

Phase 1 Report
North Grenville Water and Wastewater Master Plan

August 2025

Prepared for:

MUNICIPALITY OF NORTH GRENVILLE
285 County Road 44
Kemptville, ON
K0G 1J0

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
343 Preston Street, Tower II, Suite 1000, Ottawa, ON K1S 1N4

JLR No.: 33023-000

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Phase 1 Report

North Grenville Water and Wastewater Master Plan

Table of Contents

1.0	Introduction	1
1.1	Background	1
1.2	Class Environmental Assessment and Master Planning	1
1.3	Phase 1 Methodology & Objectives	3
1.4	Previous Studies	4
2.0	Study Area	5
2.1	Study Area Boundary	5
2.2	Growth Projections	5
3.0	Natural Environment	9
3.1	Geology	9
3.2	Hydrogeology	9
4.0	Potable Water Distribution System	11
4.1	Existing Potable Water Supply	11
4.2	Historical Potable Water Demands	11
4.3	Potable Water System Design Criteria	12
4.4	Future Potable Water Demands	13
4.5	Future Water Storage Requirements	16
4.6	Hydraulic Water Model Update	20
4.7	Future Conditions Modelling	23
4.8	Water Distribution System Design Criteria	25
4.9	Model Simulation Results	26
4.10	Summary of Existing Conditions	35
4.11	Summary of Future Conditions	35
5.0	Wastewater Collection System.....	37
5.1	Existing Wastewater System	37
5.2	Historic Wastewater Flows and Bypasses	38
5.3	Wastewater System Design Criteria	40
5.4	Future Wastewater System Requirements	41
5.5	Wastewater Model.....	44
6.0	Problem & Opportunity Statement.....	51
7.0	Phase 2 Methodology & Next Steps.....	51
8.0	Limitations	52

List of Figures

Figure 1: Kemptville Urban Service Area – Water Infrastructure	7
Figure 2: Kemptville Urban Service Area – Wastewater Infrastructure	8
Figure 3: Natural Environment and Constraints	10
Figure 4: Projected Max Day Drinking Water Demand	15
Figure 5: Total Required Treated Water Storage.....	16
Figure 6: Projected Drinking Water Storage Volumes	19
Figure 7: Pressures under Average Day Demand for Each Scenario	28

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Figure 8: Pressures under Peak Hour Demand for Each Scenario	31
Figure 9: Available Fire Flows under Maximum Day Demand for Each Scenario	34
Figure 10: Projected Average Day Wastewater Flows.....	43

List of Tables

Table 1: Estimation of Existing Population	6
Table 2: Estimated Kemptville Urban Serviced Area Population	6
Table 3: Historical Raw Water Demands (2019 to 2023).....	11
Table 4: Drinking Water Treatment Subsystem Rated Capacities	11
Table 5: Historical Treated Water Demands (2019 to 2023).....	12
Table 6: Design Criteria - Water Demand Rates	12
Table 7: Existing and Future Water Demands	13
Table 8: Existing Reservoir Storage	16
Table 9: Future Water Storage Requirements	17
Table 10: Roughness Coefficients based on Pipe Diameter	20
Table 11: Northwest Quadrant Pumping Station	22
Table 12: Water Demands under Existing Conditions	23
Table 13: Flow Calculation Design Parameters for Existing Condition Updates and Future Growth Scenarios	24
Table 14: Total Water Demand per Future Growth Scenario	25
Table 15: F.U.S. Suggested Required Fire Flows	25
Table 16: Operating Conditions under Average Day Demand	26
Table 17: Operating Conditions under Peak Hour Demand	29
Table 18: Operating Conditions under Maximum Day Demand plus Fire Flow	32
Table 19: Sanitary Pumping Station Rated Capacities	37
Table 20: Historical Wastewater Demands (2020 to 2023).....	Error! Bookmark not defined.
Table 21: Days Exceeding WPCP Rated Capacities	39
Table 22: Kemptville WPCP Bypass and Spill Events 2019-2023	39
Table 23: Design Criteria - Wastewater Demand Rates	40
Table 24: Existing and Future Wastewater Demands	41
Table 25: Residential Design Parameters	46
Table 26: Catchment Area Summary under Existing Conditions	47
Table 27: Catchment Area Summary under Short-Term Conditions	48
Table 28: Catchment Area Summary under Mid-Term Conditions	48
Table 29: Catchment Area Summary under Long-Term Conditions	48
Table 30: Catchment Area Summary under Build-Out Conditions	48
Table 31: Highest Peak Design Flow per Future Growth Scenario	49

List of Appendices

Appendix A	Existing and Future Population, Employment and Land Use Implications and Analysis (J.L. Richards & Associates Limited, March 13, 2025)
Appendix B	Water Model Appendices
Appendix C	Wastewater Model Appendices

Phase 1 Report

North Grenville Water and Wastewater Master Plan

1.0 Introduction

1.1 Background

The Municipality of North Grenville (Municipality) is comprised of a mix of rural and urban development adjacent to the southern border of the City of Ottawa. The urban settlement area of Kemptville is serviced by water and wastewater systems owned and operated by the Municipality.

The Municipality is one of the fastest growing communities in eastern Ontario, with most of the growth within the northwest quadrant of the urban area. Due to this high growth rate, the Municipality retained J.L. Richards & Associates Ltd. (JLR) in 2024 to update the Municipality's Water and Wastewater Servicing Master Plan originally published in 2010 and previously updated in 2015.

Investments in the Municipality's water and wastewater infrastructure since 2015 include:

- extending sanitary services;
- construction of a new well, pumphouse and storage facility in the East Quadrant;
- building a new sanitary pump station (SPS) in the Northwest Quadrant of Kemptville;
- and a new well and pumping station in the Northwest Quadrant.

The purpose of this Master Plan update is to provide direction for water and wastewater servicing in Kemptville for the zero (0) to five (5) year, five (5) to ten (10) year, ten (10) to twenty (20) year and build out timelines, with a focus on water distribution and storage, wastewater conveyance and pumping, and capacity needs of the water supply system and wastewater treatment plant.

1.2 Class Environmental Assessment and Master Planning

The Ontario Environmental Assessment Act (Act) sets out a planning and decision-making process to consider potential environmental effects before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA (MCEA) process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. In 1987, the first Class EA document prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Amendments were subsequently made in 1993, 2000, 2007, 2011, 2015, and 2023.

The MCEA process includes the following stages:

- **Phase 1:** Problem and/or opportunity identification.
- **Phase 2:** Identification and evaluation of alternative solutions.
- **Phase 3:** Preparation of alternative design concepts to support a preferred solution.
- **Phase 4:** Preparation of an Environmental Study Report (ESR) for posting and review on the public record.
- **Phase 5:** Project implementation and monitoring.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Since projects may vary in their environmental impact, they are now classified in terms of the following schedules, pursuant to the most recent amendment to the MCEA process in 2023:

- ‘Exempt’ projects, most of which were formerly classified as Schedule A and A+ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal environmental effects.

While these projects are exempt from the MCEA process, proponents should consider whether notice about the project should be given or consultation on the project should be carried out. Furthermore, proponents are also responsible for obtaining any other applicable permits, approvals, and authorizations for the project.

- ‘Eligible for Screening to Exempt’ projects may be eligible for exemption based on the results of a screening process. Proponents may choose to complete the applicable screening process to determine whether the project is eligible for exemption or proceed with the applicable Schedule ‘B’ or Schedule ‘C’ process, as noted below.
- Schedule ‘B’ projects have the potential for some adverse environmental impacts and therefore, the proponent is required to undertake the first two phases of the MCEA process.

This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; and the preparation of a Project File which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project.

Generally, these projects include improvements and minor expansions to existing facilities or smaller new projects.

- Schedule ‘C’ projects have the potential for greater environmental impacts and are subject to the full MCEA process.

This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; identifying, assessing, and refining alternative solutions to determine a preferred solution; and preparing the ESR which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project.

Generally, these projects include the construction of new facilities and major expansions to existing facilities.

A Master Plan is conducted under the framework of the MEA Class EA Process. It is a planning tool that identifies infrastructure requirements for existing and future land use, through the application of environmental assessment principles, and is intended to satisfy Phases 1 and 2 of the Class EA process. The Municipal Class EA guideline identifies four (4) basic approaches of the Master Planning process, including:

- **Approach No. 1:** This approach concludes at the end of Phases 1 and 2 of the Municipal Class EA Process. With this approach, the Master Plan is being completed at a broad level of assessment and may require further detailed assessment at the project-specific level depending on the nature of the project.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

- **Approach No. 2:** This approach also concludes at the end of Phases 1 and 2 of the Municipal Class EA Process. However, the level of detail (i.e., investigation, consultation, and documentation) fulfills the requirements for Schedule 'B' projects.
- **Approach No. 3:** This approach involves the preparation of a Master Plan document at the conclusion of Phase 4 of the Municipal Class EA Process. The level of detail of the Master Plan document can fulfill requirements for Schedule 'B' and/or Schedule 'C' projects.
- **Approach No. 4:** This approach involves integration with the approvals under the Planning Act.

The North Grenville Water and Wastewater Master Plan will follow Approach No. 1, which involves the preparation of a report at the conclusion of Phases 1 and 2. The Master Plan has been completed at a broad level of assessment, which requires more detailed investigations at a project-specific level in order to fulfill the Municipal Class EA documentation requirements for any specific Schedule 'B' and 'C' projects identified within the Master Plan.

This Master Plan should be reviewed every five years to determine the need for detailed formal review and/or updates. Potential changes, which may trigger the need for an update, include:

- Major changes to the original assumptions.
- Major changes to components of the Master Plan.
- Significant new environmental effects.
- Major changes in the proposed timing of projects within the Master Plan based on changed conditions relative to the original projections/predictions.

1.3 Phase 1 Methodology & Objectives

A kickoff meeting was held between JLR and the Municipality on June 26, 2024. The Township provided available related documentation to JLR for review.

A Problem and Opportunity statement was generated from Phase 1 related work and is presented in Section 6.0 of this report.

This Phase 1 Report was prepared to summarize the findings from the first phase of the Master Plan process and to provide a basis for the identification and evaluation of alternative options during Phase 2.

Phase 1 of the Master Planning process includes the review of existing background information and identifies constraints and potential problems with the potable water and wastewater systems.

The objectives of this Report are:

- To provide a description of existing conditions and constraints associated with the potable water distribution and wastewater collection systems.
- To establish proposed design basis for future servicing needs.
- To identify land use and planning constraints, and natural environment constraints.
- To establish a Problem/Opportunity Statement; and
- To confirm Phase 2 methodology and next steps.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

1.4 Previous Studies

The following is a summary of previous studies undertaken for the Kemptville drinking water and wastewater systems:

Municipality of North Grenville, Water Pollution Control Plant and Sanitary Pump Station Optimization and Expansion Environmental Class Assessment	XCG, April 2010
Schedule “C” Municipal Class Environmental Assessment (Class EA) to develop preferred alternatives and design concepts for the expansion and upgrades to the Kemptville Water Pollution Control Plant (WPCP) to accommodate projected sewage flows over a 20-year design period.	
North Grenville Potable Water and Wastewater Master Plan Update	Stantec January 2016
The Master Plan evaluated servicing alternatives to accommodate anticipated developments to the buildout year of 2034. The Plan also identified improvements to drinking water and wastewater infrastructure to address needs of areas expected to be grow and develop.	
Municipality of North Grenville, Water Pollution Control Plant and Sanitary Pump Station Optimization and Expansion Environmental Study Report Addendum	JLR April 2019
Amendment of the 2010 Class EA ESR by filing the Water Pollution Control Plant and Sanitary Pump Station Optimization and Expansion Environmental Study Report Addendum (2019 ESR Addendum) to account for updated flow projections to 2038, new advancements in wastewater treatment technologies and changing regulatory requirements.	
Groundwater Vulnerability Study and Threat Assessment, Kemptville – Merrickville Systems	Golder Sept 2019
Update to the 2008 Groundwater Vulnerability Study of the Kemptville communal well system to include the addition of the East Quadrant Well. An updated groundwater flow model was developed to identify the wellhead protection areas (WHPA). Vulnerabilities to the source water were also identified, assessed and categorized.	
Northwest Quadrant Water Distribution System Expansion Class Environmental Assessment Study	CIMA+ March 2021
Schedule ‘B’ Municipal Class Environmental Assessment (MCEA), to evaluate servicing alternatives to expand the drinking water system to accommodate the anticipated growth outlined in the 2015 Master Plan Update. The preferred solution was the establishment of the Northwest Quadrant Well, storage reservoir and pumping station.	
Municipality of North Grenville, Water Pollution Control Plant and Sanitary Pump Station Optimization and Expansion Environmental Study Report Addendum	JLR January 2022
Update to the 2019 Class EA ESR Addendum to document the required rated capacity, raw wastewater quality design parameters and WPCP upgrades scope modifications that are required to accommodate the new correctional facility.	

Phase 1 Report

North Grenville Water and Wastewater Master Plan

2.0 Study Area

2.1 Study Area Boundary

The Municipality's drinking water system is operated under the Ministry of Environment, Conservation and Parks (MECP) Municipal Drinking Water License (MDWL) Number 159-101 and Permit to Take Water (PTTW) Number 4703-C95KNP. The system is serviced by five groundwater wells, three below grade reservoirs, three above-grade reservoirs and six booster pumping stations. The groundwater wells are the Alfred Street Well, Kernahan Street Well, Van Buren Street Well, East Quadrant Well, and the Northwest Quadrant Well. There is one below grade reservoir and pumping station at each of the Alfred, Kernahan and Van Buren Street Wells. The above grade storage facilities and remaining pumping stations are located at the eQuinelle development, East Quadrant, and Northwest Quadrant. Figure 1 shows the existing water infrastructure within the Kemptville urban service area.

The Municipality's wastewater system is operated under the Ministry of Environment, Conservation and Parks (MECP) Environmental Compliance Approval Number 9890-CL9RJR. The system consists of four pumping stations, Bridge Street, East Quadrant, Northwest Quadrant and eQuinelle and a wastewater treatment plant (WWTP) located off County Rd 43. The 2019 Environmental Study Report for the WWTP found that the wastewater treatment system maximum day capacity of 11,370 m³/d was insufficient to meet to the projected demand from the development and is currently advancing the construction of the recommendations of the ESR which will see a maximum day capacity increase to 15,000 m³/d to service the population growth to 2038. Figure 2 shows the existing water infrastructure within the Kemptville urban service area.

2.2 Growth Projections

Population projections were established and summarized in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report*, prepared by JLR on March 13, 2025, for the following planning periods:

- Existing conditions (2025)
- 0 to 5 year (2026 - 2031)
- 5 to 10 year (2031 – 2036)
- 10 to 20 year (2036 – 2046)
- 20+ year buildout (beyond 2046)

The report is available in Appendix A.

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 4,051 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. For the purposes of this Water and Wastewater Servicing Master Plan, the population noted in the Long-term Population, Housing and Employment Study was used as the basis for the existing population.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

The 2025 population was estimated by updating the 2021 Census population with the developments that have been constructed and serviced to date, summarized in the table below.

Table 1: Estimation of Existing Population

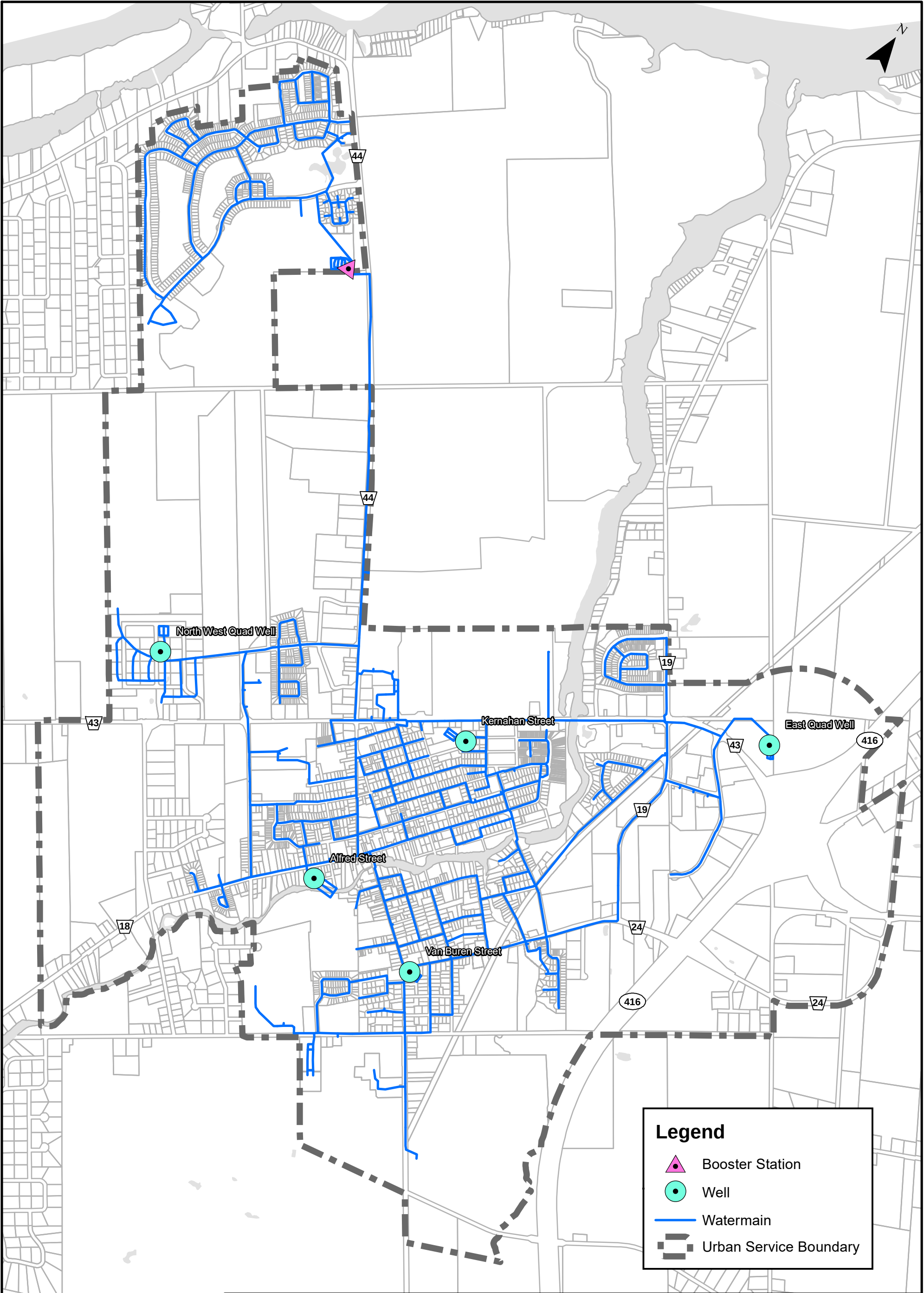
	Population
Census population – Urban Service Area (2021)	6,000
Development ID #1 (north section) Singles = 45 units Townhomes = 29 units	231
Development ID #3 Singles = 100 units Townhomes = 213 units Apartments = 120 units	1,155
Existing population (2025)	7,386

The estimated future Kemptville population in the urban serviced area was developed for each planning period in the Master Plan through consultation with the Municipality and current development applications. These estimated populations are summarized in the following table.

Table 2: Estimated Kemptville Urban Serviced Area Population

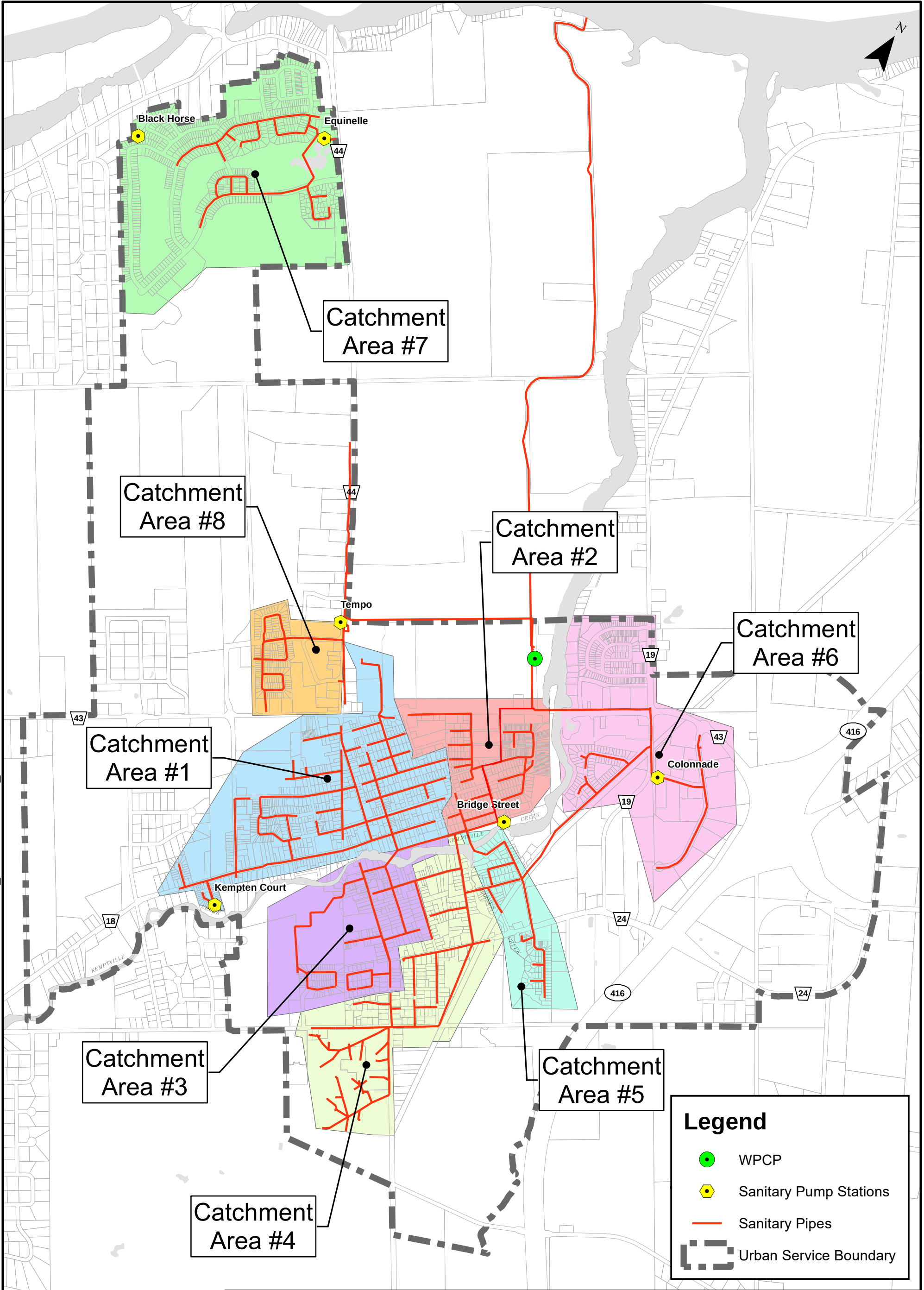
Year	Kemptville Urban Serviced Area Population
Census (2021)	6,000
Existing (2025)	7,386
0-5 year (2026-2031)	9,366
5-10 year (2031-2036)	11,986
10-20 year (2036-2046)	22,401
Buildout (beyond 2046)	34,764

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PROJECT:		North Grenville Water and Sewer Master Plan	
		Kemptville, Ontario	
DRAWING:		Kemptville Urban Service Area - Water Infrastructure	
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Phase 1 Report

North Grenville Water and Wastewater Master Plan

3.0 Natural Environment

Refer to Figure 3, which identifies significant natural environment, wetland and floodplain areas within the study area.

Limitations associated with natural environment constraints will be further explored in Phase 2.

3.1 Geology

Surficial and bedrock geology of the Kemptville area is outlined in the 2019 Groundwater Vulnerability Study prepared by Golder. Refer to the study for more details.

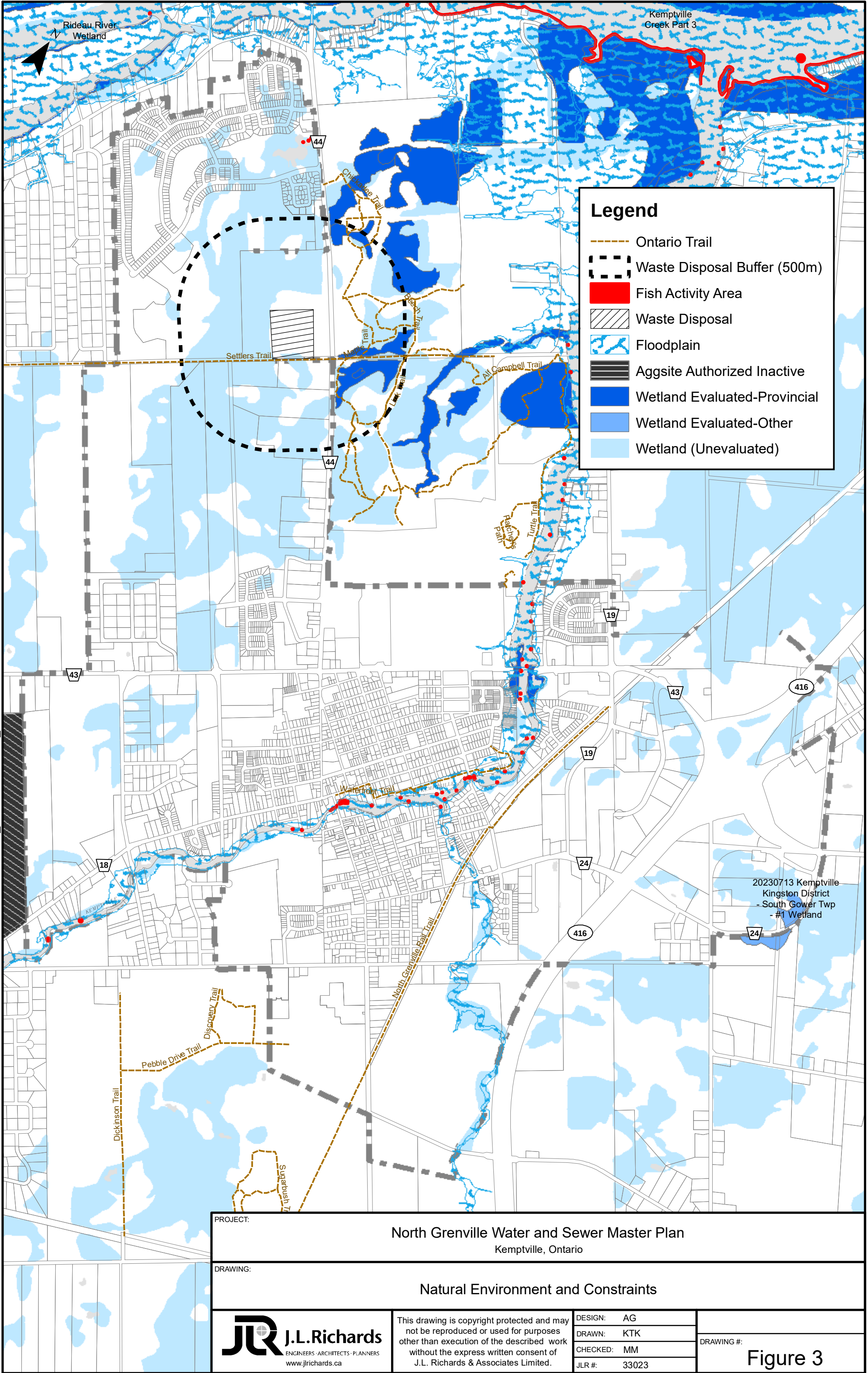
In general, the Study area contains surficial deposits generally consisting of glacial till, offshore marine clay, and near shore fine to medium sand. Overburden thickness is generally 2-10m with local areas up to 20m. Silt and clay deposits are found in areas along Kemptville Creek and Rideau River.

3.2 Hydrogeology

Hydrogeology and groundwater information of the Kemptville area are outlined in the 2019 Groundwater Vulnerability Study prepared by Golder. Refer to the study for more details.

Groundwater supply for drinking water is primarily sourced by bedrock aquifers. Overburden aquifers with sufficient quantities for domestic use are uncommon. The shallow bedrock aquifer is present in the Oxford Formation, and is the primary source of water for private supply wells. The deep bedrock aquifer is present in the lower March formation and within the Nepean Formation, and is the primary source of water for larger commercial and municipal groundwater supply systems, including Kemptville and Merrickville. The aquifer is generally productive. Groundwater quality is generally good but hard, with localized occurrences of elevated iron, sodium, chloride and hydrogen sulphide.

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Phase 1 Report

North Grenville Water and Wastewater Master Plan

4.0 Potable Water Distribution System

4.1 Existing Potable Water Supply

The Municipality's drinking water system is serviced by five groundwater wells: the Alfred Street Well, Kernahan Street Well, Van Buren Street Well, East Quadrant Well, and the Northwest Quadrant Well. Each drilled well is protected by a stainless steel casing and equipped with a submersible well pump. Duty/standby metering pumps inject sodium hypochlorite into the raw water before it enters a storage reservoir for contact time. Duty/standby centrifugal pumps discharge the treated water into the distribution system. The wells are authorized under the Ministry of the Environment, Conservation and Parks (MECP) Permit to Take Water (PTTW) No. 5856-C8ZQ57. The combined PTTW daily water taking limit of all the Municipality's wells is 10,460.24 m³/d.

Table 3: Historical Raw Water Demands (2019 to 2023)

Year	Average Day Demand (m ³ /d)	Maximum Day Demand (m ³ /d)	Max Day Factor
2019	1967	2944	1.5
2020	1808	2871	1.6
2021	1816	3321	1.8
2022	2090	3446 ⁽¹⁾	1.6
2023	1817	2614	1.4
Overall	1900	3446	1.8
Notes:			
(1) Single day max on October 26, 2022 (4,184 m ³ /d) removed as an outlier.			

As seen in Table 3, the overall average day potable water demand is 1,900 m³/d, and the maximum day demand is 3,446 m³/d. This maximum day demand is roughly 33% of the PTTW limit.

4.2 Historical Potable Water Demands

The Kemptville Drinking Water System operates under Municipal Drinking Water License (MDWL) No. 159-201, with a combined rated capacity of 6,819.92 m³/d, which includes the Alfred Street, Van Buren Street, Kernahan Street and East Quadrant subsystems. With the addition of the new Northwest Quadrant system in 2022, the combined rated capacity is 8,807.12 m³/d. With the largest subsystem (East Quadrant) out of service, the total system capacity is 6,621.12 m³/d.

Table 4: Drinking Water Treatment Subsystem Rated Capacities

Treatment Subsystem	Rated Capacity (m ³ /d)
Alfred Street	1,961.28
Van Buren Street	1,363.68
Kernahan Street	1,308.96
East Quadrant	2,186.00
Northwest Quadrant	1,987.20

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Treatment Subsystem	Rated Capacity (m ³ /d)
Total MDWL Rated Capacity	8,807.12
Total System Capacity (largest subsystem out of service)	6,621.12

The historical treated water demands provided by the Municipality are summarized below:

Table 5: Historical Treated Water Demands (2019 to 2023)

Year	Average Day Demand (m ³ /d)	Maximum Day Demand (m ³ /d)	Maximum Day Factor
2019	1965	2859	1.5
2020	1815	2749	1.5
2021	1806	2661	1.5
2022	2082	3449 ⁽¹⁾	1.7
2023	1802	2684	1.5
Overall	1894	3449	1.8
Notes:			
(1) Single day max on October 26, 2022 (4,205 m ³ /d) removed as an outlier.			

As seen in Table 5, the overall average day potable water demand is 1,894 m³/d, and the maximum day demand is 3,449 m³/d. This results in an overall maximum day factor of 1.82 times the average day demand. This maximum day demand is roughly 39% of the MDWL total rated capacity and roughly 52% of the total system capacity with one well subsystem out of service.

4.3 Potable Water System Design Criteria

Table 4 summarizes the water demand rates used to evaluate the Municipality's potable water system.

Table 6: Design Criteria - Water Demand Rates

Land Use	Design Criteria	Maximum Day Factor ⁽¹⁾
Existing Residential ⁽¹⁾	256.4 L/cap/day	1.82
Future Residential ⁽¹⁾	256.4 L/cap/day	1.82
Future Commercial ⁽²⁾	28,000 L/ha/day	1.82
Future Industrial ⁽³⁾	35,000 L/ha/day	1.82
Future School ⁽⁴⁾	70 L/student/day	1.82
Future Hotel ⁽⁴⁾	225 L/bed/day	1.82
Future Retirement Home ⁽⁵⁾	256.4 L/bed/day	1.82
Notes		
(1) Historical Flow Analysis		
(2) MECP Drinking Water Design Guidelines 3.4.3		

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Land Use	Design Criteria	Maximum Day Factor ⁽¹⁾
(3) MECP Drinking Water Design Guidelines 3.4.4		
(4) MECP Drinking Water Design Guidelines Table 3-2		
(5) Assumed residential ADD		

Peak hour factors are based on Table 3-1 of the MECP Drinking Water Design Guidelines, based on population.

4.4 Future Potable Water Demands

The following table summarizes the existing and future water demands:

Table 7: Existing and Future Water Demands

Demand Scenario	Existing Conditions (2025) ⁽³⁾	Short-Term	Mid-Term	Long-Term	Build-Out
		(2026-2031)	(2031-2036)	(2036-2046)	(beyond 2046)
Population Growth	0	1,452	2,620	10,415	12,363
Total Serviced Population ⁽¹⁾⁽²⁾	7,386	8,838	11,458	21,873	34,236
ICI - Commercial Development Area (ha)		4.0	39.1	17.9	22.5
ICI - Retirement Home (No. Beds)		-	-	192.0	-
ICI - School (No. Students)		417			
ICI - Hotel (No. Beds)		-	74.0	-	-
ICI - Industrial Development Area (ha)		-	-	-	11.8
ICI - Correctional Facility					
Average Day (m ³ /day)		261	-	-	-
Max Day (m ³ /day)		556	-	-	-
Peak Hour (m ³ /day)		893	-	-	-
Average Day (m ³ /day) - Residential		372	672	2,671	3,170
Average Day (m ³ /day) - ICI		402	1,111	550	1,043
Average Day (m ³ /day) - Total	1,894	2,668	4,452	7,672	11,885
Maximum Day (m ³ /day)	3,449	4,941	8,188	14,053	21,726
Peak Hour (m ³ /day)	5,682	8,116	13,198	22,377	33,752

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Demand Scenario	Existing Conditions (2025) ⁽³⁾	Short-Term	Mid-Term	Long-Term	Build-Out
		(2026-2031)	(2031-2036)	(2036-2046)	(beyond 2046)
Notes					
(1) The total serviced population represents residential population only and excludes equivalent institutional households and populations.					
(2) Total population excludes correctional facility population (528 persons) as demands are identified separate from residential flows.					
(3) Population of 6000 as of 2021 with addition of recently built developments.					

Figure 4 represents the projected maximum day water demand and anticipated timing to reach the System Capacity (with the largest well subsystem out of service), the MDWL rated capacity and the PTTW limit. With the largest well system out of service, 80% of the system capacity will be reached in 2031, and 100% in 2033. Regarding the MDWL rated capacity, 80% will be reached in 2034, and 100% will be reached in 2036. The PTTW limit will be reached by 2039.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

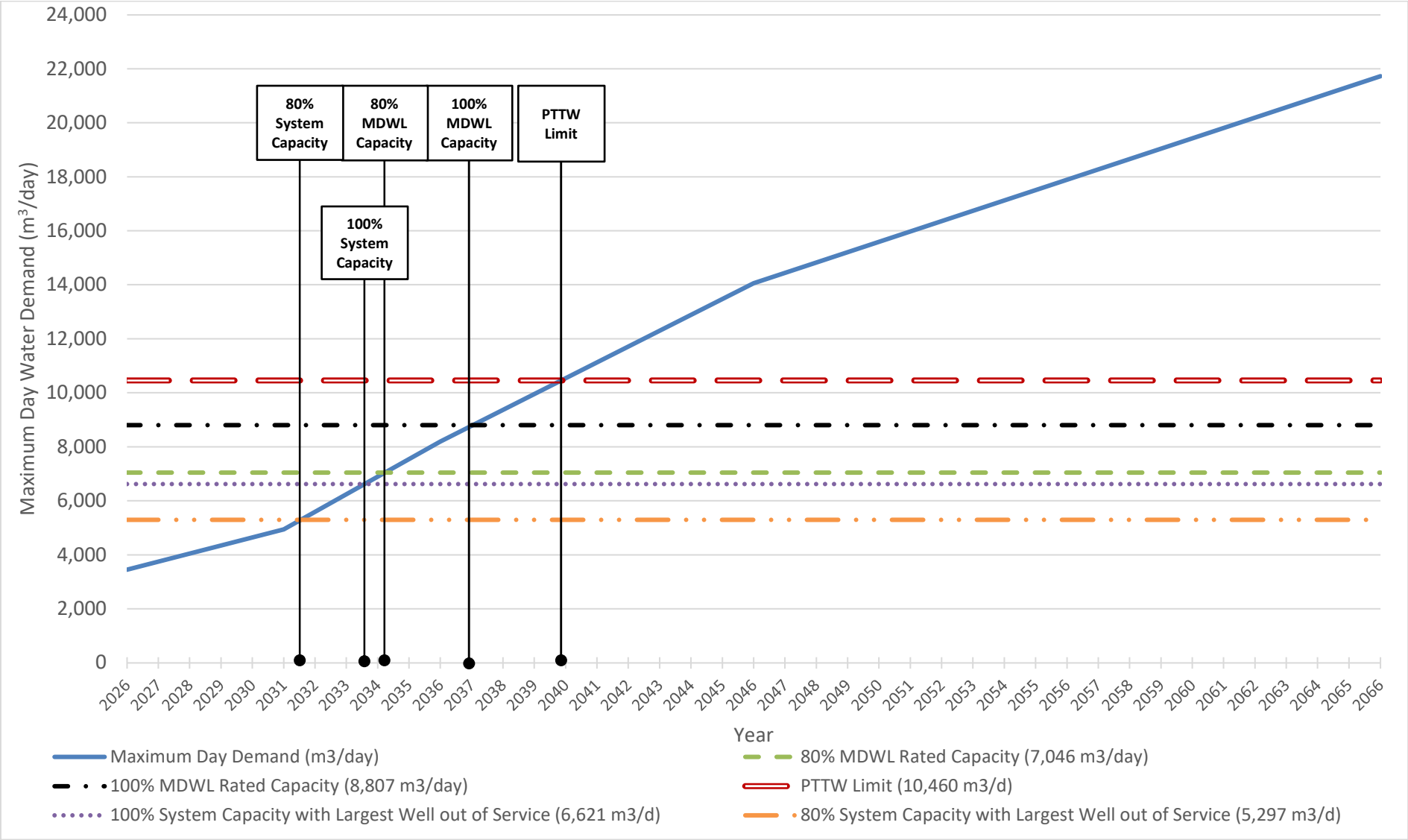


Figure 4: Projected Max Day Drinking Water Demand

Phase 1 Report

North Grenville Water and Wastewater Master Plan

4.5 Future Water Storage Requirements

The Kemptville Drinking Water System has six (6) at-grade storage reservoirs, The following table summarizes the available storage at each of these reservoirs.

Table 8: Existing Reservoir Storage

Reservoir	Effective Storage Volume (m3)
Alfred	801
Van Buren	880
Kernahan	900
eQuinelle	1,176
East Quad	1,370
Northwest Quad	1,370
Total	6,497

Per MECP Design Guidelines for Drinking-Water Systems (2008), total available treated water storage within the system should at least amount to the sum of the required equalization storage (B), fire storage (A), and emergency storage (C) allowances, as depicted in Figure 5.

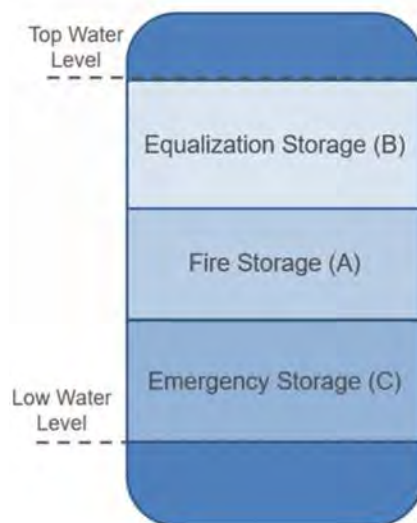


Figure 5: Total Required Treated Water Storage

Based on these guidelines, Table 9 provides a summary of the estimated existing, short, mid, and long-term and build-out total storage requirements for Kemptville. Note that the equivalent population in the table is not equal to the service population as used in previous sections of this report. The service population is the number of residents living in the Kemptville urban serviced

Phase 1 Report

North Grenville Water and Wastewater Master Plan

area. The equivalent population considers contributions from residential and ICI water demand and was calculated using the following equation:

$$\text{Equivalent Population} = \frac{\text{Average Day Demand}}{\text{Average Per Capita Water Consumption}}$$

Based on the available information, the existing treated water storage volume is sufficient for the existing demand. It is anticipated that the storage capacity will be insufficient for water demand in the mid-term projections. Additional modelling will be completed in Phase 2 of the Master Plan to incorporate future development growth and investigate storage pressure constraints.

Table 9: Future Water Storage Requirements

Parameter	Existing (2025)	Short-Term (2026-2031)	Mid-Term (2031-2036)	Long-Term (2036-2046)	Build-out (2046+)
Cumulative Equivalent Population ⁽¹⁾	7,386	10,406	17,361	29,921	46,352
Fire Flow ⁽²⁾ (L/s)	169	193	252	333	405
Duration ⁽²⁾ (Hours)	3.0	3.0	4.0	5.3	6.9
A – Fire Storage ⁽³⁾ (m ³)	1,829	2,087	3,668	6,337	10,077
B – Equalization Storage ⁽⁴⁾ (m ³)	862	1,235	2,047	3,513	5,431
C – Emergency Storage ⁽⁵⁾ (m ³)	673	830	1,429	2,463	3,877
TOTAL STORAGE REQUIREMENT (m ³)	3,365	4,152	7,144	12,313	19,385
EXISTING AVAILABLE STORAGE (m ³)	6,497	6,497	6,497	6,497	6,497
Deficit (m ³)	None	None	647	5,816	12,888

Notes

(1) Estimated to be equal to average day demand / per capita usage of 256.4 L/cap/d. The equivalent population also includes ICI flow contribution.

(2) Values interpolated from Table 8-1 of the MECP Design Guidelines (2008) based on equivalent service population. Fire flow is described as the largest expected fire flow requirement in L/s and duration is length of time fire flow shall be sustained. A sensitivity analysis was completed to compare fire flow by MECP and Fire Underwriters Survey (FUS) methods. Using FUS method, Table 8, exposure distance of less than 3 m for row housing, it generates a fire flow of 9,000 L/min or 150 L/s. The MECP method generates a more conservative estimate for fire flow and is representative of holistic approach for a

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Parameter	Existing (2025)	Short-Term (2026-2031)	Mid-Term (2031-2036)	Long-Term (2036-2046)	Build-out (2046+)
drinking water distribution system. As such, MECP fire flow numbers are being used for future water storage requirement calculations.					
(3) Largest expected fire volume = fire flow x duration					
(4) 25% of Maximum Day Demand					
(5) 25% of the sum of 'A' and 'B'					

Figure 5 represents the projected storage volume requirements and anticipated timing to reach 80% and 100% of available storage. Based on the projected growth, 80% capacity will be reached in 2033, and 100% capacity will be reached in 2034.

Phase 1 Report
North Grenville Water and Wastewater Master Plan

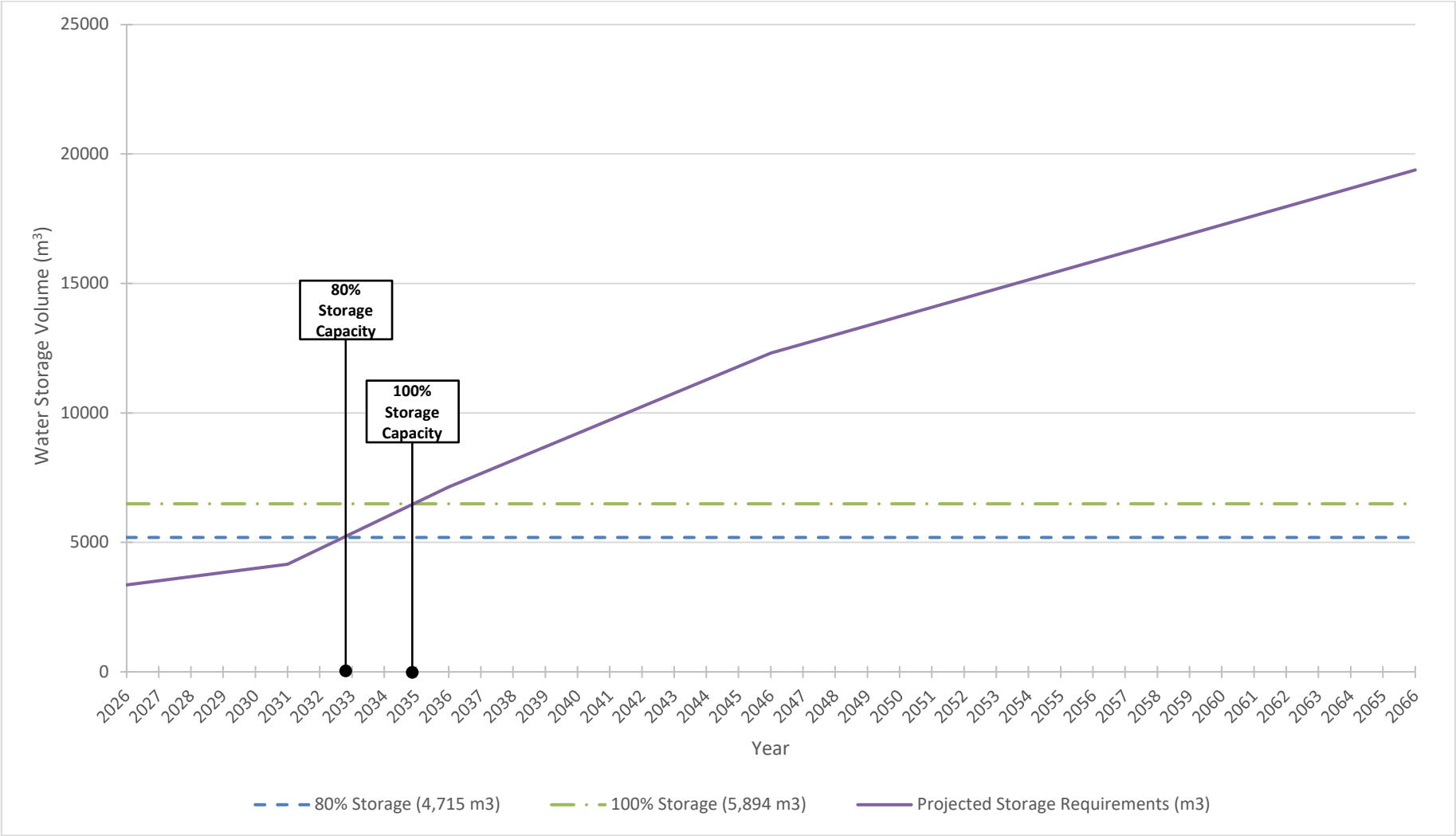


Figure 6: Projected Drinking Water Storage Volumes

Phase 1 Report

North Grenville Water and Wastewater Master Plan

4.6 Hydraulic Water Model Update

The Hydraulic Water Model for the Municipality was previously updated in 2020. In support of the current Master Plan, the water model was updated based on existing conditions and the future growth scenarios. The modelled scenarios include existing conditions for the year 2025 given the historical metered water demand data and recently completed developments, 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 to 2046, and build-out (20+ years) from 2046 onward.

4.6.1 Existing Watermain Network

The existing conditions scenarios were taken from the previous 2020 model and were updated based on information provided by the Municipality via comments (refer to Appendix B) and engineering design drawings for new development areas and pipe upgrades. Pressure reducing valve (PRV) settings and the static elevations of water reservoirs were not changed from the previous model. The following Hazen-Williams friction loss coefficients (C-factors) in the table below were used for all new pipes added:

Table 10: Roughness Coefficients based on Pipe Diameter

Pipe Diameter (mm)	C-Factor
150	100
200 to 250	110
300 to 600	120

The following updates were made to the watermain network for existing conditions:

- Kemptville College Campus CEPEO
 - o Added 200 mm and 100 mm water services to two (2) buildings including the administration building and the Rorke Hall.
 - o Junction elevations were obtained from the contour lines on the engineering drawing.
 - o Lengths of the two (2) services were manually measured and added to the model based on the scaled engineering drawing.
- Reuben Crescent
 - o Existing pipe upgraded to 200 mm.
- Concession Road
 - o Existing pipe upgraded to 200 mm between the intersection of Concession Road and Prescott Street and the intersection of Concession Road and Dr Gordon Crescent.
- Bowen and Maley Looping
 - o Watermain loop added between Bowen Crescent and Maley Street.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

- County Road 43
 - o Existing pipe upgraded to 300 mm from the section of pipe between the intersection of County Road 43 and James Street and the intersection of County Road and King Street.
- eQuinelle Phases 5 and 6
 - o Junction and hydrant elevations as well as pipe sizes added per drawings provided.
- Oxford Village
 - o Assumed 300 mm connection to existing watermain on Depencier Drive
 - o Junction and hydrant elevations as well as pipe sizes added per drawings provided.
- County Road 43
 - o Updated the watermain loop near the intersection of County Road 43 and County Road 44 per the Municipality Markup.
- Victoria Avenue
 - o Updated watermain between Victoria Avenue and Asa Street to a 100 mm pipe per Municipality Markup.
- Wellington Road
 - o Updated watermain to a 150 mm from the intersection of Wellington Road and Bridge Street to the intersection of Wellington Road to Westerra Way.

4.6.2 Northwest Quadrant Pumping Station

The recently constructed Northwest Quadrant Pumping Station was added to the model based on the *Northwest Quadrant Water System Kemptville, Issued for Building Permit Application* drawing set (CIMA+, April 2021) and *Design Report for the Northwest Quadrant Water Distribution System Expansion* (CIMA+, April 2021). The information presented in this section was based on these documents.

The site includes a well, a water storage reservoir, and the pumping station equipped with two (2) high lift pumps and one (1) high flow pump. These pumps are only designed to supply a portion of the design flow requirements for the Kemptville Drinking Water System.

As the water model is intended to evaluate the distribution system, the Northwest Quadrant Pumping Station was modelled schematically and simplified to exclude the well and well pump. A static reservoir was modelled at the low water level of 97.40 m (i.e. the level at which the reservoir starts to fill) to conservatively represent the water storage reservoir. The high lift pumps and high flow pump draw water from this reservoir to discharge to the system. The high lift pumps are identical and were modelled with Variable Frequency Drives (VFDs) to target a discharge pressure of 535 kPa per the CIMA+ report. Suction and discharge piping into and out of the pumps was modelled representatively in terms of diameters and lengths. A Flow Control Valve (FCV) was modelled at the pumping station discharge to ensure the model did not exceed the pump

Phase 1 Report

North Grenville Water and Wastewater Master Plan

capacity for each scenario as outlined in the Model Simulation Results Section. Minor losses within the pumping station were not included in the model.

The following setpoints and inputs were modelled at the pumping station:

Table 11: Northwest Quadrant Pumping Station

Description	Model Input
Storage reservoir water level	97.40 m (60% full)
Pump elevations	94.06 m
Pump curves	Refer to Appendix B
Pump discharge pressure target (VFD input)	535 kPa at J373
Suction piping	200 mm diameter, C=110, Length 5.15 m
Discharge piping	150 mm diameter, C=100, Length 9.00 m

It is noted that VFDs are not modelled at the other existing pumping stations except at East Quadrant Pumping Station.

4.6.3 Existing Water Demands

Per the above Section 4.2, the Municipality's Treated Daily Flow data over five (5) years (2019 to 2023) was used to determine the total average day, maximum day and peak hour water demands for the system, and for both pressure zones separately. The data was averaged to determine a total existing (2023) average day demand of 1,894 m³/day (Kemptonville zone 1,731 m³/day, eQuinelle zone 163 m³/day). The Municipality also provided a list of the annual high-water users, and the top ten (10) highest water user demands were manually input in the water model at the nearest junction node. Based on the available data, the ten (10) highest water users accounted for 251 m³/day of water consumption, which represents approximately 13% of the overall average day consumption for the community.

The eQuinelle pressure zone was calculated to have an average day demand of 163 m³/day based on the average of the data provided for 2020 – 2023 (no water data was provided for eQuinelle BPS in 2019). To determine the maximum day demand, an average day to maximum day peaking factor of 1.82 for the Kemptonville zone and 1.60 for the eQuinelle zone was used, which was calculated based on the actual 2019 - 2023 data for Kemptonville and 2020 – 2023 data for eQuinelle. The maximum day demand of 261 m³/day for eQuinelle was taken to be the maximum day across the four years (December 1st, 2022). Similarly, a peaking factor of 3.0 multiplied by average day demand was used to establish the peak hour demand, which is consistent with the Ministry of the Environment, Conservation and Parks (MECP) Guidelines given an existing population of 7,386 people. This population is within the 3,001 – 10,000 population range outlined in MECP. The table below summarizes the water demands for existing conditions that have been incorporated into the model. Refer to Appendix B for a detailed summary of the updated model demands.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Table 12: Water Demands under Existing Conditions

Demand Scenario	Demand (L/s)		
	Kemptville Zone	eQuinelle Zone	Total
Average Day	20.04	1.88	21.92
Maximum Day	36.91	3.01	39.92
Peak Hour	60.11	5.65	65.76

4.7 Future Conditions Modelling

4.7.1 Future Watermain Network

The watermain network was updated for all future growth scenarios including short-, mid-, long-term and build-out scenarios based on the populations and areas outlined in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (March 13, 2025). The following assumptions were applied to the watermain network for all future growth scenarios:

- All future watermains consist of 200 mm diameter pipes with a material of PVC as there were no engineering drawings provided for any future developments.
- All elevations of the proposed junctions in future growth scenarios were based on the latest LiDAR data (dated 2025).
- All subdivisions consist of a looped watermain connection with a minimum of two (2) connections to the existing water network per the *Municipality of North Grenville's Engineering Standards for Design, Approval, and Construction*, dated August 2022. Connections were made to the existing system only where necessary to illustrate the capacity of the current system to support development and determine the need for upgrades and additional watermains.
- A closed Pressure Reducing Valve (PRV) was implemented in the water model under Mid Term, Long Term and Build Out conditions to delineate the two (2) pressure zones: Kemptville and eQuinelle.

4.7.2 Future Water Demands

For all future growth scenarios, demands were applied at a representative junction located either at the center of the proposed development or at the furthest junction from the existing watermain network depending on the pipe layout, to be conservative. Demands were calculated based on the areas and population number and densities outlined in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025). The design parameters used to calculate the demands under all future growth scenarios are summarized in the table below (refer to Appendix B):

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Table 13: Flow Calculation Design Parameters for Existing Condition Updates and Future Growth Scenarios

Design Parameter	Value	Unit	Source
Single House Density	3.4	Person/unit	<i>Existing and Future Population, Employment, and Land Use Implications and Analysis Report (JLR, March 13, 2025)</i>
Townhouse/Semi-Detached Density	2.7	Person/unit	
Apartment Density	2	Person/unit	
Unknown Residential Type Density	2.35	Person/unit	
Average Day Demand - Residential	256.4	L/cap/d	Table 6: Design Criteria - Water Demand Rates
Average Day Demand - General Commercial	28000	L/d/ha	
Average Day Demand - Light Industrial	35000	L/ha/d	
Average Day Demand - Retirement Home	260	L/d/bed	
Average Day Demand - Hotel	225	L/d/bed	
Average Day Demand - Institution (Schools)	70	L/students/d	
Maximum Day Demand - Peaking Factor	1.82	x ADD	
Peak Hour Demand - Peaking Factor Existing and Short-Term	3.00	x ADD	
Peak Hour Demand - Peaking Factor Mid-Term and Long-Term	2.85	x ADD	
Peak Hour Demand - Peaking Factor Build-Out	2.70	x ADD	

The following assumptions were applied to the demand calculations for all future growth scenarios:

- Future developments labeled as commercial/industrial per the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025) were assumed to be commercial only. Therefore, the average day demand for commercial developments was applied.
- Future developments labeled as residential/commercial per the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025) were assumed to be residential only. Therefore, the average day demand for residential developments was applied.

The table below summarizes the total water demands under all future growth scenarios including short-, mid-, long-term, and build-out scenarios. The following table summarizes the detailed demands per each scenario and term which were calculated in excel per the design parameters outlined in the table above and implemented in the water model (Refer to Appendix B).

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Table 14: Total Water Demand per Future Growth Scenario

Demand Scenario	Short-Term (0-5 years) (L/s)	Mid-Term (5-10 years) (L/s)	Long-Term (10-20 years) (L/s)	Build-Out (20+ years) (L/s)
Average Day	30.88	51.52	88.79	137.55
Maximum Day	57.20	94.79	162.63	251.37
Peak Hour	93.93	152.79	259.02	390.68

4.8 Water Distribution System Design Criteria

The existing and growth scenarios for the Municipality were evaluated in accordance with the *Municipality of North Grenville's Engineering Standards for Design, Approval, and Construction*, dated August 2022 (herein referred to as the Municipality's Engineering Standards). As per the Municipality's Engineering Standards, it is recommended that all new watermain for new subdivisions be looped with a minimum of two (2) connections to the existing watermain system to eliminate dead-end sections.

The Municipality's Engineering Standards also specify that fire flow requirements must comply with the guidelines outlined in the Water Supply for Public Fire Protection, Fire Underwriters Survey (F.U.S.), dated 2020. For residential dwellings of detached single family and small two-family units not exceeding two stories in height and having a total effective area of not more than 450 m², the F.U.S. suggests the following fire flows:

Table 15: F.U.S. Suggested Required Fire Flows

Exposure Distance	Wood Frame L/s (L/min)	Masonry or Brick L/s (L/min)
Less than 3 m	133 L/s (8,000 L/min)	100 L/s (6,000 L/min)
3 to 10 m	67 L/s (4,000 L/min)	67 L/s (4,000 L/min)
10.1 to 30 m	50 L/s (3,000 L/min)	50 L/s (3,000 L/min)
Over 30 m	33 L/s (2,000 L/min)	33 L/s (2,000 L/min)

A review of residential units' exposure distances appears to indicate that most units are between three to ten metres apart with some less than three metres, particularly in new development areas. Therefore, fire flow requirements would range from 67 L/s to above 100 L/s, depending on unit exposure, occupancy, and construction.

The Ministry of the Environment, Conservation and Parks (MECP) recommends a minimum pressure of 276 kPa (40 psi) under peak hour demand, and a maximum pressure of 689 kPa (100 psi). The Municipality advised to use the MECP pressure requirements for the water model.

The Municipality noted that some areas in their system may not be able to meet F.U.S. fire flows. On a case-by-case basis, depending on the location of the proposed developments and the capability of the water system meeting F.U.S., the Municipality may consider Ontario Building Code (O.B.C.) fire flow as the minimum requirement.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

4.9 Model Simulation Results

The water model was configured to simulate the following scenarios under existing, short term, mid term, long term, and build out demand conditions:

- Average Day
- Peak Hour
- Maximum Day plus Fire Flow

In order to assess these scenarios in the model, the pump configurations were adjusted (i.e. which pumps were operating) to meet the future growth demands. This approach was necessary in order to obtain valid model results and to confirm that an upgrade in pumping capacity was needed in the future. If a specific configuration caused the model to be unbalanced, then a different configuration was attempted. For all scenarios, a configuration of existing system pumps was explored before introducing a new proposed pump. There may be other feasible configuration options to those presented in this section. The pump configurations and capacities will be further refined and assessed in Phase 2 of the Master Plan.

The results of the model simulations are summarized in the Figures below, where the percentage of junction nodes within each applicable range is depicted on the figure. The model schematic results are included in Appendix B.

Average Day Demand

The average day demand conditions were simulated to assess the system pressures expected throughout the Municipality. The table below provides a summary of the system operating conditions used in the model for each scenario that was included in this assessment. The table summarizes the pump configurations, the Pressure Reducing Valve (PRV) status at PRV-6 which was used in the model to delineate the two (2) pressure zones (boundary between Kemptville zone and eQuinelle zone), and the Flow Control Valve (FCV) status at FCV-4 which was modelled on the Northwest Quadrant Pumping Station discharge line.

Table 16: Operating Conditions under Average Day Demand

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
Existing (EX)	• Duty Pump 1 is ON at all Pump Stations • eQuinelle PMP-1 is operating.	Inactive	Inactive
Short Term (ST)	• Duty Pump 1 is ON at all Pump Stations • eQuinelle PMP-1 is operating.	Inactive	Active at 23.7 L/s
Mid Term (MT)	• Duty Pump 1 is ON at all Pump Stations • eQuinelle PMP-1 is operating	Closed	Active at 23.7 L/s
Long Term (LT)	• Duty Pump 2 is ON at all Pump Stations except East Quadrant	Closed	Active at 23.7 L/s

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
	- East Quadrant Pump Station is not operating. - eQuinelle PMP-2 active		
Build Out (BO)	- Duty Pump 2 is ON at all Pump Stations except Kernahan - East Quadrant Fire is operating. - Kernahan Fire is operating. - eQuinelle PMP-2 is operating	Closed	Active at 23.7 L/s

It is noted that under existing conditions, only Northwest Quadrant Duty Pump 1 supplied the Kemptville zone when the model was run. It is recommended the Municipality confirm this operation based on current system data. eQuinelle PMP-2 was required in the Long Term and Build Out scenarios as the total demand in eQuinelle exceeded the PMP-1 capacity. In the Build Out scenario, two (2) high-capacity pumps were required along with duty pumps to supply the demand. It is also noted that FCV-4 must remain inactive in the existing average day scenario in order for the model to compute properly.

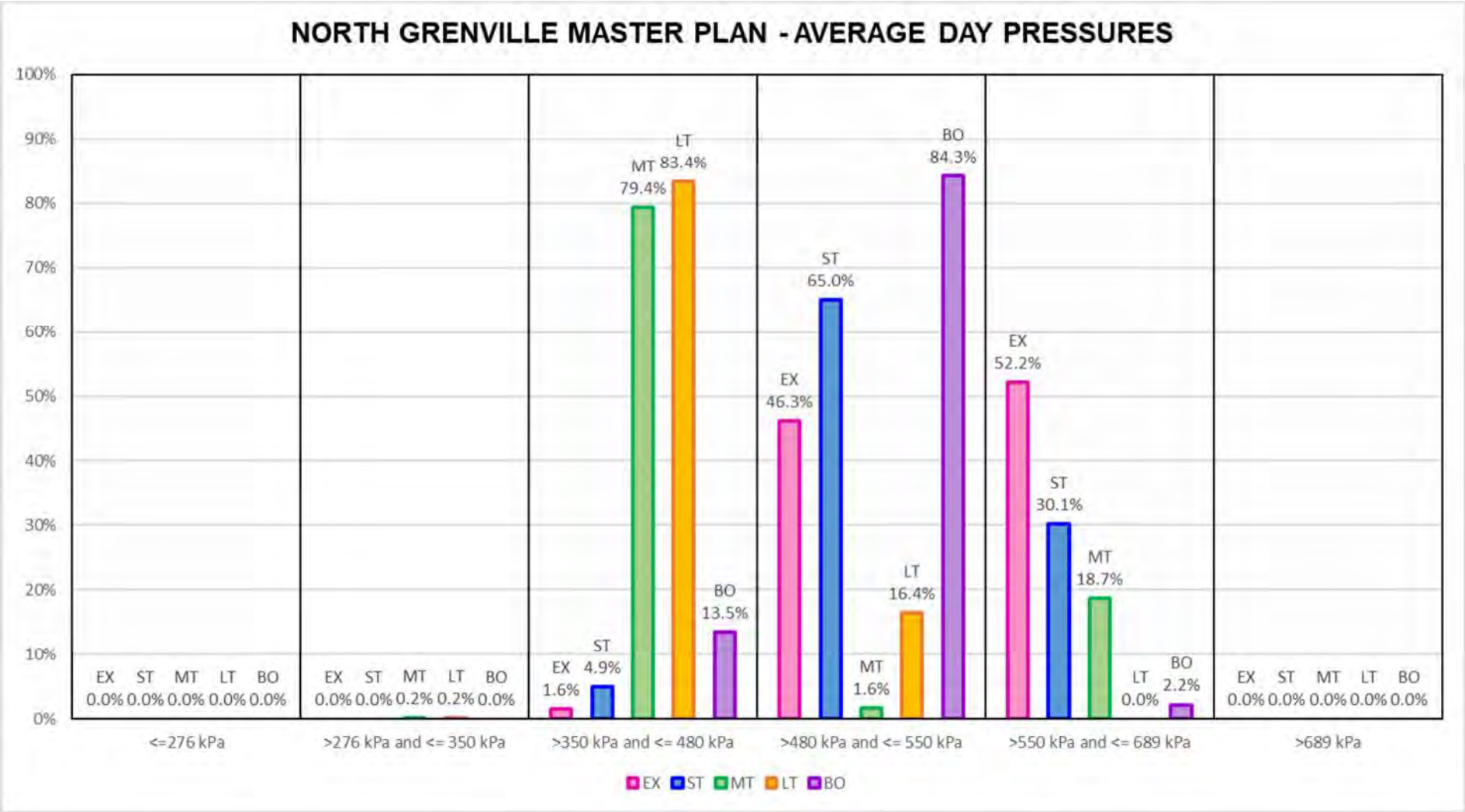


Figure 7: Pressures under Average Day Demand for Each Scenario

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Under average day demand for existing conditions, the simulation pressures were found to range from 449 kPa to 625 kPa. In the Kemptville pressure zone, the results generally fall within or slightly exceed the normal operating pressures of 350 kPa to 550 kPa, as per the Municipality's Engineering Standards. The maximum pressure expected in the Kemptville pressure zone is 596 kPa, which is less than the maximum pressure of 689 kPa (100 psi) as recommended by the MECP Guidelines but exceeds 550 kPa as per the Municipality's Engineering Standards. In the eQuinelle pressure zone, the pump produces pressures that range from 584 kPa to 625 kPa, which remains below the maximum pressure of 689 kPa (100 psi) as recommended by the MECP Guidelines but exceeds 550 kPa as per the Municipality's Engineering Standards. It should be noted that a pressure of 33 kPa was simulated at Junction J220, which represents the suction side of the eQuinelle pumps. This junction node was not included in Figure 7.

Under average day demand for future conditions, Figure 7 above shows that 0.2% of junctions have pressures at or below 350 kPa in the Mid Term and Long Term. However, this consists of only one (1) junction node (Junction J209) which is located at a relatively high elevation on the dead-end watermain on Hilltop Crescent. This junction node was found to have a pressure of 350 kPa in the Mid Term and 331 kPa in the Long Term. Therefore, all of the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP Guidelines.

For the future conditions, the majority of junction nodes have pressures between 350 kPa and 550 kPa. There are a percentage of junction nodes which have pressures greater than 550 kPa but less than 689 kPa. The expected pressures generally decrease as more future growth is added, but any discrepancies in this are attributed to the change in pump configuration as explained previously. As more pumping capacity was modelled to supply the growing demand, pressures throughout the system may show improvement as compared to an earlier term.

Peak Hour Demand

The peak hour demand conditions were simulated to assess the system pressures expected throughout the Municipality. The table below provides a summary of the system operating conditions used in the model for each scenario that was included in this assessment. The table summarizes the pump configurations, the status at PRV-6 which was used in the model to delineate the two (2) pressure zones (boundary between Kemptville zone and eQuinelle zone), and the status at FCV-4 which was modelled on the Northwest Quadrant Pumping Station discharge line.

Table 17: Operating Conditions under Peak Hour Demand

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
Existing (EX)	- Duty Pump 2 is ON at all Pump Stations - eQuinelle PMP-2 is operating.	Inactive	Active at 23.7 L/s
Short Term (ST)	- Duty Pump 2 is ON at all Pump Stations - East Quadrant high-capacity pump is operating. - eQuinelle PMP-2 is operating	Inactive	Active at 23.7 L/s

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
Mid Term (MT)	- Duty Pump 2 is ON at all Pump Stations - East Quadrant high-capacity pump is operating. - eQuinelle PMP-2 is operating	Closed	Active at 23.7 L/s
Long Term (LT)	- Duty Pump 2 is ON at Van Buren and Kernahan - High-capacity pumps are operating at Northwest Quadrant Fire, Alfred and East Quadrant - eQuinelle PMP-2 is operating	Closed	Active at 76.1 L/s
Build Out (BO)	- All high-capacity pumps are operating. - East Quadrant high-capacity duplicate pump is operating. - eQuinelle PMP-2 is operating	Closed	Active at 76.1 L/s

It is noted that the high-capacity pump at East Quadrant was required in the Short Term and Mid Term scenarios, and additional high-capacity pumps were required under the Long Term and Build Out scenarios. Furthermore, the existing high-capacity pumps throughout the system were unable to supply the total peak hour demand under the Build Out scenario. Therefore, a theoretical duplicate high-capacity pump was added in the model at East Quadrant. Details for the size and location of a new pump in the system will be further assessed in Phase 2 of the Master Plan.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

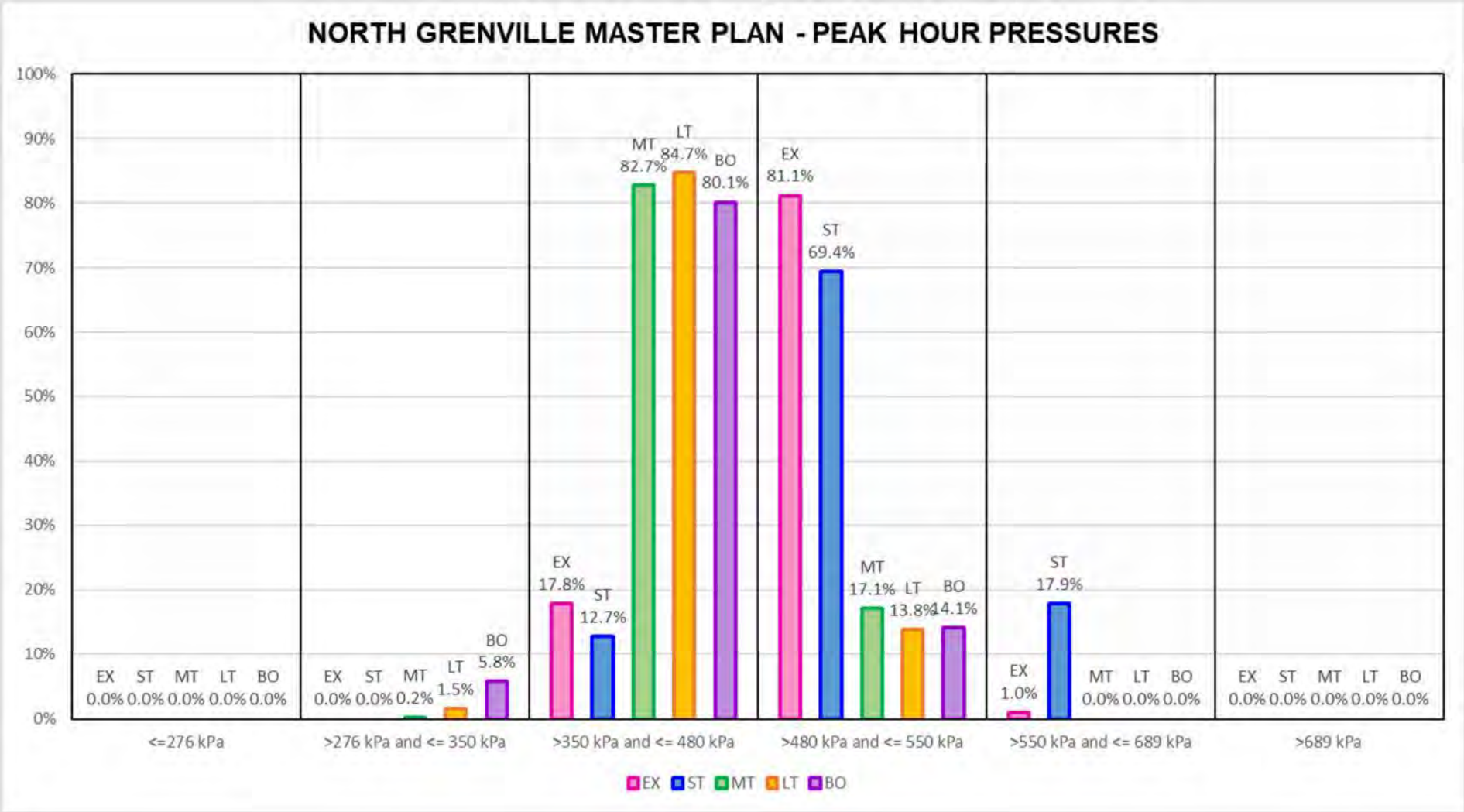


Figure 8: Pressures under Peak Hour Demand for Each Scenario

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Under peak hour demand for existing conditions, the simulation pressures were found to range from 413 kPa to 558 kPa. In the Kemptville pressure zone, the results generally fall within or slightly exceed the normal operating pressures of 350 kPa to 550 kPa, as per the Municipality's Engineering Standards. The maximum pressure expected in the Kemptville pressure zone is 558 kPa, which is less than the maximum pressure of 689 kPa (100 psi) as recommended by the MECP Guidelines but slightly exceeds 550 kPa as per the Municipality's Engineering Standards. In the eQuinelle pressure zone, the pump produces pressures that range from 458 kPa to 499 kPa, which remains below the maximum pressure of 550 kPa as per the Municipality's Engineering Standards. It should be noted that a pressure of 14 kPa was simulated at Junction J220, which represents the suction side of the eQuinelle pumps. This junction node was not included in Figure 8.

Under peak hour demand for future conditions, Figure 8 above shows that some junctions have pressures at or below 350 kPa under Mid Term, Long Term and Build Out, but all of the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP Guidelines.

For the future conditions, the majority of junction nodes have pressures between 350 kPa and 550 kPa. There are a percentage of junction nodes in the Short Term which have pressures greater than 550 kPa but less than 689 kPa. The expected pressures generally decrease as more future growth is added, but any discrepancies in this are attributed to the change in pump configuration as explained previously. As more pumping capacity was modelled to supply the growing demand, pressures throughout the system may show improvement as compared to an earlier term.

Maximum Day Demand Plus Fire Flow

The maximum day demand plus fire flow conditions were simulated to assess the available fire flows expected throughout the Municipality. The maximum day demand plus fire flow condition was analyzed by allowing the model to calculate the maximum fire flow that can be drawn from each hydrant node (existing areas) or junction node (future areas) without allowing any part of the zone to experience pressures less than 140 kPa (20 psi). The table below provides a summary of the system operating conditions used in the model for each scenario that was included in this assessment. The table summarizes the pump configurations, the status at PRV-6 which was used in the model to delineate the two (2) pressure zones (boundary between Kemptville zone and eQuinelle zone), and the status at FCV-4 which was modelled on the Northwest Quadrant Pumping Station discharge line.

Table 18: Operating Conditions under Maximum Day Demand plus Fire Flow

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
Existing (EX)	- High-capacity pumps are operating at Alfred, Kernahan, East Quad - eQuinelle PMP-5 is operating	Inactive	Inactive

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Growth Scenario	Pumps	Pressure Reducing Valve (PRV-6)	Flow Control Valve (FCV-4)
Short Term (ST)	- High-capacity pumps are operating at Alfred, Kernahan, East Quad - eQuinelle PMP-5 is operating	Inactive	Inactive
Mid Term (MT)	- High-capacity pumps are operating at Alfred, Kernahan, East Quad, Northwest Quad - eQuinelle PMP-5 is operating	Closed	Active at 76.1 L/s
Long Term (LT)	- High-capacity pumps are operating at Alfred, Kernahan, East Quad, Northwest Quad - eQuinelle PMP-5 is operating	Closed	Active at 76.1 L/s
Build Out (BO)	- High-capacity pumps are operating at Alfred, Kernahan, East Quad, Northwest Quad - eQuinelle PMP-5 is operating	Closed	Active at 76.1 L/s

It is noted that the pump configurations for the maximum day demand plus fire flow scenarios were based on the high-capacity pumps required to satisfy the maximum day demand in the system.

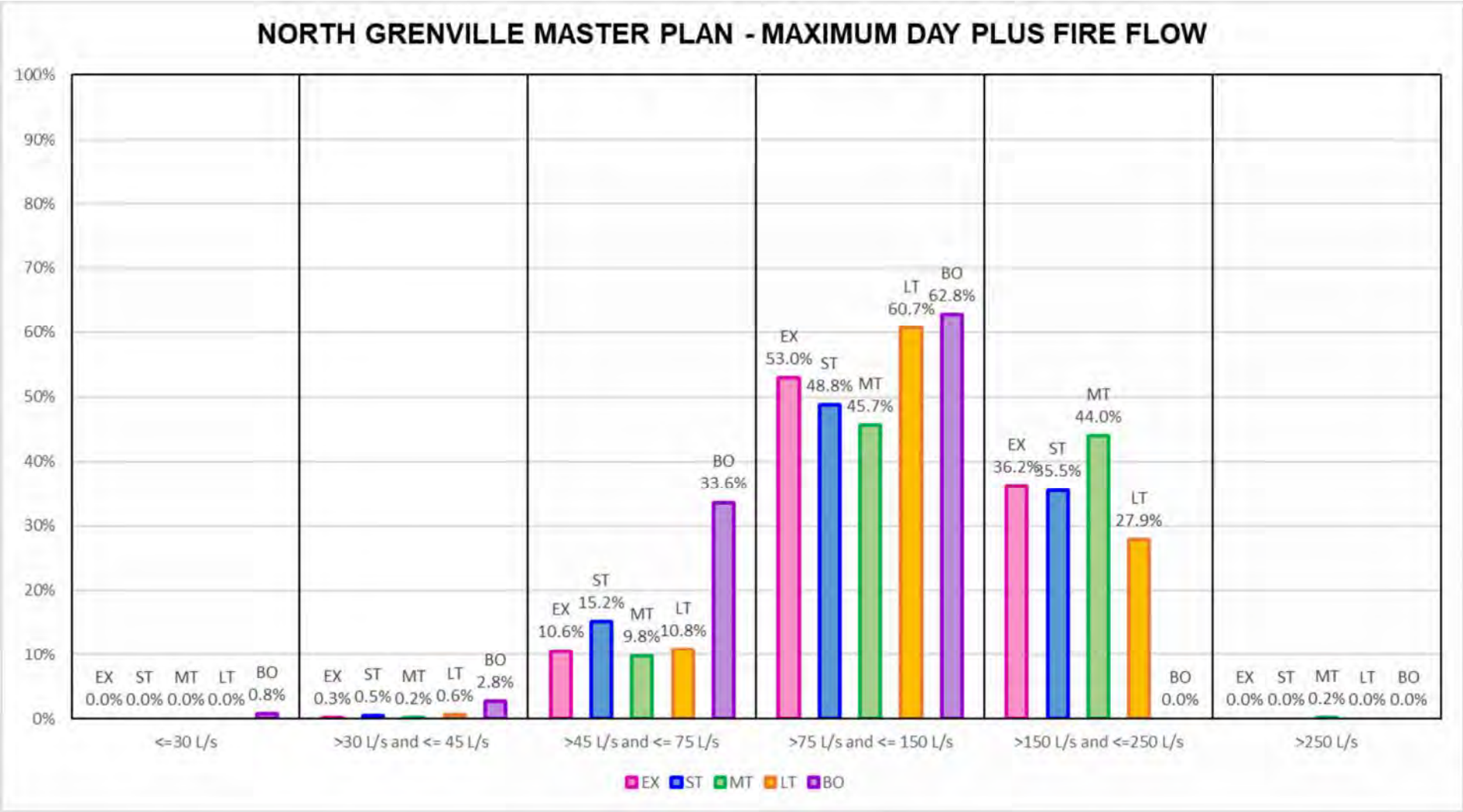


Figure 9: Available Fire Flows under Maximum Day Demand for Each Scenario

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Under maximum day demand plus fire flow for existing conditions, the majority of nodes are expected to deliver upwards of 75 L/s of fire flow. This exceeds both the 45 L/s minimum target per OBC and the 67 L/s target per FUS. There is a small percentage of nodes which are expected to deliver between 45-75 L/s of fire flow and are mostly located along smaller diameter dead-end pipes. There is one (1) hydrant (Hydrant H-1) which is expected to deliver less than 45 L/s of fire flow, located at the North Grenville District High School.

Under maximum day demand plus fire flow for future conditions, the majority of nodes are expected to deliver upwards of 75 L/s of fire flow. This exceeds both the 45 L/s minimum target per OBC and the 67 L/s target per FUS. There are some nodes which are expected to deliver less than 75 L/s of fire flow which are mostly located along dead-end pipes. Expected fire flows in the Build Out scenario are reduced the most due to the high demands.

4.10 Summary of Existing Conditions

The hydraulic water model was updated based on system expansions and upgrades that have occurred since 2020. Water demand scenarios were updated based on five (5) years of water consumption data, including updated water consumption data for the ten (10) highest water users in the system.

The modelling results for existing conditions indicate that adequate to high pressures are generally provided throughout the distribution system under the average day and peak hour demand scenarios. Under average day demand for existing conditions, the simulation pressures were found to range from 449 kPa to 625 kPa, which exceeds 550 kPa as per the Municipality's Engineering Standards. Under peak hour demand for existing conditions, the simulation pressures were found to range from 413 kPa to 558 kPa, which slightly exceeds 550 kPa. All pressures were found to be less than the maximum pressure of 689 kPa (100 psi) as recommended by the MECP Guidelines.

It is noted that under existing conditions, only Northwest Quadrant Duty Pump 1 supplied the Kemptville zone when the model was run. It is recommended the Municipality confirms this operation based on current system data.

The maximum day demand plus fire flow scenario for existing conditions indicates that most of the existing system can deliver a fire flow of 67 L/s. Based on a review of the FUS suggested fire flow requirements, 67 L/s satisfies the fire flow requirement for much of the existing system. The model schematic results are included in Appendix B.

4.11 Summary of Future Conditions

The future growth areas were modelled based on the development areas and population increases presented in the *Existing and Future Population, Employment, and Land Use Implications and Analysis Report* (JLR, March 13, 2025). These areas were modelled using representative loops and demands over the 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 to 2046, and build-out (20+ years) from 2046 onward. Connections were made to the existing system only where necessary to illustrate the capacity of the current system to support development and determine the need for upgrades and additional watermains.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

The modelling results showed that with the future growth added to the system over time, the total pump supply capacity is inadequate without modifying the pump operation. In order to assess this in the model, the pump configurations (i.e. which pumps were operating) were adjusted based on the total capacity required for each individual scenario. If a specific configuration caused the model to be unbalanced, then a different configuration was attempted. The general approach was to use a configuration of the existing pumps throughout the system before proposing a new pump to provide additional pumping capacity. The peak hour build-out scenario was the only scenario that required a new proposed pump. For this scenario, a new theoretical pump was modelled at East Quadrant Pumping Station, which was assumed to be a second high-capacity pump with the same pump curve as the existing high-capacity pump at East Quadrant Pumping Station. There may be other feasible configuration options to those presented in the previous Section. The pump configurations and capacities will be further refined and assessed in Phase 2 of the Master Plan.

Using the assumed pump configurations for each future scenario as identified in the previous section, most of the distribution system was expected to experience pressures between 350 and 550 kPa. A very small percentage of junction nodes were expected to experience pressures below 350 kPa as per the Municipality's Engineering Standards. Some pressures higher than 550 kPa were experienced under the average day scenario and less in the peak hour scenario. This is due to the selected pump configurations which will be further assessed and refined in Phase 2 of the Master Plan.

The maximum day demand plus fire flow scenarios for future conditions indicates that most of the system can deliver a fire flow of 67 L/s. There are some nodes which are expected to deliver less than 75 L/s of fire flow which are mostly located along dead-end pipes. Expected fire flows in the Build Out scenario are reduced the most due to the high demands.

The model schematic results are included in Appendix B.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

5.0 Wastewater Collection System

5.1 Existing Wastewater System

The community of Kemptville is serviced by the Kemptville Water Pollution Control Plant (WPCP), located at 2899 County Road 43, adjacent to Kemptville Creek. The WPCP currently consists of a conventional activated sludge tertiary treatment process, with a rated average and maximum day capacity of 4,510 m³/d and 11,370 m³/d, respectively. The WPCP is undergoing expansion and upgrades to increase the rated average and maximum day capacity to 5,250 m³/d and 15,000 m³/d respectively. The upgrades have been split into two phases. Construction of Phase A commenced in 2024 and is expected to be completed in 2026. Phase B will start after the completion of Phase A, and is expected to be completed in 2028.

Parameter	Current WPCP ECA Rated Capacity	Upgraded WPCP ECA Rated Capacity
Average Day Flow (m ³ /d)	4,510	5,250
Maximum Day Flow (m ³ /d)	11,370	15,000 ⁽¹⁾
Peak Instantaneous Flow (m ³ /d) (L/s)	-	32,005 ⁽¹⁾ 370
Notes: (1) Peak flows above the maximum day flow are to be attenuated by influent equalization storage to 15,000 m ³ /d.		

There are no gravity sewers to the WPCP. All influent flow is pumped via forcemains from four (4) sanitary pumping stations. The rated capacities are summarized in the following table:

Table 19: Sanitary Pumping Station Rated Capacities

Sanitary Pumping Station	Rated Capacity (m ³ /d)
Bridge Street SPS	8,640 (existing) 11,370 (future) ⁽¹⁾
eQuinelle SPS	6,160
Tempo SPS	6,912
Colonnade SPS	6,990
Total	28,702 (existing) 31,432 (future)⁽¹⁾
Notes: (1) Bridge St SPS is currently operating at a lower flow rate due to the existing rated capacity of the WPCP. The 2019 ESR Addendum noted that once WPCP upgrades are completed, the Bridge St SPS can re-rated to its full rated pump capacity.	

Phase 1 Report

North Grenville Water and Wastewater Master Plan

5.2 Historic Wastewater Flows and Bypasses

The historical influent wastewater data from the WPCP from 2020 to 2023 was provided by the Municipality and is summarized below:

Table 20: Historical WPCP Influent Flow (2020 to 2023)

Year	Average Day Demand ⁽¹⁾ (m ³ /d)	Maximum Day Demand ⁽¹⁾ (m ³ /d)	Maximum Day Factor
2020	2,553	6,892	2.70
2021	2,410	5,628	2.33
2022	3,159	8,651	2.74
2023	3,339	15,952	4.78
Average	2,866		3.14
Notes: (1) Flow data from WPCP influent proportional flow meter.			

As seen in Table 20, the overall average day wastewater demand is 2,866 m³/d, and an overall maximum day factor of 3.14 times the average day demand. This maximum day demand is roughly 64% of the current rated capacity and 55% of the future rated capacity.

The historical effluent wastewater data from the WPCP from 2020 to 2023 was provided by the Municipality and is summarized below:

Table 21: Historical WPCP Effluent Flow (2020 to 2023)

Year	Average Day Demand ⁽¹⁾ (m ³ /d)	Maximum Day Demand ⁽¹⁾ (m ³ /d)	Maximum Day Factor
2020	2,191	5,585	2.55
2021	1,963	4,972	2.53
2022	2,316	6,268	2.71
2023	2,713	9,827	3.62
Average	2,296		2.85
Notes: (1) Flow data from WPCP effluent electronic mag meter.			

As seen in **Error! Reference source not found.**, the overall average day wastewater demand is 2,296 m³/d, and an overall maximum day factor of 2.85 times the average day demand. This maximum day demand is roughly 51% of the current rated capacity and 44% of the future rated capacity.

As seen in the tables above, the average and max day influent flows are consistently greater than effluent flows. One of the causes is that the tertiary filter backwash line enters the WPCP influent upstream of the influent flow meter which could increase flow readings. In addition, the effluent flow is measured by an electronic mag meter and is expected to be much more reliable and accurate than the flow from the proportional flow weir at the influent channel. Although some

Phase 1 Report

North Grenville Water and Wastewater Master Plan

filtered water is used by the plant, it is expected that this would be minor compared to the backwash returned. Typical operation is only bypassing the tertiary treatment and therefore, actual influent flows should be much closer to effluent flows. Therefore, for this Master Plan the average day and max day wastewater demand will be taken from the WPCP effluent flow historical analysis. It should be noted that the influent flow monitoring will be revised during the expansion of the WPCP, which will result in more accurate readings.

Since all flows to the WPCP are pumped, the peak instantaneous flow is the sum of all pump stations operating simultaneously at their rated capacities. Adding the flows in Table 19, the current peak instantaneous flow is 28,702 m³/d, with a possible increase to 31,432 m³/d in the future when Bridge St SPS is re-rated.

The following table summarizes the number of days noted in the wastewater annual reports where influent flow exceeded either the rated capacity (4,510 m³/d) or peak flow capacity (11,370 m³/d) was exceeded.

Table 22: Days Exceeding WPCP Rated Capacities

Year	No. Days Exceeding WPCP Capacities
2019	50
2020	17
2021	12
2022	51
2023	55

The following table is a summary of bypass and spill events at the WPCP noted in the Wastewater Annual Reports from 2019-2023. The majority of incidents were Tertiary Filter bypasses during the spring and summer months, caused by heavy precipitation and snowmelt.

Table 23: Kemptville WPCP Bypass and Spill Events 2019-2023

Incident Start Date	Incident Type	Volume (m ³)	Reason for Incident
February 24, 2019	Tertiary Filter Bypass	2.3	Heavy precipitation and snowmelt
March 22, 2019	Tertiary Filter Bypass	38.2	Snowmelt
March 25, 2019	Tertiary Filter Bypass	0.3	Emergency maintenance
March 29, 2019	Tertiary Filter Bypass	3,651.3	Heavy precipitation and snowmelt
April 20, 2019	Tertiary Filter Bypass	2,041.3	Heavy Precipitation
October 31, 2019	Tertiary Filter Bypass	5.4	Heavy Precipitation
January 11, 2020	Tertiary Filter Bypass	1,574.9	Heavy Precipitation
April 20, 2020	Methane Spill	335	Equipment Failure
August 11, 2020	Planned Methane Spill	35	Equipment Replacement
August 23, 2020	Tertiary Filter Bypass	259.4	Heavy Precipitation
October 5, 2021	Planned Methane Spill	35.2	Equipment Replacement
May 16, 2022	Tertiary Filter Bypass	9.4	Heavy Precipitation

Phase 1 Report

North Grenville Water and Wastewater Master Plan

Incident Start Date	Incident Type	Volume (m ³)	Reason for Incident
January 6, 2023	Tertiary Filter Bypass	39.1	Heavy precipitation and snowmelt
February 21, 2023	Tertiary Filter Bypass	3,768.8	Equipment Maintenance
March 23, 2023	Tertiary Filter Bypass	241.5	Heavy precipitation and snowmelt
March 26, 2023	Tertiary Filter Bypass	1,067.2	Heavy precipitation and snowmelt
April 1, 2023	Tertiary Filter Bypass	2,215.9	Heavy precipitation and snowmelt
April 5, 2023	Tertiary Filter Bypass	16,075.7	Heavy precipitation and snowmelt
April 7, 2023	Tertiary Filter Bypass	10,988	Heavy precipitation and snowmelt
April 8, 2023	Tertiary Filter Bypass	17.8	Heavy precipitation and snowmelt
April 10, 2023	Tertiary Filter Bypass	475.8	Heavy precipitation and snowmelt
April 11, 2023	Tertiary Filter Bypass	712.2	Heavy Precipitation
April 30, 2023	Tertiary Filter Bypass	1,871.8	Heavy Precipitation
May 3, 2023	Tertiary Filter Bypass	1,649.6	Heavy Precipitation
August 7, 2023	Tertiary Filter Bypass	400.8	Heavy Precipitation

5.3 Wastewater System Design Criteria

Table 24 summarizes the wastewater demand rates used to evaluate the Municipality's wastewater system.

Table 24: Design Criteria - Wastewater Demand Rates

Land Use	Design Criteria	Maximum Day Factor
Future Residential ⁽¹⁾	300 L/cap/day	2.85
Future Commercial ⁽²⁾	28,000 L/ha/day	1.5
Future Industrial ⁽³⁾	35,000 L/ha/day	1.5
Future School ⁽⁴⁾	70 L/student/day	1.5
Future Hotel ⁽⁴⁾	225 L/bed/day	1.5
Future Retirement Home ⁽⁵⁾	300 L/bed/day	1.5
Notes (1) Municipality of North Grenville Engineering Standards E1.03. (2) MECP Design Guidelines for Sewage Works 5.5.2.2 (3) MECP Drinking Water Design Guidelines 3.4.4 (4) MECP Design Guidelines for Sewage Works Table 5-3 (5) Assumed residential ADD		

Phase 1 Report

North Grenville Water and Wastewater Master Plan

5.4 Future Wastewater System Requirements

The following table summarizes the existing and future wastewater demands:

Table 25: Existing and Future Wastewater Demands

Demand Scenario	Existing Conditions (2025) ⁽³⁾	Short-Term	Mid-Term	Long-Term	Build-Out
		(2026-2031)	(2031-2036)	(2036-2046)	(beyond 2046)
Population Growth	0	1,452	2,620	10,415	12,363
Total Serviced Population ⁽¹⁾⁽²⁾	7,386	8,838	11,458	21,873	34,236
ICI - Commercial Development Area (ha)		4.0	39.1	17.9	22.5
ICI - Retirement Home (No. Beds)		-	-	192.0	-
ICI - School (No. Students)		417			
ICI - Hotel (No. Beds)		-	74.0	-	-
ICI - Industrial Development Area (ha)		-	-	-	11.8
ICI - Correctional Facility					
Average Day (m ³ /day)		250	-	-	-
Max Day (m ³ /day)		995	-	-	-
Average Day (m ³ /day) - Residential		436	786	3,125	3,709
Average Day (m ³ /day) - ICI		391	1,111	558	1,043
Average Day (m³/day) - Total	2,296	3,123	5,020	8,703	13,455
Max Day (m ³ /day) - Residential		1,241	2,240	8,905	10,570
Max Day (m ³ /day) - ICI		1,207	1,667	838	1,565
Maximum Day Total (m³/day)	6,543	10,106	17,181	28,515	43,623
Notes: (1) The total serviced population represents residential population only and excludes equivalent institutional households and populations. (2) Total population excludes correctional facility population (528 persons) as demands are identified separate from residential flows. (3) Population of 6000 as of 2021 with addition of recently built developments.					

Figure 10 represents the projected average day wastewater flows and anticipated timing to reach 80% and 100% of the rated capacity of the WPCP. 80% rated capacity will be reached in 2033, and 100% rated capacity will be reached in 2036.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

It should be noted that the population projections from the 2019 ESR Addendum noted WPCP capacity will be reached in 2039. Due to an increased rate of planned development, the WPCP is expected to reach capacity sooner than anticipated, in 2036. It is recommended for the Municipality to conduct an annual review of uncommitted reserve capacity for future planning of developments.

In addition, the estimations of ICI wastewater flows are generalized and conservative. Depending on the application, the actual flows generated may be less than estimated, opening up WPCP capacity for other developments. It is recommended for the Municipality to review ICI applications to confirm expected flows and their demand for WPCP capacity.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

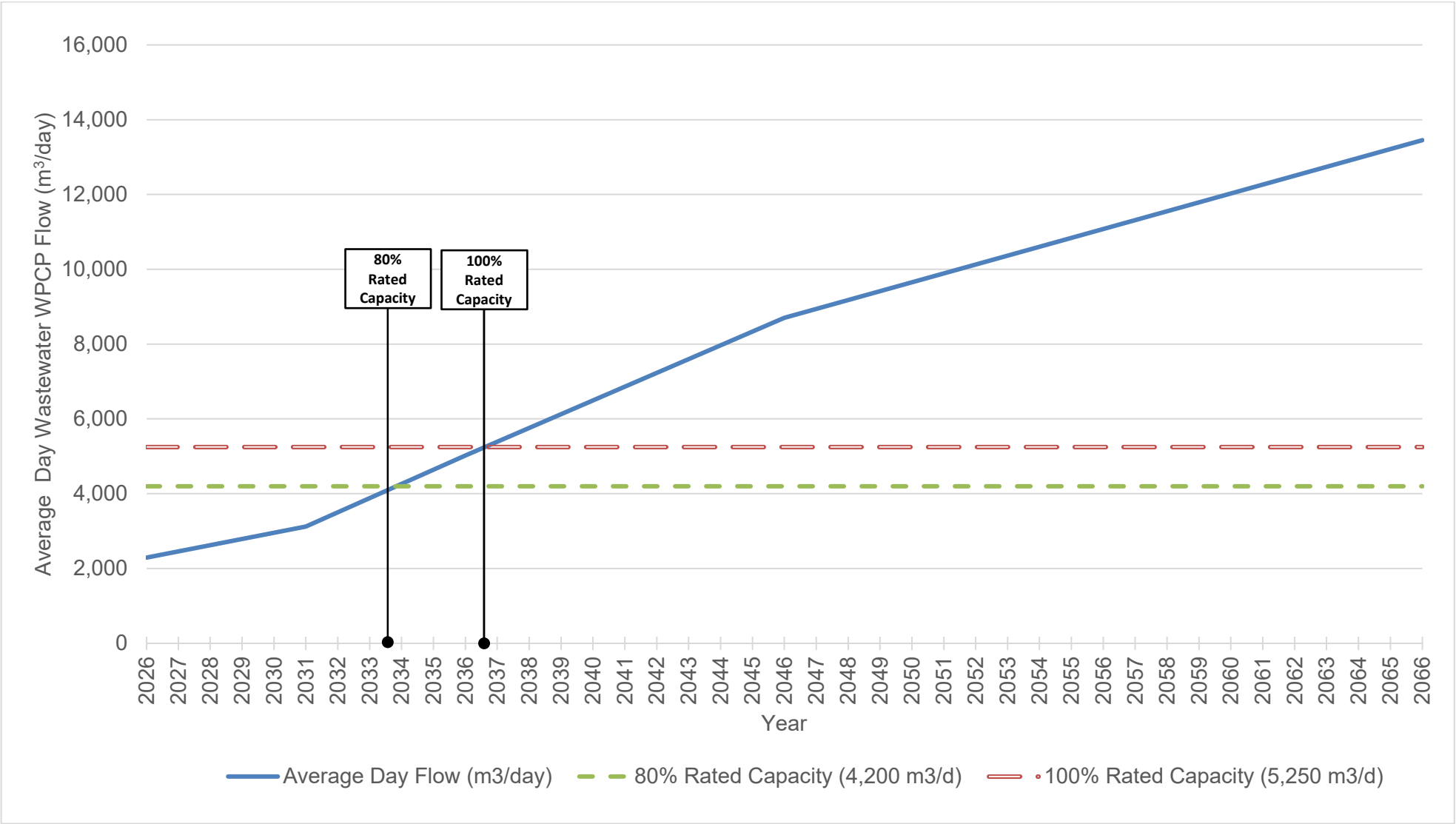


Figure 10: Projected Average Day Wastewater Flows

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 Force mains 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

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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 recommended to be reviewed ensure proper cleaning is maintained

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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.

Phase 1 Report

North Grenville Water and Wastewater Master Plan

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.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Reviewed by:

Matthew Marcuccio, P.Eng.
Senior Environmental Engineer

Mark Buchanan, P.Eng.
Associate; Senior Environmental Engineer;
Practice Lead, Environmental Infrastructure

Tatyana Roumie
Civil Engineering Graduate

Annie Williams, P.Eng.
Senior Civil Engineer



www.jlrichards.ca

Ottawa

343 Preston Street
Tower II, Suite 1000
Ottawa ON Canada
K1S 1N4
Tel: 613 728-3571
ottawa@jlrichards.ca

Kingston

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424
kingston@jlrichards.ca

Sudbury

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174
sudbury@jlrichards.ca

Timmins

834 Mountjoy Street S
Timmins ON Canada
P4N 7C5
Tel: 705 360-1899
timmins@jlrichards.ca

North Bay

501-555 Oak Street E
North Bay ON Canada
P1B 8E3
Tel: 705 495-7597
northbay@jlrichards.ca

Hawkesbury

326 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287
hawkesbury@jlrichards.ca

Guelph

107-450 Speedvale Ave. West
Guelph ON Canada
N1H 7Y6
Tel: 519 763-0713
guelph@jlrichards.ca



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

Table of Contents

1.0	Introduction	1
2.0	Settlement Strategy and Census Data	1
3.0	Residential Infill and Intensification.....	3
4.0	Projected Demand for New Housing.....	4
5.0	Housing Land Demand	5
6.0	Urban Serviced Greenfield Development & Re-development Outside the Kemptville [population centre] Census Area	7
6.1	Single Detached Dwellings.....	7
6.2	Mid-Density Row Housing	7
6.3	Apartment Dwelling Units	7
7.0	Population Analysis	8
7.1	Single Detached Dwellings.....	8
7.2	Mid-Density Row Housing	9
7.3	Apartment Dwelling	9
7.4	Housing Typology Distribution	9
8.0	Projected Population	12
8.1	Residential Population Projections	12
8.2	Population Projection (Year Intervals)	14
8.3	Candidate Expansion Areas	25
8.4	The Future Provincial Correctional Facility (MAP ID 51).....	26
8.5	Employment Population Projections	26
8.6	Private Services	28
9.0	Conclusion.....	28
10.0	Special Notes.....	31
11.0	References.....	31
12.0	Limitations	31

List of Tables

Table 1: Development in Kemptville and the Municipality (2016 to 2021) by Housing Type.....	3
Table 2: Medium Growth Scenario (Municipality, 2023)	3
Table 3: Projected Housing Shifts (2021 to 2046) (Municipality, 2023).....	4
Table 4: Projected Housing Typology (2021 to 2046) by Percentage (Municipality, 2023)	4
Table 5: Land Use Projections (2026 to 2046) (Municipality of North Grenville, 2023)	5
Table 6: Historical Building Permits for Single Detached Dwellings (2016 to 2021).....	6
Table 7: Historical Building Permits for Mid-Density Row Houses (2016 to 2021)	6
Table 8: Historical Building Permits for Apartments (2016 to 2021).....	6
Table 9: Housing Typology Distribution by Service Area	8

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

Table 10: Single Detached Dwelling Required in the Urban Serviced Area (2026 to 2046)	8
Table 11: Mid-Density Row Housing Required in the Urban Serviced Area (2026 to 2046).....	9
Table 12: Apartment Dwelling Units Required in the Urban Serviced Area (2026 to 2046).....	9
Table 13: Number of Single Detached Dwelling Units Required (2026 to 2046)	10
Table 14: Number and Distribution of Mid-Density Row Housing Units Required (2026 to 2046)	10
Table 15: Number and Distribution of Low Rise Apartment Units Required (2026 to 2046).....	10
Table 16: Number of Single Detached Dwelling Units and Land Required by Serviced Area Type (2026 to 2046).....	11
Table 17: Number of Mid-Density Row Housing Units and Land Required by Serviced Area Type (2026 to 2046).....	11
Table 18: Number of Low Rise Apartment Units and Land Required by Serviced Area Type (2026 to 2046).....	12
Table 19: Projected Population for Single Detached Dwelling Units (2026 to 2046)	13
Table 20: Projected Population for Mid-Density Row Housing (2026 to 2046).....	13
Table 21: Projected Population for Low Rise Apartments (2026 to 2046).....	13
Table 22: Population Projection (0 - 5 Years).....	14
Table 23: Population Projection (5 - 10 Years).....	15
Table 24: Population Projection (10 - 20 Years).....	16
Table 25 Population Projection (20 Plus Years)	17
Table 26: Population Projection 5 - 10 Years	18
Table 27: Population Projection 10 - 20 Years	19
Table 28: Population Projection 20 Plus Years.....	19
Table 29: 0 - 5 Years.....	27
Table 30: 5 - 10 Years.....	27
Table 31: 10 – 20 Years.....	27
Table 32: 20 Plus Years.....	28
Table 33: Projected Population Growth and Total Projected Population Growth for Land Holdings.....	29
Table 34: Projected Population for Year Interval for Kemptville Urban Serviced Area	29
Table 35: Land Holdings and Total Projected Employment Population for Land Holdings	30
Table 36: Institutional Land Holdings	30
Table 37: Retirement Residence Land Holdings	30
Table 38: Commercial Properties with Hotels.....	31

List of Figures

Figure 1: Census (2021) Kemptville [population centre] Area.....	2
Figure 2: 0-5 Year Land Holdings	21
Figure 3: 5-10 Year Land Holdings.....	22
Figure 4: 10-20 Year Land Holdings.....	23
Figure 5: 20 Plus Years.....	24

List of Appendices

Appendix A	Municipality of North Grenville Servicing Masterplan
Appendix B	Municipality of North Grenville Urban Serviced Area Map

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

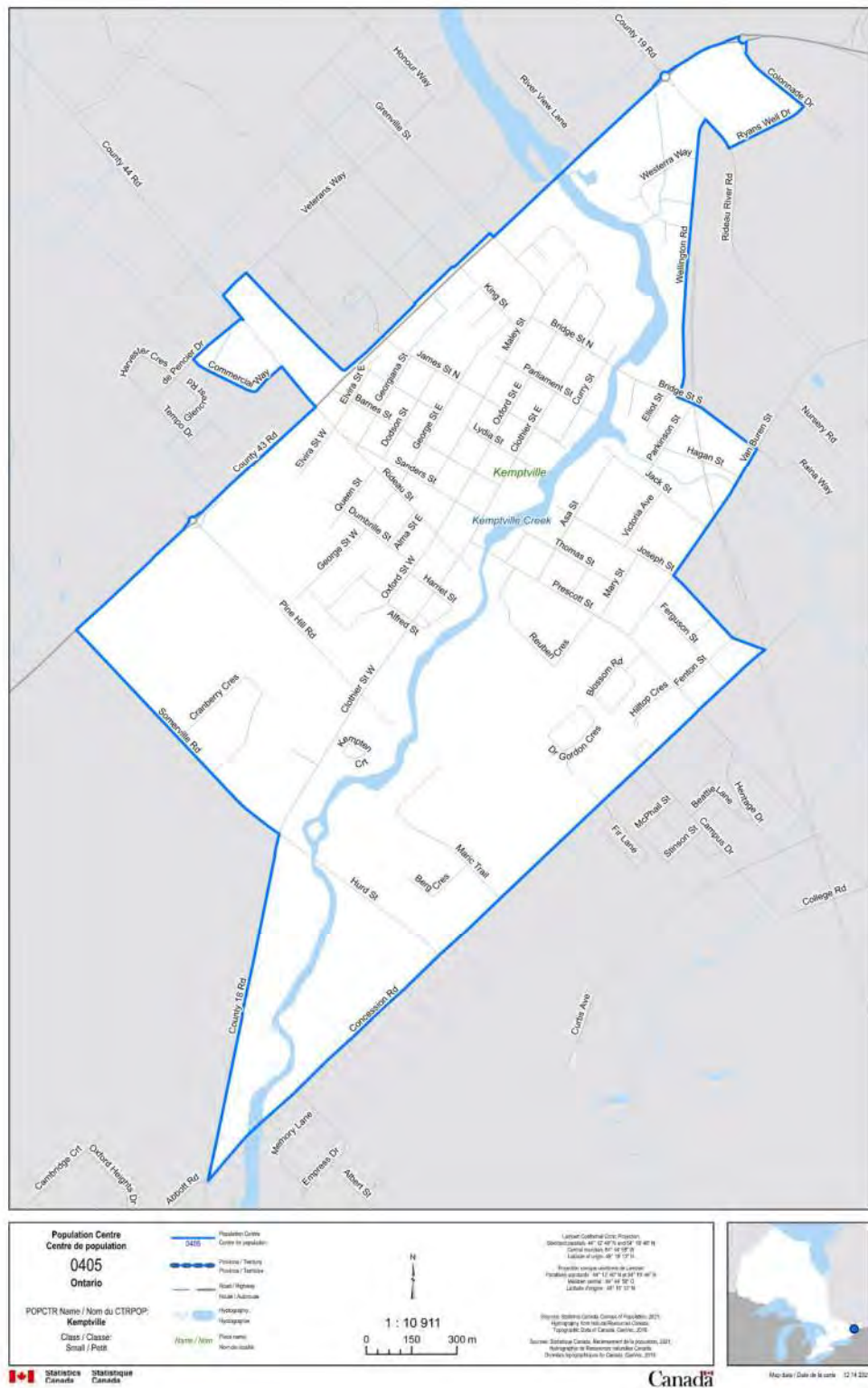


Figure 1: Census (2021) Kemptville [population centre] Area

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

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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.

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

Servicing Master Plan Update

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

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
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		
	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
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		
	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
2026	57	42	15	114	84	30

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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 Kemptville [population centre]	2	61	260	692
Total Other Urban Serviced Areas	0	144	566	1521

Table Notes:

* Denotes properties outside Kemptville [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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

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

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

Servicing Master Plan Update

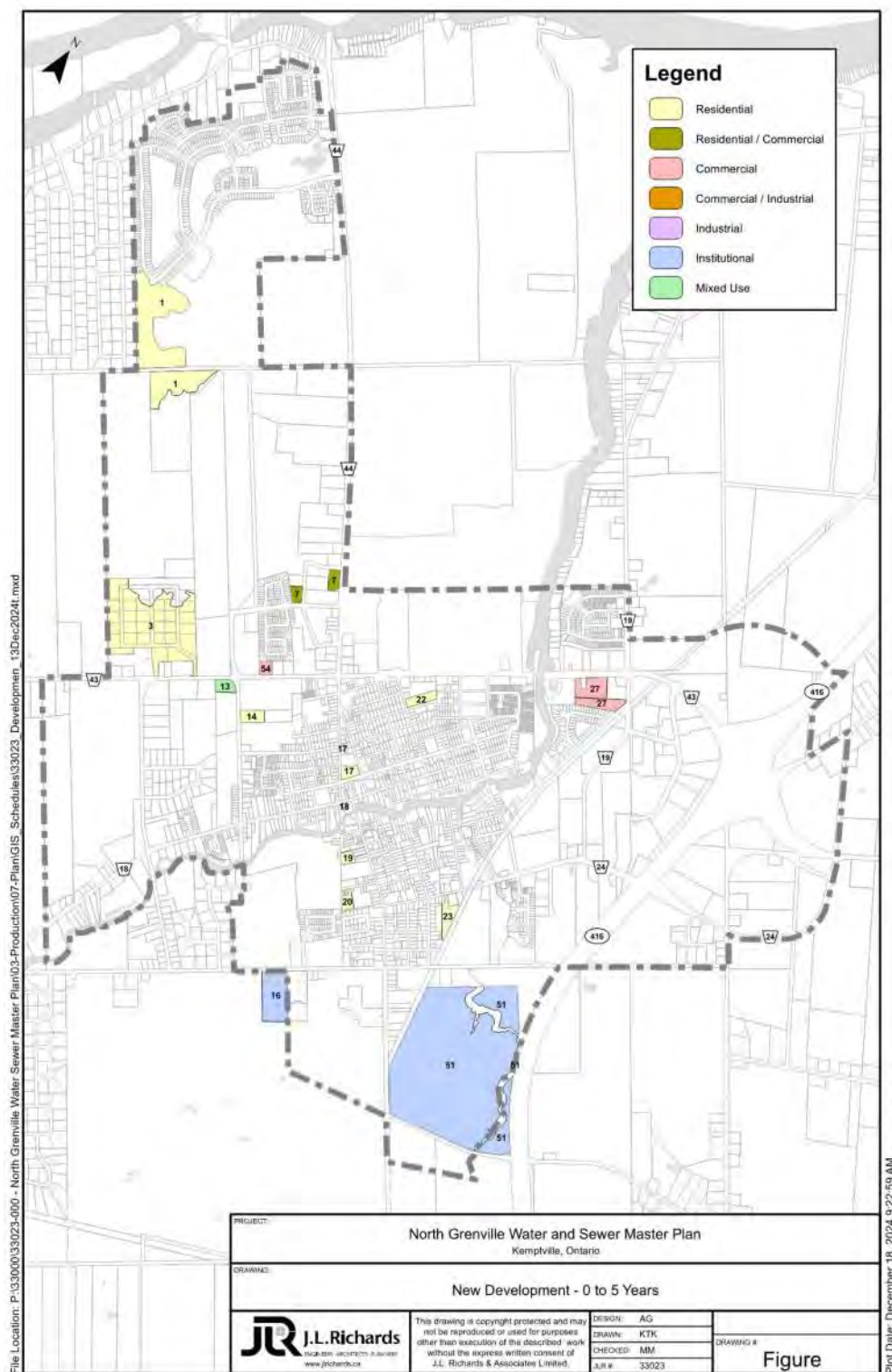


Figure 2: 0-5 Year Land Holdings

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

Servicing Master Plan Update

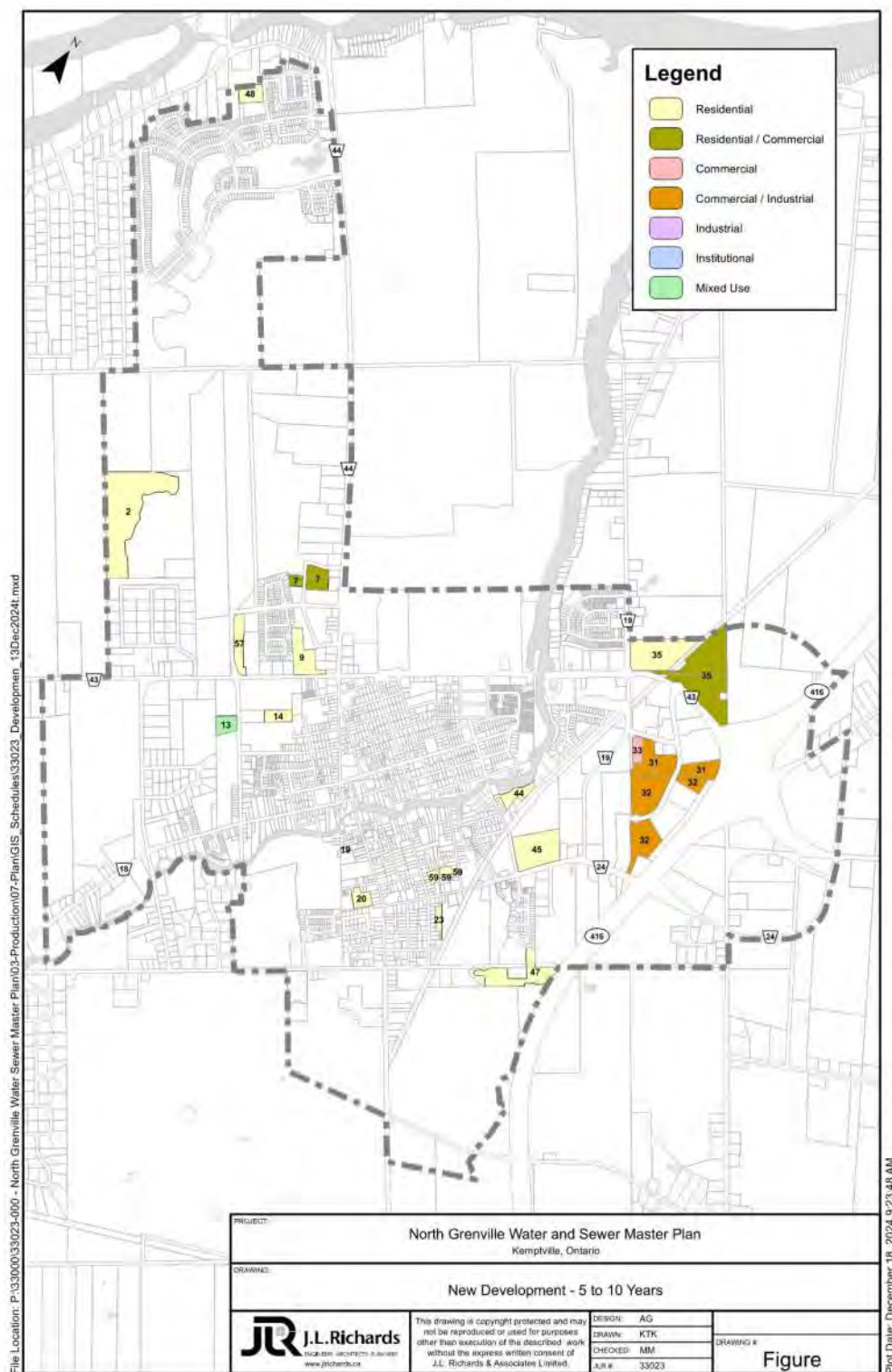


Figure 3: 5-10 Year Land Holdings

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

Servicing Master Plan Update

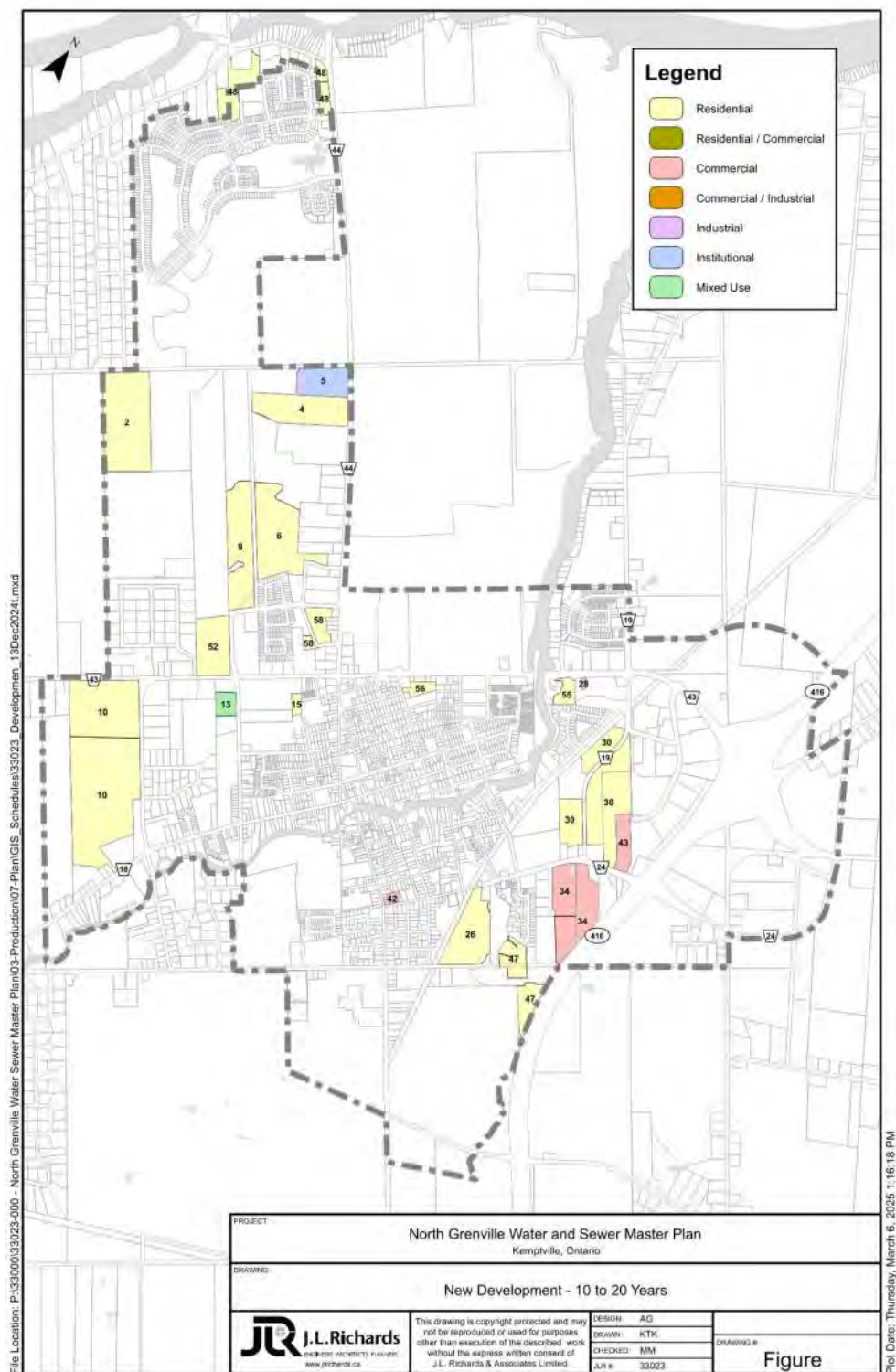


Figure 4: 10-20 Year Land Holdings

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

Servicing Master Plan Update

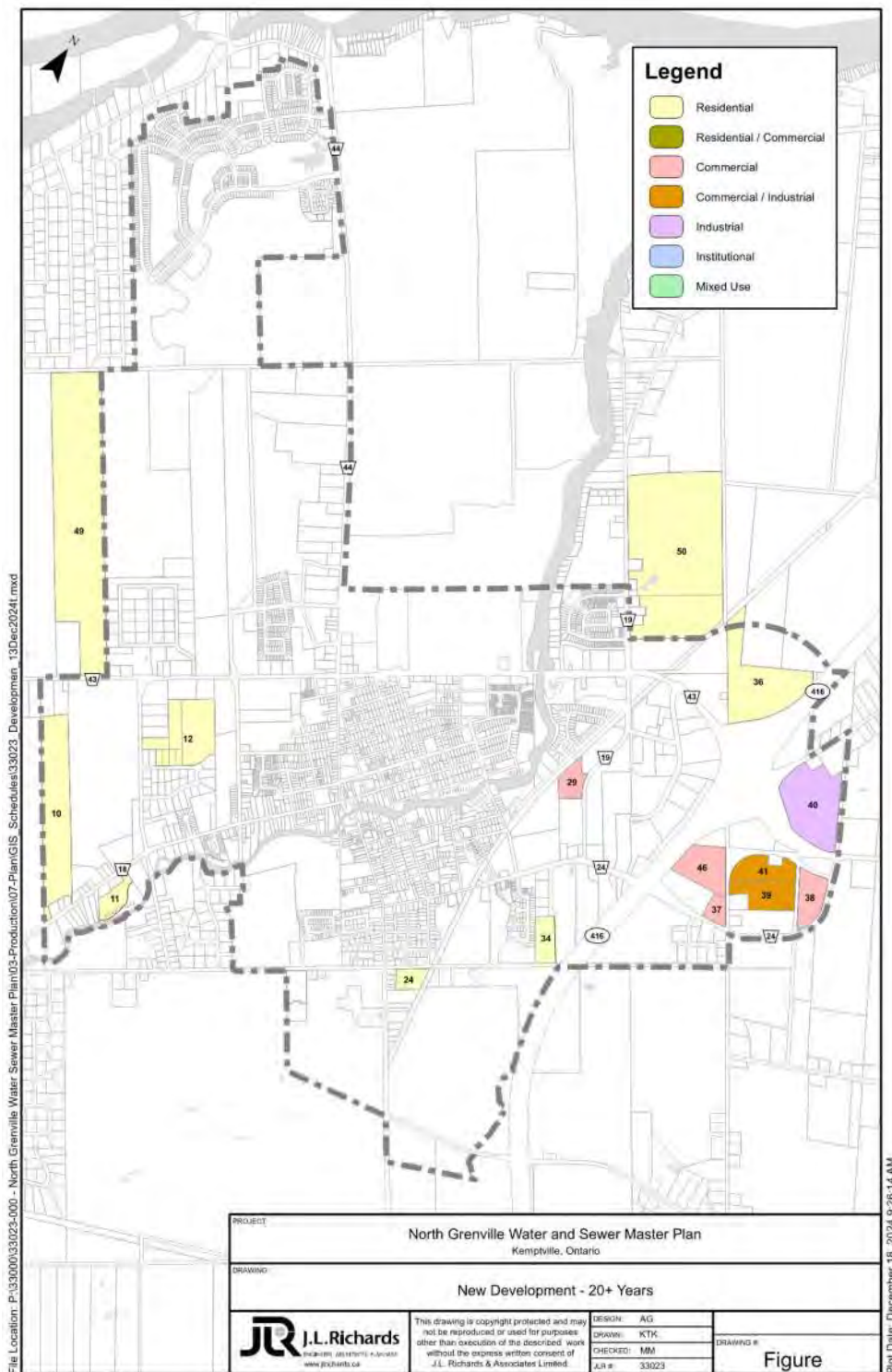


Figure 5: 20 Plus Years

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

Servicing Master Plan Update

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

Servicing Master Plan Update

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

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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:

A blue ink signature, appearing to be 'JAB', written in a cursive style.

Jamie Batchelor, MCIP, RPP
Senior Planner

Reviewed by:

A blue ink signature, appearing to be 'T Chadder', written in a cursive style.

Tim Chadder, MCIP, RPP
Associate, Senior Consultant

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

Servicing Master Plan Update



www.jlrichards.ca

Ottawa

343 Preston Street
Tower II, Suite 1000
Ottawa ON Canada
K1S 1N4
Tel: 613 728-3571
ottawa@jlrichards.ca

Kingston

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424
kingston@jlrichards.ca

Sudbury

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174
sudbury@jlrichards.ca

Timmins

834 Mountjoy Street S
Timmins ON Canada
P4N 7C5
Tel: 705 360-1899
timmins@jlrichards.ca

North Bay

501-555 Oak Street E
North Bay ON Canada
P1B 8E3
Tel: 705 495-7597
northbay@jlrichards.ca

Hawkesbury

326 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287
hawkesbury@jlrichards.ca

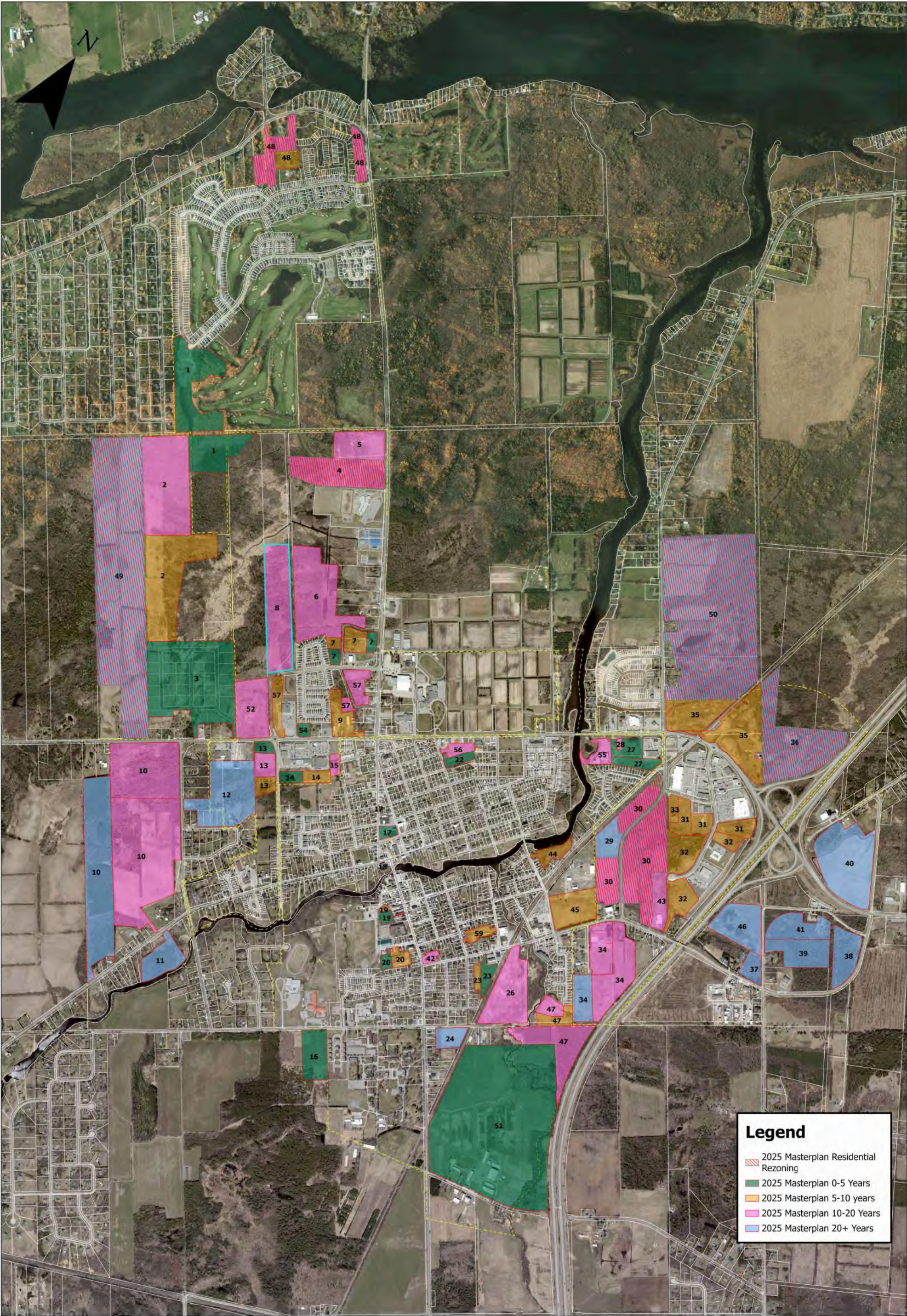
Existing and Future Population, Employment and Land Use Implications and Analysis

North Grenville Water and Wastewater Master Plan

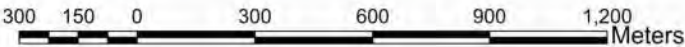
Appendix A

Municipality of North Grenville
Servicing Masterplan

MNG SERVICING 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.

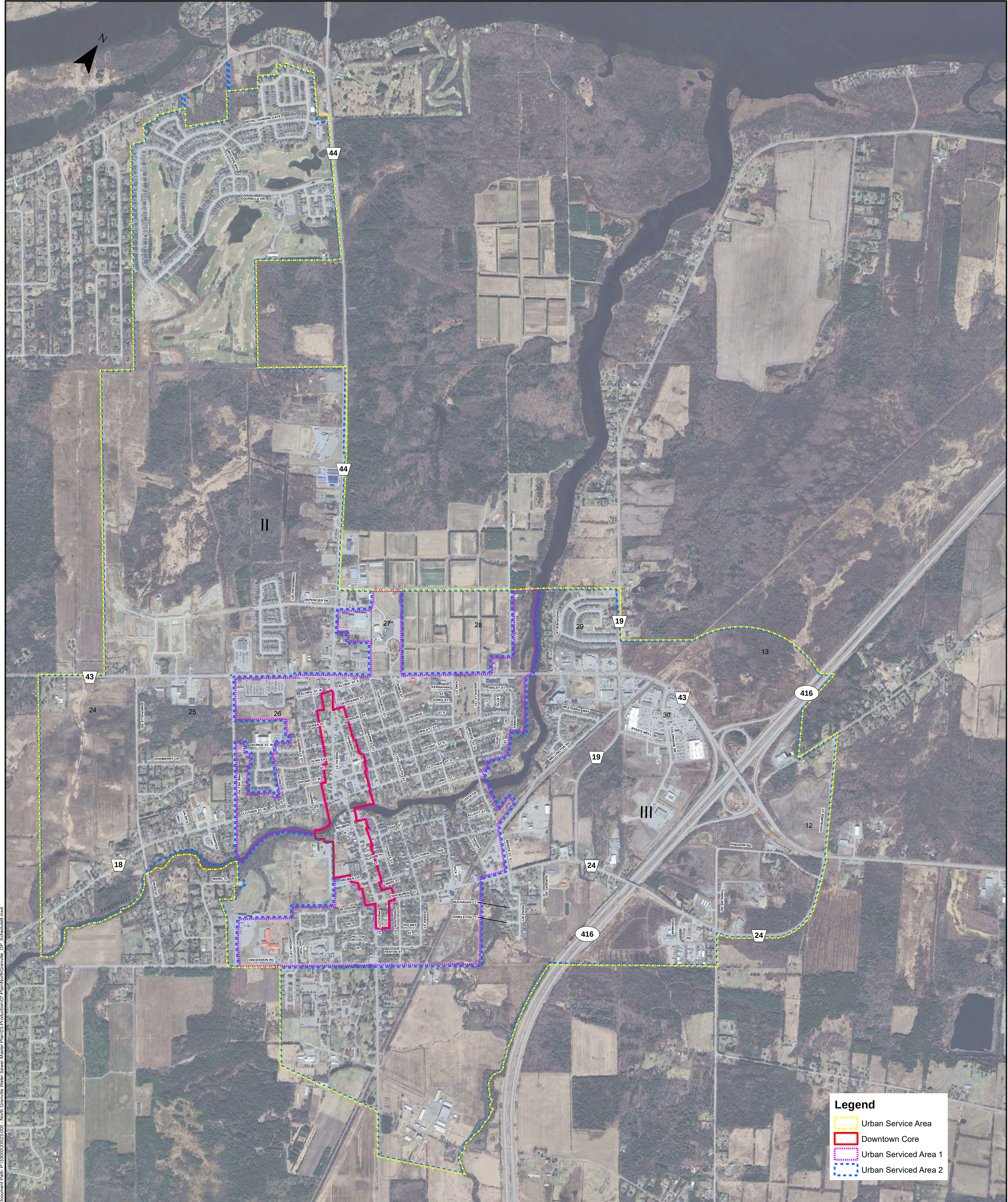


Existing and Future Population, Employment and Land Use Implications and Analysis

North Grenville Water and Wastewater Master Plan

Appendix B

Municipality of North Grenville
Urban Serviced Area Map



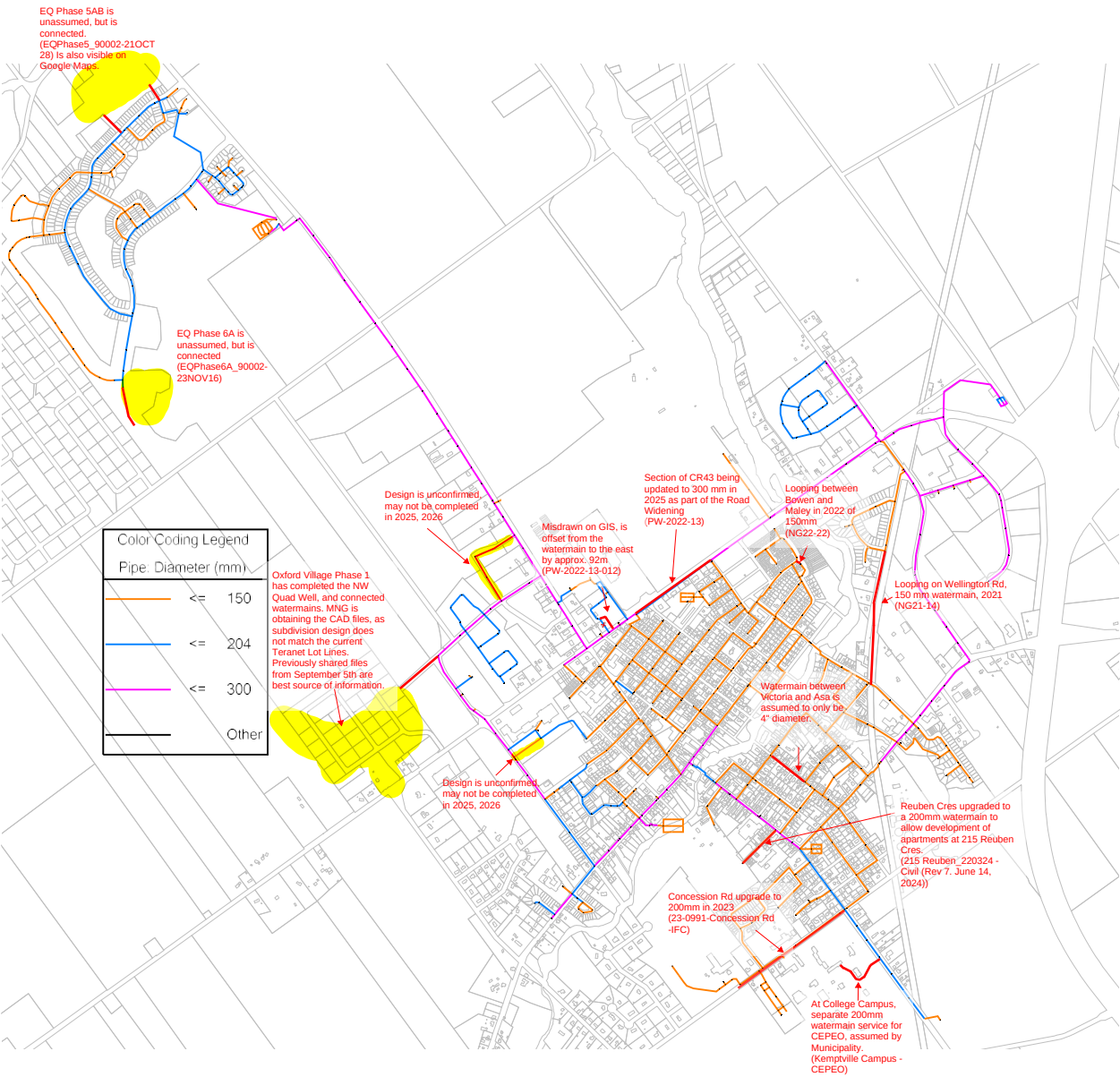
Legend

- 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.



Thomas Fuller Construction
2700 Queensview Dr
Ottawa, Ontario K2B 8
P: 805 6375023
F: 6138297296

**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	Hi Guillaume. See attached revised Pump shop drawings for review. Thanks, Evan		

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	

CIMA+	SHOP DRAWING REVIEW
	PRODUCT OR EQUIPMENT
NATURE AND EXTENT OF REVIEW: The technical specifications of the product or equipment have been reviewed to verify conformity with the Contract Plans and Specifications.	
DATE (dd/mm/yyyy) 10/01/2022	
THE DESIGN AND FABRICATION OF THE PRODUCT HAS NOT BEEN VERIFIED: This review does not relieve the manufacturer or Contractor of any responsibility for compliance with the specifications, or for coordination with other products or equipment to be incorporated into the Works. See remarks on the document (if any).	
NO COMMENT ☒ AS NOTED ☐ REVISE AND RESUBMIT ☐ REJECTED ☐	
REVIEWER'S NAME Guillaume LeBlond	REV. NO. 1
SIGNATURE	



Telephone (613) 931-2984
Fax (613) 931-1719

6857 Richmond Road,
Summerstown, ON K0C 2E0

SHOP DRG SUBMITTAL FORM

PROJECT Kemptonville 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



Shop Drawing Review

Drawing No.: 11301-01, R0 **Description:** Centrifugal Pumps
Project Name: Kemptville NW WTP **Section:** 11301
Project No: A001057 **Date:** 2021-12-02
Client: LA DEVELOPMENTS INC. **Status:** 3
Reviewers: Alireza Farrokhi (AF) **Submission No.:** 1

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

Item	Reference	Reviewer	Comment
1.		AF	The pump shall be supplied with inverter duty rated motors for variable speed operation. YES motor is Inverter duty
2.		AF	Confirm if the motor and motor accessories are CSA approved. YES, motor is CSA approved.
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.

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/ft³ 62,4
5	Static head	m	0	Kin. viscosity at t A		ft²/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]		Impeller Ø	Max.	inch 8 1/4
11	Operating speed	rpm	3500		designed	inch 7 1/2
12	Group	S			Min.	inch 6 3/16
13	Suction flange	/ /		Flow	Nominal	l/s 17,2
14	Discharge flange	/ /			Max-	l/s 23,7
15	Max. casing pressure	psi			Min-	l/s 4,4
16	Max. working pressure	psi	99.7	Head	Nominal	m 57.4
17	Impeller type	Radial impeller			at Qmax	m 45.1
18	Head H(Q=0)	m	70		at Qmin	m 70.1
19	Max. shaft power	hp	26	Shaft power		hp 18,8
20	Pump weight	lb	68,0	Efficiency		% 66,85
21	Total weight	lb	315.0	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

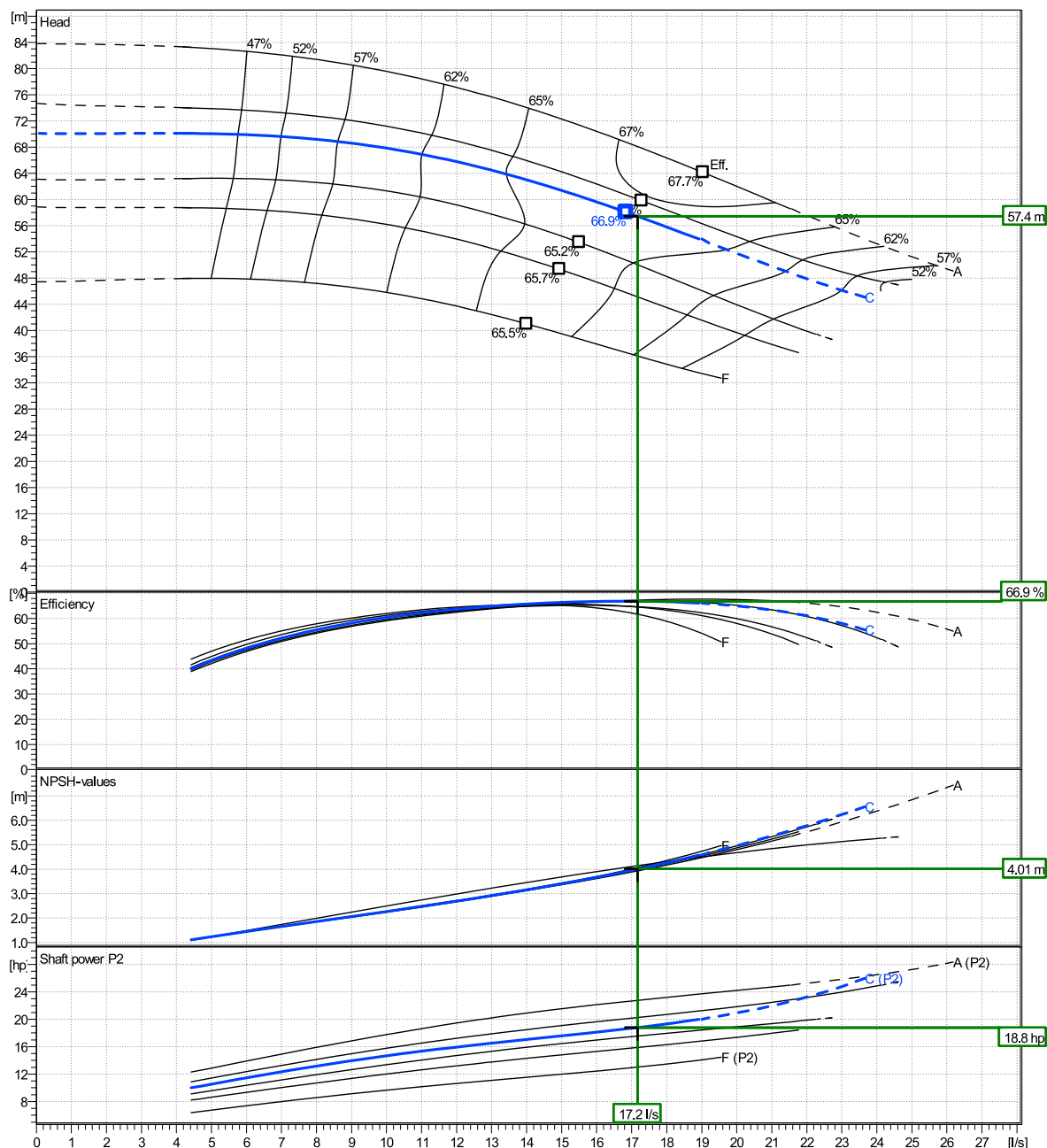
Performance Curve

Company Name
Contact
Phone number
E-Mail address

	Ø inch	Delivered Flow			Lift Capability		Shaft Power P2			Frequency	Hz	60
		Application Min. l/s	Range 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	3500
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	Nominal head	m	55
Max.	8.250	/	/	19	83.8	64.1		/	23.7	Inlet pressure	psi	0
										Static head	m	0

Power data referred to:

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



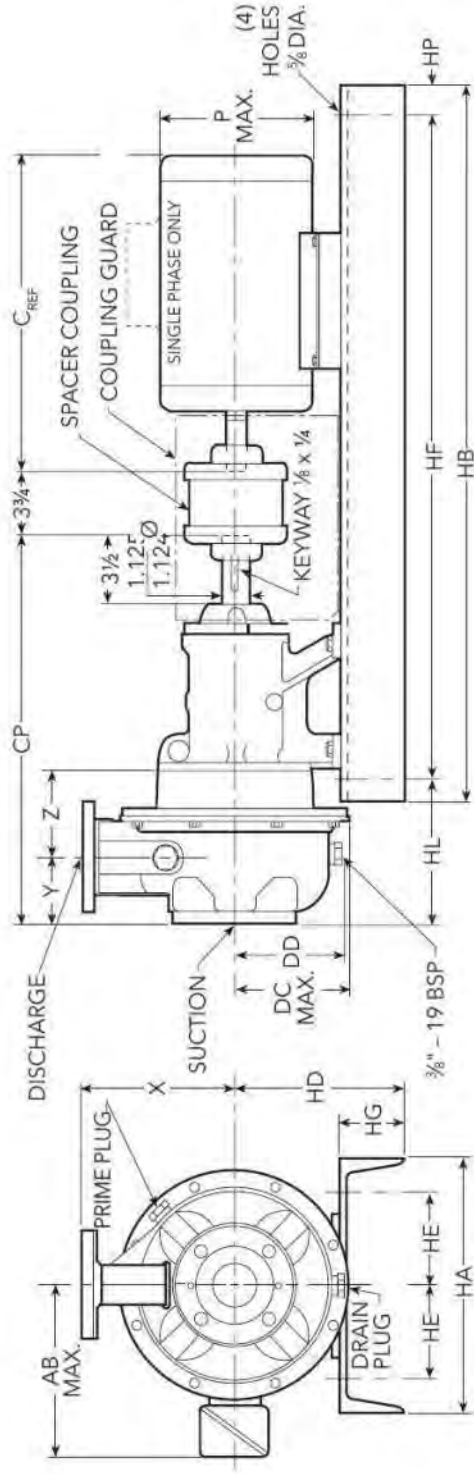
02SH08CSFRM22 - H14A32F5BK2S

Frame mounted
Rotation: 12 oClock [STD]
NEMA 3 ph TEPE [STD]Frame 256T - 20 hp

Dimensions

Company Name
Contact
Phone number
E-Mail address

Dimensions	[inch]
ABmax	10
CP	17 ⁵ / ₁₆
Cref	23 ⁵ / ₁₆
DCmax	6
DD	5 ³ / ₄
HA	10
HB	28
HD	8
HE	3 ³ / ₄
HF	24
HG	2 ³ / ₄
HL	10
HP	3 ³ / ₄
Pmax	12 ³ / ₄
X	7 ¹⁵ / ₁₆
Y	4
Z	3 ⁵ / ₈



Connections	
Suction flange	Discharge flange
Weight (+/- 5%)	
Pump	68 lb
Base plate	48 lb
Motor	199 lb
Total weight	315 lb

Dimensions and weight without obligation

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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Shop Drawing Review

Drawing No.: 11421-01, R1 **Description:** High Lift Pump 3
Project Name: Kemptville NW WTP **Section:** 11421
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.			

Notes:

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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.



Thomas Fuller Construction
2700 Queensview Dr
Ottawa, Ontario K2B 8
P: 805 6375023
F: 6138297296

**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	Hi Guillaume. See attached revised Pump shop drawings for review. Thanks, Evan		

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	

CIMA+	SHOP DRAWING REVIEW
	PRODUCT OR EQUIPMENT
NATURE AND EXTENT OF REVIEW: The technical specifications of the product or equipment have been reviewed to verify conformity with the Contract Plans and Specifications.	
DATE (dd/mm/yyyy) 10/01/2022	
THE DESIGN AND FABRICATION OF THE PRODUCT HAS NOT BEEN VERIFIED: This review does not relieve the manufacturer or Contractor of any responsibility for compliance with the specifications, or for coordination with other products or equipment to be incorporated into the Works. See remarks on the document (if any).	
NO COMMENT ☒ AS NOTED ☐ REVISE AND RESUBMIT ☐ REJECTED ☐	
REVIEWER'S NAME Guillaume LeBlond	REV. NO. 1
SIGNATURE	



Telephone (613) 931-2984
Fax (613) 931-1719

6857 Richmond Road,
Summerstown, ON K0C 2E0

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 Hozional Split Case Pumps

COMMENTS _____

DATE: Dec 22nd 2021

SIGNED: Rich Waterton



Shop Drawing Review

Drawing No.:	11421-01, R0	Description:	High Lift Pump 3
Project Name:	Kemptville NW WTP	Section:	11421
Project No:	A001057	Date:	2021-12-01
Client:	LA DEVELOPMENTS INC.	Status:	3
Reviewers:	Alireza Farrokhi (AF)	Submission No.:	1

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

Item	Reference	Reviewer	Comment
1.		AF	The pump shall be supplied with inverter duty rated motors for variable speed operation. YES motor is inverter duty
2.		AF	Confirm if the interior and exterior pump casing, nozzles and flanges will be shop primed and shop finished in NSF 61 approved, fusion bonded epoxy. Yes, this will be provided
3.		AF	The impeller shall be constructed from 316SS. Yes it will be in 316SS
4.		AF	Confirm if the motor and motor accessories are CSA approved. YES all motors supplied are CSA approved.
5.			Notes provided in data sheets as well.
6.			
7.			
8.			

Notes:

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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/ft³ 62,4
5	Static head	m 0	Kin. viscosity at t A	ft²/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
17	Impeller type	Radial impeller	Head	Nominal m 54.5
18	Head H(Q=0)	m 62		at Qmax m 37.2
19	Max. shaft power	hp 65,5		at Qmin m 61.1
20	Pump weight	lb 759,0	Shaft power	hp 51.1
21	Total weight	lb 1,875.6	Efficiency	% 70,05
			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]		

Comments:

Pump temperature detectors are not available .
Goulds standard hydro test only will be supplied.
Factory performance test will not be supplied . No factory test report will be available .
Bearing RTDs are not available.
Vibration testing during factory performance test and vibrational torsional analysis at the factory are not available.

Motor data

42	Manufacturer	Baldor	Coupling	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	Spacer length	inch 1/2	
46	Nominal speed	1780 rpm	Weight	lb 16.3	
47	Frame size	365T	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

49	Name	4x6x16 / 365T	Remarks	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

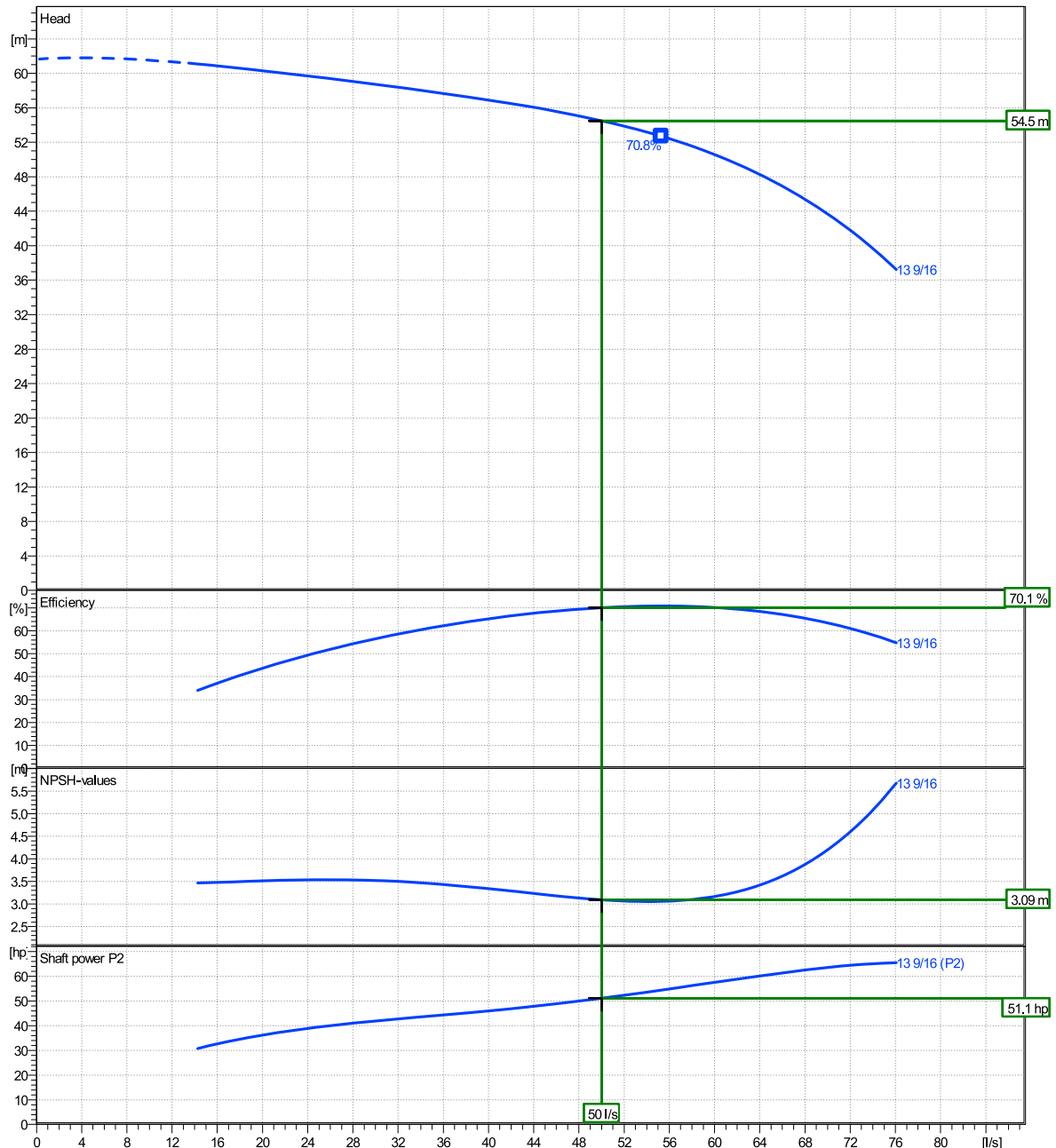
Company Name
Contact
Phone number
E-Mail address

	Ø	Delivered Flow			Lift Capability		Shaft Power P2			Frequency	Hz	60
		Application Range		η	H(Q=0) m	η Max. m	P2(Q=0) hp	Max. hp	η Max. hp	Operating speed	rpm	1780
	inch	Min. l/s	Max. l/s	Max. l/s								
Is	13.535			55.3	61.7	52.7		65.5	54.4	Nominal flow	l/s	50
Min.	6.929	/	/	25.3	12.5	8.59		/	8.18	Inlet pressure	psi	0
Max.	16.142	/	/	66.9	92.9	80.5		/	98.2	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	Created by	Created on	Last update
	OX052721 Kemptville Distribution North Grenville	Gilles Raymond	06-18-21	06-21-21



e-XC4x6x16/75H6G4WNTMUA1CC1G

Frame 365T - 75 hp

Technical drawing of the 1000 Series Vertical Drive Unit, showing front and side views with dimensions and labels.

Front View (Left):

- Dimensions:** SF-T, W, V, W, HC MAX, HI MAX, X, Y, Z, S, HA, HE2.
- Labels:** 1/4" NPT (FLUSH) VP NPT (VERT), DISCHARGE, 2 X GP NPT (GAUGE), 2 X DP NPT (DRAIN), SUCTION, 2 X GP NPT (GAUGE), 2 X DP NPT (DRAIN).

Side View (Right):

- Dimensions:** MINIMUM RADIAL CLEARANCE FOR BEARING MOUNTING, MRC, CP, V, W, HC MAX, HI MAX, HG, HF1, HF2, HF3, HF4, HF5, HP, HR, HD1, HD, HO, VH, DP1 NPT (DRAIN), 4.00 (101.6).
- Labels:** 1/4" NPT (TEMPERATURE SENSOR AT DRIVING & NON-DRIVING END), 2 X 1/4-28 UNF (VERTICAL DRIVING & NON-DRIVING END), HH DIA ANCHOR BOLT HOLE, HQ ANCHOR BOLT HOLES PER SIDE.

Orientation: CLOCKWISE ROTATION VIEWED FROM DRIVER END

Connections		
Suction flange	Discharge flange	
NPS 6	NPS 4	
CL125	CL125	
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

Project	Project ID
	OX05272
	North Gre

Created on	06-18-21
Last update	06-21-21

Page:

Detailed Water Demands Per Junction in Model																			
Water/CAD Junction Label	Max ID	Zone	Development	Units			Population	General Com. Pop.	Local Industrial (Est.)	Area	Industrial (Est. at site)	Recreation (Est.)	Total (Est.)	ADD (L/s)	MDD (L/s)	PFD (L/s)	HWU ADD (L/s)	HWU MDD (L/s)	HWU PFD (L/s)
				Troughs/Storm Outfalls	Storm	Asphalted	Unpaved												
Existing (2022)																			
2551	1	Kempenella	121 GEORGE ST W														0.46	0.84	1.35
2555	7	Kempenella	285 COUNTY RD 48														0.45	0.82	1.35
2579	13	Kempenella	285 COUNTY RD 48														0.30	0.55	0.85
26		Kempenella	285-288 CONCESSION RD														0.29	0.53	0.87
242	14	Kempenella	285 COUNTY RD 43														0.28	0.41	0.69
285		Kempenella	100-357 FRR LANE														0.28	0.51	0.84
274		Kempenella	2665 COUNTY RD 43														0.28	0.46	0.75
342		Kempenella	2627 RED CREEK RD														0.24	0.44	0.72
2170		Kempenella	521 GLOVEREE ST W														0.21	0.38	0.63
212		Kempenella	102 ELVIRA ST W														0.16	0.29	0.48
244		Kempenella	Phase SA	9	2			31					0.09	0.18	0.27				
245		Kempenella	Phase SB	29									0.23	0.42	0.69				
246		Kempenella	Phase SC	1	6			23					0.11	0.19	0.21				
240		Kempenella	Phase SA	30	8			108					0.32	0.58	0.86				
247		Kempenella	Phase SA	3				9					0.10	0.19	0.24				
248		Kempenella	Phase SA	8	11			39					0.18	0.33	0.54				
251		Kempenella	Phase SA	1				5					0.10	0.16	0.20				
252		Kempenella	Phase SA					41					0.12	0.25	0.36				
253		Kempenella	Phase S	6	13			42					0.15	0.28	0.43				
2572		Kempenella	Phase S	16				25					0.25	0.46	0.75				
258		Kempenella	Odont Village	8	3			39					0.25	0.42	0.69				
258		Kempenella	Odont Village	15	19			70					0.35	0.62	0.99				
259		Kempenella	Odont Village	7				29					0.17	0.31	0.48				
2592		Kempenella	Odont Village	12	21			104					0.31	0.58	0.93				
259		Kempenella	Odont Village	7	11			39					0.17	0.31	0.48				
2582		Kempenella	Odont Village	9	31			31					0.09	0.18	0.27				
2584		Kempenella	Odont Village	17	12			48					0.14	0.25	0.42				
2587		Kempenella	Odont Village	8	3			39					0.28	0.46	0.75				
258		Kempenella	Odont Village	18	6			51					0.15	0.27	0.45				
2584		Kempenella	Odont Village	11	6			30					0.16	0.29	0.48				
2583		Kempenella	Odont Village	42				113					0.34	0.62	1.00				
2587		Kempenella	Odont Village	12	6			30					0.16	0.29	0.48				
2583		Kempenella	CEPECO Campus	12									0.07	0.10	0.20				
TOTAL Existing														4.81	7.68	11.43			
Short-Term (3-4 years 2023-2026)																			
2588	1	eAurukella	Phase S (Top portion)	11	100			451					1.19	2.17	3.37				
2595	7	Kempenella			48				0.5				0.23	0.41	0.68				
2617	7	Kempenella											0.27	0.41	0.68				
2635	13	Kempenella				63		126					0.37	0.67	1.11				
274	14	Kempenella				49		99					0.28	0.51	0.84				
263	17	Kempenella				59		100		0.1			0.30	0.55	0.90				
262	18	Kempenella				35		70					0.08	0.15	0.24				
268	18	Kempenella				69		138					0.41	0.73	1.23				
2683	20	Kempenella	215 Reuben Crescent			138		276					0.35	0.64	1.09				
2644	22	Kempenella			26			52					0.36	0.66	1.08				
264	23	Kempenella			30			60					0.44	0.84	1.27				
2177	27	Kempenella				79		158	1.8				1.05	1.91	3.15				
2611	31	Kempenella											0.64	1.14	1.94				
263	35	Kempenella							1.6				0.34	0.62	1.00				
2611	34	Kempenella											0.62	0.96	1.56				
TOTAL New Developments														8.95	17.28	28.17			
Mid-Term (5-10 years 2026-2031)																			
2617	2	Kempenella			32			138					2.52	4.77	7.47				
2555	7	Kempenella			108			882	2				180	338	520	4.20	7.85	12.05	
2620	13	Kempenella			28			60					0.56	0.98	1.63				
261	14	Kempenella				60		120					0.56	0.98	1.63				
2624	14	Kempenella				40		80					0.40	0.72	1.12				
260	20	Kempenella	215 Reuben Crescent			109		218					0.85	1.58	2.60				
2641	20	Kempenella			25			50					0.50	0.90	1.40				
2595	27	Kempenella				43		86					0.30	0.47	0.74				
2646	31	Kempenella						62					0.62	1.11	1.71				
2559	39	Kempenella			33	2	8	112					0.53	0.93	1.54				
2628	39	Kempenella						87	2.8				0.49	0.87	1.40				
2628	44	Kempenella				43	39	49					0.29	0.53	0.83				
2171	37	Kempenella							1.9				1.56	2.94	4.49				
262	38	Kempenella						79					2.55	4.68	7.20				
2122	39	Kempenella						0.8				28	0.45	0.82	1.29				
2689	39	Kempenella						14.6					4.73	8.61	13.48				
2627	40	Kempenella						4.0					1.49	2.71	4.20				
2689	40	Kempenella											0.58	1.00	1.58				
2615	48	Kempenella						43	154				0.31	0.58	0.98				
TOTAL New Developments														26.65	37.59	58.84			
Long-Term (10+ years 2031-2041)																			
2684	2	Kempenella			415			1495					4.44	8.08	12.55				
2688	10	Kempenella			448			300					6.88	12.18	18.04				
2612	15	Kempenella					96	92					0.21	0.38	0.60				
2610	47	Kempenella			89			100	97				0.24	0.40	0.64				
2602	48	eAurukella						794	456	0.2			1.35	2.49	3.85				
2601	28	Kempenella						100		0.2			0.05	0.11	0.17				
2684	34	Kempenella						200					1.17	2.13	3.33				
2645	34	Kempenella						200					2.02	4.00	6.02				
2688	43	Kempenella						2.5					0.01	0.17	0.23				
2611	5	Kempenella						3					0.03	0.06	0.08				
2626	13	Kempenella											0.45	0.82	1.28				
2684	35	Kempenella											0.13	0.24	0.37				
2610	4	Kempenella				275		642					2.35	4.31	6.67				
2610	6	Kempenella				358		628					2.95	5.01	7.64				
2620	38	Kempenella				253		565					1.76	3.20	5.00				
2600	39	Kempenella				270		1361					2.70	5.00	7.70				
2615	52	Kempenella				359		641					2.50	4.50	7.13				
2615	52	Kempenella				359		641					2.50	4.50	7.13				
2619	58	Kempenella				87		160					0.58	1.02	1.60				
2612	42	Kempenella							0.688				0.07	0.13	0.20				
TOTAL Long-Term														37.27	67.84	106.23			
Build-Out (2041-2045)																			
2641	10	Kempenella			159			882					2.55	4.62	7.18				
2641	12	Kempenella						127					0.17	0.30	0.47				
2628	12	Kempenella						358	817				2.49	4.51	6.70				
2626	12	Kempenella						358	817				2.49	4.51	6.70				
2618	34	Kempenella				98		230					0.88	1.54	2.34				
2613	30	Kempenella				498		1099					3.99	7.10	10.40				
2629	29	Kempenella							2.4				0.79	1.42	2.11				
2612	29	Kempenella							0.8				0.39	0.70	1.04				
2611	38	Kempenella											1.30	2.37	3.51				
2603	38	Kempenella							4.7				1.52	2.77	4.19				
2632	40	Kempenella							4.3	11.8			4.78	8.70	12.91				
2612	41	Kempenella											2.50	4.50	7.00				

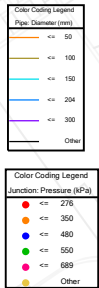
33023-000 - North Grenville - Master Plan - Water Model

Average Day Demand

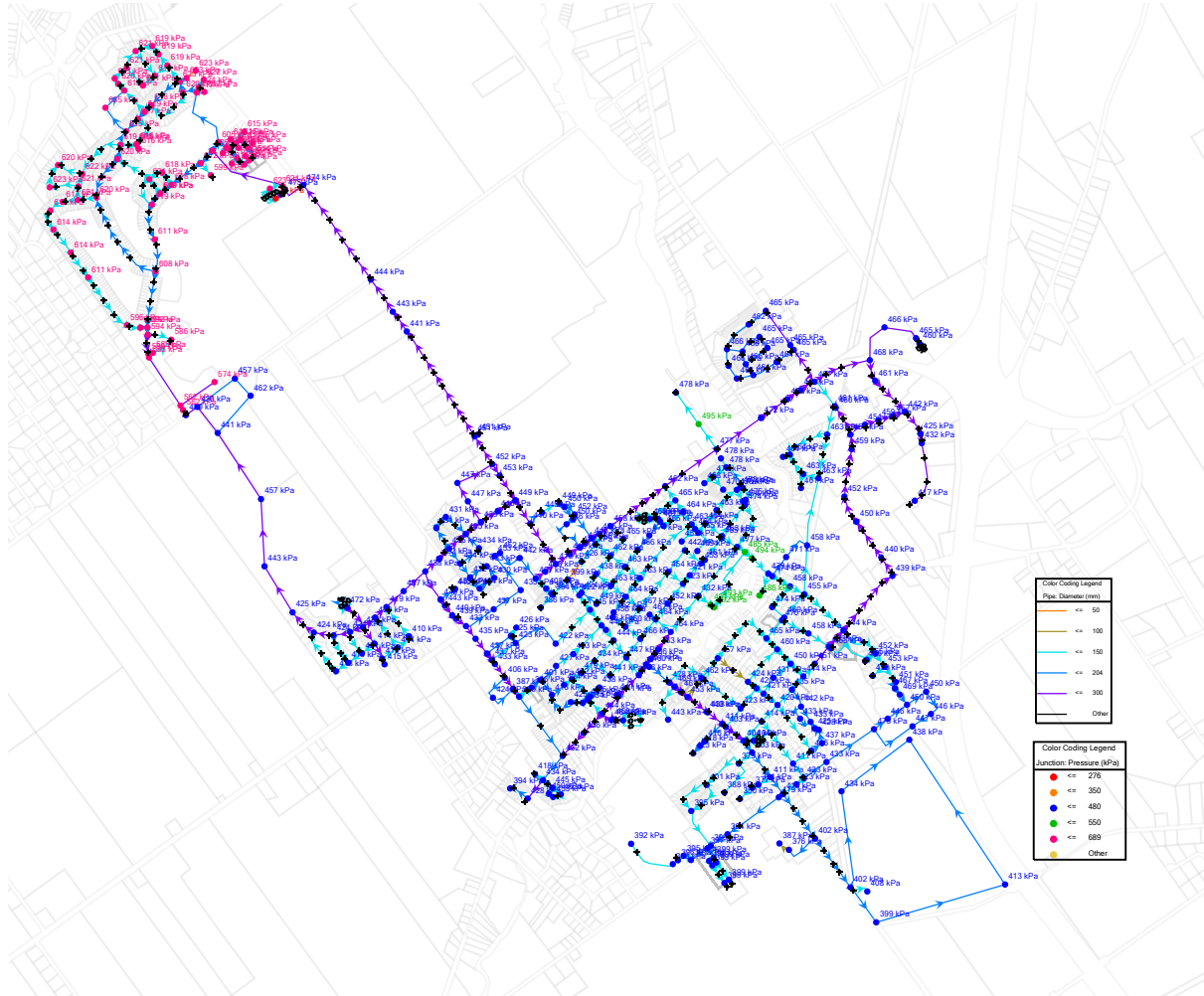
Existing Conditions



Average Day Demand Short Term (0 to 5 Years)



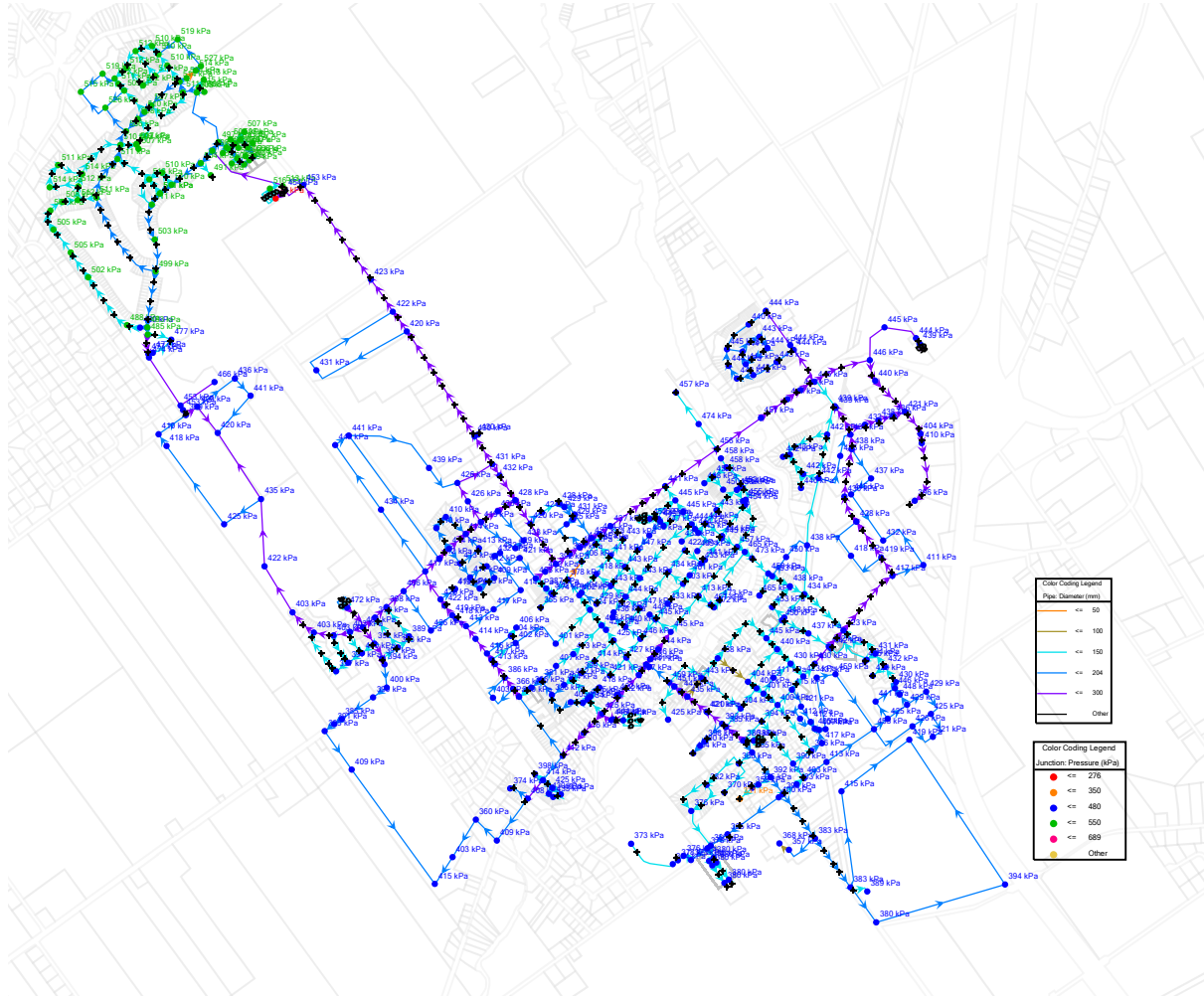
33023-000 - North Grenville - Master Plan - Water Model **Average Day Demand** **Mid Term (5 to 10 Years)**



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

Average Day Demand

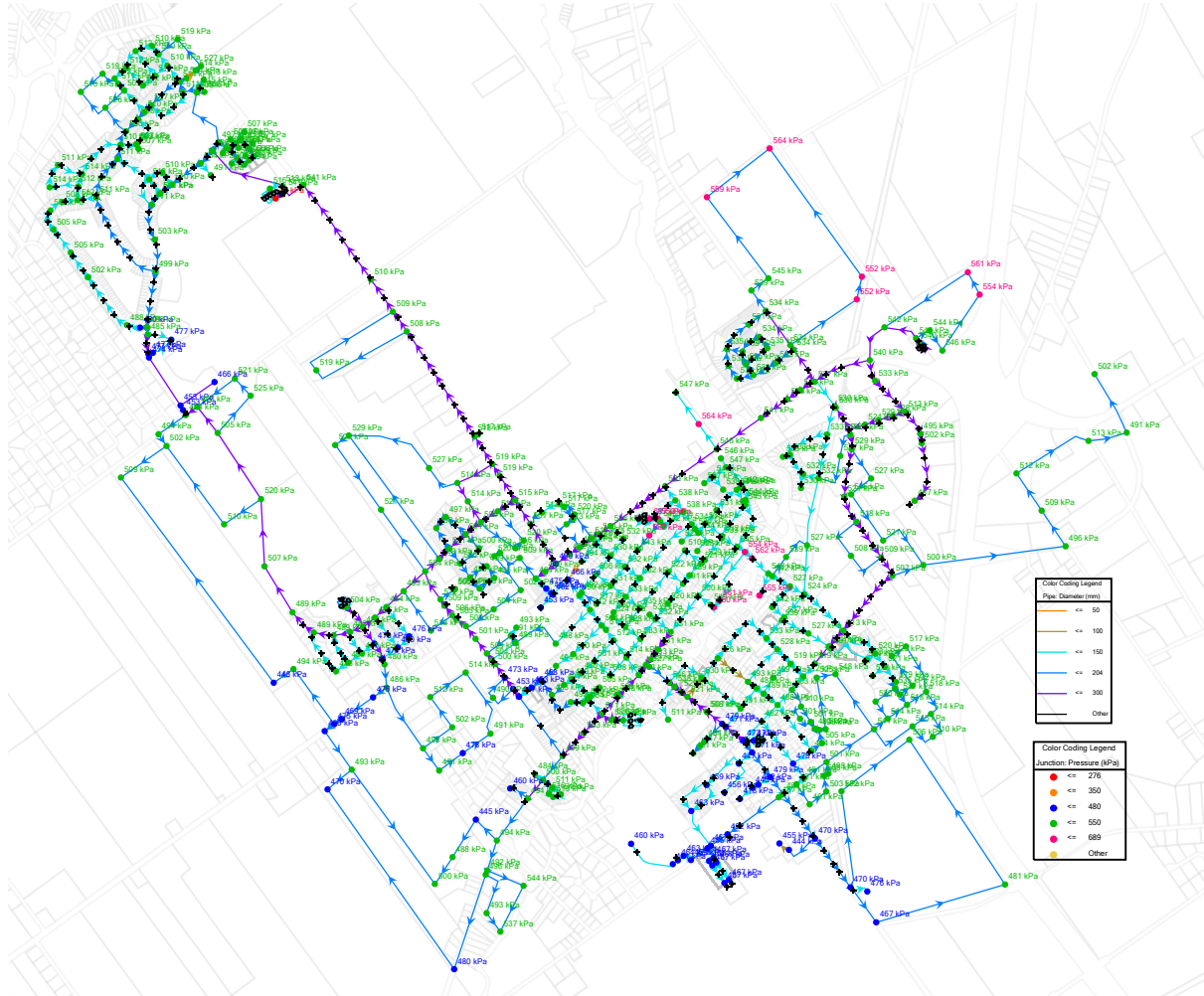
Long Term (10 to 20 Years)



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

Average Day Demand

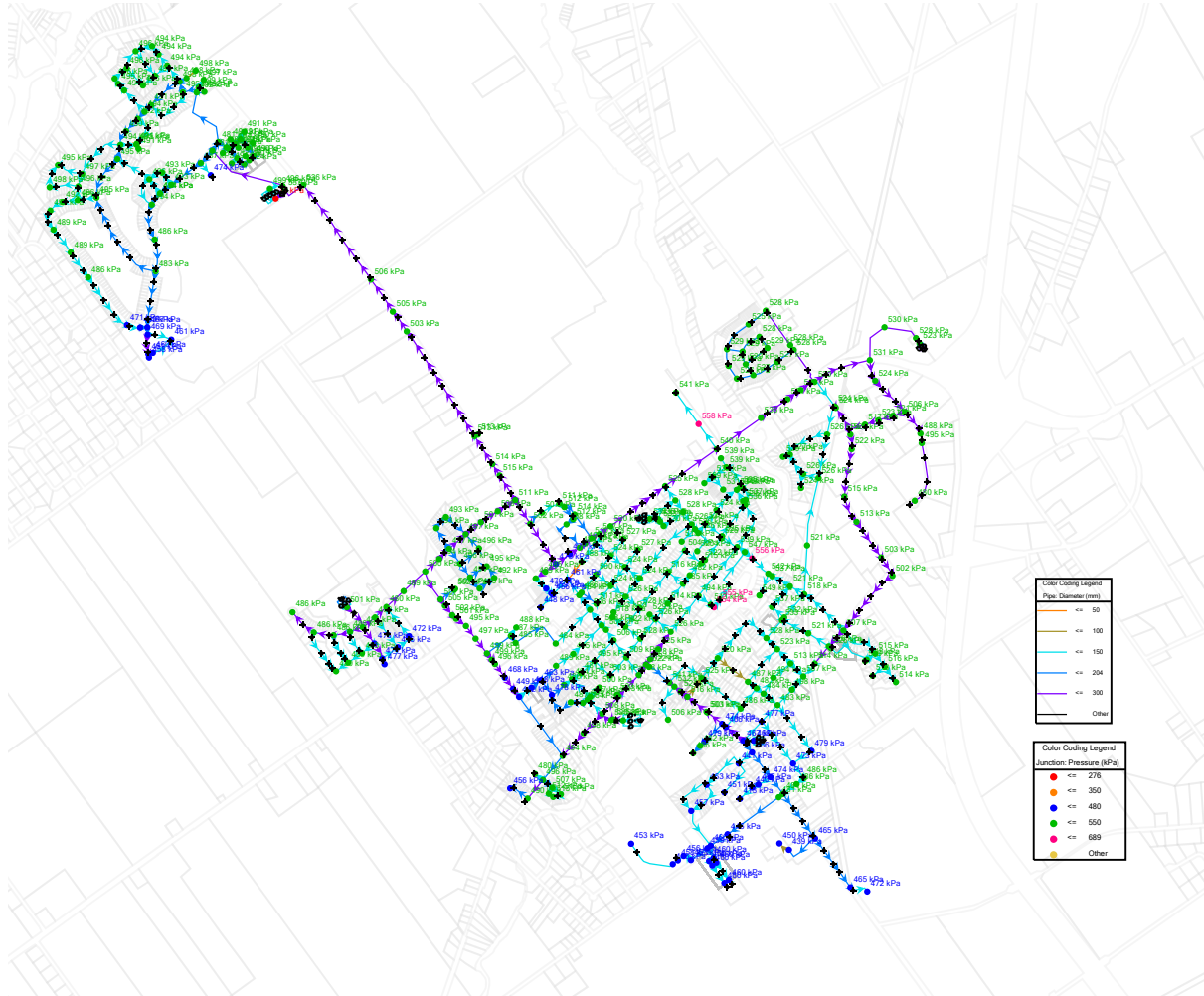
Build Out (20+ Years)



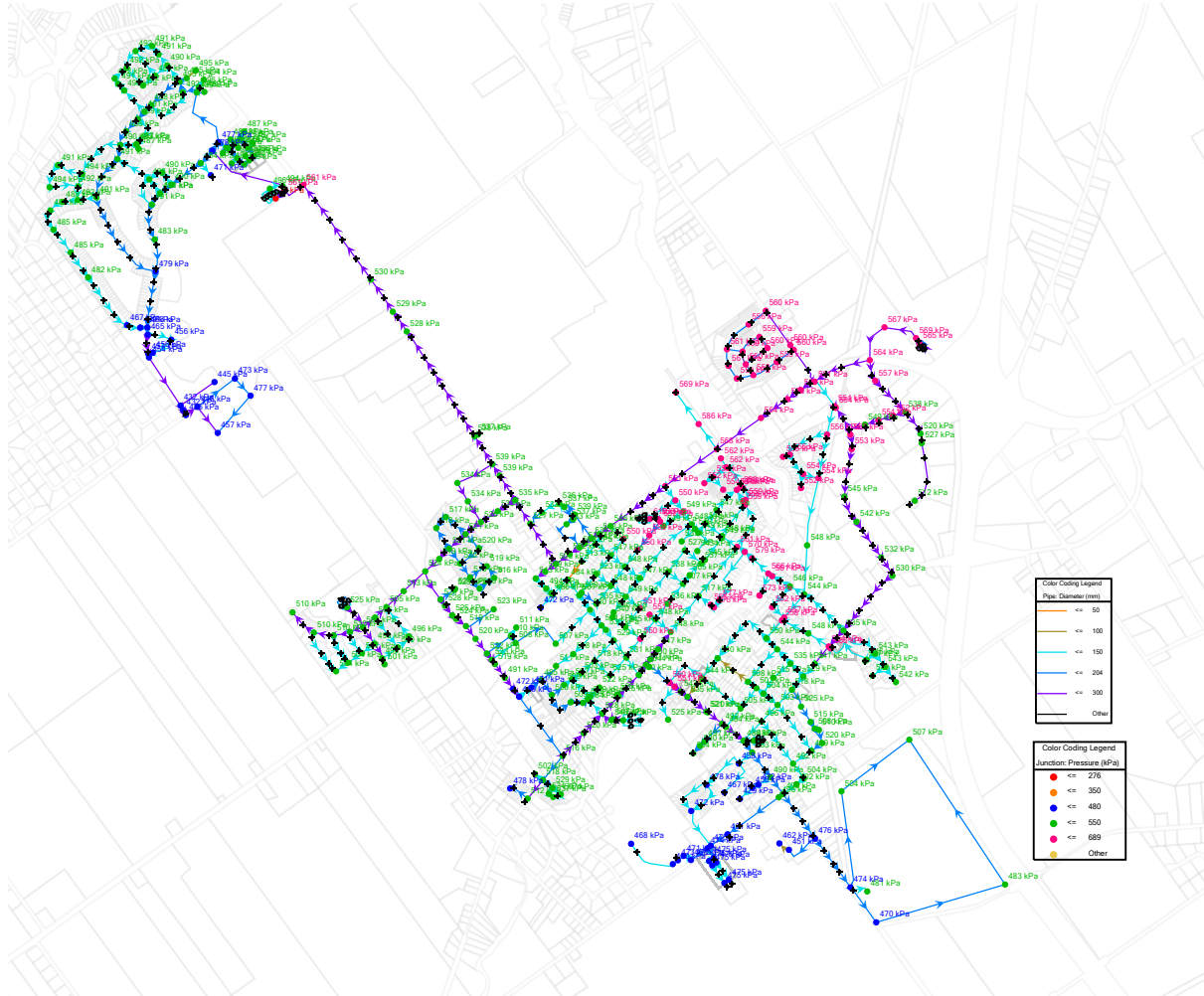
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Peak Hour Demand

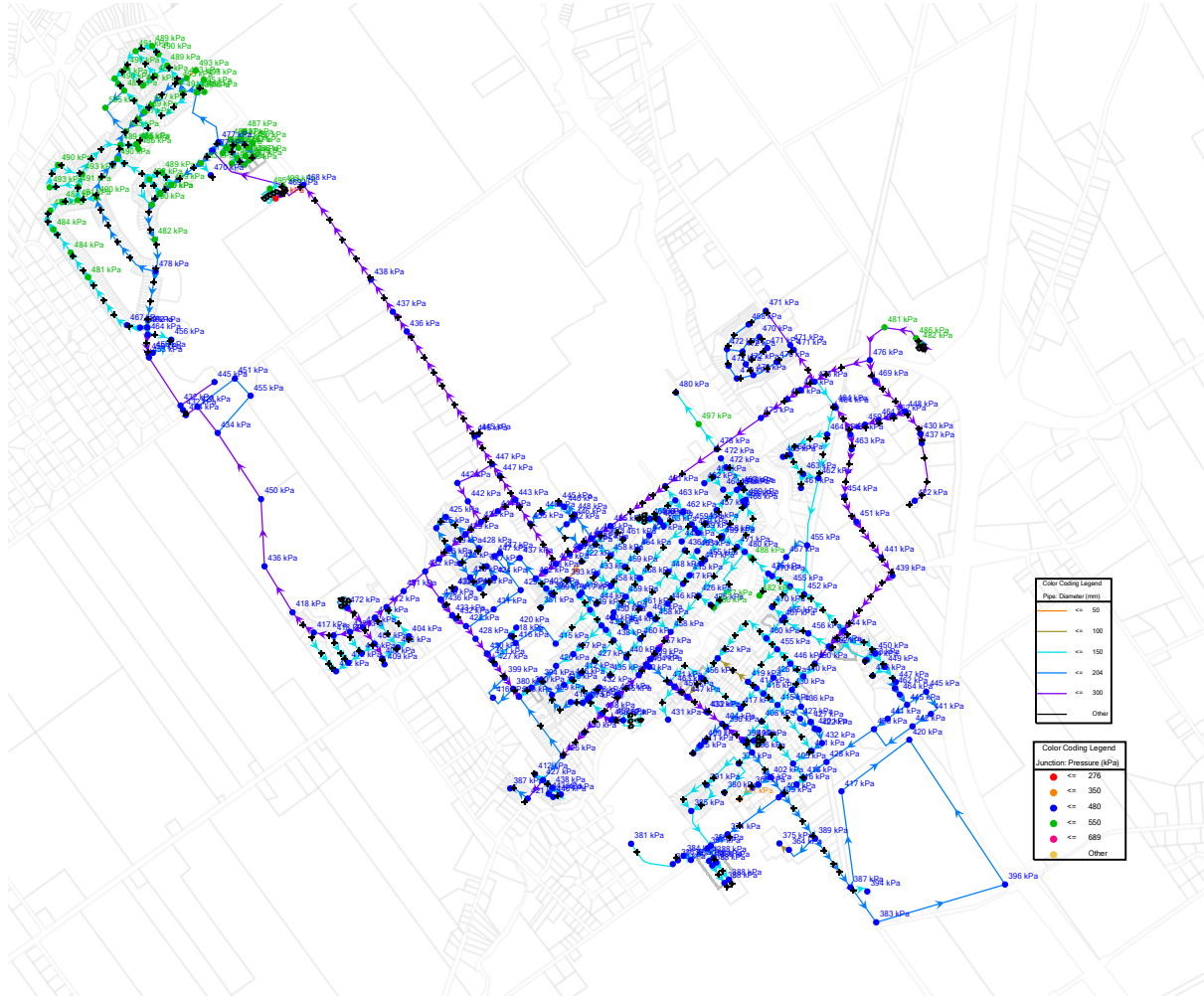
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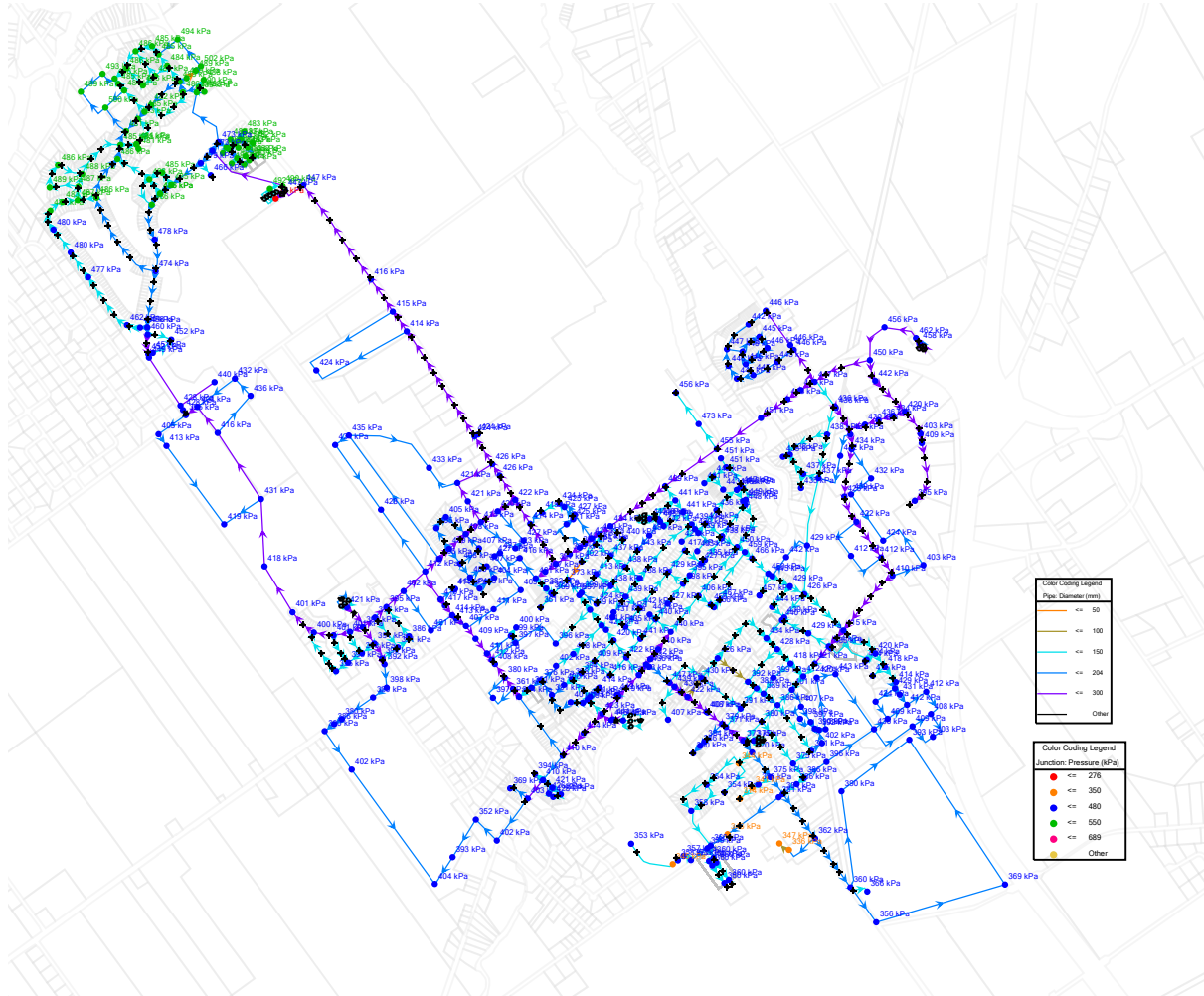
33023-000 - North Grenville - Master Plan - Water Model **Peak Hour Demand** **Short Term (0 to 5 Years)**



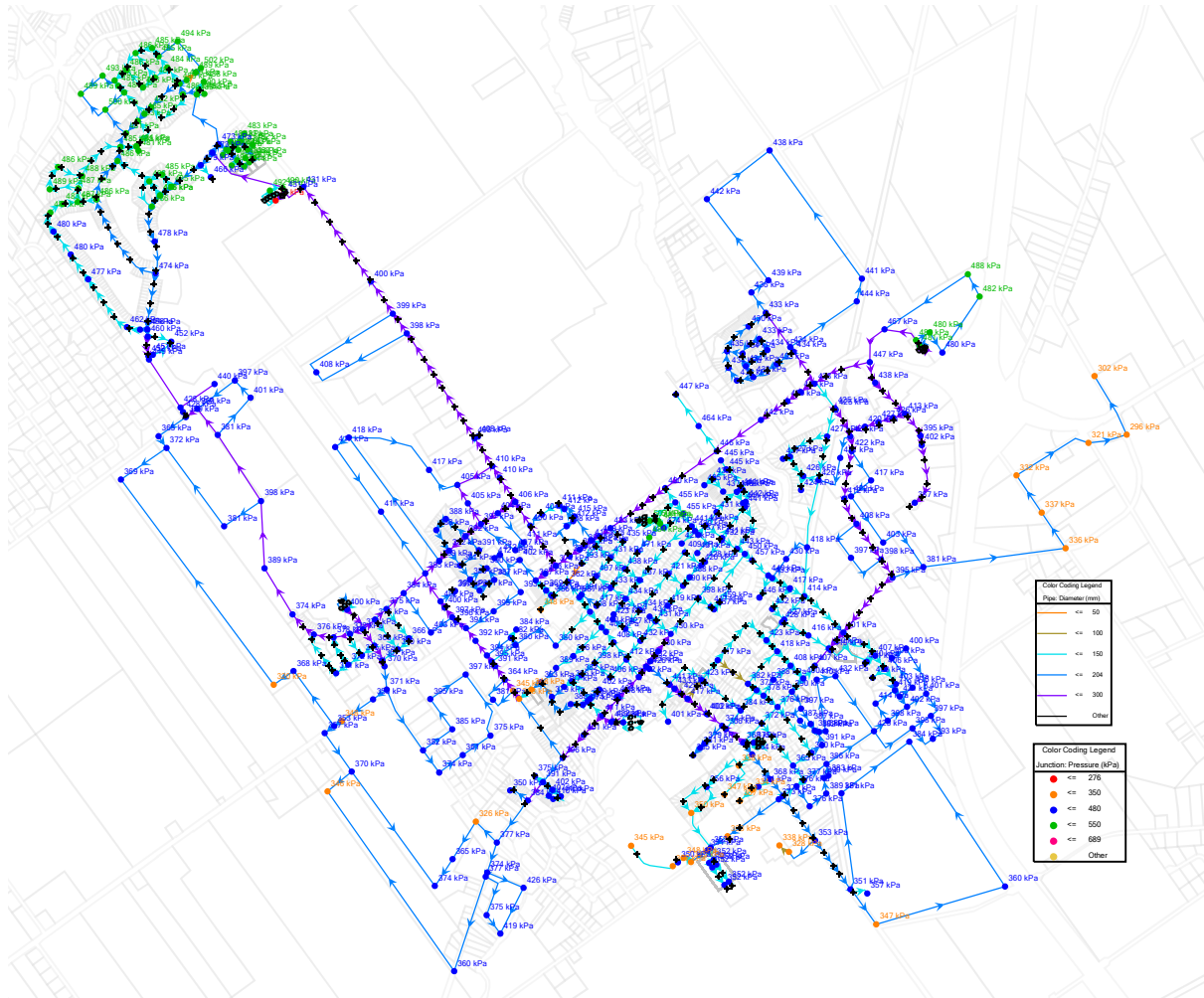
33023-000 - North Grenville - Master Plan - Water Model **Peak Hour Demand** **Mid Term (5 to 10 Years)**



33023-000 - North Grenville - Master Plan - Water Model Peak Hour Demand Long Term (10 to 20 Years)



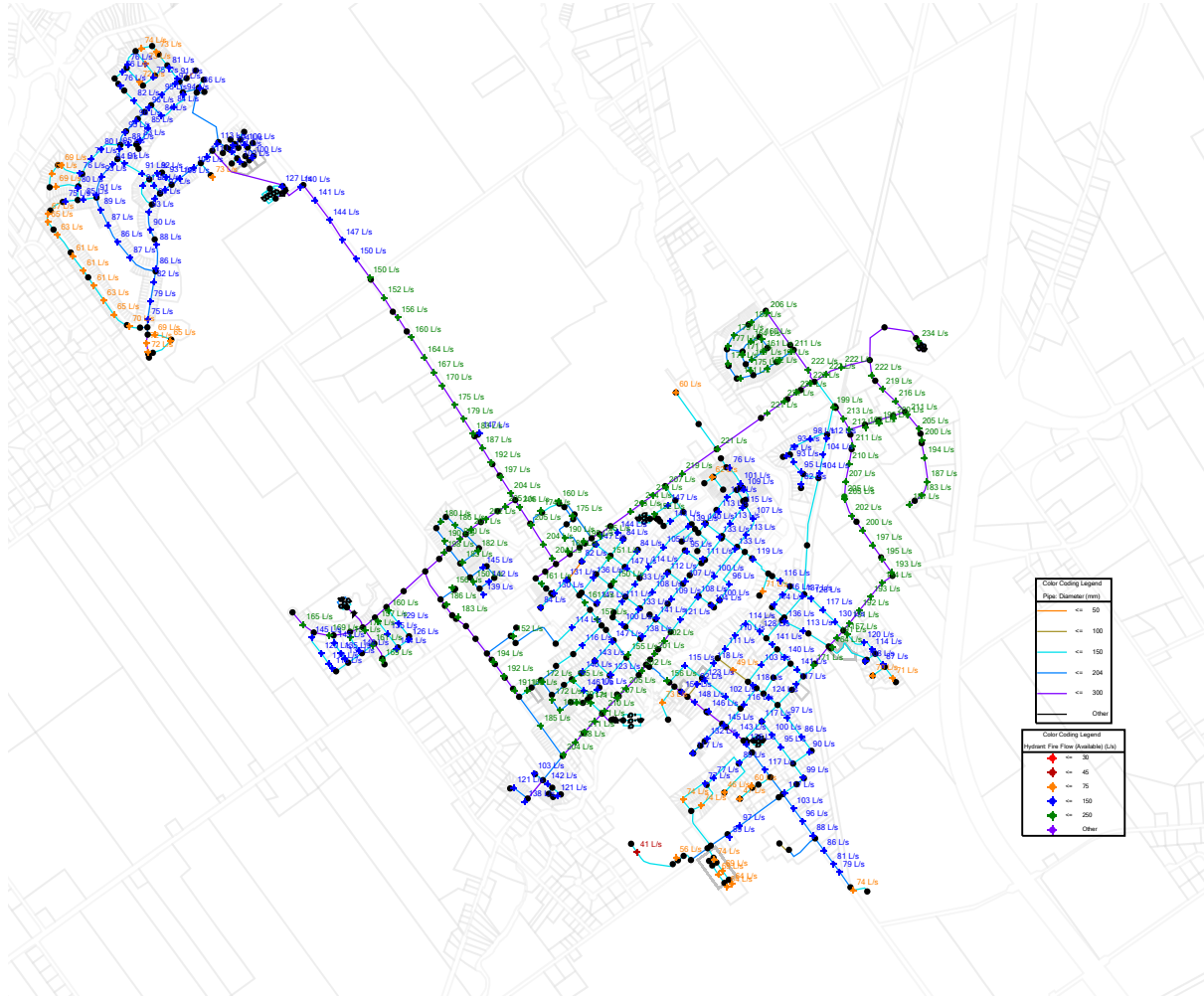
33023-000 - North Grenville - Master Plan - Water Model Peak Hour Demand Build Out (20+ Years)



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

Maximum Day + Fire Flow

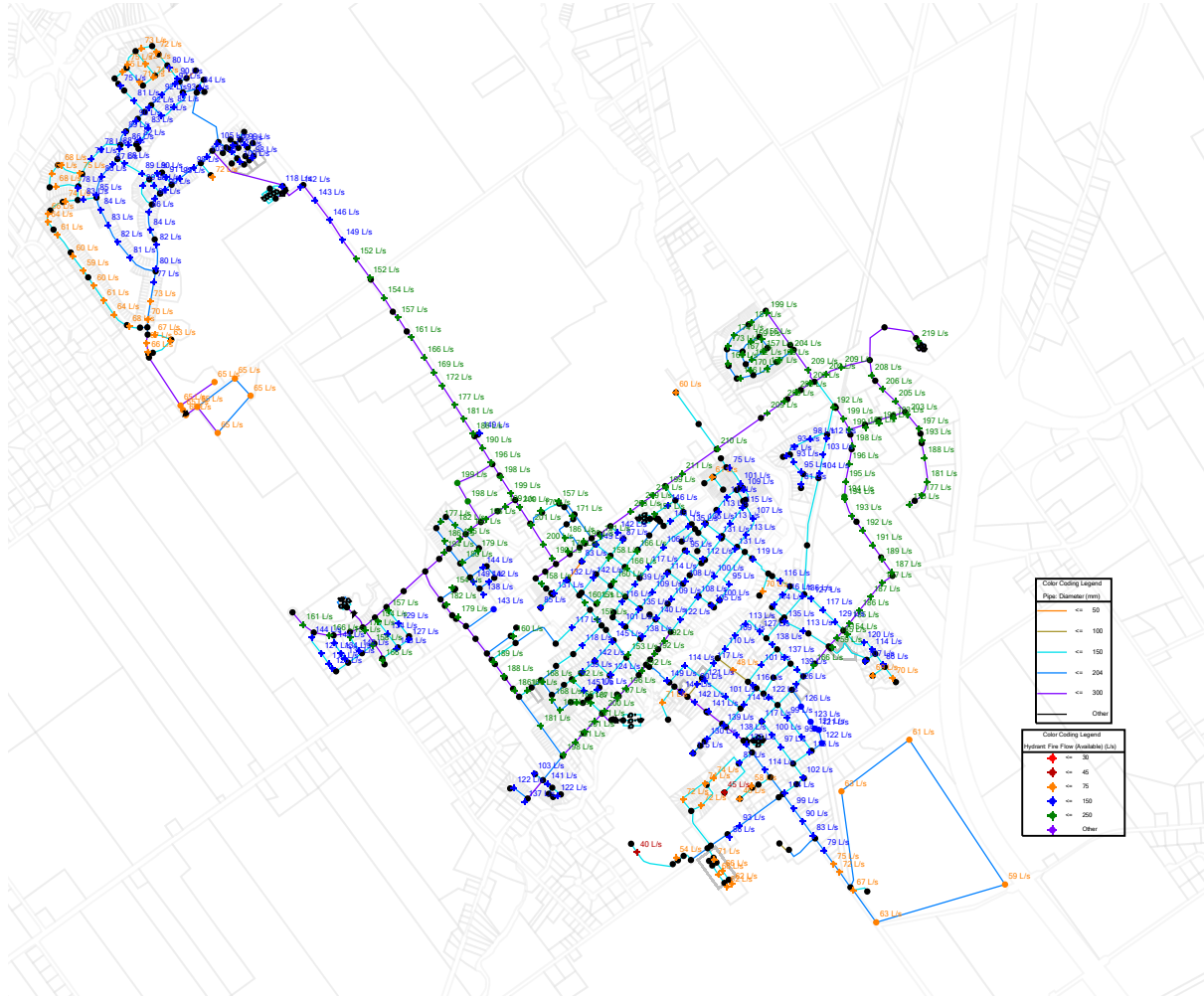
Existing Conditions



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

Maximum Day + Fire Flow

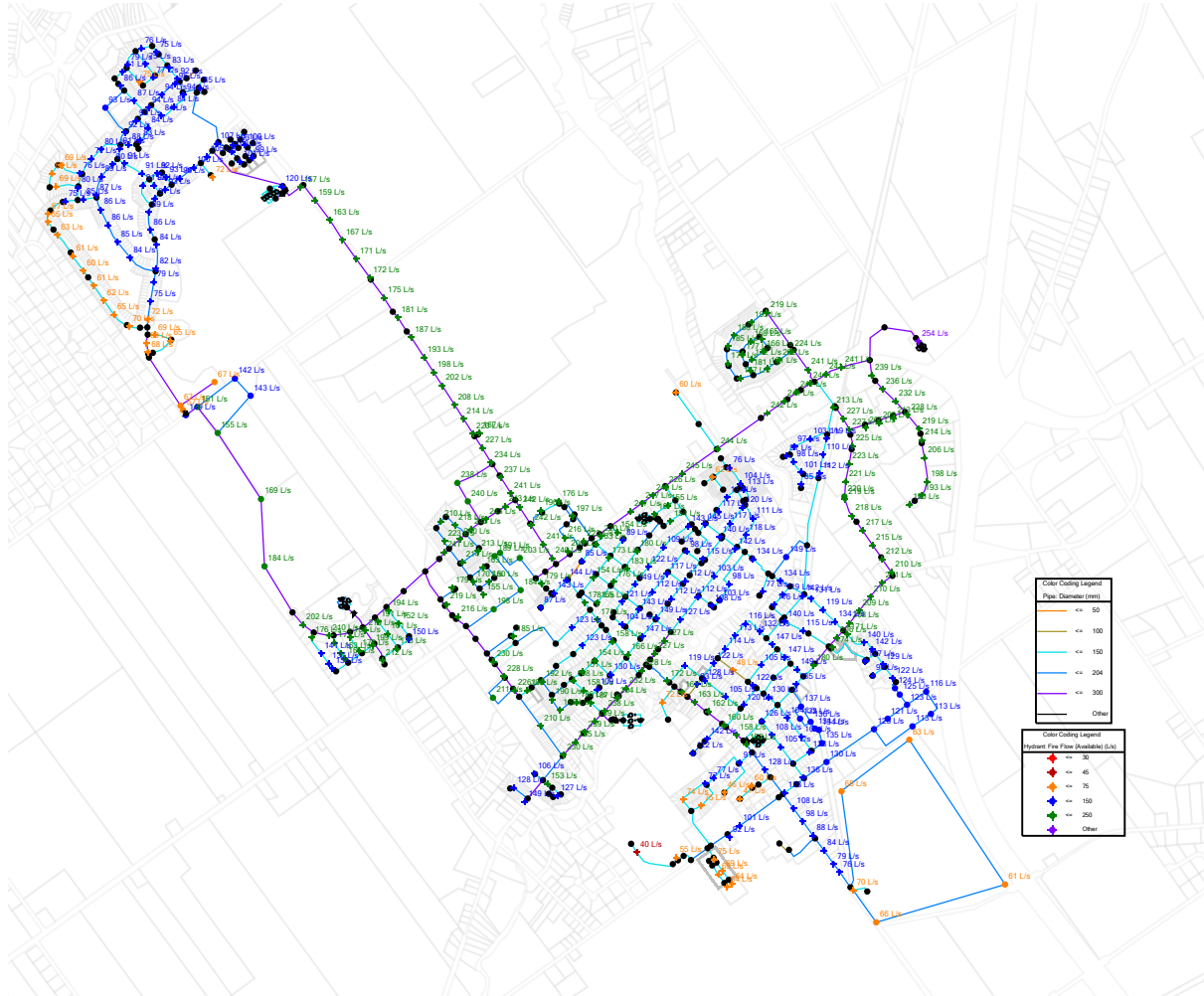
Short Term (0 to 5 Years)



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

Maximum Day + Fire Flow

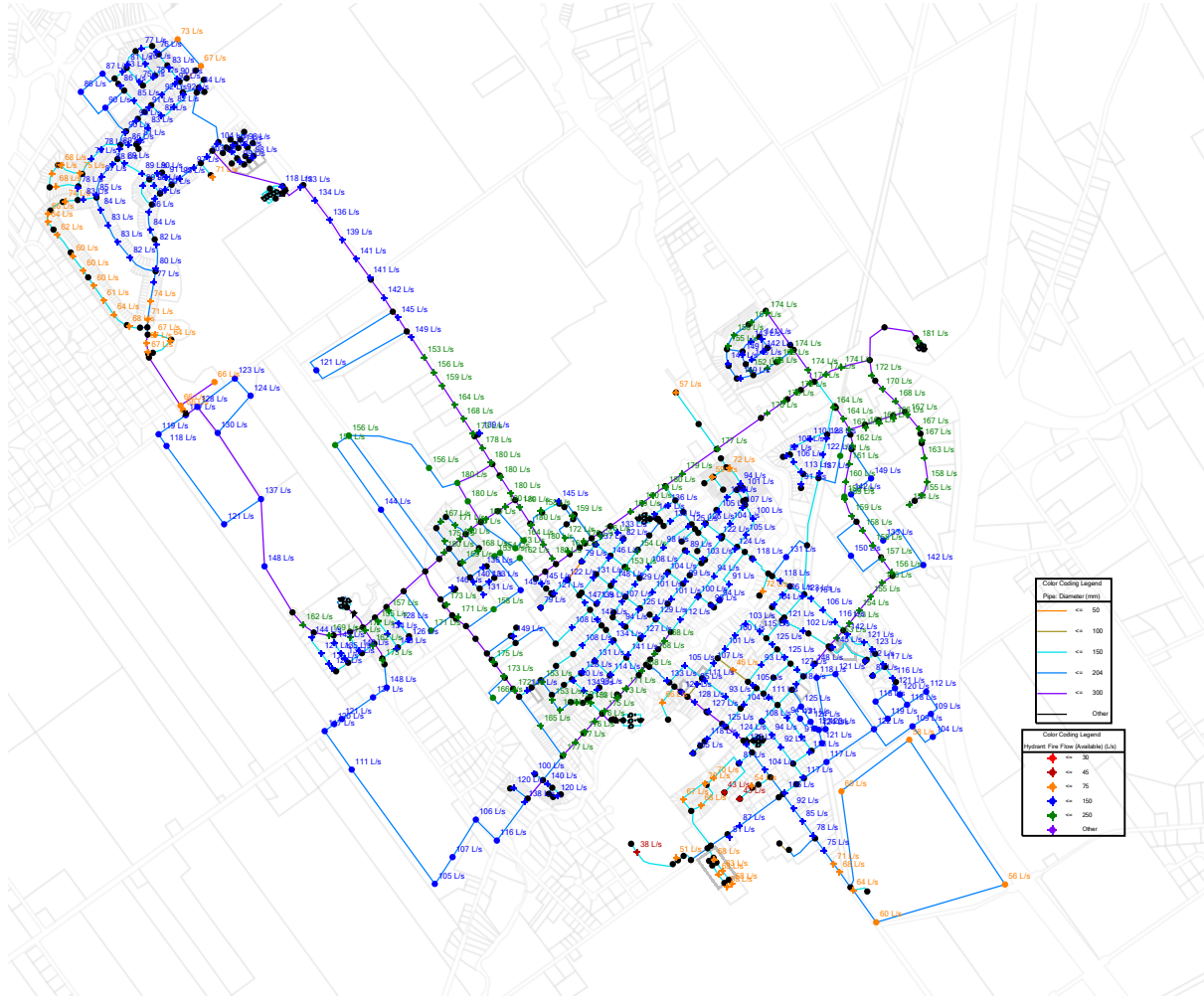
Mid Term (5 to 10 Years)



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

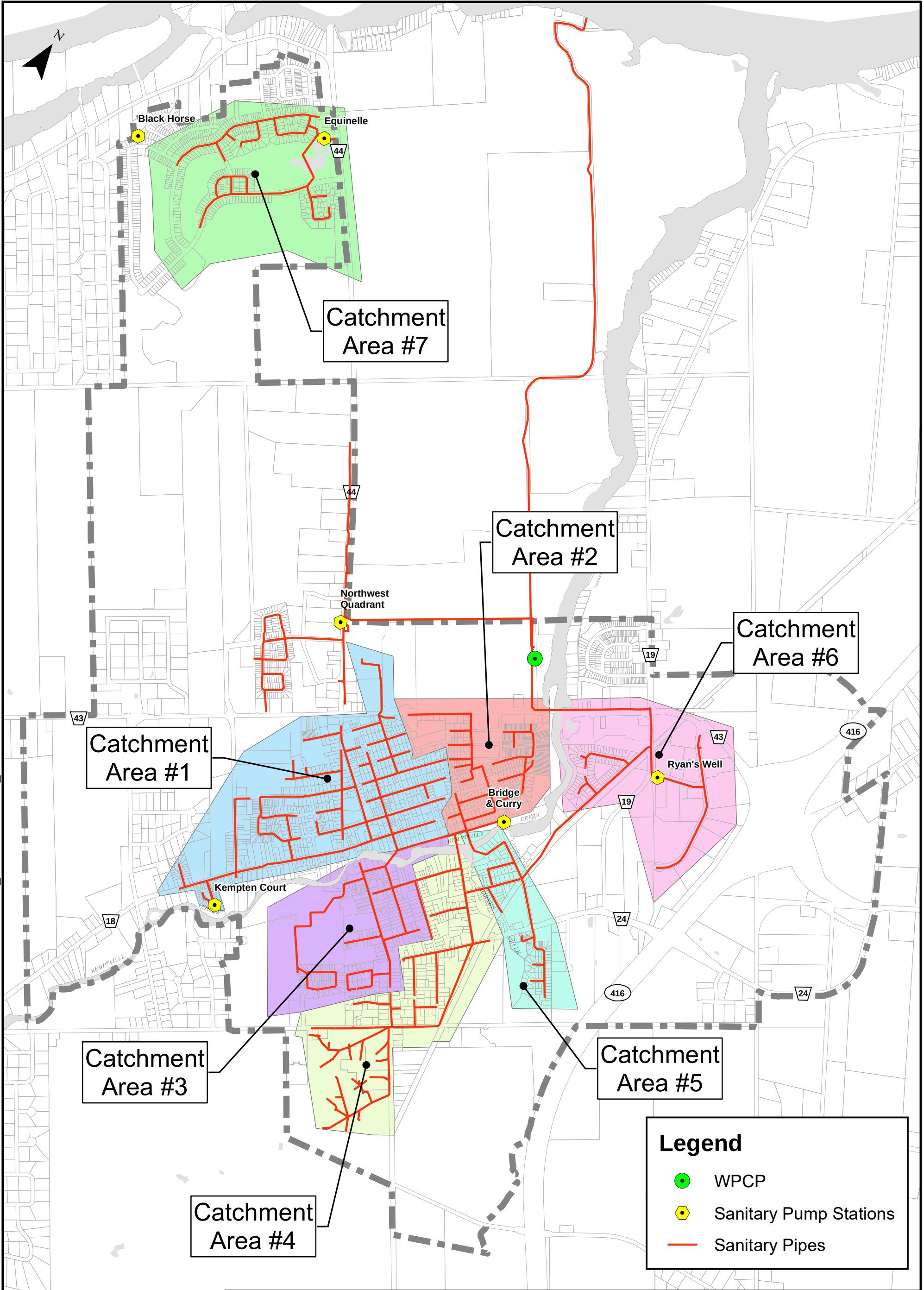
Build Out (20+ Years)



Appendix C

Wastewater Model Appendices

File Location: P:\33000\33023-000 - North Grenville Water Sewer Master Plan\03-Production\07-Plan\GIS_Schedules\33023_CatchmentArea.mxd



PROJECT:			North Grenville Water and Sewer Master Plan	
			Kemptville, Ontario	
DRAWING:			Catchment Area	
 J.L. Richards ENGINEERS · ARCHITECTS · PLANNERS www.jrichards.ca	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.		DESIGN: TR	DRAWING #: Figure
			DRAWN: KTK	
			CHECKED: MM	
			JLR #: 33023	

Table 1: Sanitary Sewer Areas per QGIS Land Use and Parcel Area Intersect

Parcel Area (ha)	Catchment Area Number	Land Use	Population (ppu)	ICI Area (ha)	I&I Area (ha)
0.036	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.063	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.117	7	Residential	2.35	0.00	0.12
0.036	7	Residential	2.35	0.00	0.04
0.049	7	Residential	2.35	0.00	0.05
0.031	7	Residential	2.35	0.00	0.03
0.044	7	Residential	2.35	0.00	0.04
0.061	7	Residential	2.35	0.00	0.06
0.035	7	Residential	2.35	0.00	0.04
0.053	7	Residential	2.35	0.00	0.05
0.051	7	Residential	2.35	0.00	0.05
0.044	7	Residential	2.35	0.00	0.04
0.034	7	Residential	2.35	0.00	0.03
0.055	7	Residential	2.35	0.00	0.06
0.045	7	Residential	2.35	0.00	0.05
0.066	7	Residential	2.35	0.00	0.07
0.04	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
10.479	7	Rural	0.00	0.00	0.00
10.479	7	Residential	2.35	0.00	10.48
0.036	7	Residential	2.35	0.00	0.04
0.066	7	Residential	2.35	0.00	0.07
0.036	7	Residential	2.35	0.00	0.04
0.048	7	Residential	2.35	0.00	0.05
0.026	7	Residential	2.35	0.00	0.03
0.065	7	Residential	2.35	0.00	0.07
0.054	7	Residential	2.35	0.00	0.05
0.056	7	Residential	2.35	0.00	0.06
0.042	7	Residential	2.35	0.00	0.04
0.056	7	Residential	2.35	0.00	0.06
0.075	7	Residential	2.35	0.00	0.08
0.054	7	Residential	2.35	0.00	0.05
0.025	7	Residential	2.35	0.00	0.03
0.052	7	Rural	0.00	0.00	0.00
0.027	7	Residential	2.35	0.00	0.03
0.043	7	Residential	2.35	0.00	0.04
0.072	7	Residential	2.35	0.00	0.07
0.044	7	Residential	2.35	0.00	0.04
0.074	7	Residential	2.35	0.00	0.07
0.069	7	Rural	0.00	0.00	0.00
0.069	7	Residential	2.35	0.00	0.07
0.028	7	Residential	2.35	0.00	0.03
0.072	7	Residential	2.35	0.00	0.07
0.064	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.094	7	Residential	2.35	0.00	0.09
0.046	7	Residential	2.35	0.00	0.05
0.045	7	Residential	2.35	0.00	0.05
0.031	7	Residential	2.35	0.00	0.03
0.073	7	Residential	2.35	0.00	0.07
0.106	7	Residential	2.35	0.00	0.11
0.071	7	Rural	0.00	0.00	0.00
0.057	7	Residential	2.35	0.00	0.06
0.025	7	Residential	2.35	0.00	0.03
0.041	7	Residential	2.35	0.00	0.04
0.035	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.034	7	Residential	2.35	0.00	0.03
0.051	7	Residential	2.35	0.00	0.05
0.034	7	Residential	2.35	0.00	0.03
0.055	7	Residential	2.35	0.00	0.06
0.034	7	Residential	2.35	0.00	0.03
0.049	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.118	7	Residential	2.35	0.00	0.12
0.037	7	Residential	2.35	0.00	0.04
0.069	7	Residential	2.35	0.00	0.07
0.063	7	Residential	2.35	0.00	0.06
0.044	7	Residential	2.35	0.00	0.04
0.072	7	Residential	2.35	0.00	0.07
0.235	7	Residential	2.35	0.00	0.24
0.056	7	Residential	2.35	0.00	0.06
0.056	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.049	7	Residential	2.35	0.00	0.05
0.052	7	Residential	2.35	0.00	0.05
0.059	7	Residential	2.35	0.00	0.06
0.124	7	Residential	2.35	0.00	0.12
0.094	7	Residential	2.35	0.00	0.09
0.054	7	Residential	2.35	0.00	0.05
0.078	7	Residential	2.35	0.00	0.08
0.109	7	Residential	2.35	0.00	0.11
0.034	7	Residential	2.35	0.00	0.03
0.065	7	Residential	2.35	0.00	0.07

Residential
Rural
Waste Disposal Buffer Area
Rural Residential
Agriculture
Provincially Significant Wetland
Economic Enterprise
Highway Commercial
Floodplain Hazards
Parks/Open Space
Downtown Commercial
Industrial

0.064	7	Residential	2.35	0.00	0.06
0.064	7	Residential	2.35	0.00	0.06
0.048	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.025	7	Residential	2.35	0.00	0.03
0.031	7	Residential	2.35	0.00	0.03
0.056	7	Residential	2.35	0.00	0.06
0.022	7	Residential	2.35	0.00	0.02
0.052	7	Rural	0.00	0.00	0.00
0.034	7	Residential	2.35	0.00	0.03
0.031	7	Residential	2.35	0.00	0.03
0.047	7	Residential	2.35	0.00	0.05
0.031	7	Residential	2.35	0.00	0.03
0.034	7	Residential	2.35	0.00	0.03
0.043	7	Residential	2.35	0.00	0.04
0.056	7	Residential	2.35	0.00	0.06
0.056	7	Residential	2.35	0.00	0.06
0.056	7	Residential	2.35	0.00	0.06
0.094	7	Residential	2.35	0.00	0.09
0.075	7	Rural	0.00	0.00	0.00
0.075	7	Residential	2.35	0.00	0.08
0.051	7	Residential	2.35	0.00	0.05
0.035	7	Residential	2.35	0.00	0.04
0.06	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.041	7	Residential	2.35	0.00	0.04
0.237	7	Rural	0.00	0.00	0.00
0.237	7	Residential	2.35	0.00	0.24
0.237	7	Waste Disposal Buffer Area	0.00	0.00	0.24
0.054	7	Residential	2.35	0.00	0.05
0.036	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
0.04	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.056	7	Residential	2.35	0.00	0.06
0.041	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.33	7	Waste Disposal Buffer Area	0.00	0.00	0.33
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.036	7	Residential	2.35	0.00	0.04
0.04	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.041	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
0.077	7	Residential	2.35	0.00	0.08
0.059	7	Residential	2.35	0.00	0.06
0.038	7	Residential	2.35	0.00	0.04
0.047	7	Residential	2.35	0.00	0.05
0.058	7	Residential	2.35	0.00	0.06
0.069	7	Residential	2.35	0.00	0.07
0.055	7	Residential	2.35	0.00	0.06
0.058	7	Residential	2.35	0.00	0.06
0.059	7	Residential	2.35	0.00	0.06
0.019	7	Residential	2.35	0.00	0.02
0.059	7	Residential	2.35	0.00	0.06
0.058	7	Residential	2.35	0.00	0.06
0.057	7	Residential	2.35	0.00	0.06
17.433	7	Rural	0.00	0.00	0.00
17.433	7	Residential	2.35	0.00	17.43
17.433	7	Waste Disposal Buffer Area	0.00	0.00	17.43
0.052	7	Residential	2.35	0.00	0.05
0.052	7	Residential	2.35	0.00	0.05
0.051	7	Residential	2.35	0.00	0.05
0.078	7	Residential	2.35	0.00	0.08
0.053	7	Residential	2.35	0.00	0.05
0.052	7	Residential	2.35	0.00	0.05
0.053	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.06	7	Residential	2.35	0.00	0.06
0.057	7	Residential	2.35	0.00	0.06
0.061	7	Residential	2.35	0.00	0.06
0.039	7	Residential	2.35	0.00	0.04
0.058	7	Residential	2.35	0.00	0.06
0.039	7	Residential	2.35	0.00	0.04
0.038	7	Residential	2.35	0.00	0.04
0.057	7	Residential	2.35	0.00	0.06
0.021	7	Residential	2.35	0.00	0.02
0.04	7	Residential	2.35	0.00	0.04
0.052	7	Residential	2.35	0.00	0.05
0.058	7	Residential	2.35	0.00	0.06
0.034	7	Residential	2.35	0.00	0.03

0.034	7	Residential	2.35	0.00	0.03
0.044	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.047	7	Residential	2.35	0.00	0.05
0.016	7	Residential	2.35	0.00	0.02
0.017	7	Residential	2.35	0.00	0.02
0.052	7	Residential	2.35	0.00	0.05
0.015	7	Residential	2.35	0.00	0.02
0.628	7	Rural Residential	0.00	0.00	0.00
0.628	7	Residential	2.35	0.00	0.63
0.049	7	Rural	0.00	0.00	0.00
0.049	7	Residential	2.35	0.00	0.05
0.034	7	Residential	2.35	0.00	0.03
0.048	7	Residential	2.35	0.00	0.05
0.036	7	Residential	2.35	0.00	0.04
0.058	7	Residential	2.35	0.00	0.06
0.047	7	Residential	2.35	0.00	0.05
0.055	7	Residential	2.35	0.00	0.06
0.047	7	Residential	2.35	0.00	0.05
0.04	7	Residential	2.35	0.00	0.04
0.041	7	Residential	2.35	0.00	0.04
0.043	7	Residential	2.35	0.00	0.04
0.015	7	Residential	2.35	0.00	0.02
0.032	7	Residential	2.35	0.00	0.03
0.062	7	Residential	2.35	0.00	0.06
0.101	7	Residential	2.35	0.00	0.10
0.05	7	Residential	2.35	0.00	0.05
0.036	7	Residential	2.35	0.00	0.04
0.046	7	Residential	2.35	0.00	0.05
0.05	7	Residential	2.35	0.00	0.05
0.025	7	Residential	2.35	0.00	0.03
0.032	7	Residential	2.35	0.00	0.03
0.075	7	Residential	2.35	0.00	0.08
0.057	7	Residential	2.35	0.00	0.06
0.029	7	Residential	2.35	0.00	0.03
0.043	7	Residential	2.35	0.00	0.04
0.02	7	Residential	2.35	0.00	0.02
0.016	7	Residential	2.35	0.00	0.02
0.014	7	Residential	2.35	0.00	0.01
0.013	7	Residential	2.35	0.00	0.01
0.209	7	Rural	0.00	0.00	0.00
0.209	7	Rural Residential	0.00	0.00	0.00
0.209	7	Residential	2.35	0.00	0.21
0.025	7	Residential	2.35	0.00	0.03
0.033	7	Residential	2.35	0.00	0.03
0.011	7	Residential	2.35	0.00	0.01
0.008	7	Residential	2.35	0.00	0.01
0.006	7	Residential	2.35	0.00	0.01
0.004	7	Residential	2.35	0.00	0.00
0.002	7	Residential	2.35	0.00	0.00
0	7	Residential	2.35	0.00	0.00
0.001	7	Residential	2.35	0.00	0.00
0.021	7	Residential	2.35	0.00	0.02
0.038	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.015	7	Residential	2.35	0.00	0.02
0.046	7	Residential	2.35	0.00	0.05
0.057	7	Residential	2.35	0.00	0.06
0.058	7	Residential	2.35	0.00	0.06
0.052	7	Residential	2.35	0.00	0.05
0.016	7	Residential	2.35	0.00	0.02
0.046	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.032	7	Residential	2.35	0.00	0.03
0.032	7	Residential	2.35	0.00	0.03
0.046	7	Residential	2.35	0.00	0.05
0.05	7	Residential	2.35	0.00	0.05
0.047	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.046	7	Residential	2.35	0.00	0.05
0.078	7	Rural Residential	0.00	0.00	0.00
0.078	7	Residential	2.35	0.00	0.08
0.001	7	Rural Residential	0.00	0.00	0.00
0.001	7	Residential	2.35	0.00	0.00
0.047	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.05	7	Residential	2.35	0.00	0.05
0.05	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.048	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.029	7	Residential	2.35	0.00	0.03
0.041	7	Residential	2.35	0.00	0.04
0.247	7	Rural	0.00	0.00	0.00
0.247	7	Residential	2.35	0.00	0.25
0.048	7	Residential	2.35	0.00	0.05
0.062	7	Residential	2.35	0.00	0.06
0.044	7	Residential	2.35	0.00	0.04

0.058	7	Residential	2.35	0.00	0.06
0.022	7	Residential	2.35	0.00	0.02
0.034	7	Residential	2.35	0.00	0.03
0.081	7	Residential	2.35	0.00	0.08
0.054	7	Residential	2.35	0.00	0.05
0.089	7	Rural	0.00	0.00	0.00
0.089	7	Residential	2.35	0.00	0.09
0.027	7	Residential	2.35	0.00	0.03
0.035	7	Residential	2.35	0.00	0.04
0.085	7	Residential	2.35	0.00	0.09
0.515	7	Rural	0.00	0.00	0.00
0.515	7	Residential	2.35	0.00	0.52
0.057	7	Residential	2.35	0.00	0.06
0.09	7	Residential	2.35	0.00	0.09
0.049	7	Residential	2.35	0.00	0.05
0.076	7	Residential	2.35	0.00	0.08
0.025	7	Residential	2.35	0.00	0.03
0.075	7	Residential	2.35	0.00	0.08
0.04	7	Residential	2.35	0.00	0.04
0.074	7	Residential	2.35	0.00	0.07
0.069	7	Residential	2.35	0.00	0.07
0.053	7	Rural	0.00	0.00	0.00
0.064	7	Residential	2.35	0.00	0.06
0.034	7	Residential	2.35	0.00	0.03
0.047	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.074	7	Residential	2.35	0.00	0.07
0.057	7	Residential	2.35	0.00	0.06
0.096	7	Residential	2.35	0.00	0.10
0.04	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.035	7	Residential	2.35	0.00	0.04
0.031	7	Residential	2.35	0.00	0.03
0.051	7	Residential	2.35	0.00	0.05
0.089	7	Residential	2.35	0.00	0.09
0.121	7	Residential	2.35	0.00	0.12
0.033	7	Residential	2.35	0.00	0.03
0.04	7	Residential	2.35	0.00	0.04
0.025	7	Residential	2.35	0.00	0.03
0.063	7	Residential	2.35	0.00	0.06
0.035	7	Residential	2.35	0.00	0.04
0.063	7	Residential	2.35	0.00	0.06
0.045	7	Residential	2.35	0.00	0.05
0.044	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
0.047	7	Residential	2.35	0.00	0.05
0.062	7	Residential	2.35	0.00	0.06
0.04	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.029	7	Residential	2.35	0.00	0.03
0.071	7	Residential	2.35	0.00	0.07
0.052	7	Residential	2.35	0.00	0.05
0.044	7	Residential	2.35	0.00	0.04
0.047	7	Residential	2.35	0.00	0.05
0	7	Residential	2.35	0.00	0.00
0.018	7	Residential	2.35	0.00	0.02
0.036	7	Residential	2.35	0.00	0.04
0.054	7	Residential	2.35	0.00	0.05
0.036	7	Residential	2.35	0.00	0.04
0.045	7	Residential	2.35	0.00	0.05
0.045	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.059	7	Residential	2.35	0.00	0.06
0.039	7	Residential	2.35	0.00	0.04
0.056	7	Residential	2.35	0.00	0.06
0.752	7	Residential	2.35	0.00	0.75
0.051	7	Residential	2.35	0.00	0.05
0.051	7	Residential	2.35	0.00	0.05
0.053	7	Residential	2.35	0.00	0.05
0.045	7	Residential	2.35	0.00	0.05
0.046	7	Residential	2.35	0.00	0.05
0.039	7	Residential	2.35	0.00	0.04
0.039	7	Residential	2.35	0.00	0.04
0.058	7	Residential	2.35	0.00	0.06
0.046	7	Residential	2.35	0.00	0.05
0.026	7	Residential	2.35	0.00	0.03
0.001	7	Residential	2.35	0.00	0.00
4.082	7	Residential	2.35	0.00	4.08
0.058	7	Residential	2.35	0.00	0.06
0.042	7	Residential	2.35	0.00	0.04
0.042	7	Residential	2.35	0.00	0.04
0.064	7	Residential	2.35	0.00	0.06
0.046	7	Residential	2.35	0.00	0.05
3.396	7	Rural	0.00	0.00	0.00
3.396	7	Agriculture	0.00	0.00	0.00
3.396	7	Provincially Significant Wetland	0.00	0.00	0.00
0.04	7	Residential	2.35	0.00	0.04

0.093	7	Residential	2.35	0.00	0.09
0.058	7	Residential	2.35	0.00	0.06
0.059	7	Residential	2.35	0.00	0.06
0.053	7	Residential	2.35	0.00	0.05
0.058	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.054	7	Residential	2.35	0.00	0.05
0.058	7	Residential	2.35	0.00	0.06
0.058	7	Residential	2.35	0.00	0.06
0.058	7	Residential	2.35	0.00	0.06
0.059	7	Residential	2.35	0.00	0.06
0.059	7	Residential	2.35	0.00	0.06
0.039	7	Residential	2.35	0.00	0.04
0.067	7	Residential	2.35	0.00	0.07
0.033	7	Residential	2.35	0.00	0.03
0.267	7	Residential	2.35	0.00	0.27
0.266	7	Rural	0.00	0.00	0.00
0.266	7	Residential	2.35	0.00	0.27
0.142	7	Residential	2.35	0.00	0.14
0.054	7	Residential	2.35	0.00	0.05
0.039	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.033	7	Residential	2.35	0.00	0.03
0.059	7	Residential	2.35	0.00	0.06
0.055	7	Residential	2.35	0.00	0.06
0.066	7	Residential	2.35	0.00	0.07
0.047	7	Residential	2.35	0.00	0.05
0.055	7	Residential	2.35	0.00	0.06
0.037	7	Residential	2.35	0.00	0.04
0.038	7	Residential	2.35	0.00	0.04
0.063	7	Residential	2.35	0.00	0.06
0.05	7	Residential	2.35	0.00	0.05
0.067	7	Residential	2.35	0.00	0.07
0.057	7	Residential	2.35	0.00	0.06
0.04	7	Residential	2.35	0.00	0.04
0.033	7	Residential	2.35	0.00	0.03
0.053	7	Residential	2.35	0.00	0.05
0.052	7	Residential	2.35	0.00	0.05
0.042	7	Residential	2.35	0.00	0.04
0.04	7	Residential	2.35	0.00	0.04
0.041	7	Residential	2.35	0.00	0.04
0.067	7	Residential	2.35	0.00	0.07
0.04	7	Residential	2.35	0.00	0.04
0.04	7	Residential	2.35	0.00	0.04
0.117	7	Residential	2.35	0.00	0.12
0.04	7	Residential	2.35	0.00	0.04
0.041	7	Residential	2.35	0.00	0.04
0.058	7	Residential	2.35	0.00	0.06
0.052	7	Residential	2.35	0.00	0.05
0.057	7	Rural	0.00	0.00	0.00
0.057	7	Residential	2.35	0.00	0.06
1.376	7	Rural	0.00	0.00	0.00
1.376	7	Waste Disposal Buffer Area	0.00	0.00	1.38
0.069	7	Rural	0.00	0.00	0.00
0.058	7	Residential	2.35	0.00	0.06
0.059	7	Residential	2.35	0.00	0.06
0.032	7	Residential	2.35	0.00	0.03
0.042	7	Residential	2.35	0.00	0.04
0.058	7	Residential	2.35	0.00	0.06
0.109	7	Residential	2.35	0.00	0.11
0.058	7	Residential	2.35	0.00	0.06
0.057	7	Residential	2.35	0.00	0.06
0.042	7	Residential	2.35	0.00	0.04
0.036	7	Residential	2.35	0.00	0.04
0.074	7	Residential	2.35	0.00	0.07
0.056	7	Residential	2.35	0.00	0.06
0.076	7	Residential	2.35	0.00	0.08
0.073	7	Residential	2.35	0.00	0.07
0.058	7	Residential	2.35	0.00	0.06
1.731	7	Residential	2.35	0.00	1.73
0.054	7	Rural	0.00	0.00	0.00
0.078	7	Rural	0.00	0.00	0.00
0.042	7	Rural	0.00	0.00	0.00
0.042	7	Residential	2.35	0.00	0.04
0.039	7	Residential	2.35	0.00	0.04
0.006	7	Residential	2.35	0.00	0.01
0.039	7	Residential	2.35	0.00	0.04
0.053	7	Residential	2.35	0.00	0.05
0.055	7	Residential	2.35	0.00	0.06
0.055	7	Residential	2.35	0.00	0.06
0.055	7	Residential	2.35	0.00	0.06
0.055	7	Residential	2.35	0.00	0.06
0.054	7	Residential	2.35	0.00	0.05
0.029	7	Residential	2.35	0.00	0.03
0.007	7	Residential	2.35	0.00	0.01
0.041	7	Rural	0.00	0.00	0.00
0.041	7	Residential	2.35	0.00	0.04
0.07	7	Rural	0.00	0.00	0.00
0.054	7	Rural	0.00	0.00	0.00
0.045	7	Residential	2.35	0.00	0.05

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0.127	6	Residential	2.35	0.00	0.13
0.054	6	Residential	2.35	0.00	0.05
0.514	6	Provincially Significant Wetland	0.00	0.00	0.00
0.514	6	Floodplain Hazards	0.00	0.00	0.00
0.514	6	Residential	2.35	0.00	0.51
0.38	6	Floodplain Hazards	0.00	0.00	0.00
0.38	6	Residential	2.35	0.00	0.38
0.1	6	Residential	2.35	0.00	0.10
0.811	6	Economic Enterprise	0.00	0.81	0.81
0.055	6	Residential	2.35	0.00	0.06
0.052	6	Residential	2.35	0.00	0.05
0.073	6	Highway Commercial	0.00	0.07	0.07
0.073	6	Residential	2.35	0.00	0.07
0.097	6	Floodplain Hazards	0.00	0.00	0.00
0.097	6	Residential	2.35	0.00	0.10
0.055	6	Residential	2.35	0.00	0.06
0.052	6	Residential	2.35	0.00	0.05
0.051	6	Residential	2.35	0.00	0.05
0.051	6	Residential	2.35	0.00	0.05
0.027	6	Residential	2.35	0.00	0.03
0.061	6	Highway Commercial	0.00	0.06	0.06
0.061	6	Residential	2.35	0.00	0.06
0.068	6	Highway Commercial	0.00	0.07	0.07
0.068	6	Residential	2.35	0.00	0.07
0.055	6	Residential	2.35	0.00	0.06
0.414	6	Economic Enterprise	0.00	0.41	0.41
0.052	6	Residential	2.35	0.00	0.05
0.052	6	Residential	2.35	0.00	0.05
0.052	6	Residential	2.35	0.00	0.05
0.066	6	Residential	2.35	0.00	0.07
0.961	6	Economic Enterprise	0.00	0.96	0.96
0.037	6	Economic Enterprise	0.00	0.04	0.04
0.13	6	Highway Commercial	0.00	0.13	0.13
0.13	6	Floodplain Hazards	0.00	0.00	0.00
0.13	6	Residential	2.35	0.00	0.13
0.072	6	Highway Commercial	0.00	0.07	0.07
0.072	6	Residential	2.35	0.00	0.07
0.054	6	Residential	2.35	0.00	0.05
0.055	6	Residential	2.35	0.00	0.06
0.038	6	Economic Enterprise	0.00	0.04	0.04
0.541	6	Economic Enterprise	0.00	0.54	0.54
2.514	6	Economic Enterprise	0.00	2.51	2.51
0	6	Economic Enterprise	0.00	0.00	0.00
2.04	6	Economic Enterprise	0.00	2.04	2.04
1.109	6	Economic Enterprise	0.00	1.11	1.11
1.663	6	Economic Enterprise	0.00	1.66	1.66
1.422	6	Economic Enterprise	0.00	1.42	1.42
0.534	6	Economic Enterprise	0.00	0.53	0.53
0.18	6	Economic Enterprise	0.00	0.18	0.18
1.031	6	Economic Enterprise	0.00	1.03	1.03
1.009	6	Economic Enterprise	0.00	1.01	1.01
0.051	6	Residential	2.35	0.00	0.05
0.051	6	Residential	2.35	0.00	0.05
0.075	6	Residential	2.35	0.00	0.08
1.195	6	Economic Enterprise	0.00	1.20	1.20
0.055	6	Residential	2.35	0.00	0.06
0.057	6	Residential	2.35	0.00	0.06
1.7	6	Economic Enterprise	0.00	1.70	1.70
0.132	6	Residential	2.35	0.00	0.13
0.055	6	Residential	2.35	0.00	0.06
0.083	6	Residential	2.35	0.00	0.08
0.055	6	Residential	2.35	0.00	0.06
0.059	6	Residential	2.35	0.00	0.06
0.055	6	Residential	2.35	0.00	0.06
0.052	6	Residential	2.35	0.00	0.05
3.764	6	Economic Enterprise	0.00	3.76	3.76
0.051	6	Residential	2.35	0.00	0.05
0.055	6	Residential	2.35	0.00	0.06
0.066	6	Residential	2.35	0.00	0.07
0.065	6	Residential	2.35	0.00	0.07
0.051	6	Residential	2.35	0.00	0.05
0.07	6	Residential	2.35	0.00	0.07
1.169	6	Economic Enterprise	0.00	1.17	1.17
0.076	6	Residential	2.35	0.00	0.08
0.056	6	Residential	2.35	0.00	0.06
0.051	6	Residential	2.35	0.00	0.05
0.051	6	Residential	2.35	0.00	0.05
0.075	6	Residential	2.35	0.00	0.08
0.112	6	Floodplain Hazards	0.00	0.00	0.00
0.112	6	Residential	2.35	0.00	0.11
0.565	6	Residential	2.35	0.00	0.57
0.095	6	Residential	2.35	0.00	0.10
0.052	6	Residential	2.35	0.00	0.05
1.387	6	Economic Enterprise	0.00	1.39	1.39
0.071	6	Residential	2.35	0.00	0.07
0.303	6	Economic Enterprise	0.00	0.30	0.30
0.049	6	Residential	2.35	0.00	0.05
0.057	6	Residential	2.35	0.00	0.06
0.261	6	Highway Commercial	0.00	0.26	0.26
1.331	6	Economic Enterprise	0.00	1.33	1.33

0.069	6	Residential	2.35	0.00	0.07
0.082	6	Residential	2.35	0.00	0.08
0.051	6	Residential	2.35	0.00	0.05
0.306	6	Economic Enterprise	0.00	0.31	0.31
0.5	6	Economic Enterprise	0.00	0.50	0.50
0.12	6	Residential	2.35	0.00	0.12
0.052	6	Residential	2.35	0.00	0.05
1.983	6	Economic Enterprise	0.00	1.98	1.98
0.196	6	Provincially Significant Wetland	0.00	0.00	0.00
0.196	6	Provincially Significant Wetland	0.00	0.00	0.00
0.196	6	Floodplain Hazards	0.00	0.00	0.00
0.196	6	Residential	2.35	0.00	0.20
0.479	6	Highway Commercial	0.00	0.48	0.48
0.568	6	Highway Commercial	0.00	0.57	0.57
0.215	6	Highway Commercial	0.00	0.22	0.22
0.052	6	Highway Commercial	0.00	0.05	0.05
0.468	6	Highway Commercial	0.00	0.47	0.47
0.026	6	Economic Enterprise	0.00	0.03	0.03
0.192	6	Floodplain Hazards	0.00	0.00	0.00
0.192	6	Provincially Significant Wetland	0.00	0.00	0.00
2.779	6	Highway Commercial	0.00	2.78	2.78
1.618	6	Provincially Significant Wetland	0.00	0.00	0.00
1.618	6	Highway Commercial	0.00	1.62	1.62
1.618	6	Floodplain Hazards	0.00	0.00	0.00
1.618	6	Residential	2.35	0.00	1.62
0.024	6	Economic Enterprise	0.00	0.02	0.02
0.808	6	Economic Enterprise	0.00	0.81	0.81
1.728	6	Economic Enterprise	0.00	1.73	1.73
0.111	6	Residential	2.35	0.00	0.11
0.053	6	Residential	2.35	0.00	0.05
0.057	6	Residential	2.35	0.00	0.06
0.052	6	Residential	2.35	0.00	0.05
0.075	6	Residential	2.35	0.00	0.08
0.02	2	Residential	2.35	0.00	0.02
0.076	2	Floodplain Hazards	0.00	0.00	0.00
0.076	2	Residential	2.35	0.00	0.08
0.097	2	Floodplain Hazards	0.00	0.00	0.00
0.097	2	Residential	2.35	0.00	0.10
0.051	2	Floodplain Hazards	0.00	0.00	0.00
0.051	2	Residential	2.35	0.00	0.05
0.074	2	Residential	2.35	0.00	0.07
0.176	2	Floodplain Hazards	0.00	0.00	0.00
0.176	2	Floodplain Hazards	0.00	0.00	0.00
0.176	2	Residential	2.35	0.00	0.18
0.06	2	Residential	2.35	0.00	0.06
0.066	2	Residential	2.35	0.00	0.07
0.06	2	Residential	2.35	0.00	0.06
0.076	2	Residential	2.35	0.00	0.08
0.044	2	Residential	2.35	0.00	0.04
0.048	2	Residential	2.35	0.00	0.05
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.085	2	Residential	2.35	0.00	0.09
0.015	2	Residential	2.35	0.00	0.02
0.06	2	Residential	2.35	0.00	0.06
0.056	2	Floodplain Hazards	0.00	0.00	0.00
0.069	2	Residential	2.35	0.00	0.07
0.042	2	Floodplain Hazards	0.00	0.00	0.00
0.033	2	Residential	2.35	0.00	0.03
0.143	2	Residential	2.35	0.00	0.14
0.433	2	Floodplain Hazards	0.00	0.00	0.00
0.433	2	Residential	2.35	0.00	0.43
0.073	2	Floodplain Hazards	0.00	0.00	0.00
0.073	2	Residential	2.35	0.00	0.07
0.06	2	Residential	2.35	0.00	0.06
0.038	2	Residential	2.35	0.00	0.04
0.06	2	Residential	2.35	0.00	0.06
0.072	2	Residential	2.35	0.00	0.07
0.111	2	Residential	2.35	0.00	0.11
0.047	2	Residential	2.35	0.00	0.05
0.056	2	Residential	2.35	0.00	0.06
0.055	2	Residential	2.35	0.00	0.06
0.02	2	Residential	2.35	0.00	0.02
0.046	2	Floodplain Hazards	0.00	0.00	0.00
0.046	2	Residential	2.35	0.00	0.05
0.049	2	Residential	2.35	0.00	0.05
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.06	2	Residential	2.35	0.00	0.06
0.052	2	Floodplain Hazards	0.00	0.00	0.00
0.052	2	Residential	2.35	0.00	0.05
0.058	2	Residential	2.35	0.00	0.06
0.033	2	Residential	2.35	0.00	0.03
0.025	2	Residential	2.35	0.00	0.03
0.083	2	Floodplain Hazards	0.00	0.00	0.00
0.083	2	Residential	2.35	0.00	0.08
0.056	2	Residential	2.35	0.00	0.06
0	2	Residential	2.35	0.00	0.00
0.073	2	Residential	2.35	0.00	0.07
0.007	2	Residential	2.35	0.00	0.01
0.057	2	Residential	2.35	0.00	0.06
0.051	2	Floodplain Hazards	0.00	0.00	0.00

0.006	2	Residential	2.35	0.00	0.01
0.022	2	Residential	2.35	0.00	0.02
0.056	2	Residential	2.35	0.00	0.06
0.073	2	Residential	2.35	0.00	0.07
0.063	2	Residential	2.35	0.00	0.06
0.022	2	Residential	2.35	0.00	0.02
0.03	2	Residential	2.35	0.00	0.03
0.058	2	Residential	2.35	0.00	0.06
0.102	2	Residential	2.35	0.00	0.10
0.046	2	Residential	2.35	0.00	0.05
0.023	2	Residential	2.35	0.00	0.02
0.066	2	Residential	2.35	0.00	0.07
0.069	2	Residential	2.35	0.00	0.07
0.03	2	Residential	2.35	0.00	0.03
0.021	2	Residential	2.35	0.00	0.02
0.071	2	Residential	2.35	0.00	0.07
0.053	2	Residential	2.35	0.00	0.05
0.07	2	Residential	2.35	0.00	0.07
0.024	2	Residential	2.35	0.00	0.02
0.063	2	Residential	2.35	0.00	0.06
0.058	2	Residential	2.35	0.00	0.06
0.021	2	Residential	2.35	0.00	0.02
0.025	2	Residential	2.35	0.00	0.03
0.029	2	Residential	2.35	0.00	0.03
0.057	2	Residential	2.35	0.00	0.06
0.055	2	Residential	2.35	0.00	0.06
0.126	2	Residential	2.35	0.00	0.13
0.058	2	Residential	2.35	0.00	0.06
0.022	2	Residential	2.35	0.00	0.02
0.094	2	Floodplain Hazards	0.00	0.00	0.00
0.094	2	Residential	2.35	0.00	0.09
0.049	2	Residential	2.35	0.00	0.05
0.03	2	Residential	2.35	0.00	0.03
0.068	2	Residential	2.35	0.00	0.07
0.06	2	Residential	2.35	0.00	0.06
0.057	2	Floodplain Hazards	0.00	0.00	0.00
0.057	2	Residential	2.35	0.00	0.06
0.001	2	Floodplain Hazards	0.00	0.00	0.00
0.061	2	Floodplain Hazards	0.00	0.00	0.00
0.106	2	Highway Commercial	0.00	0.11	0.11
0.07	2	Residential	2.35	0.00	0.07
0.056	2	Residential	2.35	0.00	0.06
0.034	2	Residential	2.35	0.00	0.03
0.043	2	Floodplain Hazards	0.00	0.00	0.00
0.043	2	Residential	2.35	0.00	0.04
0.032	2	Residential	2.35	0.00	0.03
0.083	2	Residential	2.35	0.00	0.08
0.061	2	Floodplain Hazards	0.00	0.00	0.00
0.061	2	Residential	2.35	0.00	0.06
0.026	2	Residential	2.35	0.00	0.03
0.08	2	Residential	2.35	0.00	0.08
0.078	2	Residential	2.35	0.00	0.08
0.055	2	Residential	2.35	0.00	0.06
0.026	2	Residential	2.35	0.00	0.03
0.021	2	Residential	2.35	0.00	0.02
0.041	2	Floodplain Hazards	0.00	0.00	0.00
0.041	2	Residential	2.35	0.00	0.04
0.081	2	Floodplain Hazards	0.00	0.00	0.00
0.081	2	Residential	2.35	0.00	0.08
0.06	2	Residential	2.35	0.00	0.06
0.106	2	Floodplain Hazards	0.00	0.00	0.00
0.106	2	Residential	2.35	0.00	0.11
0.035	2	Residential	2.35	0.00	0.04
0.028	2	Residential	2.35	0.00	0.03
0.013	2	Residential	2.35	0.00	0.01
0.047	2	Residential	2.35	0.00	0.05
0.046	2	Residential	2.35	0.00	0.05
0.023	2	Residential	2.35	0.00	0.02
0.021	2	Residential	2.35	0.00	0.02
0.025	2	Residential	2.35	0.00	0.03
0.021	2	Residential	2.35	0.00	0.02
0.019	2	Residential	2.35	0.00	0.02
0.035	2	Residential	2.35	0.00	0.04
0.026	2	Residential	2.35	0.00	0.03
0.043	2	Residential	2.35	0.00	0.04
0.069	2	Residential	2.35	0.00	0.07
0.042	2	Residential	2.35	0.00	0.04
0.017	2	Residential	2.35	0.00	0.02
0.046	2	Residential	2.35	0.00	0.05
0.056	2	Residential	2.35	0.00	0.06
0.023	2	Residential	2.35	0.00	0.02
0.042	2	Residential	2.35	0.00	0.04
0.02	2	Residential	2.35	0.00	0.02
0.019	2	Residential	2.35	0.00	0.02
0.019	2	Residential	2.35	0.00	0.02
0.047	2	Residential	2.35	0.00	0.05
0.076	2	Highway Commercial	0.00	0.08	0.08
0.863	2	Parks/Open Space	0.00	0.00	0.00
0.139	2	Highway Commercial	0.00	0.14	0.14
0.047	2	Residential	2.35	0.00	0.05

0.018	2	Residential	2.35	0.00	0.02
0.018	2	Residential	2.35	0.00	0.02
0.053	2	Residential	2.35	0.00	0.05
0.065	2	Residential	2.35	0.00	0.07
0.18	2	Residential	2.35	0.00	0.18
0.021	2	Residential	2.35	0.00	0.02
0.037	2	Residential	2.35	0.00	0.04
0.019	2	Residential	2.35	0.00	0.02
0.037	2	Residential	2.35	0.00	0.04
0.047	2	Residential	2.35	0.00	0.05
0.047	2	Residential	2.35	0.00	0.05
0.047	2	Residential	2.35	0.00	0.05
0.047	2	Residential	2.35	0.00	0.05
0.029	2	Residential	2.35	0.00	0.03
0.417	2	Residential	2.35	0.00	0.42
0.037	2	Residential	2.35	0.00	0.04
0.093	2	Residential	2.35	0.00	0.09
0.028	2	Residential	2.35	0.00	0.03
0.047	2	Residential	2.35	0.00	0.05
0.054	2	Residential	2.35	0.00	0.05
0.043	2	Residential	2.35	0.00	0.04
0.045	2	Residential	2.35	0.00	0.05
0.019	2	Residential	2.35	0.00	0.02
0.017	2	Residential	2.35	0.00	0.02
0.093	2	Residential	2.35	0.00	0.09
0.022	2	Residential	2.35	0.00	0.02
0.029	2	Residential	2.35	0.00	0.03
0.071	2	Residential	2.35	0.00	0.07
0.094	2	Highway Commercial	0.00	0.09	0.09
0.021	2	Residential	2.35	0.00	0.02
0.02	2	Residential	2.35	0.00	0.02
0.07	2	Residential	2.35	0.00	0.07
0.848	2	Highway Commercial	0.00	0.85	0.85
0.023	2	Residential	2.35	0.00	0.02
0.849	2	Parks/Open Space	0.00	0.00	0.00
0.145	2	Highway Commercial	0.00	0.15	0.15
0.14	2	Highway Commercial	0.00	0.14	0.14
0.096	2	Residential	2.35	0.00	0.10
0.219	2	Residential	2.35	0.00	0.22
0.029	2	Residential	2.35	0.00	0.03
0.423	2	Highway Commercial	0.00	0.42	0.42
0.423	2	Agriculture	0.00	0.00	0.00
0.092	2	Highway Commercial	0.00	0.09	0.09
0.024	2	Floodplain Hazards	0.00	0.00	0.00
0.024	2	Residential	2.35	0.00	0.02
0.03	2	Residential	2.35	0.00	0.03
0.021	2	Residential	2.35	0.00	0.02
0.094	2	Residential	2.35	0.00	0.09
0.022	2	Residential	2.35	0.00	0.02
0.047	2	Residential	2.35	0.00	0.05
0.07	2	Residential	2.35	0.00	0.07
0.049	2	Residential	2.35	0.00	0.05
0.186	2	Highway Commercial	0.00	0.19	0.19
0.06	2	Residential	2.35	0.00	0.06
1.066	2	Parks/Open Space	0.00	0.00	0.00
0.037	2	Residential	2.35	0.00	0.04
0.047	2	Residential	2.35	0.00	0.05
0.019	2	Residential	2.35	0.00	0.02
0.093	2	Highway Commercial	0.00	0.09	0.09
0.093	2	Highway Commercial	0.00	0.09	0.09
0.316	2	Highway Commercial	0.00	0.32	0.32
0.021	2	Residential	2.35	0.00	0.02
0.056	2	Residential	2.35	0.00	0.06
0.026	2	Residential	2.35	0.00	0.03
0.074	2	Residential	2.35	0.00	0.07
0.03	2	Residential	2.35	0.00	0.03
1.066	2	Highway Commercial	0.00	1.07	1.07
0.047	2	Residential	2.35	0.00	0.05
0.023	2	Residential	2.35	0.00	0.02
0.074	2	Residential	2.35	0.00	0.07
0.018	2	Residential	2.35	0.00	0.02
0.033	2	Residential	2.35	0.00	0.03
0.125	2	Residential	2.35	0.00	0.13
0.291	2	Highway Commercial	0.00	0.29	0.29
0.02	2	Highway Commercial	0.00	0.02	0.02
0.02	2	Residential	2.35	0.00	0.02
0.023	2	Residential	2.35	0.00	0.02
0.047	2	Residential	2.35	0.00	0.05
0.022	2	Floodplain Hazards	0.00	0.00	0.00
0.022	2	Residential	2.35	0.00	0.02
0.02	2	Highway Commercial	0.00	0.02	0.02
0.02	2	Residential	2.35	0.00	0.02
0.018	2	Residential	2.35	0.00	0.02
0.052	2	Highway Commercial	0.00	0.05	0.05
0.582	2	Highway Commercial	0.00	0.58	0.58
0.582	2	Residential	2.35	0.00	0.58
0.021	2	Floodplain Hazards	0.00	0.00	0.00
0.021	2	Highway Commercial	0.00	0.02	0.02
0.021	2	Residential	2.35	0.00	0.02
0.069	2	Floodplain Hazards	0.00	0.00	0.00

0.069	2	Residential	2.35	0.00	0.07
0.074	2	Floodplain Hazards	0.00	0.00	0.00
0.074	2	Residential	2.35	0.00	0.07
0.02	2	Residential	2.35	0.00	0.02
0.021	2	Residential	2.35	0.00	0.02
0.02	2	Highway Commercial	0.00	0.02	0.02
0.02	2	Residential	2.35	0.00	0.02
0.02	2	Highway Commercial	0.00	0.02	0.02
0.02	2	Residential	2.35	0.00	0.02
0.043	2	Floodplain Hazards	0.00	0.00	0.00
0.043	2	Residential	2.35	0.00	0.04
0.04	2	Floodplain Hazards	0.00	0.00	0.00
0.04	2	Residential	2.35	0.00	0.04
0.041	2	Floodplain Hazards	0.00	0.00	0.00
0.041	2	Residential	2.35	0.00	0.04
0.027	2	Floodplain Hazards	0.00	0.00	0.00
0.027	2	Residential	2.35	0.00	0.03
0.04	2	Floodplain Hazards	0.00	0.00	0.00
0.023	2	Floodplain Hazards	0.00	0.00	0.00
0.023	2	Residential	2.35	0.00	0.02
0.041	2	Floodplain Hazards	0.00	0.00	0.00
0.041	2	Residential	2.35	0.00	0.04
0.024	2	Residential	2.35	0.00	0.02
0.074	2	Floodplain Hazards	0.00	0.00	0.00
0.074	2	Residential	2.35	0.00	0.07
0.04	2	Floodplain Hazards	0.00	0.00	0.00
0.04	2	Highway Commercial	0.00	0.04	0.04
0.04	2	Residential	2.35	0.00	0.04
0.019	2	Floodplain Hazards	0.00	0.00	0.00
0.019	2	Highway Commercial	0.00	0.02	0.02
0.019	2	Residential	2.35	0.00	0.02
0.251	2	Highway Commercial	0.00	0.25	0.25
0.251	2	Agriculture	0.00	0.00	0.00
0.04	2	Floodplain Hazards	0.00	0.00	0.00
0.04	2	Residential	2.35	0.00	0.04
0.033	2	Floodplain Hazards	0.00	0.00	0.00
0.033	2	Residential	2.35	0.00	0.03
0.043	2	Floodplain Hazards	0.00	0.00	0.00
0.024	2	Highway Commercial	0.00	0.02	0.02
0.024	2	Residential	2.35	0.00	0.02
0.21	2	Provincially Significant Wetland	0.00	0.00	0.00
0.21	2	Provincially Significant Wetland	0.00	0.00	0.00
0.21	2	Floodplain Hazards	0.00	0.00	0.00
0.21	2	Agriculture	0.00	0.00	0.00
0.043	2	Floodplain Hazards	0.00	0.00	0.00
0.043	2	Residential	2.35	0.00	0.04
0.186	2	Floodplain Hazards	0.00	0.00	0.00
0.001	2	Residential	2.35	0.00	0.00
0.02	2	Residential	2.35	0.00	0.02
0.047	2	Residential	2.35	0.00	0.05
0.021	2	Residential	2.35	0.00	0.02
0.07	2	Residential	2.35	0.00	0.07
0.067	2	Residential	2.35	0.00	0.07
0.044	2	Floodplain Hazards	0.00	0.00	0.00
0.044	2	Residential	2.35	0.00	0.04
0.066	2	Residential	2.35	0.00	0.07
0.059	2	Residential	2.35	0.00	0.06
0.073	2	Residential	2.35	0.00	0.07
0.053	2	Residential	2.35	0.00	0.05
0.07	2	Residential	2.35	0.00	0.07
0.021	2	Residential	2.35	0.00	0.02
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.069	2	Floodplain Hazards	0.00	0.00	0.00
0.069	2	Residential	2.35	0.00	0.07
0.095	2	Residential	2.35	0.00	0.10
0.055	2	Residential	2.35	0.00	0.06
0.06	2	Residential	2.35	0.00	0.06
0.045	2	Residential	2.35	0.00	0.05
0.043	2	Floodplain Hazards	0.00	0.00	0.00
0.043	2	Residential	2.35	0.00	0.04
0.074	2	Residential	2.35	0.00	0.07
0.05	2	Residential	2.35	0.00	0.05
0.028	2	Residential	2.35	0.00	0.03
0.056	2	Floodplain Hazards	0.00	0.00	0.00
0.056	2	Residential	2.35	0.00	0.06
0.053	2	Residential	2.35	0.00	0.05
0.056	2	Residential	2.35	0.00	0.06
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.085	2	Residential	2.35	0.00	0.09
0.04	2	Residential	2.35	0.00	0.04
0.047	2	Floodplain Hazards	0.00	0.00	0.00
0.047	2	Residential	2.35	0.00	0.05
0.045	2	Floodplain Hazards	0.00	0.00	0.00
0.045	2	Residential	2.35	0.00	0.05
0.047	2	Floodplain Hazards	0.00	0.00	0.00
0.047	2	Residential	2.35	0.00	0.05
0.059	2	Residential	2.35	0.00	0.06
0.047	2	Floodplain Hazards	0.00	0.00	0.00
0.069	2	Residential	2.35	0.00	0.07
1.17	2	Floodplain Hazards	0.00	0.00	0.00

1.17	2	Residential	2.35	0.00	1.17
0.044	2	Floodplain Hazards	0.00	0.00	0.00
0.02	2	Residential	2.35	0.00	0.02
0.074	2	Residential	2.35	0.00	0.07
0.068	2	Residential	2.35	0.00	0.07
0.066	2	Residential	2.35	0.00	0.07
0.058	2	Residential	2.35	0.00	0.06
0.076	2	Floodplain Hazards	0.00	0.00	0.00
0.076	2	Residential	2.35	0.00	0.08
0.214	2	Residential	2.35	0.00	0.21
0.001	2	Residential	2.35	0.00	0.00
0.046	2	Floodplain Hazards	0.00	0.00	0.00
0.044	2	Floodplain Hazards	0.00	0.00	0.00
0.044	2	Residential	2.35	0.00	0.04
0.021	2	Residential	2.35	0.00	0.02
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.073	2	Residential	2.35	0.00	0.07
0.085	2	Floodplain Hazards	0.00	0.00	0.00
0.072	2	Residential	2.35	0.00	0.07
0.073	2	Residential	2.35	0.00	0.07
0.024	2	Residential	2.35	0.00	0.02
0.039	2	Residential	2.35	0.00	0.04
0.052	2	Residential	2.35	0.00	0.05
0.066	2	Residential	2.35	0.00	0.07
0.055	2	Floodplain Hazards	0.00	0.00	0.00
0.055	2	Residential	2.35	0.00	0.06
0.097	2	Floodplain Hazards	0.00	0.00	0.00
0.097	2	Residential	2.35	0.00	0.10
0.056	2	Residential	2.35	0.00	0.06
0.055	2	Residential	2.35	0.00	0.06
0.06	2	Residential	2.35	0.00	0.06
0.02	2	Residential	2.35	0.00	0.02
0.035	2	Residential	2.35	0.00	0.04
0.038	2	Floodplain Hazards	0.00	0.00	0.00
0.038	2	Residential	2.35	0.00	0.04
0.068	2	Residential	2.35	0.00	0.07
0.066	2	Residential	2.35	0.00	0.07
0.059	2	Residential	2.35	0.00	0.06
0.059	2	Residential	2.35	0.00	0.06
0.027	2	Residential	2.35	0.00	0.03
0.027	2	Residential	2.35	0.00	0.03
0.041	2	Floodplain Hazards	0.00	0.00	0.00
0.041	2	Residential	2.35	0.00	0.04
0.022	2	Residential	2.35	0.00	0.02
0.058	2	Residential	2.35	0.00	0.06
0.065	2	Floodplain Hazards	0.00	0.00	0.00
0.062	2	Residential	2.35	0.00	0.06
0.004	2	Residential	2.35	0.00	0.00
0.069	2	Residential	2.35	0.00	0.07
0.06	2	Residential	2.35	0.00	0.06
0.065	2	Residential	2.35	0.00	0.07
0.054	2	Residential	2.35	0.00	0.05
0.097	2	Residential	2.35	0.00	0.10
0.106	2	Residential	2.35	0.00	0.11
0.05	2	Residential	2.35	0.00	0.05
0.036	2	Residential	2.35	0.00	0.04
0.01	2	Residential	2.35	0.00	0.01
0.072	2	Residential	2.35	0.00	0.07
0.009	2	Residential	2.35	0.00	0.01
0.028	2	Residential	2.35	0.00	0.03
0.084	2	Floodplain Hazards	0.00	0.00	0.00
0.084	2	Residential	2.35	0.00	0.08
0.073	2	Residential	2.35	0.00	0.07
0.088	2	Floodplain Hazards	0.00	0.00	0.00
0.088	2	Residential	2.35	0.00	0.09
0.113	2	Floodplain Hazards	0.00	0.00	0.00
0.113	2	Residential	2.35	0.00	0.11
0.113	2	Floodplain Hazards	0.00	0.00	0.00
0.113	2	Residential	2.35	0.00	0.11
0.003	2	Floodplain Hazards	0.00	0.00	0.00
0.459	2	Floodplain Hazards	0.00	0.00	0.00
0.459	2	Highway Commercial	0.00	0.46	0.46
0.459	2	Residential	2.35	0.00	0.46
2.601	2	Highway Commercial	0.00	2.60	2.60
2.601	2	Floodplain Hazards	0.00	0.00	0.00
2.601	2	Agriculture	0.00	0.00	0.00
0.073	2	Floodplain Hazards	0.00	0.00	0.00
0.073	2	Residential	2.35	0.00	0.07
0.091	2	Residential	2.35	0.00	0.09
0.103	1	Residential	2.35	0.00	0.10
0.203	1	Residential	2.35	0.00	0.20
0.031	1	Highway Commercial	0.00	0.03	0.03
0.031	1	Residential	2.35	0.00	0.03
0.326	1	Downtown Commercial	0.00	0.33	0.33
0.042	1	Residential	2.35	0.00	0.04
0.08	1	Residential	2.35	0.00	0.08
0.082	1	Residential	2.35	0.00	0.08
0.041	1	Residential	2.35	0.00	0.04
0.079	1	Residential	2.35	0.00	0.08
0.168	1	Downtown Commercial	0.00	0.17	0.17

0.088	1	Residential	2.35	0.00	0.09
0	1	Residential	2.35	0.00	0.00
0.062	1	Residential	2.35	0.00	0.06
0.046	1	Residential	2.35	0.00	0.05
0.027	1	Residential	2.35	0.00	0.03
0.044	1	Downtown Commercial	0.00	0.04	0.04
0.038	1	Residential	2.35	0.00	0.04
0.513	1	Residential	2.35	0.00	0.51
0.128	1	Residential	2.35	0.00	0.13
0.104	1	Residential	2.35	0.00	0.10
0.08	1	Residential	2.35	0.00	0.08
0.08	1	Residential	2.35	0.00	0.08
0.069	1	Downtown Commercial	0.00	0.07	0.07
0.05	1	Residential	2.35	0.00	0.05
0.05	1	Downtown Commercial	0.00	0.05	0.05
0.103	1	Residential	2.35	0.00	0.10
0.114	1	Downtown Commercial	0.00	0.11	0.11
0.114	1	Residential	2.35	0.00	0.11
0.102	1	Floodplain Hazards	0.00	0.00	0.00
0.102	1	Residential	2.35	0.00	0.10
0.186	1	Floodplain Hazards	0.00	0.00	0.00
0.186	1	Residential	2.35	0.00	0.19
0.067	1	Residential	2.35	0.00	0.07
0.157	1	Highway Commercial	0.00	0.16	0.16
0.087	1	Residential	2.35	0.00	0.09
0.162	1	Residential	2.35	0.00	0.16
0.191	1	Highway Commercial	0.00	0.19	0.19
0.031	1	Residential	2.35	0.00	0.03
0.619	1	Downtown Commercial	0.00	0.62	0.62
0.057	1	Residential	2.35	0.00	0.06
0.057	1	Residential	2.35	0.00	0.06
0.029	1	Downtown Commercial	0.00	0.03	0.03
0.1	1	Floodplain Hazards	0.00	0.00	0.00
0.1	1	Residential	2.35	0.00	0.10
0.044	1	Residential	2.35	0.00	0.04
0.092	1	Residential	2.35	0.00	0.09
0.029	1	Residential	2.35	0.00	0.03
0.194	1	Residential	2.35	0.00	0.19
0.062	1	Residential	2.35	0.00	0.06
0.103	1	Residential	2.35	0.00	0.10
0.049	1	Residential	2.35	0.00	0.05
0.049	1	Downtown Commercial	0.00	0.05	0.05
0.052	1	Residential	2.35	0.00	0.05
0.026	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.065	1	Residential	2.35	0.00	0.07
0.04	1	Downtown Commercial	0.00	0.04	0.04
0.045	1	Downtown Commercial	0.00	0.05	0.05
0.069	1	Floodplain Hazards	0.00	0.00	0.00
0.069	1	Downtown Commercial	0.00	0.07	0.07
0.036	1	Downtown Commercial	0.00	0.04	0.04
0.145	1	Residential	2.35	0.00	0.15
0.026	1	Residential	2.35	0.00	0.03
0.082	1	Residential	2.35	0.00	0.08
0.019	1	Residential	2.35	0.00	0.02
0.027	1	Residential	2.35	0.00	0.03
0.082	1	Residential	2.35	0.00	0.08
0.278	1	Downtown Commercial	0.00	0.28	0.28
0.04	1	Residential	2.35	0.00	0.04
0.074	1	Residential	2.35	0.00	0.07
0.103	1	Residential	2.35	0.00	0.10
0.043	1	Residential	2.35	0.00	0.04
0.037	1	Residential	2.35	0.00	0.04
0.071	1	Residential	2.35	0.00	0.07
0.027	1	Residential	2.35	0.00	0.03
0.031	1	Downtown Commercial	0.00	0.03	0.03
0.046	1	Residential	2.35	0.00	0.05
0.027	1	Highway Commercial	0.00	0.03	0.03
0.165	1	Residential	2.35	0.00	0.17
0.086	1	Residential	2.35	0.00	0.09
0.154	1	Residential	2.35	0.00	0.15
0.154	1	Floodplain Hazards	0.00	0.00	0.00
0.061	1	Residential	2.35	0.00	0.06
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.144	1	Residential	2.35	0.00	0.14
0.144	1	Floodplain Hazards	0.00	0.00	0.00
0.059	1	Residential	2.35	0.00	0.06
0.089	1	Residential	2.35	0.00	0.09
0.123	1	Residential	2.35	0.00	0.12
0.123	1	Downtown Commercial	0.00	0.12	0.12
0.081	1	Residential	2.35	0.00	0.08
0.058	1	Residential	2.35	0.00	0.06
0.08	1	Residential	2.35	0.00	0.08
0.135	1	Residential	2.35	0.00	0.14
0.135	1	Floodplain Hazards	0.00	0.00	0.00
0.102	1	Residential	2.35	0.00	0.10
0.04	1	Residential	2.35	0.00	0.04
0.04	1	Floodplain Hazards	0.00	0.00	0.00
0.079	1	Residential	2.35	0.00	0.08
0.052	1	Residential	2.35	0.00	0.05

0.068	1	Downtown Commercial	0.00	0.07	0.07
0.068	1	Floodplain Hazards	0.00	0.00	0.00
0.044	1	Residential	2.35	0.00	0.04
0.103	1	Residential	2.35	0.00	0.10
0.103	1	Floodplain Hazards	0.00	0.00	0.00
0.072	1	Residential	2.35	0.00	0.07
0.236	1	Residential	2.35	0.00	0.24
0.236	1	Downtown Commercial	0.00	0.24	0.24
0.055	1	Residential	2.35	0.00	0.06
0.081	1	Residential	2.35	0.00	0.08
0.092	1	Residential	2.35	0.00	0.09
0.079	1	Residential	2.35	0.00	0.08
0.032	1	Residential	2.35	0.00	0.03
0.057	1	Residential	2.35	0.00	0.06
0.067	1	Residential	2.35	0.00	0.07
0.038	1	Residential	2.35	0.00	0.04
0.095	1	Residential	2.35	0.00	0.10
0.026	1	Residential	2.35	0.00	0.03
0.06	1	Residential	2.35	0.00	0.06
0.028	1	Residential	2.35	0.00	0.03
0.06	1	Residential	2.35	0.00	0.06
0.203	1	Residential	2.35	0.00	0.20
0.196	1	Residential	2.35	0.00	0.20
0.141	1	Residential	2.35	0.00	0.14
0.073	1	Residential	2.35	0.00	0.07
0.047	1	Residential	2.35	0.00	0.05
0.019	1	Residential	2.35	0.00	0.02
0.065	1	Residential	2.35	0.00	0.07
0.075	1	Residential	2.35	0.00	0.08
0.053	1	Residential	2.35	0.00	0.05
0.091	1	Residential	2.35	0.00	0.09
0.027	1	Residential	2.35	0.00	0.03
0.097	1	Residential	2.35	0.00	0.10
0.067	1	Residential	2.35	0.00	0.07
0.067	1	Downtown Commercial	0.00	0.07	0.07
0.006	1	Residential	2.35	0.00	0.01
0.05	1	Residential	2.35	0.00	0.05
0.053	1	Downtown Commercial	0.00	0.05	0.05
0.103	1	Residential	2.35	0.00	0.10
0.055	1	Residential	2.35	0.00	0.06
0.048	1	Residential	2.35	0.00	0.05
0.07	1	Downtown Commercial	0.00	0.07	0.07
0.057	1	Residential	2.35	0.00	0.06
0.457	1	Residential	2.35	0.00	0.46
0.019	1	Residential	2.35	0.00	0.02
0.05	1	Residential	2.35	0.00	0.05
0.088	1	Residential	2.35	0.00	0.09
0.046	1	Residential	2.35	0.00	0.05
0.08	1	Residential	2.35	0.00	0.08
0.207	1	Residential	2.35	0.00	0.21
0.04	1	Residential	2.35	0.00	0.04
0.08	1	Residential	2.35	0.00	0.08
0.073	1	Residential	2.35	0.00	0.07
0.04	1	Residential	2.35	0.00	0.04
0.081	1	Residential	2.35	0.00	0.08
0.059	1	Residential	2.35	0.00	0.06
0.112	1	Residential	2.35	0.00	0.11
0.073	1	Downtown Commercial	0.00	0.07	0.07
0.073	1	Residential	2.35	0.00	0.07
0.053	1	Floodplain Hazards	0.00	0.00	0.00
0.053	1	Downtown Commercial	0.00	0.05	0.05
0.062	1	Residential	2.35	0.00	0.06
0.048	1	Residential	2.35	0.00	0.05
0.081	1	Residential	2.35	0.00	0.08
0.039	1	Downtown Commercial	0.00	0.04	0.04
0.079	1	Residential	2.35	0.00	0.08
0.047	1	Residential	2.35	0.00	0.05
0.02	1	Residential	2.35	0.00	0.02
0.061	1	Residential	2.35	0.00	0.06
0.064	1	Residential	2.35	0.00	0.06
0	1	Residential	2.35	0.00	0.00
0.056	1	Residential	2.35	0.00	0.06
0.053	1	Residential	2.35	0.00	0.05
0.102	1	Residential	2.35	0.00	0.10
0.029	1	Residential	2.35	0.00	0.03
0.097	1	Residential	2.35	0.00	0.10
0.071	1	Residential	2.35	0.00	0.07
0.05	1	Residential	2.35	0.00	0.05
0.033	1	Residential	2.35	0.00	0.03
0.063	1	Residential	2.35	0.00	0.06
0.082	1	Residential	2.35	0.00	0.08
0.037	1	Residential	2.35	0.00	0.04
0.05	1	Residential	2.35	0.00	0.05
0.08	1	Residential	2.35	0.00	0.08
0.08	1	Floodplain Hazards	0.00	0.00	0.00
0.063	1	Residential	2.35	0.00	0.06
0.047	1	Residential	2.35	0.00	0.05
0.05	1	Residential	2.35	0.00	0.05
0.055	1	Residential	2.35	0.00	0.06
0.066	1	Residential	2.35	0.00	0.07

0.054	1	Residential	2.35	0.00	0.05
0.026	1	Residential	2.35	0.00	0.03
0.074	1	Residential	2.35	0.00	0.07
0.106	1	Residential	2.35	0.00	0.11
0.128	1	Downtown Commercial	0.00	0.13	0.13
0.079	1	Residential	2.35	0.00	0.08
0.041	1	Downtown Commercial	0.00	0.04	0.04
0.062	1	Residential	2.35	0.00	0.06
0.101	1	Residential	2.35	0.00	0.10
0.064	1	Residential	2.35	0.00	0.06
0.064	1	Downtown Commercial	0.00	0.06	0.06
0.005	1	Residential	2.35	0.00	0.01
0.081	1	Residential	2.35	0.00	0.08
0.088	1	Residential	2.35	0.00	0.09
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.083	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.086	1	Downtown Commercial	0.00	0.09	0.09
0.043	1	Residential	2.35	0.00	0.04
0.136	1	Residential	2.35	0.00	0.14
0.082	1	Residential	2.35	0.00	0.08
0.074	1	Downtown Commercial	0.00	0.07	0.07
0.109	1	Residential	2.35	0.00	0.11
0.109	1	Floodplain Hazards	0.00	0.00	0.00
0.126	1	Residential	2.35	0.00	0.13
0.126	1	Floodplain Hazards	0.00	0.00	0.00
0.126	1	Residential	2.35	0.00	0.13
0.126	1	Floodplain Hazards	0.00	0.00	0.00
0.035	1	Residential	2.35	0.00	0.04
0.086	1	Residential	2.35	0.00	0.09
0.061	1	Residential	2.35	0.00	0.06
0.021	1	Residential	2.35	0.00	0.02
0.046	1	Residential	2.35	0.00	0.05
0.019	1	Residential	2.35	0.00	0.02
0.046	1	Residential	2.35	0.00	0.05
0.146	1	Residential	2.35	0.00	0.15
0.146	1	Floodplain Hazards	0.00	0.00	0.00
0.058	1	Residential	2.35	0.00	0.06
0.051	1	Residential	2.35	0.00	0.05
0.049	1	Residential	2.35	0.00	0.05
0.058	1	Residential	2.35	0.00	0.06
0.093	1	Residential	2.35	0.00	0.09
0.061	1	Residential	2.35	0.00	0.06
0.083	1	Residential	2.35	0.00	0.08
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.067	1	Residential	2.35	0.00	0.07
0.083	1	Residential	2.35	0.00	0.08
0.046	1	Residential	2.35	0.00	0.05
0.133	1	Residential	2.35	0.00	0.13
0.063	1	Residential	2.35	0.00	0.06
0.001	1	Residential	2.35	0.00	0.00
0.014	1	Residential	2.35	0.00	0.01
0.037	1	Downtown Commercial	0.00	0.04	0.04
0.037	1	Residential	2.35	0.00	0.04
0.049	1	Residential	2.35	0.00	0.05
0.093	1	Residential	2.35	0.00	0.09
0.102	1	Residential	2.35	0.00	0.10
0.067	1	Residential	2.35	0.00	0.07
0.243	1	Highway Commercial	0.00	0.24	0.24
0.021	1	Residential	2.35	0.00	0.02
0.112	1	Residential	2.35	0.00	0.11
0.112	1	Downtown Commercial	0.00	0.11	0.11
0.321	1	Downtown Commercial	0.00	0.32	0.32
0.087	1	Residential	2.35	0.00	0.09
0.064	1	Downtown Commercial	0.00	0.06	0.06
0.084	1	Downtown Commercial	0.00	0.08	0.08
0.045	1	Residential	2.35	0.00	0.05
0.076	1	Highway Commercial	0.00	0.08	0.08
0.027	1	Residential	2.35	0.00	0.03
0.155	1	Residential	2.35	0.00	0.16
0.026	1	Residential	2.35	0.00	0.03
0.042	1	Residential	2.35	0.00	0.04
0.041	1	Residential	2.35	0.00	0.04
0.127	1	Downtown Commercial	0.00	0.13	0.13
0.127	1	Residential	2.35	0.00	0.13
0.068	1	Residential	2.35	0.00	0.07
0.081	1	Residential	2.35	0.00	0.08
0.161	1	Highway Commercial	0.00	0.16	0.16
0.161	1	Residential	2.35	0.00	0.16
0.032	1	Residential	2.35	0.00	0.03
0.041	1	Residential	2.35	0.00	0.04
0.042	1	Residential	2.35	0.00	0.04
0.026	1	Residential	2.35	0.00	0.03
0.031	1	Residential	2.35	0.00	0.03
0.063	1	Residential	2.35	0.00	0.06
0.004	1	Residential	2.35	0.00	0.00
0.05	1	Residential	2.35	0.00	0.05
0.038	1	Residential	2.35	0.00	0.04
0.029	1	Residential	2.35	0.00	0.03
0	1	Residential	2.35	0.00	0.00

0.066	1	Residential	2.35	0.00	0.07
0.251	1	Residential	2.35	0.00	0.25
1.804	1	Highway Commercial	0.00	1.80	1.80
1.804	1	Agriculture	0.00	0.00	0.00
0.07	1	Residential	2.35	0.00	0.07
0.01	1	Residential	2.35	0.00	0.01
0.07	1	Downtown Commercial	0.00	0.07	0.07
0.19	1	Floodplain Hazards	0.00	0.00	0.00
0.19	1	Residential	2.35	0.00	0.19
0.14	1	Floodplain Hazards	0.00	0.00	0.00
0.14	1	Provincially Significant Wetland	0.00	0.00	0.00
0.14	1	Downtown Commercial	0.00	0.14	0.14
0.1	1	Residential	2.35	0.00	0.10
0.019	1	Residential	2.35	0.00	0.02
0.023	1	Residential	2.35	0.00	0.02
0.079	1	Residential	2.35	0.00	0.08
0.148	1	Residential	2.35	0.00	0.15
0.088	1	Floodplain Hazards	0.00	0.00	0.00
0.088	1	Provincially Significant Wetland	0.00	0.00	0.00
0.088	1	Downtown Commercial	0.00	0.09	0.09
0.028	1	Residential	2.35	0.00	0.03
0.1	1	Residential	2.35	0.00	0.10
0.063	1	Residential	2.35	0.00	0.06
0.022	1	Residential	2.35	0.00	0.02
0.079	1	Residential	2.35	0.00	0.08
0.138	1	Residential	2.35	0.00	0.14
0.364	1	Residential	2.35	0.00	0.36
0.041	1	Downtown Commercial	0.00	0.04	0.04
0.053	1	Downtown Commercial	0.00	0.05	0.05
0.04	1	Highway Commercial	0.00	0.04	0.04
0.082	1	Residential	2.35	0.00	0.08
0.082	1	Residential	2.35	0.00	0.08
0.043	1	Downtown Commercial	0.00	0.04	0.04
0.066	1	Residential	2.35	0.00	0.07
0.05	1	Residential	2.35	0.00	0.05
0.033	1	Downtown Commercial	0.00	0.03	0.03
0.035	1	Residential	2.35	0.00	0.04
0.107	1	Residential	2.35	0.00	0.11
0.107	1	Downtown Commercial	0.00	0.11	0.11
0.027	1	Residential	2.35	0.00	0.03
0.066	1	Residential	2.35	0.00	0.07
0.059	1	Downtown Commercial	0.00	0.06	0.06
0.076	1	Residential	2.35	0.00	0.08
0.041	1	Residential	2.35	0.00	0.04
0.026	1	Residential	2.35	0.00	0.03
0.043	1	Downtown Commercial	0.00	0.04	0.04
0.027	1	Highway Commercial	0.00	0.03	0.03
0.134	1	Residential	2.35	0.00	0.13
0.063	1	Residential	2.35	0.00	0.06
0.093	1	Downtown Commercial	0.00	0.09	0.09
0.059	1	Residential	2.35	0.00	0.06
0.065	1	Residential	2.35	0.00	0.07
0.109	1	Residential	2.35	0.00	0.11
0.109	1	Floodplain Hazards	0.00	0.00	0.00
0.08	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.065	1	Residential	2.35	0.00	0.07
0.032	1	Residential	2.35	0.00	0.03
0.051	1	Downtown Commercial	0.00	0.05	0.05
0.047	1	Residential	2.35	0.00	0.05
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.082	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.079	1	Residential	2.35	0.00	0.08
0.002	1	Residential	2.35	0.00	0.00
0.045	1	Residential	2.35	0.00	0.05
0.019	1	Residential	2.35	0.00	0.02
0.02	1	Residential	2.35	0.00	0.02
0.029	1	Residential	2.35	0.00	0.03
0.04	1	Residential	2.35	0.00	0.04
0.036	1	Residential	2.35	0.00	0.04
0.296	1	Residential	2.35	0.00	0.30
2.024	1	Residential	2.35	0.00	2.02
0.044	1	Residential	2.35	0.00	0.04
0.02	1	Highway Commercial	0.00	0.02	0.02
0.02	1	Residential	2.35	0.00	0.02
0.019	1	Highway Commercial	0.00	0.02	0.02
0.019	1	Residential	2.35	0.00	0.02
0.035	1	Residential	2.35	0.00	0.04
0.045	1	Residential	2.35	0.00	0.05
0.04	1	Residential	2.35	0.00	0.04
0.027	1	Residential	2.35	0.00	0.03
0.032	1	Residential	2.35	0.00	0.03
0.053	1	Residential	2.35	0.00	0.05
0.055	1	Residential	2.35	0.00	0.06
0.08	1	Residential	2.35	0.00	0.08
0.08	1	Floodplain Hazards	0.00	0.00	0.00
0.031	1	Residential	2.35	0.00	0.03
0.097	1	Residential	2.35	0.00	0.10

0.097	1	Floodplain Hazards	0.00	0.00	0.00
0.031	1	Residential	2.35	0.00	0.03
0.051	1	Residential	2.35	0.00	0.05
0.038	1	Residential	2.35	0.00	0.04
0.039	1	Residential	2.35	0.00	0.04
0.054	1	Residential	2.35	0.00	0.05
0.031	1	Residential	2.35	0.00	0.03
0.033	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.031	1	Residential	2.35	0.00	0.03
0.044	1	Residential	2.35	0.00	0.04
0.042	1	Residential	2.35	0.00	0.04
0.067	1	Residential	2.35	0.00	0.07
0.062	1	Residential	2.35	0.00	0.06
0.053	1	Residential	2.35	0.00	0.05
0.08	1	Highway Commercial	0.00	0.08	0.08
0.089	1	Residential	2.35	0.00	0.09
0.063	1	Residential	2.35	0.00	0.06
0.118	1	Highway Commercial	0.00	0.12	0.12
0.118	1	Residential	2.35	0.00	0.12
0.05	1	Residential	2.35	0.00	0.05
0.024	1	Highway Commercial	0.00	0.02	0.02
0.024	1	Residential	2.35	0.00	0.02
0.056	1	Residential	2.35	0.00	0.06
0.031	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.031	1	Residential	2.35	0.00	0.03
0.031	1	Residential	2.35	0.00	0.03
0.059	1	Residential	2.35	0.00	0.06
0.061	1	Residential	2.35	0.00	0.06
0.06	1	Residential	2.35	0.00	0.06
0.142	1	Residential	2.35	0.00	0.14
0.076	1	Residential	2.35	0.00	0.08
0.088	1	Residential	2.35	0.00	0.09
0.075	1	Downtown Commercial	0.00	0.08	0.08
0.075	1	Residential	2.35	0.00	0.08
0.065	1	Downtown Commercial	0.00	0.07	0.07
0.094	1	Residential	2.35	0.00	0.09
0.094	1	Downtown Commercial	0.00	0.09	0.09
0.058	1	Downtown Commercial	0.00	0.06	0.06
0.081	1	Residential	2.35	0.00	0.08
0.048	1	Residential	2.35	0.00	0.05
0.063	1	Residential	2.35	0.00	0.06
0.048	1	Residential	2.35	0.00	0.05
0.048	1	Downtown Commercial	0.00	0.05	0.05
0.09	1	Downtown Commercial	0.00	0.09	0.09
0.058	1	Downtown Commercial	0.00	0.06	0.06
0.08	1	Residential	2.35	0.00	0.08
0.101	1	Residential	2.35	0.00	0.10
0.101	1	Downtown Commercial	0.00	0.10	0.10
0.093	1	Downtown Commercial	0.00	0.09	0.09
0.081	1	Residential	2.35	0.00	0.08
0.046	1	Residential	2.35	0.00	0.05
0.046	1	Downtown Commercial	0.00	0.05	0.05
0.085	1	Residential	2.35	0.00	0.09
0.085	1	Downtown Commercial	0.00	0.09	0.09
0.087	1	Residential	2.35	0.00	0.09
0.087	1	Downtown Commercial	0.00	0.09	0.09
0.081	1	Residential	2.35	0.00	0.08
0.077	1	Residential	2.35	0.00	0.08
0.077	1	Downtown Commercial	0.00	0.08	0.08
0.122	1	Residential	2.35	0.00	0.12
0.122	1	Downtown Commercial	0.00	0.12	0.12
0.003	1	Residential	2.35	0.00	0.00
1.621	1	Highway Commercial	0.00	1.62	1.62
0.078	1	Residential	2.35	0.00	0.08
0.039	1	Residential	2.35	0.00	0.04
0.039	1	Floodplain Hazards	0.00	0.00	0.00
0.026	1	Residential	2.35	0.00	0.03
0.054	1	Downtown Commercial	0.00	0.05	0.05
0.055	1	Residential	2.35	0.00	0.06
0.305	1	Floodplain Hazards	0.00	0.00	0.00
0.305	1	Residential	2.35	0.00	0.31
0.086	1	Residential	2.35	0.00	0.09
0.051	1	Residential	2.35	0.00	0.05
0.082	1	Residential	2.35	0.00	0.08
0.1	1	Residential	2.35	0.00	0.10
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.023	1	Residential	2.35	0.00	0.02
0.023	1	Floodplain Hazards	0.00	0.00	0.00
0.081	1	Residential	2.35	0.00	0.08
0.043	1	Residential	2.35	0.00	0.04
0.081	1	Residential	2.35	0.00	0.08
0.103	1	Residential	2.35	0.00	0.10
0.081	1	Residential	2.35	0.00	0.08
0.102	1	Residential	2.35	0.00	0.10
0.079	1	Downtown Commercial	0.00	0.08	0.08
0.079	1	Floodplain Hazards	0.00	0.00	0.00

0.718	1	Residential	2.35	0.00	0.72
0.718	1	Downtown Commercial	0.00	0.72	0.72
0.056	1	Floodplain Hazards	0.00	0.00	0.00
0.056	1	Residential	2.35	0.00	0.06
0.057	1	Residential	2.35	0.00	0.06
0.061	1	Residential	2.35	0.00	0.06
0.058	1	Residential	2.35	0.00	0.06
0.072	1	Residential	2.35	0.00	0.07
0.069	1	Residential	2.35	0.00	0.07
0.077	1	Residential	2.35	0.00	0.08
0.094	1	Downtown Commercial	0.00	0.09	0.09
0.026	1	Residential	2.35	0.00	0.03
0.046	1	Residential	2.35	0.00	0.05
0.051	1	Residential	2.35	0.00	0.05
0.092	1	Residential	2.35	0.00	0.09
0.047	1	Residential	2.35	0.00	0.05
0.06	1	Residential	2.35	0.00	0.06
0.027	1	Residential	2.35	0.00	0.03
0.081	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.044	1	Residential	2.35	0.00	0.04
0.06	1	Residential	2.35	0.00	0.06
0.047	1	Residential	2.35	0.00	0.05
0.047	1	Residential	2.35	0.00	0.05
0.085	1	Downtown Commercial	0.00	0.09	0.09
0.079	1	Residential	2.35	0.00	0.08
0.079	1	Downtown Commercial	0.00	0.08	0.08
0.207	1	Residential	2.35	0.00	0.21
0.062	1	Residential	2.35	0.00	0.06
0.05	1	Residential	2.35	0.00	0.05
0.104	1	Residential	2.35	0.00	0.10
0.239	1	Residential	2.35	0.00	0.24
0.043	1	Residential	2.35	0.00	0.04
0.102	1	Residential	2.35	0.00	0.10
0.103	1	Floodplain Hazards	0.00	0.00	0.00
0.103	1	Residential	2.35	0.00	0.10
0.026	1	Residential	2.35	0.00	0.03
0.082	1	Residential	2.35	0.00	0.08
0.063	1	Residential	2.35	0.00	0.06
0.074	1	Residential	2.35	0.00	0.07
0.028	1	Residential	2.35	0.00	0.03
0.027	1	Residential	2.35	0.00	0.03
0.015	1	Residential	2.35	0.00	0.02
0.07	1	Residential	2.35	0.00	0.07
0.07	1	Downtown Commercial	0.00	0.07	0.07
0.061	1	Residential	2.35	0.00	0.06
0.038	1	Residential	2.35	0.00	0.04
0.082	1	Residential	2.35	0.00	0.08
0.031	1	Downtown Commercial	0.00	0.03	0.03
0.036	1	Downtown Commercial	0.00	0.04	0.04
0.102	1	Residential	2.35	0.00	0.10
0.102	1	Residential	2.35	0.00	0.10
0.051	1	Downtown Commercial	0.00	0.05	0.05
0.081	1	Residential	2.35	0.00	0.08
0.039	1	Downtown Commercial	0.00	0.04	0.04
0.004	1	Residential	2.35	0.00	0.00
0.004	1	Floodplain Hazards	0.00	0.00	0.00
0.096	1	Residential	2.35	0.00	0.10
0.096	1	Floodplain Hazards	0.00	0.00	0.00
0.077	1	Residential	2.35	0.00	0.08
0.04	1	Residential	2.35	0.00	0.04
0.061	1	Residential	2.35	0.00	0.06
0.028	1	Residential	2.35	0.00	0.03
0.145	1	Downtown Commercial	0.00	0.15	0.15
0.029	1	Residential	2.35	0.00	0.03
0.029	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.123	1	Residential	2.35	0.00	0.12
0.085	1	Residential	2.35	0.00	0.09
0.059	1	Residential	2.35	0.00	0.06
0.102	1	Residential	2.35	0.00	0.10
0.027	1	Highway Commercial	0.00	0.03	0.03
0.103	1	Residential	2.35	0.00	0.10
0.082	1	Residential	2.35	0.00	0.08
0.058	1	Residential	2.35	0.00	0.06
0.042	1	Highway Commercial	0.00	0.04	0.04
0.084	1	Downtown Commercial	0.00	0.08	0.08
0.088	1	Residential	2.35	0.00	0.09
0.116	1	Residential	2.35	0.00	0.12
0.095	1	Residential	2.35	0.00	0.10
0.058	1	Residential	2.35	0.00	0.06
0.026	1	Residential	2.35	0.00	0.03
0.019	1	Residential	2.35	0.00	0.02
0.049	1	Residential	2.35	0.00	0.05
0.053	1	Residential	2.35	0.00	0.05
0.203	1	Floodplain Hazards	0.00	0.00	0.00
0.203	1	Provincially Significant Wetland	0.00	0.00	0.00
0.203	1	Downtown Commercial	0.00	0.20	0.20
0.035	1	Residential	2.35	0.00	0.04
0.023	1	Residential	2.35	0.00	0.02

0.026	1	Residential	2.35	0.00	0.03
0.039	1	Residential	2.35	0.00	0.04
0.082	1	Residential	2.35	0.00	0.08
0.027	1	Residential	2.35	0.00	0.03
0.019	1	Residential	2.35	0.00	0.02
0.137	1	Floodplain Hazards	0.00	0.00	0.00
0.137	1	Residential	2.35	0.00	0.14
0.027	1	Residential	2.35	0.00	0.03
0.047	1	Residential	2.35	0.00	0.05
0.067	1	Residential	2.35	0.00	0.07
0.067	1	Residential	2.35	0.00	0.07
0.102	1	Residential	2.35	0.00	0.10
0.156	1	Residential	2.35	0.00	0.16
0.081	1	Residential	2.35	0.00	0.08
0.093	1	Residential	2.35	0.00	0.09
0.081	1	Downtown Commercial	0.00	0.08	0.08
0.062	1	Residential	2.35	0.00	0.06
0.101	1	Residential	2.35	0.00	0.10
0.075	1	Residential	2.35	0.00	0.08
0.075	1	Downtown Commercial	0.00	0.08	0.08
0.113	1	Residential	2.35	0.00	0.11
0.059	1	Downtown Commercial	0.00	0.06	0.06
0.065	1	Residential	2.35	0.00	0.07
0.037	1	Residential	2.35	0.00	0.04
0.046	1	Residential	2.35	0.00	0.05
0.043	1	Residential	2.35	0.00	0.04
0.039	1	Downtown Commercial	0.00	0.04	0.04
0.043	1	Residential	2.35	0.00	0.04
0.041	1	Residential	2.35	0.00	0.04
0.103	1	Residential	2.35	0.00	0.10
0.066	1	Residential	2.35	0.00	0.07
0.022	1	Residential	2.35	0.00	0.02
0.061	1	Downtown Commercial	0.00	0.06	0.06
0.029	1	Residential	2.35	0.00	0.03
0.05	1	Residential	2.35	0.00	0.05
0.101	1	Floodplain Hazards	0.00	0.00	0.00
0.101	1	Residential	2.35	0.00	0.10
0.026	1	Residential	2.35	0.00	0.03
0.043	1	Residential	2.35	0.00	0.04
0.043	1	Floodplain Hazards	0.00	0.00	0.00
0.043	1	Provincially Significant Wetland	0.00	0.00	0.00
0.043	1	Downtown Commercial	0.00	0.04	0.04
0.058	1	Residential	2.35	0.00	0.06
0.088	1	Residential	2.35	0.00	0.09
0.036	1	Downtown Commercial	0.00	0.04	0.04
0.07	1	Residential	2.35	0.00	0.07
0.104	1	Residential	2.35	0.00	0.10
0.045	1	Residential	2.35	0.00	0.05
0.059	1	Residential	2.35	0.00	0.06
0.027	1	Highway Commercial	0.00	0.03	0.03
0.202	1	Floodplain Hazards	0.00	0.00	0.00
0.202	1	Residential	2.35	0.00	0.20
0.043	1	Residential	2.35	0.00	0.04
0.055	1	Downtown Commercial	0.00	0.06	0.06
0.055	1	Residential	2.35	0.00	0.06
0.056	1	Downtown Commercial	0.00	0.06	0.06
0.056	1	Floodplain Hazards	0.00	0.00	0.00
0.019	1	Residential	2.35	0.00	0.02
0.087	1	Residential	2.35	0.00	0.09
0.087	1	Downtown Commercial	0.00	0.09	0.09
0.053	1	Residential	2.35	0.00	0.05
0.1	1	Residential	2.35	0.00	0.10
0.054	1	Residential	2.35	0.00	0.05
0.027	1	Residential	2.35	0.00	0.03
0.037	1	Residential	2.35	0.00	0.04
0.031	1	Residential	2.35	0.00	0.03
0.029	1	Residential	2.35	0.00	0.03
0.047	1	Residential	2.35	0.00	0.05
0.068	1	Downtown Commercial	0.00	0.07	0.07
0.035	1	Residential	2.35	0.00	0.04
0.059	1	Residential	2.35	0.00	0.06
0.034	1	Residential	2.35	0.00	0.03
0.052	1	Residential	2.35	0.00	0.05
0.062	1	Residential	2.35	0.00	0.06
0.039	1	Residential	2.35	0.00	0.04
0.103	1	Floodplain Hazards	0.00	0.00	0.00
0.103	1	Residential	2.35	0.00	0.10
0.052	1	Residential	2.35	0.00	0.05
0.027	1	Residential	2.35	0.00	0.03
0.081	1	Residential	2.35	0.00	0.08
0.079	1	Residential	2.35	0.00	0.08
0.208	1	Residential	2.35	0.00	0.21
0.042	1	Residential	2.35	0.00	0.04
0.049	1	Downtown Commercial	0.00	0.05	0.05
0.046	1	Residential	2.35	0.00	0.05
0.067	1	Residential	2.35	0.00	0.07
0.083	1	Residential	2.35	0.00	0.08
0.043	1	Downtown Commercial	0.00	0.04	0.04
0.048	1	Residential	2.35	0.00	0.05
0.039	1	Residential	2.35	0.00	0.04

0.082	1	Residential	2.35	0.00	0.08
0.092	1	Residential	2.35	0.00	0.09
0.037	1	Residential	2.35	0.00	0.04
0.038	1	Residential	2.35	0.00	0.04
0.047	1	Residential	2.35	0.00	0.05
0.082	1	Residential	2.35	0.00	0.08
0.044	1	Residential	2.35	0.00	0.04
0.081	1	Residential	2.35	0.00	0.08
0.035	1	Downtown Commercial	0.00	0.04	0.04
0.035	1	Residential	2.35	0.00	0.04
0.551	1	Downtown Commercial	0.00	0.55	0.55
0.029	1	Residential	2.35	0.00	0.03
0.029	1	Residential	2.35	0.00	0.03
0.04	1	Downtown Commercial	0.00	0.04	0.04
0.057	1	Residential	2.35	0.00	0.06
0.055	1	Residential	2.35	0.00	0.06
0.055	1	Floodplain Hazards	0.00	0.00	0.00
0.079	1	Residential	2.35	0.00	0.08
0.079	1	Residential	2.35	0.00	0.08
0.052	1	Residential	2.35	0.00	0.05
0.058	1	Residential	2.35	0.00	0.06
0.072	1	Residential	2.35	0.00	0.07
0.072	1	Downtown Commercial	0.00	0.07	0.07
0.051	1	Residential	2.35	0.00	0.05
0.007	1	Residential	2.35	0.00	0.01
0.211	1	Residential	2.35	0.00	0.21
0.074	1	Residential	2.35	0.00	0.07
0.367	1	Residential	2.35	0.00	0.37
0.044	1	Residential	2.35	0.00	0.04
0.022	1	Residential	2.35	0.00	0.02
0.054	1	Residential	2.35	0.00	0.05
0.048	1	Residential	2.35	0.00	0.05
0.045	1	Residential	2.35	0.00	0.05
0.024	1	Highway Commercial	0.00	0.02	0.02
0.024	1	Residential	2.35	0.00	0.02
0.018	1	Residential	2.35	0.00	0.02
0.021	1	Residential	2.35	0.00	0.02
0.007	1	Residential	2.35	0.00	0.01
0.059	1	Residential	2.35	0.00	0.06
0.025	1	Highway Commercial	0.00	0.03	0.03
0.025	1	Agriculture	0.00	0.00	0.00
0.071	1	Residential	2.35	0.00	0.07
0.044	1	Residential	2.35	0.00	0.04
0.406	1	Residential	2.35	0.00	0.41
0.032	1	Residential	2.35	0.00	0.03
0.033	1	Residential	2.35	0.00	0.03
0.027	1	Residential	2.35	0.00	0.03
0.042	1	Residential	2.35	0.00	0.04
0.032	1	Residential	2.35	0.00	0.03
0.031	1	Residential	2.35	0.00	0.03
0.032	1	Residential	2.35	0.00	0.03
0.057	1	Residential	2.35	0.00	0.06
0.083	1	Residential	2.35	0.00	0.08
0.083	1	Downtown Commercial	0.00	0.08	0.08
0.092	1	Residential	2.35	0.00	0.09
0.092	1	Downtown Commercial	0.00	0.09	0.09
0.054	1	Residential	2.35	0.00	0.05
0.054	1	Downtown Commercial	0.00	0.05	0.05
0.126	1	Residential	2.35	0.00	0.13
0.126	1	Downtown Commercial	0.00	0.13	0.13
0.126	1	Floodplain Hazards	0.00	0.00	0.00
0.631	1	Highway Commercial	0.00	0.63	0.63
0.631	1	Residential	2.35	0.00	0.63
1.743	1	Highway Commercial	0.00	1.74	1.74
1.743	1	Residential	2.35	0.00	1.74
4.763	1	Residential	2.35	0.00	4.76
0.257	1	Highway Commercial	0.00	0.26	0.26
0.257	1	Residential	2.35	0.00	0.26
0.143	1	Residential	2.35	0.00	0.14
0.062	1	Residential	2.35	0.00	0.06
0.061	1	Residential	2.35	0.00	0.06
0.095	1	Residential	2.35	0.00	0.10
0.058	1	Residential	2.35	0.00	0.06
0.007	1	Residential	2.35	0.00	0.01
0.059	1	Residential	2.35	0.00	0.06
0.013	1	Residential	2.35	0.00	0.01
0.073	1	Residential	2.35	0.00	0.07
0.026	1	Residential	2.35	0.00	0.03
0.098	1	Residential	2.35	0.00	0.10
0.063	1	Residential	2.35	0.00	0.06
0.058	1	Residential	2.35	0.00	0.06
0.057	1	Residential	2.35	0.00	0.06
0.058	1	Residential	2.35	0.00	0.06
0.047	1	Residential	2.35	0.00	0.05
0.039	1	Residential	2.35	0.00	0.04
0.004	1	Residential	2.35	0.00	0.00
1.711	1	Residential	2.35	0.00	1.71
1.711	1	Downtown Commercial	0.00	1.71	1.71
0.024	1	Highway Commercial	0.00	0.02	0.02
0.024	1	Residential	2.35	0.00	0.02

0.071	1	Highway Commercial	0.00	0.07	0.07
0.071	1	Residential	2.35	0.00	0.07
0.046	1	Residential	2.35	0.00	0.05
0.073	1	Residential	2.35	0.00	0.07
0.174	1	Downtown Commercial	0.00	0.17	0.17
0.045	1	Residential	2.35	0.00	0.05
0.025	1	Residential	2.35	0.00	0.03
0.025	1	Downtown Commercial	0.00	0.03	0.03
0.011	1	Floodplain Hazards	0.00	0.00	0.00
0.011	1	Residential	2.35	0.00	0.01
0.04	1	Residential	2.35	0.00	0.04
0.199	1	Residential	2.35	0.00	0.20
0.031	1	Residential	2.35	0.00	0.03
0.033	1	Residential	2.35	0.00	0.03
0.033	1	Residential	2.35	0.00	0.03
0.081	1	Residential	2.35	0.00	0.08
0.083	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.081	1	Residential	2.35	0.00	0.08
0.082	1	Residential	2.35	0.00	0.08
0.052	1	Residential	2.35	0.00	0.05
0.081	1	Residential	2.35	0.00	0.08
0.244	1	Highway Commercial	0.00	0.24	0.24
0.082	1	Residential	2.35	0.00	0.08
0.084	1	Residential	2.35	0.00	0.08
0.083	1	Residential	2.35	0.00	0.08
0.083	1	Residential	2.35	0.00	0.08
0.055	1	Residential	2.35	0.00	0.06
0.057	1	Residential	2.35	0.00	0.06
0.084	1	Residential	2.35	0.00	0.08
0.052	1	Residential	2.35	0.00	0.05
0.081	1	Residential	2.35	0.00	0.08
0.054	1	Highway Commercial	0.00	0.05	0.05
0.084	1	Residential	2.35	0.00	0.08
0.067	1	Residential	2.35	0.00	0.07
0.081	1	Residential	2.35	0.00	0.08
0.042	1	Residential	2.35	0.00	0.04
0.084	1	Residential	2.35	0.00	0.08
0.083	1	Residential	2.35	0.00	0.08
0.084	1	Residential	2.35	0.00	0.08
0.052	1	Residential	2.35	0.00	0.05
0.061	1	Residential	2.35	0.00	0.06
0.65	1	Highway Commercial	0.00	0.65	0.65
0.65	1	Residential	2.35	0.00	0.65
0.082	1	Highway Commercial	0.00	0.08	0.08
0.082	1	Residential	2.35	0.00	0.08
0.084	1	Residential	2.35	0.00	0.08
2.482	1	Highway Commercial	0.00	2.48	2.48
2.482	1	Agriculture	0.00	0.00	0.00
0.069	1	Highway Commercial	0.00	0.07	0.07
0.069	1	Residential	2.35	0.00	0.07
0.021	1	Highway Commercial	0.00	0.02	0.02
0.021	1	Residential	2.35	0.00	0.02
0.022	1	Residential	2.35	0.00	0.02
0.205	1	Highway Commercial	0.00	0.21	0.21
0.027	1	Residential	2.35	0.00	0.03
0.026	1	Residential	2.35	0.00	0.03
0.044	1	Residential	2.35	0.00	0.04
0.033	1	Residential	2.35	0.00	0.03
0.063	1	Residential	2.35	0.00	0.06
0.027	1	Residential	2.35	0.00	0.03
0.039	1	Residential	2.35	0.00	0.04
0.047	1	Residential	2.35	0.00	0.05
0.026	1	Residential	2.35	0.00	0.03
0.063	1	Downtown Commercial	0.00	0.06	0.06
0.055	1	Downtown Commercial	0.00	0.06	0.06
0.052	1	Downtown Commercial	0.00	0.05	0.05
0.055	1	Residential	2.35	0.00	0.06
0.283	1	Residential	2.35	0.00	0.28
0.22	1	Residential	2.35	0.00	0.22
0.029	1	Downtown Commercial	0.00	0.03	0.03
0.026	1	Downtown Commercial	0.00	0.03	0.03
0.18	1	Downtown Commercial	0.00	0.18	0.18
0.18	1	Floodplain Hazards	0.00	0.00	0.00
0.087	1	Downtown Commercial	0.00	0.09	0.09
0.163	1	Residential	2.35	0.00	0.16
0.032	1	Residential	2.35	0.00	0.03
0.172	1	Residential	2.35	0.00	0.17
0.031	1	Residential	2.35	0.00	0.03
0.001	1	Residential	2.35	0.00	0.00
0.009	1	Residential	2.35	0.00	0.01
0.075	1	Residential	2.35	0.00	0.08
4.46	1	Residential	2.35	0.00	4.46
0.047	1	Residential	2.35	0.00	0.05
2.009	1	Highway Commercial	0.00	2.01	2.01
0.054	1	Downtown Commercial	0.00	0.05	0.05
0.04	1	Residential	2.35	0.00	0.04
0.187	1	Residential	2.35	0.00	0.19
0.052	1	Residential	2.35	0.00	0.05

0.055	1	Residential	2.35	0.00	0.06
0.058	1	Residential	2.35	0.00	0.06
0.221	1	Highway Commercial	0.00	0.22	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.22	1	Residential	2.35	0.00	0.22
0.192	5	Economic Enterprise	0.00	0.19	0.19
0.192	5	Residential	2.35	0.00	0.19
0.168	5	Economic Enterprise	0.00	0.17	0.17
0.15	5	Economic Enterprise	0.00	0.15	0.15
1.474	5	Economic Enterprise	0.00	1.47	1.47
0.032	5	Residential	2.35	0.00	0.03
0.04	5	Industrial	0.00	0.04	0.04
0.04	5	Residential	2.35	0.00	0.04
0.052	5	Residential	2.35	0.00	0.05
0.052	5	Residential	2.35	0.00	0.05
0.056	5	Residential	2.35	0.00	0.06
0.05	5	Residential	2.35	0.00	0.05
0.065	5	Residential	2.35	0.00	0.07
0.017	5	Residential	2.35	0.00	0.02
0.146	5	Economic Enterprise	0.00	0.15	0.15
0.146	5	Residential	2.35	0.00	0.15
0.155	5	Provincially Significant Wetland	0.00	0.00	0.00
0.155	5	Floodplain Hazards	0.00	0.00	0.00
0.155	5	Residential	2.35	0.00	0.16
0.024	5	Residential	2.35	0.00	0.02
0.091	5	Provincially Significant Wetland	0.00	0.00	0.00
0.091	5	Floodplain Hazards	0.00	0.00	0.00
0.091	5	Residential	2.35	0.00	0.09
2.164	5	Residential	2.35	0.00	2.16
2.164	5	Industrial	0.00	2.16	2.16
2.164	5	Floodplain Hazards	0.00	0.00	0.00
2.164	5	Floodplain Hazards	0.00	0.00	0.00
0.033	5	Residential	2.35	0.00	0.03
0.038	5	Residential	2.35	0.00	0.04
0.068	5	Residential	2.35	0.00	0.07
0.041	5	Residential	2.35	0.00	0.04
0.049	5	Residential	2.35	0.00	0.05
0.046	5	Residential	2.35	0.00	0.05
0.048	5	Residential	2.35	0.00	0.05
0.031	5	Residential	2.35	0.00	0.03
0.048	5	Floodplain Hazards	0.00	0.00	0.00
0.218	5	Floodplain Hazards	0.00	0.00	0.00
0.218	5	Residential	2.35	0.00	0.22
0.13	5	Provincially Significant Wetland	0.00	0.00	0.00
0.13	5	Floodplain Hazards	0.00	0.00	0.00
0.13	5	Residential	2.35	0.00	0.13
0.047	5	Residential	2.35	0.00	0.05
0.046	5	Residential	2.35	0.00	0.05
0.012	5	Industrial	0.00	0.01	0.01
0.012	5	Residential	2.35	0.00	0.01
0.071	5	Residential	2.35	0.00	0.07
0.111	5	Residential	2.35	0.00	0.11
0.118	5	Industrial	0.00	0.12	0.12
0.118	5	Floodplain Hazards	0.00	0.00	0.00
0.118	5	Residential	2.35	0.00	0.12
0.088	5	Provincially Significant Wetland	0.00	0.00	0.00
0.088	5	Floodplain Hazards	0.00	0.00	0.00
0.088	5	Residential	2.35	0.00	0.09
0.071	5	Residential	2.35	0.00	0.07
0.071	5	Floodplain Hazards	0.00	0.00	0.00
0.068	5	Residential	2.35	0.00	0.07
0.068	5	Floodplain Hazards	0.00	0.00	0.00
0.621	5	Economic Enterprise	0.00	0.62	0.62
0.621	5	Residential	2.35	0.00	0.62
0.034	5	Residential	2.35	0.00	0.03
0.094	5	Residential	2.35	0.00	0.09
0.068	5	Residential	2.35	0.00	0.07
0.038	5	Residential	2.35	0.00	0.04
0.121	5	Provincially Significant Wetland	0.00	0.00	0.00
0.121	5	Floodplain Hazards	0.00	0.00	0.00
0.121	5	Residential	2.35	0.00	0.12
0.046	5	Residential	2.35	0.00	0.05
0.017	5	Residential	2.35	0.00	0.02
0.017	5	Residential	2.35	0.00	0.02
0.101	5	Residential	2.35	0.00	0.10
0.046	5	Residential	2.35	0.00	0.05
0.046	5	Economic Enterprise	0.00	0.05	0.05
0.046	5	Residential	2.35	0.00	0.05
0.072	5	Residential	2.35	0.00	0.07
0.058	5	Residential	2.35	0.00	0.06

0.046	5	Residential	2.35	0.00	0.05
0.046	5	Residential	2.35	0.00	0.05
0.035	5	Floodplain Hazards	0.00	0.00	0.00
0.035	5	Residential	2.35	0.00	0.04
0.046	5	Residential	2.35	0.00	0.05
0.046	5	Residential	2.35	0.00	0.05
0.075	5	Residential	2.35	0.00	0.08
0.046	5	Economic Enterprise	0.00	0.05	0.05
0.046	5	Residential	2.35	0.00	0.05
0.473	5	Economic Enterprise	0.00	0.47	0.47
0.473	5	Residential	2.35	0.00	0.47
0.096	5	Residential	2.35	0.00	0.10
0.067	5	Residential	2.35	0.00	0.07
0.025	5	Floodplain Hazards	0.00	0.00	0.00
0.025	5	Residential	2.35	0.00	0.03
0.046	5	Industrial	0.00	0.05	0.05
0.046	5	Residential	2.35	0.00	0.05
0.095	5	Residential	2.35	0.00	0.10
0.158	5	Floodplain Hazards	0.00	0.00	0.00
0.018	5	Residential	2.35	0.00	0.02
0.048	5	Residential	2.35	0.00	0.05
0.071	5	Residential	2.35	0.00	0.07
0.046	5	Residential	2.35	0.00	0.05
0.067	5	Residential	2.35	0.00	0.07
1.734	5	Industrial	0.00	1.73	1.73
0.046	5	Residential	2.35	0.00	0.05
0.086	5	Residential	2.35	0.00	0.09
0.086	5	Floodplain Hazards	0.00	0.00	0.00
0.08	5	Residential	2.35	0.00	0.08
0.08	5	Floodplain Hazards	0.00	0.00	0.00
0.05	5	Residential	2.35	0.00	0.05
0.016	5	Residential	2.35	0.00	0.02
0.037	5	Residential	2.35	0.00	0.04
0.047	5	Residential	2.35	0.00	0.05
0.038	5	Residential	2.35	0.00	0.04
0.08	5	Residential	2.35	0.00	0.08
0.382	5	Economic Enterprise	0.00	0.38	0.38
0.382	5	Residential	2.35	0.00	0.38
0.05	5	Residential	2.35	0.00	0.05
0.045	5	Residential	2.35	0.00	0.05
0.06	5	Residential	2.35	0.00	0.06
0.04	5	Residential	2.35	0.00	0.04
0.058	5	Floodplain Hazards	0.00	0.00	0.00
0.058	5	Residential	2.35	0.00	0.06
0.168	5	Floodplain Hazards	0.00	0.00	0.00
0.168	5	Residential	2.35	0.00	0.17
0.08	5	Floodplain Hazards	0.00	0.00	0.00
0.08	5	Residential	2.35	0.00	0.08
0.46	5	Industrial	0.00	0.46	0.46
0.123	5	Industrial	0.00	0.12	0.12
0.123	5	Residential	2.35	0.00	0.12
0.129	5	Residential	2.35	0.00	0.13
0.067	5	Residential	2.35	0.00	0.07
0.017	5	Residential	2.35	0.00	0.02
0.044	5	Residential	2.35	0.00	0.04
0.046	5	Residential	2.35	0.00	0.05
0.071	5	Residential	2.35	0.00	0.07
0.07	5	Floodplain Hazards	0.00	0.00	0.00
0.07	5	Residential	2.35	0.00	0.07
0.138	5	Industrial	0.00	0.14	0.14
0.138	5	Floodplain Hazards	0.00	0.00	0.00
0.041	5	Residential	2.35	0.00	0.04
2.185	5	Economic Enterprise	0.00	2.19	2.19
2.185	5	Residential	2.35	0.00	2.19
0.094	5	Residential	2.35	0.00	0.09
0.075	5	Residential	2.35	0.00	0.08
0.045	5	Residential	2.35	0.00	0.05
0.051	5	Residential	2.35	0.00	0.05
0.08	5	Industrial	0.00	0.08	0.08
0.08	5	Residential	2.35	0.00	0.08
0.832	5	Residential	2.35	0.00	0.83
0.832	5	Floodplain Hazards	0.00	0.00	0.00
0.075	5	Residential	2.35	0.00	0.08
0.035	5	Industrial	0.00	0.04	0.04
0.017	5	Residential	2.35	0.00	0.02
0.079	5	Residential	2.35	0.00	0.08
0.103	5	Floodplain Hazards	0.00	0.00	0.00
0.103	5	Provincially Significant Wetland	0.00	0.00	0.00
0.103	5	Residential	2.35	0.00	0.10
0.046	5	Residential	2.35	0.00	0.05
0.038	5	Residential	2.35	0.00	0.04
0.058	5	Residential	2.35	0.00	0.06
0.012	5	Residential	2.35	0.00	0.01
0.08	5	Residential	2.35	0.00	0.08
0.07	5	Residential	2.35	0.00	0.07
0.052	5	Residential	2.35	0.00	0.05
0.087	5	Residential	2.35	0.00	0.09
0.087	5	Floodplain Hazards	0.00	0.00	0.00
0.018	5	Residential	2.35	0.00	0.02
0.027	5	Floodplain Hazards	0.00	0.00	0.00

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0.183	4	Downtown Commercial	0.00	0.18	0.18
0.063	4	Floodplain Hazards	0.00	0.00	0.00
0.063	4	Residential	2.35	0.00	0.06
0.04	4	Residential	2.35	0.00	0.04
1.036	4	Industrial	0.00	1.04	1.04
1.036	4	Floodplain Hazards	0.00	0.00	0.00
0.071	4	Residential	2.35	0.00	0.07
0.059	4	Residential	2.35	0.00	0.06
0.059	4	Provincially Significant Wetland	0.00	0.00	0.00
0.059	4	Floodplain Hazards	0.00	0.00	0.00
0.049	4	Residential	2.35	0.00	0.05
0.128	4	Residential	2.35	0.00	0.13
1.271	4	Residential	2.35	0.00	1.27
1.271	4	Industrial	0.00	1.27	1.27
0.065	4	Residential	2.35	0.00	0.07
0.081	4	Residential	2.35	0.00	0.08
0.068	4	Residential	2.35	0.00	0.07
0.05	4	Floodplain Hazards	0.00	0.00	0.00
0.369	4	Floodplain Hazards	0.00	0.00	0.00
0.369	4	Provincially Significant Wetland	0.00	0.00	0.00
0.071	4	Residential	2.35	0.00	0.07
0.125	4	Residential	2.35	0.00	0.13
0.072	4	Residential	2.35	0.00	0.07
0.089	4	Residential	2.35	0.00	0.09
0.033	4	Floodplain Hazards	0.00	0.00	0.00
0.033	4	Residential	2.35	0.00	0.03
0.069	4	Residential	2.35	0.00	0.07
1.735	4	Residential	2.35	0.00	1.74
0.072	4	Residential	2.35	0.00	0.07
0.091	4	Residential	2.35	0.00	0.09
0.091	4	Floodplain Hazards	0.00	0.00	0.00
0.335	4	Residential	2.35	0.00	0.34
0.114	4	Residential	2.35	0.00	0.11
0.114	4	Floodplain Hazards	0.00	0.00	0.00
0.09	4	Residential	2.35	0.00	0.09
0.132	4	Residential	2.35	0.00	0.13
0.132	4	Provincially Significant Wetland	0.00	0.00	0.00
0.132	4	Floodplain Hazards	0.00	0.00	0.00
0.089	4	Residential	2.35	0.00	0.09
0.094	4	Residential	2.35	0.00	0.09
0.084	4	Residential	2.35	0.00	0.08
0.091	4	Residential	2.35	0.00	0.09
0.127	4	Residential	2.35	0.00	0.13
0.25	4	Residential	2.35	0.00	0.25
0.093	4	Residential	2.35	0.00	0.09
0.374	4	Residential	2.35	0.00	0.37
0.092	4	Residential	2.35	0.00	0.09
0.07	4	Residential	2.35	0.00	0.07
0.066	4	Residential	2.35	0.00	0.07
0.067	4	Residential	2.35	0.00	0.07
0.292	4	Residential	2.35	0.00	0.29
0.138	4	Residential	2.35	0.00	0.14
0.138	4	Provincially Significant Wetland	0.00	0.00	0.00
0.138	4	Floodplain Hazards	0.00	0.00	0.00
0.085	4	Residential	2.35	0.00	0.09
0.085	4	Residential	2.35	0.00	0.09
0.072	4	Residential	2.35	0.00	0.07
0.07	4	Residential	2.35	0.00	0.07
0.078	4	Residential	2.35	0.00	0.08
0.078	4	Floodplain Hazards	0.00	0.00	0.00
0.071	4	Residential	2.35	0.00	0.07
0.098	4	Residential	2.35	0.00	0.10
0.045	4	Floodplain Hazards	0.00	0.00	0.00
0.053	4	Floodplain Hazards	0.00	0.00	0.00
0.014	4	Agriculture	0.00	0.00	0.00
0.217	4	Residential	2.35	0.00	0.22
0.217	4	Downtown Commercial	0.00	0.22	0.22
0.001	4	Agriculture	0.00	0.00	0.00
0.096	4	Residential	2.35	0.00	0.10
0.055	4	Residential	2.35	0.00	0.06
0.055	4	Floodplain Hazards	0.00	0.00	0.00
0.083	4	Residential	2.35	0.00	0.08
0.054	4	Residential	2.35	0.00	0.05
0.054	4	Floodplain Hazards	0.00	0.00	0.00
0.037	4	Residential	2.35	0.00	0.04
0.083	4	Residential	2.35	0.00	0.08
0.118	4	Residential	2.35	0.00	0.12
0.002	4	Residential	2.35	0.00	0.00
0.091	4	Residential	2.35	0.00	0.09
0.06	4	Residential	2.35	0.00	0.06
0.074	4	Residential	2.35	0.00	0.07
0.104	4	Residential	2.35	0.00	0.10
0.041	4	Floodplain Hazards	0.00	0.00	0.00
0.041	4	Residential	2.35	0.00	0.04
0.119	4	Residential	2.35	0.00	0.12
0.119	4	Floodplain Hazards	0.00	0.00	0.00
0.109	4	Residential	2.35	0.00	0.11
0.197	4	Residential	2.35	0.00	0.20
0.197	4	Provincially Significant Wetland	0.00	0.00	0.00
0.197	4	Floodplain Hazards	0.00	0.00	0.00

0.133	4	Residential	2.35	0.00	0.13
0.069	4	Residential	2.35	0.00	0.07
0.082	4	Residential	2.35	0.00	0.08
0	4	Residential	2.35	0.00	0.00
0.085	4	Residential	2.35	0.00	0.09
0.068	4	Residential	2.35	0.00	0.07
0.147	4	Residential	2.35	0.00	0.15
0.23	4	Residential	2.35	0.00	0.23
0.164	4	Residential	2.35	0.00	0.16
0.084	4	Residential	2.35	0.00	0.08
0.066	4	Residential	2.35	0.00	0.07
0.109	4	Residential	2.35	0.00	0.11
0.086	4	Floodplain Hazards	0.00	0.00	0.00
0.086	4	Residential	2.35	0.00	0.09
1.596	4	Industrial	0.00	1.60	1.60
1.596	4	Highway Commercial	0.00	1.60	1.60
0.045	4	Floodplain Hazards	0.00	0.00	0.00
0.045	4	Residential	2.35	0.00	0.05
0.034	4	Floodplain Hazards	0.00	0.00	0.00
0.034	4	Residential	2.35	0.00	0.03
0.086	4	Residential	2.35	0.00	0.09
0.069	4	Residential	2.35	0.00	0.07
0.21	4	Residential	2.35	0.00	0.21
0.088	4	Residential	2.35	0.00	0.09
0.127	4	Residential	2.35	0.00	0.13
0.069	4	Residential	2.35	0.00	0.07
0.094	4	Residential	2.35	0.00	0.09
0.094	4	Downtown Commercial	0.00	0.09	0.09
0.097	4	Residential	2.35	0.00	0.10
0.076	4	Residential	2.35	0.00	0.08
0.084	4	Residential	2.35	0.00	0.08
0.084	4	Residential	2.35	0.00	0.08
0.093	4	Residential	2.35	0.00	0.09
0.093	4	Industrial	0.00	0.09	0.09
0.093	4	Floodplain Hazards	0.00	0.00	0.00
0.091	4	Residential	2.35	0.00	0.09
0.072	4	Residential	2.35	0.00	0.07
0.106	4	Residential	2.35	0.00	0.11
0.243	4	Industrial	0.00	0.24	0.24
0.243	4	Floodplain Hazards	0.00	0.00	0.00
0.142	4	Residential	2.35	0.00	0.14
0.044	4	Residential	2.35	0.00	0.04
0.103	4	Residential	2.35	0.00	0.10
0.103	4	Residential	2.35	0.00	0.10
0.157	4	Residential	2.35	0.00	0.16
0.089	4	Residential	2.35	0.00	0.09
0.05	4	Residential	2.35	0.00	0.05
0.218	4	Residential	2.35	0.00	0.22
0.059	4	Residential	2.35	0.00	0.06
0.059	4	Floodplain Hazards	0.00	0.00	0.00
0.283	4	Residential	2.35	0.00	0.28
0.348	4	Residential	2.35	0.00	0.35
0.153	4	Highway Commercial	0.00	0.15	0.15
0.071	4	Residential	2.35	0.00	0.07
0.112	4	Residential	2.35	0.00	0.11
0.193	4	Residential	2.35	0.00	0.19
0.193	4	Floodplain Hazards	0.00	0.00	0.00
0.16	4	Highway Commercial	0.00	0.16	0.16
0.082	4	Residential	2.35	0.00	0.08
0.037	4	Residential	2.35	0.00	0.04
0.198	4	Residential	2.35	0.00	0.20
0.081	4	Residential	2.35	0.00	0.08
0.16	4	Residential	2.35	0.00	0.16
0.005	4	Residential	2.35	0.00	0.01
0.16	4	Residential	2.35	0.00	0.16
0.069	4	Residential	2.35	0.00	0.07
0.069	4	Floodplain Hazards	0.00	0.00	0.00
0.094	4	Residential	2.35	0.00	0.09
0.155	4	Residential	2.35	0.00	0.16
0.117	4	Residential	2.35	0.00	0.12
0.394	4	Residential	2.35	0.00	0.39
0.006	4	Highway Commercial	0.00	0.01	0.01
0.006	4	Residential	2.35	0.00	0.01
0.062	4	Residential	2.35	0.00	0.06
0.117	4	Residential	2.35	0.00	0.12
0.082	4	Residential	2.35	0.00	0.08
0.139	4	Residential	2.35	0.00	0.14
0.122	4	Residential	2.35	0.00	0.12
2.067	4	Residential	2.35	0.00	2.07
0.065	4	Residential	2.35	0.00	0.07
0.093	4	Residential	2.35	0.00	0.09
0.06	4	Highway Commercial	0.00	0.06	0.06
0.06	4	Residential	2.35	0.00	0.06
0.122	4	Highway Commercial	0.00	0.12	0.12
0.122	4	Residential	2.35	0.00	0.12
0.347	4	Residential	2.35	0.00	0.35
0.067	4	Residential	2.35	0.00	0.07
0.056	4	Residential	2.35	0.00	0.06
0.24	4	Residential	2.35	0.00	0.24
0.476	4	Residential	2.35	0.00	0.48

0.144	4	Residential	2.35	0.00	0.14
0.385	4	Residential	2.35	0.00	0.39
0.181	4	Residential	2.35	0.00	0.18
0.096	4	Residential	2.35	0.00	0.10
0.081	4	Residential	2.35	0.00	0.08
0.101	4	Residential	2.35	0.00	0.10
0.137	4	Residential	2.35	0.00	0.14
0.06	4	Residential	2.35	0.00	0.06
0.069	4	Residential	2.35	0.00	0.07
0.067	4	Residential	2.35	0.00	0.07
0.051	4	Residential	2.35	0.00	0.05
0.058	4	Residential	2.35	0.00	0.06
0.083	4	Residential	2.35	0.00	0.08
0.083	4	Residential	2.35	0.00	0.08
0.196	4	Residential	2.35	0.00	0.20
0.089	4	Residential	2.35	0.00	0.09
0.294	4	Residential	2.35	0.00	0.29
0.067	4	Residential	2.35	0.00	0.07
0.046	4	Residential	2.35	0.00	0.05
0.063	4	Residential	2.35	0.00	0.06
0.16	4	Residential	2.35	0.00	0.16
0.16	4	Agriculture	0.00	0.00	0.00
0.162	4	Residential	2.35	0.00	0.16
0.162	4	Agriculture	0.00	0.00	0.00
0.007	4	Residential	2.35	0.00	0.01
18.077	4	Residential	2.35	0.00	18.08
18.077	4	Agriculture	0.00	0.00	0.00
2.842	4	Agriculture	0.00	0.00	0.00
0.209	4	Residential	2.35	0.00	0.21
0.209	4	Agriculture	0.00	0.00	0.00
0.039	4	Downtown Commercial	0.00	0.04	0.04
0.109	4	Residential	2.35	0.00	0.11
0.109	4	Downtown Commercial	0.00	0.11	0.11
0.094	4	Residential	2.35	0.00	0.09
0.094	4	Downtown Commercial	0.00	0.09	0.09
0.137	4	Residential	2.35	0.00	0.14
0.137	4	Downtown Commercial	0.00	0.14	0.14
0.13	4	Residential	2.35	0.00	0.13
0.061	4	Downtown Commercial	0.00	0.06	0.06
0.091	4	Residential	2.35	0.00	0.09
0.091	4	Downtown Commercial	0.00	0.09	0.09
0.037	4	Residential	2.35	0.00	0.04
0.104	4	Residential	2.35	0.00	0.10
0.096	4	Residential	2.35	0.00	0.10
0.047	4	Residential	2.35	0.00	0.05
0.03	4	Residential	2.35	0.00	0.03
0.066	4	Residential	2.35	0.00	0.07
0.07	4	Residential	2.35	0.00	0.07
0.071	4	Residential	2.35	0.00	0.07
0.034	4	Residential	2.35	0.00	0.03
0.034	4	Residential	2.35	0.00	0.03
0.466	4	Residential	2.35	0.00	0.47
0.102	4	Residential	2.35	0.00	0.10
0.103	4	Residential	2.35	0.00	0.10
0.02	4	Floodplain Hazards	0.00	0.00	0.00
0.02	4	Residential	2.35	0.00	0.02
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.414	4	Residential	2.35	0.00	0.41
0.147	4	Residential	2.35	0.00	0.15
0.335	4	Residential	2.35	0.00	0.34
0.335	4	Residential	2.35	0.00	0.34
0.335	4	Residential	2.35	0.00	0.34
0.335	4	Residential	2.35	0.00	0.34
0.335	4	Residential	2.35	0.00	0.34
0.335	4	Residential	2.35	0.00	0.34
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4	Residential	2.35	0.00	0.24
0.242	4	Floodplain Hazards	0.00	0.00	0.00
0.242	4				

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0.077	3	Provincially Significant Wetland	0.00	0.00	0.00
0.077	3	Floodplain Hazards	0.00	0.00	0.00
0.077	3	Downtown Commercial	0.00	0.08	0.08
0.064	3	Residential	2.35	0.00	0.06
0.034	3	Residential	2.35	0.00	0.03
0.158	3	Residential	2.35	0.00	0.16
0.158	3	Provincially Significant Wetland	0.00	0.00	0.00
0.158	3	Floodplain Hazards	0.00	0.00	0.00
0.004	3	Residential	2.35	0.00	0.00
0.028	3	Downtown Commercial	0.00	0.03	0.03
0.033	3	Residential	2.35	0.00	0.03
0.015	3	Residential	2.35	0.00	0.02
0.002	3	Residential	2.35	0.00	0.00
0.002	3	Downtown Commercial	0.00	0.00	0.00
0.133	3	Residential	2.35	0.00	0.13
0.133	3	Provincially Significant Wetland	0.00	0.00	0.00
0.133	3	Floodplain Hazards	0.00	0.00	0.00
0.049	3	Residential	2.35	0.00	0.05
0.034	3	Residential	2.35	0.00	0.03
0.058	3	Residential	2.35	0.00	0.06
0.025	3	Floodplain Hazards	0.00	0.00	0.00
0.025	3	Provincially Significant Wetland	0.00	0.00	0.00
0.061	3	Residential	2.35	0.00	0.06
0.031	3	Residential	2.35	0.00	0.03
0.044	3	Residential	2.35	0.00	0.04
0.034	3	Residential	2.35	0.00	0.03
0.034	3	Parks/Open Space	0.00	0.00	0.00
0.11	3	Residential	2.35	0.00	0.11
0.11	3	Downtown Commercial	0.00	0.11	0.11
0.032	3	Residential	2.35	0.00	0.03
0.034	3	Residential	2.35	0.00	0.03
0.034	3	Parks/Open Space	0.00	0.00	0.00
0.067	3	Residential	2.35	0.00	0.07
0.177	3	Residential	2.35	0.00	0.18
0.075	3	Residential	2.35	0.00	0.08
0.038	3	Residential	2.35	0.00	0.04
0.001	3	Residential	2.35	0.00	0.00
7.203	3	Residential	2.35	0.00	7.20
7.203	3	Parks/Open Space	0.00	0.00	0.00
0.083	3	Downtown Commercial	0.00	0.08	0.08
0.039	3	Residential	2.35	0.00	0.04
0.027	3	Residential	2.35	0.00	0.03
0.313	3	Residential	2.35	0.00	0.31
0.313	3	Parks/Open Space	0.00	0.00	0.00
0.313	3	Downtown Commercial	0.00	0.31	0.31
0.143	3	Downtown Commercial	0.00	0.14	0.14
0.089	3	Residential	2.35	0.00	0.09
0.043	3	Residential	2.35	0.00	0.04
0.198	3	Downtown Commercial	0.00	0.20	0.20
0.041	3	Residential	2.35	0.00	0.04
0.034	3	Residential	2.35	0.00	0.03
0.106	3	Residential	2.35	0.00	0.11
0.105	3	Residential	2.35	0.00	0.11
0.047	3	Downtown Commercial	0.00	0.05	0.05
0.063	3	Residential	2.35	0.00	0.06
0.114	3	Residential	2.35	0.00	0.11
0.058	3	Residential	2.35	0.00	0.06
0.058	3	Downtown Commercial	0.00	0.06	0.06
0.021	3	Residential	2.35	0.00	0.02
0.032	3	Residential	2.35	0.00	0.03
0	3	Floodplain Hazards	0.00	0.00	0.00
0.134	3	Downtown Commercial	0.00	0.13	0.13
0.057	3	Provincially Significant Wetland	0.00	0.00	0.00
0.057	3	Floodplain Hazards	0.00	0.00	0.00
0.034	3	Residential	2.35	0.00	0.03
0.069	3	Residential	2.35	0.00	0.07
0.048	3	Downtown Commercial	0.00	0.05	0.05
0.037	3	Residential	2.35	0.00	0.04
0.061	3	Downtown Commercial	0.00	0.06	0.06
0.069	3	Residential	2.35	0.00	0.07
0.042	3	Residential	2.35	0.00	0.04
0.091	3	Residential	2.35	0.00	0.09
0.068	3	Residential	2.35	0.00	0.07
0.003	3	Residential	2.35	0.00	0.00
0.104	3	Residential	2.35	0.00	0.10
0.034	3	Residential	2.35	0.00	0.03
0.098	3	Residential	2.35	0.00	0.10
0.098	3	Downtown Commercial	0.00	0.10	0.10
0.099	3	Downtown Commercial	0.00	0.10	0.10
0.04	3	Residential	2.35	0.00	0.04
0.14	3	Residential	2.35	0.00	0.14
0.14	3	Downtown Commercial	0.00	0.14	0.14
0.078	3	Residential	2.35	0.00	0.08
0.078	3	Provincially Significant Wetland	0.00	0.00	0.00
0.078	3	Floodplain Hazards	0.00	0.00	0.00
0.09	3	Downtown Commercial	0.00	0.09	0.09
0.058	3	Residential	2.35	0.00	0.06
0.102	3	Residential	2.35	0.00	0.10
0.064	3	Residential	2.35	0.00	0.06
0.081	3	Parks/Open Space	0.00	0.00	0.00

0.081	3	Downtown Commercial	0.00	0.08	0.08
0.098	3	Downtown Commercial	0.00	0.10	0.10
0.056	3	Residential	2.35	0.00	0.06
0.006	3	Residential	2.35	0.00	0.01
0.006	3	Downtown Commercial	0.00	0.01	0.01
0.066	3	Residential	2.35	0.00	0.07
0.034	3	Downtown Commercial	0.00	0.03	0.03
0.073	3	Residential	2.35	0.00	0.07
0.073	3	Floodplain Hazards	0.00	0.00	0.00
0.275	3	Floodplain Hazards	0.00	0.00	0.00
0.275	3	Provincially Significant Wetland	0.00	0.00	0.00
0.091	3	Downtown Commercial	0.00	0.09	0.09
0.073	3	Residential	2.35	0.00	0.07
0.1	3	Residential	2.35	0.00	0.10
0.067	3	Residential	2.35	0.00	0.07
0.1	3	Residential	2.35	0.00	0.10
0.04	3	Residential	2.35	0.00	0.04
0.071	3	Downtown Commercial	0.00	0.07	0.07
0.201	3	Residential	2.35	0.00	0.20
0.1	3	Residential	2.35	0.00	0.10
0.1	3	Downtown Commercial	0.00	0.10	0.10
0.176	3	Residential	2.35	0.00	0.18
0.176	3	Provincially Significant Wetland	0.00	0.00	0.00
0.176	3	Floodplain Hazards	0.00	0.00	0.00
0.176	3	Downtown Commercial	0.00	0.18	0.18
0.063	3	Residential	2.35	0.00	0.06
0.099	3	Residential	2.35	0.00	0.10
0.099	3	Downtown Commercial	0.00	0.10	0.10
0.166	3	Residential	2.35	0.00	0.17
0.125	3	Floodplain Hazards	0.00	0.00	0.00
0.125	3	Provincially Significant Wetland	0.00	0.00	0.00
0.034	3	Residential	2.35	0.00	0.03
0.039	3	Residential	2.35	0.00	0.04
0.142	3	Residential	2.35	0.00	0.14
0.034	3	Residential	2.35	0.00	0.03
0.03	3	Residential	2.35	0.00	0.03
0.114	3	Residential	2.35	0.00	0.11
0.114	3	Downtown Commercial	0.00	0.11	0.11
0.066	3	Residential	2.35	0.00	0.07
0.034	3	Residential	2.35	0.00	0.03
0.204	3	Floodplain Hazards	0.00	0.00	0.00
0.204	3	Provincially Significant Wetland	0.00	0.00	0.00
0.057	3	Residential	2.35	0.00	0.06
0.217	3	Residential	2.35	0.00	0.22
0.114	3	Downtown Commercial	0.00	0.11	0.11
0.064	3	Downtown Commercial	0.00	0.06	0.06
1.426	3	Parks/Open Space	0.00	0.00	0.00
1.426	3	Downtown Commercial	0.00	1.43	1.43
0.021	3	Floodplain Hazards	0.00	0.00	0.00
0.021	3	Downtown Commercial	0.00	0.02	0.02
0.068	3	Residential	2.35	0.00	0.07
0.117	3	Residential	2.35	0.00	0.12
0.177	3	Downtown Commercial	0.00	0.18	0.18
0.038	3	Residential	2.35	0.00	0.04
0.072	3	Residential	2.35	0.00	0.07
0.023	3	Residential	2.35	0.00	0.02
0.022	3	Downtown Commercial	0.00	0.02	0.02
0.084	3	Floodplain Hazards	0.00	0.00	0.00
0.084	3	Provincially Significant Wetland	0.00	0.00	0.00
0.003	3	Floodplain Hazards	0.00	0.00	0.00
0.003	3	Provincially Significant Wetland	0.00	0.00	0.00
0.058	3	Residential	2.35	0.00	0.06
0.002	3	Residential	2.35	0.00	0.00
0.115	3	Residential	2.35	0.00	0.12
0.115	3	Downtown Commercial	0.00	0.12	0.12
0.078	3	Residential	2.35	0.00	0.08
0.078	3	Downtown Commercial	0.00	0.08	0.08
0.002	3	Residential	2.35	0.00	0.00
0.045	3	Residential	2.35	0.00	0.05
0.027	3	Downtown Commercial	0.00	0.03	0.03
0.061	3	Residential	2.35	0.00	0.06
0.154	3	Provincially Significant Wetland	0.00	0.00	0.00
0.154	3	Floodplain Hazards	0.00	0.00	0.00
0.154	3	Floodplain Hazards	0.00	0.00	0.00
0.154	3	Downtown Commercial	0.00	0.15	0.15
0.072	3	Downtown Commercial	0.00	0.07	0.07
0.07	3	Residential	2.35	0.00	0.07
0.066	3	Residential	2.35	0.00	0.07
0.096	3	Residential	2.35	0.00	0.10
0.087	3	Residential	2.35	0.00	0.09
0.087	3	Downtown Commercial	0.00	0.09	0.09
0.098	3	Residential	2.35	0.00	0.10
0.083	3	Provincially Significant Wetland	0.00	0.00	0.00
0.083	3	Floodplain Hazards	0.00	0.00	0.00
0.072	3	Provincially Significant Wetland	0.00	0.00	0.00
0.072	3	Floodplain Hazards	0.00	0.00	0.00
0.18	3	Downtown Commercial	0.00	0.18	0.18
0.096	3	Residential	2.35	0.00	0.10
0.096	3	Downtown Commercial	0.00	0.10	0.10
0.048	3	Downtown Commercial	0.00	0.05	0.05

0.08	3	Downtown Commercial	0.00	0.08	0.08
0.071	3	Residential	2.35	0.00	0.07
0.272	3	Residential	2.35	0.00	0.27
0.272	3	Downtown Commercial	0.00	0.27	0.27
0.071	3	Residential	2.35	0.00	0.07
0.071	3	Downtown Commercial	0.00	0.07	0.07
0.091	3	Downtown Commercial	0.00	0.09	0.09
0.062	3	Residential	2.35	0.00	0.06
0.023	3	Downtown Commercial	0.00	0.02	0.02
0.052	3	Residential	2.35	0.00	0.05
0.052	3	Residential	2.35	0.00	0.05
0.08	3	Residential	2.35	0.00	0.08
0.08	3	Parks/Open Space	0.00	0.00	0.00
0.059	3	Downtown Commercial	0.00	0.06	0.06
0.098	3	Downtown Commercial	0.00	0.10	0.10
0.069	3	Residential	2.35	0.00	0.07
0.012	3	Provincially Significant Wetland	0.00	0.00	0.00
0.012	3	Floodplain Hazards	0.00	0.00	0.00
0.056	3	Residential	2.35	0.00	0.06
0.035	3	Residential	2.35	0.00	0.04
0.229	3	Provincially Significant Wetland	0.00	0.00	0.00
0.229	3	Parks/Open Space	0.00	0.00	0.00
0.229	3	Floodplain Hazards	0.00	0.00	0.00
0.229	3	Downtown Commercial	0.00	0.23	0.23
0.036	3	Residential	2.35	0.00	0.04
0.045	3	Residential	2.35	0.00	0.05
0.157	3	Downtown Commercial	0.00	0.16	0.16
0.065	3	Residential	2.35	0.00	0.07
0.044	3	Downtown Commercial	0.00	0.04	0.04
0.184	3	Residential	2.35	0.00	0.18
0.068	3	Residential	2.35	0.00	0.07
0.016	3	Downtown Commercial	0.00	0.02	0.02
0.053	3	Downtown Commercial	0.00	0.05	0.05
0.052	3	Downtown Commercial	0.00	0.05	0.05
0.191	3	Residential	2.35	0.00	0.19
0.191	3	Provincially Significant Wetland	0.00	0.00	0.00
0.191	3	Floodplain Hazards	0.00	0.00	0.00
0.053	3	Residential	2.35	0.00	0.05
0.079	3	Downtown Commercial	0.00	0.08	0.08
0.003	3	Residential	2.35	0.00	0.00
0.058	3	Residential	2.35	0.00	0.06
0.058	3	Parks/Open Space	0.00	0.00	0.00
0.039	3	Residential	2.35	0.00	0.04
0.099	3	Residential	2.35	0.00	0.10
0.099	3	Downtown Commercial	0.00	0.10	0.10
0.075	3	Residential	2.35	0.00	0.08
0.075	3	Parks/Open Space	0.00	0.00	0.00
0.089	3	Residential	2.35	0.00	0.09
0.034	3	Residential	2.35	0.00	0.03
0.061	3	Downtown Commercial	0.00	0.06	0.06
0.032	3	Residential	2.35	0.00	0.03
0.039	3	Residential	2.35	0.00	0.04
0.038	3	Residential	2.35	0.00	0.04
0.226	3	Floodplain Hazards	0.00	0.00	0.00
0.226	3	Downtown Commercial	0.00	0.23	0.23
0.041	3	Residential	2.35	0.00	0.04
0.103	3	Residential	2.35	0.00	0.10
0.074	3	Residential	2.35	0.00	0.07
0.036	3	Downtown Commercial	0.00	0.04	0.04
0.046	3	Parks/Open Space	0.00	0.00	0.00
0.046	3	Downtown Commercial	0.00	0.05	0.05
0.058	3	Residential	2.35	0.00	0.06
0.034	3	Residential	2.35	0.00	0.03
0.034	3	Parks/Open Space	0.00	0.00	0.00
0.017	3	Residential	2.35	0.00	0.02
0.04	3	Residential	2.35	0.00	0.04
0.135	3	Downtown Commercial	0.00	0.14	0.14
0.087	3	Residential	2.35	0.00	0.09
0.127	3	Residential	2.35	0.00	0.13
0.058	3	Provincially Significant Wetland	0.00	0.00	0.00
0.058	3	Floodplain Hazards	0.00	0.00	0.00
0.058	3	Downtown Commercial	0.00	0.06	0.06
0.082	3	Residential	2.35	0.00	0.08
0.091	3	Residential	2.35	0.00	0.09
0.058	3	Residential	2.35	0.00	0.06
0.035	3	Residential	2.35	0.00	0.04
0.067	3	Residential	2.35	0.00	0.07
0.04	3	Residential	2.35	0.00	0.04
0.034	3	Residential	2.35	0.00	0.03
0.034	3	Parks/Open Space	0.00	0.00	0.00
0	3	Floodplain Hazards	0.00	0.00	0.00
0.015	3	Residential	2.35	0.00	0.02
0.073	3	Downtown Commercial	0.00	0.07	0.07
0.151	3	Residential	2.35	0.00	0.15
0.151	3	Downtown Commercial	0.00	0.15	0.15
0.122	3	Residential	2.35	0.00	0.12
0.122	3	Provincially Significant Wetland	0.00	0.00	0.00
0.122	3	Floodplain Hazards	0.00	0.00	0.00
0.047	3	Downtown Commercial	0.00	0.05	0.05
0.034	3	Residential	2.35	0.00	0.03

0.034	3	Parks/Open Space	0.00	0.00	0.00
0.033	3	Residential	2.35	0.00	0.03
0.151	3	Residential	2.35	0.00	0.15
0.14	3	Residential	2.35	0.00	0.14
0.029	3	Downtown Commercial	0.00	0.03	0.03
0.133	3	Residential	2.35	0.00	0.13
0.033	3	Downtown Commercial	0.00	0.03	0.03
0.046	3	Downtown Commercial	0.00	0.05	0.05
0.078	3	Residential	2.35	0.00	0.08
0.069	3	Residential	2.35	0.00	0.07
0.049	3	Residential	2.35	0.00	0.05
0.067	3	Residential	2.35	0.00	0.07
0.019	3	Residential	2.35	0.00	0.02
0.04	3	Downtown Commercial	0.00	0.04	0.04
0.017	3	Residential	2.35	0.00	0.02
0.127	3	Residential	2.35	0.00	0.13
0.11	3	Downtown Commercial	0.00	0.11	0.11
0.017	3	Downtown Commercial	0.00	0.02	0.02
0.034	3	Residential	2.35	0.00	0.03
0.033	3	Residential	2.35	0.00	0.03
0.131	3	Residential	2.35	0.00	0.13
0.131	3	Downtown Commercial	0.00	0.13	0.13
0.065	3	Residential	2.35	0.00	0.07
0.037	3	Residential	2.35	0.00	0.04
0.045	3	Residential	2.35	0.00	0.05
0.002	3	Residential	2.35	0.00	0.00
0.102	3	Residential	2.35	0.00	0.10
0.034	3	Downtown Commercial	0.00	0.03	0.03
0.098	3	Downtown Commercial	0.00	0.10	0.10
0.071	3	Residential	2.35	0.00	0.07
0.029	3	Residential	2.35	0.00	0.03
0.035	3	Residential	2.35	0.00	0.04
0.031	3	Residential	2.35	0.00	0.03
0.099	3	Residential	2.35	0.00	0.10
0.099	3	Downtown Commercial	0.00	0.10	0.10
0.105	3	Residential	2.35	0.00	0.11
0.105	3	Provincially Significant Wetland	0.00	0.00	0.00
0.105	3	Floodplain Hazards	0.00	0.00	0.00
0.099	3	Provincially Significant Wetland	0.00	0.00	0.00
0.099	3	Floodplain Hazards	0.00	0.00	0.00
0.099	3	Downtown Commercial	0.00	0.10	0.10
0.216	3	Residential	2.35	0.00	0.22
0.216	3	Provincially Significant Wetland	0.00	0.00	0.00
0.216	3	Floodplain Hazards	0.00	0.00	0.00
0.041	3	Residential	2.35	0.00	0.04
0.019	3	Downtown Commercial	0.00	0.02	0.02
0.056	3	Residential	2.35	0.00	0.06
0.395	3	Residential	2.35	0.00	0.40
0.04	3	Residential	2.35	0.00	0.04
0.041	3	Downtown Commercial	0.00	0.04	0.04
0.056	3	Residential	2.35	0.00	0.06
0.012	3	Provincially Significant Wetland	0.00	0.00	0.00
0.012	3	Floodplain Hazards	0.00	0.00	0.00
0.109	3	Residential	2.35	0.00	0.11
0.205	3	Residential	2.35	0.00	0.21
0.205	3	Downtown Commercial	0.00	0.21	0.21
0.055	3	Residential	2.35	0.00	0.06
0.074	3	Residential	2.35	0.00	0.07
0.074	3	Residential	2.35	0.00	0.07
0.124	3	Residential	2.35	0.00	0.12
0.123	3	Provincially Significant Wetland	0.00	0.00	0.00
0.123	3	Floodplain Hazards	0.00	0.00	0.00
0.123	3	Downtown Commercial	0.00	0.12	0.12
0.048	3	Floodplain Hazards	0.00	0.00	0.00
0.048	3	Provincially Significant Wetland	0.00	0.00	0.00
0.054	3	Residential	2.35	0.00	0.05
0.054	3	Downtown Commercial	0.00	0.05	0.05
0.101	3	Residential	2.35	0.00	0.10
0.098	3	Residential	2.35	0.00	0.10
0.098	3	Downtown Commercial	0.00	0.10	0.10
0.038	3	Residential	2.35	0.00	0.04
0.077	3	Downtown Commercial	0.00	0.08	0.08
0.041	3	Residential	2.35	0.00	0.04
0.033	3	Residential	2.35	0.00	0.03
0.091	3	Parks/Open Space	0.00	0.00	0.00
0.034	3	Residential	2.35	0.00	0.03
0.034	3	Parks/Open Space	0.00	0.00	0.00
0.182	3	Provincially Significant Wetland	0.00	0.00	0.00
0.182	3	Floodplain Hazards	0.00	0.00	0.00
0.007	3	Provincially Significant Wetland	0.00	0.00	0.00
0.007	3	Floodplain Hazards	0.00	0.00	0.00
1.508	3	Residential	2.35	0.00	1.51
1.508	3	Parks/Open Space	0.00	0.00	0.00
0.089	3	Residential	2.35	0.00	0.09
0.089	3	Downtown Commercial	0.00	0.09	0.09
0.094	3	Residential	2.35	0.00	0.09
0.094	3	Downtown Commercial	0.00	0.09	0.09
0.437	3	Residential	2.35	0.00	0.44
0.437	3	Downtown Commercial	0.00	0.44	0.44
0.119	3	Residential	2.35	0.00	0.12

[illegible]

Table 1. Design Parameters

Unit Type	Residential Density (ppu)	Source
Single House Population	3.40	North Grenville Population Projection NGR Revision 3 Report (March 13, 2025)
Townhouse/Semi-Detached	2.70	
Apartments	2.00	
Unknown Residential Type	2.35	

Map ID	Units				Population	Catchment	Plug Flow (L/s)	Area (QGIS) (ha)
	Townhouse/Semi-Detached	Single	Apartment	Unknown				
Short-Term (0-5 years;2023-2026)								
3						3		21.38
13			63		126	3		0.75
14			48		96	3		0.88
17			50		100	4		0.66
18			8		16	4		0.09
19			69		138	3		0.54
20			59		118	3		0.56
22	26		26		122	4		0.85
23	30				81	4		1.18
51							10.8	
16						4		3.87
Mid-Term (5-10 years;2026-2031)								
13	28				76	1		1.10
14			60		120	1		1.01
19			40		80	3		0.14
20			109		218	3		0.95
23	20				54	4		0.55
47	92				248	5		3.76
59	33	2	8		112	4		1.00
44				42	99	5		1.44
45						5		4.57
Long-Term (10-20 years;2031-2041)								
15			36		72	1		0.63
47	89		150	91	754	5		5.22
13						1		1.49
26				253	595	5		7.66
56				36	85	2		1.07
42						3		0.49
Build-Out (20+; 2041+)								
24				62	145	4		1.82
34				98	230	5		2.88

Tatyana Roumie

From: Matthew Marcuccio
Sent: March 26, 2025 1:22 PM
To: Tatyana Roumie
Subject: FW: 33023-000 North Grenville Master Plan - Syphon as-built

fyi

Matthew Marcuccio, P.Eng.
Senior Environmental Engineer
Ottawa ON
Work: [343-803-4554](tel:343-803-4554)

From: Nicholas Shepherd <nshepherd@northgrenville.on.ca>
Sent: March 26, 2025 9:49 AM
To: Matthew Marcuccio <mmarcuccio@jlrichards.ca>
Cc: Eric Sly <esly@northgrenville.on.ca>; Mike Finley <mfinley@northgrenville.on.ca>
Subject: RE: 33023-000 North Grenville Master Plan - Syphon as-built

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Hey Matthew,

We will be able to check the maintenance holes sometime today or tomorrow and I will forward those measurements when they are done. I also asked them to double check the maintenance holes around the Jack St syphon so we can compare results.

For the syphon slopes, I haven't been able to find any other design drawings other than the one on Vista Cres. I think we will need to use the average overall slope instead, even though that is less ideal.

Thanks,



Nicholas Shepherd (he/him)
Water & Wastewater Technologist
Municipality of North Grenville
613-258-9569 ext.179
www.northgrenville.ca



Existing Kemptville Inverted Syphons Calculation Sheet



Resource: [Inverted Siphon, Depressed Sewer, Design Calculations \(imnoeng.com\)](#)

Variable Descriptions	
V_i	Velocity in Syphon Sewer
D_i	Diameter of Syphon Sewer
n_s	Mannings n coefficient of Syphon Sewer
S_a	Allowable Hydraulic Gradeline for the Syphon Sewers
E	Main Invert Difference Between Inlet & Outlet Chamber
L_s	Total length of Syphon Sewer (Not Horizontal distance)

Equations
$V_i = \frac{S_a^{\frac{1}{3}}}{n_s} \left(\frac{D_i}{4} \right)^{\frac{2}{3}}$
$S_a = \frac{E}{L_s}$

Catchment Area #3 Syphon - 150 mm diameter

No slope, length or upstream invert and T/G data available to undertake the assessment.

Catchment Area #4 Syphon - 300 mm diameter

Known Data

Variable	Value	Unit
D_i	0.3	m
n_s	0.013	
L_s	120.24	m
Upstream Main Invert	85.947	m
Downstream Main Invert	84.840	m
Avg Slope	1.05%	

Horiz. Length= 120.23 m

Calculations

$$E = \text{Upstream Main Invert} - \text{Downstream Main Invert}$$
$$E = 85.947 \text{ m} - 84.840 \text{ m}$$
$$E = 1.107$$
$$S_a = \frac{1.107 \text{ m}}{120.24 \text{ m}}$$
$$S_a = 0.0092$$
$$V_i = \frac{0.0092^{\frac{1}{3}}}{0.013} \left(\frac{0.3}{4} \right)^{\frac{2}{3}}$$

$V_i = 1.31 \text{ m/s}$

The average velocity of the syphon = 1.31 m/s, given that the average slope= 1.05%

Catchment Area #5 Syphon - 250 mm diameter

Known Data

Variable	Value	Unit
D_i	0.25	m
n_s	0.013	
L_s	173.71	m
Upstream Main Invert	85.65	m
Downstream Main Invert	84.15	m
Avg Slope	1.31%	

Horiz. Length= 173.70 m

Calculations

$$E = \text{Upstream Main Invert} - \text{Downstream Main Invert}$$
$$E = 85.65 \text{ m} - 84.15 \text{ m}$$
$$E = 1.50$$
$$S_a = \frac{1.50 \text{ m}}{173.71 \text{ m}}$$
$$S_a = 0.0086$$
$$V_i = \frac{0.0086^{\frac{1}{3}}}{0.013} \left(\frac{0.25}{4} \right)^{\frac{2}{3}}$$

$V_i = 1.13 \text{ m/s}$

The average velocity of the syphon = 1.13 m/s, given that the average slope= 1.31%

Existing Conditions (2023)

Street Name	MH No.		Residential					Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry				
	From	To	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	ICI Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Obvert	Invert	Cover
Catchment Area #3 (Syphon)	SAMH-13000	SAMH-10007	557	557	0.00	3.36	6.50	13.89	13.89	1.50	6.75	53.12	53.12	14.87	28.12	150	Circular	152.40										87.730	85.512	85.360	2.218	
Catchment Area #1 (Barnes St)	SAMHA-0018	SAMH-10007	1504	1504	0.00	3.14	16.41	25.80	25.80	1.50	12.54	88.29	88.29	24.72	53.68	300	Circular	304.80				37.85						87.805	85.605	85.300	2.200	
Barnes St - Lydia St	SAMH-10007	SAMH-10006		2061	0.00	3.06	21.90		39.69	1.50	19.29		88.29	24.72	65.92	375	Circular	381.00	0.26%	93.27	0.82	37.85	27.35	71%	87.730	85.561	85.180	2.169	87.470	85.251	84.870	2.219
Lydia St - James St	SAMH-10006	SAMH-10005		2061	0.00	3.06	21.90		39.69	1.50	19.29		88.29	24.72	65.92	375	Circular	381.00	0.20%	81.80	0.72	115.61	15.88	81%	87.420	85.251	84.870	2.169	88.240	85.051	84.670	3.189
Curry (James St - midway to Parliament St)	SAMH-10005	SAMH-10004		2061	0.00	3.06	21.90		39.69	1.50	19.29		88.29	24.72	65.92	375	Circular	381.00	0.56%	136.88	1.20	74.89	70.96	48%	88.240	84.780	84.670	3.460	88.030	84.631	84.250	3.399
Curry St (Midway of James - Parliament St)	SAMH-10004	SAMH-10003		2061	0.00	3.06	21.90		39.69	1.50	19.29		88.29	24.72	65.92	375	Circular	381.00	0.28%	96.79	0.85	62.76	30.87	68%	88.030	84.631	84.250	3.399	87.680	84.791	84.410	2.889
Catchment Area #2 (Parliament St)	SAMHA-0052	SAMH-10003	691	691	0.00	3.32	7.96	8.24	8.24	1.50	4.00	25.93	25.93	7.26	19.22	300	Circular	304.80	0.98%	99.87	1.37	47.12	80.64	19%	88.840	85.885	85.580	2.955	87.650	85.425	85.120	2.225
Curry St (at Parliament St)	SAMH-10003	SAMH-10002		2752	0.00	2.98	28.47		47.93	1.50	23.30		114.22	31.98	83.75	375	Circular	381.00	0.40%	115.68	1.01	5.63	31.94	72%	87.680	84.821	84.440	2.859	87.450	84.691	84.310	2.759
Catchment Area #4 (Syphon)	SAMHA-0069	SAMH010004	764	764	0.00	3.30	8.75	12.06	12.06	1.50	5.86	101.40	101.40	28.39	43.00	300	Circular	304.80	1.05%	103.37	1.42	120.23	60.37	42%	88.937	86.252	85.947	2.685	88.030	85.145	84.840	2.885
Catchment Area #5 (Syphon)	SAMHA-16000	SAMH-10002	489	489	0.00	3.38	5.74	11.38	11.38	1.50	5.53	63.58	63.58	17.80	29.08	250	Circular	254.00	1.31%	71.01	1.40	120.23	41.93	41%	89.670	85.904	85.650	3.766	87.500	84.404	84.150	3.096
Curry St (Parliament St - Bridge St)	SAMH-10002	SAMH-10001		3241	0.00	2.93	32.98		59.31	1.50	28.83		332.32	93.05	154.86	600	Circular	609.60	0.96%	627.62	2.15	151.36	472.76	25%	87.500	84.970	84.360	2.530	87.390	83.180	82.570	4.210
Curry St (Bridge St - PS)	SAMH-10001	SAMH-10000		3241	0.00	2.93	32.98		59.31	1.50	28.83		332.32	93.05	154.86	600	Circular	609.60	3.14%	1135.08	3.89	48.60	980.22	14%	87.390	83.140	82.530	4.250	88.430	81.590	80.980	6.840

Pipes Directly on Curry Street or Syphon for Master Plan Assesment

Design Parameters		
Residential Flows	300	L/Cap/Day
Infiltration Flows	0.28	L/s/ha
Correction Factor (Harmon's Formula)	0.8	-
Commercial (ICI) Peak Factor	1.5	-
Commercial (ICI) Average Flow	28000	L/ha/d
Manning Coefficient	0.013	

Short-Term Conditions (0-5 years)

Street Name	MH No.		Residential					Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry				
	From	To	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	ICI Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Obvert	Invert	Cover
Catchment Area #3 (Syphon)	SAMH-13000	SAMH-10007	1035	1035	0.00	3.23	11.62	35.27	35.27	1.50	17.15	77.23	77.23	21.62	61.18	150	Circular	152.40										87.730	85.512	85.360	2.218	
Catchment Area #1 (Barnes St)	SAMHA-0018	SAMH-10007	1504	1504	0.00	3.14	16.41	25.80	25.80	1.50	12.54	88.29	88.29	24.72	53.68	300	Circular	304.80				37.85						87.805	85.605	85.300	2.200	
Barnes St - Lydia St	SAMH-10007	SAMH-10006		2539	0.00	3.00	26.47	61.07	61.07	1.50	29.69	88.29	88.29	24.72	80.88	375	Circular	381.00	0.26%	93.27	0.82	37.85	12.39	87%	87.730	85.561	85.180	2.169	87.470	85.251	84.870	2.219
Lydia St - James St	SAMH-10006	SAMH-10005		2539	0.00	3.00	26.47	61.07	61.07	1.50	29.69	88.29	88.29	24.72	80.88	375	Circular	381.00	0.20%	81.80	0.72	115.61	0.92	99%	87.420	85.251	84.870	2.169	88.240	85.051	84.670	3.189
Curry (James St - midway to Parliament St)	SAMH-10005	SAMH-10004		2539	0.00	3.00	26.47	61.07	61.07	1.50	29.69	88.29	88.29	24.72	80.88	375	Circular	381.00	0.56%	136.88	1.20	74.89	56.00	59%	88.240	85.161	84.780	3.079	88.030	84.631	84.250	3.399
Curry St (Midway of James - Parliament St)	SAMH-10004	SAMH-10003		2539	0.00	3.00	26.47	61.07	61.07	1.50	29.69	88.29	88.29	24.72	80.88	375	Circular	381.00	0.28%	96.79	0.85	62.76	15.91	84%	88.030	84.631	84.250	3.399	87.680	84.791	84.410	2.889
Catchment Area #2 (Parliament St)	SAMHA-0052	SAMH-10003	691	691	0.00	3.32	7.96	8.24	8.24	1.50	4.00	25.93	25.93	7.26	19.22	300	Circular	304.80	0.98%	99.87	1.37	47.12	80.64	19%	88.840	85.885	85.580	2.955	87.650	85.425	85.120	2.225
Curry St (at Parliament St)	SAMH-10003	SAMH-10002		3230	0.00	2.93	32.88	69.31	69.31	1.50	33.69	114.22	114.22	31.98	98.55	375	Circular	381.00	0.40%	115.68	1.01	5.63	17.13	85%	87.680	84.821	84.440	2.859	87.450	84.691	84.310	2.759
Catchment Area #4 (Syphon)	SAMHA-0069	SAMH010004	1083	1083	0.00	3.22	12.11	15.93	15.93	1.50	7.74	108.05	108.05	30.25	50.11	300	Circular	304.80	1.05%	103.37	1.42	120.23	53.26	48%	88.937	86.252	85.947	2.685	88.030	85.145	84.840	2.885
Catchment Area #5 (Syphon)	SAMHA-16000	SAMH-10002	489	489	0.00	3.38	5.74	11.38	11.38	1.50	5.53	63.58	63.58	17.80	29.08	250	Circular	254.00	1.31%	71.01	1.40	173.70	41.93	41%	89.670	85.904	85.650	3.766	87.500	84.404	84.150	3.096
Curry St (Parliament St - Bridge St)	SAMH-10002	SAMH-10001		3719	0.00	2.89	37.31	80.69	80.69	1.50	39.22	363.08	363.08	101.66	178.19	600	Circular	609.60	0.96%	627.62	2.15	151.36	449.43	28%	87.500	84.970	84.360	2.530	87.390	83.180	82.570	4.210
Curry St (Bridge St - PS)	SAMH-10001	SAMH-10000		3719	0.00	2.89	37.31	80.69	80.69	1.50	39.22	363.08	363.08	101.66	178.19	600	Circular	609.60	3.14%	1135.08	3.89	48.60	956.88	16%	87.390	83.140	82.530	4.250	88.430	81.590	80.980	6.840

Design Parameters		
Residential Flows	300	L/Cap/Day
Infiltration Flows	0.28	L/s/ha
Correction Factor (Harmon's Formula)	0.8	-
Commercial (ICI) Peak Factor	1.5	-
Commercial (ICI) Average Flow	28000	L/ha/d
Manning Coefficient	0.013	

Pipes Directly on Curry Street or Syphon for Master Plan Assessment

Mid-term Conditions (5-10 years)

Street Name	MH No.		Residential					Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry				
	From	To	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	ICI Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Obvert	Invert	Cover
Catchment Area #3 (Syphon)	SAMH-13000	SAMH-10007	1333	1333	0.00	3.17	14.68	35.27	35.27	1.50	17.15	78.32	78.32	21.93	64.56	150	Circular	152.40										87.730	85.512	85.360	2.218	
Catchment Area #1 (Barnes St)	SAMHA-0018	SAMH-10007	1700	1700	0.00	3.11	18.37	25.80	25.80	1.50	12.54	92.52	92.52	25.91	56.81	300	Circular	304.80				37.85						87.805	85.605	85.300	2.200	
Barnes St - Lydia St	SAMH-10007	SAMH-10006	3033	3033	0.00	2.95	31.07	61.07	61.07	1.50	29.69	92.52	92.52	25.91	86.67	375	Circular	381.00	0.26%	93.27	0.82	37.85	6.60	93%	87.730	85.561	85.180	2.169	87.470	85.251	84.870	2.219
Lydia St - James St	SAMH-10006	SAMH-10005	3033	3033	0.00	2.95	31.07	61.07	61.07	1.50	29.69	92.52	92.52	25.91	86.67	375	Circular	381.00	0.20%	81.80	0.72	115.61	-4.87	106%	87.420	85.251	84.870	2.169	88.240	85.051	84.670	3.189
Curry (James St - midway to Parliament St)	SAMH-10005	SAMH-10004		3033	0.00	2.95	31.07	61.07	61.07	1.50	29.69	92.52	92.52	25.91	86.67	375	Circular	381.00	0.56%	136.88	1.20	74.89	50.21	63%	88.240	85.161	84.780	3.079	88.030	84.631	84.250	3.399
Curry St (Midway of James - Parliament St)	SAMH-10004	SAMH-10003		3033	0.00	2.95	31.07	61.07	61.07	1.50	29.69	92.52	92.52	25.91	86.67	375	Circular	381.00	0.28%	96.79	0.85	62.76	10.12	90%	88.030	84.631	84.250	3.399	87.680	84.791	84.410	2.889
Catchment Area #2 (Parliament St)	SAMHA-0052	SAMH-10003	691	691	0.00	3.32	7.96	8.24	8.24	1.50	4.00	25.93	25.93	7.26	19.22	300	Circular	304.80	0.98%	99.87	1.37	47.12	80.64	19%	88.840	85.885	85.580	2.955	87.650	85.425	85.120	2.225
Curry St (at Parliament St)	SAMH-10003	SAMH-10002		3724	0.00	2.89	37.35	69.31	69.31	1.50	33.69	118.45	118.45	33.17	104.21	375	Circular	381.00	0.40%	115.68	1.01	5.63	11.47	90%	87.680	84.821	84.440	2.859	87.450	84.691	84.310	2.759
Catchment Area #4 (Syphon)	SAMHA-0069	SAMH010004	1249	1249	0.00	3.19	13.83	15.93	15.93	1.50	7.74	118.60	118.60	33.21	54.78	300	Circular	304.80	1.05%	103.37	1.42	120.23	48.60	53%	88.937	86.252	85.947	2.685	88.030	85.145	84.840	2.885
Catchment Area #5 (Syphon)	SAMHA-16000	SAMH-10002	836	836	0.00	3.28	9.52	15.95	15.95	1.50	7.75	73.35	73.35	20.54	37.81	250	Circular	254.00	1.31%	71.01	1.40	173.70	33.20	53%	89.670	85.904	85.650	3.766	87.500	84.404	84.150	3.096
Curry St (Parliament St - Bridge St)	SAMH-10002	SAMH-10001		4560	0.00	2.83	44.73	85.26	85.26	1.50	41.44	388.72	388.72	108.84	195.02	600	Circular	609.60	0.96%	627.62	2.15	151.36	432.60	31%	87.500	84.970	84.360	2.530	87.390	83.180	82.570	4.210
Curry St (Bridge St - PS)	SAMH-10001	SAMH-10000		4560	0.00	2.83	44.73	85.26	85.26	1.50	41.44	388.72	388.72	108.84	195.02	600	Circular	609.60	3.14%	1135.08	3.89	48.60	940.06	17%	87.390	83.140	82.530	4.250	88.430	81.590	80.980	6.840

Pipes Directly on Curry Street or Syphon for Master Plan Assesment

Design Parameters		
Residential Flows	300	L/Cap/Day
Infiltration Flows	0.28	L/s/ha
Correction Factor (Harmon's Formula)	0.8	-
Commercial (ICI) Peak Factor	1.5	-
Commercial (ICI) Average Flow	28000	L/ha/d
Manning Coefficient	0.013	

Long-Term Conditions (10-20 years)

Street Name	MH No.		Residential					Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry				
	From	To	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	ICI Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Obvert	Invert	Cover
Catchment Area #3 (Syphon)	SAMH-13000	SAMH-10007	1333	1333	0.00	3.17	14.68	35.76	35.76	1.50	17.38	78.81	78.81	22.07	64.94	150	Circular	152.40										87.730	85.512	85.360	2.218	
Catchment Area #1 (Barnes St)	SAMHA-0018	SAMH-10007	1700	1700	0.00	3.11	18.37	27.29	27.29	1.50	13.27	90.40	90.40	25.31	56.95	300	Circular	304.80				37.85						87.805	85.605	85.300	2.200	
Barnes St - Lydia St	SAMH-10007	SAMH-10006	3033	0.00	2.95	31.07	63.05	1.50	30.65		90.40	25.31	87.04		375	Circular	381.00	0.26%	93.27	0.82	37.85	6.23	93%	87.730	85.561	85.180	2.169	87.470	85.251	84.870	2.219	
Lydia St - James St	SAMH-10006	SAMH-10005	3033	0.00	2.95	31.07	63.05	1.50	30.65		90.40	25.31	87.04		375	Circular	381.00	0.20%	81.80	0.72	115.61	-5.24	106%	87.420	85.251	84.870	2.169	88.240	85.051	84.670	3.189	
Curry (James St - midway to Parliament St)	SAMH-10005	SAMH-10004	3033	0.00	2.95	31.07	63.05	1.50	30.65		90.40	25.31	87.04		375	Circular	381.00	0.56%	136.88	1.20	74.89	49.84	64%	88.240	85.161	84.780	3.079	88.030	84.631	84.250	3.399	
Curry St (Midway of James - Parliament St)	SAMH-10004	SAMH-10003	3033	0.00	2.95	31.07	63.05	1.50	30.65		90.40	25.31	87.04		375	Circular	381.00	0.28%	96.79	0.85	62.76	9.75	90%	88.030	84.631	84.250	3.399	87.680	84.791	84.410	2.889	
Catchment Area #2 (Parliament St)	SAMHA-0052	SAMH-10003	776	776	0.00	3.29	8.88	8.24	8.24	1.50	4.00	27.00	27.00	7.56	20.44	300	Circular	304.80	0.98%	99.87	1.37	47.12	79.43	20%	88.840	85.885	85.580	2.955	87.650	85.425	85.120	2.225
Curry St (at Parliament St)	SAMH-10003	SAMH-10002	3809	0.00	2.88	38.11	71.29	1.50	34.65		117.40	32.87	105.64		375	Circular	381.00	0.40%	115.68	1.01	5.63	10.04	91%	87.680	84.821	84.440	2.859	87.450	84.691	84.310	2.759	
Catchment Area #4 (Syphon)	SAMHA-0069	SAMH010004	1249	1249	0.00	3.19	13.83	15.93	15.93	1.50	7.74	109.60	109.60	30.69	52.26	300	Circular	304.80	1.05%	103.37	1.42	120.23	51.12	51%	88.937	86.252	85.947	2.685	88.030	85.145	84.840	2.885
Catchment Area #5 (Syphon)	SAMHA-16000	SAMH-10002	2185	2185	0.00	3.04	23.10	11.38	11.38	1.50	5.53	86.23	86.23	24.14	52.77	250	Circular	254.00	1.31%	71.01	1.40	173.70	18.23	74%	89.670	85.904	85.650	3.766	87.500	84.404	84.150	3.096
Curry St (Parliament St - Bridge St)	SAMH-10002	SAMH-10001	5994	0.00	2.74	56.96	82.67	1.50	40.19		392.04	109.77	206.92		600	Circular	609.60	0.96%	627.62	2.15	151.36	420.70	33%	87.500	84.970	84.360	2.530	87.390	83.180	82.570	4.210	
Curry St (Bridge St - PS)	SAMH-10001	SAMH-10000	5994	0.00	2.74	56.96	82.67	1.50	40.19		392.04	109.77	206.92		600	Circular	609.60	3.14%	1135.08	3.89	48.60	928.16	18%	87.390	83.140	82.530	4.250	88.430	81.590	80.980	6.840	

Design Parameters		
Residential Flows	300	L/Cap/Day
Infiltration Flows	0.28	L/s/ha
Correction Factor (Harmon's Formula)	0.8	-
Commercial (ICI) Peak Factor	1.5	-
Commercial (ICI) Average Flow	28000	L/ha/d
Manning Coefficient	0.013	

Pipes Directly on Curry Street or Syphon for Master Plan Assesment

Build-Out Conditions (20+ years)

Street Name	MH No.		Residential					Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry				
	From	To	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	ICI Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Obvert	Invert	Cover
Catchment Area #3 (Syphon)	SAMH-13000	SAMH-10007	1333	1333	0.00	3.17	14.68	35.76	35.76	1.50	17.38	78.81	78.81	22.07	64.94	150	Circular	152.40										87.730	85.512	85.360	2.218	
Catchment Area #1 (Barnes St)	SAMHA-0018	SAMH-10007	1700	1700	0.00	3.11	18.37	27.29	27.29	1.50	13.27	90.40	90.40	25.31	56.95	300	Circular	304.80				37.85						87.805	85.605	85.300	2.200	
Barnes St - Lydia St	SAMH-10007	SAMH-10006	3033	0.00	2.95	31.07	31.07	63.05	63.05	1.50	30.65	90.40	90.40	25.31	87.04	375	Circular	381.00	0.26%	93.27	0.82	37.85	6.23	93%	87.730	85.561	85.180	2.169	87.470	85.251	84.870	2.219
Lydia St - James St	SAMH-10006	SAMH-10005	3033	0.00	2.95	31.07	31.07	63.05	63.05	1.50	30.65	90.40	90.40	25.31	87.04	375	Circular	381.00	0.20%	81.80	0.72	115.61	-5.24	106%	87.420	85.251	84.870	2.169	88.240	85.051	84.670	3.189
Curry (James St - midway to Parliament St)	SAMH-10005	SAMH-10004		3033	0.00	2.95	31.07		63.05	1.50	30.65		90.40	25.31	87.04	375	Circular	381.00	0.56%	136.88	1.20	74.89	49.84	64%	88.240	85.161	84.780	3.079	88.030	84.631	84.250	3.399
Curry St (Midway of James - Parliament St)	SAMH-10004	SAMH-10003		3033	0.00	2.95	31.07		63.05	1.50	30.65		90.40	25.31	87.04	375	Circular	381.00	0.28%	96.79	0.85	62.76	9.75	90%	88.030	84.631	84.250	3.399	87.680	84.791	84.410	2.889
Catchment Area #2 (Parliament St)	SAMHA-0052	SAMH-10003	776	776	0.00	3.29	8.88	8.24	8.24	1.50	4.00	27.00	27.00	7.56	20.44	300	Circular	304.80	0.98%	99.87	1.37	47.12	79.43	20%	88.840	85.885	85.580	2.955	87.650	85.425	85.120	2.225
Curry St (at Parliament St)	SAMH-10003	SAMH-10002		3809	0.00	2.88	38.11		71.29	1.50	34.65		117.40	32.87	105.64	375	Circular	381.00	0.40%	115.68	1.01	5.63	10.04	91%	87.680	84.821	84.440	2.859	87.450	84.691	84.310	2.759
Catchment Area #4 (Syphon)	SAMHA-0069	SAMH010004	1394	1394	0.00	3.16	15.30	15.93	15.93	1.50	7.74	118.60	118.60	33.21	56.25	300	Circular	304.80	1.05%	103.37	1.42	120.23	47.12	54%	88.937	86.252	85.947	2.685	88.030	85.145	84.840	2.885
Catchment Area #5 (Syphon)	SAMHA-16000	SAMH-10002	2415	2415	0.00	3.02	25.29	11.38	11.38	1.50	5.53	90.93	90.93	25.46	56.29	250	Circular	254.00	1.31%	71.01	1.40	173.70	14.72	79%	89.670	85.904	85.650	3.766	87.500	84.404	84.150	3.096
Curry St (Parliament St - Bridge St)	SAMH-10002	SAMH-10001		6224	0.00	2.72	58.88		82.67	1.50	40.19		405.74	113.61	212.67	600	Circular	609.60	0.96%	627.62	2.15	151.36	414.95	34%	87.500	84.970	84.360	2.530	87.390	83.180	82.570	4.210
Curry St (Bridge St - PS)	SAMH-10001	SAMH-10000		6224	0.00	2.72	58.88		82.67	1.50	40.19		405.74	113.61	212.67	600	Circular	609.60	3.14%	1135.08	3.89	48.60	922.41	19%	87.390	83.140	82.530	4.250	88.430	81.590	80.980	6.840

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