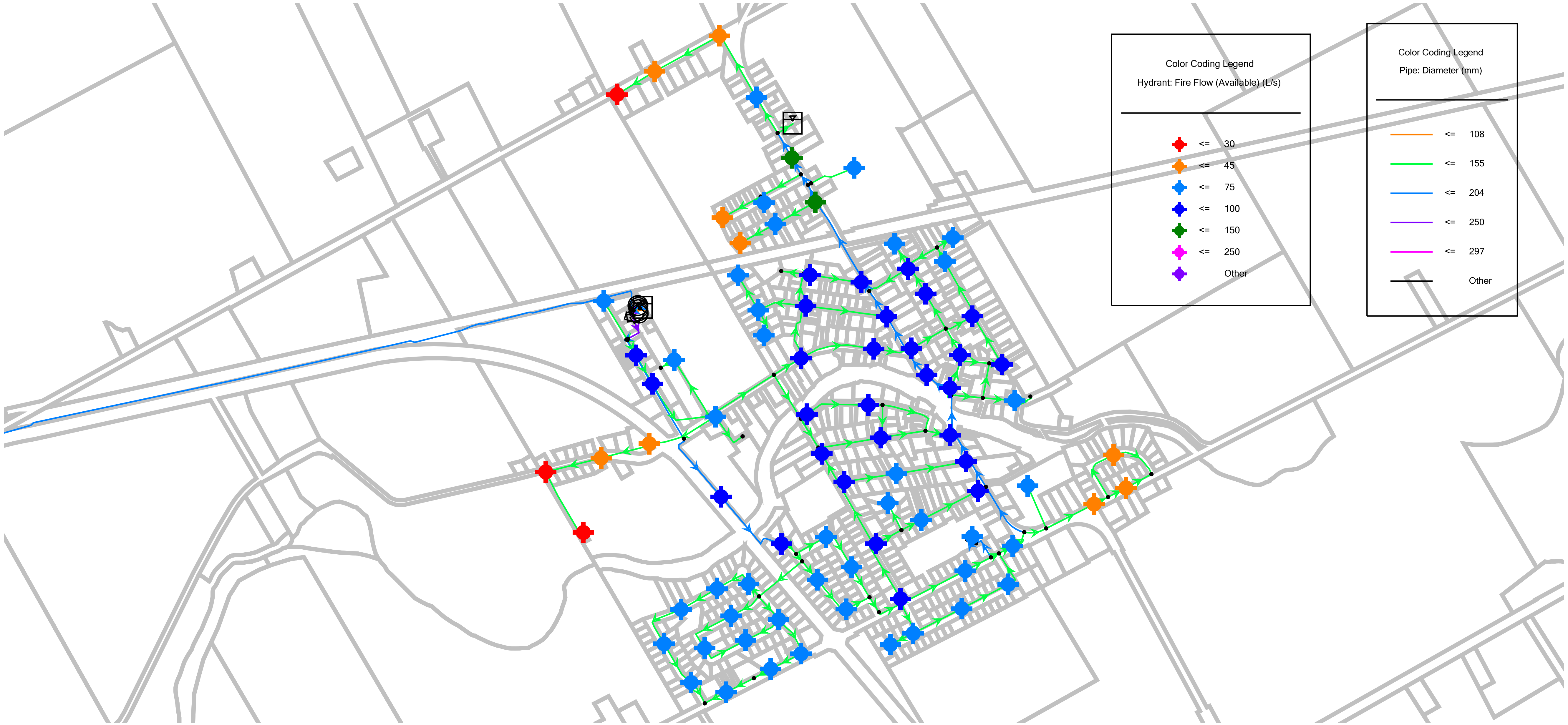
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model

Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Chesterville

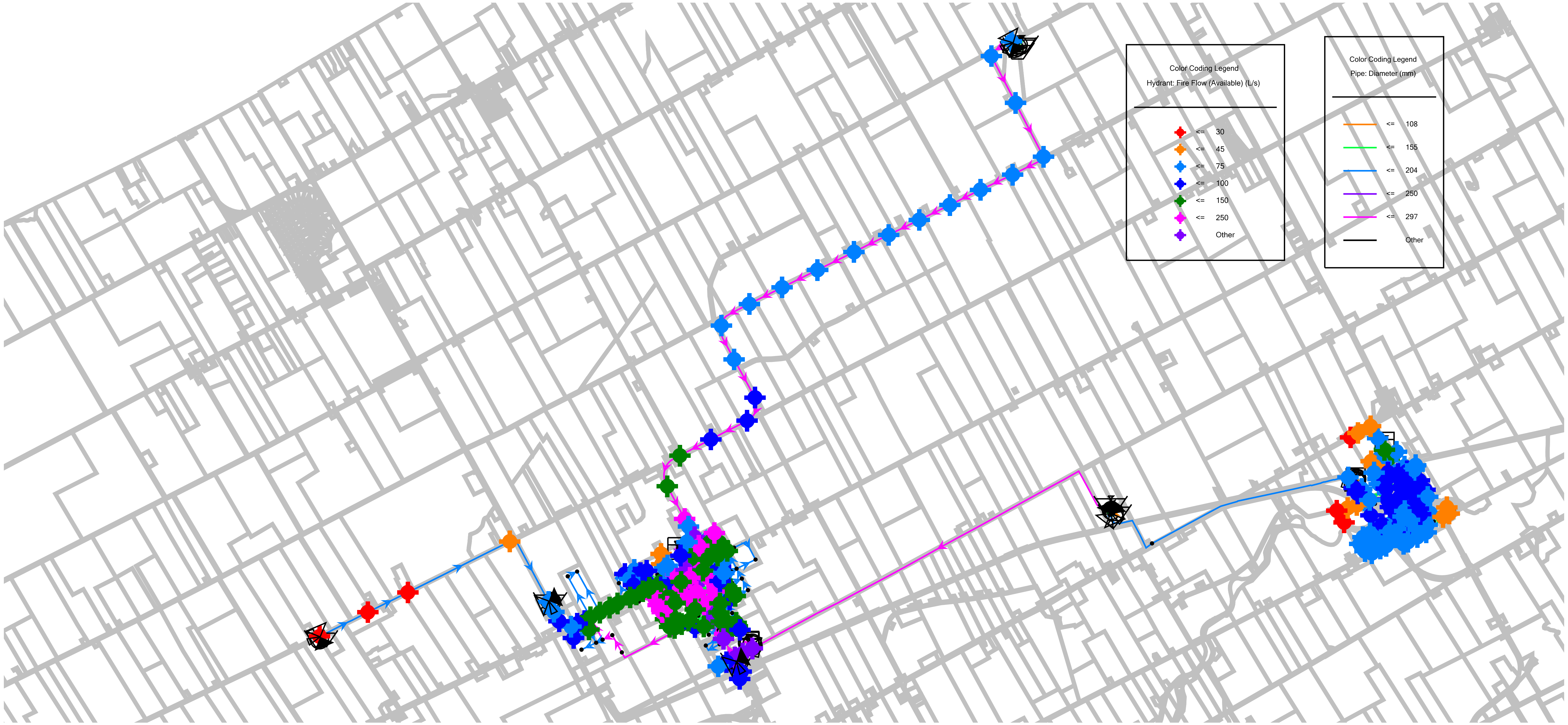
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model

Build Out (20+ Year) Maximum Day Demand + Fire Flow

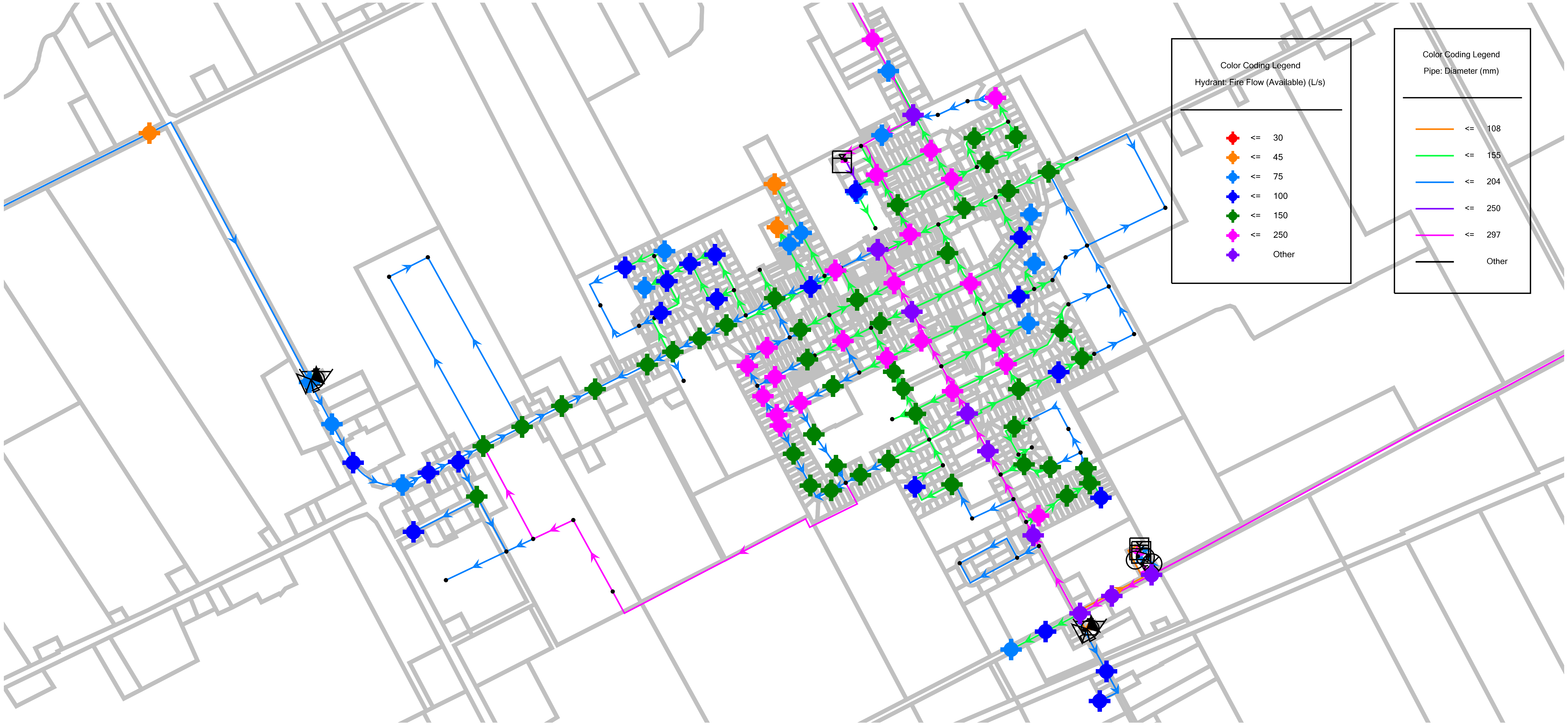
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model

Build Out (20+ Year) Maximum Day Demand + Fire Flow - Winchester

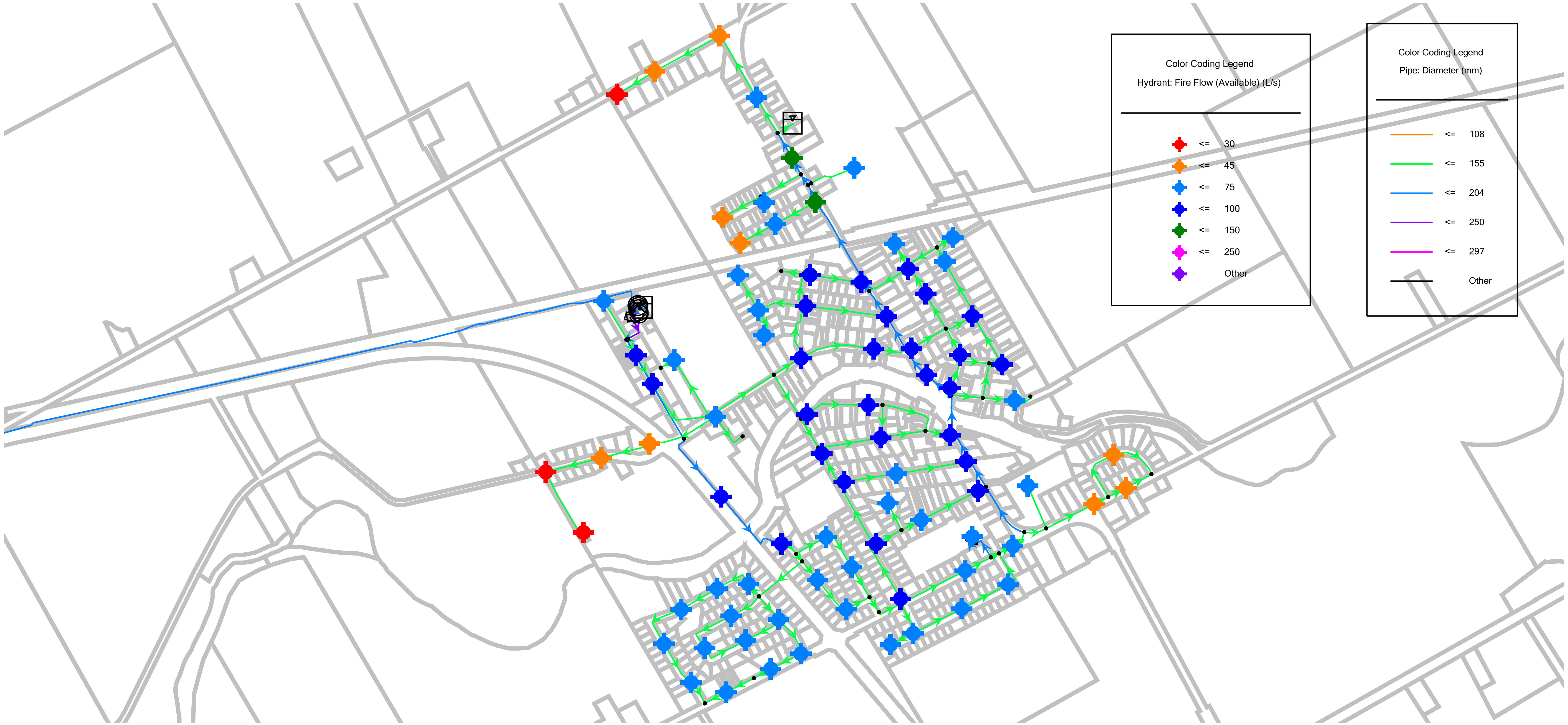
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



North Dundas Hydraulic Water Model

Build Out (20+ Year) Maximum Day Demand + Fire Flow - Chesterville

With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



BUILD OUT		
ID	Label	Fire Flow
248	H-1	59.54
249	H-10	290.01
250	H-100	75.75
251	H-101	78.69
252	H-102	83.33
253	H-103	75.53
254	H-104	53.09
255	H-105	54.37
256	H-106	52.82
257	H-107	52.39
258	H-108	51.3
259	H-109	49.09
260	H-11	286.66
261	H-110	47.4
262	H-111	69.87
263	H-112	70.27
264	H-113	82.72
265	H-114	70.27
266	H-115	71.11
267	H-116	69.12
268	H-117	74.8
269	H-118	66.32
270	H-119	63.87
271	H-12	257.31
272	H-120	66.4
273	H-121	54.66
274	H-122	76.74
275	H-123	81.21
276	H-124	89.34
277	H-125	84.81
278	H-126	91.27
279	H-128	39.07
280	H-129	39.15
281	H-13	226.62
282	H-130	52
283	H-131	53.4
284	H-132	43.39
285	H-133	106.26
286	H-134	57.84
287	H-135	44.47
288	H-136	53.15
289	H-137	45.88
290	H-138	81.53
291	H-139	76.21
292	H-14	194.51
293	H-140	80.52
294	H-141	59.9

BUILD OUT		
ID	Label	Fire Flow
295	H-142	70.57
296	H-143	80.12
297	H-144	66.49
298	H-145	216.77
299	H-146	48.57
300	H-147	79.71
301	H-148	103.61
302	H-149	94.75
303	H-15	188.29
304	H-150	42.02
305	H-151	33.47
306	H-152	211.62
307	H-153	145.9
308	H-154	166.01
309	H-155	107.33
310	H-156	326.88
311	H-157	215.22
312	H-158	166.02
313	H-159	58.05
314	H-16	206.32
315	H-160	126.06
316	H-161	111.21
317	H-162	230.67
318	H-163	92.69
319	H-164	264.2
320	H-165	115.95
321	H-166	169.23
322	H-167	26.37
323	H-168	86.92
324	H-169	70.29
325	H-17	208.46
326	H-170	45.98
327	H-171	44.07
328	H-172	40.31
329	H-173	30.3
330	H-174	28.07
331	H-175	28.1
333	H-177	60.27
334	H-178	136.75
335	H-18	179.19
336	H-180	214.79
337	H-181	122.73
338	H-182	159.42
339	H-183	112.58
340	H-184	151.09
341	H-185	75.03
342	H-186	51.27

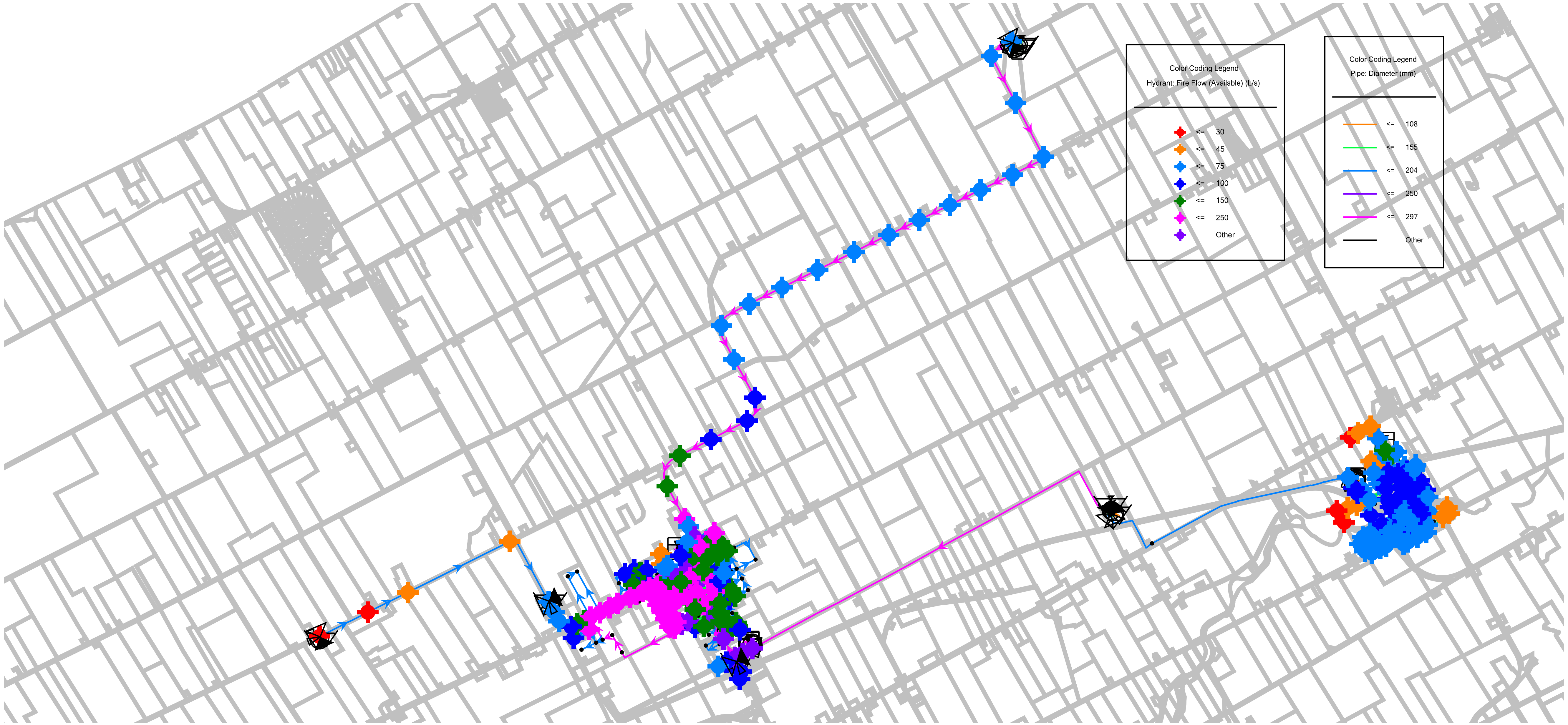
BUILD OUT		
ID	**Label**	**Fire Flow**
343	H-187	51.28
344	H-188	51.24
345	H-189	52.29
346	H-19	193.91
347	H-190	52.29
348	H-191	52.24
349	H-192	52.26
350	H-193	52.29
351	H-194	52.26
352	H-195	54.37
353	H-196	56.81
354	H-197	59.62
355	H-198	70.74
356	H-199	77.42
357	H-2	92.72
358	H-20	183.19
359	H-200	82.73
360	H-201	93.64
361	H-202	107.99
362	H-203	46.49
363	H-204	46.5
364	H-205	47
365	H-207	66.29
366	H-208	62.66
367	H-209	257.86
368	H-21	185.99
369	H-210	256.12
370	H-211	257.61
371	H-212	98.19
372	H-213	155.08
373	H-214	89.16
374	H-215	49.66
375	H-216	51.37
376	H-217	53.5
377	H-218	111.01
378	H-219	115.73
379	H-22	169.65
380	H-220	81.38
381	H-221	101.98
382	H-222	108.63
383	H-223	156.58
384	H-23	297.34
385	H-24	161.48
386	H-25	88.62
387	H-26	57.72
388	H-27	108.14
389	H-28	119.27

BUILD OUT		
ID	Label	Fire Flow
390	H-29	148.42
391	H-3	76.3
392	H-30	152.62
393	H-31	58.79
394	H-32	134.24
395	H-33	151.46
396	H-34	180.56
397	H-35	100.71
398	H-36	49.4
399	H-37	268.05
400	H-38	297.94
401	H-39	77.37
402	H-4	54.53
403	H-40	139.57
404	H-41	212.36
405	H-42	141.2
406	H-43	47.63
407	H-44	93.4
408	H-45	222.05
409	H-46	199.47
410	H-47	144.82
411	H-48	103.08
412	H-49	93.06
413	H-5	96.28
414	H-50	107.95
415	H-51	105.48
416	H-52	151.37
417	H-53	89.71
418	H-54	103.72
419	H-55	75.29
420	H-56	104.25
421	H-57	205.03
422	H-58	218.38
423	H-59	226.03
424	H-60	207.76
425	H-61	176.77
426	H-62	143.77
427	H-63	126.82
428	H-64	186.99
429	H-65	193.41
430	H-66	180.01
431	H-67	174.85
432	H-68	108.11
433	H-69	92.1
434	H-7	86.41
435	H-70	74.37
436	H-71	66.34

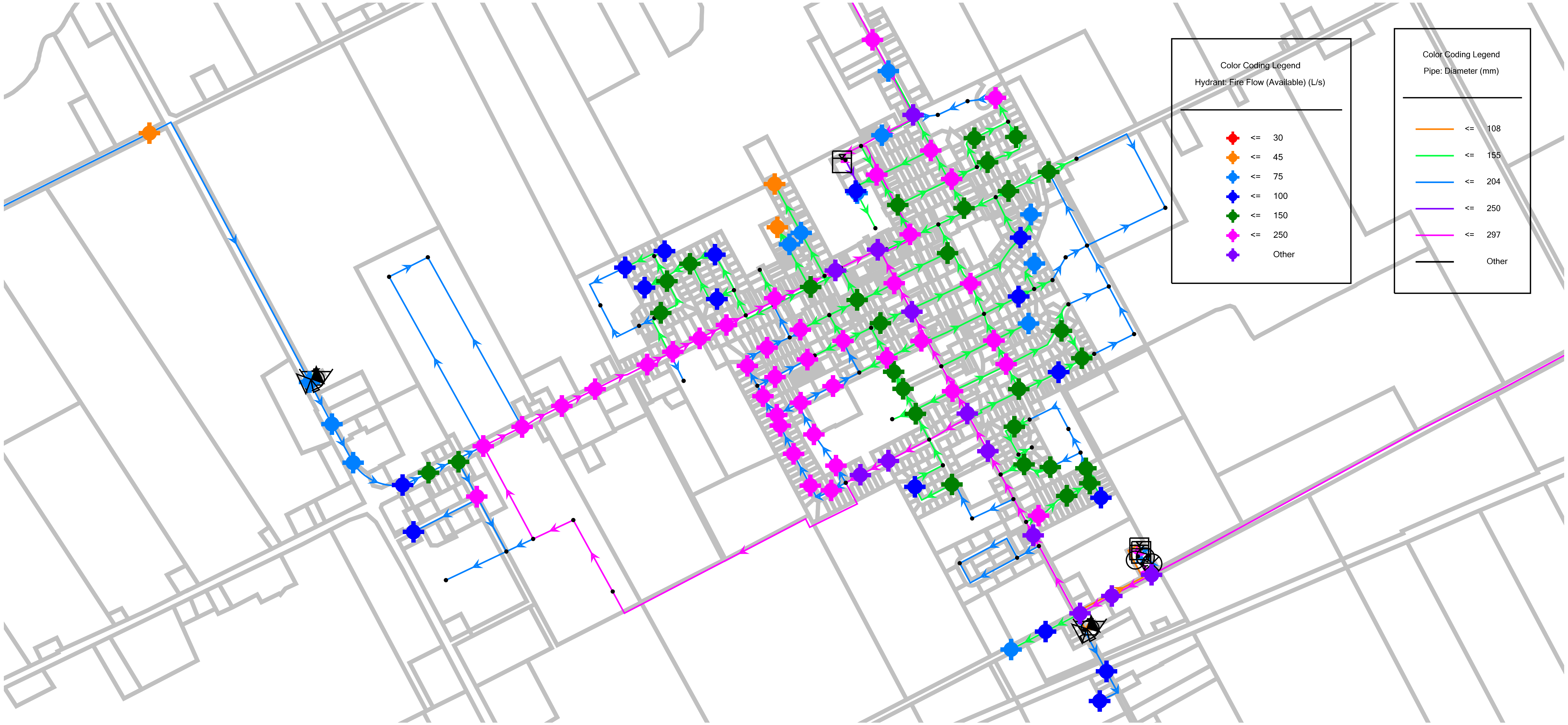
BUILD OUT		
ID	**Label**	**Fire Flow**
437	H-72	133.62
438	H-73	99.85
439	H-74	56.21
440	H-75	173.81
441	H-76	94.61
442	H-77	27.42
443	H-78	30.29
444	H-79	43.52
445	H-8	59.28
446	H-80	35.65
447	H-81	29.97
448	H-82	77.09
449	H-83	87.06
450	H-84	57.75
451	H-85	68.97
452	H-86	84.41
453	H-87	78.27
454	H-88	93.61
455	H-89	115.91
456	H-9	281.41
457	H-90	52.87
458	H-91	37.54
459	H-92	78.5
460	H-93	77.72
461	H-94	60.03
462	H-95	70.1
463	H-96	85.37
464	H-97	79.88
465	H-98	69.66
466	H-99	55.47
1151	J-267	100.66
1152	J-268	126.11
1153	J-269	126.08
1154	J-270	179.51
1155	J-271	184.43
1156	J-272	194.06
1157	J-273	160.58
1158	J-274	110.33
1159	J-275	101.45
1160	J-276	238.76
1161	J-277	182.11
1162	J-278	103.32
1163	J-279	126.77
1164	J-280	121.06
1165	J-281	126.2
1166	J-282	115.47
1167	J-283	114.36

BUILD OUT		
ID	**Label**	**Fire Flow**
1168	J-284	178.85
1169	J-285	193.8
1170	J-286	160.55
1171	J-287	166.44
1205	J-289	119.75

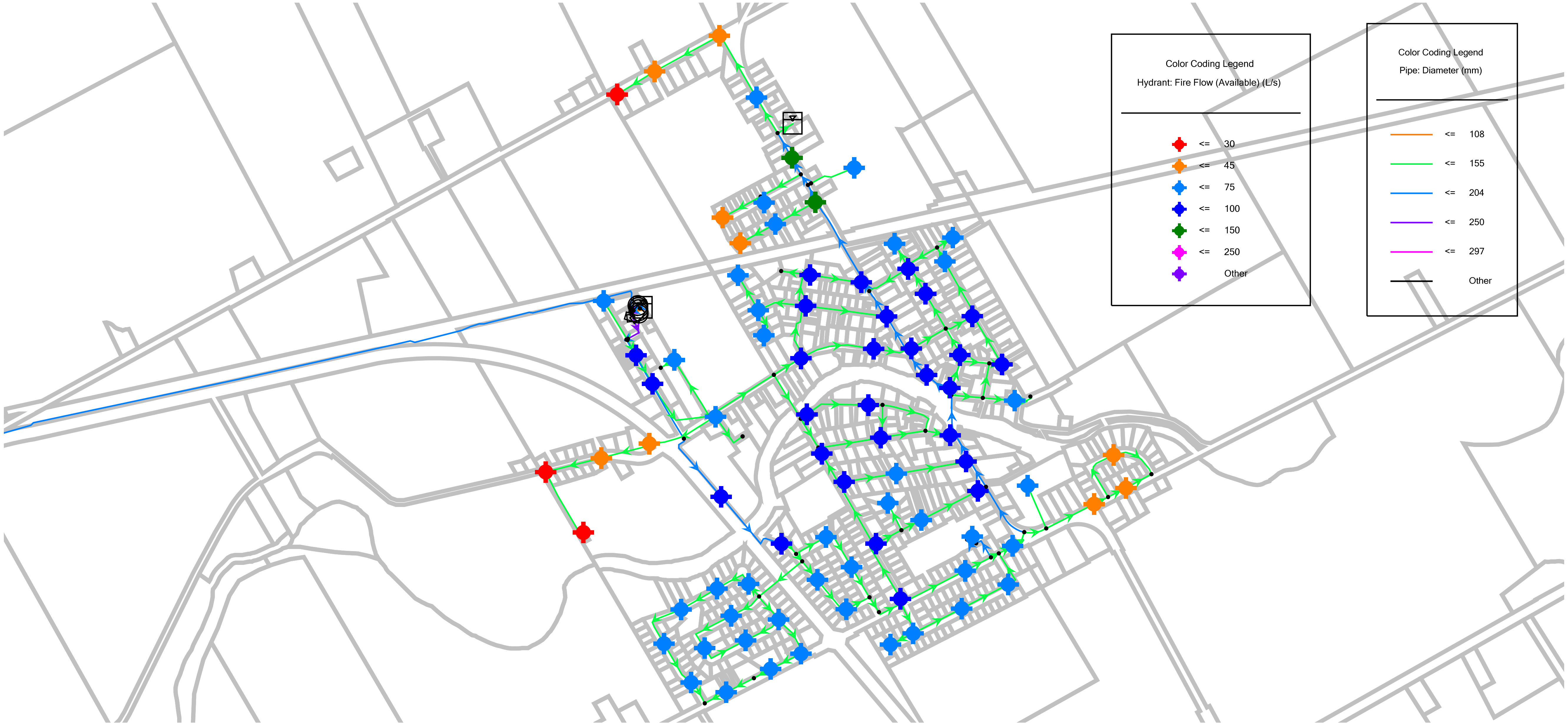
North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow
With Full 300mm Winchester Watermain Loop



North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow - Winchester
With Full 300mm Winchester Watermain Loop



North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow - Chesterville
With Full 300mm Winchester Watermain Loop



Attachment 3

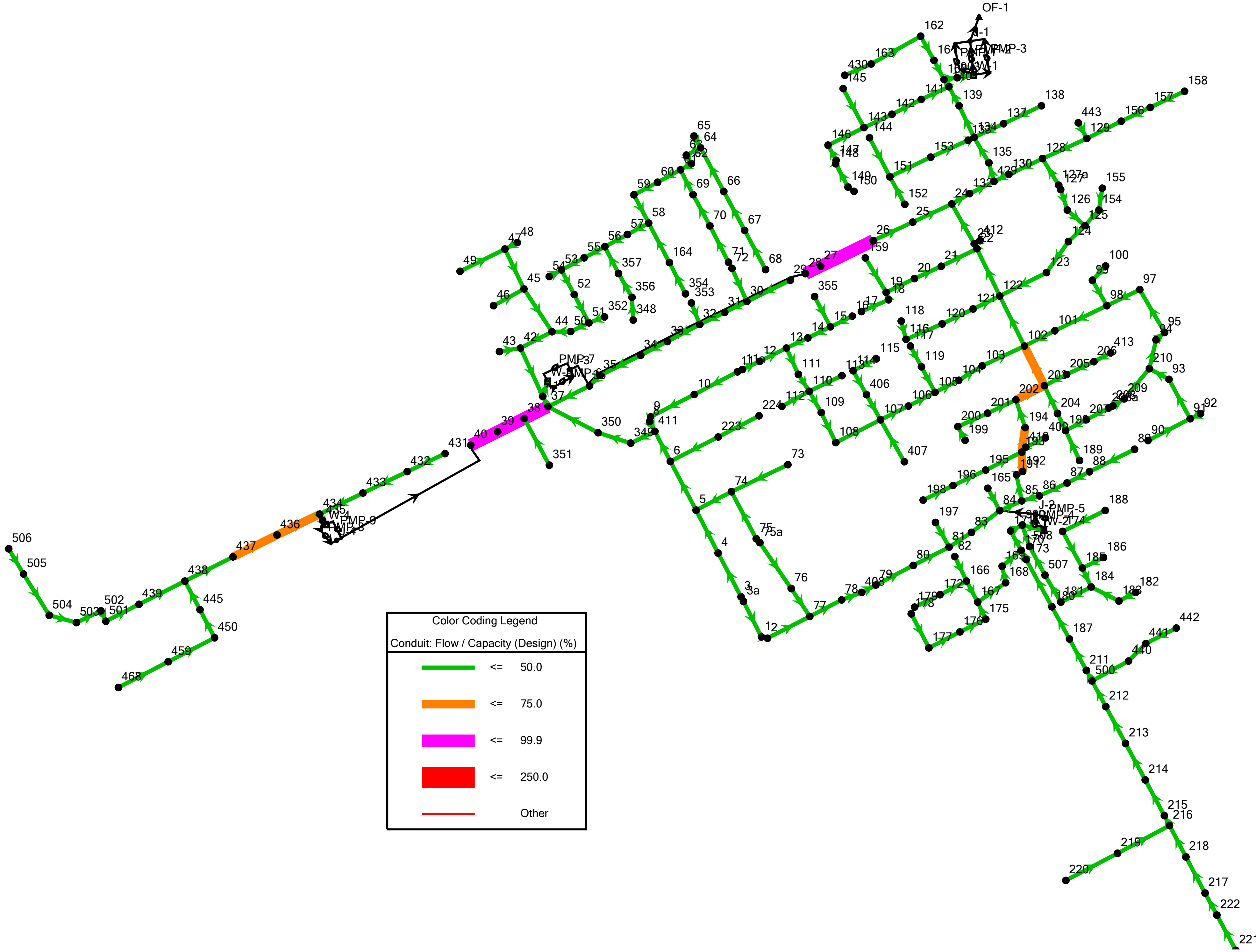
HYDRAULIC SEWER MODEL SCHEMATICS

North Dundas Servicing Study

Active Scenario: WWF_Existing

North Dundas Servicing Study

Active Scenario: WWF Option 1 5yr



North Dundas Servicing Study

Active Scenario: WWF Option 1 10yr

North Dundas Servicing Study

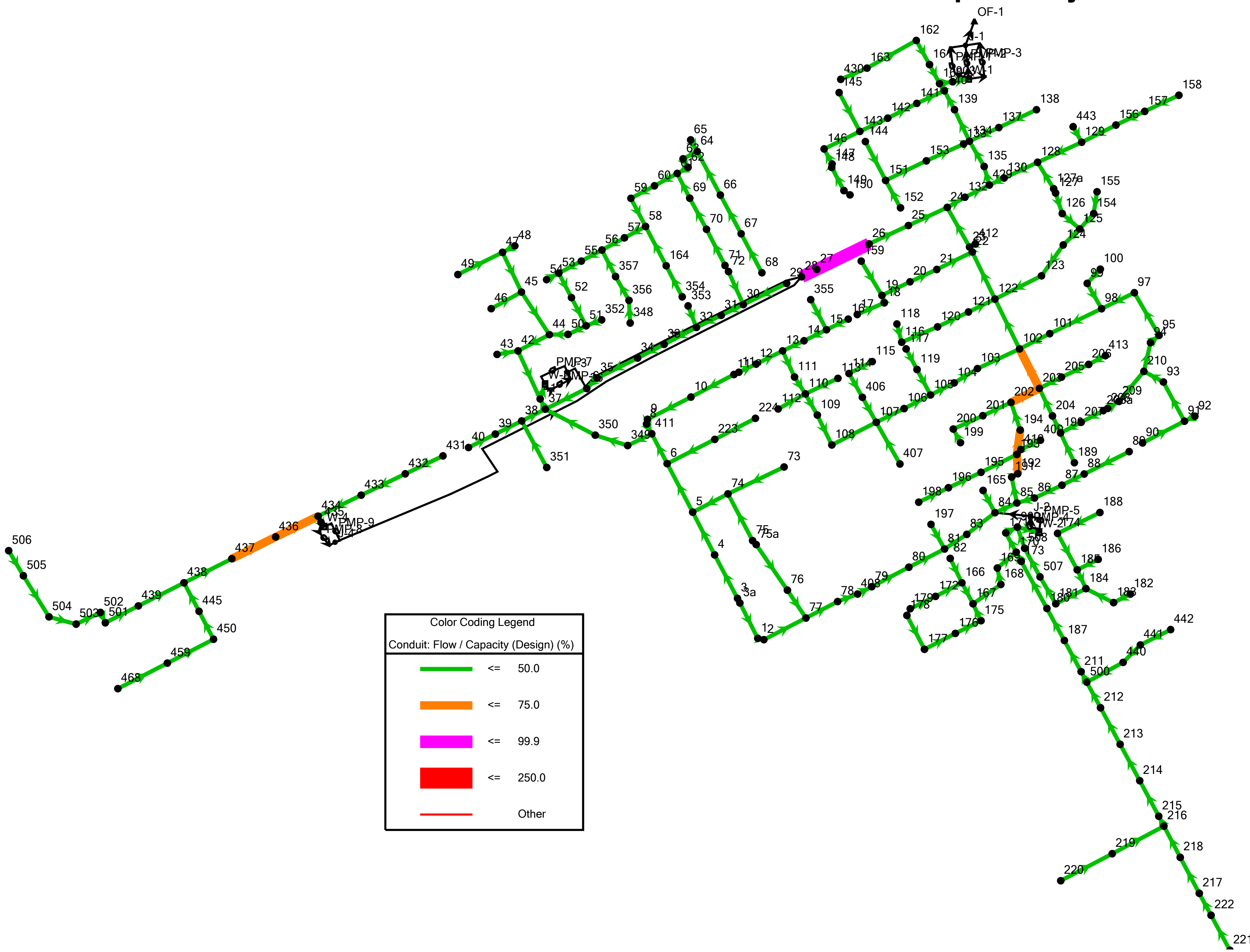
Active Scenario: WWF Option 1 20yr

North Dundas Servicing Study

Active Scenario: WWF Option 1 Build-out

North Dundas Servicing Study

Active Scenario: WWF Option 2A 5yr MainSt



North Dundas Servicing Study

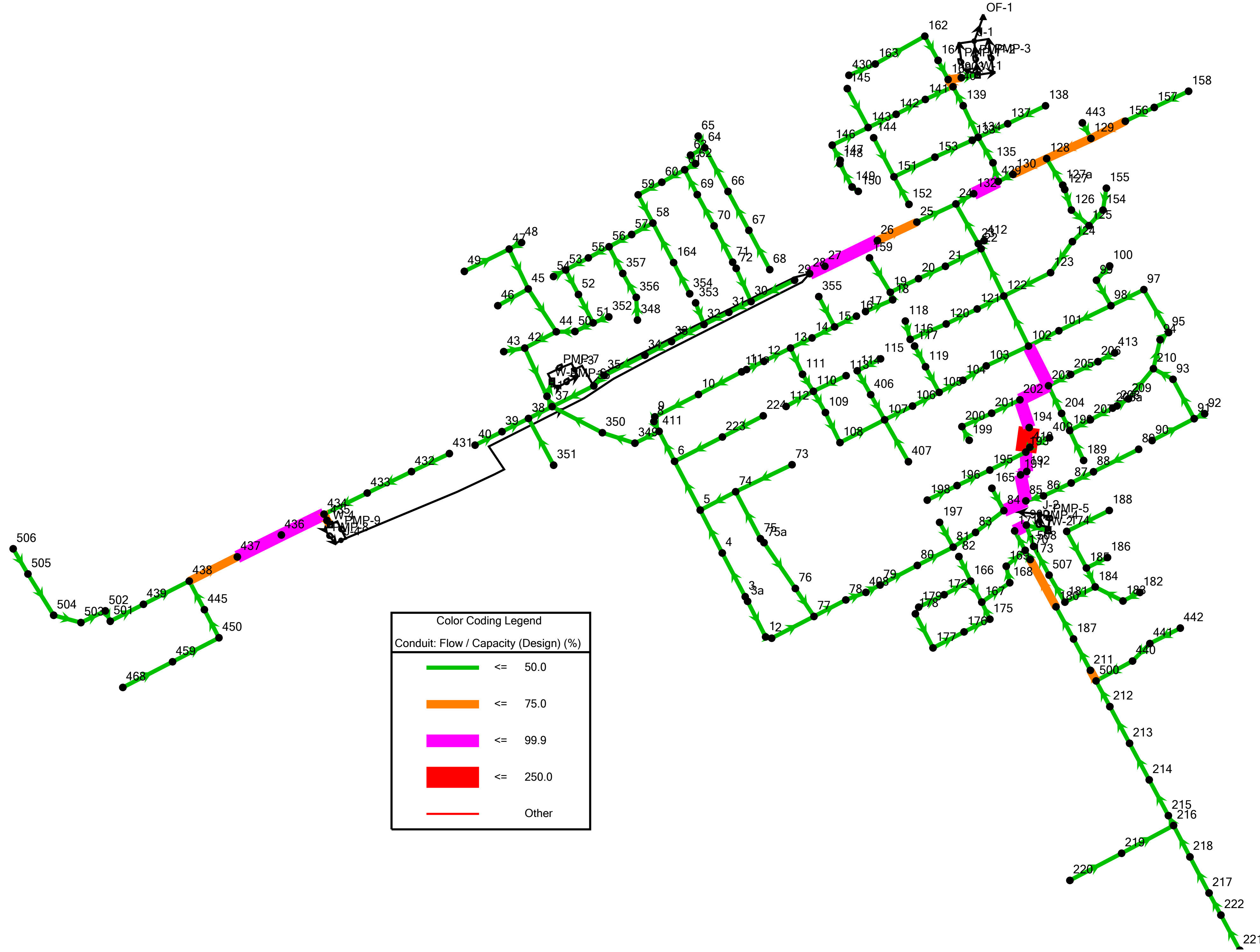
Active Scenario: WWF Option 2A 10yr MainSt

North Dundas Servicing Study

Active Scenario: WWF Option 2A 20yr MainSt

North Dundas Servicing Study

Active Scenario: WWF Option 2A Build-out MainSt



North Dundas Servicing Study

Active Scenario: WWF Option 2B 5yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF_Option 2B 10yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 2B 20yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 2B Build-out Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 3A 5 yr Main St

North Dundas Servicing Study

Active Scenario: WWF Option 3A 10 yr Main St

North Dundas Servicing Study

Active Scenario: WWF Option 3A 20 yr Main St

North Dundas Servicing Study

Active Scenario: WWF Option 3A Build-out Main St

North Dundas Servicing Study

Active Scenario: WWF Option 3B 5 yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 3B 10 yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 3B 20 yr Clarence St

North Dundas Servicing Study

Active Scenario: WWF Option 3B Build-out Clarence St