

Phase 1 Report

North Grenville Water and Wastewater Master Plan

5.5 Wastewater Model

The following section provides an assessment of the capacity of Curry Street sanitary sewer and two (2) of the three (3) syphons crossing under Kemptville Creek. One of the syphons in the following assessment conveys sanitary flow from Vista Crescent to Curry Street and the second syphon conveys sanitary flow from Jack Street to Curry Street. There was no data provided such as slope(s) or the upstream invert and top of grate for the third syphon crossing under Kemptville Creek which conveys sanitary flows from Water Street to Barnes Street (located at SAMHA-0018 per QGIS labelling).

Standard design parameters have been used to develop peak theoretical sanitary sewage flows for the Municipality's sanitary sewer analysis completed in the sanitary sewer design sheet. The design parameters have been used to represent theoretical peak flows that may or may not be reflective of the actual flow being generated within a given catchment area. The actual flow generation will vary with population demographics; type of Industrial, Commercial, Institutional (ICI) establishments; ground conditions, groundwater table elevation; construction practices, sewer condition and other factors. We recommend the Municipality complete sewer flow monitoring to verify the design parameters are representative of actual system operation and to refine the sanitary sewer and syphon analysis contained in this Master Plan.

5.5.1 Standard Design Parameters

The standard peak flow design parameters are used for the design of new sewers and pumping stations. They provide a set of conditions to conservatively estimate theoretical peak sewer flow with a factor of safety to account for a certain degree of system degradation over time. Within the Municipality, the MECP Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under an Environmental Compliance Approval (May 31, 2023) and North Grenville Engineering Standards for Design, Approval, and Construction (August 2022) have been used to develop parameters for the design flows and are summarized below:

- Residential Average Flow: 300 L/c/day*
- ICI Average Flow: 28,000 L/ha/day
- Peaking Factor (Residential): Harmon Equation ($2.0 < P.F. < 4.0$)
- Harmon Correction Factor 0.8
- ICI Peak Factor: 1.5
- Inflow and Infiltration (I&I) 0.28 L/s/ha

Note: L/c/day = Liters per capita per day
ha = gross hectare

* = per North Grenville Engineering Standards for Design, Approval, and Construction (August 2022)

5.5.2 Wastewater Model Set-Up

An excel spreadsheet model of the existing, short-term, mid-term, long-term, and build-out conditions of the sanitary sewer system for the Municipality was developed using a Sanitary Design Sheet. Under existing conditions, the extent of the existing network was confirmed by

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cross-referencing parcels with the catchment areas and the land use data supplied by the Municipality in the format of shape files, which were opened in QGIS. Using QGIS, the parcels within each relevant catchment area were intersected with the land use data to indicate the type of land usage (i.e., residential, ICI, and park space) on each parcel. Given the land usage, the residential population and density, ICI, and inflow and infiltration (I&I) areas were assigned accordingly, and total population and areas were calculated for each catchment area. For all future conditions, the residential density, ICI, and I&I areas were manually inserted in the Sanitary Design Sheet per the growth projections outlined in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (March 13, 2025). The resulting sanitary sewer spreadsheet model is attached in Appendix C. The model was constructed as described below.

The Municipality provided GIS data that was used to assess the capacity of the Curry Street sanitary sewer and the two (2) syphons. This data consisted of seven (7) catchment areas, however, only five (5) catchment areas labelled Nos. 1 to 5, were included as they were the only ones that are tributary to Curry Street. The catchment areas in the received GIS data were slightly adjusted to ensure that there is no overlap or double counting of the drainage areas to prevent overestimating the system flows and to ensure all nearby parcels are properly accounted for in each catchment area. Catchment areas were adjusted based on lot parcels and proximity of sanitary manholes. All the catchment areas within North Grenville are shown in Appendix C. It is recommended to refine the sewer assessment, and the Municipality review the catchment area boundaries are representative of installed sewer locations and drainage area divides.

Sanitary sewer data such as length, diameter, top of grate, and invert elevations were obtained from the shape data provided by the Municipality. However, some data gaps were identified in the physical attributes of the system. In instances where this information was missing including the slopes, drawings, and markups were provided by the Municipality to complete data gaps in the sewer system.

As confirmed by the Municipality (dated March 26, 2025), the slope of the Jack Street Syphon was assumed to be an average slope of 1.05%. Refer to Appendix C for email correspondence. Typically, syphons consist of two (2) slopes; as it slopes down under the creek (or waterbody) and then slopes back up to the land. However, given that this information was not available at the Jack Street Syphon, an overall slope was used to represent the average of the two (2) typical syphon slopes.

5.5.3 Theoretical Sewage Generation

The Municipality's sanitary sewer system primarily services residential development, but also some commercial and institutional developments and industrial areas under existing, short-term, mid-term, long-term, and build-out conditions.

5.5.3.1 Residential Development

The residential density assumption was obtained from the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025). The Report provided a breakdown of existing serviced units and population for residential land use within the Municipality for existing and future growth conditions including short-term (0-5 years) from 2026 to 2031, mid-term (5-10 years) from 2031 to 2036, long-term (10-20 years) from 2036

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to 2046, and build-out (20+ years) from 2046 for the sanitary sewer capacity assessment of Curry Street and the two (2) of the three (3) syphons.

In developing the Sanitary Design Sheet, the flows were calculated based on the population and ICI and I&I areas. The unit types were identified spatially to each catchment area. For all residential sanitary flows in existing conditions, a unit density of 2.35 person/unit was assumed given the unknown unit types on each residential parcel of land within the five (5) catchment areas that are tributary to Curry Street (including the syphons). For short-term, mid-term, long-term, and build-out growth scenarios, the table below lists the density associated with each residential unit based on the assumptions from the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025).

Table 26: Residential Design Parameters

Unit Type	Density
Single Home Density	3.4 person/unit
Townhouse/Semi-Detached Home Density	2.7 person/unit
Unknown Residential Home	2.35 person/unit
Apartment Unit	2.0 person/unit

The flow generation parameter applied to these spatially weighted populations for the analysis was 300 L/cap/day per the North Grenville Engineering Standards for Design, Approval, and Construction (August 2022). The Harmon peaking equation (adjusted for Operational Parameters, using K = 0.8) was used to estimate peak sewage generation rates, consistent with the MECP Design Criteria (May 31, 2023). Below are the calculations for the Residential Harmon peaking factor equation per MECP Design Criteria (May 31, 2023).

$$P.F. = 1 + \frac{14}{4 + \left(\frac{P}{1000}\right)^{\frac{1}{2}}} * K$$

where:

- P.F.: Peaking Factor
- K.: Correction Factor = 0.8
- P: Population

5.5.3.2 Industrial, Commercial, and Institutional (ICI) Lands

Per the MECP Design Criteria (May 31, 2023), the peak flow generation parameters specify a value of 28,000 L/ha/day to estimate average flow generation rates for commercial, institutional type developments. This value is generally reserved for new or existing type developments at a Master Plan level of detail rather than specifics depending on the development type, number of employees, number of fixtures, etc.

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A peaking factor of 1.5 times the average flow was used for ICI developments per MECP Design Criteria (May 31, 2023).

Similar to the residential development under existing conditions, the ICI areas were obtained by intersecting the land use with the catchment area data provided by the Municipality using QGIS. Please refer to Appendix C for the data. The total number of ICI areas per catchment area flowing into the Curry Street sewer was added to the Sanitary Design Sheet. Under short-term, mid-term, long-term, and build-out conditions, ICI areas we added manually per the growth projections outlined in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025). A sanitary peak flow of 10.8 L/s was provided for the Future Provincial Correctional Facility under Short-Term conditions. This flow was manually added to the Peak Design Flow for Catchment Area #3 (Syphon) in the Sanitary Design Sheet.

5.5.3.3 Extraneous Flows

Sanitary sewers must be designed to convey waste discharges (the user generated flow), as well as extraneous, non-waste flow components, such as groundwater infiltration and inflow of surface runoff. Excessive extraneous flows can limit the capacity of existing sewer systems to serve expanding growth. They can also result in sewer backups, basement flooding, and increased operation and maintenance costs for pumping and treatment facilities. Conversely, successful control of extraneous flows can increase or maintain the life expectancy of the infrastructure and free available capacity for expansion and development.

The extraneous flow design allowance is added to the peak theoretical consumption flow, to yield the total theoretical peak flow that the sewer must be designed to convey. Per the MECP Design Criteria (May 31, 2023), a general allowance of 0.28 L/s/ha was used for the Municipality to calculate the extraneous flow component of the total flow, irrespective of the land use classification, sewer construction or soil type.

The tables below summarize the total residential population, ICI area, and inflow and infiltration (I&I) area also known as extraneous flows for all five (5) catchment areas which contribute flow to Curry Street under existing, short-term, mid-term, long-term, and build-out conditions. Please refer to Appendix C for the detailed calculations. As mentioned above, the future population, unit densities, and ICI areas were based on the growth projections outlined in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (March 13, 2025).

Table 27: Catchment Area Summary under Existing Conditions

Catchment Area Number	Total Residential Population	Total ICI Area (ha)	Total I&I Area (ha)
1	1504	25.8	88.3
2	691	8.2	25.9
3	557	13.9	53.1
4	764	12.1	101.4
5	489	11.4	63.6

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Table 28: Catchment Area Summary under Short-Term Conditions

Catchment Area Number	Residential Population Growth	ICI Area (ha)	I&I Area (ha)
3	478	21.4	24.1
4	319	3.9	6.7

Table 29: Catchment Area Summary under Mid-Term Conditions

Catchment Area Number	Residential Population Growth	ICI Area (ha)	I&I Area (ha)
1	196	N/A	2.1
3	298	N/A	1.1
4	166	N/A	1.6
5	347	4.6	9.8

Table 30: Catchment Area Summary under Long-Term Conditions

Catchment Area Number	Residential Population Growth	ICI Area (ha)	I&I Area (ha)
1	72	1.5	2.1
2	85	N/A	1.1
3	N/A	0.5	0.5
5	1349	N/A	12.9

Table 31: Catchment Area Summary under Build-Out Conditions

Catchment Area Number	Residential Population Growth	ICI Area (ha)	I&I Area (ha)
4	145	N/A	1.8
5	230	N/A	2.9

5.5.4 Sanitary Sewer Model Analysis

The theoretical sewer capacity and corresponding flow velocity were computed using Mannings Equation. The key variables in Mannings equation are sewer diameter, slope, and Mannings Roughness Coefficient (n). A roughness coefficient of 0.013 was assumed for all sewers in the Sanitary Design Sheet.

The residual capacity is defined as the theoretical sewer capacity minus the peak design flow for a given sewer segment. If the residual capacity is positive, then there is sufficient capacity in the existing sewer to accommodate expected peak design flow. However, if the residual capacity is negative, the sewer is considered to operate under 'surcharged' conditions during peak flow events.

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5.5.5 Sanitary Sewer Model Results

The model results for Curry Street sanitary sewer and syphons are summarized below. Refer to Appendix C for further details.

Curry Street Capacity Assessment

Based on the Sanitary Design Sheet, the highest peak design flow within Curry Street under each future growth scenario is listed in the table below.

Table 32: Highest Peak Design Flow per Future Growth Scenario

Future Growth Scenario	Highest Peak Flow (L/s)
Existing	154.86
Short-Term	178.19
Mid-Term	195.02
Long-Term	206.92
Build-Out	212.67

The peak design flows in the Sanitary Design Sheet only accounts for a smaller 'typical wet weather flow contribution'. More intense 'annual' or 'extreme' storm events could generate higher rainfall induced extraneous flows in the system.

Under existing conditions, the Sanitary Design Sheet indicates that most sewers in the system operate between 14% and 72% capacity. All sewers along Curry Street operate below 90% capacity. Thus, it is not anticipated that any upgrades should be recommended under existing conditions.

Under short-term conditions, the Sanitary Design Sheet indicates that most sewers in the system operate between 16% and 85% capacity. All sewers along Curry Street operate below 90% capacity. Thus, it is not anticipated that any upgrades should be recommended under short-term conditions.

Under mid-term conditions, the Sanitary Design Sheet indicates that most sewers in the system operate between 17% and 90% capacity. All sewers along Curry Street operate at or below 90% capacity. Given that sewer sections at the intersection of Curry Street and Parliament Street located between SAMH-10003 to SAMH-10002 (per shape file labels) and between the intersections at James Street and Parliament Street operate at 90% capacity, it is anticipated that upgrades are recommended to these two (2) pipe sections under mid-term conditions.

Under long-term conditions, the Sanitary Design Sheet indicates that most sewers in the system operate between 18% and 91% capacity. All pipes operate below 90% capacity excluding the two (2) sewer sections listed above under mid-term conditions. It is anticipated that the pipe upgrades to be recommended in the mid-term conditions will also account for the increase in flows under long-term conditions.

Similarly, under build-out conditions, the Sanitary Design Sheet indicates that most sewers in the system operate between 19% and 91% capacity. All pipes operate below 90% capacity excluding the two (2) sewer sections listed above under mid-term conditions. It is anticipated that the pipe

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upgrades to be recommended in the mid-term conditions will also account for the increase in flows under long-term and build-out conditions.

Syphon Capacity Assessment

The assessment of two (2) out of three (3) syphons was completed based on the GIS information provided by the Municipality. In the case where QGIS data was unavailable, drawings and markups based on field work were also provided by the Municipality to determine the slopes, inverts, and diameters of the syphons. For the third syphon crossing under the Kemptville Creek from Water Street to Barnes Street, missing data including the slope(s), length, and upstream invert and top of grate are highlight in yellow in the Sanitary Design Sheet (refer to Appendix C) as the assessment for this syphon could not be undertaken at this stage given the lack of information.

Under existing conditions, the syphon conveying sanitary flow from Catchment Area #4 has an average slope of 1.05% as confirmed by the Municipality and drawings provided (refer to Appendix C). The average velocity was calculated to be 1.31 m/s. The velocity is greater than 0.9 m/s, which is in accordance with the MECP Design Criteria (May 31, 2023). Given that the populations increase in each future growth scenario, the velocity of the sanitary flow within the syphon will also increase. Therefore, the syphon will continue to meet MECP Design Criteria (May 31, 2023) under all future growth scenarios as well given that the velocity will always be greater than 0.9 m/s under existing, short-term, mid-term, long-term, and build-out scenarios. The theoretical conveyance capacity of the syphon under all future conditions is below 60%, when considered as a free-flowing pipe at the foregoing average slope.

Under existing conditions, the syphon conveying sanitary flows from Catchment Area #5 has an average slope of 1.31% as per the drawings provided (refer to Appendix C). The average velocity was calculated to be 1.13 m/s. The velocity is greater than 0.9 m/s, which is in accordance with the MECP Design Criteria (May 31, 2023) under existing, short-term, mid-term, long-term, and build-out scenarios. The theoretical conveyance capacity of the syphon under all future conditions is below 80%, when considered as a free-flowing pipe at the foregoing average slope.

Despite the theoretical review, the Municipality has experienced surcharging in the syphons during recent high flow events. During a storm event in April 2023, the Municipality observed surcharging in sewer surcharging at both sides of the Kemptville Creek. Based on recent discussions with the Municipality, it appears that the existing syphons operated at a higher conveyance capacity than the theoretical capacity calculated, with the upstream sanitary flows lower the available capacity within the syphons, resulting in the surcharging.

The MECP Design Criteria (May 31, 2023) recommends there should be at least two (2) redundant syphons with the same pipe diameters and inverts for regular cleaning purposes. For redundant syphons with the same properties, the average syphon velocity would be maintained while the duration of the scouring velocity under average flow is expected to be halved. The Municipality's maintenance procedures are be recommended to be reviewed ensure proper cleaning is maintained

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6.0 Problem & Opportunity Statement

Based on the work completed during the Phase 1 Master Plan process, the following Problem/Opportunity Statement has been developed:

The community of Kemptville in the Municipality of North Grenville is anticipating increased development pressures over the next 20 years. The drinking water system consists of five groundwater wells and six storage reservoirs and one booster pumping station. The wastewater system consists of four pumping stations and a wastewater treatment plant. There is an opportunity through the Master Planning process to review the water and wastewater systems holistically and develop a strategic plan of actions that can be implemented over a logical time period and in a prioritized fashion with the intended goal of addressing future servicing needs and ensuring appropriate performance and reliability of the water and wastewater systems in the 20-year planning horizon.

7.0 Phase 2 Methodology & Next Steps

This Phase 1 report is the culmination of the work completed during Phase 1 of the Master Plan. It is intended that it be used as a reference when working through Phase 2. Phase 2 is intended to identify alternative solutions to the problems/opportunities developed in Phase 1. A high-level assessment will be undertaken, and options will be evaluated based on technical, economic, environmental and other factors.

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8.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for the Municipality of North Grenville's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

This report was prepared for the sole benefit and use of the named client and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited, and anyone intending to rely upon this report is advised to contact J.L. Richards & Associates Limited in order to obtain permission and to ensure that the report is suitable for their purpose.

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Appendix A

Existing and Future Population, Employment and
Land Use Implications and Analysis (J.L. Richards
& Associates Limited, March 13, 2025)

Existing and Future Population, Employment, and Land Use Implications and Analysis

Municipality of North Grenville Servicing Master Plan Update



Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

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Existing and Future Population, Employment, and Land Use Implications and Analysis Servicing Master Plan Update

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

1.0 Introduction

The Municipality of North Grenville (the Municipality) is a small- to mid-sized community comprised of a mix of rural and urban development. Located adjacent to the southern border of the City of Ottawa, the Municipality has experienced tremendous growth over recent years. In fact, it is one of the fastest growing communities in eastern Ontario. Most of the growth is expected to be within the northwest quadrant of the urban area. Due to this elevated growth rate the Municipality is experiencing, the Municipality retained J.L. Richards & Associates Limited (JLR) to update the North Grenville Water and Wastewater Servicing Master Plan, which was originally produced in 2015.

As part of this Master Plan update, JLR is identifying population projections for the zero to five (5) year, five (5) to ten (10) year, ten (10) to twenty (20) year and twenty plus year (20 +) buildout timeframes for the Servicing Master Plan. It should be noted that the Municipality recently had a Long-term Population, Housing and Employment Study (December 2023) completed by KPMG to help inform their upcoming Official Plan Review. Our analysis used the findings from the KPMG report to help calculate the estimated populations to inform the Servicing Master Plan. It is not meant to replace the findings of the KPMG report for Official Plan purposes.

2.0 Settlement Strategy and Census Data

The Municipality has experienced significant growth between 2011 to 2021, at a rate of just over 9% for every five-year period. During this period, the Municipality added an average of 135 new dwelling units each year. The Municipality recently conducted a Long-term Population, Housing and Employment Study (December 2023) which identified the long-term population, housing, and employment projections for the planning horizon of 2046.

Based on the Statistics Canada 2021 Census of Population, the Municipality of North Grenville's population was 17,964 people, while Kemptville [population centre] had a population of 4051 people. The Long-term Population, Housing and Employment Study (December 2023) identified the population of Kemptville as approximately 6,000 people in the urban service area. The discrepancy between the two figures is likely because the geographic area for Kemptville [population centre] does not account for the entirety of the urban serviced area of Kemptville.

According to the Long-term Population, Housing and Employment Study (December 2023), the average household size in the Municipality of North Grenville is 2.5 persons per dwelling unit. However, according to Statistics Canada, the average household size in Kemptville [population centre] is 2.2 persons per dwelling unit. As previously noted, the Kemptville [population centre] does not factor all the lands within the Kemptville urban serviced area, which is likely the source of this discrepancy. Therefore, it is recommended that a conservative population density (per person per dwelling unit) is used to help inform the population projection. It is recommended that the average between the two different North Grenville and Kemptville [population centre] densities (per person per dwelling unit) be used, which is 2.35 persons per dwelling unit.

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

3.0 Residential Infill and Intensification

The Municipality of North Grenville Official Plan (2018) has targeted 20% of growth in areas that are specified in North Grenville’s infill and intensification policies. According to the Long-term Population, Housing and Employment Study (December 2023), in the census-designated place of Kemptville [population centre], the net residential development across all housing types only comprised 18% of the total new housing development in the Municipality. This is slightly below the stated goal of 20%.

According to the study, all development within the Kemptville [population centre] census area between 2016 and 2021 was in the form of higher density housing. It is important to note that most of the new development within the Kemptville urban serviced area is outside of the Kemptville [population centre] census area. Therefore, the information in Table 1 should be used to determine infill and intensification only.

Table 1: Development in Kemptville and the Municipality (2016 to 2021) by Housing Type

Housing Type	Kemptville			Municipality of North Grenville			Kemptville Share (%)
	2016	2021	Five-Year Increase	2016	2021	Five-Year Increase	
Single Detached	1020	1020	0	5355	5790	435	0%
Semi-detached + other detached	185	215	30	275	330	55	55%
Duplex + Row House	270	310	40	395	460	65	62%
Apartment	220	255	35	380	425	45	78%
Total	1695	1800	105	6405	7005	600	18%

The Long-term Population, Housing and Employment Study (December 2023) provided three growth scenarios (low-, medium-, high-growth). They assume 30%, 50%, and 70%, of projected growth, respectively, for the County of Leeds and Grenville. The study noted that Scenario 2 (Medium Growth) is the most likely population growth scenario. It is used to create housing demand projections.

Table 2: Medium Growth Scenario (Municipality, 2023)

Year	Population	Five-Year Growth
2021 ⁽¹⁾	17,964	9.2%
2026	20,845	16%
2031	23,088	10.8%
2036	25,483	10.4%
2041	27,980	9.8%
2046	30,602	9.4%

Table Notes:

(1) 2021 Actual figure from Statistics Canada

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4.0 Projected Demand for New Housing

The Municipality's Official Plan set the following targets for new development:

- Low Density (Approximately 18 units/ha): 68%
- Medium Density (approximately 30 units/ha): 21%
- High Density (approximately 45 units/ha): 11%

These are targets to be met or exceeded, not requirements under the Official Plan.

The Long-term Population, Housing and Employment Study (December 2023) did not use these targets but relied on observed historical trends since 2016. Based on these housing trends, the study predicted there will be a significant shift in the projected housing types. The projected housing shifts are in Table 3.

Table 3: Projected Housing Shifts (2021 to 2046) (Municipality, 2023)

End of Five-Year Period	Total New Dwellings	Single Detached Dwellings	Mid-Density Row house	Low-Rise Apartment
2021 ⁽¹⁾	605	435	120	45
2026	758	506	189	63
2031	848	513	256	79
2036	862	458	314	90
2041	874	388	384	102
2046	958	324	509	125
Total	4,905	2,624	1,772	504

Table Notes:

- (1) 2021 Actual figure from Statistics Canada.

The distribution of each housing typology is summarized as percentages in Table 4.

Table 4: Projected Housing Typology (2021 to 2046) by Percentage (Municipality, 2023)

End of Five-Year Period	Single-detached House (%)	Mid-Density Row House (%)	Low-Rise Apartment (%)
2021 ⁽¹⁾	72%	20%	7%
2026	67%	25%	8%
2031	60%	30%	9%
2036	53%	36%	10%
2041	44%	44%	12%
2046	34%	53%	13%

Table Notes:

- (1) 2021 Actual figure from Statistics Canada.

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5.0 Housing Land Demand

Based on the growth projections in the Long-term Population, Housing and Employment Study (December 2023), a total of 4,905 dwelling units will be required to meet the Municipality’s residential needs. While the Official Plan directs most of the development towards the Kemptville urban serviced areas or the hamlets, it does not specify a target based on settlement boundaries.

The study projected the following assumptions of average gross dwelling units per hectare to be used for new developments.

- Single Detached House 18 units/ha
- Mid-Density Row House 30 units/ha
- Low-Rise Apartments 45 units/ha

At the time the study was written (2023), development had been approved through *Planning Act* applications for approximately 1790 new dwelling units. Of these, 244 were expected to be built by 2024. The projected number of dwelling units required for this five-year period (ending in 2026) was 758. The study provided a three-year projection, identifying a total of 454 new dwelling units required.

If 244 units were expected to be built by 2024, then an additional 210 dwelling units are remaining to be built between 2024 and 2026.

The study provided the following land use projections:

Table 5: Land Use Projections (2026 to 2046) (Municipality of North Grenville, 2023)

End of Five-Year Period	Area (ha)				Cumulative Land
	Single Detached	Mid-Density	Apartment	Total Land	
2026	28.1	6.3	1.4	35.8	35.8
2031	28.5	8.5	1.8	38.8	74.6
2036	25.4	10.5	2.0	37.9	112.5
2041	21.6	12.8	2.3	36.6	149.1
2046	18.0	17.0	2.8	37.7	186.9
Total	121.6	55.1	10.2	186.0	186.9

The Municipality of North Grenville provided building permit information for the years spanning 2016 through 2021, including the housing typology. The following tables provide a breakdown of these numbers.

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Table 6: Historical Building Permits for Single Detached Dwellings (2016 to 2021)

Year	Urban	Rural	Total % Urban
2016	84	33	72
2017	76	51	60
2018	110	43	72
2019	36	38	49
2020	96	41	70
2021	74	63	54
Total	476	269	64 (average)

Based on the building permit information received from the Municipality, the Municipality averaged 79 building permits for Single Detached Dwellings per year, from 2016 through 2021.

Table 7: Historical Building Permits for Mid-Density Row Houses (2016 to 2021)

Year	Urban	Rural	Total % Urban
2016	23	0	100
2017	37	0	100
2018	13	0	100
2019	3	0	100
2020	20	0	100
2021	42	0	100
Total	138	0	100

Based on the building permit information received from the Municipality, the Municipality averaged 23 building permits for Mid-Density Row Housing per year, from 2016 through 2021.

Table 8: Historical Building Permits for Apartments (2016 to 2021)

Year	Urban	Rural	Total % Urban
2016	7	0	100
2017	1	2	33
2018	22	0	100
2019	0	0	0
2020	0	0	0
2021	18	4	82
Total	48	6	89 (average)

Based on the building permit information received from the Municipality, the Municipality averaged eight building permits for apartment units per year, from 2016 through 2021.

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6.0 Urban Serviced Greenfield Development & Re-development Outside the Kemptville [population centre] Census Area

The Long-term Population, Housing and Employment Study (December 2023) provided the number of dwelling units by housing type which was added to the Kemptville [population centre] census area for the years of 2016 through 2021. This information was used in the report to determine how the Municipality was meeting its infill/intensification targets of the Official Plan. However, it did not provide information on the greenfield development, or redevelopment occurring outside of the Kemptville [population centre] census area, which includes a significant portion of the urban service boundary and is where most of the urban serviced growth has occurred.

To better understand how much development has occurred, by housing type, through Greenfield development and redevelopment within the urban serviced areas outside the Kemptville [population centre] census area, the total number of dwelling units by housing type for the Kemptville [population centre] census area were subtracted from the overall urban serviced building permit data provided by the Municipality.

6.1 Single Detached Dwellings

There were no single detached dwellings identified in the Kemptville [population centre] census area. Therefore, all the 476 single detached dwelling building permits for the urban serviced area occurred outside the Kemptville [population centre] census area. This averages to approximately 79 single detached dwellings a year, between 2016 through 2021.

6.2 Mid-Density Row Housing

According to the Long-term Population, Housing and Employment Study (December 2023), the Kemptville [population centre] census area had a total of 70 new mid-density row housing. The entire serviced area had a total of 138 building permits issued for mid-density row housing between 2016 and 2021.

$$138 - 70 = 68 \text{ Total Mid-Density Row Housing}$$

A total of 68 mid-density row housing dwelling units were added to the urban serviced area outside the Kemptville [population centre] census area from 2016 through 2021. These units can be attributed to greenfield development and redevelopment of existing sites. This averages to approximately 11 mid-density row housing dwelling units per year for that five-year span.

6.3 Apartment Dwelling Units

According to the Long-term Population, Housing and Employment Study (December 2023), the Kemptville [population centre] had a total of 35 new apartment dwelling units, while the entire serviced area had a total of 48 building permits issued for mid-density row housing.

$$48 - 35 = 13 \text{ Total Apartments}$$

A total of 13 apartment dwelling units were added to the urban serviced area outside the Kemptville [population centre] census area between 2016 through 2021. These units can be attributed to greenfield

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development and redevelopment of existing sites. This averages to approximately two apartment dwelling units per year for that five-year span.

Using the information above, a percentage of housing typology can be derived for both the Kemptville [population centre] census area and the remaining urban serviced area, assumed to be greenfield development and redevelopment of existing sites.

Table 9: Housing Typology Distribution by Service Area

Housing Typology	Kemptville [population centre] five-year change	Other Urban Serviced Areas five-year change	Total of Housing Typology in Other Urban Serviced Areas (%)
Single Detached Dwelling Units	0	476	100
Mid-Density Row Housing	70	68	49
Apartments	35	13	27

7.0 Population Analysis

To provide a more accurate understanding of the projected population, particularly for infill/intensification (Kemptville [population centre] census area) and greenfield/redevelopment (outside the Kemptville [population centre] census area), the existing numbers (Municipality of North Grenville) must be broken down to determine how much housing typology can be expected within the urban serviced area.

This can be achieved through multiplying the total housing typology numbers projected for the five-year intervals provided in the Long-term Population, Housing and Employment Study (December 2023), by the observed urban housing typology percentages from 2016 to 2021 for the urban serviced area. This results in a projected total number of units required in the urban serviced area, based on observed percentages.

7.1 Single Detached Dwellings

Table 10: Single Detached Dwelling Required in the Urban Serviced Area (2026 to 2046)

Five-Year Period Ending	Total Dwelling Units	Percent of Single Detached Dwellings in the Urban Serviced Area (2016 to 2021)	Total Units Required in the Urban Serviced Area
2026	506	64%	324
2031	513		328
2036	458		293
2041	388		248
2046	324		207

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7.2 Mid-Density Row Housing

For the Mid-Density Row Housing, the observed percentage of this housing typology within the Urban Serviced area is 100%. Therefore, the number of dwelling units for each five-year interval remains the same as those projected in the Long-term Population, Housing and Employment Study (December 2023). These numbers are:

Table 11: Mid-Density Row Housing Required in the Urban Serviced Area (2026 to 2046)

Five-Year Period Ending	Total Dwelling Units Required in the Urban Serviced Area
2026	189
2031	256
2036	314
2041	384
2046	509

7.3 Apartment Dwelling

Table 12: Apartment Dwelling Units Required in the Urban Serviced Area (2026 to 2046)

Five-Year Period Ending	Total Dwelling Units	Percent of Apartment Units in the Urban Serviced Area (2016 to 2021)	Total Units Required in the Urban Serviced Area
2026	63	89%	56
2031	79		70
2036	90		80
2041	102		91
2046	125		111

7.4 Housing Typology Distribution

After determining the dwelling units required for each housing typology in the urban serviced area for each five-year interval, the distribution of each housing typology within Kemptville [population centre] census area and the other urban serviced areas can be determined. This can be achieved through multiplying the total number of each housing typology total units required (urban serviced area) by the observed percentages in housing typologies from 2016 to 2021 in Table 9.

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Table 13: Number of Single Detached Dwelling Units Required (2026 to 2046)

Five-year Ending	Total Dwellings Units Required (Other Urban Serviced Areas)
2026	324
2031	328
2036	293
2041	248
2046	207

As seen in Table 9 for single detached dwellings, all units (100%) within the urban serviced area were entirely outside the Kemptville [population centre] census area.

Table 14: Number and Distribution of Mid-Density Row Housing Units Required (2026 to 2046)

Five-year Ending	Total Dwelling Units Required	Housing Typology (%)		Total Dwelling Units Required	
		in Kemptville [population centre]	in Other Urban Serviced Areas	in Kemptville [population centre]	in Other Urban Serviced Areas
2026	189	51	49	96	93
2031	256	51	49	131	125
2036	314	51	49	160	154
2041	384	51	49	196	188
2046	509	51	49	260	249

Table 15: Number and Distribution of Low Rise Apartment Units Required (2026 to 2046)

Five-year Ending	Total Dwelling Units Required	Housing Typology (%)		Total Dwelling Units Required	
		in Kemptville [population centre]	in Other Urban Serviced Areas	in Kemptville [population centre]	in Other Urban Serviced Areas
2026	56	73	27	41	15
2031	70	73	27	51	19
2036	80	73	27	58	22
2041	91	73	27	66	25
2046	111	73	27	81	30

Using the numbers derived from the total number of dwelling units required for the Kemptville [population centre] census area and for other urban serviced areas, a total hectare for each area can be calculated using the projected assumptions of average gross dwelling unit per hectare to be used for new

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developments cited in the Long-term Population, Housing and Employment Study (December 2023). This can be done by dividing the total number of dwelling units by the average gross dwelling unit per hectare for each housing typology.

For the single detached dwellings, 18 units/ha was used.

Table 16: Number of Single Detached Dwelling Units and Land Required by Serviced Area Type (2026 to 2046)

Five-year Ending	Total Dwelling Units Required		Total Hectares Required		
	In Kemptville [population centre]	in Other Urban Serviced Areas	In Kemptville [population centre]	In Other Urban Serviced Areas	for entire Urban Serviced Area
2026	0	324	0	18	18
2031	0	328	0	18.2	18.2
2036	0	293	0	16.3	16.3
2041	0	248	0	13.8	13.8
2046	0	207	0	11.5	11.5
Total	0	1400	0	77.8	77.8

For Mid-Density Row Housing, 30 units/ha was used.

Table 17: Number of Mid-Density Row Housing Units and Land Required by Serviced Area Type (2026 to 2046)

Five-year Ending	Total Dwelling Units Required		Total Hectares Required		
	In Kemptville [population centre]	in Other Urban Serviced Areas	In Kemptville [population centre]	In Other Urban Serviced Areas	for entire Urban Serviced Area
2026	96	93	3.2	3.1	6.3
2031	131	125	4.4	4.2	8.6
2036	160	154	5.3	5.1	10.4
2041	196	188	6.5	6.3	12.8
2046	260	249	8.7	8.3	17
Total	843	809	28.1	27	55.1

For Low Rise Apartments, 45 units/ha was used.

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Table 18: Number of Low Rise Apartment Units and Land Required by Serviced Area Type (2026 to 2046)

Five-year Ending	Total Dwelling Units Required		Total Hectares Required		
	In Kemptville [population centre]	in Other Urban Serviced Areas	In Kemptville [population centre]	In Other Urban Serviced Areas	for entire Urban Serviced Area
2026	41	15	0.9	0.3	1.2
2031	51	19	1.1	0.4	1.5
2036	58	22	1.3	0.5	1.8
2041	66	25	1.5	0.6	2.1
2046	81	30	1.8	0.7	2.5
Total	298	111	6.6	2.5	9.1

8.0 Projected Population

8.1 Residential Population Projections

For land holdings where the mix of housing typologies proposed or approved was known, the Municipality has requested that we use the per person per units identified in the Municipality of North Grenville Engineering Standards for Design, Approval, and Construction, Section D, D2.05 for Domestic Demand which is as follows:

- Single Detached Dwellings = 3.4 person/unit
- Semi-Detached Dwellings = 2.7 person/unit
- Townhouse = 2.7 person/unit
- Apartments = 2 person/unit

JLR has also applied these per person per units to each typology for the projected population using the KPMG report information to ensure the same per person per unit counts were used for a proper comparison. For all other land holding areas where the housing typologies are not known, to obtain a projected population of the urban serviced area, the total number of dwelling units required is multiplied by the projected person per dwelling unit (2.35) calculated in Section 2.

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Table 19: Projected Population for Single Detached Dwelling Units (2026 to 2046)

Five-year Ending	Total Dwellings Required			Projected Population		
	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Serviced Areas	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Urban Serviced Areas
2026	324	0	324	1102	0	1102
2031	328	0	328	1115	0	1115
2036	293	0	293	996	0	996
2041	248	0	248	843	0	843
2046	207	0	207	704	0	704
Total	1400	0	1400	4760	0	4760

Table 20: Projected Population for Mid-Density Row Housing (2026 to 2046)

Five-year Ending	Total Dwellings Required			Projected Population		
	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Serviced Areas	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Urban Serviced Areas
2026	189	96	93	510	259	251
2031	256	131	125	691	354	338
2036	314	160	154	848	432	416
2041	384	196	188	1037	529	508
2046	509	260	249	1374	702	672
Total	1652	843	809	4460	2276	2184

Table 21: Projected Population for Low Rise Apartments (2026 to 2046)

Five-year Ending	Total Dwellings Required			Projected Population		
	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Serviced Areas	Kemptonville [population centre] and Other Urban Serviced Areas	Kemptonville [population centre]	Other Urban Serviced Areas
2026	57	42	15	114	84	30

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Five-year Ending	Total Dwellings Required			Projected Population		
	Kemptville [population centre] and Other Urban Serviced Areas	Kemptville [population centre]	Other Serviced Areas	Kemptville [population centre] and Other Urban Serviced Areas	Kemptville [population centre]	Other Urban Serviced Areas
2031	70	51	19	140	102	38
2036	80	58	22	160	116	44
2041	91	66	25	182	132	50
2046	111	81	30	222	162	60
Total	409	298	111	818	596	262

The Municipality has provided information on the number of existing dwelling units approved or planned (including the housing typologies) through *Planning Act* applications for all properties in the Town of Kemptville urban serviced area. Based on this information, the number of approved or planned dwelling units can be multiplied by the projected per person per dwelling unit identified in the Municipality of North Grenville Engineering Standards for Design, Approval, and Construction to obtain a projected population for each land holding.

For the purposes of this analysis, all commercial properties which the Municipality had identified as potential conversion to residential has been assigned a total population projection based on residential demands as the residential population projection would yield a higher population projection. All land holding areas (ha) were calculated using the geometry area of the parcel fabric. All land holdings which contained the wetland identified in the Northwest Quadrant by Niblett Environmental, and the floodplain as identified by RVCA has been subtracted from the total land holding area used in any calculations.

8.2 Population Projection (Year Intervals)

Table 22: Population Projection (0 - 5 Years)

Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
1*	154	40		632
3*	100	213	120	1155
7*			48	96
13			63	126
14			48	96

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Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
17			50	100
18			8	16
19			69	138
20			59	118
22		26	26	122
23*		30		81
27			79	158
Total	254	309	570	2838
Total Kempville [population centre]	0	26	402	874
Total Other Urban Serviced Areas	254	283	168	1964

Table Notes:

* Denotes properties outside Kempville [population centre] designated census area

The properties identified as being within the 0-5 year interval can be found in Figure 1.

Table 23: Population Projection (5 - 10 Years)

Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
2*		32	398	882
7*	0	0	168	336
13		28		76

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Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
14			60	120
19			40	80
20			109	218
23*		20		54
27			43	86
47*		92		248
59	2	33	8	112
Total	2	205	826	2212
Total Kempville [population centre]	2	61	260	692
Total Other Urban Serviced Areas	0	144	566	1521

Table Notes:

* Denotes properties outside Kempville [population centre] designated census area

The properties identified as being within the 5-10 year interval can be found in Figure 2.

Table 24: Population Projection (10 - 20 Years)

Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
2*	110	415		1495
10*	306	448	0	2250
15			36	72

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Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
47*	0	89	150	540
Total	416	952	186	4357
Total Kemptville [population centre]	0	0	36	72
Total Other Urban Serviced Areas	416	952	150	4285

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

The properties identified as being within the 10-20 year interval can be found in Figure 3.

Table 25 Population Projection (20 Plus Years)

Map ID	Single Detached	Semi Detached/Townhouse	Apartments	Total Population Projection
10*	152	139		892
Total	152	139		892
Total Kemptville [population centre]	0	0	0	0
Total Other Urban Serviced Areas	152	139	0	175

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

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For the residential land holdings where there were no approved or proposed dwelling units identified, the projected population must be determined. Through discussions with the Municipality, it was determined to use the average number of the following assumed average gross dwelling unit per hectare numbers from the of the Long-term Population, Housing and Employment Study (December 2023). Those numbers were as follows:

- Single Detached House 18 units/ha
- Mid-Density Row House 30 units/ha
- Low-Rise Apartments 45 units/ha

$$18 \text{ units/ha} + 30 \text{ units/ha} + 45 \text{ units/ha} / 3 = 31 \text{ units/ha}$$

Through discussions with the Municipality, it was determined that adding a 10% to the average unit/hectare was desirable in order to account for some potential Additional Residential Units. This results in density of 34 units/ha. This number can be used to calculate the projected population for each residential land holding which does not have approved or proposed dwelling units. This can be done by multiplying the unit per hectare by the size of the land holding to obtain the total dwelling units per property. The total dwelling units per property is then multiplied by 2.35 persons per dwelling unit to obtain the projected population.

There were no vacant residential land holdings for the 0-5 year interval where the housing typology was not known. Therefore, no calculations for this interval were required.

Table 26: Population Projection 5 - 10 Years

Map ID	Land Area (hectare)	Total Potential Dwelling Units (Land Size x 34 units/ha)	Projected Population (Dwelling Units x 2.35 person per unit)
9*	2.6	87	205
44	1.2	42	99
Total	3.8	129	304
Total Kemptville [population centre]	1.2	42	99
Total Other Urban Serviced Areas	2.6	87	205

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

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Table 27: Population Projection 10 - 20 Years

Map ID	Land Area (ha)	Total Dwelling Units (Land size x 34 units/ha)	Projected Population (Dwelling Units x 2.35 persons per unit)
4*	8.0	273	641
6*	11.6	395	928
8*	9.3	318	746
26*	7.4	253	594
30*	17.0	579	1361
47*	2.7	91	214
52*	6.0	358 ⁽¹⁾	841
56	1.1	36	85
58	2.4	81	191
Total	65.6	2384	5602
Total Kemptville [population centre]	3.5	118	276
Total Other Urban Serviced Areas	62.1	2266	5326

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

(1) Calculated using 60 units/ha as provided by the Municipality.

Table 28: Population Projection 20 Plus Years

Map ID	Land Area (ha)	Total Dwelling Units (Land size x 34 units/ha)	Projected Population (Dwelling Units x 2.35 persons per unit)
11	2.5	84	197
12	10.5	356	837
24*	1.8	62	145
34*	2.9	98	230
36*	13.8	468	1099
Total	31.4	1067	2508

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Map ID	Land Area (ha)	Total Dwelling Units (Land size x 34 units/ha)	Projected Population (Dwelling Units x 2.35 persons per unit)
Total Kemptville [population centre]	12.9	440	1034
Total Other Urban Serviced Areas	18.5	627	1474

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

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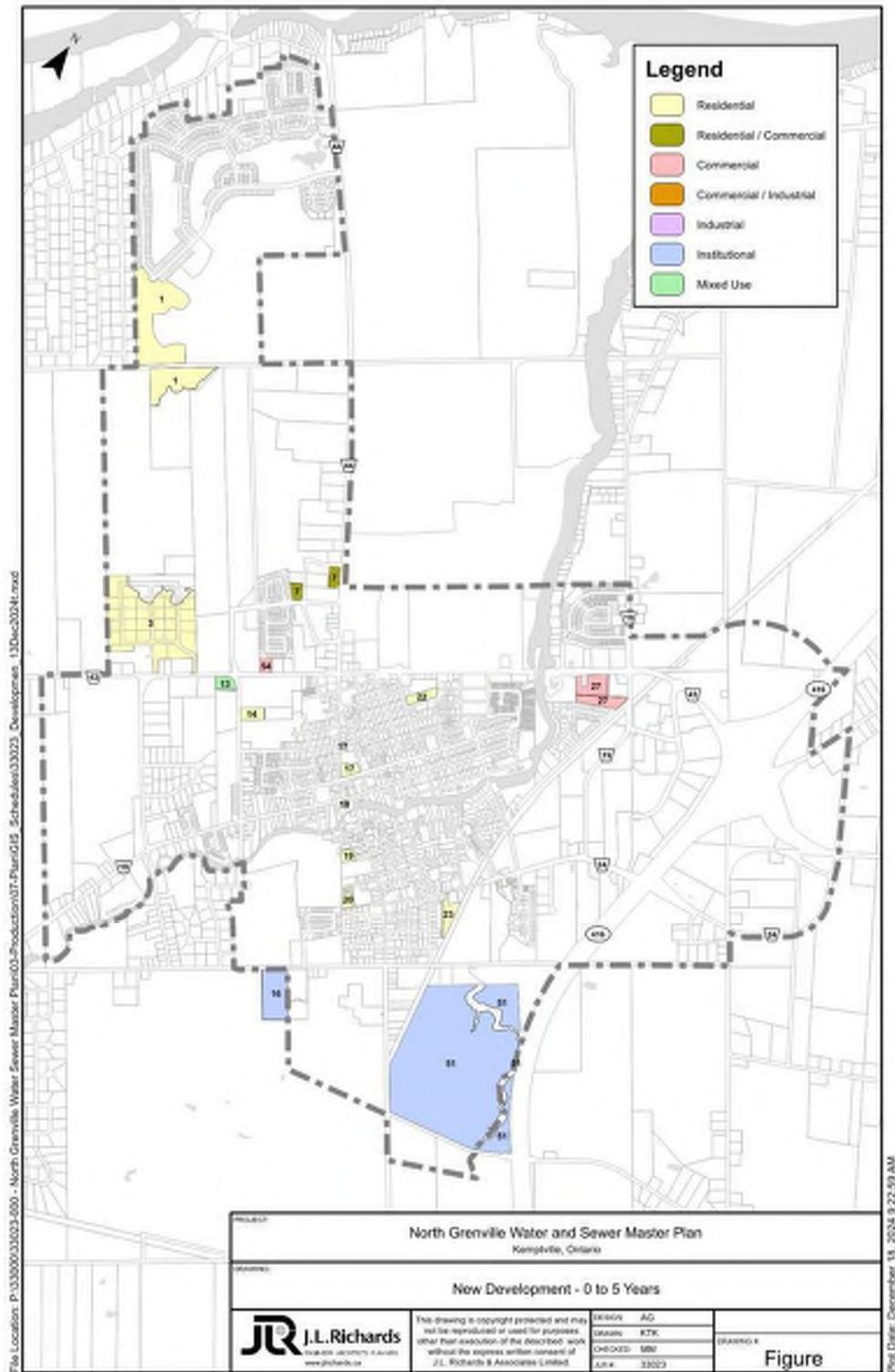


Figure 2: 0-5 Year Land Holdings

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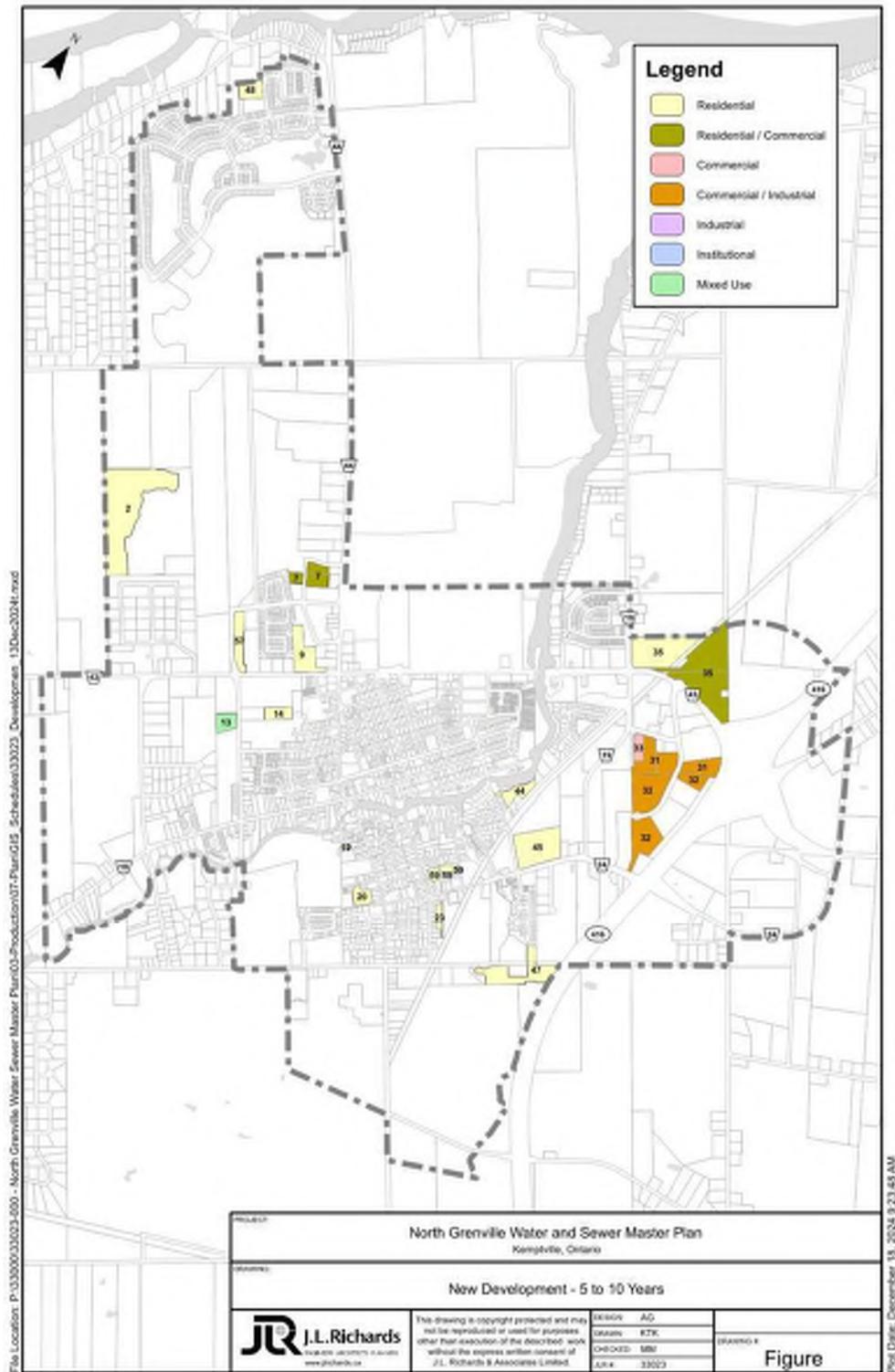


Figure 3: 5-10 Year Land Holdings

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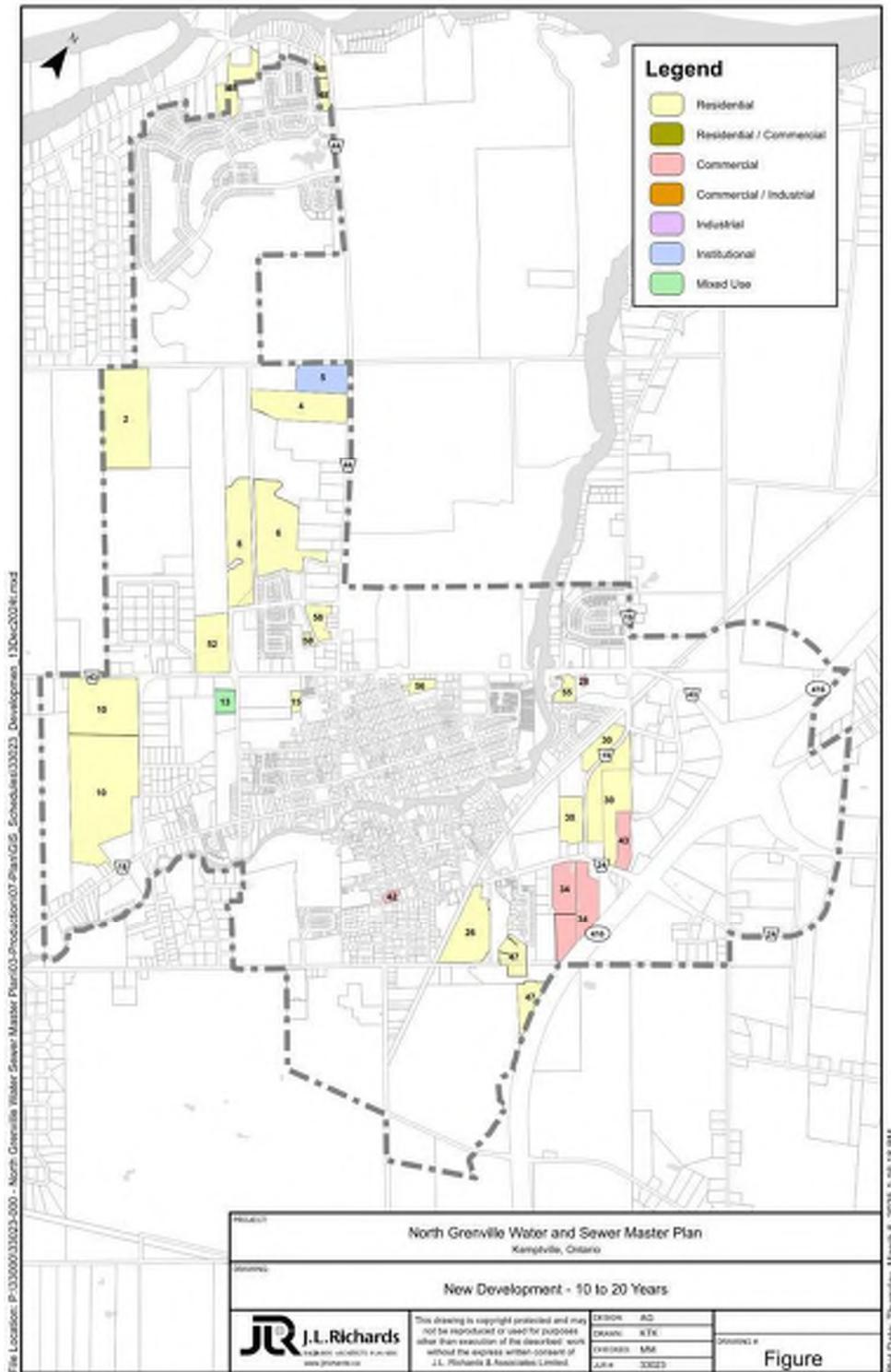


Figure 4: 10-20 Year Land Holdings

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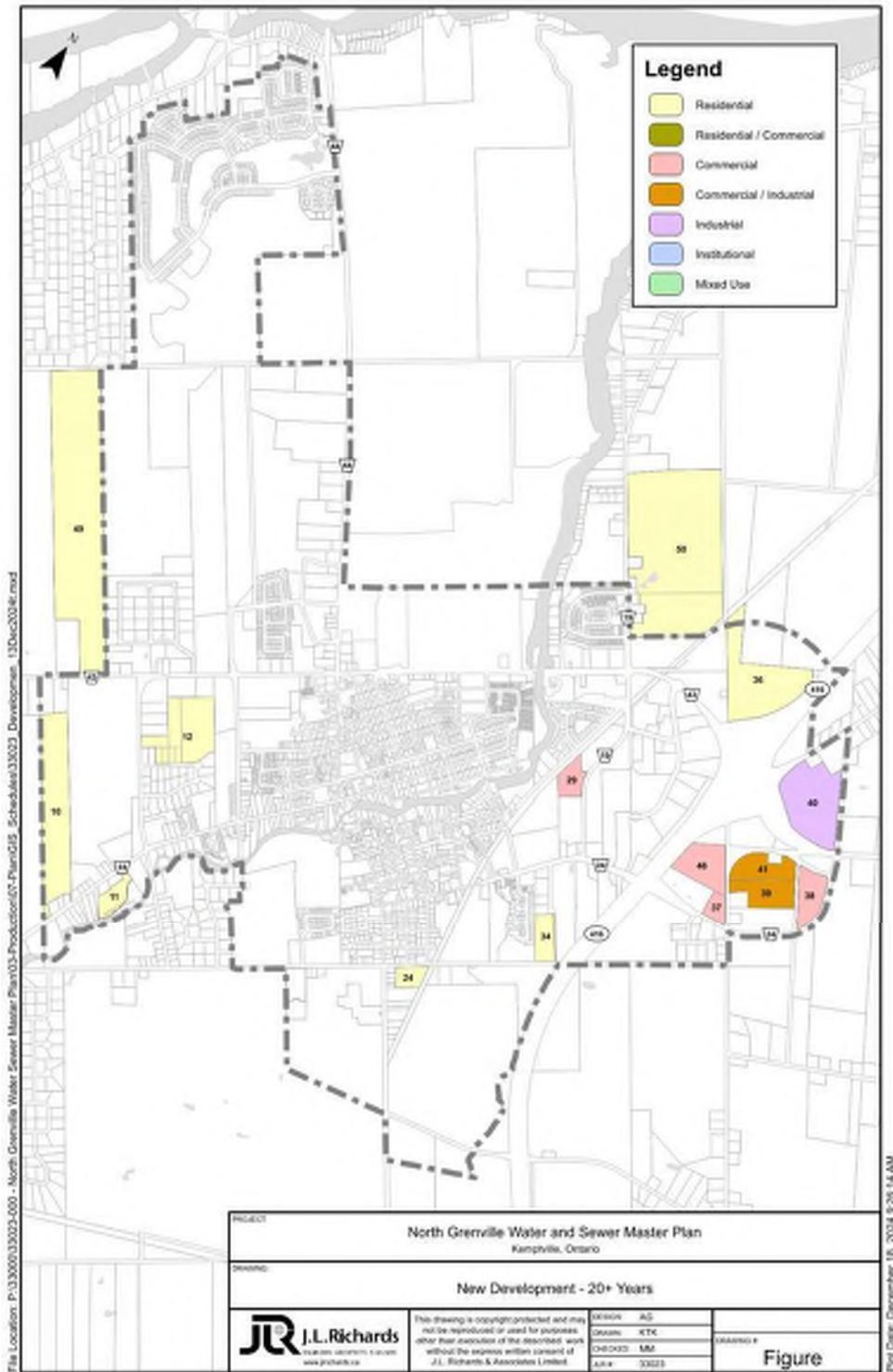


Figure 5: 20 Plus Years

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8.3 Candidate Expansion Areas

Based on information in the Long-term Population, Housing and Employment Study (December 2023) by KPMG, two main expansion candidate areas to the urban boundary were identified. These have been identified by the Municipality as the Western Expansion Area and the Northeast Expansion Lands. The KPMG report had provided an estimate on the capacity of each expansion area based on high density. The following projections were provided:

Western Expansion Area = 1823 potential residential units
Northeast Expansion Area = 1256 potential residential units

A third expansion area was identified by the Municipality as the Northern Expansion Lands. No projected unit count for this area was provided.

Western Expansion Area (MAP ID 49)

Correspondence from the Municipality directly from the planning consultant working on the Western Expansion Area candidate site has indicated that the rough estimate is approximately 1,941 units. While it is understood that this number could change, this number will be used for this analysis. To calculate the total projected population of the Western Expansion Area, the total units proposed is multiplied by the 2.35 persons per units.

$1,941 \times 2.35 = 4,561$ projected population

Northeast Expansion Area (MAP ID 50)

The Northeast Expansion Area boundaries identified by the Municipality differs slightly from the Northeast Expansion Area boundaries by the KPMG report. The area identified by the Municipality provided some additional lands not contemplated by the KPMG report. Therefore, these additional lands need to be added to the total projected units provided by KPMG for the Northeast Expansion Area. Using the high density rate of 45 units per hectare provided by KPMG, the total projected units for the additional lands can be calculated. The total potential residential lands for the additional lands can then be added to the total of potential residential units provided by the KPMG report. The Municipality has identified this expansion area for the 20 plus year interval.

$13.7 \text{ hectares} \times 45 \text{ units/ha} = 617$ potential residential units for the additional lands
 $617 \text{ potential residential units} + 1256 \text{ potential residential units} = 1873$ potential residential units

The Northeast Expansion Area projected population can be calculated using the projected number of dwelling units multiplied by 2.35 person per unit.

$1873 \times 2.35 = 4,402$ projected population (based on high density)

Northern Expansion Area (MAP ID 48)

The Municipality had also provided a third candidate expansion area identified as the Northern Expansion Area. The first phases are predicted to occur within the 5-10 year interval, while the second phases are

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

predicted to occur during the 10-20 year interval. To calculate the projected population for the Northern Expansion Lands, the total size of the land holding is multiplied by the average units per hectare (34 units/hectare). The sum is then multiplied by the 2.35 persons per unit count to calculate the total population projection.

5-10 year interval (Phases)

Total ha: 1.3 ha
 $1.3 \times 34 = 44$ proposed units
 $44 \times 2.35 = 104$ projected population

10-20 year interval (Phases)

Total ha: 5.7 ha
 $5.7 \times 34 = 194$ proposed units
 $194 \times 2.35 = 456$ projected population

8.4 The Future Provincial Correctional Facility (MAP ID 51)

The future Provincial Correctional Facility was identified as being within the 0-5 year interval. The estimated population is 528 people. Information obtained by the Municipality has identified the following preliminary water servicing information:

- AVDY = 3.02
- MXDY = 6.44
- PKHR = 10.34

8.5 Employment Population Projections

The Municipality had provided information on land holdings within the Kemptville urban serviced area including land size and has assigned a predicted 1-5-, 5-10-, 10-20- and 20 plus year projection for each land holding identified as commercial or industrial.

Using this information, a projected employment land population for each land holding can be calculated using the size of the land holding multiplied by a density assumption for the employment lands. There has been no additional information provided with respect to existing densities for employment lands. Therefore, an assumed density of 45 employees/hectare for employment lands has been used. This is consistent with the density assumption made for other similar sized towns located within commuting distance of the City of Ottawa, such as the Municipality of Mississippi Mills.

For this analysis, all land holdings identified by the Municipality as commercial or industrial were considered for the projected employment population, including those that are not within the Economic Enterprise or Industrial designations within the Official Plan.

Existing and Future Population, Employment, and Land Use Implications and Analysis

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Table 29: 0 - 5 Years

Number on Map	Land size (ha)	Projected Population (Lot Size x 45 employees per hectare)
7*	0.5	23
18	0.1	5
27	1.8	83
54	1.6	70
Total	4.0	180
Total Kemptville [population centre]	3.5	157
Total Other Urban Serviced Area	0.5	23

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

Table 30: 5 - 10 Years

Number on Map	Land Size (ha)	Projected Population (Lot Size x 45 employees per hectare)
7*	2.0	92
9*	2.6	115
31*	4.8	214
32*	7.9	354
33*	0.8	36
35*	14.6	659
45*	4.6	206
57*	1.8	79
Total	39.0	1755
Total Kemptville [population centre]	0	0
Total Other Urban Serviced Areas	39.0	1755

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

Table 31: 10 – 20 Years

Number on Map	Land Size (ha)	Projected Population (Lot Size x 45 employees per hectare)
28	0.2	8
34*	3.6	163
34*	6.8	306
43*	2.5	111
Total	13.1	588
Total Kemptville [population centre]	0.2	8
Total Other Urban Serviced Areas	12.9	581

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

Table 32: 20 Plus Years

Number on Map	Land Size (ha)	Projected Population (Lot Size x 45 employees per hectare)
29*	2.4	110
37*	1.6	70
38*	4.0	178
39*	4.7	210
40*	11.8	532
41*	4.3	194
46	5.5	249
Total	34.3	1543
Total Kemptville [population centre]	5.5	249
Total Other Urban Serviced Areas	28.8	1294

Table Notes:

* Denotes properties outside Kemptville [population centre] designated census area

8.6 Private Services

The following properties have been identified by the Municipality as being on private servicing for the foreseeable future given the complications of extending municipal servicing across Highway 416:

- Map ID 34
- Map ID 37
- Map ID 38
- Map ID 39
- Map ID 40
- Map ID 41
- Map ID 46

9.0 Conclusion

The projected populations have been identified for each land holding that was identified by the Municipality. Based on the total projected populations for each time interval, there is considerably more potential residential capacity than required to meet the predicted population growth when using an average unit per hectare density (plus 10% for ARUs) calculated using the numbers provided by KPMG in the Long-term Population, Housing and Employment Study (December 2023). A summary of the land holdings capacity versus the projected population growth can be found in the following Table.

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

Table 33: Projected Population Growth and Total Projected Population Growth for Land Holdings

Year Interval	Projected Population Growth ⁽¹⁾			Total Projected Population Growth ⁽²⁾			
	Kemptonville [population centre]	Other urban serviced areas	TOTAL For all urban serviced areas	For all land holdings within Kemptonville [population centre]	For all land Holding in other urban serviced areas	TOTAL For all Land Holdings in urban serviced area	TOTAL For all Land Holdings in urban serviced area with Expansion Areas
0-5	343	1383 ⁽³⁾	1726	874	1964	3366 ⁽³⁾	3366 ⁽³⁾
5-10	456	1491	1946	790	1726	2516 ⁽⁴⁾	2620
10-20	1209	2857	4066	348	9611	9959 ⁽⁵⁾	10415
20 +	864	1436	2300	1034	2366	3400 ⁽⁶⁾	12363

Table Notes:

- (2) Calculated using information from Tables 19 to 21 (using information from the KPMG report).
- (3) Calculated using information from Tables 22 to 28.
- (4) Includes population projection for the correctional facility.
- (5) Total does not include Northern Expansion Area.
- (6) Total does not include Northern Expansion Area.
- (7) Total does not include Northeast Expansion Area or Western Expansion Area.

The total projected population for each interval is summarized in the Table below.

Table 34: Projected Population for Year Interval for Kemptonville Urban Serviced Area

Year Interval	Projected Population ⁽¹⁾	Projected Population using Land Holding Capacity ⁽²⁾	Projected Population using Land Holding Capacity ⁽²⁾ with Expansion Areas
Existing ⁽³⁾	6000	6000	6000
0-5	8254 ⁽⁴⁾	9366 ⁽⁴⁾	9366
5-10	10200	11882 ⁽⁵⁾	11986
10-20	14266	21945 ⁽⁶⁾	22401
20 +	16566	25345 ⁽⁷⁾	34764

Table Notes:

- (1) Calculated using information from Table 33 and KPMG's estimated existing population of 6000 for Kemptonville.
- (2) Calculated using information from Table 31 and KPMG's estimated existing population of 6000 for Kemptonville.
- (3) Estimated population for Kemptonville identified in the KPMG report with no land holding projections.
- (4) Includes population projection for the correctional facility.
- (5) Includes population projection for the correctional facility. Calculations do not include Northern Expansion Area.

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

- (6) Includes population projection for the correctional facility. Calculations do not include Northern Expansion Area.
- (7) Includes population projection for the correctional facility. Calculations do not include Northeast Expansion Area or Western Expansion Area.

Table 34 provides two options of population projections. To inform the Master Servicing Plan Update, the Land Holding Capacity Population Projection is the recommended population projection to be used.

The following table summarizes the projected employee population for all commercial land holdings.

Table 35: Land Holdings and Total Projected Employment Population for Land Holdings

Year Interval	Land Size for all Land Holdings (ha)	Total Projected Employment Population for Land Holding Capacity ⁽¹⁾
0-5	4.0	181
5-10	39.0	1755
10-20	13.1	588
20 +	34.3	1543

Table Notes:

- (1) Calculated using information from Table 29 to Table 32.

There were two institutional land holdings identified by the Municipality, one for the 0-5 year interval, one for the 10-20 year interval.

Table 36: Institutional Land Holdings

Year Interval	Map ID	Land Size (ha)
0-5	16	3.9
10-20	5	4.3

There were two retirement/long term care residence land holdings identified by the Municipality for the 10-20 year interval.

Table 37: Retirement Residence Land Holdings

Year Interval	Map ID	Projected Beds	Land Size (ha)
10-20	13	150 beds	1.5
10-20	55	42 beds	1.3

Of the commercial properties identified by the Municipality, two were identified as having a potential hotel, one for the 5-10 year interval, one for the 10-20 year interval.

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

Table 38: Commercial Properties with Hotels

Year Interval	Map ID	Projected Beds	Land Size (ha)
5-10	33	74 Beds	0.8
10-20	43	unknown	2.5

10.0 Special Notes

Institutional Lands: Lands that were identified as Institutional were not included in the population projection or employment projection calculations.

Residential Calculations: All lands that were identified by the municipality as residential or the potential for residential conversion were included in the residential population projection calculations. All housing typology and numbers for land holdings were provided by the Municipality.

Floodplain: Floodplain limits for any relevant properties were obtained from the most recent information available from the Rideau Valley Conservation Authority and excluded in the area calculations.

Per Person Per Unit: KPMG did not provide a per person per unit count for each housing typology. Therefore, the per person per unit count for each housing typology from the Municipality of North Grenville Engineering Standards for Design, Approval, and Construction, Section D, D2.05 for Domestic Demand was used with the KPMG information for required dwelling units to meet the KPMG projected populations.

11.0 References

The following documents were referenced in the creation of this report:

- Municipality of North Grenville Official Plan (2018)
- Municipality of North Grenville Long-term Population, Housing and Employment Study, dated December 13th, 2023, prepared by KPMG

12.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for the Municipality of North Grenville's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update

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J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:



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Reviewed by:



Tim Chadder, MCIP, RPP
Associate, Senior Consultant

Existing and Future Population, Employment, and Land Use Implications and Analysis

Servicing Master Plan Update



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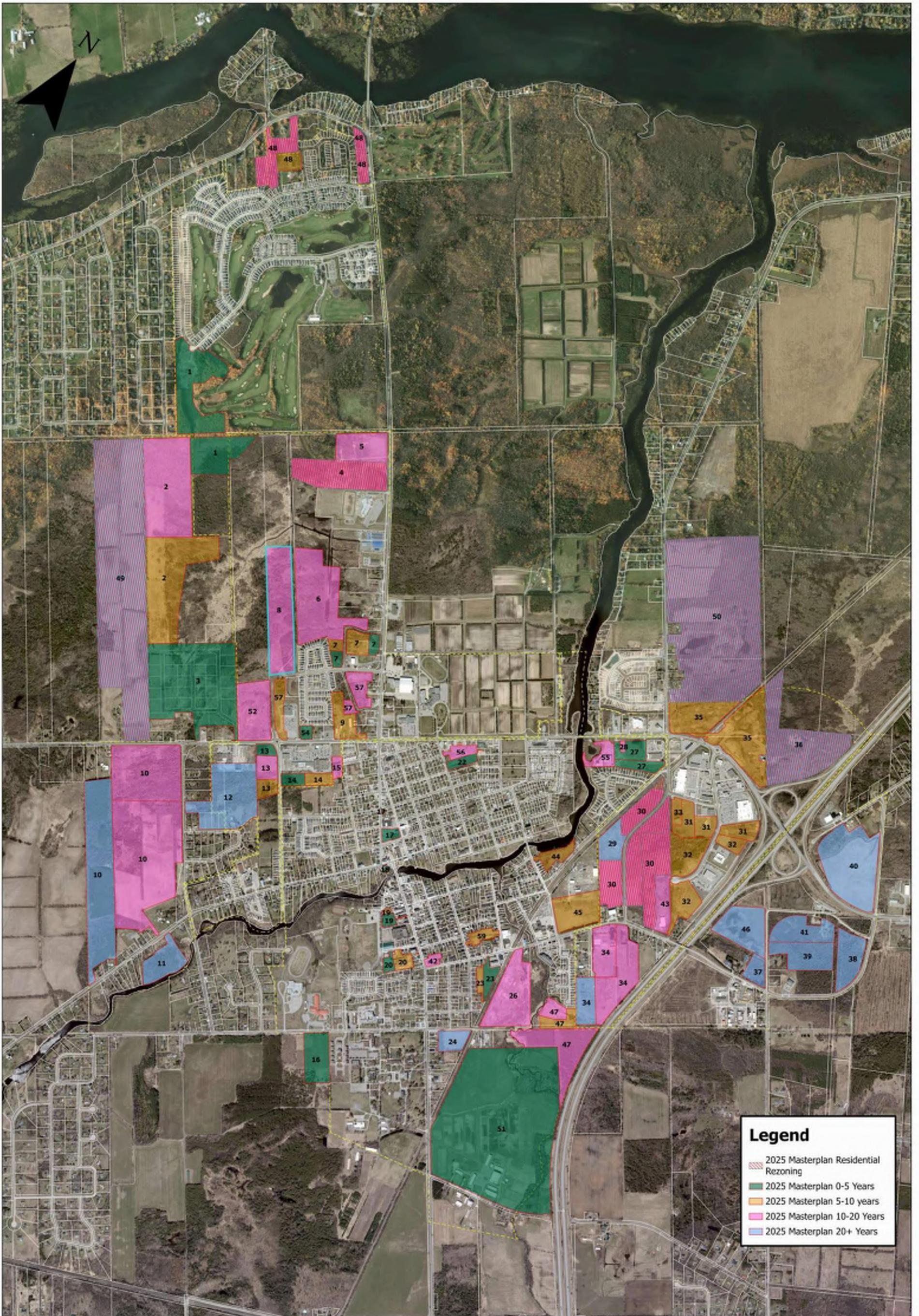
Existing and Future Population, Employment and Land Use Implications and Analysis

North Grenville Water and Wastewater Master Plan

Appendix A

Municipality of North Grenville
Servicing Masterplan

MNG Infrastructure Masterplan - Projected Developments



Maps are for graphical purposes only. They do not represent a legal survey.
 The Municipality of North Grenville offers no warranty or guarantee of any kind
 in connection to accuracy or completeness of the data on this map.

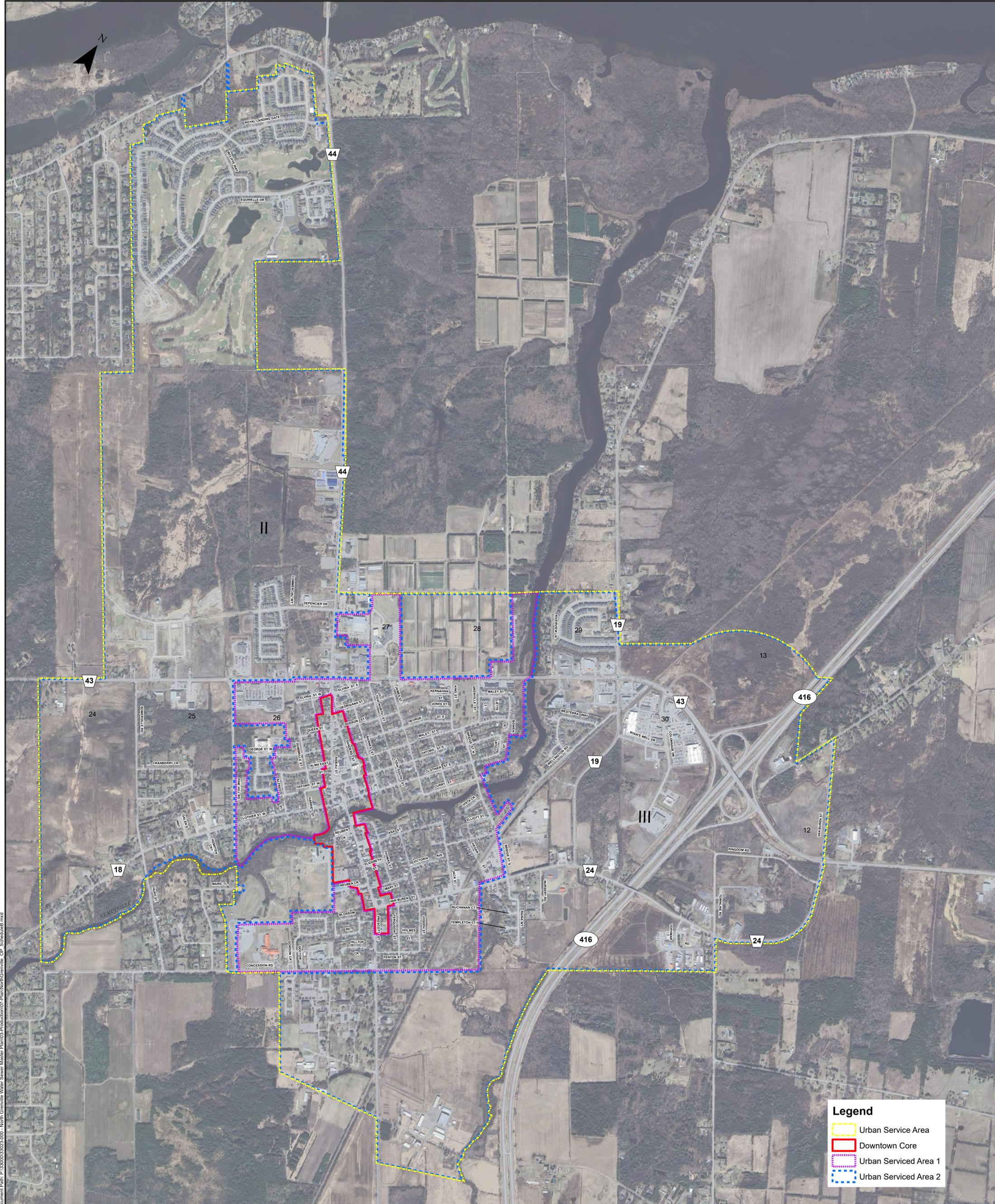
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Existing and Future Population, Employment and Land Use Implications and Analysis

North Grenville Water and Wastewater Master Plan

Appendix B

Municipality of North Grenville
Urban Serviced Area Map



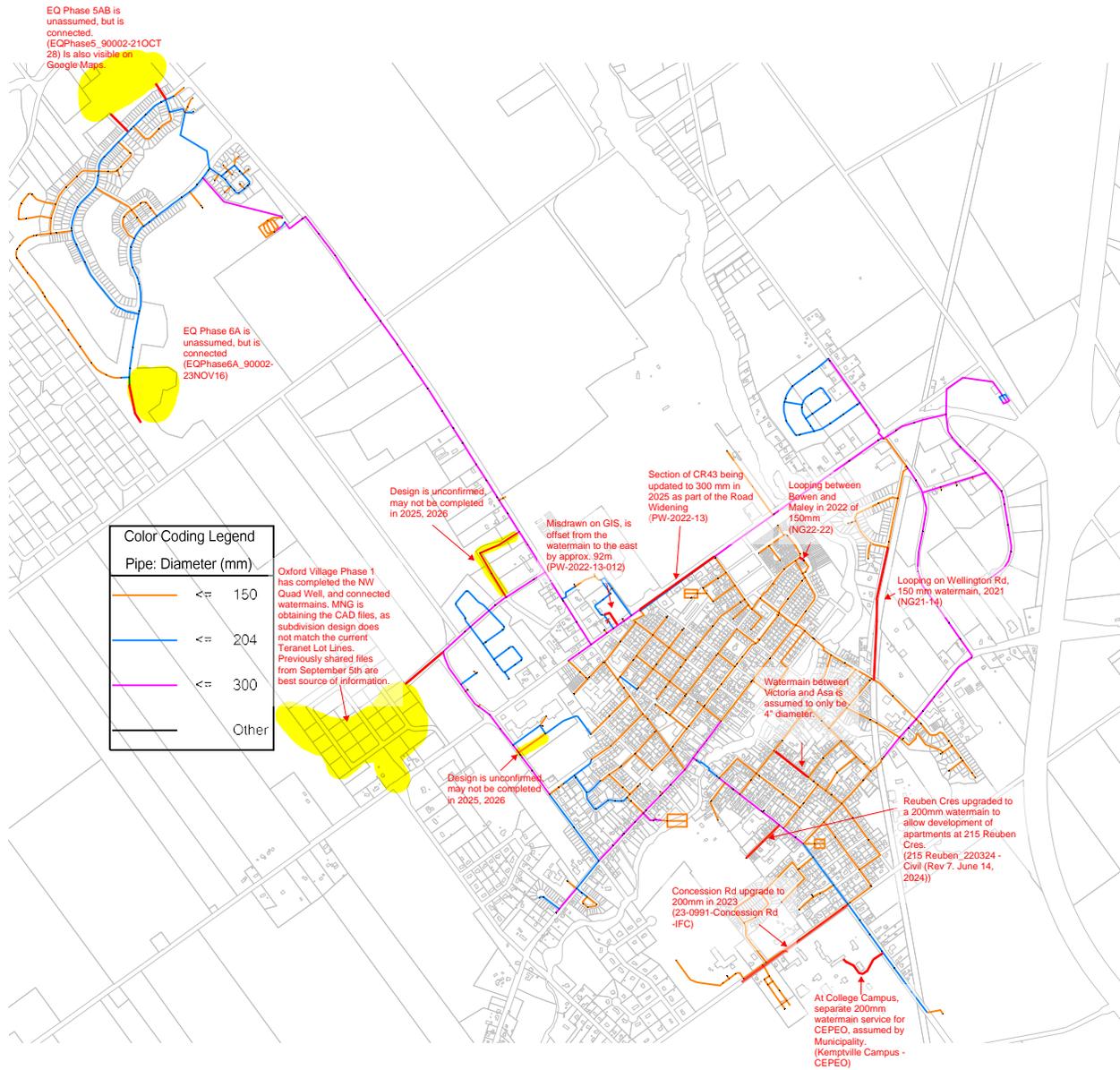
Legend

- Urban Service Area
- Downtown Core
- Urban Served Area 1
- Urban Served Area 2

Appendix B

Water Model Appendices

24362-025 - North Grenville - Master Plan





Shop Drawing Review

Drawing No.: 11301-01, R1 **Description:** Centrifugal Pumps
Project Name: Kemptville NW WTP **Section:** 11301
Project No.: A001057 **Date:** 2022-01-07
Client: LA DEVELOPMENTS INC. **Status:** 1
Reviewers: Alireza Farrokhi (AF) **Submission No.:** 2

Status: **1 – No Comment** 2 – As Noted 3 – Revise and Resubmit
4 – Rejected 5 – Not Reviewed

Item	Reference	Reviewer	Comment
1.		AF	All previous comments have been addressed. No further comment.
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Notes:

1. The Contractor's responsibility for errors and omissions in a submittal is not relieved by the Engineer's review of the submittal. Review by the Engineer is for general conformance with the design concept and compliance with the Contract documents.
2. The Engineer's review does not relieve the Contractor of their responsibility to meet all contractual requirements. Deviations must be noted on the cover sheet of the Contractor's submission.



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**Project: 908 Kemptville Northwest Quadrant Water Distribution
 System Expansion Municipality of North Grenville**

Submittal #3.0 - SD 8, 12, 13 R1 - Pumps

Revision	0	Submittal Manager	Evan Cory (Thomas Fuller Construction Co. Limited)
Status	Open	Date Created	5 Jan, 2022
Issue Date	5 Jan, 2022	Spec Section	
Responsible Contractor	Eastern Welding	Received From	Rich Waterton (Eastern Welding)
Received Date		Submit By	4 Jan, 2022
Final Due Date	12 Jan, 2022	Lead Time	
		Cost Code	
Location		Type	
Approvers	Guillaume LeBlond (CIMA)		
Ball in Court	Guillaume LeBlond (CIMA)		
Distribution	Barry Workman (Thomas Fuller Construction Co. Limited), John Wilson (LA Group), Guillaume LeBlond (CIMA), Zack Haymoor (LA Group), Leigh Fuller (Thomas Fuller Construction Co. Limited), Evan Cory (Thomas Fuller Construction Co. Limited)		
Description	<p>Hi Guillaume.</p> <p>See attached revised Pump shop drawings for review.</p> <p>Thanks,</p> <p>Evan</p>		

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					SD-13r1 Horz Split Case Pumps.pdf SD-08r1 Submersible Well Pump.pdf SD-12r1 Horz End Suction Centrifugal Pumps.pdf
Guillaume LeBlond	5 Jan, 2022	12 Jan, 2022		Pending	



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SHOP DRG SUBMITTAL FORM

PROJECT Kemptville NW Quadrant Distribution System Expansion
SD Number SD-12r1

Contract # LAD Proj No. LAD-2021-03 / EW No. P21-434
Section 11301
Clause # _____

Equipment Schedule # Highlift Pump 1 & 2 (HLP-10400 and 10410)

Component Horizontal End Suction Centrifugal Pumps

COMMENTS

DATE: Dec 22nd 2021

SIGNED: Rich Waterton

02SH08CSFRM22 - H14A32F5BK2S

Technical data	Company Name	
	Contact	
	Phone number	
	E-Mail address	

Operating data					
1	Pumpe type	Single head pump	Fluid	Water	
2	No. of pumps	2	Operating temperature t A	°F	39,2
3	Nominal flow	l/s 16,8	pH-value at t A	7	
4	Nominal head	m 55	Density at t A	lb/ft ³	62,4
5	Static head	m 0	Kin. viscosity at t A	ft ² /s	1.689E-5
6	Inlet pressure	psi 0	Vapor pressure at t A	psi	14,5
7	Environmental temperature	°F 68	Content of solid%	Solid size	inch 0 0
8	Available system NPSH	m 0	Altitude	m	0

Pump data						
9	Design	Highly efficient stainless steel end suction pumps				
10	Execution	Rotation: 12 oClock [STD]				
11	Operating speed	rpm 3500	Impeller Ø	Max.	inch 8 1/4	
12	Group	S		designed	inch 7 1/2	
13	Suction flange	/ /		Min.	inch 6 3/16	
14	Discharge flange	/ /	Flow	Nominal	l/s 17,2	
15	Max. casing pressure	psi		Max-	l/s 23,7	
16	Max. working pressure	psi 99,7		Min-	l/s 4,4	
17	Impeller type	Radial impeller		Head	Nominal	m 57,4
18	Head H(Q=0)	m 70	at Qmax		m 45,1	
19	Max. shaft power	hp 26	at Qmin		m 70,1	
20	Pump weight	lb 68,0	Shaft power	hp	18,8	
21	Total weight	lb 315,0	Efficiency	%	66,85	
			NPSH 3%	m	4	

Materials					
22		Pump		Shaft Seal	
23	Casing	Stainless steel 316L	John Crane	Elastomer Bellows Shaft Seal	
24	Impeller	Stainless steel 316L	Type 21		
25	Wear Ring	Stainless steel 316L	Seal faces	Carbon [STD]	
26	Adapter	Gray cast iron class 20B	Stationary ring	Silicon Carbide	
27	Ball bearing (outboard)	Steel	Elastomers	FKM	
28	Pump shaft	Steel grade 1213	Springs	Stainless steel CF8M (316)	
29	Deflector	Buna-N	Other metal parts	Stainless steel CF8M (316)	
30	Shaft Sleeve	Stainless steel CF8M (316)			
31	Bearing Cover	Gray cast iron class 20B			
32	Ball bearing (inboard)	Steel			
33	Impeller Key	Steel			
34	Seal Housing	Stainless steel 316L			
35	Impeller Washer	Stainless steel CF8M			
36	Bearing Frame	Gray cast iron class 20B			
37	Lip Seal	Not available			
38	V-Ring	Buna-N			
39	Casing bolt with nut (casing to adapter)	Stainless Steel			
40	Retaining ring	Steel			
41					

Motor data					
42	Manufacturer	Baldor			
43	Specific design	NEMA 3 ph TEPE [STD] Inverter Duty, CSA Approved			
44	Type	Frame 256T - 20 hp			
45	Rated power	20 hp	Item no.		
46	Nominal speed	3600 rpm	Service factor	1,15	
47	Frame size	256T	Electric voltage	575V	
48	Weight	lb 199,0			

Base plate			Remarks		
49	Name	02SH08 / 184T			
50	Weight	lb 48,0			

Project	Project ID	Created by	Created on	Last update
	OX052721 Kemptville Distribution North Grenville	Gilles Raymond	06-18-21	06-21-21

02SH08CSFRM22 - H14A32F5BK2S

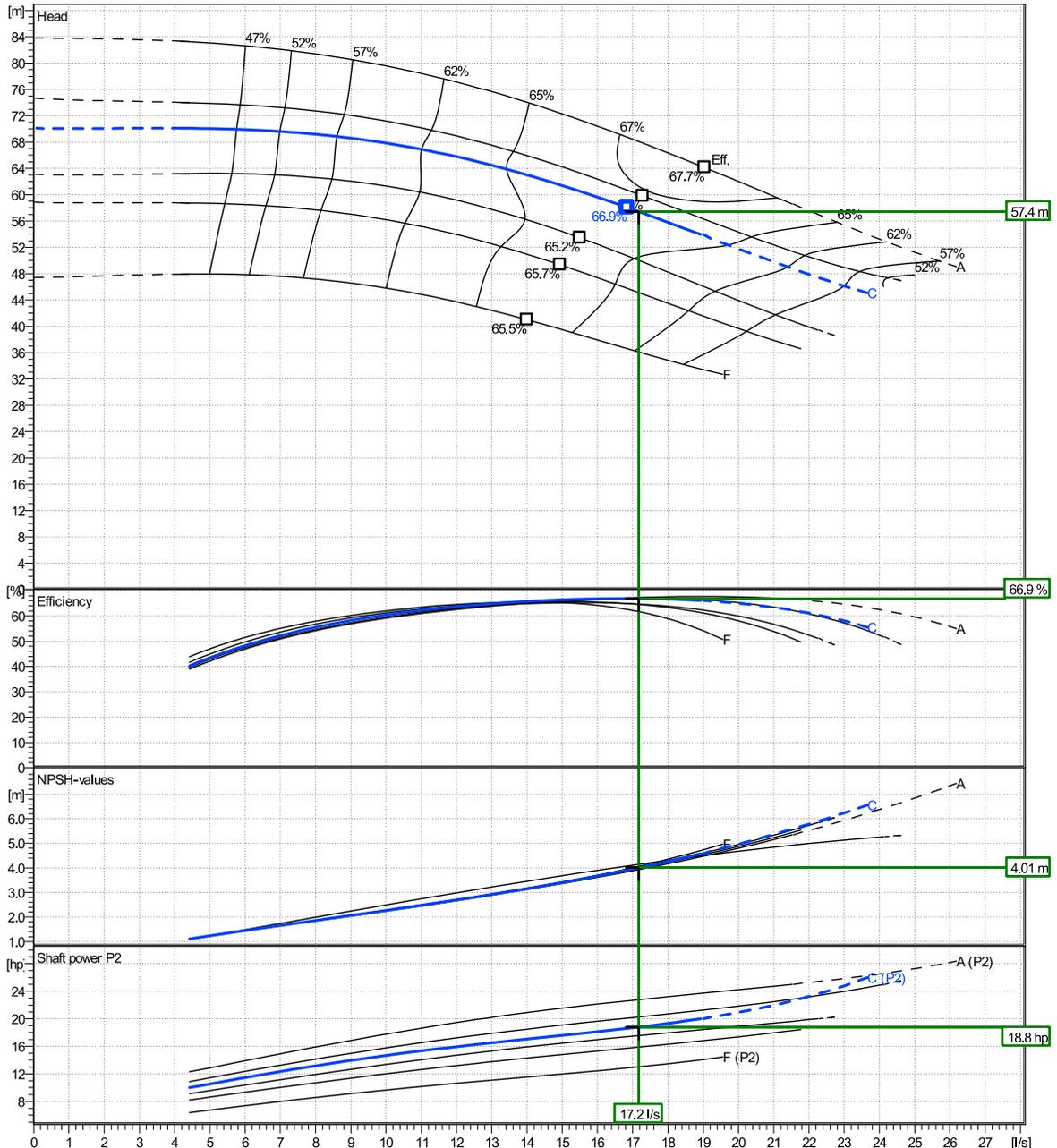
Performance Curve

Company Name
Contact
Phone number
E-Mail address

	Ø inch	Delivered Flow			Lift Capability		Shaft Power P2			Frequency		
		Min. l/s	Max. l/s	η Max. l/s	H(Q=0) m	η Max. m	P2(Q=0) hp	Max. hp	η Max. hp	Operating speed rpm	Hz	
Is	7.500			16.8	70.1	58.1		26	18.6	Nominal flow	l/s	16.8
Min.	6.187	/	/	14	47.4	41		/	11.5	Inlet pressure	psi	0
Max.	8.250	/	/	19	83.8	64.1		/	23.7	Static head	m	0

Power data referred to:

Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s



Project	Project ID OX052721 Kemptville Distribution North Grenville	Created by Gilles Raymond	Created on 06-18-21	Last update 06-21-21
---------	---	------------------------------	------------------------	-------------------------



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**Project: 908 Kemptville Northwest Quadrant Water Distribution
 System Expansion Municipality of North Grenville**

Submittal #3.0 - SD 8, 12, 13 R1 - Pumps

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Approvers	Guillaume LeBlond (CIMA)		
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Submittal Workflow

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Guillaume LeBlond	5 Jan, 2022	12 Jan, 2022		Pending	



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SHOP DRG SUBMITTAL FORM

PROJECT Kemptville NW Quadrant Distribution System Expansion
SD Number SD-13r1

Contract # LAD Proj No. LAD-2021-03 / EW No. P21-434
Section 11421
Clause # _____

Equipment Schedule # Highlift Pump 3 (HLP-10420)

Component Horizontal Split Case Pumps

COMMENTS

DATE: Dec 22nd 2021

SIGNED: Rich Waterton



e-XC4x6x16/75H6G4WNTMUA1CC1G

Technical data	Company Name	
	Contact	
	Phone number	
	E-Mail address	

Operating data				
1	Pumpe type	Single head pump	Fluid	Water
2	No. of pumps	1	Operating temperature t A	°F 39,2
3	Nominal flow	l/s 50	pH-value at t A	7
4	Nominal head	m 54,5	Density at t A	lb/ft ³ 62.4
5	Static head	m 0	Kin. viscosity at t A	ft ² /s 1.689E-5
6	Inlet pressure	psi 0	Vapor pressure at t A	psi 14.5
7	Environmental temperature	°F 68	Content of solid%	Solid size inch 0 0
8	Available system NPSH	m 0	Altitude	m 0

Pump data				
9	Design	Double Suction Split Case Pumps Epoxy NSF Fusion bonded paint interior and exterior pump		
10	Execution	Clockwise Rotation - viewed from motor end [STD]		
11	Operating speed	rpm 1780	Impeller Ø	Max. inch 16.142
12	No. of stages	1		designed inch 13.535
13	Suction flange	NPS 6 / CL125 / ASME B16.1 (e-XC)		Min. inch 6.929
14	Discharge flange	NPS 4 / CL125 / ASME B16.1 (e-XC)	Flow	Nominal l/s 50
15	Max. casing pressure	psi 175		Max- l/s 76.1
16	Max. working pressure	psi 87.7	Min- l/s 14.3	Nominal m 54.5
17	Impeller type	Radial impeller	Head	at Qmax m 37.2
18	Head H(Q=0)	m 62		at Qmin m 61.1
19	Max. shaft power	hp 65,5	Shaft power	hp 51.1
20	Pump weight	lb 759,0	Efficiency	% 70,05
21	Total weight	lb 1,875.6	NPSH 3%	m 3.1

Materials				
22		Pump	Shaft Seal	
23	Casings	Cast Iron [STD]	Xylem	Rubber below seal [STD]
24	Impeller	Stainless steel CF8 (304) [STD] 316SS	MR4 - Seal on sleeve (ID 35/2,375 in)	
25	Shaft Construction	Dry (sleeves) [STD]	Mechanical seal diameter	inch 2.375
26	Shaft	40cR (5140-carbon steel)	Seal faces	Carbon [STD]
27	Shaft Sleeves	Stainless steel CF8 (304) [STD]	Stationary ring	Silicon Carbide
28	Shaft Sleeve Nuts	Stainless steel CF8 (304) [STD]	Elastomers	EPDM [STD]
29	Casing Wear Ring	Bronze [STD]	Springs	Stainless steel CF8M (316)
30	Impeller Wear Ring	Stainless steel CF8 (304) [STD]	Other metal parts	Stainless steel CF8M (316)
31	Lantern Ring	Polytetrafluoroethylene (PTFE)		
32	Seal flush lines	Stainless steel CF8 (304) [STD]		

33				
34	Comments:			
35	Pump temperature detectors are not available .			
36	Goulds standard hydro test only will be supplied.			
37	Factory performance test will not be supplied . No factory test report will be available .			
38	Bearing RTDs are not available.			
39	Vibration testing during factory performance test and vibrational torsional analysis at the factory are not available.			
40				
41				

Motor data				Coupling	
42	Manufacturer	Baldor		Manufacturer	TB Woods Dura-Flex - NON Spacer [STD]
43	Specific design	NEMA 3 ph TEPE winding RTD's 2 per phase		Type	WE20
44	Type	Frame 365T - 75 hp Inverter Duty, CSA Approved		Frame size	WE20
45	Rated power	75 hp	Item no. SM1311	Spacer length	inch 1/2
46	Nominal speed	1780 rpm	Service factor 1.15	Weight	lb 16.3
47	Frame size	365T	Electric voltage 575 V	Coupling guard	Coupling Guard KIT-2 27.10 lb
48	Weight	lb 869.0	Shaft diameter 2 3/8 inch	Coupling Guard Material	Painted carbon steel

Base plate			Remarks	
49	Name	4x6x16 / 365T	Goulds standard drip rim baseplate and standard coupling guard will be supplied	
50	Weight	lb 204.2		

Project	Project ID	Created by	Created on	Last update
	OX052721 Kemptville Distribution North Grenville	Gilles Raymond	06-18-21	06-21-21



e-XC4x6x16/75H6G4WNTMUA1CC1G

Performance Curve

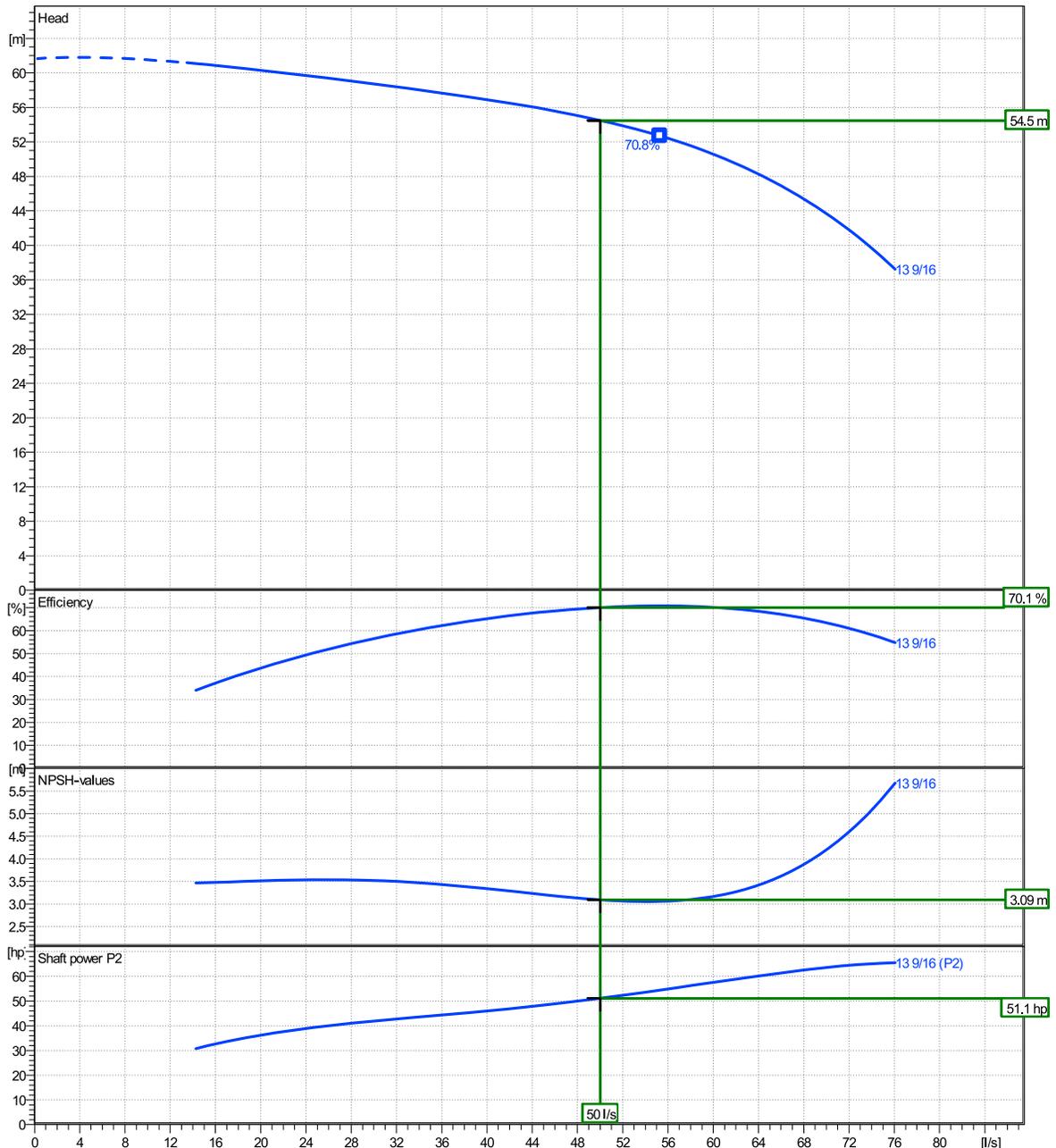
Company Name
Contact
Phone number
E-Mail address

	Ø inch	Delivered Flow			Lift Capability		Shaft Power P2			Frequency	
		Application Range Min. l/s	Max. l/s	η Max. l/s	H(Q=0) m	η Max. m	P2(Q=0) hp	Max. hp	η Max. hp	Hz	
Is	13.535			55.3	61.7	52.7		65.5	54.4	Operating speed	rpm 1780
Min.	6.929	/	/	25.3	12.5	8.59		/	8.18	Nominal flow	l/s 50
Max.	16.142	/	/	66.9	92.9	80.5		/	98.2	Nominal head	m 54,5
										Inlet pressure	psi 0
										Static head	m 0

Power data referred to:

Hydr. performance acceptance acc. to EN ISO 9906 Class 2B

Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s



Project	Project ID OX052721 Kemptville Distribution North Grenville	Created by Gilles Raymond	Created on 06-18-21	Last update 06-21-21
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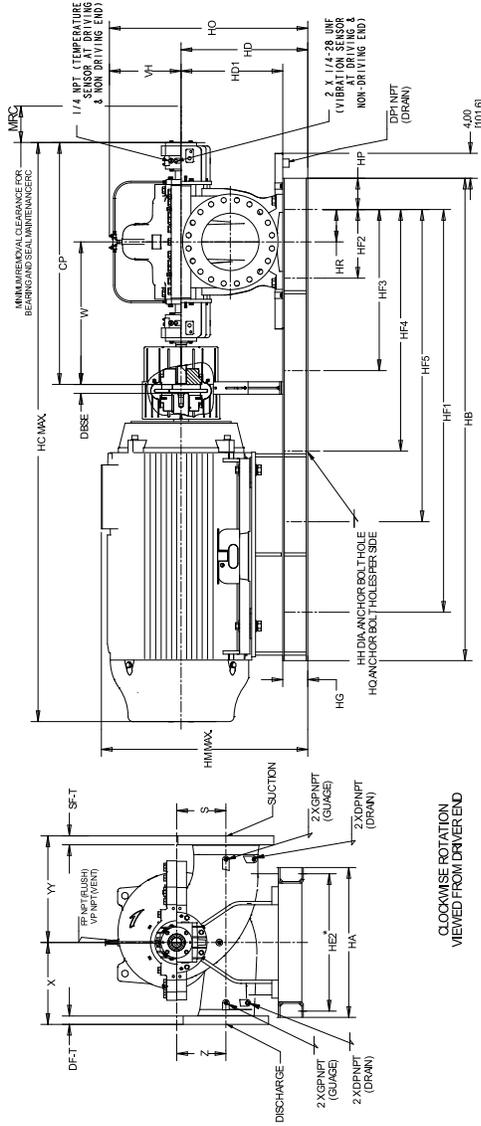
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Dimensions

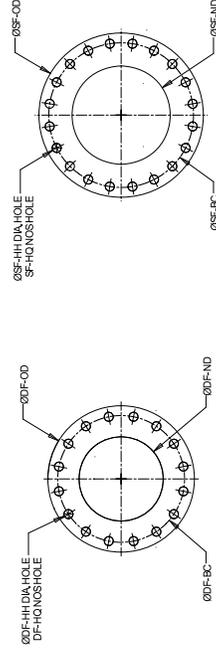
Company Name
Contact
Phone number
E-Mail address

Complete Unit with Baseplate
Clockwise Rotation - viewed from motor end [STD]
NEMA 3 ph TEPE
Frame 365T - 75 hp

Dimensions	[inch]
CP	39 ³ / ₁₆
DBSE	1/2
DF-BC	7 1/2
DF-HH	3/4
DF-HQ	8x
DF-ND	4
DF-OD	9
DF-T	15 ¹ / ₁₆
DP	1/2 NPT
FP	1/2 NPT
GP	1/2 NPT
HA	24
HB	68
HC Max	N.A.
HD	17 ³ / ₄
HD1	13 ³ / ₄
HE2	22
HF1	58
HF2	29
HF3	N.A.
HF4	N.A.
HF5	N.A.
HG	4
HH	1
HM Max	N.A.
HO	30 ³ / ₄
HP	5
HQ	6x
HR	5 1/2
MRC	3
S	6 11/16
SF-BC	9 1/2
SF-HH	7/8
SF-HQ	8x
SF-ND	6
SF-OD	11
SF-T	1
VH	13
VP	1/2 NPT
W	21 ³ / ₈
X	15 ³ / ₄
Y	16 ⁹ / ₁₆
Z	6 11/16



CLOCKWISE ROTATION
VIEWED FROM DRIVER END



Connections	Discharge flange
Suction flange	NPS 4
NPS 6	CL125
CL125	ASME B16.1 (e-XC)
ASME B16.1 (e-XC)	ASME B16.1 (e-XC)
Weight	(+/- 5%)
Pump	759 lb
Coupling	16 lb
Coupling Guard	27 lb
Base plate	204 lb
Motor	869 lb
Total weight	1,876 lb

Dimensions and weight without obligation

Project

Project ID
OX052721 Kemptville Distribution
North Greenville

Created by
Gilles Raymond

Created on
06-18-21

Last update
06-21-21

Design Parameter	Value	Unit	Source
Single House Population	3.4	Person/unit	Existing and future population, employment and land use implications and analysis - Municipality of North Grenville working Master Plan Update (p. 12)
Commercial/Industrial	2.2	Person/unit	
Residential	2.25	Person/unit	
ADD - General Commercial	208.4	Litres	
ADD - Light Industrial	3000.0	Litres	
ADD - Restaurant	260.0	Litres	
ADD - Institution (Schools)	75.0	Litres/Person	
ADD - Public Facility	1.64	*ADD	
ADD - Public Facility	3.00	*ADD	
ADD - Public Facility	2.85	*ADD	
ADD - Public Facility	2.70	*ADD	

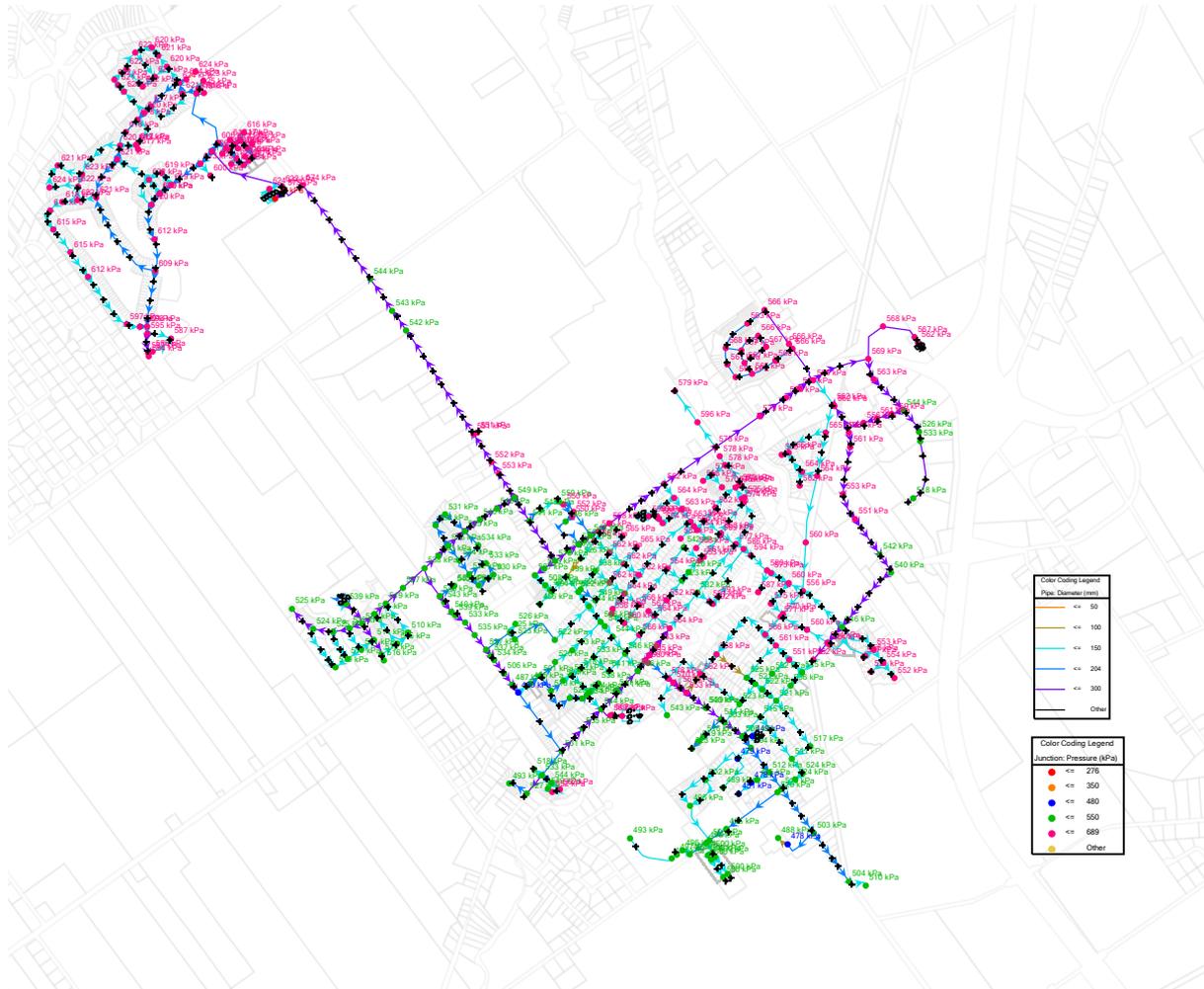
Water Analysis, v0 (08 4)

Water/CAD Junction Label	Map ID	Zone	1996			Population	2026				ADD (L/s)	MDD (L/s)	PFD (L/s)	HWU ADD (L/s)	HWU MDD (L/s)	HWU PFD (L/s)	
			Townhouse/Resi-Detached	Single	Apartment		Urbanism	General Com. (ha)	Light Industrial (ha)	Institutional (# students)							Retirement (bed)
Existing (2016)																	
J211		Kemptville	121 GEORGE ST W														
J212		Kemptville	285 COUNTY RD 44														
J119		Kemptville	2668 COUNTY RD 43														
J249		Kemptville	2993 COUNTY RD 43														
J293		Kemptville	1930 VINE AVE														
J179		Kemptville	2602 COUNTY RD 43														
J242		Kemptville	2927 RIDGE RD														
J210		Kemptville	521 CLOUTHER ST W														
J212		Kemptville	100 EVANER ST W														
J249		eGonville	Phase 5A	9	2	31					0.09	0.19	0.27			0.46	0.84
J249		eGonville	Phase 5B	29		76					0.23	0.42	0.58			0.41	0.78
J248		eGonville	Phase 5C	1	6	23					0.07	0.13	0.21			0.30	0.55
J250		eGonville	Phase 5A	35	8	108					0.32	0.58	0.80			0.50	0.93
J247		eGonville	Phase 5A	2	8	30					0.10	0.18	0.30			0.28	0.51
J248		eGonville	Phase 5A	6	11	40					0.18	0.33	0.54			0.36	0.67
J251		eGonville	Phase 5A	15	15	54					0.10	0.18	0.30			0.28	0.51
J252		eGonville	Phase 5A	12	12	43					0.12	0.22	0.36			0.30	0.54
J271		eGonville	Phase 5	13	8	47					0.12	0.22	0.36			0.30	0.54
J271		eGonville	Phase 5	10	12	34					0.35	0.48	0.75			0.24	0.44
J254		Kemptville	Deford Village	9	26	95					0.25	0.46	0.75			0.28	0.54
J254		Kemptville	Deford Village	19	8	66					0.15	0.29	0.48			0.28	0.54
J255		Kemptville	Deford Village	12	21	78					0.21	0.38	0.63			0.24	0.44
J260		Kemptville	Deford Village	7	11	38					0.17	0.31	0.51			0.21	0.38
J260		Kemptville	Deford Village	11	11	40					0.21	0.37	0.61			0.16	0.29
J264		Kemptville	Deford Village	17	10	54					0.10	0.18	0.30				
J264		Kemptville	Deford Village	12	12	43					0.12	0.22	0.36				
J267		Kemptville	Deford Village	8	2	28					0.08	0.15	0.24				
J266		Kemptville	Deford Village	19	8	66					0.15	0.27	0.45				
J268		Kemptville	Deford Village	11	6	39					0.15	0.27	0.45				
J263		Kemptville	Deford Village	42		153					0.34	0.62	1.02			0.24	0.44
J267		Kemptville	Deford Village	12	6	43					0.18	0.32	0.48				
J242		Kemptville	Deford Village								0.07	0.13	0.21				
TOTAL (existing)											4.21	7.45	12.62				
Mid-Term (10-20 years:2021-2026)																	
J268	1	eGonville	Phase 6 (Top portion)	11	109	48					1.19	2.17	3.57				
J239	7	Kemptville									0.23	0.41	0.68				
J231	7	Kemptville									0.27	0.47	0.76				
J226	13	Kemptville				53	136				0.37	0.67	1.11				
J267	14	Kemptville				48	90				0.28	0.51	0.84				
J263	17	Kemptville				50	90				0.30	0.55	0.90				
J262	18	Kemptville				8	16	0.1			0.08	0.15	0.24				
J266	18	Kemptville				69	130				0.41	0.75	1.23				
J264	22	Kemptville	215 Newden Crescent			28	120				0.30	0.54	0.88				
J264	22	Kemptville	215 Newden Crescent			28	120				0.30	0.54	0.88				
J217	22	Kemptville				30	81				0.33	0.58	0.95				
J211	27	Kemptville				79	168	1.8			1.05	1.91	3.15				
J21	18	Kemptville									0.34	0.62	1.02				
J261	24	Kemptville									0.54	0.98	1.56				
TOTAL Mid-Term											8.96	17.28	28.17				
Mid-Term (20 years:2026-2031)																	
J217	2	Kemptville				32	398	852			2.82	4.77	7.47				
J236	7	Kemptville				169	330				1.64	3.00	4.76				
J220	13	Kemptville				28	60	76	2		0.22	0.40	0.63				
J217	14	Kemptville				60	120				0.37	0.67	1.11				
J26	19	Kemptville				40	80				0.24	0.44	0.68				
J264	20	Kemptville	215 Newden Crescent			199	239				0.65	1.19	1.90				
J242	23	Kemptville				20	54				0.18	0.32	0.49				
J265	27	Kemptville				43	86				0.24	0.47	0.74				
J248	47	Kemptville				92	249	2.6			0.74	1.35	2.11				
J239	59	Kemptville				33	2	8			0.33	0.60	0.94				
J222	9	Kemptville				87	206	2.6			1.45	2.64	4.13				
J228	44	Kemptville				42	90				0.29	0.53	0.83				
J271	31	Kemptville						4.8			1.56	2.84	4.45				
J266	32	Kemptville						1.9			2.56	4.65	7.25				
J272	33	Kemptville						0.8		74	0.45	0.82	1.29				
J268	35	Kemptville						1.6			0.56	1.03	1.58				
J227	45	Kemptville						4.6			1.49	2.71	4.25				
J266	47	Kemptville						1.8			0.58	1.08	1.65				
J215	48	eGonville				44	104				0.31	0.56	0.88				
TOTAL Mid-Term 2031											26.65	51.99	80.84				
Long-Term (30 years:2031-2041)																	
J264	2	Kemptville				419	110	1495			4.44	8.08	12.65				
J268	15	Kemptville				449	306	2200			8.88	17.8	27.68				
J212	15	Kemptville					38	220			0.31	0.58	0.89				
J211	47	Kemptville				190	91	724			2.4	4.5	7.06				
J200	48	eGonville					104	456			1.35	2.48	3.85				
J201	38	Kemptville						62			0.69	1.31	2.02				
J254	34	Kemptville						3.8			1.17	2.13	3.31				
J245	38	Kemptville						6.8			2.30	4.30	6.57				
J268	43	Kemptville						2.5			0.81	1.47	2.31				
J261	7	Kemptville						2.3			0.73	1.35	2.06				
J264	13	Kemptville						1.8		190	0.45	0.82	1.29				
J264	50	Kemptville						42			0.13	0.24	0.37				
J265	4	Kemptville					273	842			1.90	3.46	5.42				
J250	6	Kemptville					393	928			2.15	3.91	5.84				
J271	8	Kemptville					318	747			2.22	4.06	6.33				
J260	26	Kemptville					253	595			1.76	3.20	5.02				
J265	30	Kemptville					539	1361			4.04	7.55	11.51				
J219	32	Kemptville					328	841			2.92	5.45	8.35				
J237	35	Kemptville					38	86			0.25	0.46	0.71				
J276	35	Kemptville					81	190			0.56	1.02	1.60				
J212	42																

33023-000 - North Grenville - Master Plan - Water Model

Average Day Demand

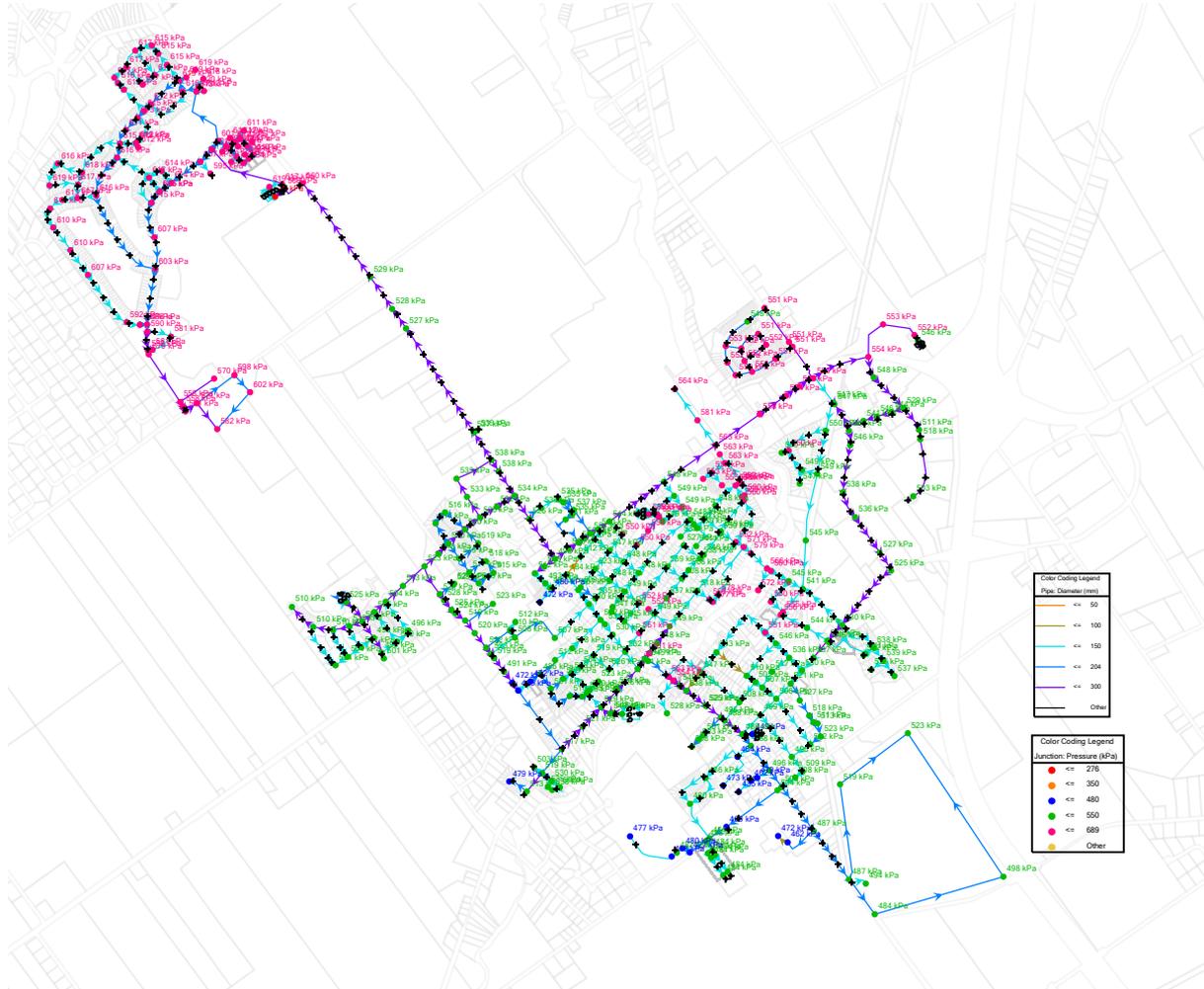
Existing Conditions



33023-000 - North Grenville - Master Plan - Water Model

Average Day Demand

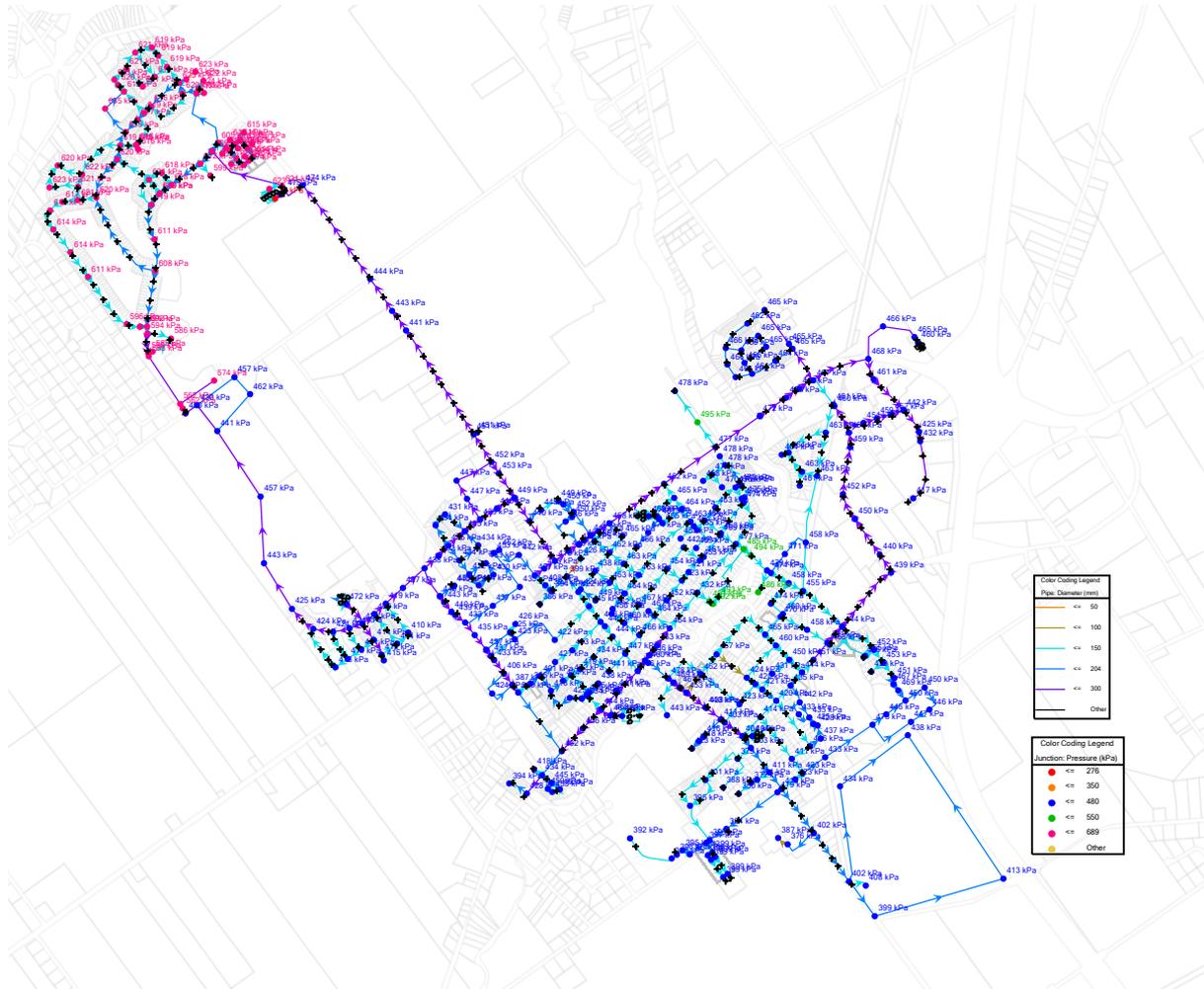
Short Term (0 to 5 Years)



33023-000 - North Grenville - Master Plan - Water Model

Average Day Demand

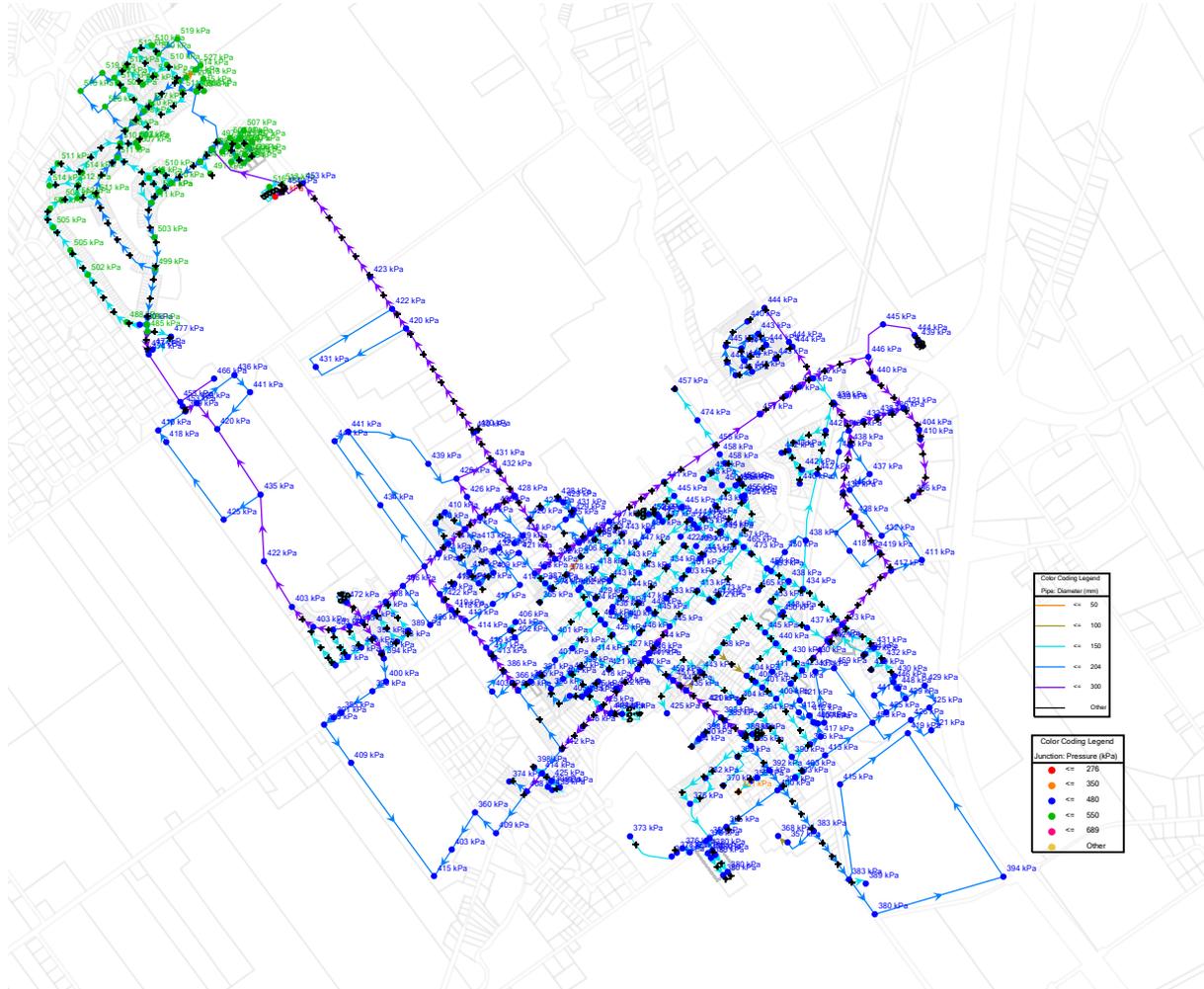
Mid Term (5 to 10 Years)



33023-000 - North Grenville - Master Plan - Water Model

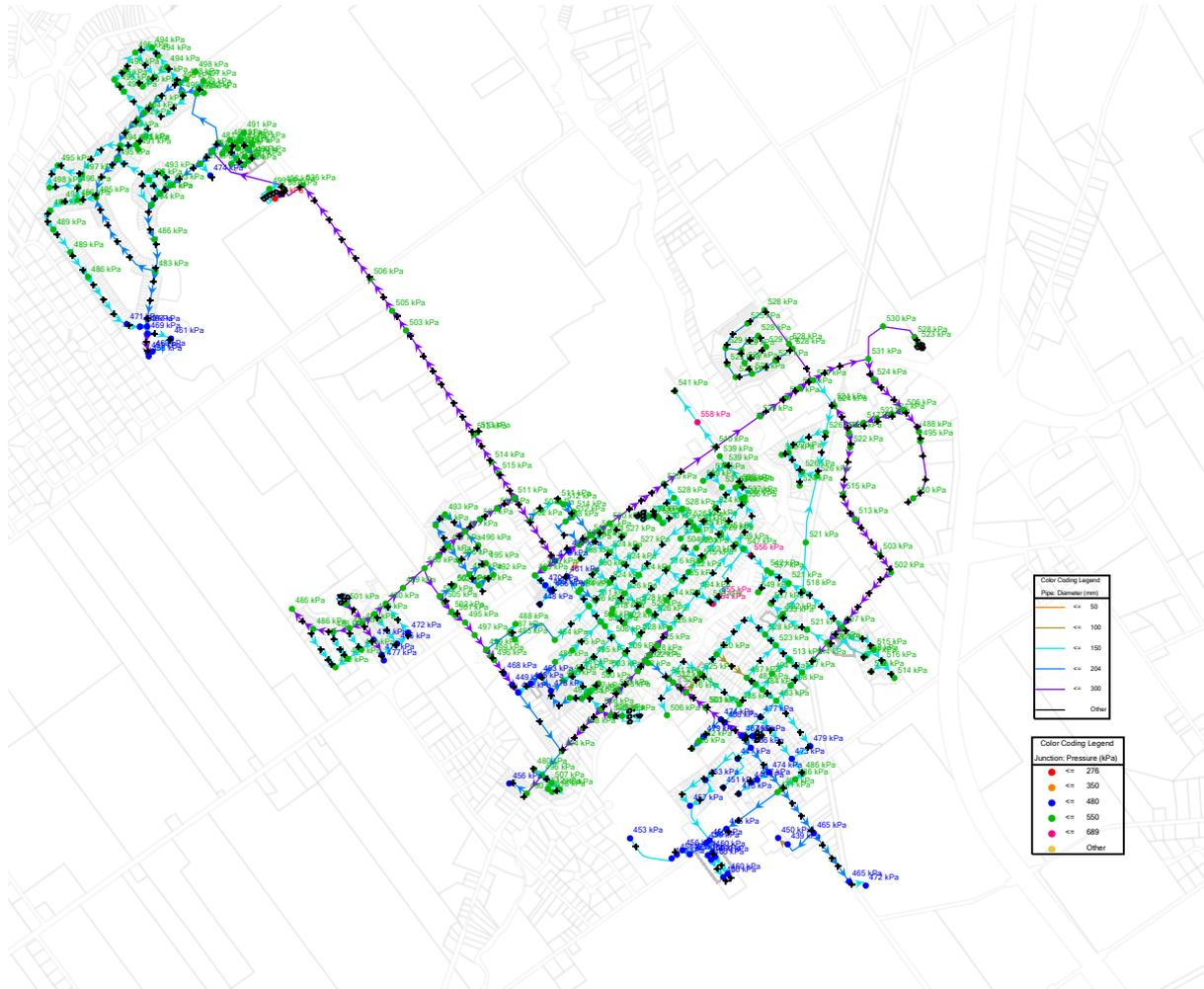
Average Day Demand

Long Term (10 to 20 Years)



33023-000 - North Grenville - Master Plan - Water Model

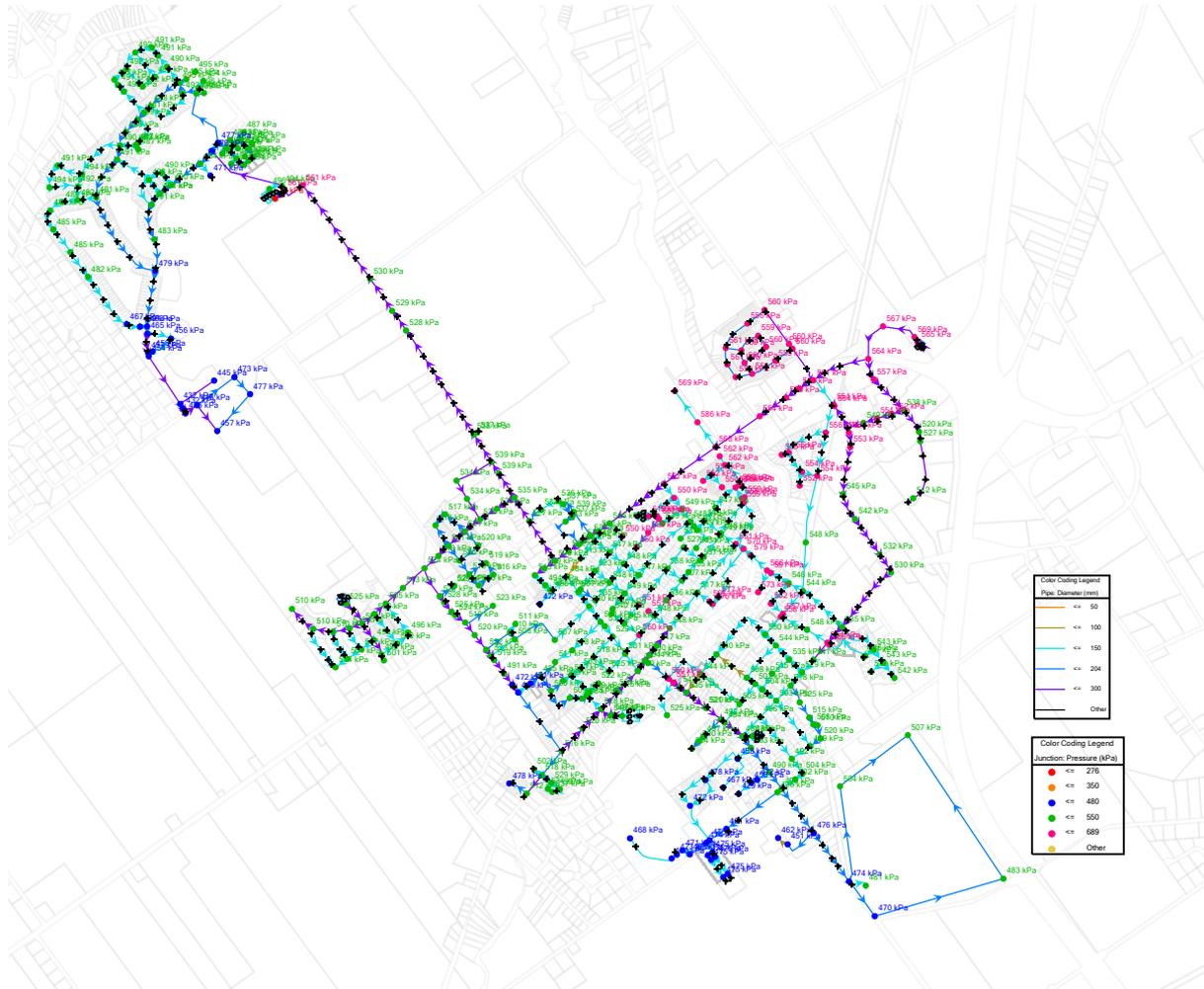
Peak Hour Demand Existing Conditions



33023-000 - North Grenville - Master Plan - Water Model

Peak Hour Demand

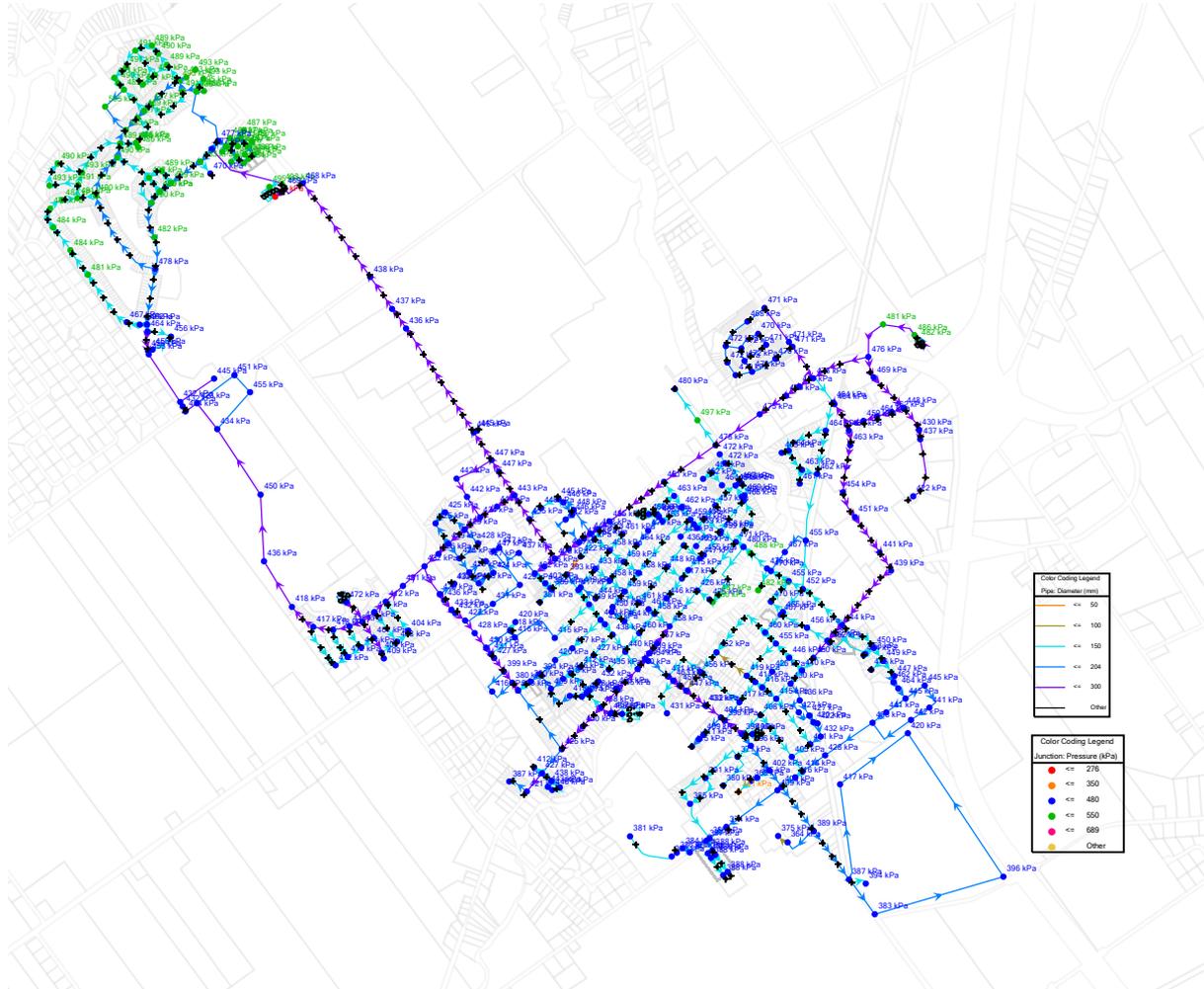
Short Term (0 to 5 Years)



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Peak Hour Demand

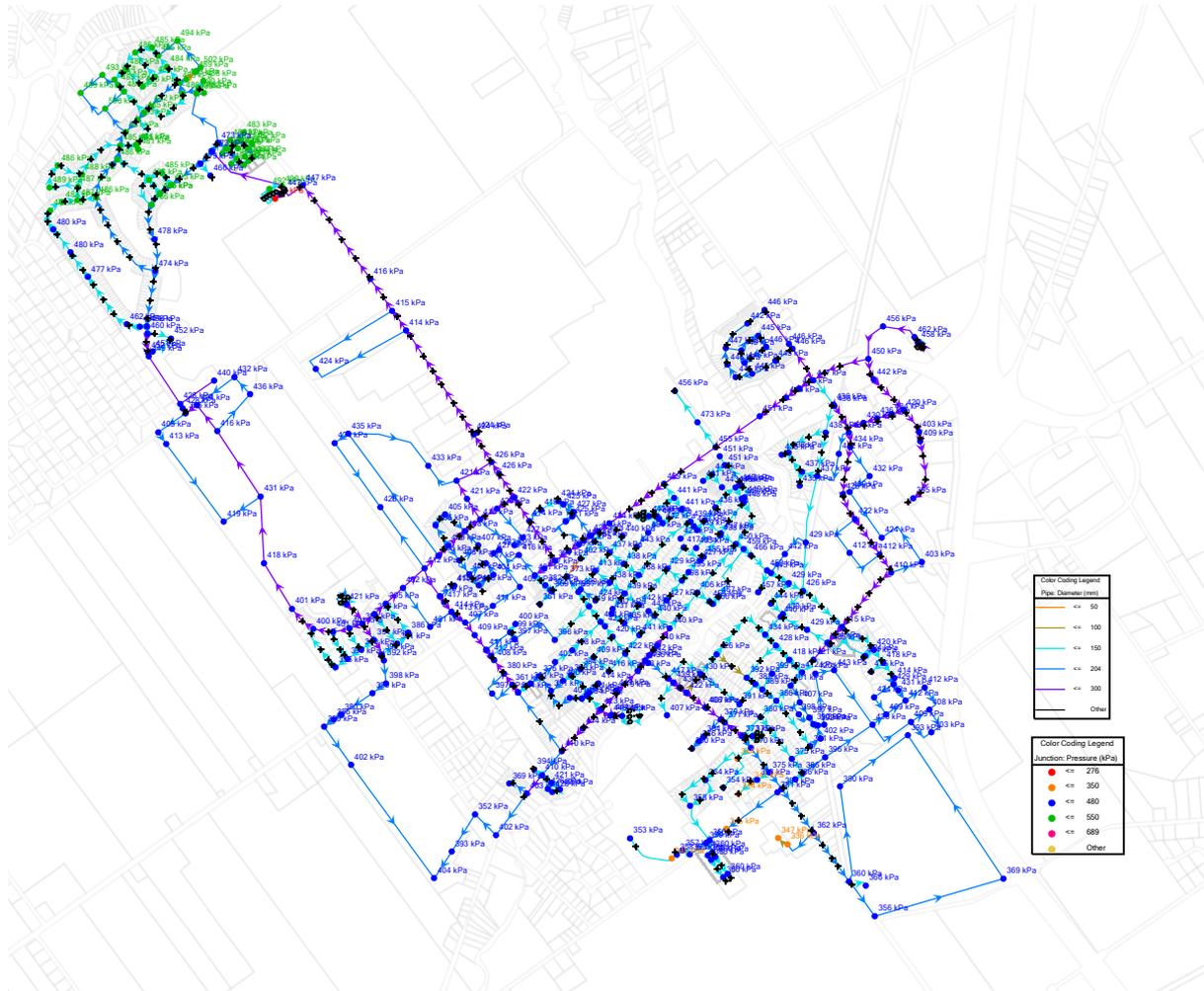
Mid Term (5 to 10 Years)



33023-000 - North Grenville - Master Plan - Water Model

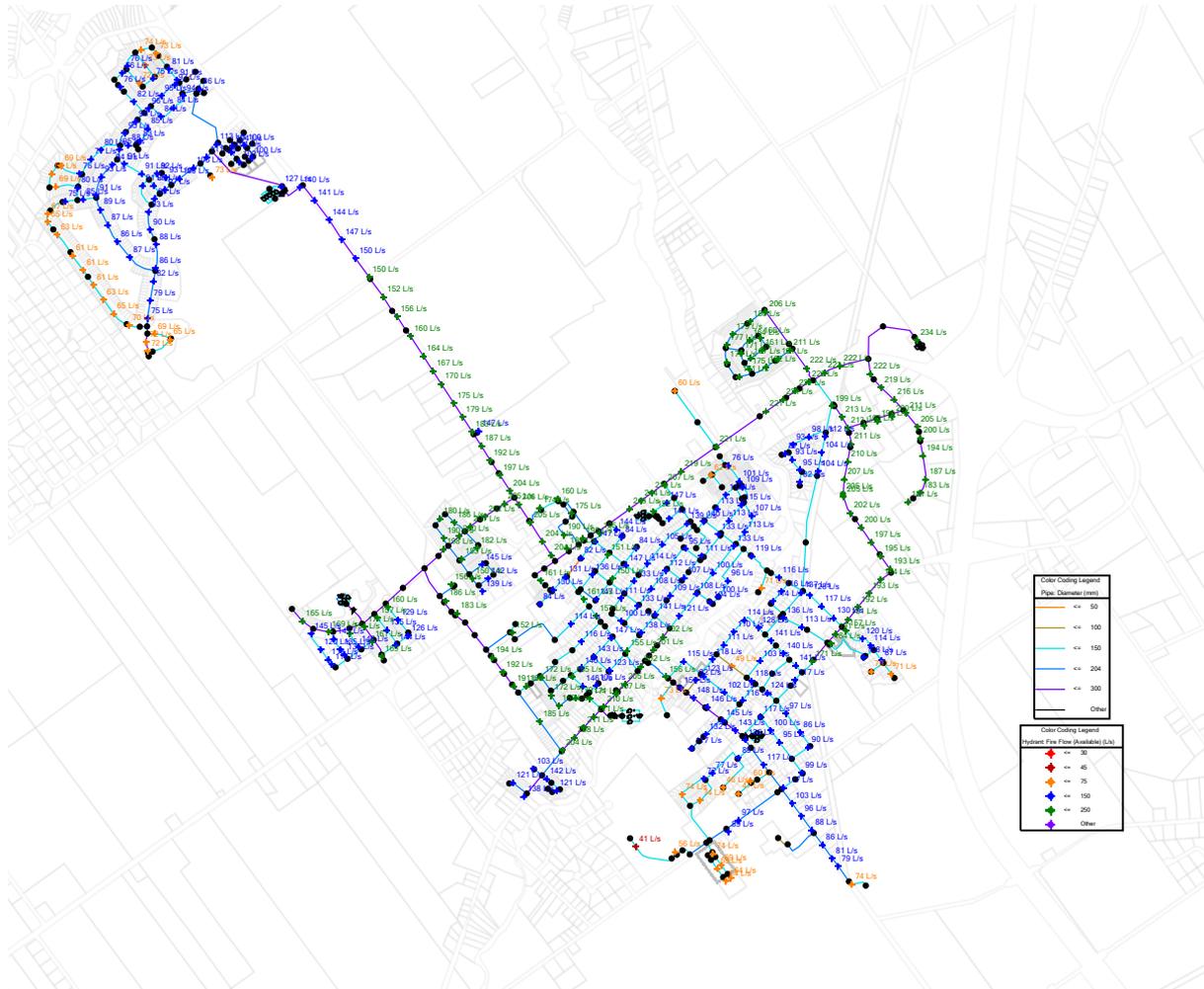
Peak Hour Demand

Long Term (10 to 20 Years)



33023-000 - North Grenville - Master Plan - Water Model

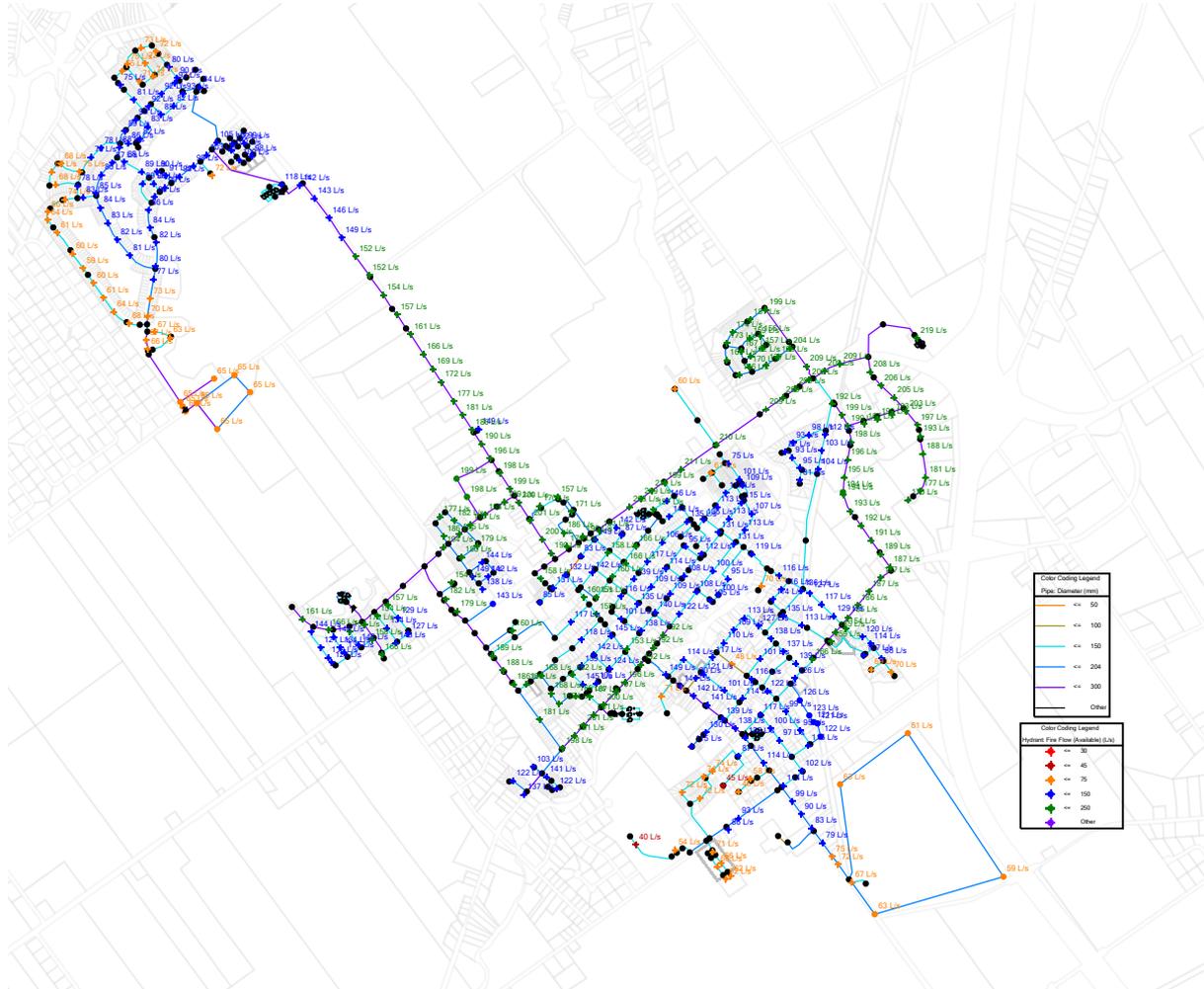
Maximum Day + Fire Flow Existing Conditions



33023-000 - North Grenville - Master Plan - Water Model

Maximum Day + Fire Flow

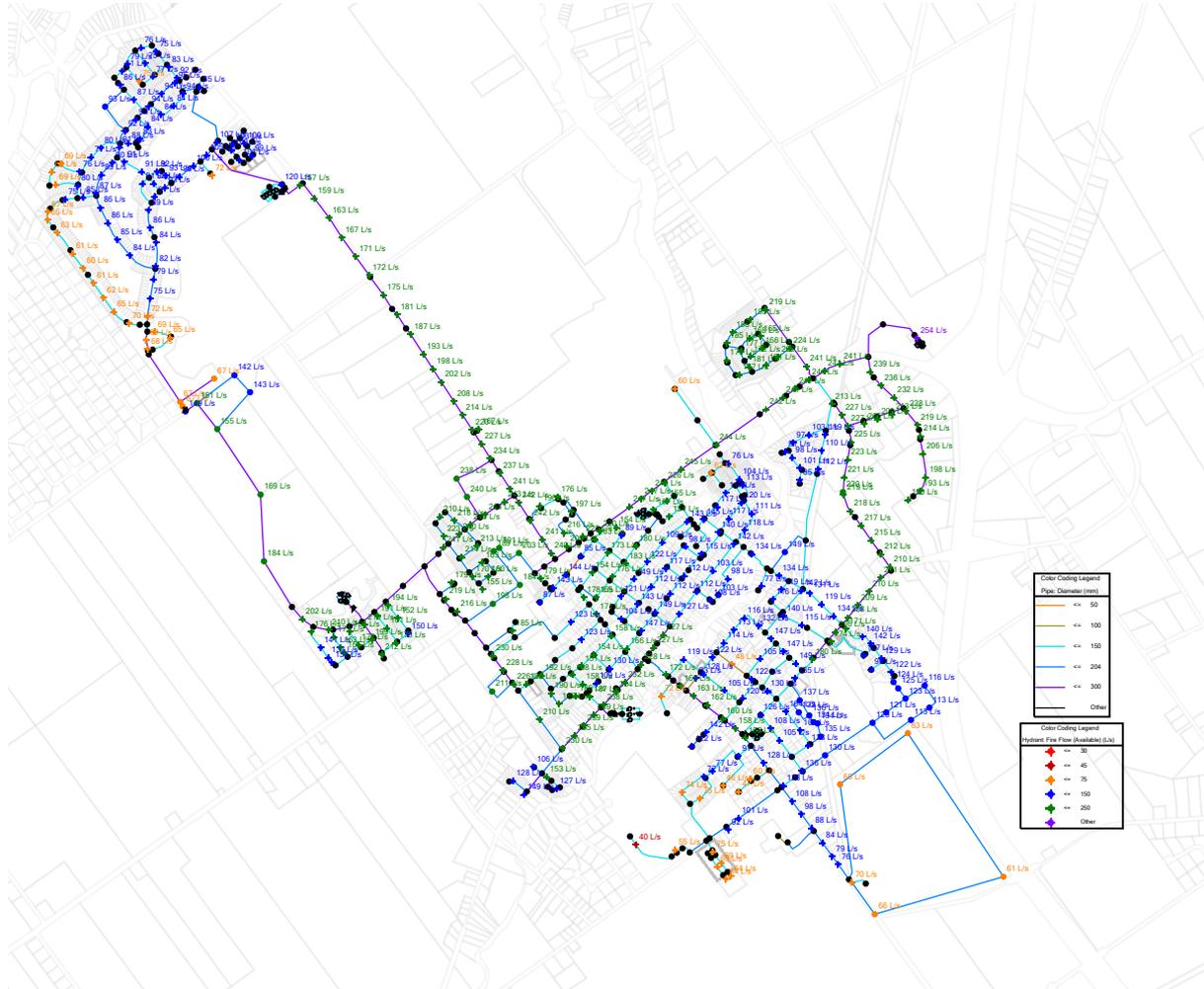
Short Term (0 to 5 Years)



33023-000 - North Grenville - Master Plan - Water Model

Maximum Day + Fire Flow

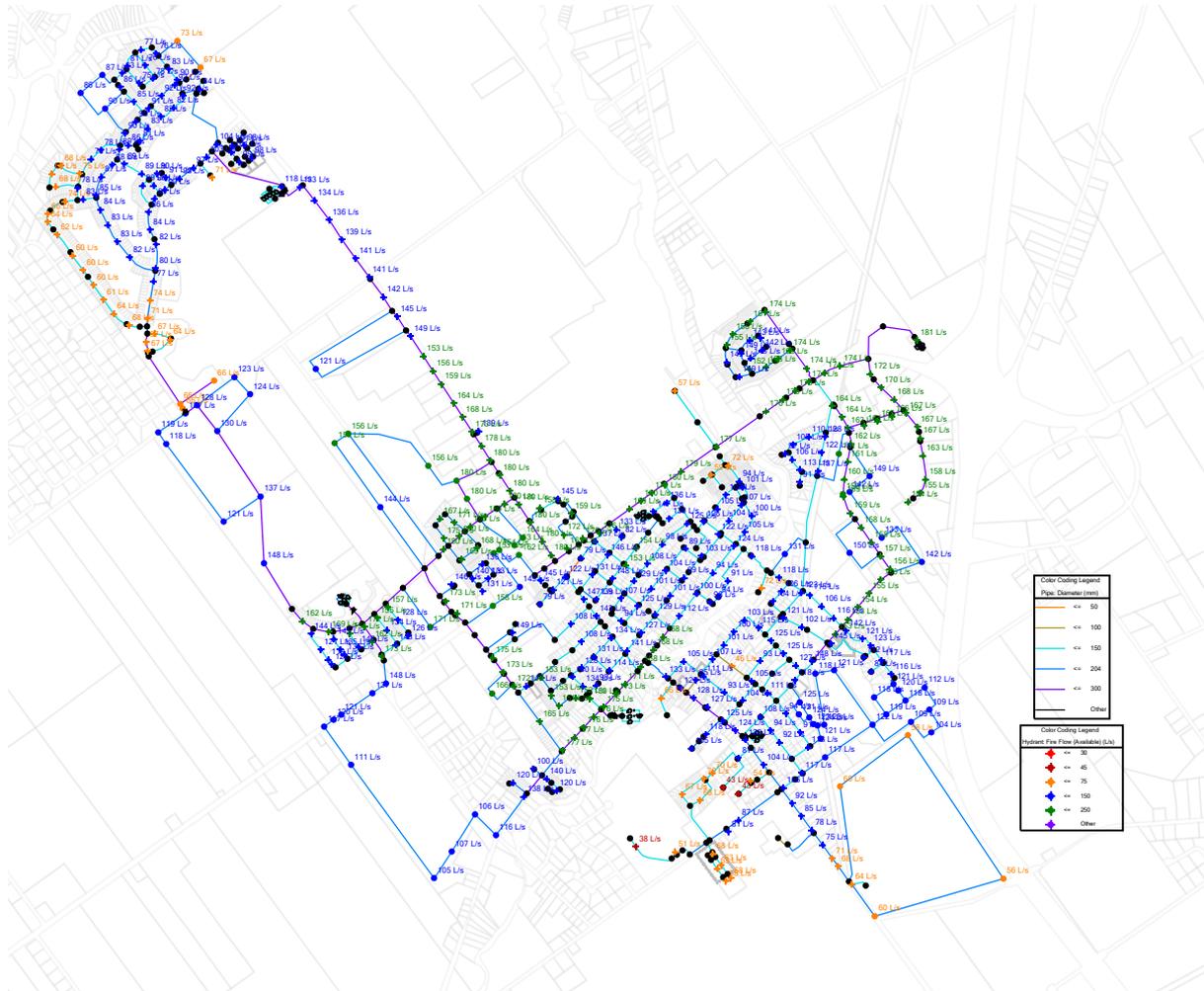
Mid Term (5 to 10 Years)



33023-000 - North Grenville - Master Plan - Water Model

Maximum Day + Fire Flow

Long Term (10 to 20 Years)



33023-000 - North Grenville - Master Plan - Water Model

Maximum Day + Fire Flow

Build Out (20+ Years)

