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.

Average Day Demand

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	Mid Term	Long Term	Build-out
			1-5 year	*5-10 year*	*10-20 year*	*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	Mid Term	Long Term	Build-out
			1-5 year	*5-10 year*	*10-20 year*	*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

Prepared by:

Annie Williams., P.Eng.
Civil Engineer

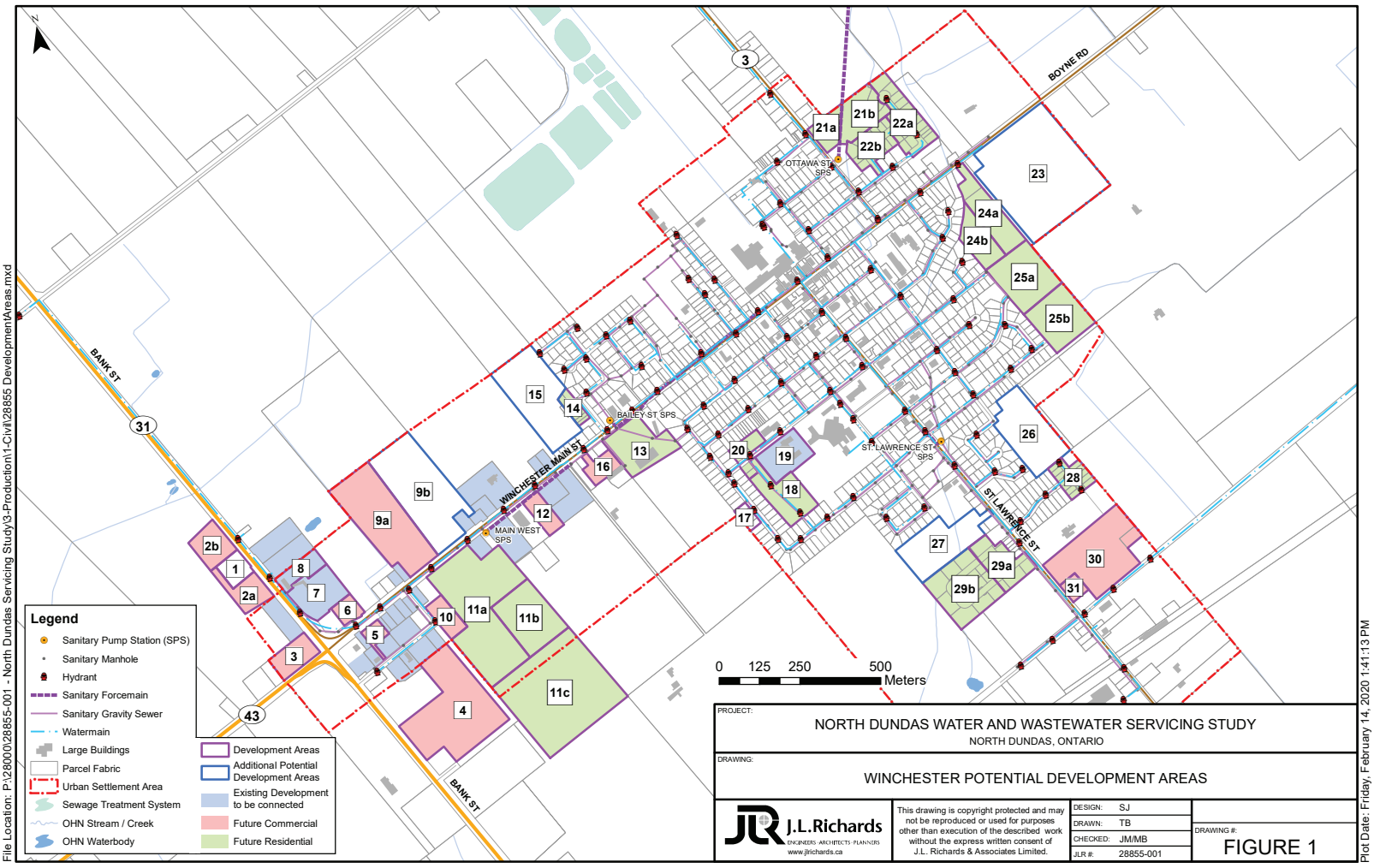
Prepared by:

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

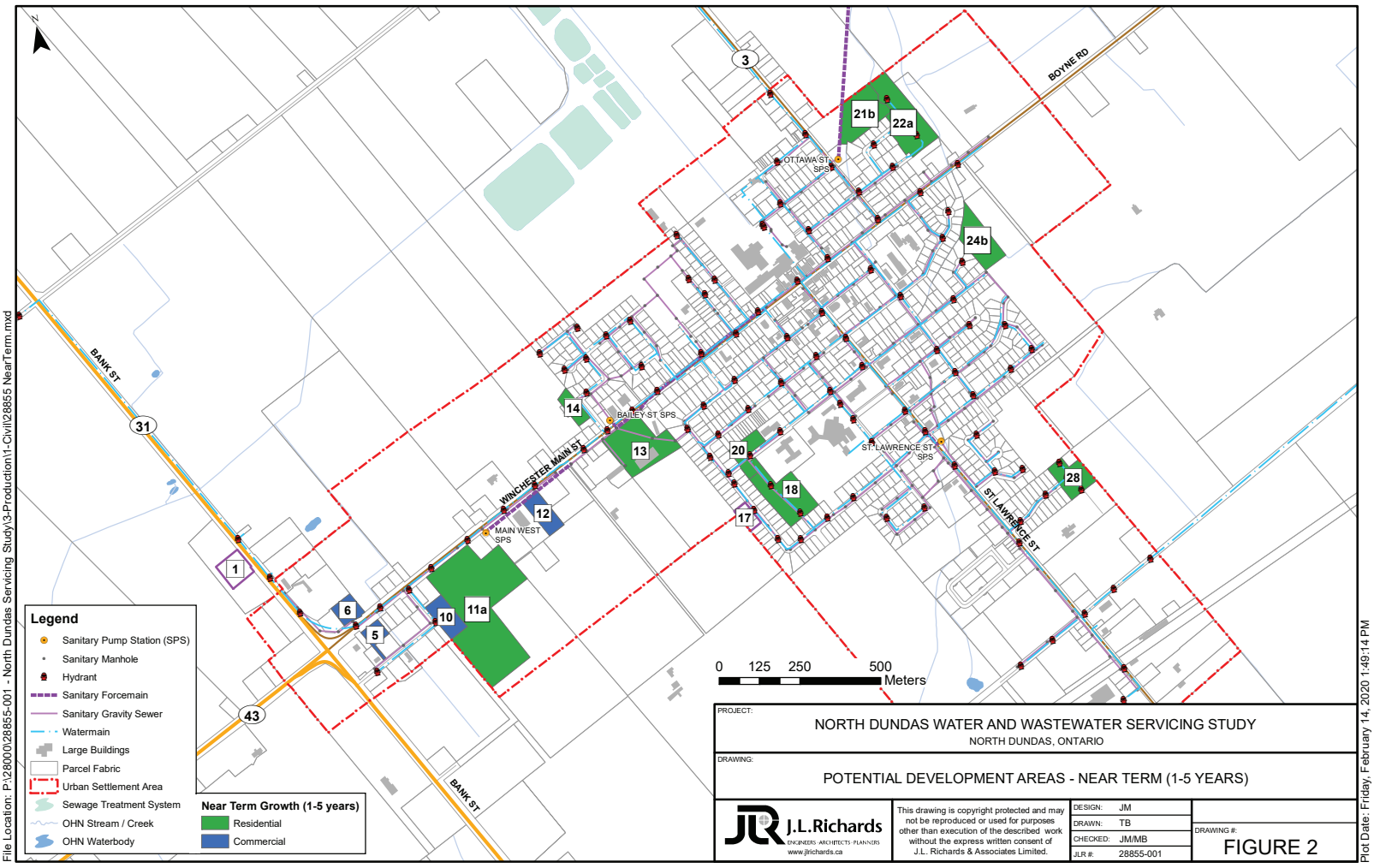
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN: SJ
DRAWN: TB
CHECKED: JM/MB
JLR #: 28855-001

DRAWING #:
FIGURE 1

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 DevelopmentAreas.mxd

Plot Date: Friday, February 14, 2020 1:41:13 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
POTENTIAL DEVELOPMENT AREAS - NEAR TERM (1-5 YEARS)

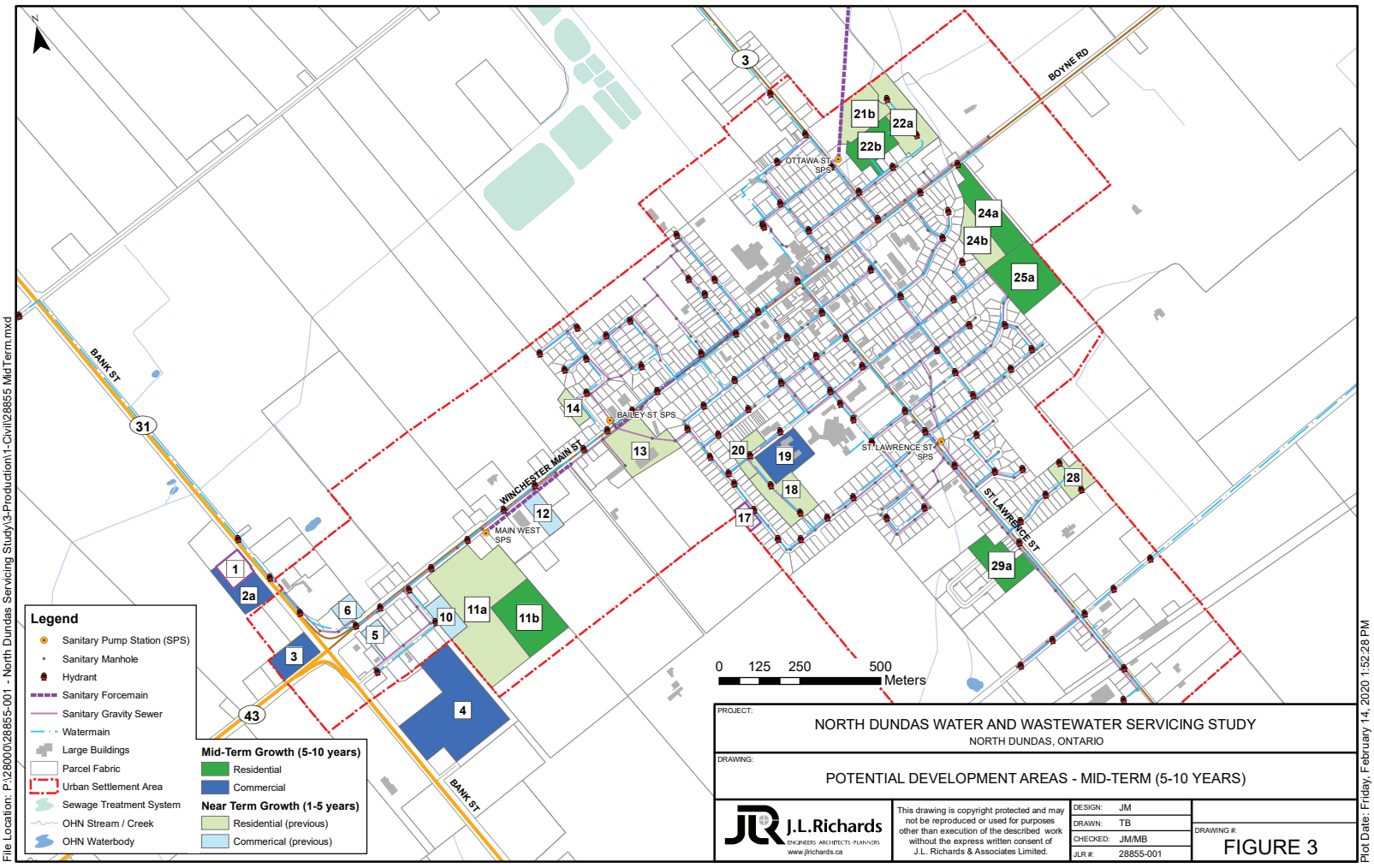
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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

Plot Date: Friday, February 14, 2020 1:49:14 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
POTENTIAL DEVELOPMENT AREAS - MID-TERM (5-10 YEARS)

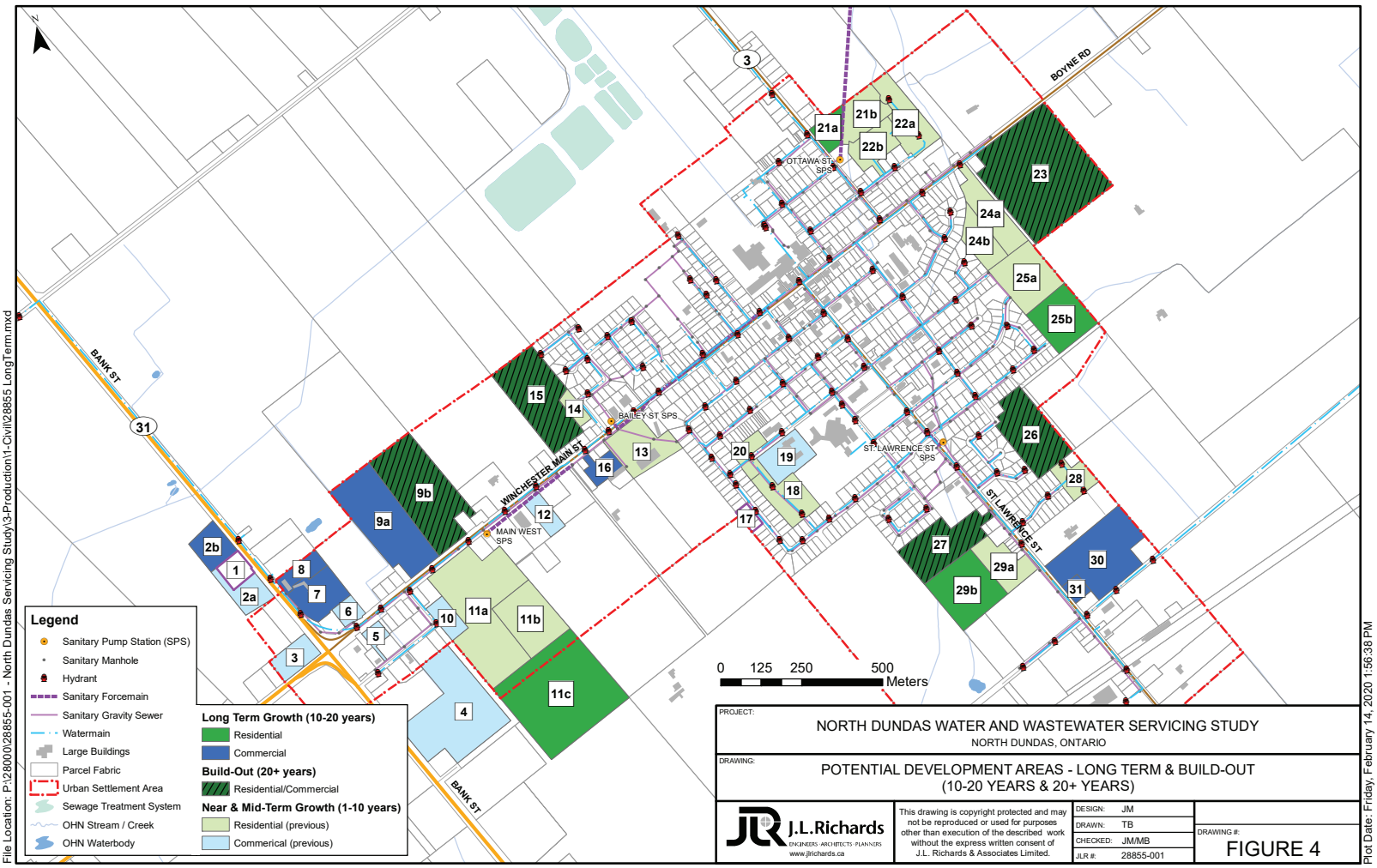
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	JM
DRAWN:	TB
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 3

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 MidTerm.mxd

Plot Date: Friday, February 14, 2020 1:52:28 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
POTENTIAL DEVELOPMENT AREAS - LONG TERM & BUILD-OUT
(10-20 YEARS & 20+ YEARS)

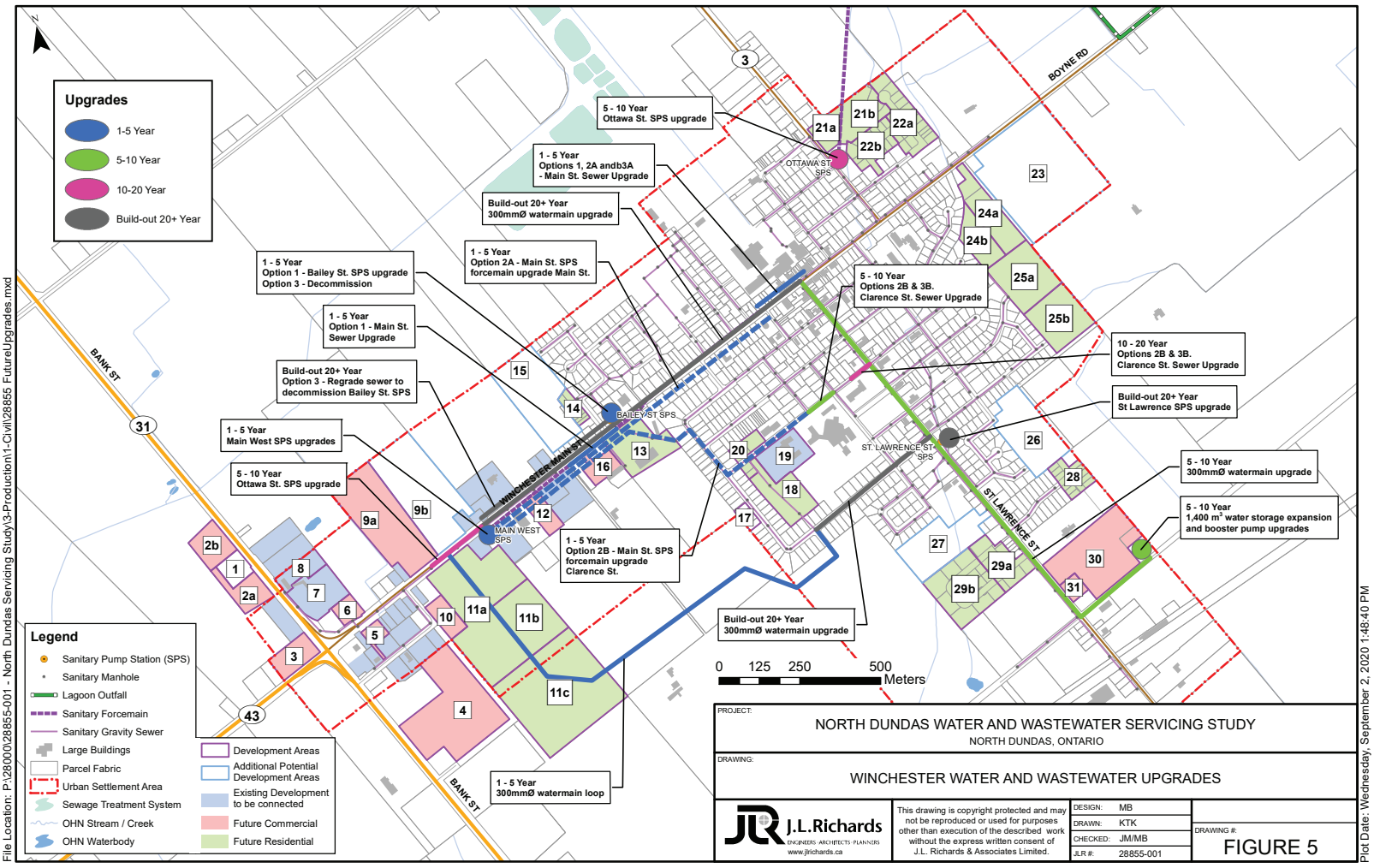
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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

Plot Date: Friday, February 14, 2020 1:56:38 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER UPGRADES

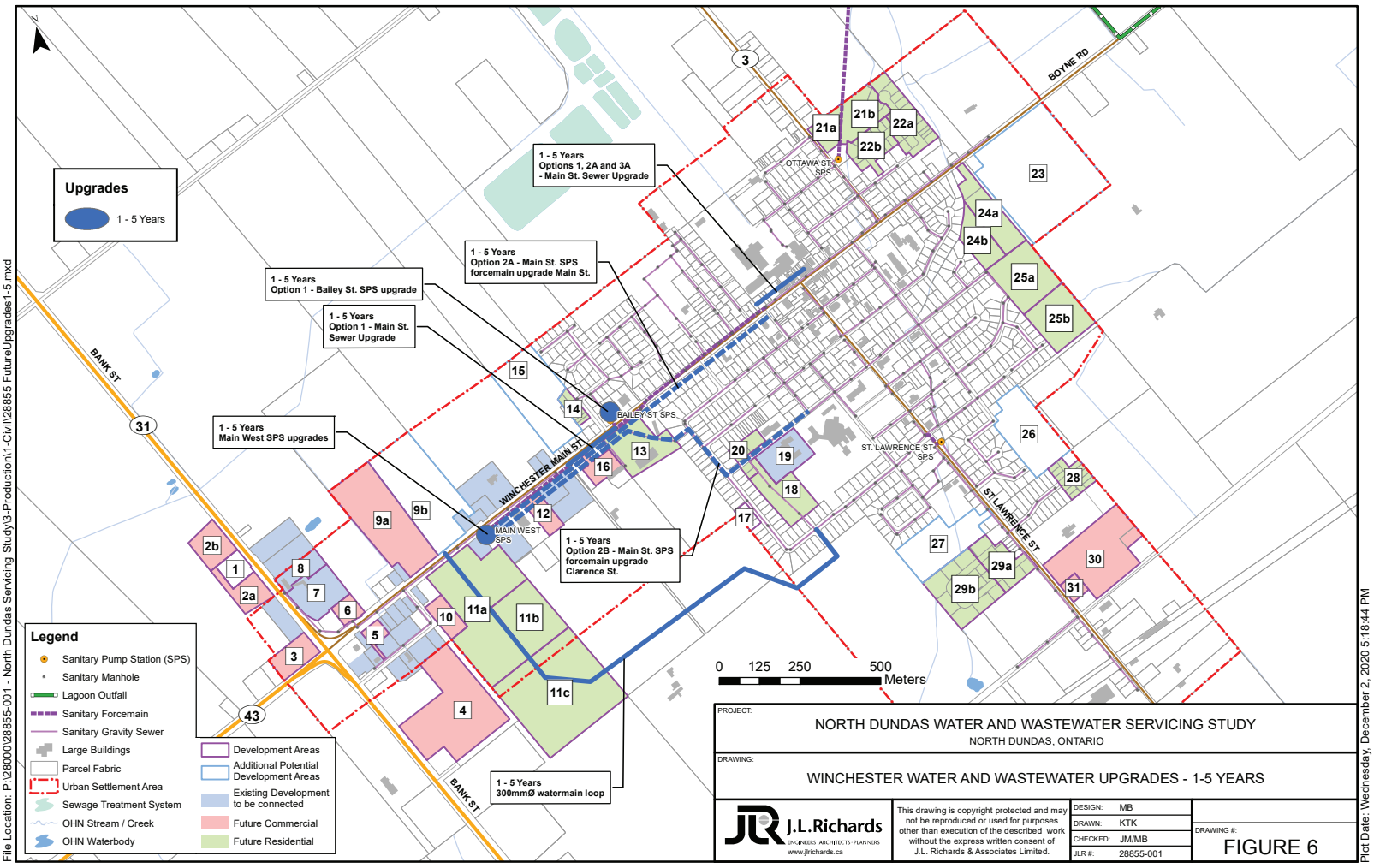
J.L.Richards
ENGINEERS ARCHITECTS PLANNERS
www.jlrichards.ca

DESIGN: MB
DRAWN: KTK
CHECKED: JM/MB
JLR #: 28855-001

DRAWING #:
FIGURE 5

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgrades.mxd

Plot Date: Wednesday, September 2, 2020 1:48:40 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER UPGRADES - 1-5 YEARS

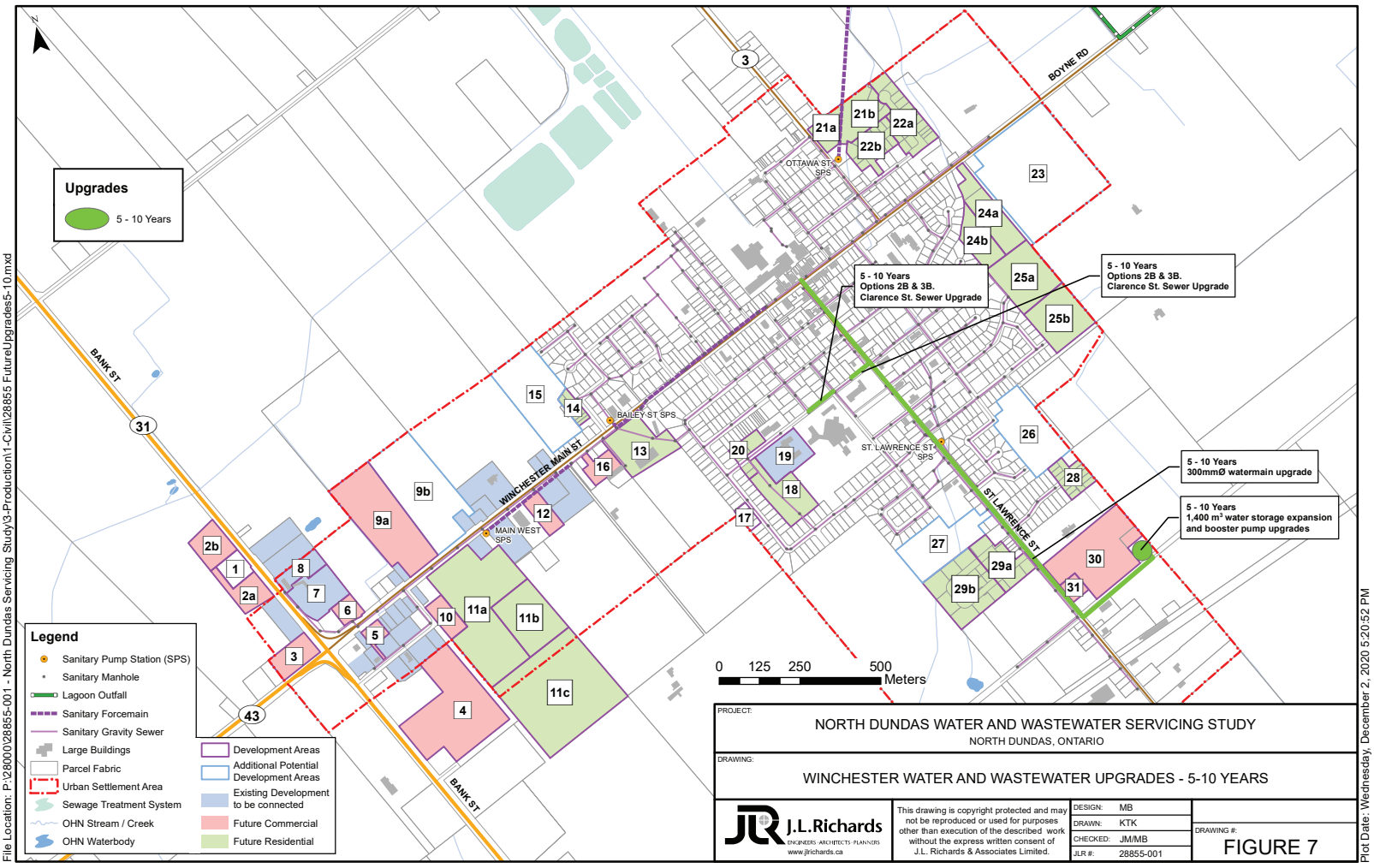
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	MB
DRAWN:	KTK
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 6

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgrades1-5.mxd

Plot Date: Wednesday, December 2, 2020 5:18:44 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER UPGRADES - 5-10 YEARS

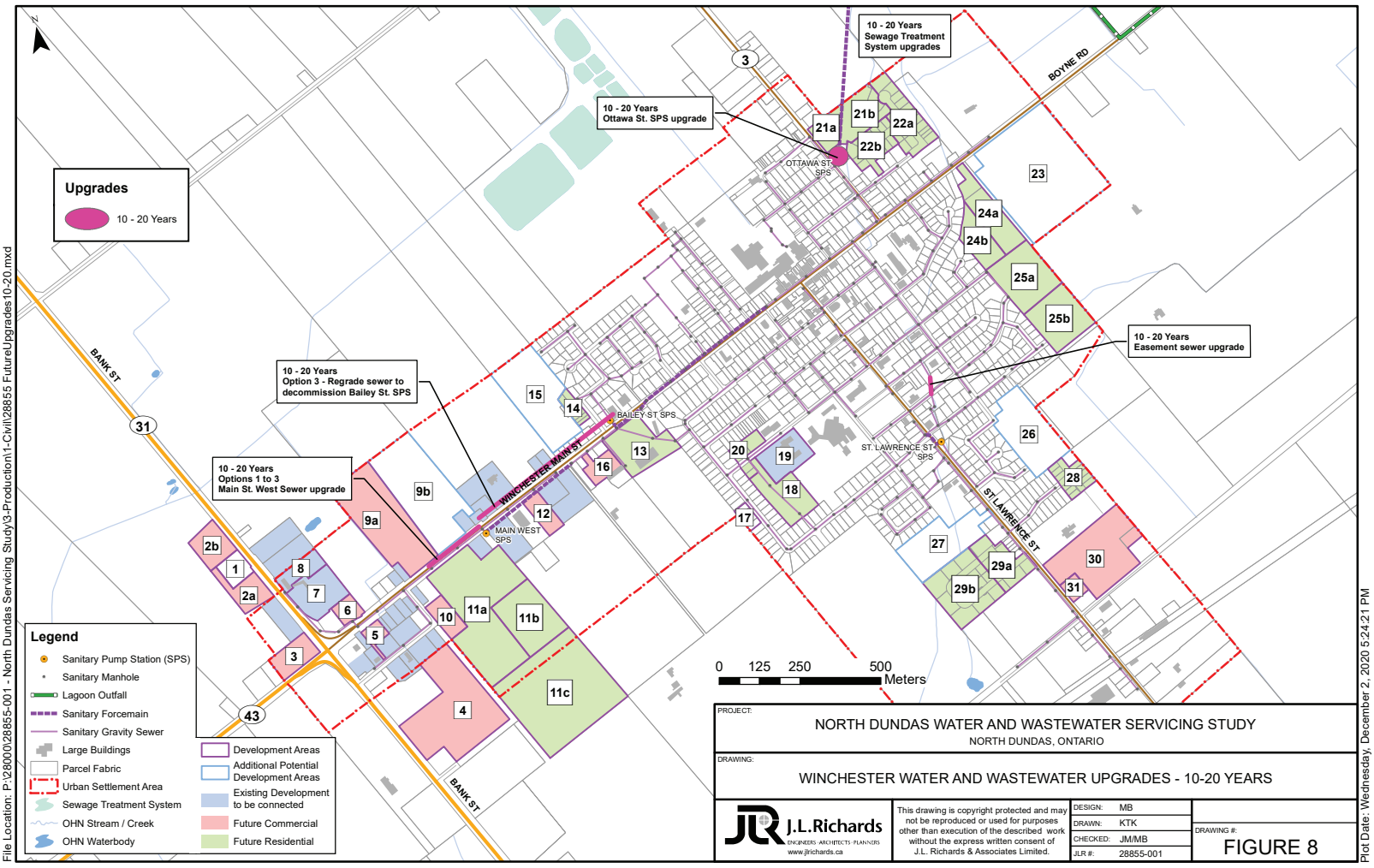
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN: MB
DRAWN: KTK
CHECKED: JM/MB
JLR #: 28855-001

DRAWING #:
FIGURE 7

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgrades5-10.mxd

Plot Date: Wednesday, December 2, 2020 5:20:52 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER UPGRADES - 10-20 YEARS

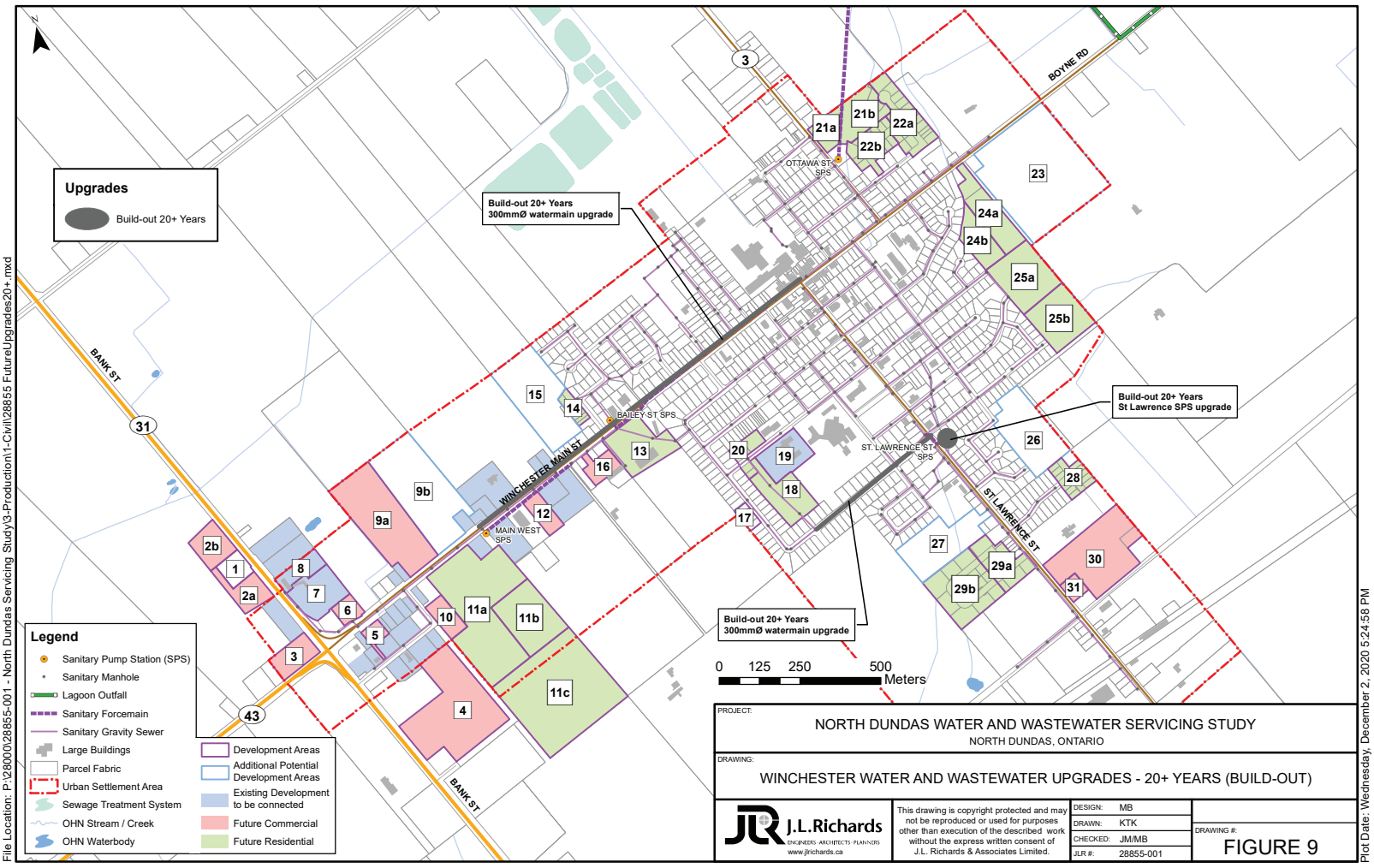
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	MB
DRAWN:	KTK
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 8

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgrades10-20.mxd

Plot Date: Wednesday, December 2, 2020 5:24:21 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER UPGRADES - 20+ YEARS (BUILD-OUT)

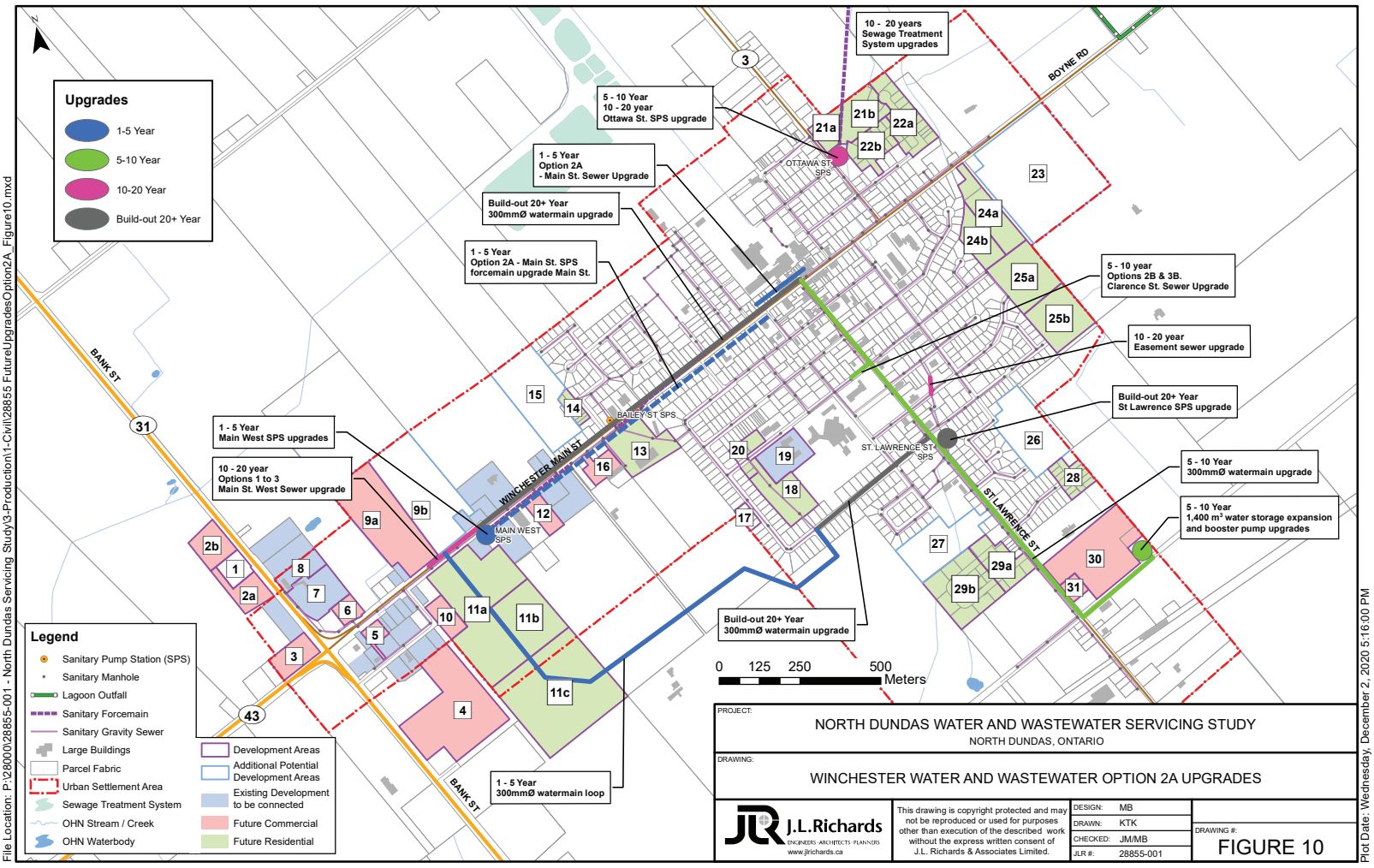
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	MB
DRAWN:	KTK
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 9

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgrades20+.mxd

Plot Date: Wednesday, December 2, 2020 5:24:58 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER WATER AND WASTEWATER OPTION 2A UPGRADES

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	MB
DRAWN:	KTK
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 10

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 FutureUpgradesOption2A_Figure10.mxd

Plot Date: Wednesday, December 2, 2020 5:16:00 PM

Attachment 1

GROWTH PROJECTIONS MEMORANDUM

MEMORANDUM

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 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

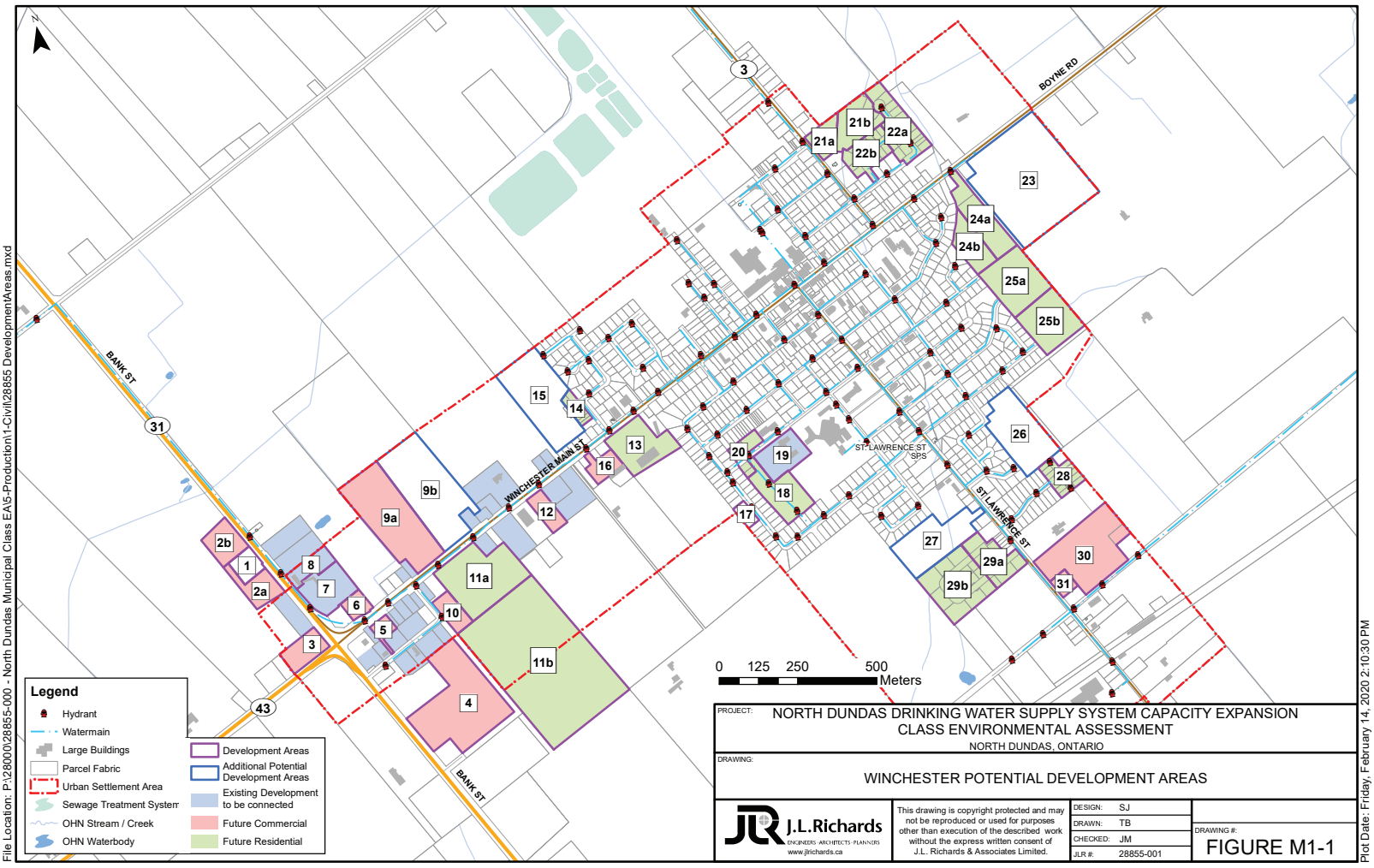
J.L. RICHARDS & ASSOCIATES LIMITED

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

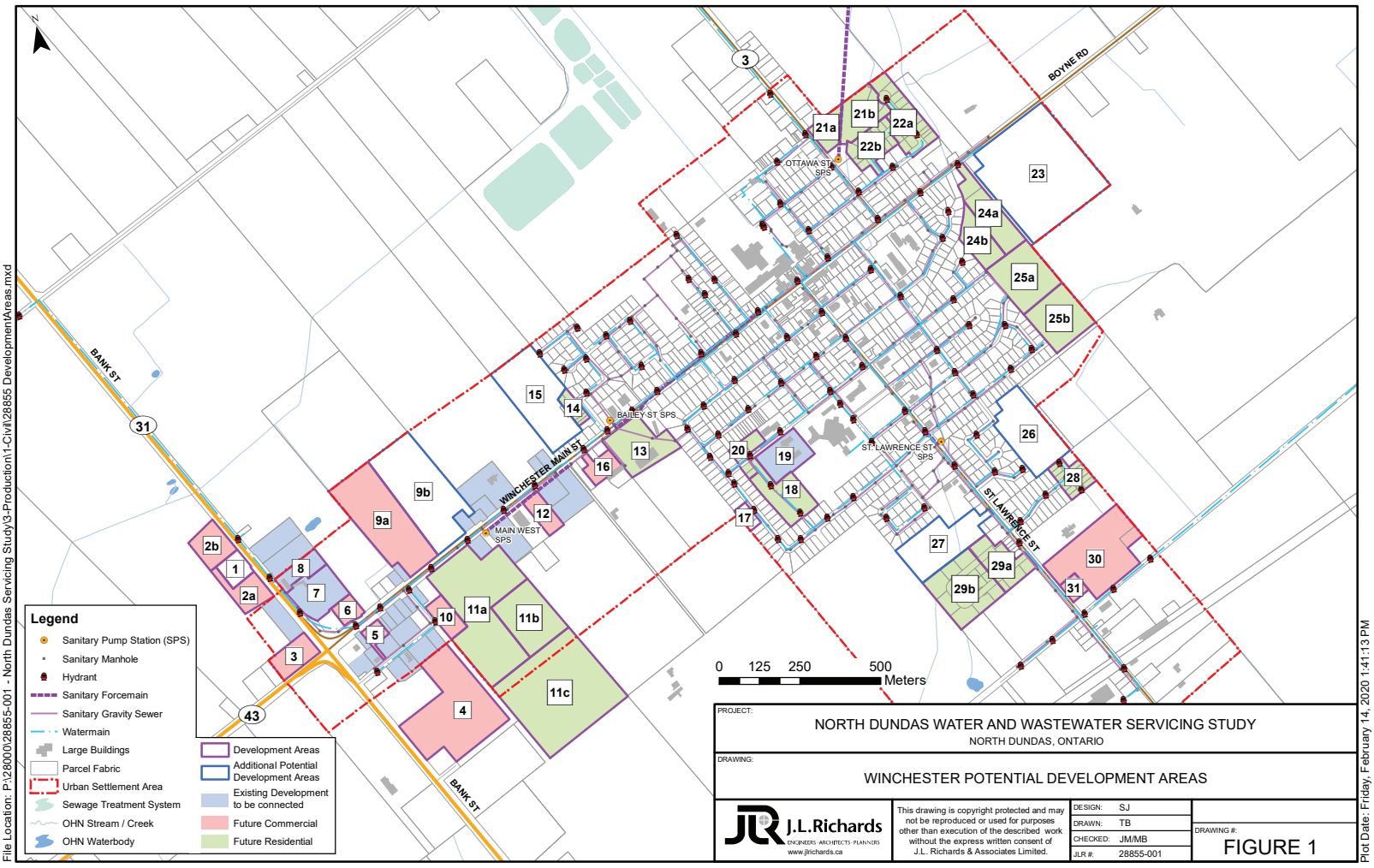
File Location: P:\28000\28855-000 - North Dundas Municipal Class EA\5-Production\1-Civil\28855 DevelopmentAreas.mxd

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.



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
WINCHESTER POTENTIAL DEVELOPMENT AREAS

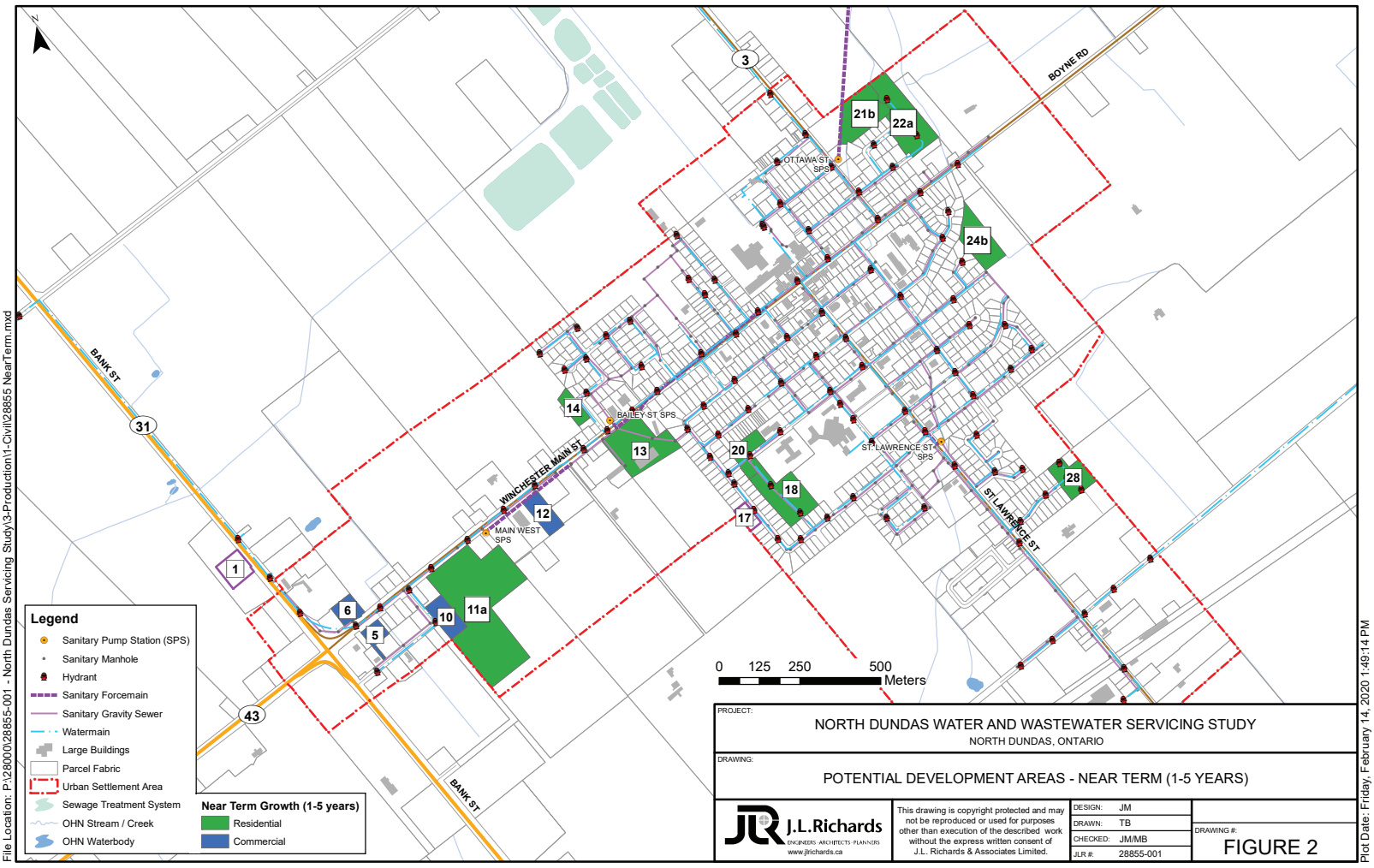
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN: SJ
DRAWN: TB
CHECKED: JM/MB
JLR #: 28855-001

DRAWING #:
FIGURE 1

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 DevelopmentAreas.mxd

Plot Date: Friday, February 14, 2020 1:41:13 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
POTENTIAL DEVELOPMENT AREAS - NEAR TERM (1-5 YEARS)

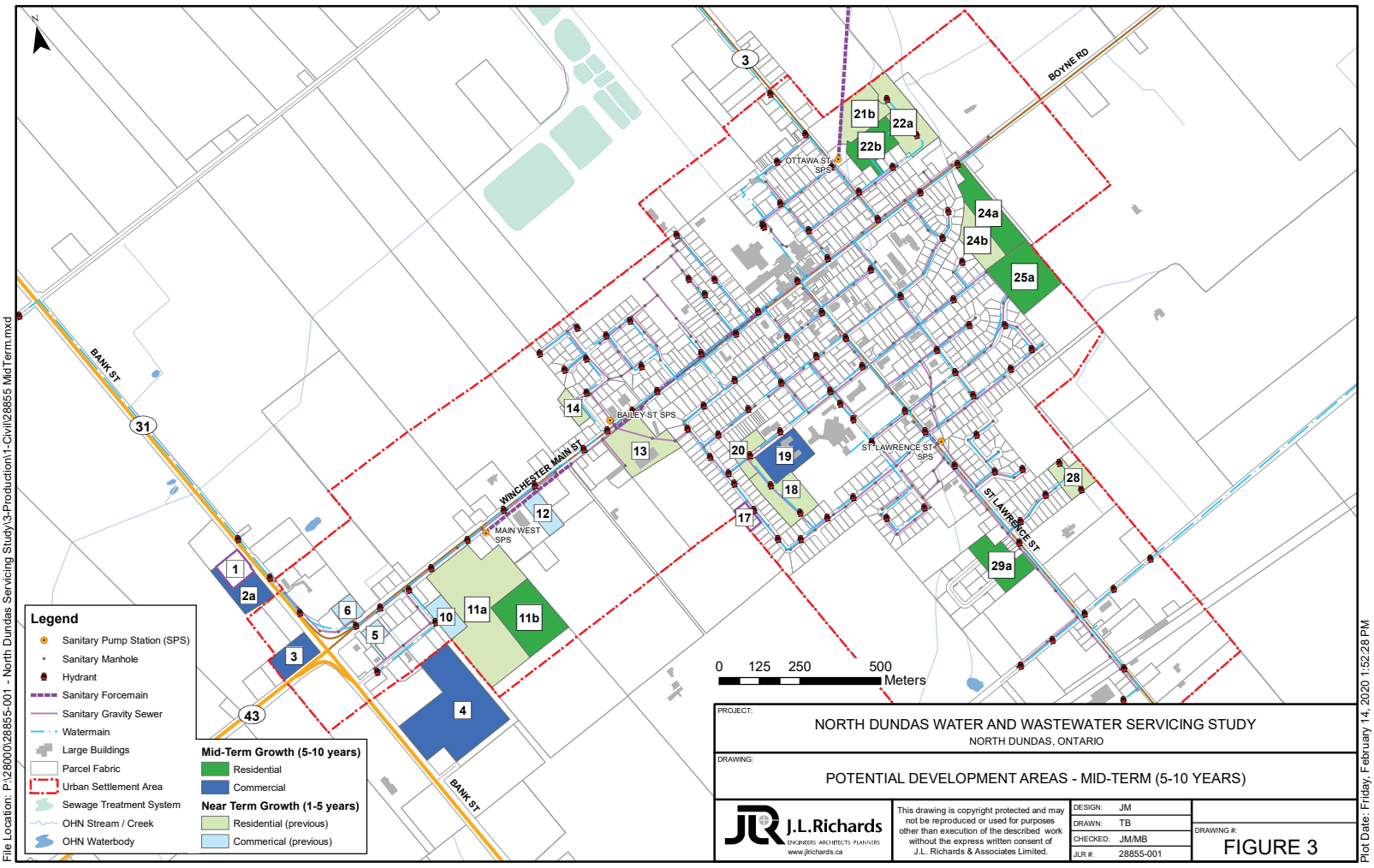
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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

Plot Date: Friday, February 14, 2020 1:49:14 PM



PROJECT:
NORTH DUNDAS WATER AND WASTEWATER SERVICING STUDY
NORTH DUNDAS, ONTARIO

DRAWING:
POTENTIAL DEVELOPMENT AREAS - MID-TERM (5-10 YEARS)

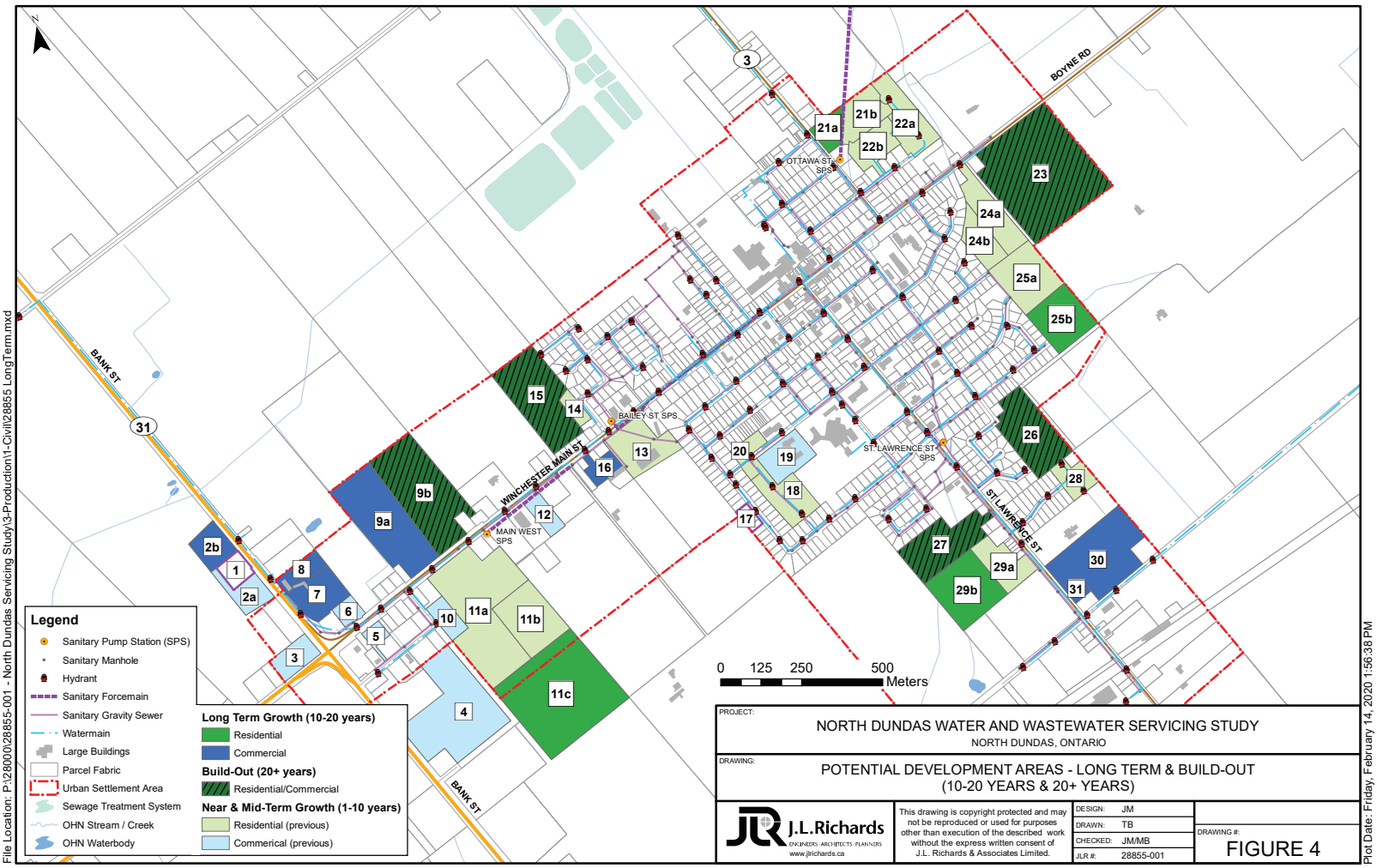
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	JM
DRAWN:	TB
CHECKED:	JM/MB
JLR #:	28855-001

DRAWING #:
FIGURE 3

File Location: P:\28000\28855-001 - North Dundas Servicing Study\3-Production\1-Civil\28855 MidTerm.mxd

Plot Date: Friday, February 14, 2020 1:52:28 PM



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
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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

Plot Date: Friday, February 14, 2020 1:56:38 PM

Attachment 2

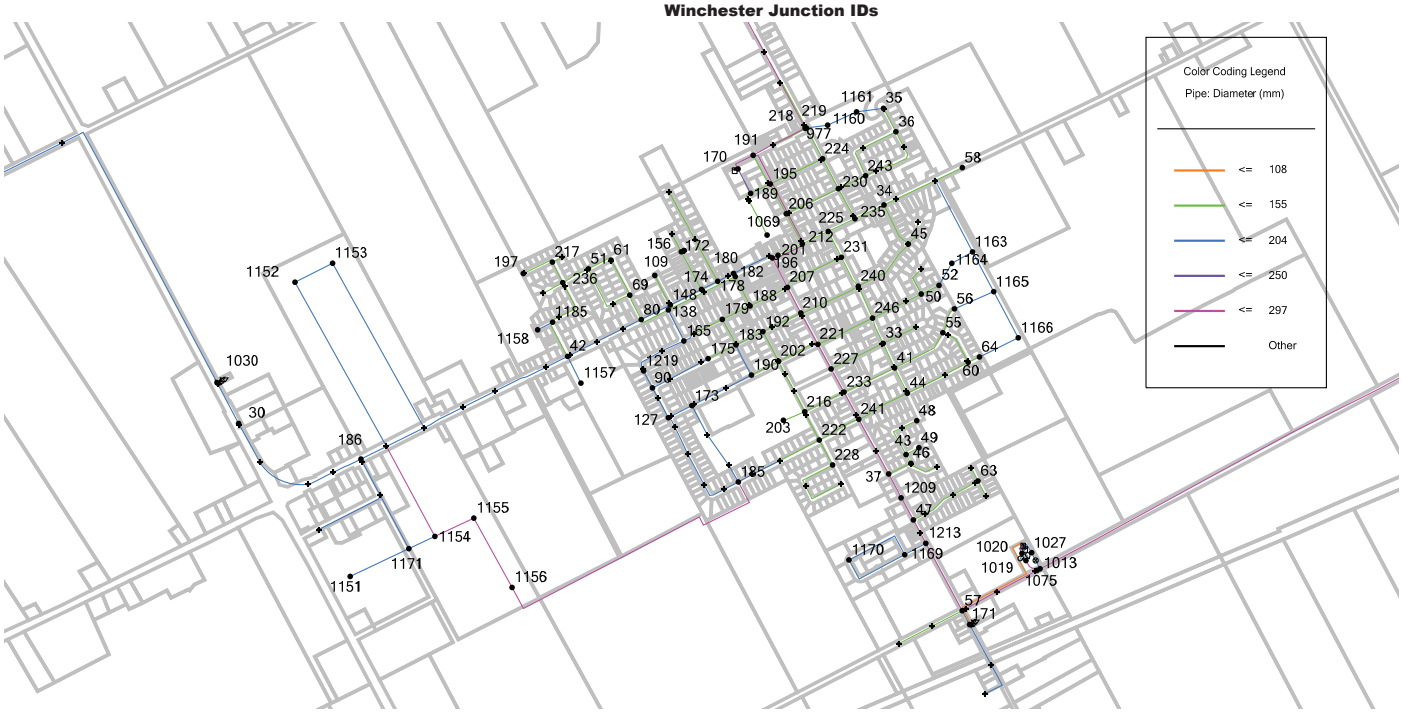
HYDRAULIC WATER MODEL SCHEMATICS

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

Color Coding Legend
Pipe: Diameter (mm)

- <= 108
- <= 155
- <= 204
- <= 250
- <= 297
- Other

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING		
ID	Label	Pressure
30	J-1	369
33	J-101	367
34	J-102	365
35	J-103	375
36	J-104	377
37	J-105	368
41	J-109	362
42	J-11	360
43	J-111	367
44	J-112	348
45	J-113	371
46	J-114	364
47	J-116	362
48	J-117	357
49	J-118	363
50	J-119	363
51	J-12	371
52	J-120	364
55	J-123	366
56	J-124	363
57	J-125	355
58	J-126	362
60	J-129	347
61	J-13	368
63	J-131	352
64	J-132	355
66	J-135	323
69	J-14	354
70	J-140	377
72	J-142	363
73	J-143	363
74	J-144	359
76	J-146	368
77	J-147	372
79	J-149	363
80	J-15	349
81	J-150	369
82	J-151	369
83	J-152	369
85	J-154	386
87	J-157	360
89	J-159	375
90	J-16	356
91	J-160	353
92	J-162	369
93	J-163	324
95	J-165	370
96	J-167	372
97	J-168	372
100	J-170	418
101	J-171	339
102	J-172	371
103	J-173	372
104	J-174	367
105	J-175	373
106	J-176	344
107	J-177	344
108	J-178	356
109	J-18	337
110	J-180	349
111	J-182	374
112	J-183	377
113	J-187	366
114	J-188	366
115	J-189	373
117	J-191	377
118	J-192	372
119	J-193	382
120	J-194	394
121	J-195	371
125	J-199	378
127	J-20	352
128	J-200	374
132	J-204	379
133	J-205	368
135	J-207	375

NEAR TERM		
ID	Label	Pressure
30	J-1	369
33	J-101	366
34	J-102	365
35	J-103	375
36	J-104	377
37	J-105	367
41	J-109	361
42	J-11	359
43	J-111	367
44	J-112	347
45	J-113	371
46	J-114	364
47	J-116	361
48	J-117	357
49	J-118	362
50	J-119	363
51	J-12	370
52	J-120	364
55	J-123	365
56	J-124	363
57	J-125	355
58	J-126	362
60	J-129	347
61	J-13	368
63	J-131	351
64	J-132	355
66	J-135	323
69	J-14	353
70	J-140	375
72	J-142	362
73	J-143	362
74	J-144	358
76	J-146	367
77	J-147	371
79	J-149	362
80	J-15	349
81	J-150	368
82	J-151	368
83	J-152	368
85	J-154	385
87	J-157	359
89	J-159	374
90	J-16	355
91	J-160	352
92	J-162	368
93	J-163	323
95	J-165	368
96	J-167	371
97	J-168	370
100	J-170	416
101	J-171	338
102	J-172	369
103	J-173	371
104	J-174	366
105	J-175	372
106	J-176	344
107	J-177	344
108	J-178	355
109	J-18	337
110	J-180	348
111	J-182	373
112	J-183	376
113	J-187	365
114	J-188	365
115	J-189	372
117	J-191	376
118	J-192	371
119	J-193	380
120	J-194	393
121	J-195	370
125	J-199	376
127	J-20	352
128	J-200	373
132	J-204	378
133	J-205	366
135	J-207	373

MID TERM		
ID	Label	Pressure
30	J-1	368
33	J-101	366
34	J-102	365
35	J-103	375
36	J-104	377
37	J-105	367
41	J-109	361
42	J-11	359
43	J-111	367
44	J-112	347
45	J-113	371
46	J-114	364
47	J-116	361
48	J-117	357
49	J-118	362
50	J-119	363
51	J-12	370
52	J-120	363
55	J-123	365
56	J-124	363
57	J-125	355
58	J-126	361
60	J-129	347
61	J-13	367
63	J-131	351
64	J-132	355
66	J-135	323
69	J-14	352
70	J-140	374
72	J-142	360
73	J-143	360
74	J-144	356
76	J-146	365
77	J-147	369
79	J-149	360
80	J-15	348
81	J-150	366
82	J-151	366
83	J-152	366
85	J-154	383
87	J-157	357
89	J-159	372
90	J-16	355
91	J-160	351
92	J-162	366
93	J-163	323
95	J-165	367
96	J-167	369
97	J-168	369
100	J-170	415
101	J-171	337
102	J-172	368
103	J-173	370
104	J-174	365
105	J-175	371
106	J-176	343
107	J-177	343
108	J-178	354
109	J-18	336
110	J-180	347
111	J-182	372
112	J-183	374
113	J-187	364
114	J-188	364
115	J-189	370
117	J-191	374
118	J-192	369
119	J-193	379
120	J-194	391
121	J-195	368
125	J-199	375
127	J-20	351
128	J-200	371
132	J-204	376
133	J-205	365
135	J-207	372

LONG TERM		
ID	Label	Pressure
30	J-1	366
33	J-101	365
34	J-102	364
35	J-103	375
36	J-104	376
37	J-105	366
41	J-109	360
42	J-11	357
43	J-111	366
44	J-112	346
45	J-113	370
46	J-114	363
47	J-116	360
48	J-117	356
49	J-118	361
50	J-119	362
51	J-12	368
52	J-120	362
55	J-123	364
56	J-124	362
57	J-125	354
58	J-126	360
60	J-129	346
61	J-13	366
63	J-131	350
64	J-132	354
66	J-135	323
69	J-14	351
70	J-140	370
72	J-142	356
73	J-143	356
74	J-144	352
76	J-146	361
77	J-147	365
79	J-149	356
80	J-15	347
81	J-150	362
82	J-151	362
83	J-152	362
85	J-154	379
87	J-157	353
89	J-159	368
90	J-16	353
91	J-160	349
92	J-162	363
93	J-163	322
95	J-165	363
96	J-167	366
97	J-168	365
100	J-170	411
101	J-171	336
102	J-172	364
103	J-173	366
104	J-174	361
105	J-175	367
106	J-176	341
107	J-177	341
108	J-178	352
109	J-18	335
110	J-180	345
111	J-182	368
112	J-183	370
113	J-187	360
114	J-188	360
115	J-189	366
117	J-191	370
118	J-192	365
119	J-193	375
120	J-194	388
121	J-195	365
125	J-199	371
127	J-20	350
128	J-200	367
132	J-204	373
133	J-205	361
135	J-207	368

BUILD OUT		
ID	Label	Pressure
30	J-1	365
33	J-101	364
34	J-102	363
35	J-103	374
36	J-104	376
37	J-105	365
41	J-109	359
42	J-11	356
43	J-111	365
44	J-112	345
45	J-113	369
46	J-114	362
47	J-116	359
48	J-117	354
49	J-118	360
50	J-119	361
51	J-12	367
52	J-120	361
55	J-123	363
56	J-124	361
57	J-125	353
58	J-126	359
60	J-129	345
61	J-13	364
63	J-131	349
64	J-132	353
66	J-135	322
69	J-14	350
70	J-140	370
72	J-142	356
73	J-143	356
74	J-144	352
76	J-146	361
77	J-147	365
79	J-149	356
80	J-15	346
81	J-150	362
82	J-151	362
83	J-152	362
85	J-154	379
87	J-157	353
89	J-159	368
90	J-16	352
91	J-160	349
92	J-162	363
93	J-163	322
95	J-165	363
96	J-167	366
97	J-168	365
100	J-170	411
101	J-171	336
102	J-172	364
103	J-173	366
104	J-174	361
105	J-175	367
106	J-176	341
107	J-177	341
108	J-178	352
109	J-18	334
110	J-180	345
111	J-182	368
112	J-183	370
113	J-187	360
114	J-188	360
115	J-189	366
117	J-191	370
118	J-192	365
119	J-193	375
120	J-194	388
121	J-195	365
125	J-199	371
127	J-20	349
128	J-200	367
132	J-204	373
133	J-205	361
135	J-207	368

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING		
ID	Label	Pressure
136	J-208	392
137	J-209	371
138	J-21	331
139	J-210	380
145	J-217	397
147	J-219	399
148	J-22	331
150	J-222	381
151	J-225	385
152	J-226	383
153	J-227	382
154	J-228	385
156	J-23	320
157	J-230	385
158	J-231	379
159	J-232	386
161	J-234	376
162	J-235	376
164	J-239	373
165	J-24	333
166	J-240	394
168	J-242	374
169	J-243	378
170	J-244	338
171	J-245	351
172	J-25	320
173	J-26	352
174	J-27	315
175	J-28	343
178	J-30	314
179	J-31	326
180	J-34	315
182	J-36	315
183	J-37	339
185	J-39	351
186	J-4	368
188	J-41	319
189	J-42	322
190	J-43	344
191	J-44	339
192	J-45	325
195	J-48	325
196	J-49	312
197	J-5	379
201	J-53	315
202	J-54	338
203	J-55	342
206	J-58	327
207	J-59	317
210	J-62	332
212	J-65	332
216	J-69	345
217	J-7	378
218	J-70	356
219	J-72	356
221	J-74	349
222	J-75	353
224	J-78	359
225	J-79	367
227	J-80	360
228	J-81	365
230	J-83	378
231	J-84	375
233	J-87	362
235	J-89	364
236	J-9	376
240	J-93	378
241	J-94	370
243	J-96	364
246	J-99	382
248	H-1	366
249	H-10	375
250	H-100	377
251	H-101	374
252	H-102	418
253	H-103	393

NEAR TERM		
ID	Label	Pressure
136	J-208	390
137	J-209	369
138	J-21	331
139	J-210	379
145	J-217	396
147	J-219	398
148	J-22	331
150	J-222	379
151	J-225	383
152	J-226	382
153	J-227	381
154	J-228	383
156	J-23	319
157	J-230	384
158	J-231	378
159	J-232	385
161	J-234	374
162	J-235	374
164	J-239	372
165	J-24	332
166	J-240	393
168	J-242	372
169	J-243	377
170	J-244	338
171	J-245	351
172	J-25	319
173	J-26	351
174	J-27	314
175	J-28	342
178	J-30	313
179	J-31	325
180	J-34	315
182	J-36	315
183	J-37	338
185	J-39	351
186	J-4	367
188	J-41	319
189	J-42	322
190	J-43	344
191	J-44	339
192	J-45	324
195	J-48	324
196	J-49	312
197	J-5	379
201	J-53	314
202	J-54	338
203	J-55	341
206	J-58	327
207	J-59	317
210	J-62	332
212	J-65	332
216	J-69	345
217	J-7	377
218	J-70	356
219	J-72	356
221	J-74	349
222	J-75	352
224	J-78	359
225	J-79	367
227	J-80	359
228	J-81	365
230	J-83	378
231	J-84	375
233	J-87	362
235	J-89	364
236	J-9	376
240	J-93	377
241	J-94	370
243	J-96	364
246	J-99	382
248	H-1	365
249	H-10	375
250	H-100	376
251	H-101	373
252	H-102	416
253	H-103	391

MID TERM		
ID	Label	Pressure
136	J-208	389
137	J-209	368
138	J-21	330
139	J-210	377
145	J-217	394
147	J-219	396
148	J-22	330
150	J-222	378
151	J-225	382
152	J-226	380
153	J-227	379
154	J-228	382
156	J-23	319
157	J-230	382
158	J-231	376
159	J-232	384
161	J-234	373
162	J-235	373
164	J-239	370
165	J-24	332
166	J-240	392
168	J-242	371
169	J-243	375
170	J-244	338
171	J-245	351
172	J-25	319
173	J-26	351
174	J-27	314
175	J-28	342
178	J-30	313
179	J-31	325
180	J-34	314
182	J-36	314
183	J-37	338
185	J-39	350
186	J-4	366
188	J-41	318
189	J-42	322
190	J-43	343
191	J-44	339
192	J-45	324
195	J-48	324
196	J-49	312
197	J-5	378
201	J-53	314
202	J-54	338
203	J-55	341
206	J-58	327
207	J-59	316
210	J-62	332
212	J-65	331
216	J-69	345
217	J-7	377
218	J-70	356
219	J-72	355
221	J-74	348
222	J-75	352
224	J-78	359
225	J-79	366
227	J-80	359
228	J-81	365
230	J-83	378
231	J-84	374
233	J-87	362
235	J-89	364
236	J-9	375
240	J-93	377
241	J-94	370
243	J-96	363
246	J-99	381
248	H-1	364
249	H-10	375
250	H-100	374
251	H-101	371
252	H-102	415
253	H-103	390

LONG TERM		
ID	Label	Pressure
136	J-208	385
137	J-209	364
138	J-21	329
139	J-210	373
145	J-217	391
147	J-219	392
148	J-22	329
150	J-222	374
151	J-225	378
152	J-226	376
153	J-227	375
154	J-228	378
156	J-23	318
157	J-230	378
158	J-231	372
159	J-232	380
161	J-234	369
162	J-235	369
164	J-239	366
165	J-24	331
166	J-240	388
168	J-242	367
169	J-243	371
170	J-244	338
171	J-245	350
172	J-25	318
173	J-26	349
174	J-27	313
175	J-28	341
178	J-30	312
179	J-31	324
180	J-34	313
182	J-36	313
183	J-37	336
185	J-39	349
186	J-4	364
188	J-41	317
189	J-42	321
190	J-43	342
191	J-44	339
192	J-45	323
195	J-48	324
196	J-49	311
197	J-5	377
201	J-53	313
202	J-54	337
203	J-55	340
206	J-58	326
207	J-59	315
210	J-62	331
212	J-65	330
216	J-69	344
217	J-7	375
218	J-70	355
219	J-72	355
221	J-74	347
222	J-75	351
224	J-78	359
225	J-79	366
227	J-80	358
228	J-81	363
230	J-83	377
231	J-84	373
233	J-87	361
235	J-89	363
236	J-9	374
240	J-93	376
241	J-94	369
243	J-96	363
246	J-99	380
248	H-1	360
249	H-10	374
250	H-100	370
251	H-101	367
252	H-102	411
253	H-103	386

BUILD OUT		
ID	Label	Pressure
136	J-208	385
137	J-209	364
138	J-21	328
139	J-210	373
145	J-217	391
147	J-219	392
148	J-22	328
150	J-222	374
151	J-225	378
152	J-226	376
153	J-227	375
154	J-228	378
156	J-23	317
157	J-230	378
158	J-231	372
159	J-232	380
161	J-234	369
162	J-235	369
164	J-239	366
165	J-24	330
166	J-240	388
168	J-242	367
169	J-243	371
170	J-244	338
171	J-245	349
172	J-25	317
173	J-26	348
174	J-27	312
175	J-28	339
178	J-30	311
179	J-31	323
180	J-34	312
182	J-36	312
183	J-37	335
185	J-39	348
186	J-4	363
188	J-41	316
189	J-42	321
190	J-43	341
191	J-44	339
192	J-45	322
195	J-48	324
196	J-49	310
197	J-5	375
201	J-53	312
202	J-54	336
203	J-55	339
206	J-58	326
207	J-59	315
210	J-62	330
212	J-65	330
216	J-69	343
217	J-7	374
218	J-70	355
219	J-72	355
221	J-74	346
222	J-75	350
224	J-78	359
225	J-79	365
227	J-80	357
228	J-81	363
230	J-83	377
231	J-84	373
233	J-87	360
235	J-89	362
236	J-9	372
240	J-93	375
241	J-94	368
243	J-96	363
246	J-99	379
248	H-1	360
249	H-10	373
250	H-100	370
251	H-101	367
252	H-102	411
253	H-103	386

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING		
ID	Label	Pressure
254	H-104	370
255	H-105	380
256	H-106	372
257	H-107	388
258	H-108	369
259	H-109	361
260	H-11	370
261	H-110	360
262	H-111	373
263	H-112	375
264	H-113	377
265	H-114	370
266	H-115	372
267	H-116	375
268	H-117	374
269	H-118	381
270	H-119	380
271	H-12	352
272	H-120	373
273	H-121	373
274	H-122	374
275	H-123	381
276	H-124	392
277	H-125	383
278	H-126	380
279	H-128	377
280	H-129	396
281	H-13	352
282	H-130	387
283	H-131	353
284	H-132	365
285	H-133	354
286	H-134	357
287	H-135	362
288	H-136	376
289	H-137	380
290	H-138	372
291	H-139	367
292	H-14	344
293	H-140	368
294	H-141	371
295	H-142	373
296	H-143	387
297	H-144	316
298	H-145	344
299	H-146	349
300	H-147	377
301	H-148	371
302	H-149	362
303	H-15	342
304	H-150	323
305	H-151	333
306	H-152	360
307	H-153	367
308	H-154	370
309	H-155	363
310	H-156	356
311	H-157	325
312	H-158	362
313	H-159	362
314	H-16	350
315	H-160	319
316	H-161	332
317	H-162	362
318	H-163	366
319	H-164	346
320	H-165	356
321	H-166	332
322	H-167	377
323	H-168	382
324	H-169	385
325	H-17	356
326	H-170	370
327	H-171	379
328	H-172	362
329	H-173	319

NEAR TERM		
ID	Label	Pressure
254	H-104	368
255	H-105	378
256	H-106	371
257	H-107	386
258	H-108	368
259	H-109	360
260	H-11	370
261	H-110	359
262	H-111	372
263	H-112	373
264	H-113	375
265	H-114	368
266	H-115	370
267	H-116	374
268	H-117	373
269	H-118	380
270	H-119	379
271	H-12	352
272	H-120	372
273	H-121	372
274	H-122	373
275	H-123	379
276	H-124	390
277	H-125	382
278	H-126	379
279	H-128	375
280	H-129	394
281	H-13	351
282	H-130	386
283	H-131	352
284	H-132	365
285	H-133	353
286	H-134	356
287	H-135	361
288	H-136	375
289	H-137	379
290	H-138	371
291	H-139	366
292	H-14	343
293	H-140	366
294	H-141	370
295	H-142	371
296	H-143	386
297	H-144	315
298	H-145	344
299	H-146	349
300	H-147	377
301	H-148	370
302	H-149	362
303	H-15	341
304	H-150	323
305	H-151	333
306	H-152	359
307	H-153	367
308	H-154	370
309	H-155	363
310	H-156	356
311	H-157	324
312	H-158	361
313	H-159	361
314	H-16	349
315	H-160	318
316	H-161	331
317	H-162	362
318	H-163	366
319	H-164	345
320	H-165	356
321	H-166	332
322	H-167	375
323	H-168	381
324	H-169	383
325	H-17	355
326	H-170	369
327	H-171	378
328	H-172	362
329	H-173	319

MID TERM		
ID	Label	Pressure
254	H-104	367
255	H-105	377
256	H-106	369
257	H-107	385
258	H-108	366
259	H-109	358
260	H-11	370
261	H-110	357
262	H-111	370
263	H-112	372
264	H-113	374
265	H-114	367
266	H-115	369
267	H-116	372
268	H-117	371
269	H-118	378
270	H-119	377
271	H-12	351
272	H-120	370
273	H-121	370
274	H-122	371
275	H-123	378
276	H-124	389
277	H-125	380
278	H-126	377
279	H-128	374
280	H-129	393
281	H-13	351
282	H-130	384
283	H-131	351
284	H-132	364
285	H-133	352
286	H-134	355
287	H-135	361
288	H-136	373
289	H-137	377
290	H-138	370
291	H-139	364
292	H-14	343
293	H-140	365
294	H-141	368
295	H-142	370
296	H-143	385
297	H-144	315
298	H-145	344
299	H-146	349
300	H-147	376
301	H-148	370
302	H-149	361
303	H-15	341
304	H-150	323
305	H-151	333
306	H-152	359
307	H-153	366
308	H-154	369
309	H-155	363
310	H-156	356
311	H-157	324
312	H-158	361
313	H-159	361
314	H-16	349
315	H-160	318
316	H-161	331
317	H-162	362
318	H-163	366
319	H-164	345
320	H-165	356
321	H-166	331
322	H-167	374
323	H-168	379
324	H-169	382
325	H-17	355
326	H-170	368
327	H-171	376
328	H-172	361
329	H-173	318

LONG TERM		
ID	Label	Pressure
254	H-104	363
255	H-105	373
256	H-106	365
257	H-107	381
258	H-108	362
259	H-109	354
260	H-11	369
261	H-110	353
262	H-111	366
263	H-112	368
264	H-113	370
265	H-114	363
266	H-115	365
267	H-116	368
268	H-117	367
269	H-118	374
270	H-119	373
271	H-12	350
272	H-120	366
273	H-121	366
274	H-122	368
275	H-123	374
276	H-124	385
277	H-125	376
278	H-126	373
279	H-128	370
280	H-129	389
281	H-13	349
282	H-130	380
283	H-131	349
284	H-132	362
285	H-133	350
286	H-134	353
287	H-135	358
288	H-136	370
289	H-137	374
290	H-138	366
291	H-139	361
292	H-14	342
293	H-140	361
294	H-141	365
295	H-142	366
296	H-143	381
297	H-144	315
298	H-145	343
299	H-146	348
300	H-147	375
301	H-148	368
302	H-149	360
303	H-15	339
304	H-150	321
305	H-151	331
306	H-152	357
307	H-153	364
308	H-154	369
309	H-155	363
310	H-156	355
311	H-157	324
312	H-158	360
313	H-159	360
314	H-16	347
315	H-160	317
316	H-161	330
317	H-162	361
318	H-163	364
319	H-164	343
320	H-165	355
321	H-166	330
322	H-167	370
323	H-168	375
324	H-169	378
325	H-17	353
326	H-170	364
327	H-171	372
328	H-172	359
329	H-173	316

BUILD OUT		
ID	Label	Pressure
254	H-104	363
255	H-105	373
256	H-106	365
257	H-107	381
258	H-108	362
259	H-109	354
260	H-11	368
261	H-110	353
262	H-111	366
263	H-112	368
264	H-113	370
265	H-114	363
266	H-115	365
267	H-116	368
268	H-117	367
269	H-118	374
270	H-119	373
271	H-12	349
272	H-120	366
273	H-121	366
274	H-122	368
275	H-123	374
276	H-124	385
277	H-125	376
278	H-126	373
279	H-128	370
280	H-129	389
281	H-13	348
282	H-130	380
283	H-131	349
284	H-132	362
285	H-133	350
286	H-134	353
287	H-135	358
288	H-136	370
289	H-137	374
290	H-138	366
291	H-139	361
292	H-14	340
293	H-140	361
294	H-141	365
295	H-142	366
296	H-143	381
297	H-144	315
298	H-145	343
299	H-146	348
300	H-147	373
301	H-148	367
302	H-149	359
303	H-15	338
304	H-150	320
305	H-151	331
306	H-152	356
307	H-153	362
308	H-154	369
309	H-155	362
310	H-156	355
311	H-157	324
312	H-158	359
313	H-159	359
314	H-16	346
315	H-160	316
316	H-161	329
317	H-162	360
318	H-163	363
319	H-164	342
320	H-165	354
321	H-166	329
322	H-167	370
323	H-168	375
324	H-169	378
325	H-17	352
326	H-170	364
327	H-171	372
328	H-172	358
329	H-173	315

North Dundas (Winchester and Chesterville) - Average Day Demand

EXISTING		
ID	Label	Pressure
330	H-174	268
331	H-175	325
333	H-177	368
334	H-178	366
335	H-18	353
336	H-180	352
337	H-181	339
338	H-182	360
339	H-183	345
340	H-184	336
341	H-185	355
342	H-186	323
343	H-187	368
344	H-188	294
345	H-189	353
346	H-19	357
347	H-190	341
348	H-191	378
349	H-192	372
350	H-193	311
351	H-194	248
352	H-195	293
353	H-196	342
354	H-197	384
355	H-198	392
356	H-199	340
357	H-2	366
358	H-20	343
359	H-200	315
360	H-201	391
361	H-202	364
362	H-203	365
363	H-204	370
364	H-205	372
365	H-207	401
366	H-208	402
367	H-209	354
368	H-21	339
369	H-210	357
370	H-211	369
371	H-212	358
372	H-213	362
373	H-214	399
374	H-215	395
375	H-216	384
376	H-217	369
377	H-218	352
378	H-219	350
379	H-22	338
380	H-220	356
381	H-221	370
382	H-222	378
383	H-223	375
384	H-23	333
385	H-24	378
386	H-25	371
387	H-26	376
388	H-27	367
389	H-28	377
390	H-29	368
391	H-3	377
392	H-30	359
393	H-31	336
394	H-32	327
395	H-33	343
396	H-34	328
397	H-35	318
398	H-36	320
399	H-37	314
400	H-38	312
401	H-39	317
402	H-4	341
403	H-40	369
404	H-41	317
405	H-42	319
406	H-43	317

NEAR TERM		
ID	Label	Pressure
330	H-174	267
331	H-175	324
333	H-177	368
334	H-178	366
335	H-18	352
336	H-180	352
337	H-181	339
338	H-182	359
339	H-183	345
340	H-184	336
341	H-185	355
342	H-186	323
343	H-187	368
344	H-188	294
345	H-189	352
346	H-19	356
347	H-190	341
348	H-191	378
349	H-192	372
350	H-193	311
351	H-194	248
352	H-195	293
353	H-196	342
354	H-197	384
355	H-198	392
356	H-199	340
357	H-2	365
358	H-20	343
359	H-200	315
360	H-201	391
361	H-202	363
362	H-203	363
363	H-204	369
364	H-205	371
365	H-207	401
366	H-208	402
367	H-209	354
368	H-21	338
369	H-210	357
370	H-211	368
371	H-212	357
372	H-213	361
373	H-214	398
374	H-215	394
375	H-216	382
376	H-217	367
377	H-218	351
378	H-219	350
379	H-22	338
380	H-220	355
381	H-221	369
382	H-222	378
383	H-223	375
384	H-23	333
385	H-24	377
386	H-25	371
387	H-26	376
388	H-27	367
389	H-28	377
390	H-29	368
391	H-3	376
392	H-30	359
393	H-31	336
394	H-32	327
395	H-33	342
396	H-34	327
397	H-35	318
398	H-36	319
399	H-37	314
400	H-38	312
401	H-39	317
402	H-4	340
403	H-40	368
404	H-41	317
405	H-42	319
406	H-43	317

MID TERM		
ID	Label	Pressure
330	H-174	266
331	H-175	323
333	H-177	367
334	H-178	366
335	H-18	352
336	H-180	351
337	H-181	338
338	H-182	359
339	H-183	345
340	H-184	336
341	H-185	355
342	H-186	323
343	H-187	368
344	H-188	294
345	H-189	352
346	H-19	356
347	H-190	341
348	H-191	378
349	H-192	372
350	H-193	310
351	H-194	248
352	H-195	293
353	H-196	342
354	H-197	384
355	H-198	391
356	H-199	340
357	H-2	364
358	H-20	342
359	H-200	315
360	H-201	391
361	H-202	363
362	H-203	362
363	H-204	367
364	H-205	369
365	H-207	401
366	H-208	402
367	H-209	354
368	H-21	338
369	H-210	357
370	H-211	368
371	H-212	357
372	H-213	361
373	H-214	396
374	H-215	392
375	H-216	381
376	H-217	366
377	H-218	351
378	H-219	350
379	H-22	338
380	H-220	355
381	H-221	369
382	H-222	378
383	H-223	375
384	H-23	333
385	H-24	377
386	H-25	371
387	H-26	375
388	H-27	367
389	H-28	377
390	H-29	367
391	H-3	374
392	H-30	359
393	H-31	336
394	H-32	327
395	H-33	342
396	H-34	327
397	H-35	318
398	H-36	319
399	H-37	314
400	H-38	311
401	H-39	317
402	H-4	339
403	H-40	368
404	H-41	316
405	H-42	318
406	H-43	316

LONG TERM		
ID	Label	Pressure
330	H-174	264
331	H-175	321
333	H-177	365
334	H-178	366
335	H-18	351
336	H-180	350
337	H-181	337
338	H-182	358
339	H-183	344
340	H-184	335
341	H-185	354
342	H-186	323
343	H-187	368
344	H-188	293
345	H-189	352
346	H-19	355
347	H-190	341
348	H-191	378
349	H-192	372
350	H-193	310
351	H-194	248
352	H-195	293
353	H-196	341
354	H-197	383
355	H-198	391
356	H-199	340
357	H-2	360
358	H-20	341
359	H-200	314
360	H-201	391
361	H-202	363
362	H-203	358
363	H-204	363
364	H-205	365
365	H-207	401
366	H-208	402
367	H-209	353
368	H-21	336
369	H-210	356
370	H-211	367
371	H-212	355
372	H-213	359
373	H-214	392
374	H-215	388
375	H-216	377
376	H-217	362
377	H-218	350
378	H-219	349
379	H-22	337
380	H-220	354
381	H-221	369
382	H-222	377
383	H-223	375
384	H-23	332
385	H-24	376
386	H-25	370
387	H-26	374
388	H-27	366
389	H-28	376
390	H-29	366
391	H-3	370
392	H-30	359
393	H-31	336
394	H-32	326
395	H-33	341
396	H-34	325
397	H-35	316
398	H-36	318
399	H-37	313
400	H-38	311
401	H-39	316
402	H-4	337
403	H-40	367
404	H-41	315
405	H-42	317
406	H-43	315

BUILD OUT		
ID	Label	Pressure
330	H-174	263
331	H-175	320
333	H-177	364
334	H-178	365
335	H-18	350
336	H-180	349
337	H-181	336
338	H-182	357
339	H-183	343
340	H-184	334
341	H-185	353
342	H-186	322
343	H-187	368
344	H-188	293
345	H-189	352
346	H-19	353
347	H-190	341
348	H-191	378
349	H-192	371
350	H-193	310
351	H-194	248
352	H-195	293
353	H-196	341
354	H-197	383
355	H-198	391
356	H-199	340
357	H-2	360
358	H-20	340
359	H-200	314
360	H-201	390
361	H-202	363
362	H-203	358
363	H-204	363
364	H-205	365
365	H-207	401
366	H-208	401
367	H-209	352
368	H-21	335
369	H-210	355
370	H-211	366
371	H-212	353
372	H-213	357
373	H-214	392
374	H-215	388
375	H-216	377
376	H-217	362
377	H-218	349
378	H-219	348
379	H-22	336
380	H-220	353
381	H-221	369
382	H-222	377
383	H-223	374
384	H-23	331
385	H-24	375
386	H-25	369
387	H-26	374
388	H-27	365
389	H-28	375
390	H-29	366
391	H-3	370
392	H-30	359
393	H-31	335
394	H-32	326
395	H-33	339
396	H-34	324
397	H-35	315
398	H-36	317
399	H-37	312
400	H-38	310
401	H-39	316
402	H-4	337
403	H-40	366
404	H-41	315
405	H-42	316
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

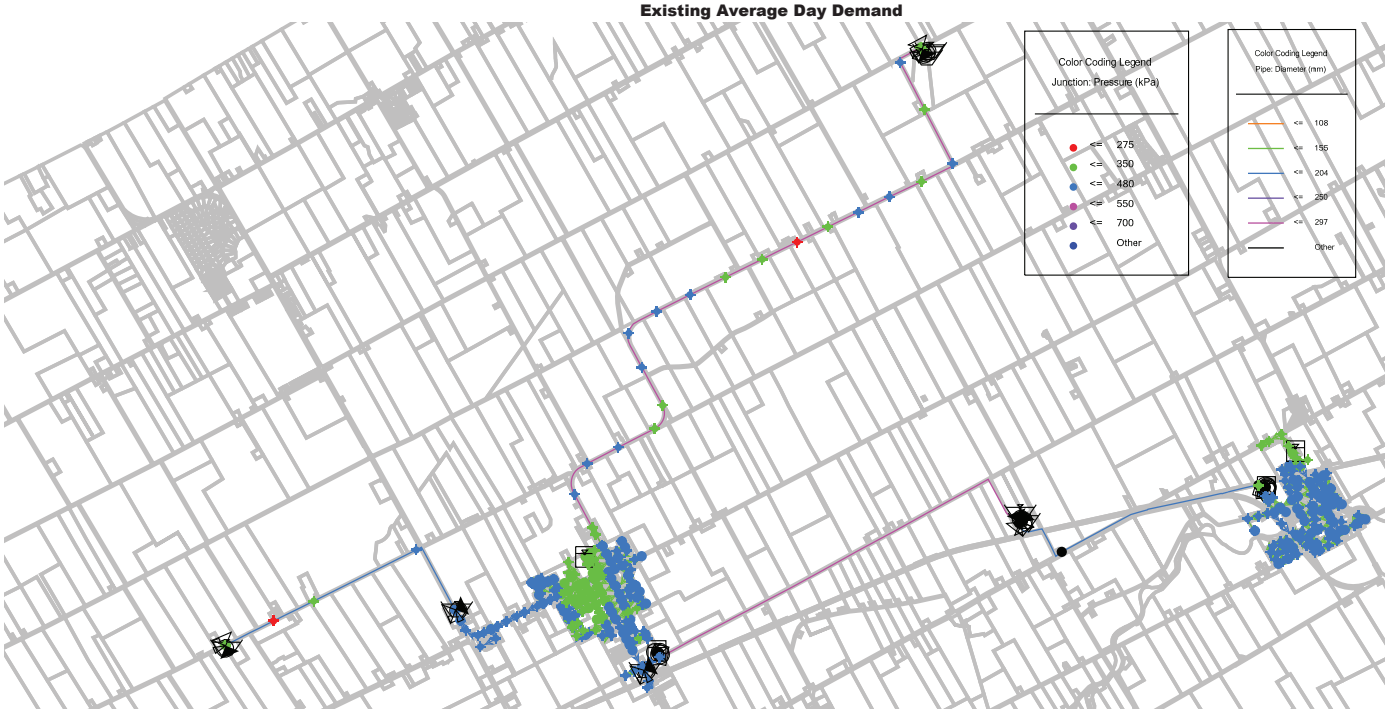
MID TERM		
ID	Label	Pressure
1160	J-276	402
1161	J-277	402
1163	J-279	392
1164	J-280	392
1165	J-281	392
1169	J-285	392
1171	J-287	342
1185	J-288	367
1209	J-290	364
1213	J-291	361
1219	J-292	356

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

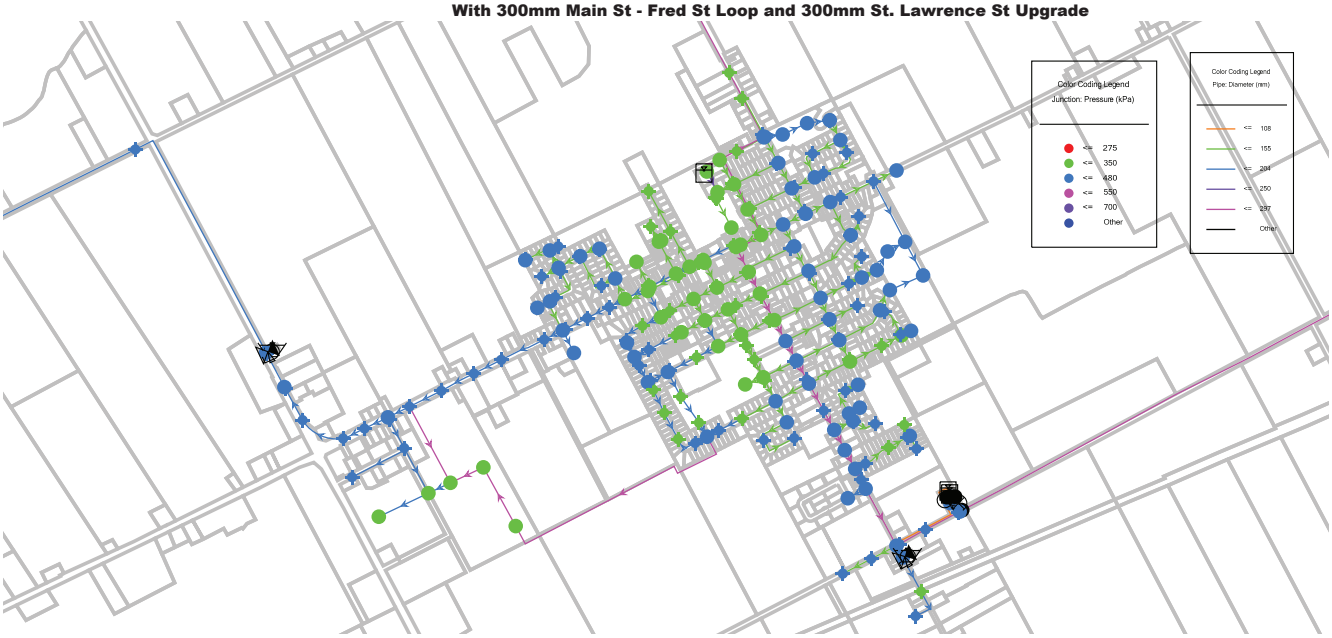
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Average Day Demand
With 300mm Main St - Fred St Loop

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

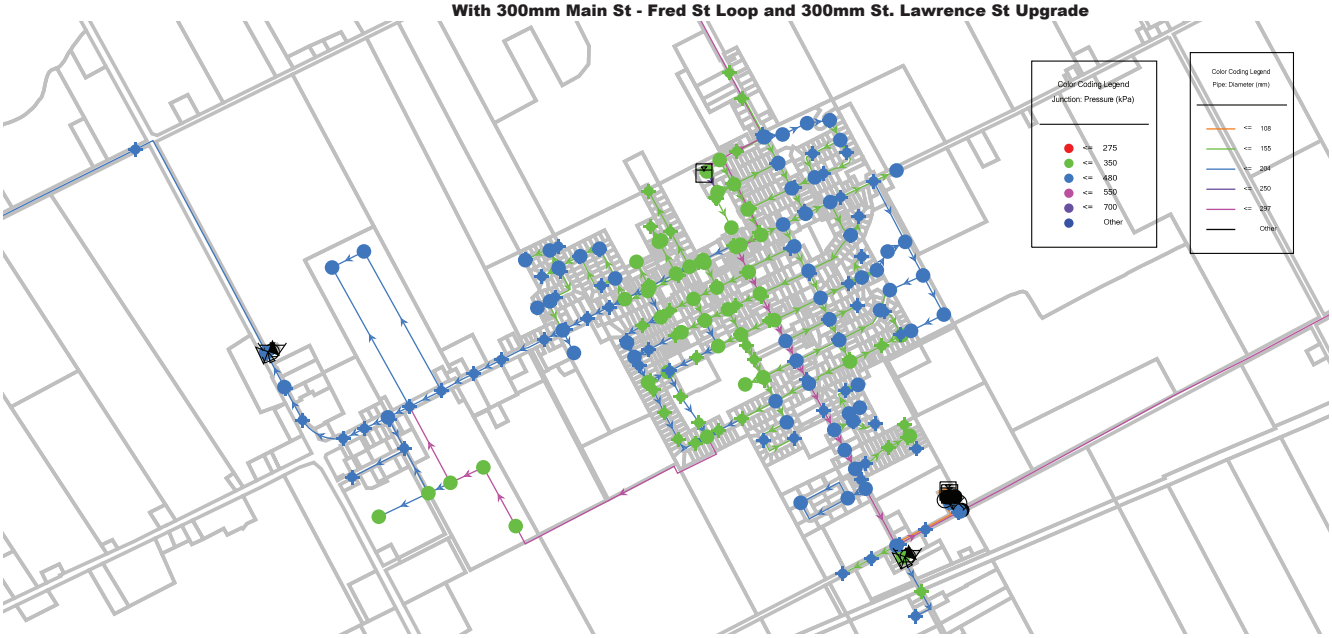
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



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

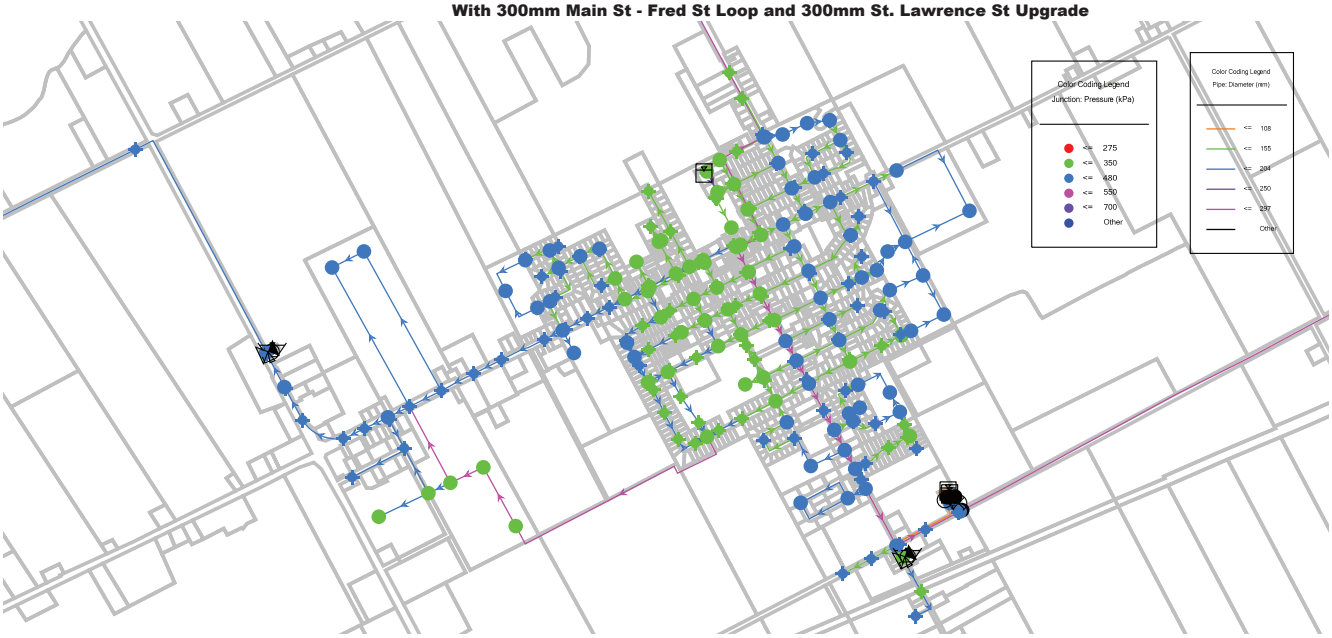
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Average Day Demand - Winchester
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade



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		
ID	Label	Pressure
30	J-1	388
33	J-101	382
34	J-102	370
35	J-103	377
36	J-104	380
37	J-105	440
41	J-109	382
42	J-11	369
43	J-111	439
44	J-112	370
45	J-113	377
46	J-114	436
47	J-116	467
48	J-117	429
49	J-118	435
50	J-119	374
51	J-12	379
52	J-120	375
55	J-123	386
56	J-124	384
57	J-125	530
58	J-126	366
60	J-129	369
61	J-13	376
63	J-131	457
64	J-132	376
66	J-135	369
69	J-14	361
70	J-140	385
72	J-142	381
73	J-143	381
74	J-144	377
76	J-146	377
77	J-147	388
79	J-149	372
80	J-15	357
81	J-150	378
82	J-151	377
83	J-152	377
85	J-154	394
87	J-157	369
89	J-159	384
90	J-16	365
91	J-160	354
92	J-162	373
93	J-163	324
95	J-165	379
96	J-167	375
97	J-168	382
100	J-170	421
101	J-171	340
102	J-172	380
103	J-173	375
104	J-174	370
105	J-175	377
106	J-176	346
107	J-177	346
108	J-178	357
109	J-18	344
110	J-180	351
111	J-182	378
112	J-183	381
113	J-187	369
114	J-188	369
115	J-189	381
117	J-191	380
118	J-192	378
119	J-193	385
120	J-194	398
121	J-195	374
125	J-199	381
127	J-20	362
128	J-200	378
132	J-204	382
133	J-205	370
135	J-207	379

NEAR TERM		
ID	Label	Pressure
30	J-1	380
33	J-101	378
34	J-102	369
35	J-103	376
36	J-104	378
37	J-105	436
41	J-109	377
42	J-11	364
43	J-111	436
44	J-112	366
45	J-113	375
46	J-114	433
47	J-116	464
48	J-117	425
49	J-118	431
50	J-119	368
51	J-12	374
52	J-120	369
55	J-123	382
56	J-124	380
57	J-125	528
58	J-126	366
60	J-129	364
61	J-13	372
63	J-131	454
64	J-132	372
66	J-135	368
69	J-14	357
70	J-140	383
72	J-142	379
73	J-143	379
74	J-144	375
76	J-146	375
77	J-147	386
79	J-149	370
80	J-15	353
81	J-150	376
82	J-151	376
83	J-152	376
85	J-154	393
87	J-157	367
89	J-159	382
90	J-16	361
91	J-160	353
92	J-162	372
93	J-163	324
95	J-165	377
96	J-167	373
97	J-168	380
100	J-170	419
101	J-171	339
102	J-172	378
103	J-173	374
104	J-174	369
105	J-175	375
106	J-176	345
107	J-177	345
108	J-178	356
109	J-18	341
110	J-180	350
111	J-182	376
112	J-183	379
113	J-187	368
114	J-188	367
115	J-189	379
117	J-191	379
118	J-192	376
119	J-193	383
120	J-194	396
121	J-195	372
125	J-199	379
127	J-20	358
128	J-200	376
132	J-204	380
133	J-205	369
135	J-207	377

MID TERM		
ID	Label	Pressure
30	J-1	379
33	J-101	378
34	J-102	372
35	J-103	378
36	J-104	380
37	J-105	394
41	J-109	374
42	J-11	366
43	J-111	393
44	J-112	360
45	J-113	379
46	J-114	391
47	J-116	396
48	J-117	383
49	J-118	389
50	J-119	372
51	J-12	377
52	J-120	373
55	J-123	377
56	J-124	373
57	J-125	405
58	J-126	370
60	J-129	359
61	J-13	374
63	J-131	385
64	J-132	367
66	J-135	369
69	J-14	360
70	J-140	379
72	J-142	375
73	J-143	375
74	J-144	371
76	J-146	371
77	J-147	382
79	J-149	366
80	J-15	355
81	J-150	372
82	J-151	372
83	J-152	372
85	J-154	389
87	J-157	363
89	J-159	378
90	J-16	362
91	J-160	351
92	J-162	368
93	J-163	323
95	J-165	373
96	J-167	370
97	J-168	376
100	J-170	416
101	J-171	337
102	J-172	374
103	J-173	370
104	J-174	365
105	J-175	372
106	J-176	343
107	J-177	343
108	J-178	354
109	J-18	343
110	J-180	347
111	J-182	373
112	J-183	375
113	J-187	364
114	J-188	364
115	J-189	375
117	J-191	375
118	J-192	372
119	J-193	380
120	J-194	392
121	J-195	369
125	J-199	376
127	J-20	359
128	J-200	373
132	J-204	377
133	J-205	366
135	J-207	373

LONG TERM		
ID	Label	Pressure
30	J-1	370
33	J-101	373
34	J-102	369
35	J-103	376
36	J-104	378
37	J-105	388
41	J-109	369
42	J-11	360
43	J-111	387
44	J-112	355
45	J-113	375
46	J-114	384
47	J-116	389
48	J-117	377
49	J-118	383
50	J-119	368
51	J-12	371
52	J-120	369
55	J-123	371
56	J-124	369
57	J-125	397
58	J-126	366
60	J-129	353
61	J-13	368
63	J-131	378
64	J-132	361
66	J-135	369
69	J-14	354
70	J-140	367
72	J-142	362
73	J-143	362
74	J-144	358
76	J-146	359
77	J-147	369
79	J-149	353
80	J-15	350
81	J-150	360
82	J-151	359
83	J-152	359
85	J-154	376
87	J-157	350
89	J-159	365
90	J-16	357
91	J-160	345
92	J-162	356
93	J-163	319
95	J-165	359
96	J-167	358
97	J-168	363
100	J-170	403
101	J-171	331
102	J-172	361
103	J-173	359
104	J-174	354
105	J-175	360
106	J-176	336
107	J-177	336
108	J-178	346
109	J-18	338
110	J-180	340
111	J-182	360
112	J-183	363
113	J-187	353
114	J-188	353
115	J-189	362
117	J-191	363
118	J-192	359
119	J-193	367
120	J-194	380
121	J-195	357
125	J-199	363
127	J-20	353
128	J-200	360
132	J-204	365
133	J-205	354
135	J-207	361

BUILD OUT		
ID	Label	Pressure
30	J-1	366
33	J-101	370
34	J-102	366
35	J-103	376
36	J-104	378
37	J-105	383
41	J-109	366
42	J-11	356
43	J-111	383
44	J-112	352
45	J-113	373
46	J-114	380
47	J-116	382
48	J-117	373
49	J-118	378
50	J-119	365
51	J-12	367
52	J-120	365
55	J-123	368
56	J-124	365
57	J-125	391
58	J-126	363
60	J-129	350
61	J-13	364
63	J-131	368
64	J-132	357
66	J-135	368
69	J-14	350
70	J-140	367
72	J-142	362
73	J-143	362
74	J-144	358
76	J-146	359
77	J-147	369
79	J-149	353
80	J-15	346
81	J-150	360
82	J-151	359
83	J-152	359
85	J-154	376
87	J-157	350
89	J-159	365
90	J-16	354
91	J-160	345
92	J-162	356
93	J-163	319
95	J-165	359
96	J-167	358
97	J-168	363
100	J-170	403
101	J-171	331
102	J-172	361
103	J-173	359
104	J-174	354
105	J-175	360
106	J-176	336
107	J-177	336
108	J-178	346
109	J-18	335
110	J-180	340
111	J-182	360
112	J-183	363
113	J-187	353
114	J-188	353
115	J-189	362
117	J-191	363
118	J-192	359
119	J-193	367
120	J-194	380
121	J-195	357
125	J-199	363
127	J-20	350
128	J-200	360
132	J-204	365
133	J-205	354
135	J-207	361

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING		
ID	Label	Pressure
136	J-208	395
137	J-209	373
138	J-21	339
139	J-210	383
145	J-217	400
147	J-219	402
148	J-22	338
150	J-222	384
151	J-225	388
152	J-226	386
153	J-227	385
154	J-228	388
156	J-23	326
157	J-230	388
158	J-231	382
159	J-232	389
161	J-234	380
162	J-235	379
164	J-239	377
165	J-24	341
166	J-240	397
168	J-242	377
169	J-243	381
170	J-244	338
171	J-245	526
172	J-25	326
173	J-26	362
174	J-27	322
175	J-28	352
178	J-30	320
179	J-31	334
180	J-34	321
182	J-36	322
183	J-37	348
185	J-39	362
186	J-4	382
188	J-41	326
189	J-42	322
190	J-43	354
191	J-44	340
192	J-45	334
195	J-48	326
196	J-49	317
197	J-5	387
201	J-53	318
202	J-54	349
203	J-55	358
206	J-58	329
207	J-59	323
210	J-62	340
212	J-65	335
216	J-69	363
217	J-7	386
218	J-70	358
219	J-72	358
221	J-74	360
222	J-75	371
224	J-78	361
225	J-79	371
227	J-80	375
228	J-81	384
230	J-83	380
231	J-84	381
233	J-87	382
235	J-89	368
236	J-9	384
240	J-93	385
241	J-94	404
243	J-96	366
246	J-99	393
248	H-1	369
249	H-10	431
250	H-100	380
251	H-101	378
252	H-102	421
253	H-103	396

NEAR TERM		
ID	Label	Pressure
136	J-208	393
137	J-209	372
138	J-21	335
139	J-210	381
145	J-217	399
147	J-219	400
148	J-22	335
150	J-222	382
151	J-225	387
152	J-226	385
153	J-227	383
154	J-228	387
156	J-23	323
157	J-230	386
158	J-231	381
159	J-232	388
161	J-234	378
162	J-235	378
164	J-239	375
165	J-24	337
166	J-240	396
168	J-242	375
169	J-243	379
170	J-244	338
171	J-245	524
172	J-25	323
173	J-26	357
174	J-27	318
175	J-28	348
178	J-30	317
179	J-31	330
180	J-34	318
182	J-36	318
183	J-37	344
185	J-39	357
186	J-4	374
188	J-41	323
189	J-42	321
190	J-43	350
191	J-44	340
192	J-45	330
195	J-48	325
196	J-49	315
197	J-5	383
201	J-53	316
202	J-54	345
203	J-55	354
206	J-58	328
207	J-59	320
210	J-62	337
212	J-65	334
216	J-69	358
217	J-7	381
218	J-70	357
219	J-72	357
221	J-74	356
222	J-75	367
224	J-78	361
225	J-79	370
227	J-80	371
228	J-81	379
230	J-83	379
231	J-84	378
233	J-87	378
235	J-89	367
236	J-9	380
240	J-93	382
241	J-94	400
243	J-96	365
246	J-99	389
248	H-1	368
249	H-10	427
250	H-100	379
251	H-101	376
252	H-102	419
253	H-103	394

MID TERM		
ID	Label	Pressure
136	J-208	390
137	J-209	369
138	J-21	338
139	J-210	378
145	J-217	395
147	J-219	397
148	J-22	337
150	J-222	379
151	J-225	383
152	J-226	381
153	J-227	380
154	J-228	383
156	J-23	326
157	J-230	383
158	J-231	377
159	J-232	384
161	J-234	374
162	J-235	374
164	J-239	372
165	J-24	339
166	J-240	392
168	J-242	372
169	J-243	376
170	J-244	338
171	J-245	401
172	J-25	326
173	J-26	359
174	J-27	321
175	J-28	350
178	J-30	320
179	J-31	333
180	J-34	321
182	J-36	321
183	J-37	346
185	J-39	358
186	J-4	374
188	J-41	326
189	J-42	322
190	J-43	351
191	J-44	341
192	J-45	333
195	J-48	326
196	J-49	318
197	J-5	385
201	J-53	320
202	J-54	347
203	J-55	352
206	J-58	330
207	J-59	324
210	J-62	341
212	J-65	337
216	J-69	357
217	J-7	384
218	J-70	358
219	J-72	358
221	J-74	359
222	J-75	364
224	J-78	362
225	J-79	373
227	J-80	372
228	J-81	377
230	J-83	381
231	J-84	382
233	J-87	376
235	J-89	370
236	J-9	382
240	J-93	386
241	J-94	387
243	J-96	366
246	J-99	392
248	H-1	364
249	H-10	398
250	H-100	375
251	H-101	373
252	H-102	416
253	H-103	391

LONG TERM		
ID	Label	Pressure
136	J-208	377
137	J-209	356
138	J-21	332
139	J-210	366
145	J-217	383
147	J-219	384
148	J-22	332
150	J-222	366
151	J-225	370
152	J-226	369
153	J-227	368
154	J-228	370
156	J-23	321
157	J-230	371
158	J-231	365
159	J-232	372
161	J-234	361
162	J-235	361
164	J-239	359
165	J-24	334
166	J-240	380
168	J-242	359
169	J-243	363
170	J-244	338
171	J-245	393
172	J-25	321
173	J-26	353
174	J-27	316
175	J-28	344
178	J-30	315
179	J-31	328
180	J-34	317
182	J-36	317
183	J-37	340
185	J-39	352
186	J-4	366
188	J-41	321
189	J-42	321
190	J-43	346
191	J-44	340
192	J-45	328
195	J-48	326
196	J-49	315
197	J-5	379
201	J-53	317
202	J-54	342
203	J-55	347
206	J-58	329
207	J-59	320
210	J-62	337
212	J-65	334
216	J-69	351
217	J-7	377
218	J-70	357
219	J-72	357
221	J-74	355
222	J-75	359
224	J-78	361
225	J-79	370
227	J-80	367
228	J-81	371
230	J-83	380
231	J-84	378
233	J-87	371
235	J-89	367
236	J-9	376
240	J-93	382
241	J-94	382
243	J-96	365
246	J-99	387
248	H-1	352
249	H-10	392
250	H-100	363
251	H-101	360
252	H-102	403
253	H-103	378

BUILD OUT		
ID	Label	Pressure
136	J-208	377
137	J-209	356
138	J-21	329
139	J-210	366
145	J-217	383
147	J-219	384
148	J-22	329
150	J-222	366
151	J-225	370
152	J-226	369
153	J-227	368
154	J-228	370
156	J-23	318
157	J-230	371
158	J-231	365
159	J-232	372
161	J-234	361
162	J-235	361
164	J-239	359
165	J-24	331
166	J-240	380
168	J-242	359
169	J-243	363
170	J-244	338
171	J-245	387
172	J-25	318
173	J-26	350
174	J-27	313
175	J-28	341
178	J-30	313
179	J-31	325
180	J-34	315
182	J-36	315
183	J-37	338
185	J-39	349
186	J-4	362
188	J-41	319
189	J-42	321
190	J-43	344
191	J-44	340
192	J-45	326
195	J-48	325
196	J-49	313
197	J-5	375
201	J-53	316
202	J-54	340
203	J-55	346
206	J-58	328
207	J-59	319
210	J-62	335
212	J-65	333
216	J-69	350
217	J-7	374
218	J-70	356
219	J-72	356
221	J-74	353
222	J-75	358
224	J-78	360
225	J-79	368
227	J-80	365
228	J-81	373
230	J-83	379
231	J-84	377
233	J-87	368
235	J-89	365
236	J-9	372
240	J-93	380
241	J-94	379
243	J-96	364
246	J-99	385
248	H-1	352
249	H-10	387
250	H-100	363
251	H-101	360
252	H-102	403
253	H-103	378

North Dundas (Winchester and Chesterville) - Peak Hour Demand

EXISTING		
ID	Label	Pressure
254	H-104	379
255	H-105	389
256	H-106	381
257	H-107	397
258	H-108	378
259	H-109	370
260	H-11	402
261	H-110	369
262	H-111	381
263	H-112	384
264	H-113	389
265	H-114	379
266	H-115	379
267	H-116	379
268	H-117	378
269	H-118	385
270	H-119	384
271	H-12	363
272	H-120	377
273	H-121	377
274	H-122	377
275	H-123	383
276	H-124	395
277	H-125	386
278	H-126	383
279	H-128	380
280	H-129	399
281	H-13	362
282	H-130	390
283	H-131	354
284	H-132	367
285	H-133	356
286	H-134	358
287	H-135	364
288	H-136	379
289	H-137	383
290	H-138	375
291	H-139	369
292	H-14	354
293	H-140	370
294	H-141	374
295	H-142	375
296	H-143	390
297	H-144	311
298	H-145	346
299	H-146	351
300	H-147	385
301	H-148	379
302	H-149	370
303	H-15	352
304	H-150	330
305	H-151	340
306	H-152	369
307	H-153	382
308	H-154	372
309	H-155	366
310	H-156	358
311	H-157	326
312	H-158	381
313	H-159	377
314	H-16	360
315	H-160	327
316	H-161	346
317	H-162	382
318	H-163	384
319	H-164	357
320	H-165	428
321	H-166	341
322	H-167	385
323	H-168	396
324	H-169	388
325	H-17	365
326	H-170	373
327	H-171	383
328	H-172	386
329	H-173	349

NEAR TERM		
ID	Label	Pressure
254	H-104	377
255	H-105	387
256	H-106	379
257	H-107	395
258	H-108	376
259	H-109	368
260	H-11	398
261	H-110	367
262	H-111	379
263	H-112	382
264	H-113	387
265	H-114	376
266	H-115	377
267	H-116	377
268	H-117	376
269	H-118	383
270	H-119	382
271	H-12	358
272	H-120	376
273	H-121	376
274	H-122	375
275	H-123	382
276	H-124	393
277	H-125	384
278	H-126	381
279	H-128	378
280	H-129	397
281	H-13	358
282	H-130	389
283	H-131	353
284	H-132	366
285	H-133	355
286	H-134	357
287	H-135	363
288	H-136	377
289	H-137	381
290	H-138	374
291	H-139	368
292	H-14	350
293	H-140	369
294	H-141	372
295	H-142	374
296	H-143	389
297	H-144	309
298	H-145	346
299	H-146	350
300	H-147	381
301	H-148	374
302	H-149	366
303	H-15	347
304	H-150	327
305	H-151	337
306	H-152	364
307	H-153	373
308	H-154	371
309	H-155	365
310	H-156	357
311	H-157	325
312	H-158	377
313	H-159	373
314	H-16	355
315	H-160	324
316	H-161	342
317	H-162	378
318	H-163	380
319	H-164	353
320	H-165	425
321	H-166	337
322	H-167	383
323	H-168	394
324	H-169	387
325	H-17	361
326	H-170	372
327	H-171	381
328	H-172	378
329	H-173	340

MID TERM		
ID	Label	Pressure
254	H-104	373
255	H-105	383
256	H-106	375
257	H-107	391
258	H-108	372
259	H-109	364
260	H-11	387
261	H-110	363
262	H-111	375
263	H-112	378
264	H-113	383
265	H-114	373
266	H-115	374
267	H-116	374
268	H-117	373
269	H-118	380
270	H-119	379
271	H-12	359
272	H-120	372
273	H-121	372
274	H-122	372
275	H-123	378
276	H-124	390
277	H-125	381
278	H-126	378
279	H-128	374
280	H-129	394
281	H-13	359
282	H-130	385
283	H-131	351
284	H-132	364
285	H-133	352
286	H-134	355
287	H-135	361
288	H-136	374
289	H-137	378
290	H-138	370
291	H-139	365
292	H-14	351
293	H-140	366
294	H-141	369
295	H-142	371
296	H-143	385
297	H-144	309
298	H-145	347
299	H-146	351
300	H-147	383
301	H-148	377
302	H-149	368
303	H-15	349
304	H-150	330
305	H-151	340
306	H-152	366
307	H-153	373
308	H-154	373
309	H-155	366
310	H-156	358
311	H-157	326
312	H-158	374
313	H-159	373
314	H-16	357
315	H-160	327
316	H-161	342
317	H-162	376
318	H-163	377
319	H-164	353
320	H-165	383
321	H-166	339
322	H-167	379
323	H-168	390
324	H-169	383
325	H-17	362
326	H-170	368
327	H-171	377
328	H-172	377
329	H-173	339

LONG TERM		
ID	Label	Pressure
254	H-104	359
255	H-105	370
256	H-106	362
257	H-107	377
258	H-108	359
259	H-109	351
260	H-11	381
261	H-110	350
262	H-111	362
263	H-112	365
264	H-113	370
265	H-114	359
266	H-115	361
267	H-116	361
268	H-117	360
269	H-118	367
270	H-119	366
271	H-12	353
272	H-120	359
273	H-121	359
274	H-122	360
275	H-123	366
276	H-124	377
277	H-125	369
278	H-126	366
279	H-128	362
280	H-129	381
281	H-13	353
282	H-130	373
283	H-131	345
284	H-132	357
285	H-133	345
286	H-134	347
287	H-135	353
288	H-136	362
289	H-137	366
290	H-138	359
291	H-139	353
292	H-14	345
293	H-140	354
294	H-141	357
295	H-142	358
296	H-143	373
297	H-144	309
298	H-145	346
299	H-146	350
300	H-147	377
301	H-148	371
302	H-149	362
303	H-15	343
304	H-150	325
305	H-151	335
306	H-152	360
307	H-153	366
308	H-154	371
309	H-155	365
310	H-156	357
311	H-157	326
312	H-158	369
313	H-159	368
314	H-16	351
315	H-160	322
316	H-161	337
317	H-162	371
318	H-163	372
319	H-164	347
320	H-165	376
321	H-166	333
322	H-167	367
323	H-168	377
324	H-169	370
325	H-17	357
326	H-170	357
327	H-171	365
328	H-172	368
329	H-173	330

BUILD OUT		
ID	Label	Pressure
254	H-104	359
255	H-105	370
256	H-106	362
257	H-107	377
258	H-108	359
259	H-109	351
260	H-11	378
261	H-110	350
262	H-111	362
263	H-112	365
264	H-113	370
265	H-114	359
266	H-115	361
267	H-116	361
268	H-117	360
269	H-118	367
270	H-119	366
271	H-12	350
272	H-120	359
273	H-121	359
274	H-122	360
275	H-123	366
276	H-124	377
277	H-125	369
278	H-126	366
279	H-128	362
280	H-129	381
281	H-13	350
282	H-130	373
283	H-131	345
284	H-132	357
285	H-133	345
286	H-134	347
287	H-135	353
288	H-136	362
289	H-137	366
290	H-138	359
291	H-139	353
292	H-14	342
293	H-140	354
294	H-141	357
295	H-142	358
296	H-143	373
297	H-144	309
298	H-145	345
299	H-146	350
300	H-147	373
301	H-148	367
302	H-149	359
303	H-15	340
304	H-150	322
305	H-151	332
306	H-152	356
307	H-153	362
308	H-154	370
309	H-155	364
310	H-156	357
311	H-157	325
312	H-158	366
313	H-159	366
314	H-16	348
315	H-160	320
316	H-161	335
317	H-162	368
318	H-163	377
319	H-164	344
320	H-165	372
321	H-166	331
322	H-167	367
323	H-168	377
324	H-169	370
325	H-17	354
326	H-170	357
327	H-171	365
328	H-172	363
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

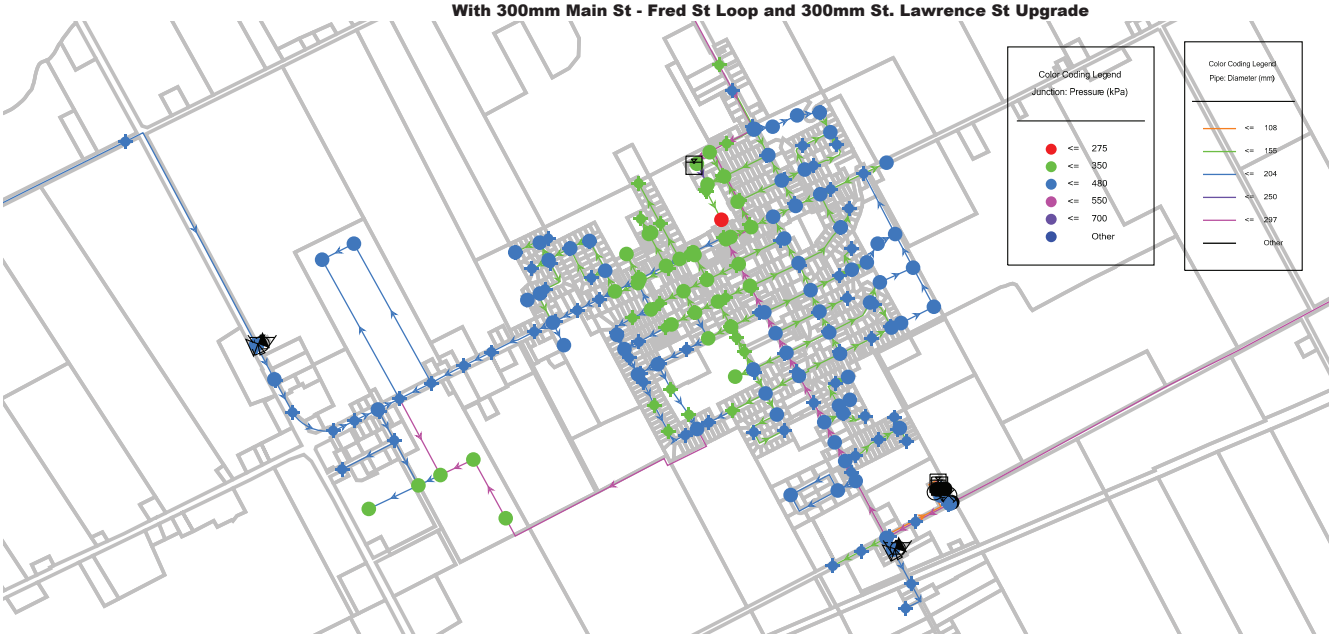
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Peak Hour Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade

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

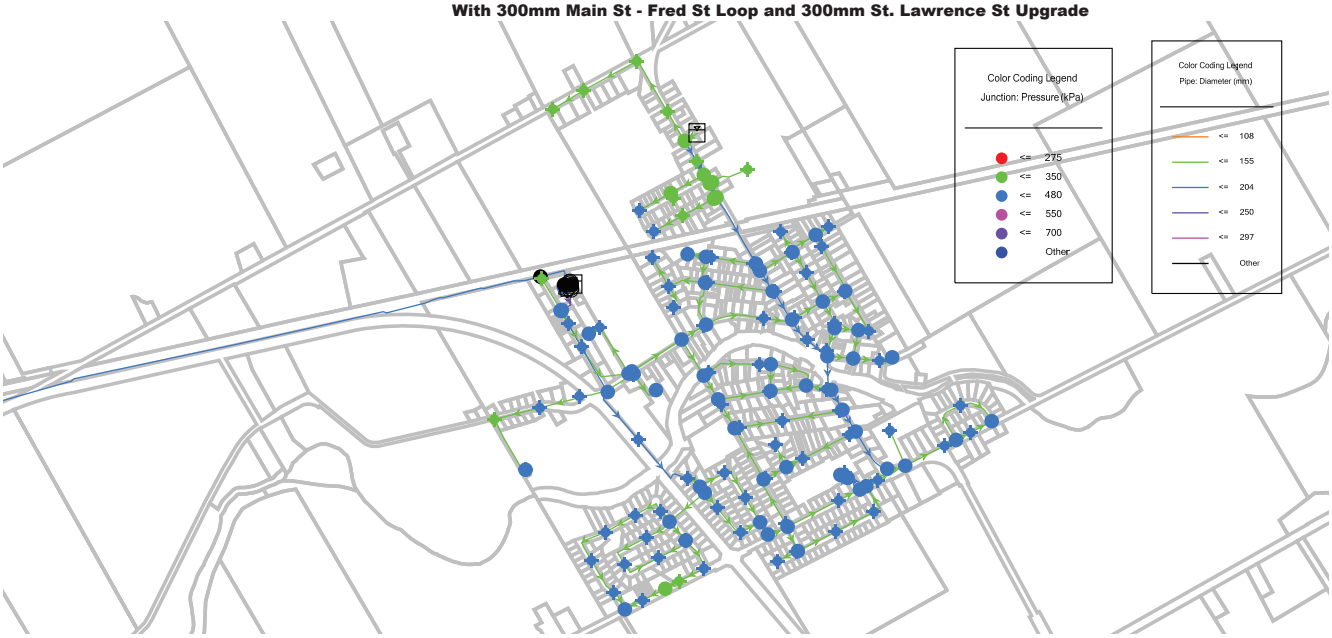
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Peak Hour Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade

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

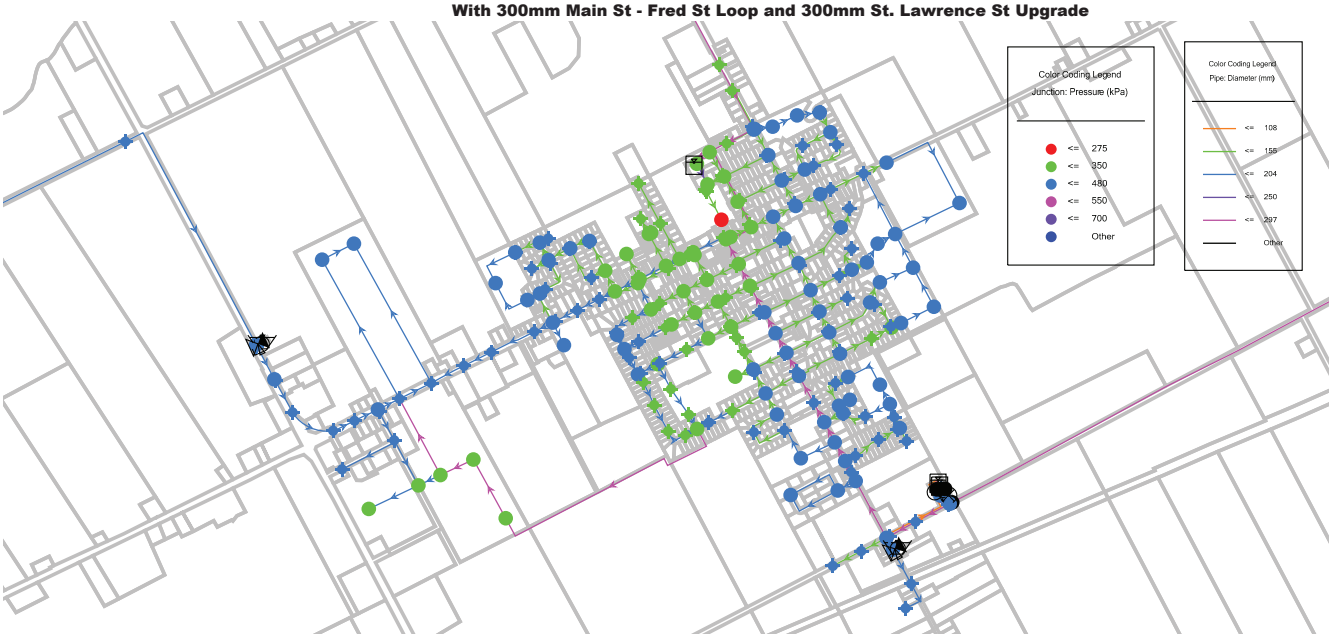


North Dundas Hydraulic Water Model
Long Term (10-20 Year) Peak Hour Demand - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade

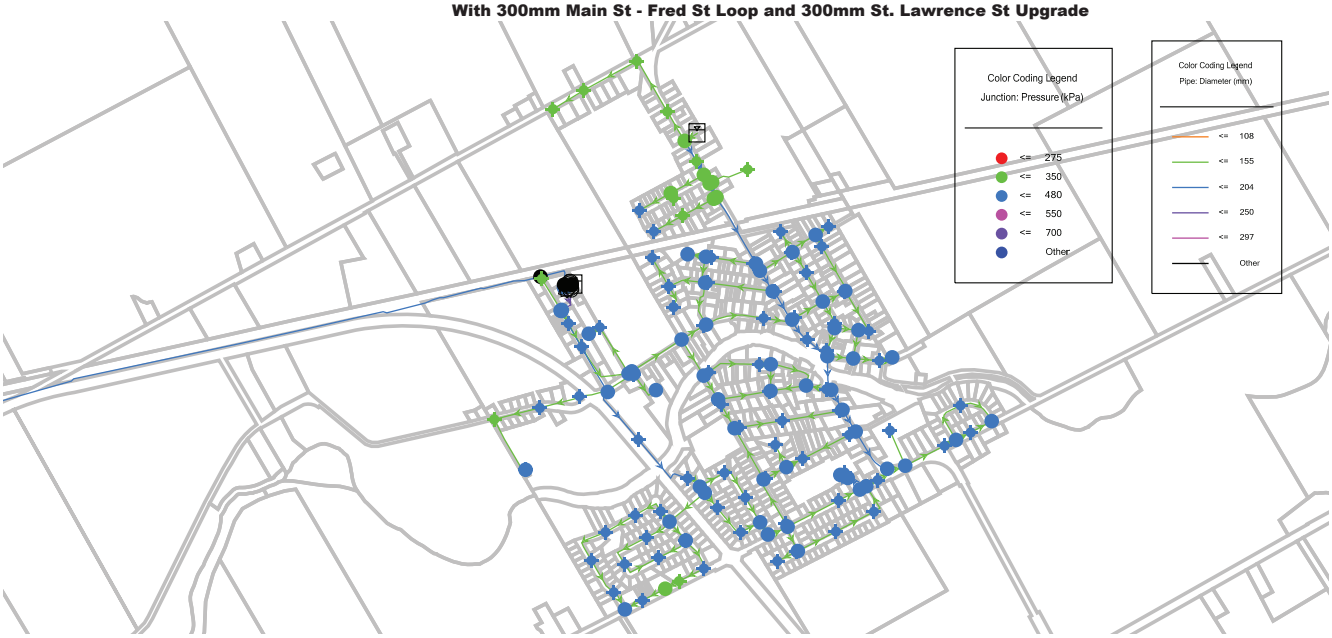


North Dundas Hydraulic Water Model
Build Out (20+ Year) Peak Hour Demand
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade

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		
ID	Label	Fire Flow
248	H-1	62.85
249	H-10	143.46
250	H-100	81.5
251	H-101	84.62
252	H-102	89.26
253	H-103	80.94
254	H-104	55.36
255	H-105	56.78
256	H-106	54.9
257	H-107	54.33
258	H-108	53.3
259	H-109	50.94
260	H-11	141.68
261	H-110	49.06
262	H-111	73.73
263	H-112	74.14
264	H-113	87.84
265	H-114	74.22
266	H-115	75.18
267	H-116	73.76
268	H-117	80.49
269	H-118	70.51
270	H-119	67.78
271	H-12	131.92
272	H-120	70.66
273	H-121	57.46
274	H-122	82.3
275	H-123	87.45
276	H-124	96.54
277	H-125	91.51
278	H-126	98.84
279	H-128	40.35
280	H-129	40.35
281	H-13	134.36
282	H-130	54.64
283	H-131	55.15
284	H-132	44.35
285	H-133	114.03
286	H-134	59.95
287	H-135	45.51
288	H-136	55.62
289	H-137	47.4
290	H-138	87.75
291	H-139	81.7
292	H-14	129.47
293	H-140	86.76
294	H-141	63.27
295	H-142	75.3
296	H-143	86.07
297	H-144	70.96
298	H-145	213.32
299	H-146	48.52
300	H-147	58.88
301	H-148	82.17
302	H-149	78.54
303	H-15	131.35
304	H-150	41.07
305	H-151	33.16
306	H-152	88.53
307	H-153	53.51
308	H-154	119.94
309	H-155	58.13
310	H-156	314.76
311	H-157	212.18
312	H-158	124.93
313	H-159	57.31
314	H-16	143.14
315	H-160	115.42
316	H-161	102.26
317	H-162	140.57
318	H-163	43.23
319	H-164	121.74
320	H-165	63.35
321	H-166	143.44
322	H-167	27.13

NEAR TERM		
ID	Label	Fire Flow
248	H-1	62.06
249	H-10	144.04
250	H-100	80.08
251	H-101	83.16
252	H-102	87.8
253	H-103	79.61
254	H-104	54.84
255	H-105	56.22
256	H-106	54.42
257	H-107	53.87
258	H-108	52.85
259	H-109	50.53
260	H-11	142.83
261	H-110	48.7
262	H-111	72.78
263	H-112	73.21
264	H-113	86.62
265	H-114	73.27
266	H-115	74.2
267	H-116	72.63
268	H-117	79.08
269	H-118	69.47
270	H-119	66.82
271	H-12	131.36
272	H-120	69.63
273	H-121	56.79
274	H-122	80.9
275	H-123	85.92
276	H-124	94.76
277	H-125	89.86
278	H-126	96.96
279	H-128	40.1
280	H-129	40.12
281	H-13	133.72
282	H-130	54.03
283	H-131	54.74
284	H-132	44.13
285	H-133	112.1
286	H-134	59.45
287	H-135	45.3
288	H-136	55.04
289	H-137	47.06
290	H-138	86.2
291	H-139	80.33
292	H-14	128.76
293	H-140	85.22
294	H-141	62.46
295	H-142	74.14
296	H-143	84.61
297	H-144	66.44
298	H-145	215.55
299	H-146	48.55
300	H-147	57.75
301	H-148	80.17
302	H-149	76.72
303	H-15	130.59
304	H-150	40.74
305	H-151	32.97
306	H-152	83.07
307	H-153	51.96
308	H-154	165.14
309	H-155	107.51
310	H-156	323.47
311	H-157	214.54
312	H-158	126.44
313	H-159	57.53
314	H-16	142.44
315	H-160	114.97
316	H-161	102.12
317	H-162	142.19
318	H-163	43.15
319	H-164	121.19
320	H-165	63.24
321	H-166	141.91
322	H-167	26.93

MID TERM		
ID	Label	Fire Flow
248	H-1	61.24
249	H-10	145.4
250	H-100	78.63
251	H-101	81.68
252	H-102	86.32
253	H-103	78.25
254	H-104	54.29
255	H-105	55.64
256	H-106	53.9
257	H-107	53.39
258	H-108	52.37
259	H-109	50.08
260	H-11	145.22
261	H-110	48.3
262	H-111	71.83
263	H-112	72.24
264	H-113	85.39
265	H-114	72.28
266	H-115	73.18
267	H-116	71.45
268	H-117	77.65
269	H-118	68.48
270	H-119	65.88
271	H-12	128.84
272	H-120	68.59
273	H-121	56.1
274	H-122	79.53
275	H-123	84.34
276	H-124	92.97
277	H-125	88.16
278	H-126	95.04
279	H-128	39.79
280	H-129	39.84
281	H-13	131.06
282	H-130	53.36
283	H-131	54.31
284	H-132	43.9
285	H-133	110.16
286	H-134	58.92
287	H-135	45.03
288	H-136	54.44
289	H-137	46.73
290	H-138	84.63
291	H-139	78.95
292	H-14	126.15
293	H-140	83.65
294	H-141	61.62
295	H-142	72.95
296	H-143	83.11
297	H-144	66.39
298	H-145	214.28
299	H-146	48.49
300	H-147	56.35
301	H-148	77.58
302	H-149	74.33
303	H-15	127.85
304	H-150	40.23
305	H-151	32.72
306	H-152	76.75
307	H-153	45.44
308	H-154	164.79
309	H-155	107.07
310	H-156	320.74
311	H-157	213.91
312	H-158	137.57
313	H-159	57.08
314	H-16	139.32
315	H-160	112.86
316	H-161	100.7
317	H-162	143.35
318	H-163	42.9
319	H-164	118.99
320	H-165	62.96
321	H-166	138.14
322	H-167	26.72

LONG TERM		
ID	Label	Fire Flow
248	H-1	59.54
249	H-10	143.05
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	143.04
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	125.75
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	127.81
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	81.5
291	H-139	76.21
292	H-14	122.98
293	H-140	80.52
294	H-141	59.9
295	H-142	70.57
296	H-143	80.12
297	H-144	66.33
298	H-145	212.73
299	H-146	48.47
300	H-147	54.22
301	H-148	73.92
302	H-149	70.95
303	H-15	124.55
304	H-150	39.44
305	H-151	32.28
306	H-152	68.37
307	H-153	39.59
308	H-154	163.93
309	H-155	106.74
310	H-156	317.33
311	H-157	212.99
312	H-158	136.61
313	H-159	56.52
314	H-16	135.57
315	H-160	110.38
316	H-161	98.76
317	H-162	140.8
318	H-163	42.56
319	H-164	116.27
320	H-165	62.27
321	H-166	133.45
322	H-167	26.37

BUILD OUT		
ID	Label	Fire Flow
248	H-1	59.54
249	H-10	146.65
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	52.34
258	H-108	51.3
259	H-109	49.09
260	H-11	141.24
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	127.48
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	129.14
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	81.5
291	H-139	76.21
292	H-14	124.01
293	H-140	80.52
294	H-141	59.9
295	H-142	70.57
296	H-143	80.12
297	H-144	66.31
298	H-145	212.27
299	H-146	48.45
300	H-147	61.96
301	H-148	74.71
302	H-149	70.84
303	H-15	125.44
304	H-150	39.08
305	H-151	32.08
306	H-152	65.23
307	H-153	36.98
308	H-154	163.55
309	H-155	106.62
310	H-156	316.41
311	H-157	212.68
312	H-158	135.54
313	H-159	56.21
314	H-16	136.55
315	H-160	110.12
316	H-161	99.3
317	H-162	140.6
318	H-163	84.89
319	H-164	118.14
320	H-165	97.63
321	H-166	132.94
322	H-167	26.37

North Dundas (Winchester and Chesterville) - Maximum Day Demand + Fire Flow - No Watermain Upgrades

EXISTING		
ID	Label	Fire Flow
323	H-168	92.57
324	H-169	75.08
325	H-17	154.09
326	H-170	47.57
327	H-171	45.99
328	H-172	34.78
329	H-173	28.23
330	H-174	26.51
331	H-175	26.55
333	H-177	43.53
334	H-178	135.97
335	H-18	143.99
336	H-180	148.32
337	H-181	112.19
338	H-182	99.86
339	H-183	66.83
340	H-184	146.59
341	H-185	76.85
342	H-186	51.26
343	H-187	51.26
344	H-188	51.23
345	H-189	52.27
346	H-19	154.23
347	H-190	52.27
348	H-191	52.22
349	H-192	52.24
350	H-193	52.27
351	H-194	52.24
352	H-195	54.35
353	H-196	56.78
354	H-197	59.58
355	H-198	70.66
356	H-199	77.32
357	H-2	100.44
358	H-20	150.29
359	H-200	82.6
360	H-201	93.44
361	H-202	107.65
362	H-203	48.03
363	H-204	48.01
364	H-205	48.53
365	H-207	66.23
366	H-208	62.61
367	H-209	161.53
368	H-21	152.43
369	H-210	163.58
370	H-211	166.23
371	H-212	53.5
372	H-213	53.52
373	H-214	96.39
374	H-215	51.46
375	H-216	53.3
376	H-217	55.44
377	H-218	55.33
378	H-219	49.65
379	H-22	144.86
380	H-220	49.49
381	H-221	55.59
382	H-222	55.28
383	H-223	47.25
384	H-23	173.6
385	H-24	148.92
386	H-25	80.18
387	H-26	55.19
388	H-27	65.23
389	H-28	42.01
390	H-29	128.11
391	H-3	82.09
392	H-30	148.58
393	H-31	58.74
394	H-32	129.34
395	H-33	128.29
396	H-34	117.76
397	H-35	94.93
398	H-36	47.7

NEAR TERM		
ID	Label	Fire Flow
323	H-168	91.22
324	H-169	73.91
325	H-17	153.28
326	H-170	47.21
327	H-171	45.56
328	H-172	33.75
329	H-173	27.48
330	H-174	25.84
331	H-175	25.87
333	H-177	42.15
334	H-178	136.36
335	H-18	143.11
336	H-180	147.63
337	H-181	112.08
338	H-182	99.61
339	H-183	66.51
340	H-184	149.67
341	H-185	76.79
342	H-186	51.26
343	H-187	51.26
344	H-188	51.23
345	H-189	52.26
346	H-19	153.18
347	H-190	52.27
348	H-191	52.22
349	H-192	52.24
350	H-193	52.27
351	H-194	52.24
352	H-195	54.34
353	H-196	56.78
354	H-197	59.58
355	H-198	70.66
356	H-199	77.33
357	H-2	98.52
358	H-20	148.96
359	H-200	82.63
360	H-201	93.5
361	H-202	107.78
362	H-203	47.7
363	H-204	47.69
364	H-205	48.21
365	H-207	66.23
366	H-208	62.61
367	H-209	161.43
368	H-21	151.79
369	H-210	163.48
370	H-211	166.12
371	H-212	51.97
372	H-213	51.97
373	H-214	94.6
374	H-215	51.05
375	H-216	52.86
376	H-217	55
377	H-218	55.02
378	H-219	49.39
379	H-22	145.16
380	H-220	49.25
381	H-221	102.32
382	H-222	108.8
383	H-223	156.65
384	H-23	174.05
385	H-24	149.21
386	H-25	85.75
387	H-26	57.09
388	H-27	93.08
389	H-28	76.21
390	H-29	143.57
391	H-3	80.66
392	H-30	152.33
393	H-31	58.78
394	H-32	133.65
395	H-33	127.41
396	H-34	114.63
397	H-35	93.81
398	H-36	47.25

MID TERM		
ID	Label	Fire Flow
323	H-168	89.86
324	H-169	72.7
325	H-17	149.75
326	H-170	46.87
327	H-171	45.09
328	H-172	30.99
329	H-173	25.69
330	H-174	24.27
331	H-175	24.29
333	H-177	37.75
334	H-178	135.88
335	H-18	139.93
336	H-180	144.33
337	H-181	110.34
338	H-182	99.35
339	H-183	66.18
340	H-184	148.72
341	H-185	76.64
342	H-186	51.22
343	H-187	51.22
344	H-188	51.19
345	H-189	52.21
346	H-19	149.54
347	H-190	52.21
348	H-191	52.16
349	H-192	52.18
350	H-193	52.21
351	H-194	52.18
352	H-195	54.28
353	H-196	56.71
354	H-197	59.5
355	H-198	70.55
356	H-199	77.21
357	H-2	96.57
358	H-20	145.14
359	H-200	82.48
360	H-201	93.29
361	H-202	107.49
362	H-203	47.33
363	H-204	47.33
364	H-205	47.84
365	H-207	66.13
366	H-208	62.52
367	H-209	161.25
368	H-21	148.22
369	H-210	163.3
370	H-211	165.94
371	H-212	45.7
372	H-213	45.72
373	H-214	92.81
374	H-215	50.6
375	H-216	52.39
376	H-217	54.52
377	H-218	54.8
378	H-219	49.23
379	H-22	142.36
380	H-220	49.14
381	H-221	101.76
382	H-222	108.38
383	H-223	155.98
384	H-23	170.19
385	H-24	148.36
386	H-25	86.89
387	H-26	57.41
388	H-27	102.83
389	H-28	99.54
390	H-29	145.21
391	H-3	79.2
392	H-30	152.03
393	H-31	58.7
394	H-32	133.29
395	H-33	124.74
396	H-34	110.16
397	H-35	91.87
398	H-36	46.54

LONG TERM		
ID	Label	Fire Flow
323	H-168	86.92
324	H-169	70.29
325	H-17	145.47
326	H-170	45.98
327	H-171	44.07
328	H-172	27.97
329	H-173	23.53
330	H-174	22.3
331	H-175	22.33
333	H-177	33.43
334	H-178	135.25
335	H-18	136.03
336	H-180	140.38
337	H-181	108.1
338	H-182	97.67
339	H-183	65.37
340	H-184	147.29
341	H-185	75.81
342	H-186	51.17
343	H-187	51.17
344	H-188	51.13
345	H-189	52.13
346	H-19	145.07
347	H-190	52.13
348	H-191	52.08
349	H-192	52.1
350	H-193	52.13
351	H-194	52.1
352	H-195	54.19
353	H-196	56.61
354	H-197	59.39
355	H-198	70.41
356	H-199	77.03
357	H-2	92.72
358	H-20	140.41
359	H-200	82.27
360	H-201	93.01
361	H-202	107.11
362	H-203	46.49
363	H-204	46.5
364	H-205	47
365	H-207	66.01
366	H-208	62.41
367	H-209	157.6
368	H-21	143.9
369	H-210	159.57
370	H-211	162.17
371	H-212	39.83
372	H-213	39.82
373	H-214	89.16
374	H-215	49.66
375	H-216	51.37
376	H-217	53.5
377	H-218	54.36
378	H-219	48.88
379	H-22	138.78
380	H-220	48.76
381	H-221	101.47
382	H-222	108.06
383	H-223	155.36
384	H-23	165.72
385	H-24	145.89
386	H-25	86.22
387	H-26	57.17
388	H-27	103.2
389	H-28	103.49
390	H-29	144.07
391	H-3	76.3
392	H-30	151.48
393	H-31	58.61
394	H-32	132.5
395	H-33	121.47
396	H-34	101.36
397	H-35	89.4
398	H-36	45.49

BUILD OUT		
ID	Label	Fire Flow
323	H-168	86.92
324	H-169	70.29
325	H-17	146.24
326	H-170	45.98
327	H-171	44.07
328	H-172	26.57
329	H-173	22.51
330	H-174	21.38
331	H-175	21.42
333	H-177	31.54
334	H-178	135.06
335	H-18	136.49
336	H-180	141.46
337	H-181	108.55
338	H-182	118.18
339	H-183	95.4
340	H-184	146.78
341	H-185	75.27
342	H-186	51.15
343	H-187	51.15
344	H-188	51.11
345	H-189	52.1
346	H-19	145.33
347	H-190	52.1
348	H-191	52.05
349	H-192	52.07
350	H-193	52.1
351	H-194	52.07
352	H-195	54.16
353	H-196	56.58
354	H-197	59.36
355	H-198	70.36
356	H-199	76.96
357	H-2	92.72
358	H-20	140.25
359	H-200	82.2
360	H-201	92.92
361	H-202	106.99
362	H-203	46.49
363	H-204	46.5
364	H-205	47
365	H-207	65.97
366	H-208	62.37
367	H-209	162.67
368	H-21	144.45
369	H-210	164.7
370	H-211	167.36
371	H-212	37.17
372	H-213	37.16
373	H-214	89.16
374	H-215	49.66
375	H-216	51.37
376	H-217	53.5
377	H-218	94.82
378	H-219	97.27
379	H-22	139.46
380	H-220	75.58
381	H-221	101.36
382	H-222	107.94
383	H-223	155.16
384	H-23	164.98
385	H-24	144.87
386	H-25	85.77
387	H-26	56.91
388	H-27	103.25
389	H-28	110.46
390	H-29	143.46
391	H-3	76.3
392	H-30	151.26
393	H-31	58.58
394	H-32	132.2
395	H-33	121.72
396	H-34	96.78
397	H-35	88.67
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

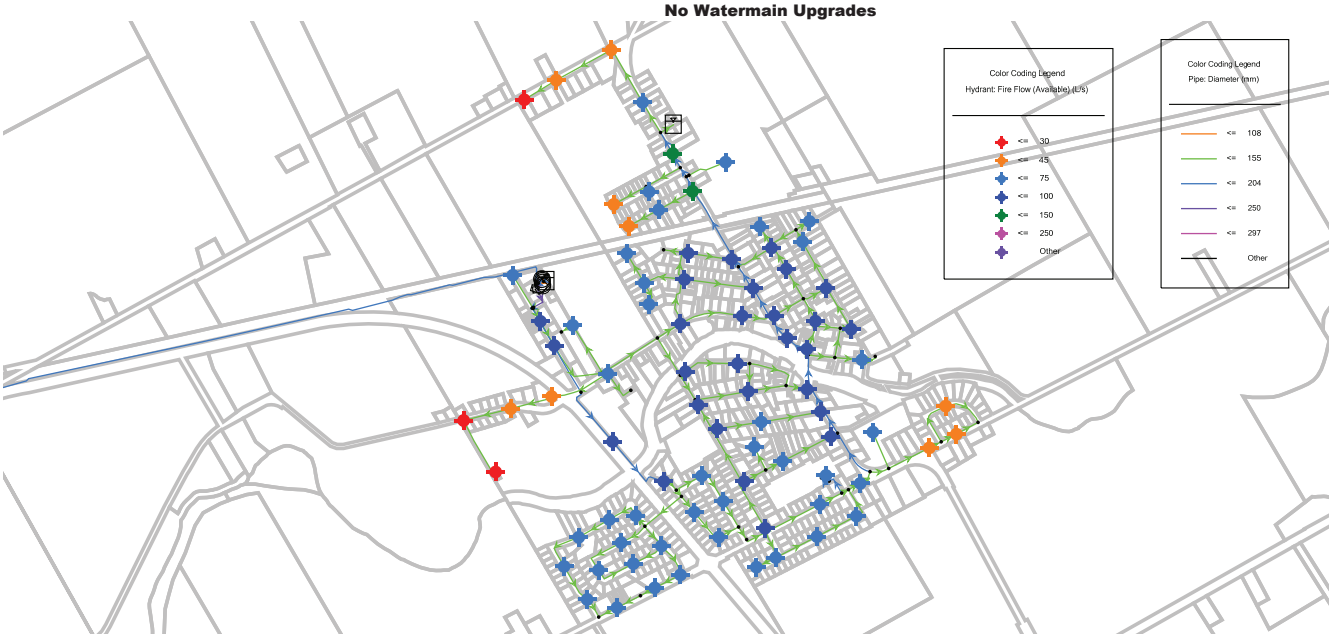
North Dundas Hydraulic Water Model
Long Term (10-20 Year) Maximum Day Demand + Fire Flow
No Watermain Upgrades

North Dundas Hydraulic Water Model
Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Winchester
No Watermain Upgrades

North Dundas Hydraulic Water Model

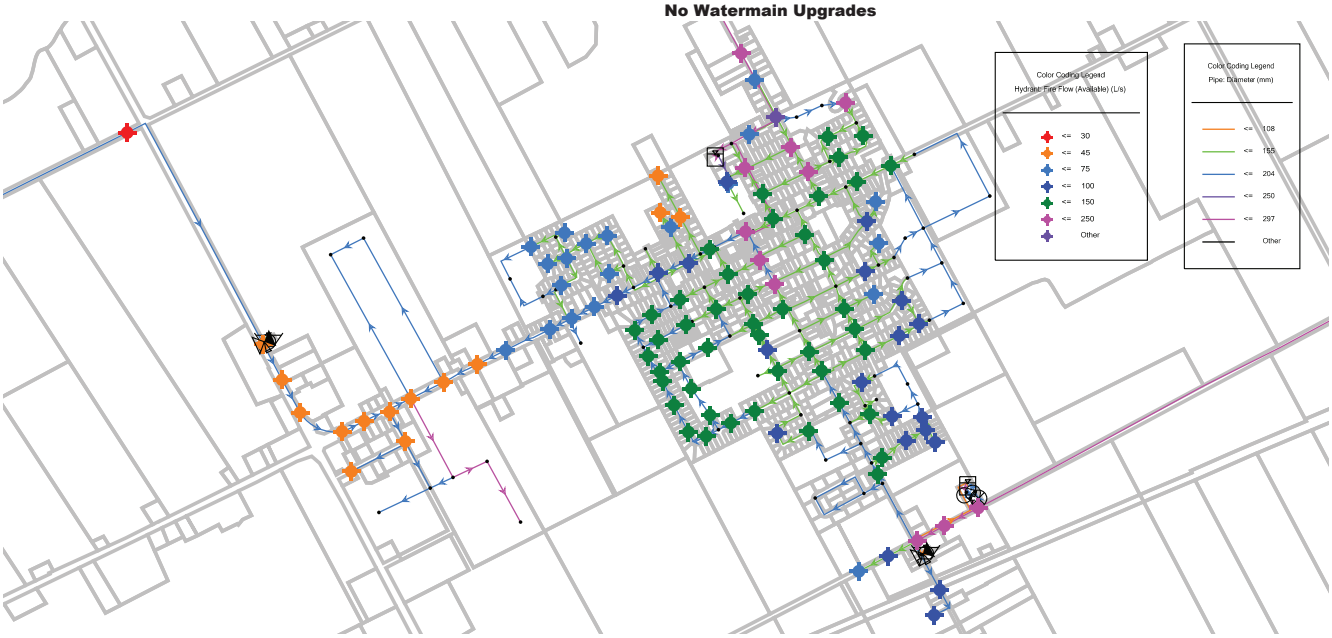
Long Term (10-20 Year) Maximum Day Demand + Fire Flow - Chesterville

No Watermain Upgrades

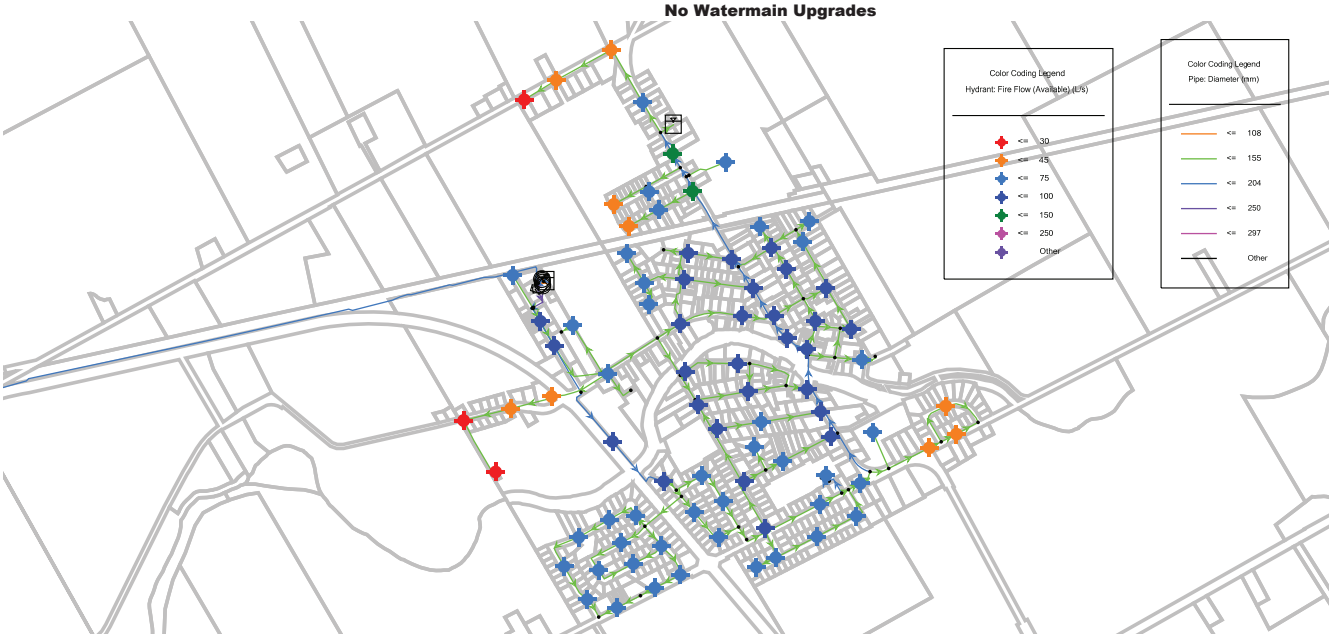


North Dundas Hydraulic Water Model
Build Out (20+ Year) Maximum Day Demand + Fire Flow
No Watermain Upgrades

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		
ID	Label	Fire Flow
248	H-1	62.85
249	H-10	143.46
250	H-100	81.5
251	H-101	84.62
252	H-102	89.26
253	H-103	80.94
254	H-104	55.36
255	H-105	56.78
256	H-106	54.9
257	H-107	54.33
258	H-108	53.3
259	H-109	50.94
260	H-11	141.68
261	H-110	49.06
262	H-111	73.73
263	H-112	74.14
264	H-113	87.84
265	H-114	74.22
266	H-115	75.18
267	H-116	73.76
268	H-117	80.49
269	H-118	70.51
270	H-119	67.78
271	H-12	131.92
272	H-120	70.66
273	H-121	57.46
274	H-122	82.3
275	H-123	87.45
276	H-124	96.54
277	H-125	91.51
278	H-126	98.84
279	H-128	40.35
280	H-129	40.35
281	H-13	134.36
282	H-130	54.64
283	H-131	55.15
284	H-132	44.35
285	H-133	114.03
286	H-134	59.95
287	H-135	45.51
288	H-136	55.62
289	H-137	47.4
290	H-138	87.75
291	H-139	81.7
292	H-14	129.47
293	H-140	86.76
294	H-141	63.27
295	H-142	75.3
296	H-143	86.07
297	H-144	70.96
298	H-145	213.32
299	H-146	48.52
300	H-147	58.88
301	H-148	82.17
302	H-149	78.54
303	H-15	131.35
304	H-150	41.07
305	H-151	33.16
306	H-152	88.53
307	H-153	53.51
308	H-154	119.94
309	H-155	58.13
310	H-156	314.76
311	H-157	212.18
312	H-158	124.93
313	H-159	57.31
314	H-16	143.14
315	H-160	115.42
316	H-161	102.26
317	H-162	140.57
318	H-163	43.23
319	H-164	121.74
320	H-165	63.35
321	H-166	143.44
322	H-167	27.13
323	H-168	92.57
324	H-169	75.08
325	H-17	154.09
326	H-170	47.57
327	H-171	45.99
328	H-172	34.78
329	H-173	28.23
330	H-174	26.51
331	H-175	26.55
333	H-177	43.53
334	H-178	135.97
335	H-18	143.99
336	H-180	148.32
337	H-181	112.19

NEAR TERM		
ID	Label	Fire Flow
248	H-1	62.06
249	H-10	145.24
250	H-100	80.08
251	H-101	83.16
252	H-102	87.8
253	H-103	79.61
254	H-104	54.84
255	H-105	56.22
256	H-106	54.42
257	H-107	53.87
258	H-108	52.85
259	H-109	50.53
260	H-11	144.5
261	H-110	48.7
262	H-111	72.78
263	H-112	73.21
264	H-113	86.62
265	H-114	73.27
266	H-115	74.2
267	H-116	72.63
268	H-117	79.08
269	H-118	69.47
270	H-119	66.82
271	H-12	143.87
272	H-120	69.63
273	H-121	56.79
274	H-122	80.9
275	H-123	85.92
276	H-124	94.76
277	H-125	89.86
278	H-126	96.96
279	H-128	40.1
280	H-129	40.12
281	H-13	143.71
282	H-130	54.03
283	H-131	54.74
284	H-132	44.13
285	H-133	112.1
286	H-134	59.45
287	H-135	45.3
288	H-136	55.04
289	H-137	47.06
290	H-138	86.2
291	H-139	80.33
292	H-14	142.09
293	H-140	85.22
294	H-141	62.46
295	H-142	74.14
296	H-143	84.61
297	H-144	66.44
298	H-145	215.55
299	H-146	48.55
300	H-147	60.05
301	H-148	85.94
302	H-149	81.57
303	H-15	141.77
304	H-150	40.89
305	H-151	33.02
306	H-152	133.88
307	H-153	93.9
308	H-154	165.14
309	H-155	107.51
310	H-156	323.48
311	H-157	214.54
312	H-158	127.6
313	H-159	57.57
314	H-16	152.58
315	H-160	115.9
316	H-161	103.32
317	H-162	144.09
318	H-163	43.26
319	H-164	133.19
320	H-165	63.32
321	H-166	142.33
322	H-167	26.93
323	H-168	91.22
324	H-169	73.91
325	H-17	159.03
326	H-170	47.21
327	H-171	45.56
328	H-172	39.61
329	H-173	30.25
330	H-174	28.07
331	H-175	28.1
333	H-177	56.3
334	H-178	136.36
335	H-18	148.03
336	H-180	153.99
337	H-181	113.59

MID TERM		
ID	Label	Fire Flow
248	H-1	61.24
249	H-10	302.97
250	H-100	78.63
251	H-101	81.68
252	H-102	86.32
253	H-103	78.25
254	H-104	54.29
255	H-105	55.64
256	H-106	53.9
257	H-107	53.39
258	H-108	52.37
259	H-109	50.08
260	H-11	305.56
261	H-110	48.3
262	H-111	71.83
263	H-112	72.24
264	H-113	85.39
265	H-114	72.28
266	H-115	73.18
267	H-116	71.45
268	H-117	77.65
269	H-118	68.48
270	H-119	65.88
271	H-12	153.72
272	H-120	68.59
273	H-121	56.1
274	H-122	79.53
275	H-123	84.34
276	H-124	92.97
277	H-125	88.16
278	H-126	95.04
279	H-128	39.79
280	H-129	39.84
281	H-13	153.29
282	H-130	53.36
283	H-131	54.31
284	H-132	43.9
285	H-133	110.16
286	H-134	58.92
287	H-135	45.03
288	H-136	54.44
289	H-137	46.73
290	H-138	84.63
291	H-139	78.95
292	H-14	150.94
293	H-140	83.65
294	H-141	61.62
295	H-142	72.95
296	H-143	83.11
297	H-144	66.61
298	H-145	219.39
299	H-146	48.65
300	H-147	60.22
301	H-148	87.2
302	H-149	82.57
303	H-15	150.79
304	H-150	41.01
305	H-151	33.16
306	H-152	140.09
307	H-153	105
308	H-154	167.19
309	H-155	107.88
310	H-156	332.89
311	H-157	216.72
312	H-158	168.11
313	H-159	58.49
314	H-16	165.38
315	H-160	126.89
316	H-161	109.84
317	H-162	234.67
318	H-163	43.22
319	H-164	140.84
320	H-165	65.88
321	H-166	152.23
322	H-167	26.72
323	H-168	89.86
324	H-169	72.7
325	H-17	174.42
326	H-170	46.87
327	H-171	45.09
328	H-172	39.41
329	H-173	30.13
330	H-174	28
331	H-175	28.02
333	H-177	56.61
334	H-178	137.69
335	H-18	158.4
336	H-180	167.29
337	H-181	121.63

LONG TERM		
ID	Label	Fire Flow
248	H-1	59.54
249	H-10	298.43
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	289.11
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	143.87
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	143.52
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	145.61
293	H-140	80.52
294	H-141	59.9
295	H-142	70.57
296	H-143	80.12
297	H-144	66.54
298	H-145	217.78
299	H-146	48.6
300	H-147	59.54
301	H-148	85.8
302	H-149	81.29
303	H-15	145.6
304	H-150	40.64
305	H-151	32.88
306	H-152	136.26
307	H-153	99.05
308	H-154	166.62
309	H-155	107.54
310	H-156	329.16
311	H-157	215.87
312	H-158	167.71
313	H-159	58.32
314	H-16	154.93
315	H-160	124.68
316	H-161	108.2
317	H-162	229.84
318	H-163	42.95
319	H-164	136.34
320	H-165	65.68
321	H-166	147.74
322	H-167	26.37
323	H-168	86.92
324	H-169	70.29
325	H-17	163.17
326	H-170	45.98
327	H-171	44.07
328	H-172	38.16
329	H-173	29.31
330	H-174	27.24
331	H-175	27.29
333	H-177	54.27
334	H-178	137.12
335	H-18	153.68
336	H-180	156.49
337	H-181	119.61

BUILD OUT		
ID	Label	Fire Flow
248	H-1	59.54
249	H-10	282.16
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	279.33
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	141.22
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	140.76
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	81.5
291	H-139	76.21
292	H-14	144.27
293	H-140	80.52
294	H-141	59.9
295	H-142	70.57
296	H-143	80.12
297	H-144	66.49
298	H-145	216.71
299	H-146	48.57
300	H-147	71.99
301	H-148	89.57
302	H-149	83.18
303	H-15	144.22
304	H-150	40.47
305	H-151	32.75
306	H-152	134.47
307	H-153	96.9
308	H-154	166.06
309	H-155	107.36
310	H-156	326.73
311	H-157	215.24
312	H-158	165.21
313	H-159	58.11
314	H-16	151.91
315	H-160	123.55
316	H-161	108.36
317	H-162	226.34
318	H-163	90.59
319	H-164	136.51
320	H-165	115.42
321	H-166	146.06
322	H-167	26.37
323	H-168	86.92
324	H-169	70.29
325	H-17	159.94
326	H-170	45.98
327	H-171	44.07
328	H-172	37.78
329	H-173	29.03
330	H-174	26.98
331	H-175	27.03
333	H-177	53.59
334	H-178	136.74
335	H-18	152.21
336	H-180	153.4
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

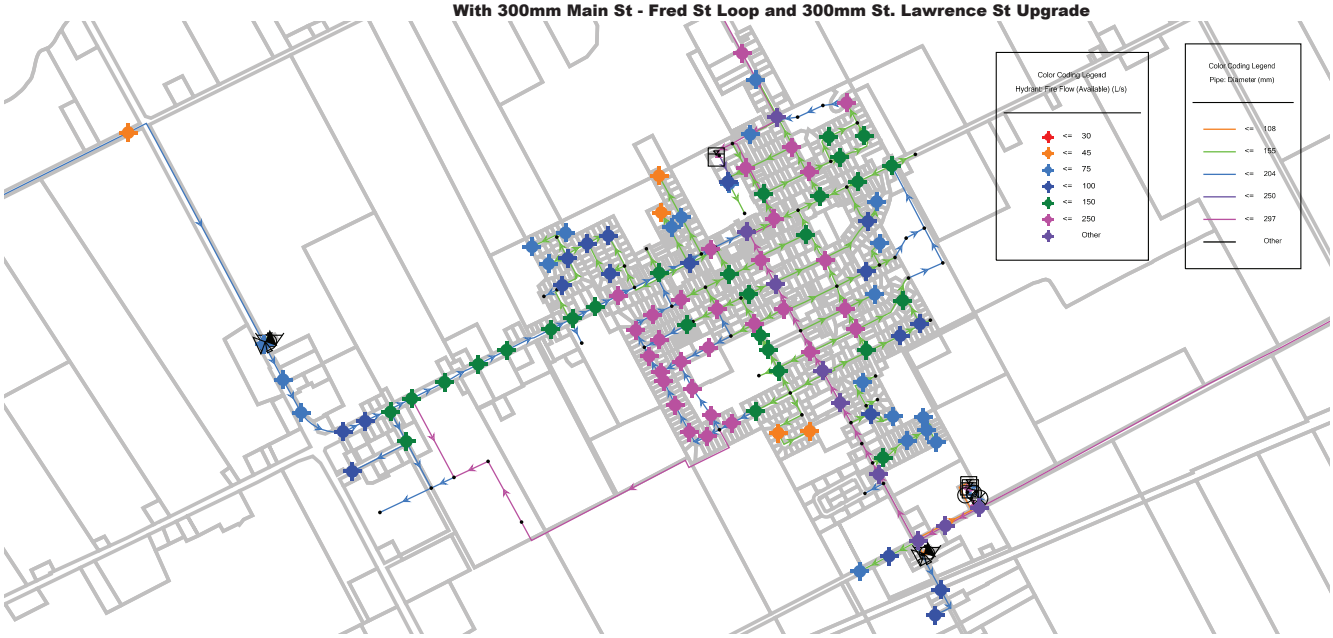
North Dundas Hydraulic Water Model
Near Term (1-5 Year) Maximum Day Demand + Fire Flow - Chesterville
With 300mm Main St - Fred St Loop

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



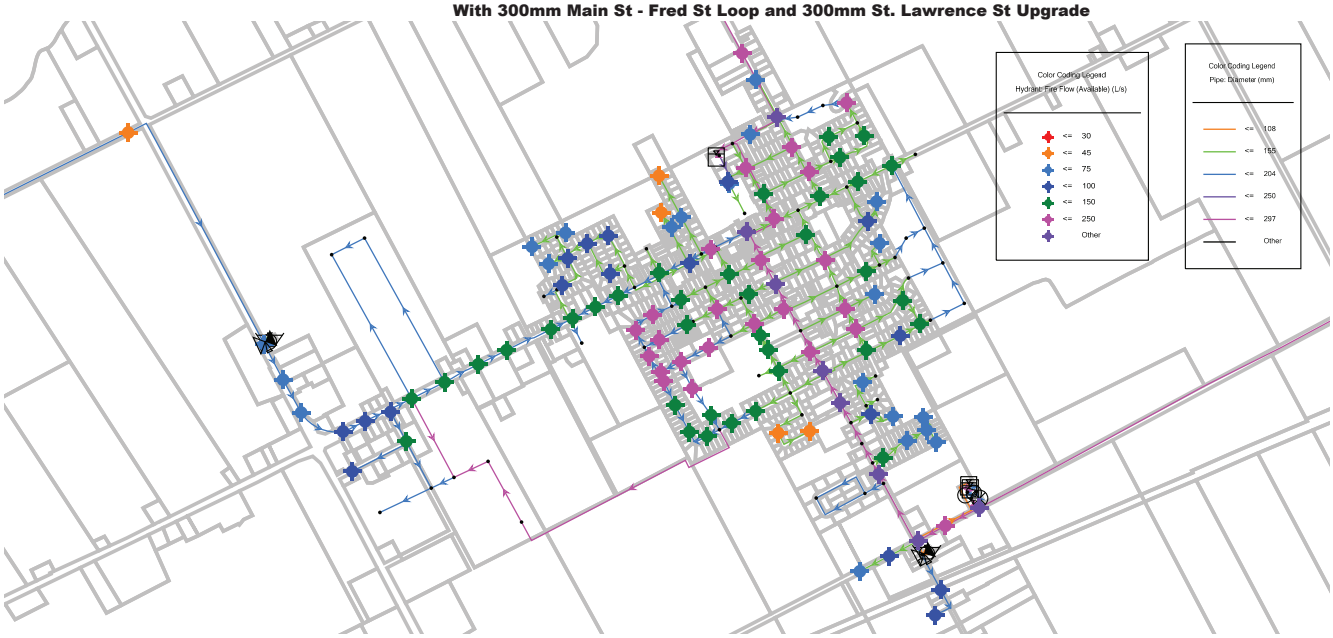
North Dundas Hydraulic Water Model
Mid Term (5-10 Year) Maximum Day Demand + Fire Flow - Chesterville
With 300mm Main St - Fred St Loop and 300mm St. Lawrence St Upgrade

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

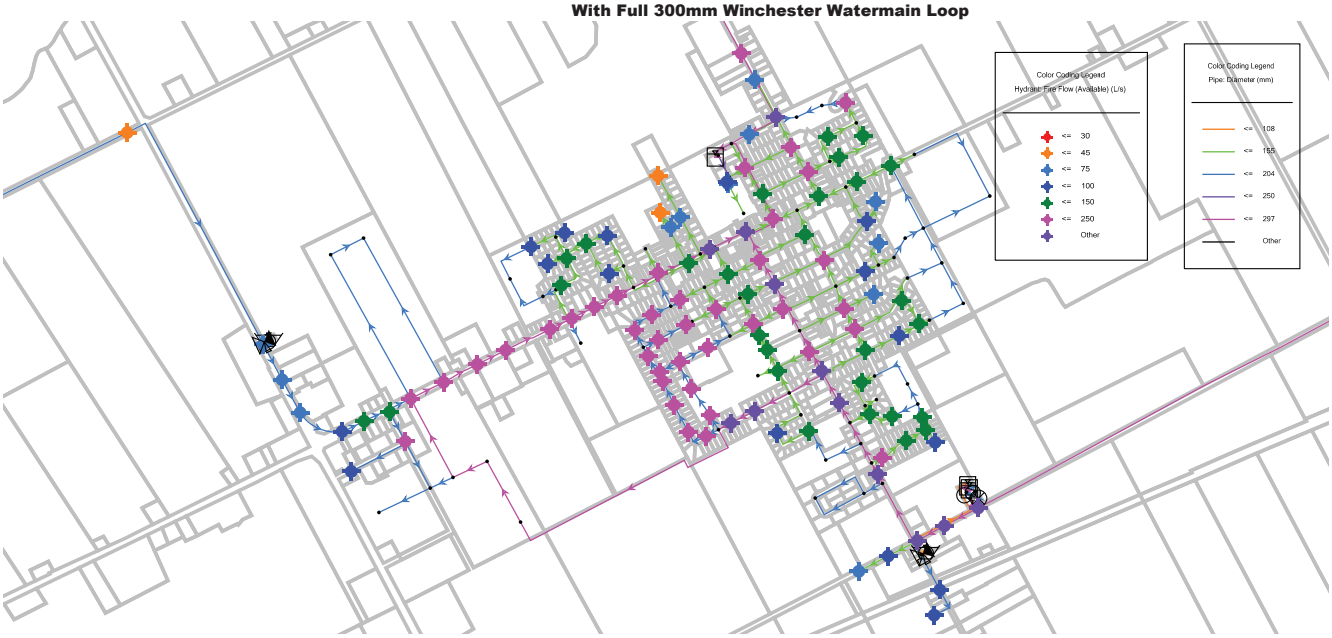
BUILD OUT		
ID	Label	Fire Flow
390	H-29	148.42
391	H-3	76.3
392	H-30	152.62
393	H-31	58.79
394	H-32	134.24
395	H-33	151.46
396	H-34	180.56
397	H-35	100.71
398	H-36	49.4
399	H-37	268.05
400	H-38	297.94
401	H-39	77.37
402	H-4	54.53
403	H-40	139.57
404	H-41	212.36
405	H-42	141.2
406	H-43	47.63
407	H-44	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

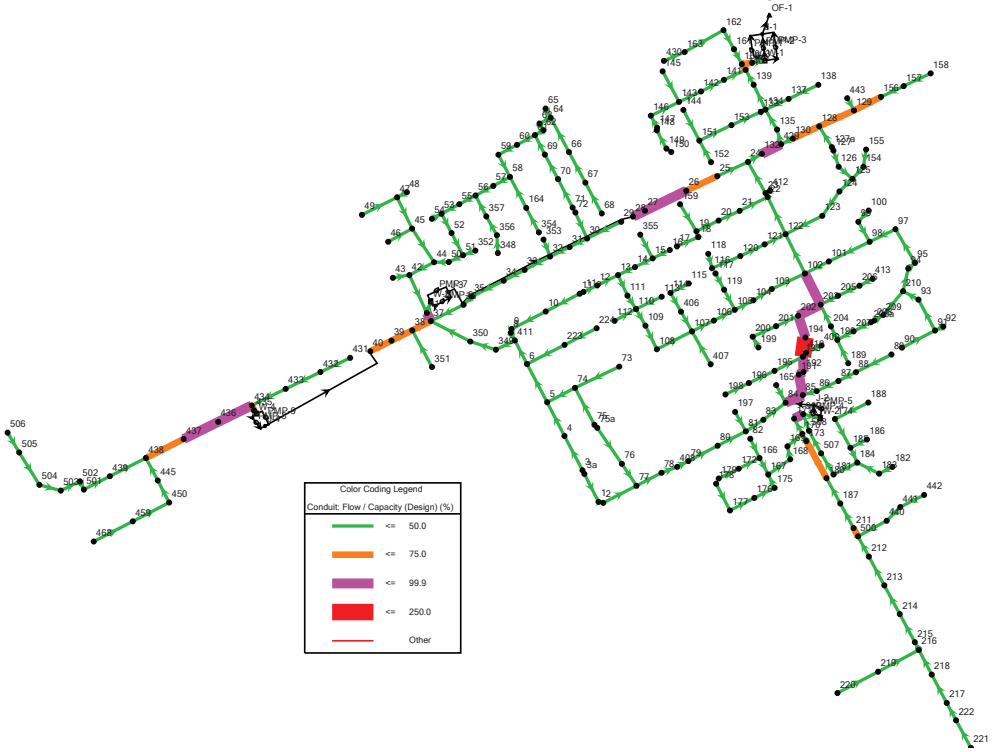
Active Scenario: WWF Option 1 10yr

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

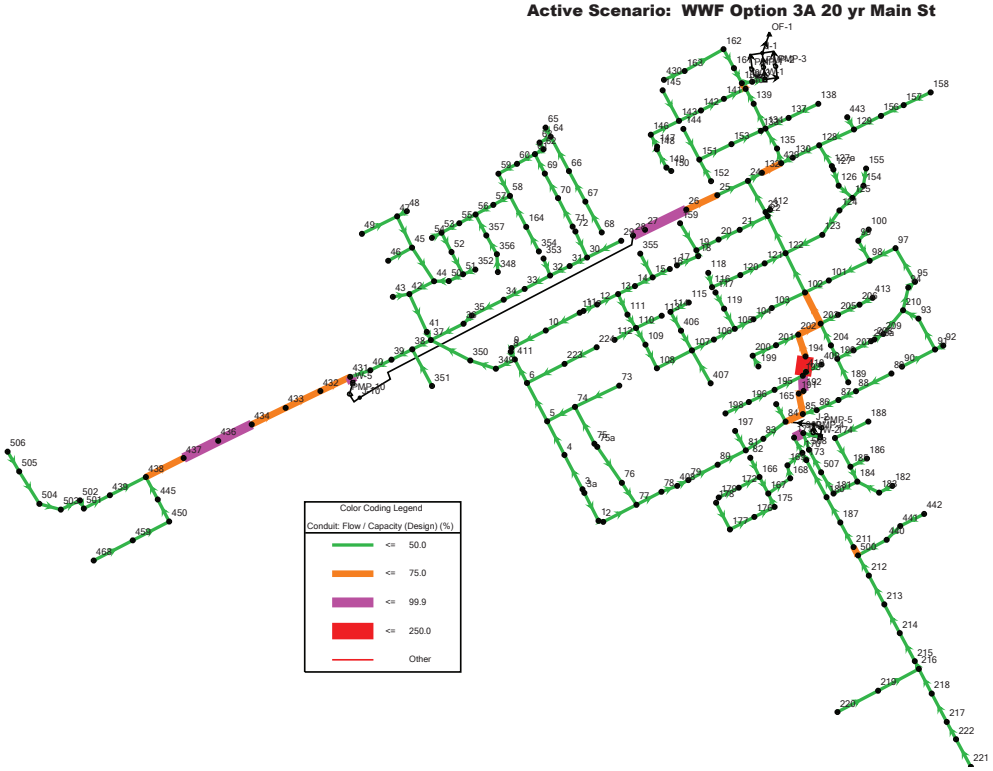
Active Scenario: WWF Option 3A 5 yr Main St

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

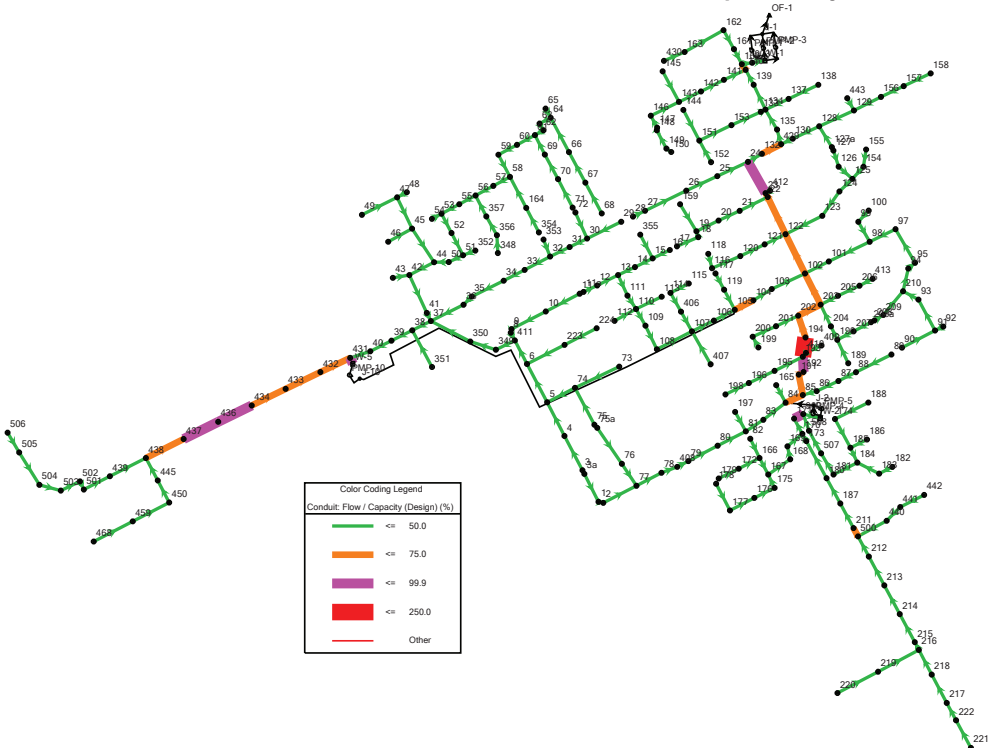
Active Scenario: WWF Option 3B 5 yr Clarence St

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