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Revision: After 30-Day Review Period
July 8, 2024

Phase 2 Report (Final After 30-Day Review)

Casselman Water and Wastewater Infrastructure Master Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through service and commitment

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1.0 Introduction

1.1 Background

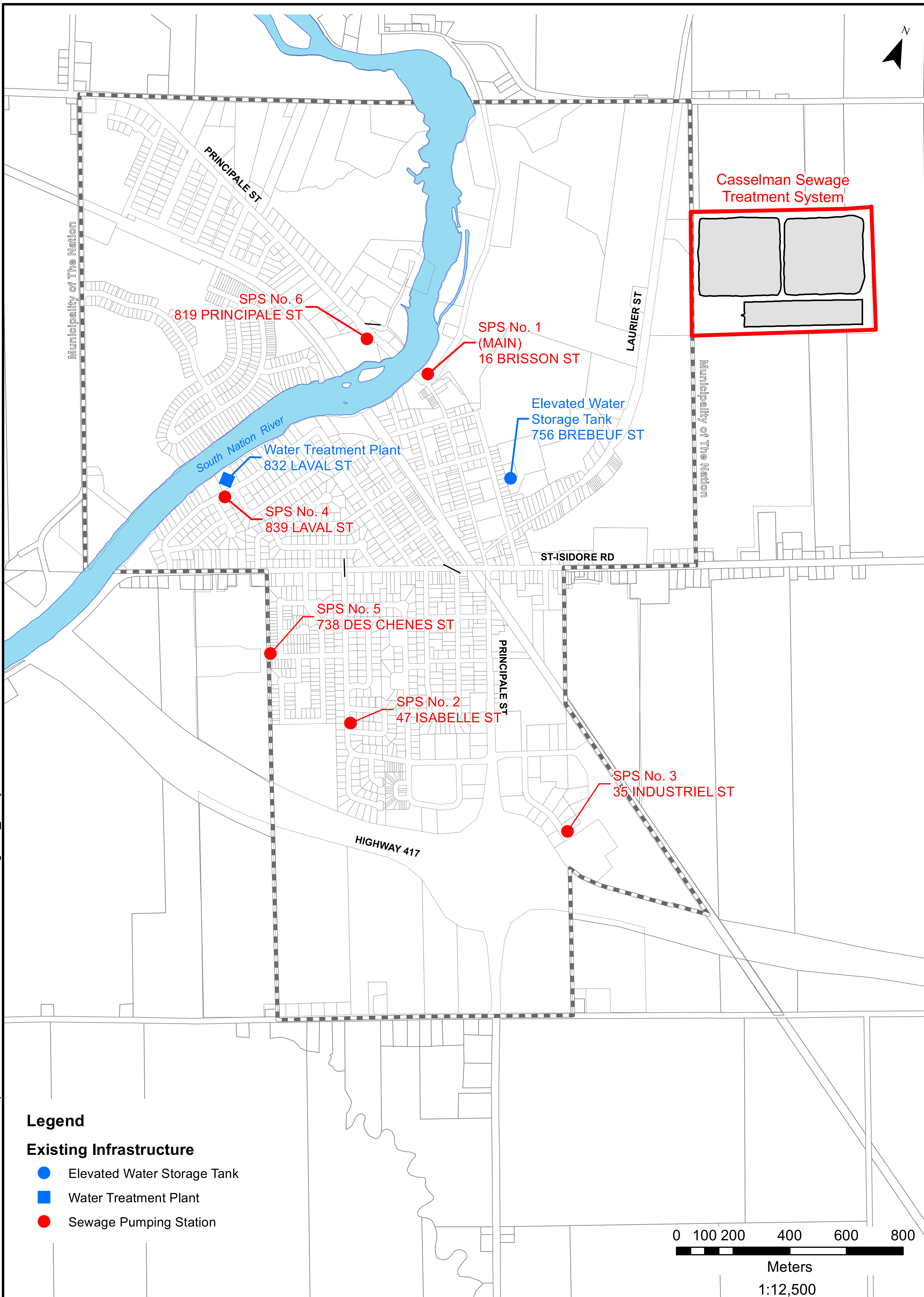
The Municipality of Casselman (the Municipality) initiated a Class Environmental Assessment (Class EA) Study to address treatment, capacity, and condition limitations of its water treatment plant (WTP), elevated water storage tank, water distribution system, wastewater conveyance system, sewage pumping stations and sewage treatment system through the development of a Water and Wastewater Infrastructure Master Plan. J.L. Richards & Associates Limited (JLR) was retained by the Municipality in 2021 to assist in the preparation of the Master Plan. This Master Plan is being completed in accordance with the Municipal Engineers Association (MEA) Class EA Approach 1 master planning process. The ultimate objective of the Master Plan is to develop a strategy to accommodate future growth within the Municipality for the next 25 years that can be implemented in a prioritized fashion to improve the overall performance and reliability of the water and wastewater system.

The Municipality is located along Highway 417 on the South Nation River and borders the Municipality of the Nation. The Municipality is serviced by a water distribution system, consisting of the water treatment plant (WTP), elevated water storage tank, and over 22 km of watermains. The Casselman WTP has a rated capacity of 3,182 m^3/day, is owned by the Municipality and operated by the Ontario Clean Water Agency (OCWA). This facility is operated under the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water License Number 173-101 and Drinking Water Works Permit No. 173-201. It provides conventional treatment through an Actiflo ® treatment system, dual media filtration, and disinfection. Additionally, raw water is treated with potassium permanganate during the summer months when influent manganese concentrations are elevated.

The Municipality is serviced by a wastewater collection system consisting of sewage treatment system (STS), six (6) sewage pumping stations (SPS), and over 30 km of sanitary sewers. The Casselman STS has a rated capacity of 2,110 m^3/day and consists of two (2) facultative lagoon cells (Cells ‘A’ and ‘B’), an aerated lagoon cell (Cell ‘C’), an aeration system, a phosphorous removal system, a wet well and pumping system to convey lagoon effluent to two Moving Bed Biofilm Reactor (MBBR) process trains, a disc filter, and an effluent flow meter. This facility is operated under the MECP Environmental Compliance Approval (ECA) No. 8160-BAHPRF dated April 29, 2019.

Refer to Figure 1 for a location plan and overview of the water and wastewater infrastructure.

The main purpose of this Phase 2 Report is to summarize the findings from the second phase of the Master Plan process. The Phase 2 Report documents the work completed following the completion of the Phase 1 Report, which includes identification of possible servicing strategies to address the deficiencies, growth projections and the Problem and Opportunity statement identified in Phase 1 of the Master Plan, evaluation of the various servicing alternatives, and recommendation of preferred servicing strategies and associated costs and timing.



PROJECT:

MUNICIPALITY OF CASSELMAN
WATER AND WASTEWATER MASTERPLAN
MUNICIPALITY OF CASSELMAN, ONTARIO

DRAWING:

STUDY AREA AND OVERVIEW OF KEY INFRASTRUCTURE

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1.2 Phase 1 Problem and Opportunity Statement

The Master Plan Phase 1 report was finalized on October 12, 2023, and posted on the Municipality's website (https://en.casselman.ca/services/water_and_sewer). Based on the work completed in Phase 1 of the Master Plan process, the following Problem and Opportunity Statement was developed:

"The Municipality of Casselman is serviced by communal water and wastewater systems consisting of a water treatment plant, an elevated water storage tank, over 22 km of watermains, a sewage treatment system, six sewage pumping stations, and over 30 km of sanitary sewers. In recent years, the South Nation River, the source water for the Municipality, has presented challenges with respect to raw water quality and quantity. Moreover, the Municipality has been experiencing significant development pressures at present and within the Master Plan timeline. 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 short, mid and long-term planning horizons."

1.3 Phase 1 Deficiencies

As established in Phase 1 of the Master Plan, population and flow projections (residential and industrial, commercial, and institutional (ICI)) have been categorized for the near term (0-5 years; 2023 to 2027), medium term (5-10 years; 2028 to 2032), and long term (10-25 years; 2033 to 2042) planning horizons.

To elaborate on the Problem and Opportunity Statement, more specifically, the following infrastructure components have been identified in Phase 1 as needing upgrades, based on the future servicing requirements for the various timeframes up to 25 years. Refer to Phase 1 Report for further information on the deficiencies.

Table 1: Water and Wastewater Infrastructure Deficiencies Identified in Phase 1

Infrastructure	Deficiency/Challenges Identified in Phase 1
Water Supply and Treatment	1. Water supply quantity and quality concerns with South Nation River. 2. 80% of the WTP rated capacity will be reached sometime between 2023-2028, 90% WTP rated capacity will be reached sometime between 2024-2032, and the rated capacity of the WTP will be reached sometime between 2025-2035. 3. WTP condition upgrades required over the next 5 to 25 years to rehabilitate the various equipment and elements of the facility.
Water Storage	4. The elevated storage tank capacity will be insufficient for water demands beyond 5 years. 5. The elevated storage tank requires condition-related upgrades.
Water Distribution System	6. Under existing conditions, all areas in Casselman meet the required system pressures; as well as the required fire flows except at the following three (3) locations: a dead end watermain on Laurier Street, northwest area south of Principale Street, Riviere Nation North Road.

Infrastructure	Deficiency/Challenges Identified in Phase 1
Conveyance System	7. Under existing conditions, there are 11 sewer segments that are >90% capacity of the peak design flow. 8 out of 11 sewer segments are insufficient to convey peak flow. 6 segments in the sewer system have negative slope.
Sewage Pumping Stations (SPS)	8. Under existing conditions, all SPSs are operating less than their firm capacity. SPS No. 1 (Main SPS that feeds into the STS) receives flow greater than its firm capacity but below its peak capacity. 9. Each SPS requires minor condition-related upgrades within the Master Plan timeframe.
Sewage Treatment System (STS)	10. 80% of the STS rated capacity will be reached sometime between 2023-2028, 90% STS rated capacity will be reached sometime between 2025-2033, and the rated capacity of the STS will be reached sometime between 2026-2037.

1.4 Phase 2 Objectives

The Casselman Water and Wastewater Infrastructure Master Plan has followed Approach No. 1, under the framework of the Municipal Class Environmental Assessment (Class EA) Process, which involves the preparation of a Report at the conclusion of Phases 1 and 2. For reference, the Class EA and Master Planning process have been fully detailed in the Phase 1 Report.

The objective of this Phase 2 report is to identify and evaluate alternative solutions to determine a preferred solution to the Problem and Opportunity Statement identified in Phase 1 (and presented in Section 1.2). This Report also outlines the evaluation methodology used to evaluate the alternatives and identifies their potential impacts and mitigation measures. Options considered include new construction, potential retrofits, and/or upgrades to optimize the treatment and efficiency of the existing water and wastewater infrastructure, in order to accommodate 25-year growth within the Municipality.

More specifically, the objectives of this Report are:

- To model future water distribution and wastewater conveyance systems for the Master Planning period of 25-years, and establish required water distribution, wastewater conveyance and SPS upgrades.

- To present an evaluation matrix with criterion by which servicing alternatives are evaluated against the natural, social/cultural, technical and financial considerations.

- To identify and evaluate alternative solutions to address treatment, capacity and storage issues associated with the linear infrastructure, WTP, water storage, STS and six SPS's within the Municipality, as established in Phase 1.

- To recommend a list of preferred alternatives, their proposed timelines, and associated costs.

- To provide mitigation measures and identify potential impacts associated with preferred alternatives, as well as any required permits or approvals.

- To conduct a council meeting and public information centre (PIC) to present proposed alternatives and recommended preferred solutions.

- To update and finalize the Master Plan Report based on comments received throughout the process and place on record for a 30-day review period.

It should be noted that the objective of a Master Planning exercise is to determine an overall “generalized solution”. As such, more detailed investigations at a project-specific level will be required in order to fulfill the Class EA process required for specific Schedule ‘B’ and ‘C’ projects identified as a result of this Master Plan.

2.0 Identification and Evaluation of Servicing Strategies

2.1 Evaluation Methodology

In order to facilitate the evaluation and selection of the preferred solutions during Phase 2, the evaluation process consisted of a review of the alternatives in consideration of the criteria described in Table 2.

Table 2: Summary of Evaluation Criteria

Criteria	Description
Natural Environment Considerations	Natural features, natural heritage areas, areas of natural and significant interest, designated natural areas, watercourses and aquatic habitat.
Social and Cultural Environment Considerations	Proximity of facilities to residential, commercial and institutions, archaeological resources and areas of archaeological potential, known and potential built heritage resources and cultural heritage landscapes.
Technical Feasibility	Constructability, maintaining or enhancing water/wastewater treatment, reliability and security of distribution/conveyance system, ease of connection to existing infrastructure and operating and maintenance requirements, addresses aging infrastructure, expandability.
Financial Considerations	Capital costs, Operation and Maintenance costs.

Each criterion was assigned a colour to reflect its level of impact relative to other criteria. The relative level of impact for each criterion for each potential solution was then assessed based on the colour weighting system summarized in Table 3. The option that has the least negative impact (or has the strongest positive impact) was recommended as the preferred solution. The four (4) major criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the Master Plan stage.

Table 3: Detailed Evaluation Impact Level and Colouring System

Impact Level	Colour	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

2.2 Water Supply and Treatment

There are a number of options to achieve the required future water demand to support the 25-year growth (and beyond) within the Municipality. The following alternatives have been identified to address the deficiencies and challenges associated with the existing water supply and treatment.

- Alternative 1: Status Quo – Maintain Water Supply from South Nation River
- Alternative 2: Increase Water Supply from South Nation River
- Alternative 3: Maintain Water Supply from South Nation River, Supplement Water Supply from Another Source
- Alternative 4: Discontinue Water Supply from South Nation River and Obtain Water from Other Sources

2.2.1 Alternative 1: Status Quo – Maintain Water Supply from South Nation River

The “Status Quo” alternative represents what would likely occur if the raw water intake quantity remained the same for the future scenarios, i.e., no increase to water supply and water treatment. The “status quo” option is always included in the evaluation as the basis for comparison.

This alternative is not feasible and will not be carried forward into the detailed evaluation. As presented in Phase 1, the increase in water demand brought by growth within the Municipality requires doubling the current maximum day demand rated capacity of the WTP within the next 25 years.

2.2.2 Alternative 2: Increase Water Supply from South Nation River

The South Nation River has historically experienced water quality challenges. As described in the Phase 1 report, as recently as June/July 2023, the Municipality’s water system experienced an elevated manganese event during which the drinking water turned brown. In addition, the Municipality currently has issues meeting turbidity and disinfection-by product (THM) guidelines, which are both likely linked to high influent organic loading from the South Nation River. When this alternative was initially discussed with the Municipality, they indicated that this is a less preferred alternative due to potential water quality concerns. There are also concerns surrounding water quantity in the South Nation River as the projected maximum day demand in the Municipality is set to double.

JLR in partnership with GEMTEC Consulting Engineering and Scientists Limited (GEMTEC) conducted a preliminary feasibility analysis (see Appendix A) to investigate the feasibility for the continued use of the South Nation River as Casselman’s drinking water source to support increasing water demands. Figure 2 shows an overview of the South Nation River within

Casselman as well as the location of key infrastructure along this section of the river: the Casselman WTP, the Casselman Weir, and the Ontario Hydroelectric dam. During low flow conditions, typically experienced from August to October, the Casselman Weir is intended to impound water to supplement streamflow.

Based on a review of available information, it was determined that, <u>theoretically</u>, the South Nation River would be able to support Casselman's future average day demand with the support of the Casselman Weir during low flow conditions. During a rare 200-year return period, 15-day low-flow conditions event and at the long-term future average day demand, it was estimated that the river drawdown would be a maximum of 0.16 m, a minimal value in comparison to the depth of the Casselman WTP intake, located at 7 m below the water surface. Additional studies were recommended to provide a better understanding of the storage volumes upstream of the Casselman Weir and water quality risks associated with sourcing impounded water.

Note that while the Feasibility Study demonstrated that the South Nation River has enough water to sustain the projected flow demand in Casselman for the next 25-years, climate change may threaten water quantity and thus exacerbate the water quality issues in the South Nation River. As noted by GEMTEC the South Nation River experiences low flow periods from August to October. Low to no river flow necessitating the use of impounded, stagnant water will worsen raw water quality (by lack of dilution) and intensify concerns regarding manganese and organics (i.e., disinfection byproduct formation) the Municipality currently experiences with the South Nation River. Progressive climate change resulting in hotter, dryer summers is anticipated to exacerbate water quantity and thus water quality issues in the South Nation River.

Furthermore, the expandability of the current WTP rated capacity to meet future demands is also a concern. Methods by which this may be accomplished could include additional treatment units (Actiflo® and dual media filtration) to the existing site, retrofitting the existing system with newer technology to address required upgrades and expand treatment capacity (such as dissolved air flotation, membranes), or siting and constructing a new WTP along the South Nation River on vacant lands to serve expanded service areas and future growth (the Municipality would need to purchase lands).

The cost to implement WTP retrofits/upgrades would remain significant and ultimately would not address the water quality issues in the South Nation River and potential for climate change impact to low river flows.

2.2.3 Alternative 3: Maintain Water Supply from South Nation River and Supplement from Other Sources

As described above for Alternative 2, there are long-term risks related to the South Nation River's ability to provide reliable water quality and quantity to sustain the growth anticipated in the Municipality. Therefore, an alternative of supplementing future water demand with other water sources are being proposed. Supplemental water supply can include groundwater produced in the vicinity of the Municipality; or treated water from a neighboring Municipality. Risks and benefits associated with each of these potential supplemental water supplies are discussed in Alternative 4. The current alternative is based on maintaining current water intake from South Nation River and existing WTP up to the rated capacity of 3,182 m^3/day. The water demand beyond this capacity will be supplemented by a different water source.

Figure 2: Overview of South Nation River within Casselman (GEMTEC, 2023)

This alternative involves dividing and/or blending treated water from a different source. When this alternative was initially discussed with the Municipality, they indicated that this is a less preferred alternative due to potential water quality concerns. Dividing and/or blending the Municipality by water supply may cause upset among current and future residents and developers. For instance, a subset of residents or businesses receiving treated water from the South Nation River as the source water may experience water quantity and quality threats that a subset of residents receiving water from another source may not.

This also presents challenges from a technical standpoint in terms of dividing and/or blending water services amongst the Municipality. For example, existing water distribution system will likely need to be altered and future services may require additional water storage, pumping, and/or chemical treatment depending on the source. This makes maintaining consistent water quality for all users challenging. Moreover, there are potential increased costs associated with operation and maintenance of two different water treatment systems within the Municipality.

2.2.4 Alternative 4: Discontinue Water Supply from the South Nation River and Obtain Water from Other Sources

Alternative 4 presents an option for the Municipality to discontinue use of the South Nation River as a water source, due to the risks associated with its water quality and quantity to sustain the growth anticipated in the Municipality.

Other water sources presented herein include groundwater in the vicinity of the Municipality and treated water from a neighboring Municipality.

2.2.4.1 Alternative 4a: Obtain Water from Groundwater In the Vicinity of the Municipality of Casselman

JLR in partnership with GEMTEC completed a Water Supply Feasibility Study (see Appendix A) to assess the feasibility of a new groundwater well(s) to supplement the short-, mid- and long-term development and water demand anticipated in the Master Plan timeframe.

A variety of known water sources and eskers within proximity to the Municipality were assessed as part of a desktop review (see Figure 3). Based on available information, the Crysler-Finch esker was identified as the most likely aquifer capable of supplying groundwater to the Municipality (see Figure 4). However, given the lack of available information on the characteristics of the aquifer, including the depth, extent, water quantity, and quality, intrusive studies would be required to confirm the overall feasibility to supply Casselman's water demand. The timeline for the completion of a preliminary hydrogeological assessment of the Crysler-Finch esker is expected to be a multi-year process to allow for test well siting and drilling, hydraulic testing, preliminary wellhead delineation studies, and regulatory approval. GEMTEC indicated that the Crysler-Finch esker is susceptible to influence from surface water and numerous exceedances of health-based standards (nitrate, boron, total coliform, and sodium), aesthetic objectives (sodium, sulphide, chloride, DOC, iron, manganese, colour, methane, TDS, turbidity) and operational standards (alkalinity, pH, organic nitrogen, hardness) and would require consideration during well construction, well siting, and design of new treatment systems. Additionally, no part of the esker is located within the municipal boundaries of Casselman, necessitating land-use arrangements or land procurement of a potential well field. Moreover, changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system.

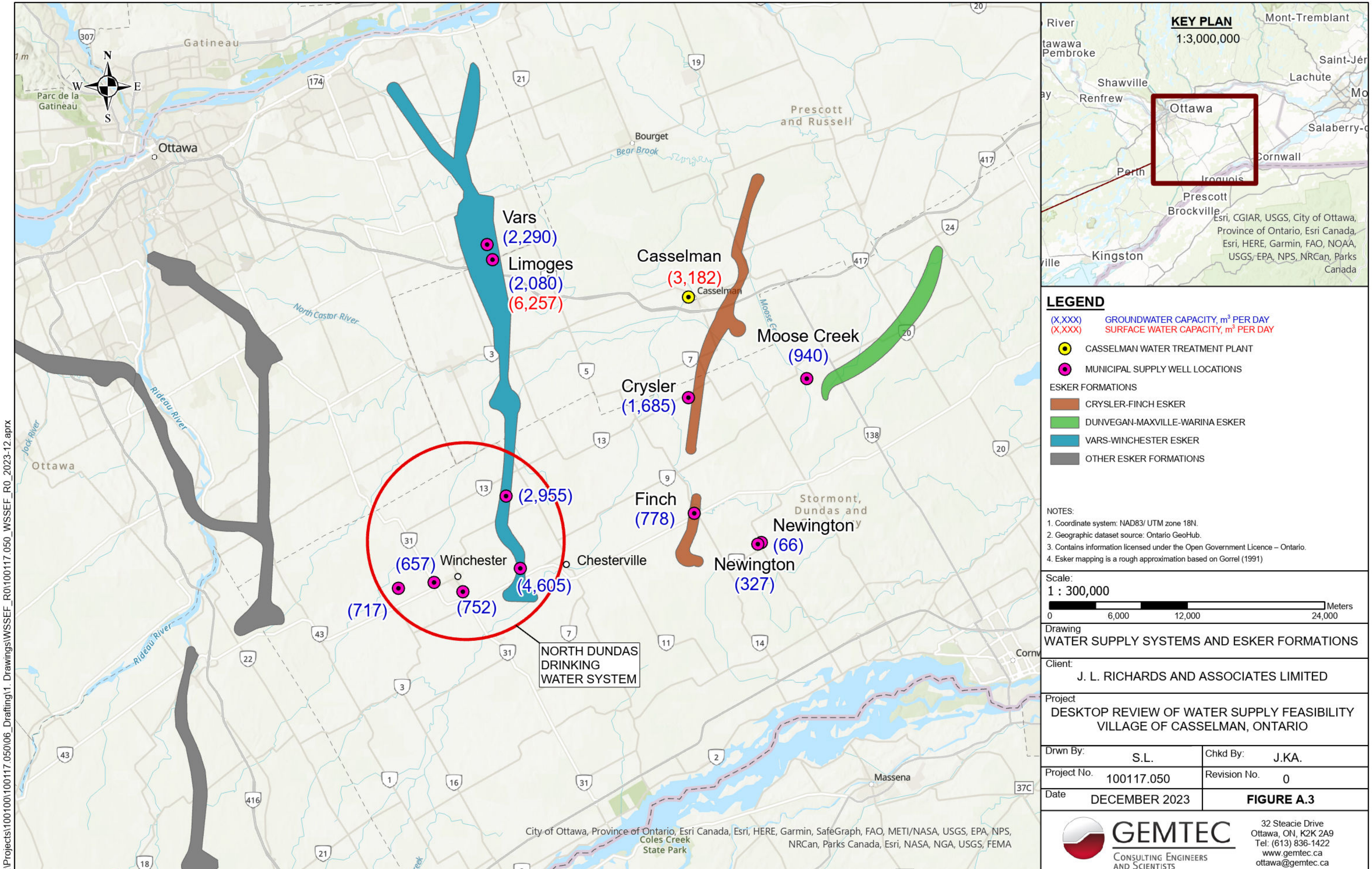
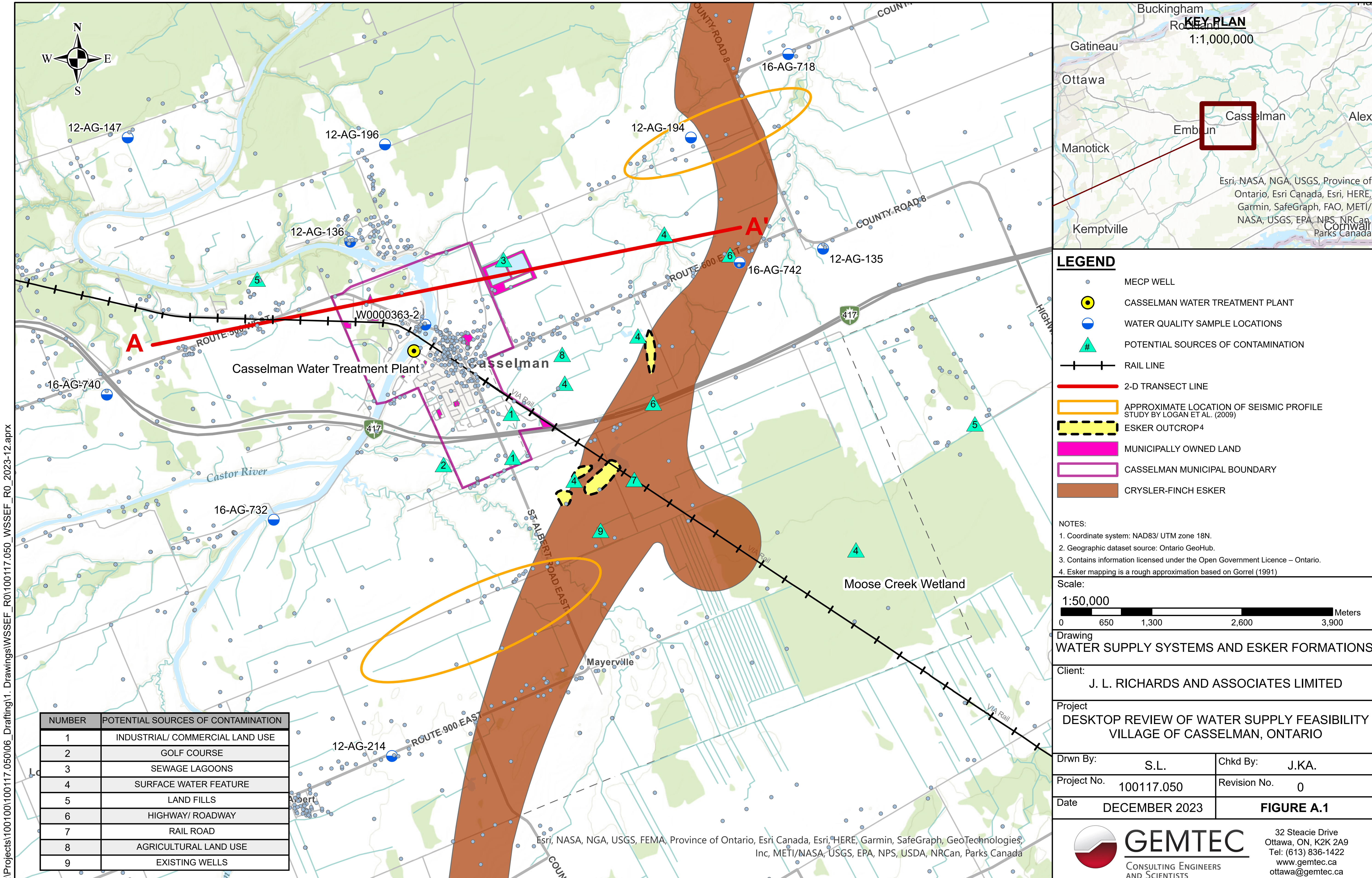


Figure 3: Water Supply Systems and Esker Formations (GEMTEC, 2023)



NUMBER	POTENTIAL SOURCES OF CONTAMINATION
1	INDUSTRIAL/ COMMERCIAL LAND USE
2	GOLF COURSE
3	SEWAGE LAGOONS
4	SURFACE WATER FEATURE
5	LAND FILLS
6	HIGHWAY/ ROADWAY
7	RAIL ROAD
8	AGRICULTURAL LAND USE
9	EXISTING WELLS

Figure 4: Crysler-Finch Esker Formation (GEMTEC, 2023)

2.2.4.2 Alternative 4b: Obtain Water from the City of Clarence-Rockland

The City of Clarence-Rockland is one of the adjacent regions to the Municipality of Casselman that treats water sourced from the Ottawa River: a reliable source water in terms of quantity and quality. The City of Clarence-Rockland currently has a service agreement with the Nation Municipality for the Town of Limoges where stored, treated water in the Village of Cheney (originating from the City's WTP) is pumped to and stored in Limoges via a single transmission water main (approximately 9.7 km long, 400 mm HDPE).

A meeting was held on May 31, 2023 with members of the Municipality of Casselman, City of Clarence-Rockland, the Nation Municipality (within which the Town of Limoges resides), and JLR to discuss the feasibility of supplying water to the Casselman from the City of Clarence-Rockland. Another meeting was held on November 8, 2023 to discuss the Casselman Master Plan findings and required process for the City of Clarence-Rockland to provide treated water to Casselman. Refer to Appendix B for meeting minutes.

Clarence-Rockland stated that the connection between Limoges to Cheney took 7 years from planning to completion; therefore, they noted that a reasonable connection date to Casselman would be by 2030/2031 based on Clarence-Rocklands' estimated timeline of 3-year Class EA/Design and 3-year construction period. Clarence-Rockland confirmed that there is ample space at the WTP site to expand and to accommodate Casselman's demand. Clarence-Rockland indicated that they would require commitment from Casselman regarding connection by March 2024.

In terms of pipe routing options, Clarence-Rockland specified that a direct connection is required to connect to the Municipality, i.e., no shared watermain between the Nation and Casselman.

Based on the information collected during these meetings, JLR completed a Piped Water Supply Feasibility Study (see Appendix B) to investigate the viability of outsourcing Casselman's total future water demand. Two connection points within the City of Clarence-Rockland were identified at Cheney and at Bourget as potential options. A connection to the Cheney Water Tower proved to be the favorable option given its shorter distance. High-level hydraulic analysis was completed to assess the preferred option and determined that a watermain 22 km long with a minimum diameter of 457 mm would satisfy Casselman's water requirements for the long-term growth. Further studies should be conducted once more information becomes available from the Clarence-Rockland water distribution system to provide more accurate watermain alignment and hydraulic modelling parameters.

The Municipality of Casselman will need to complete a Schedule B Class EA for switching water supply to Clarence-Rockland.

2.2.5 Evaluation Matrix

Table 4 provides a descriptive summary and evaluation of each alternative listed above.

Table 4: Water Supply and Treatment Evaluation Matrix

	Alternative 2 – Increase Water Supply South Nation River	Alternative 3 – Maintain Water Supply South Nation River and Supplement from Another Water Source	Alternative 4a – Discontinue Water Supply from South Nation River and Obtain Water Supply from Groundwater In the Vicinity of the Municipality	Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water Supply from the City of Clarence-Rockland
Natural Environment	• The South Nation River has limited flow particularly in the summer period. • Withdrawing additional water from the river will reduce river level upstream of the dam, therefore causing negative effect on the aquatic environment.	• Maintaining the South Nation River as a water source does not provide positive effect on the aquatic environment. • Climate change impact on small stream like the South Nation River will result in significant reduction in river flow and worsening quality in the future.	• Discontinuing water intake from South Nation River will have positive effect on the aquatic environment upstream and downstream. • Withdrawing groundwater for municipal water supply will limit groundwater availability in this area.	• Discontinuing water intake from South Nation River will have positive effect on the aquatic environment upstream and downstream. • Constructing a long feeder main from Clarence-Rockland will have negative impact on the terrestrial environment during construction. • Impact to Ottawa River aquatic environment is expected to be minimal as Ottawa River is expected to have the river flow needed for Casselman's demand.
Evaluation	Least Preferred	Less Preferred	Less Preferred	Preferred
Social and Cultural Environment	• Negative social/political implications as the South Nation River generally has challenges providing adequate water quality (i.e., manganese/iron and elevated disinfection by-product formation) to support growth. • Extreme weather events have proven to cause treatment challenges which resulted in negative impact on public health and safety. • Maintaining the South Nation River as the sole water source for the Municipality will result in continued and worsening water quantity/quality issues. • Climate change will worsen the extreme weather events which may impact surface water supplies in the future. • Additional water taking activities will also have negative effects on the downstream water availability and hydro dam operation. • South Nation River water quantity may restrict future development due to limited river flow. • Existing siting and infrastructure proposed with this alternative; therefore, no cultural heritage resources will be impacted.	• Supplementing future water demand with other water sources (ex. groundwater in the vicinity of the Municipality or treated water from a neighboring Municipality) will help secure future water demands for future growth. • Potential for inconsistent water quantity/quality due to varied source waters. • Blending water from different sources can have operational challenges and will be difficult to monitor and manage. • Groundwater in this area is vulnerable to surface influences and generally contains manganese and iron which is similar to that from the South Nation River. Concerns with respect to water quality are still present. However, issues with organics/ disinfection by-product formation potential are typically low for groundwater sources. • South Nation River, combined with another water source, will be able to support the future development in the community. • Using the existing WTP and obtaining water from a neighboring municipality where it would be anticipated that the transmission watermain would be construction within existing rights-of-ways would not impact cultural heritage resources. For establishing new wells, cultural heritage resource screening required and potential impacts on undisturbed sites.	• Feasibility Study/Hydrogeological Study required to determine well field location and potential to provide adequate water supply to the Municipality's 25-year needs. This will be a multi-year study. • The establishment of new wellhead protection areas will restrict land use planning and increase risk management/ monitoring for existing prescribed drinking water threats activities. • Groundwater in this area is vulnerable to surface influences and generally contains manganese and iron which is similar to that from the South Nation River. Concerns with respect to water quality is still present. However, issues with organics/ disinfection by-product formation potential are typically low for groundwater sources. • The groundwater supply in this area is vulnerable to surface water contamination and enhanced level of treatment is expected. • Land acquisition will be required to purchase land from the Nation Municipality for the new well(s) and treatment facility. • Using the existing WTP would not impact cultural heritage resources. For establishing new wells, cultural heritage resource screening required and potential impacts on undisturbed sites.	• Receiving treated water from the City of Clarence-Rockland will ensure adequate water quantity and quality (i.e., reduced risk of disinfection by-product formation and manganese/iron) for future growth. • Current and future residents will be provided with a more reliable water source for their drinking water. • Transmission watermain piping proposed in existing rights-of-way, therefore no cultural heritage resources will likely be impacted.
Evaluation	Least Preferred	Least Preferred	Less Preferred	Preferred

	Alternative 2 – Increase Water Supply South Nation River	Alternative 3 – Maintain Water Supply South Nation River and Supplement from Another Water Source	Alternative 4a – Discontinue Water Supply from South Nation River and Obtain Water Supply from Groundwater In the Vicinity of the Municipality	Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water Supply from the City of Clarence-Rockland
Technical Feasibility	• Concerns in terms of expandability of the WTP due to limited space at the existing site. • Siting and constructing a new WTP along the South Nation River is limited by available, vacant lands. • Increased treatment requirements for increased water intake due to deteriorating river quality. • Significant risk of maintaining long-term water supply to the community.	• Dividing water services amongst the Municipality will require existing water distribution system to be altered to include additional water storage and pumping. • It will be challenging to maintain consistent water quality for all users with different source waters and treatment systems. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • Operational challenges in operating and maintaining two different water treatment systems.	• Potential for well drilling and a preferred location requires confirmation by a hydrogeologist. The wellhead protection areas are driven by the future demand, and it is highly likely that a well field of multiple wellheads are required. • Consistent water quality may be achieved if provided with proper treatment. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • The Municipality's water operations staff would be required to operate and maintain a new treatment system.	• New watermain is required to convey water from Clarence-Rockland to Casselman. • Infrastructure upgrades are required within the Clarence-Rockland system to deliver water to the connection point. • Additional water storage and/or treatment may be required to maintain water quantity/quality. • Existing water distribution system will likely need modifications to support the new feeder main. • Changing the water chemistry of the source water would need to be assessed with respect to possible effects on the distribution system. • Clarence-Rockland will not be able to provide treated water until year 2030. This presents a gap between when Casselman WTP reaches capacity (theoretical timeline of 2025) and when Clarence-Rockland water is available.
Evaluation	Least Preferred (Not Feasible)	Less Preferred	Less Preferred	Preferred
Financial Considerations	• High-level capital cost estimate in the $30M range. • Expanding the current WTP and/or constructing a new WTP will require the Municipality to purchase vacant lands. • Costs of retrofits/upgrades and/or new construction will be significant and ultimately do not address water quantity/quality concerns.	• High-level capital cost estimate in the $35M range. • Capital costs will include altering existing services; future services may require additional water storage, pumping, and/or chemical treatment depending on the source. • Increase in operation and maintenance costs to run two different water treatment systems within the Municipality.	• High-level capital cost estimate in the $50M range. • Capital costs will include hydrogeological studies, drilling new well(s), constructing a new groundwater treatment facility, installing new water feeder main to connect to existing distribution system, and decommissioning the existing WTP. • Future operation and maintenance costs will be to run the new groundwater treatment facility which is anticipated to be comparable to existing WTP operations.	• High-level capital costs estimate mid-term $74.2M; long-term $12.1M, to connect to the Clarence-Rockland water system. Capital costs in addition to new watermains may include a new booster pumping station, water storage, re-chlorination system, and existing system upgrades associated with bringing water from the City. • Future operation and maintenance will only involve maintaining booster pumping, water storage, re-chlorination and linear infrastructure as the Casselman WTP will be decommissioned.
Evaluation	Less Preferred	Preferred	Less Preferred	Least Preferred
Overall Evaluation	**Least Preferred (Not Feasible)**	**Less Preferred**	**Less Preferred**	**Preferred**

2.2.6 Recommended Water Supply and Treatment Alternative

The recommended long-term water supply and treatment solution is Alternative 4b – Discontinue Water Supply from South Nation River and Obtain Water from Clarence-Rockland. A Schedule B Class EA will be required for switching water supply to Clarence-Rockland. Additional public consultation activities will be undertaken during that Class EA process.

Since the City of Clarence-Rockland requires up until year 2030/2031 to upgrade its water infrastructure to be able to deliver treated water to Casselman, an interim solution needs to be investigated to bridge the gap between when Casselman WTP is anticipated to reach capacity sometime between 2025 and 2035 (as illustrated in Figure 6 of the Phase 1 Master Plan Report,) when Clarence-Rockland treated water becomes available in 2030/2031. The interim solutions involve leveraging the available capacity at Casselman WTP and may include the following.

- Interim Solution 1: Managing growth within the Municipality until treated water becomes available from Clarence-Rockland.

- Interim Solution 2: Proceeding with follow-up studies to investigate the feasibility of increasing water supply from South Nation River (Alternative 2) and supplementing water supply from groundwater source (Alternative 3). At present the Municipality is conducting a water quality testing study at the WTP to determine strategies to optimize the removal of Mn and Organics that are the precursors to THM formation to meet water quality objectives.

It is also recommended that the Municipality undertake the following steps in the interim.

- Completion of a D-5-1 Uncommitted Reserve Capacity Calculation for WTP and update on an annual basis; annual review of the water demand in comparison to WTP rated capacity.

- Ongoing monitoring and management of incoming new development.

- Promotion of water conservation and efficiency measures to reduce residential, industrial, commercial and institutional water demand. For example, with an overall reduction of 10% in water use, the short-term growth can be realized without the need to expand the existing WTP capacity. Additional reduction in water demand will prolong the timing for the required connection to Clarence-Rockland.

2.3 Water Storage

The Phase 1 Report has identified water storage deficiency in mid-term between 2028 and 2032.

There are a number of options to achieve the required rated storage capacity expansion. The additional water storage capacity may be achieved through construction of a new water storage reservoir within the Municipality, and/or along the feeder main route between Clarence-Rockland and Casselman. Several possible alternative water storage configurations are identified in the following sections. Note, the exact configuration and location of the new storage facility for the Municipality will need to be determined in the subsequent Schedule B Class EA for Water Supply, as there are various factors that drive the evaluation process, including topography, land availability, site-specific geotechnical and hydrogeological conditions, water distribution modelling results, capital costs, operation and maintenance costs, social and environmental impacts, etc. There are generally four (4) configurations available for water storage, including a below-grade reservoir and pumping station, an at-grade reservoir and pumping station, a composite elevated tower and a standpipe.

2.3.1 Configuration 1: Below-Grade Reservoir and Pumping Station

A typical below-grade reservoir is constructed of reinforced concrete and covered with earth and vegetation. In addition to potentially more appealing aesthetics, an advantage of this configuration is that the reservoir tank can be arranged to have two (2) or more cells that can be taken offline independently, enabling maintenance or inspection activities to proceed without losing all of the storage capacity of the facility. The pumping station can be arranged to be at-grade or below-grade, but at-grade buildings are more typical and operator friendly.

On the other hand, a reservoir plus pumping station configuration relative to an elevated tower is generally more complex to maintain and would require higher operating and maintenance costs (related to the new pumping station). The new pumping station would require redundant pumping capacity (domestic and fire protection) to allow flexible operations to remove a pump from service for routine maintenance or respond to a potential equipment failure. Additionally, pumping capacity will likely be required to meet the full range of everyday domestic demands up to fire protection demands. Increased electrical consumption will result from continual pump operation required to maintain adequate water distribution system pressure at all times. In the event of a power failure, the pumping station must be equipped with a backup power supply, such as diesel driven generators. The below-grade reservoir and pumping station will have the highest capital and life cycle costs among the four (4) configurations. In addition, to fill the below-grade reservoir local pressure reduction will be required to prevent tank overflowing.

2.3.2 Configuration 2: At-Grade Reservoir and Pumping Station

Modern at-grade reservoirs are typically constructed of reinforced concrete or coated/glass-fused-to-steel with the latter being the least costly to construct. Glass-fused-to-steel tanks are preferred due to ease of installation, longevity, and lower maintenance. One disadvantage with at-grade tanks is that during maintenance or inspection, all storage capacity is unavailable since there are no internal baffles to allow parts of the tank to remain in service. Due to the wide variety of diameters and heights available for at-grade steel tanks, the area required is flexible, and usually takes up less space than a below-grade reservoir of comparable size. One advantage of an at-grade reservoir over a below-grade reservoir is that the depth at which rock is encountered has less of a bearing on the cost of the reservoir, since it sits above the ground, rather than within.

The at-grade reservoir and pumping station will have the slightly lower capital and life cycle costs compared to below-grade reservoir and pumping station. However, similar to a below-grade reservoir, an at-grade reservoir configuration requires the same pumping station infrastructure, which relative to an elevated tank is generally a more complex system resulting in increased operating and maintenance costs.

2.3.3 Configuration 3: Composite Elevated Tank

Composite elevated tanks are typically coated steel or glass-fuse-to-steel tanks located at the top of a pedestal or other support structure. The water level in the elevated tank sets the pressure in the water distribution system. The functional/usable capacity of an elevated tank is the volume of water that can be stored in the tank between the high and low water levels. Thus, provided the tank is of sufficient height, the diameter of the tank determines the functional capacity. An elevated tank needs relatively lower operation and maintenance requirements when compared to a continually operating pumping station with more equipment, valves, and ancillary systems to maintain a pressurized system. Since the elevated tank water level sets the pressure in the system, it does not require more sophisticated control systems to ensure safe and reliable water distribution system operation.

The main difference between capital and life cycle costs associated with a below- or at-grade reservoir and pumping station configuration compared to an elevated tank configuration is largely due to the pumping station.

The elevated composite tank will have significant lower cost than a below- or at-grade reservoir and pumping station. However, the cost of a composite elevated tank is typically higher than a standpipe.

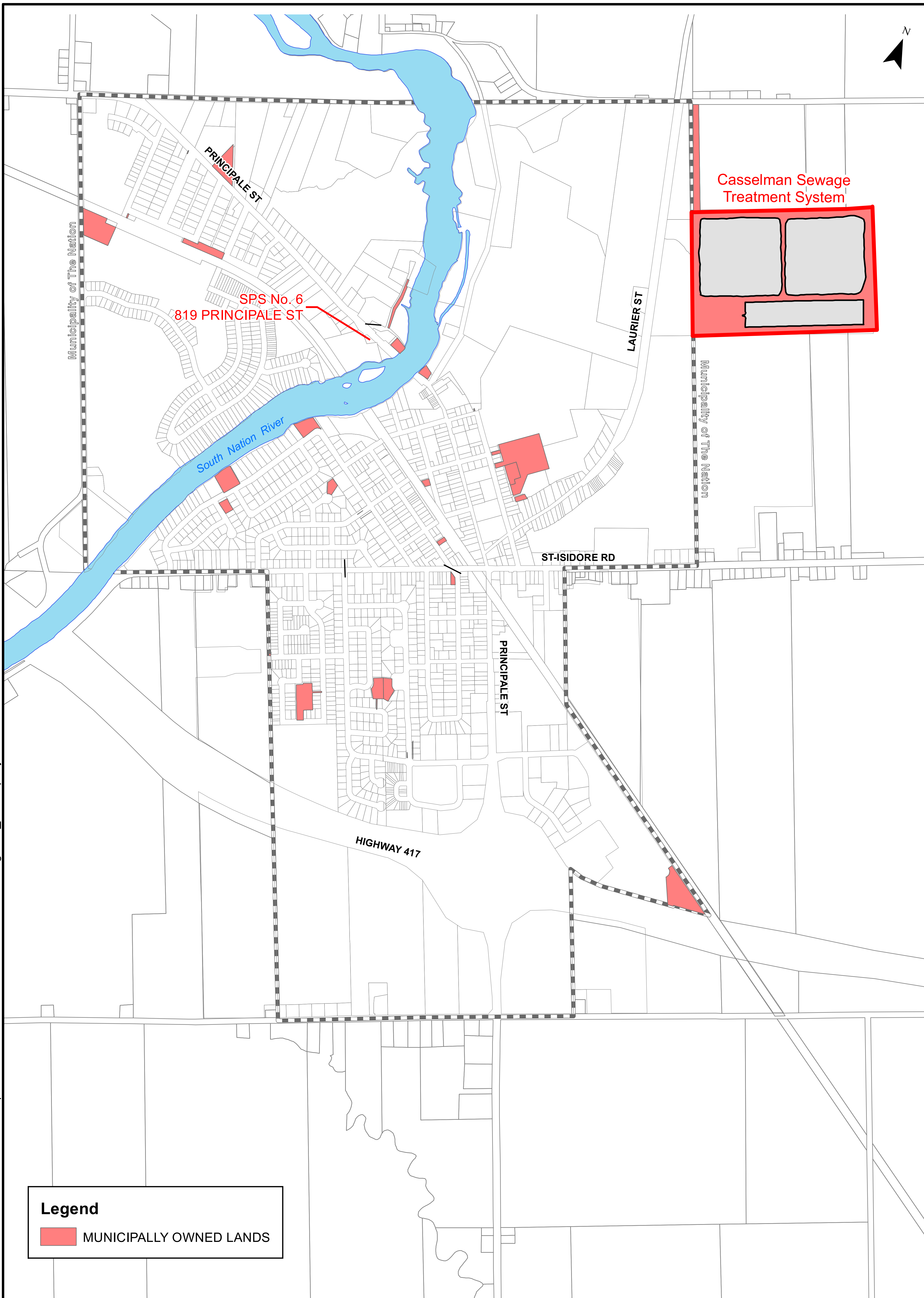
2.3.4 Configuration 4: Standpipe

Standpipes are essentially ground storage tanks constructed to a height that will provide adequate system pressure in the operating range. Their diameter is constant from the ground to the top, and they are completely filled with water. The typical material of construction for a standpipe can be glass-fused-to-steel, coated steel or a combination of both. The glass-fused-to-steel tank offers the advantage of easier installation, longevity, and minimal shutdown time for maintenance.

A standpipe blends the characteristics and performance of both ground storage and elevated storage tank, with its taller design allowing water above the operating range to typically provide gravity-fed pressure. Standpipes are often used in small systems where less volume is needed, or in situations where the site has a high ground elevation relative to the system pressure.

2.3.5 Locations

The new water storage location should be selected in tandem with the storage configuration. Figure 5 identifies Municipally owned lands which may be available as potential locations for new storage. Should the preferred location for water storage, which will be identified in the Schedule B Water Supply Class EA, be located on land parcels in the adjacent municipality, the Municipality will need to investigate purchasing these lands.



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WATER AND WASTEWATER MASTERPLAN
MUNICIPALITY OF CASSELMAN, ONTARIO

DRAWING:

MUNICIPALLY OWNED LANDS

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DESIGN:	MK	JLR NO:	16953-118
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2.4 Water Distribution System

2.4.1 Design Parameters and Future Flow Projections

The design parameters used to calculate the future water demands are summarized in the table below. The average day flow and the peaking factor for the peak hour flow were obtained from the MECP Design Guidelines for Drinking Water Systems (2008). The maximum day flow peaking factor was determined from the average and maximum day demands from the Casselman WTP treated daily flow data (presented in Phase 1).

Table 5: Design Parameters – Future Water Demands

Future Water Flow Projection – Design Parameters		
Parameter	**Residential**	**Light Industrial / Commercial / Institutional**
Average Day Flow	350 L/cap/day	35,000 L/ha/day
Maximum Day Flow	1.9 x Average Day	1.9 x Average Day
Peak Hour Flow	1.5 x Maximum Day	1.5 x Maximum Day

Based on these design parameters, as well as the water demand under existing conditions, the projected short-term, mid-term, and long-term populations and the areas of future commercial development (established in the Phase 1 report), the following water flow projections for residential, commercial, and industrial buildings were calculated for each future scenario without accumulation from the previous scenario.

Table 6: Future Water Flow Projections per Scenario (Non-Cumulative)

Demand Scenario	Short-Term (0-5 years) L/s *(m^3/day)*	Mid-Term (5-10 years) L/s *(m^3/day)*	Long-Term (10-25 years) L/s *(m^3/day)*
Average Day	9.45 *(816.5)*	8.26 *(713.6)*	11.13 *(961.6)*
Maximum Day	17.96 *(1,551.7)*	15.69 *(1,355.6)*	21.14 *(1,827.4)*
Peak Hour	26.94 *(2,327.6)*	23.54 *(2,033.9)*	31.72 *(2,740.6)*

It is noted that the type of units expected within various residential areas and the specific type of commercial use expected within future commercial lands can have a significant influence on the water demands projected for short-term, mid-term, and long-term. With limited information currently available regarding the details of future developments, design guideline values for the projected flows have been assumed to assess system performance. Based on our experience, guideline values are generally considered conservative to account for unknowns when limited information is available and, as indicated previously, there may be opportunities to define the projected flows more specifically with further details as part of a future assignment.

2.4.2 Water Modelling

The WaterCAD hydraulic water model was used to assess the water distribution system under existing and short-term (0-5 years) demand conditions and to determine if water distribution system upgrades are required.

The following assumptions were used in these model simulations:

- A representative watermain loop was modelled within each future development area servicing over 49 units (or 50 m^3/d) as per Ottawa Design Guidelines for Water Distribution (July 2010).
- The demands for each area were distributed to the nearest representative junction node in the model.
- The existing average day and peak hour scenarios assume that a single pump (labeled PMP-1 in the model) is operating at the Water Treatment Plant (WTP).
- The existing maximum day plus fire flow scenario assumes that the two high-lift pumps (labeled PMP-1 and PMP-2 in the model) are operating at the WTP.
- The hydraulic grade line (HGL) of the existing elevated storage tank is 100.52 m (elevated water storage tower is 90% full) as provided by Ontario Clean Water Agency (OCWA) in April 2023 (refer to Phase 1 Report). This water level represents the existing normal low operating level before the pumps would be activated at the WTP. The noted HGL was modelled for all demand scenarios.

2.4.2.1 Future Conditions – No Upgrades

The tables below summarize the water model results for future short-term (0-5 years), mid-term (5-10 years), and long-term (10-25 years) under average day, maximum day, and peak hour conditions <u>without</u> any watermain upgrades. The only additional changes from the existing watermain infrastructure includes the representative pipes that were added to service the proposed future developments.

Table 7: Hydraulic Water Model Results – Average Day Demand

Average Day Demand			**Percentage of Junctions**			
Pressure Range (kPa)			**Existing**	**Short-Term**	**Mid-Term**	**Long-Term**
	Less than	276	0.0%	0.0%	0.0%	0.0%
276	up to	350	54.2%	63.5%	66.8%	73.8%
350	up to	400	45.3%	36.0%	32.7%	25.8%
400	up to	450	0.5%	0.5%	0.4%	0.4%
450	up to	500	0.0%	0.0%	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%	0.0%	0.0%
	Greater than	552	0.0%	0.0%	0.0%	0.0%

<u>Note:</u> It is assumed that there is no change to the existing water supply and the elevated water storage tower elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.

Under the average day demand conditions for the existing, short-term, mid-term and long-term scenarios, the table above shows that most junction nodes experience pressures between 276 kPa and 350 kPa, and a smaller percentage of the junction nodes experience pressures above 350 kPa. The system pressures decrease slightly across the future scenarios due to the increased water demands, but all the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP design guidelines.

Table 8: Hydraulic Water Model Results – Peak Hour Demand

Peak Hour Demand			Percentage of Junctions			
Pressure Range (kPa)			Existing	Short-Term	Mid-Term	Long-Term
	Less than	276	0.0%	0.0%	0.0%	0.9%
276	up to	350	70.8%	85.8%	90.6%	98.7%
350	up to	400	28.6%	13.7%	9.0%	0.4%
400	up to	450	0.5%	0.5%	0.4%	0.0%
450	up to	500	0.0%	0.0%	0.0%	0.0%
500	up to and incl.	552	0.0%	0.0%	0.0%	0.0%
	Greater than	552	0.0%	0.0%	0.0%	0.0%

Note: It is assumed that there is no change to the existing water supply and the elevated water storage tower water elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.

Under the peak hour demand conditions for the existing, short-term, mid-term and long-term scenarios, the table above shows that most junction nodes experience pressures between 276 kPa and 350 kPa, and a smaller percentage of the junction nodes experience pressures above 350 kPa. Generally, all the junction nodes exceed the minimum pressure of 276 kPa (40 psi) as recommended in the MECP design guidelines. The system pressures decrease over the future scenarios due to the increased water demands. There are a couple of junction nodes in the long-term scenario that are expected to experience pressures slightly below the minimum requirement. These are located at the dead-end services for the new developments off Principale Street.

Table 9: Hydraulic Water Model Results – Maximum Day Demand Plus Fire Flow

Maximum Day Demand + Fire Flow			Percentage of Junctions			
Fire Flow Range (L/s)			Existing	Short-Term	Mid-Term	Long-Term
	Less than	30	0.0%	0.0%	0.0%	0.0%
30	up to	45	3.7%	3.3%	0.5%	0.0%
45	up to	67	2.1%	1.9%	1.4%	5.3%
67	up to	83	7.4%	8.6%	10.4%	11.5%
83	up to	100	11.6%	11.5%	14.5%	21.1%
100	up to	117	10.0%	17.7%	17.6%	19.4%
117	up to	150	33.2%	31.6%	34.4%	20.7%
150	up to and incl.	200	14.7%	13.4%	12.2%	14.1%
	Greater than or equal to	200	17.4%	12.0%	9.0%	7.9%

<u>Note:</u> *It is assumed that there is no change to the existing water supply and the elevated water storage tower water elevation is 100.52 m. Any future changes to the existing water supply will affect the noted results.*

Under the maximum day demand plus fire flow conditions for the existing, short-term and mid-term scenarios, the table above shows that a small percentage of junction nodes are unable to supply 45 L/s of fire flow, which is the minimum fire flow requirement for a typical two-storey residential dwelling per the Ontario Building Code (OBC). The percentage of junction nodes supplying less than 45 L/s of fire flow decreases with each future growth scenario due to the increased watermain looping and connectivity to supply the new developments.

Based on the above table under the existing condition, 24.8% of junctions have fire flows below the general target Fire Underwriters Survey (FUS) fire flow requirement of 100 L/s in most areas of Casselman. Under the future short-term conditions, 25.3% of junctions have fire flows below 100 L/s. The percentage of junctions below the FUS fire flow target increases across each future scenario if no upgrades are implemented. The water model results schematics are presented in Appendix C.

The methodology used to calculate the fire flow requirements is outlined in the Phase 1 Master Plan Report. The required fire flow for each area was calculated and compared to the available fire flows anticipated from the water model. Below are the areas in Casselman under the existing and short-term scenarios that do not meet the required fire flows:

- <u>Dead end watermain on Laurier Street</u>: The residential houses and elementary school (Sainte-Euphémie Pavillion) on Laurier Street are supplied by a dead end 150 mm diameter watermain. For the residential properties, it was determined that the required fire flow per FUS is between 83 L/s and 100 L/s. For the school, the OBC minimum fire flow requirement for a two-story residential dwelling is 45 L/s and a school of this size would have an FUS fire flow requirement greater than that. The water model shows that the dead end watermain on Laurier Street has available fire flows below 83 L/s, so it does not meet the required fire flow. This is attributed to the length and size of the dead end watermain, which increases headlosses along the pipe.

    - Recommended Distribution Upgrade #1 as described in Section 2.4.2.2 is proposed to address this deficiency.

- <u>Northwest area south of Principale Street</u>: The FUS required fire flow was calculated to be 100 L/s based on a representative home on Filion Street. The water model shows that this area does not achieve the required fire flow from the water distribution system. This is attributed to this area being further away from the water tower and at a higher topographic elevation than the surrounding areas.

    - Recommended Distribution Upgrade #2 as described in Section 2.4.2.2 is proposed to address this deficiency.

- <u>Riviere Nation North Road</u>: It is noted that the water model shows an available fire flow of 46 L/s in the short-term scenario at the end of the dead end watermain on Riviere Nation North Road, which is above OBC requirements but below FUS requirements for that area.

This is attributed to the length and size of the dead end watermain, which increases headlosses along the pipe. This 150 mm diameter watermain supplies fire flow to a small number of residential houses.

- No upgrades are recommended at this time to address this deficiency as there appears to be only a small number of homes (approximately 5 homes) located at the end of the dead end watermain.

It is noted that Recommended Operational Upgrade #3 as described in Section 2.4.2.2 will improve available fire flows throughout the system.

2.4.2.2 Future Short-Term (0-5 years) – Recommended Upgrades

The short-term scenario is the only future scenario for which upgrades are recommended in this Master Plan, since the water supply is anticipated to remain unchanged within the next five (5) years. Once the future water supply is confirmed, the mid-term and long-term scenarios will be evaluated for the supply conditions. The following section focuses on short-term (0-5 years) recommended upgrades to address the deficiencies mentioned in Section 2.4.2.1.

Recommended Distribution Upgrade #1 (Brisson St. and Laurier St. Loop)

- Dead end watermain on Laurier Street: To address this deficiency, it is proposed to create a 300 mm watermain loop between Brisson Street and Laurier Street. This watermain loop passes through the anticipated 'Nation View' residential development proposed in the mid-term scenario. This loop will increase the available fire flow on Laurier Street in the short-term and supply the 'Nation View' development in the mid-term. The location of the proposed 300 mm watermain loop can be found in Figure 6.

Recommended Distribution Upgrade #2 (Railway Crossing)

- Northwest area south of Principale Street: To address this deficiency, it is proposed to extend the 200 mm watermain from Argile Street and install a 300 mm watermain beneath the existing rail line to connect to Francess Street, thus creating a watermain loop. This loop will increase the available fire flow in the northwest area (area west of Martin Street) in the short-term. The location of the proposed railway crossing and watermain loop can be found in Figure 6.

Recommended Operational Upgrade #3 (Elevated Storage Tank Level)

To increase pressures and achieve targeted fire flows in the short-term, the normal operating water level bandwidth in the elevated storage tank should be raised. A water level of 106.50 m was found in the model to provide the targeted fire flow of 100 L/s to the Devcore development, which does not achieve this fire flow without the upgrade. It is recommended that Casselman review and confirm the normal low operating level of 100.52 m and the existing maximum water level available in the elevated storage tank. It is noted that there was a discrepancy between the operating level provided by OCWA and the Landmark water tower drawings, however this discrepancy is not expected to change the recommendations.

Under the average day and peak hour demand scenarios in the short-term, implementing the recommended upgrades will improve system pressures while maintaining them between 276 kPa (40 psi) and 552 kPa (80 psi) in accordance with the MECP Design Guidelines and the OBC.

The improvements in fire flow availability anticipated from implementing the recommended upgrades above are shown in the table below.

Table 10: Hydraulic Water Model Results – Maximum Day Demand Plus Fire Flow

Maximum Day Demand + Fire Flow			Percentage of Junctions		
Fire Flow Range (L/s)			Existing	Short-Term - No Upgrades	Short-Term – Recommended Upgrades #1, #2, #3
	Less than	30	0.0%	0.0%	0.0%
30	up to	45	3.7%	3.3%	0.0%
45	up to	67	2.1%	1.9%	0.9%
67	up to	83	7.4%	8.6%	0.9%
83	up to	100	11.6%	11.5%	5.6%
100	up to	117	10.0%	17.7%	13.5%
117	up to	150	33.2%	31.6%	27.9%
150	up to and incl.	200	14.7%	13.4%	33.5%
	Greater than or equal to	200	17.4%	12.0%	17.7%

Under the maximum day demand plus fire flow conditions for the existing and short-term (no upgrades) scenarios, the table above shows that a small percentage of junction nodes are unable to supply 45 L/s of fire flow, which is the minimum fire flow requirement for a typical two-storey residential dwelling per the OBC. However, with the recommended upgrades implemented including the increase to the elevated storage tank water level, there are no junctions below this minimum OBC fire flow requirement. Furthermore, the junctions along Laurier Street and within the northwest area can meet the FUS required fire flows of 83 L/s and 100 L/s, respectively, and the overall system can supply the targeted fire flows with the exceptions noted below. The water model results schematic is presented in Figure 7 and Appendix C.

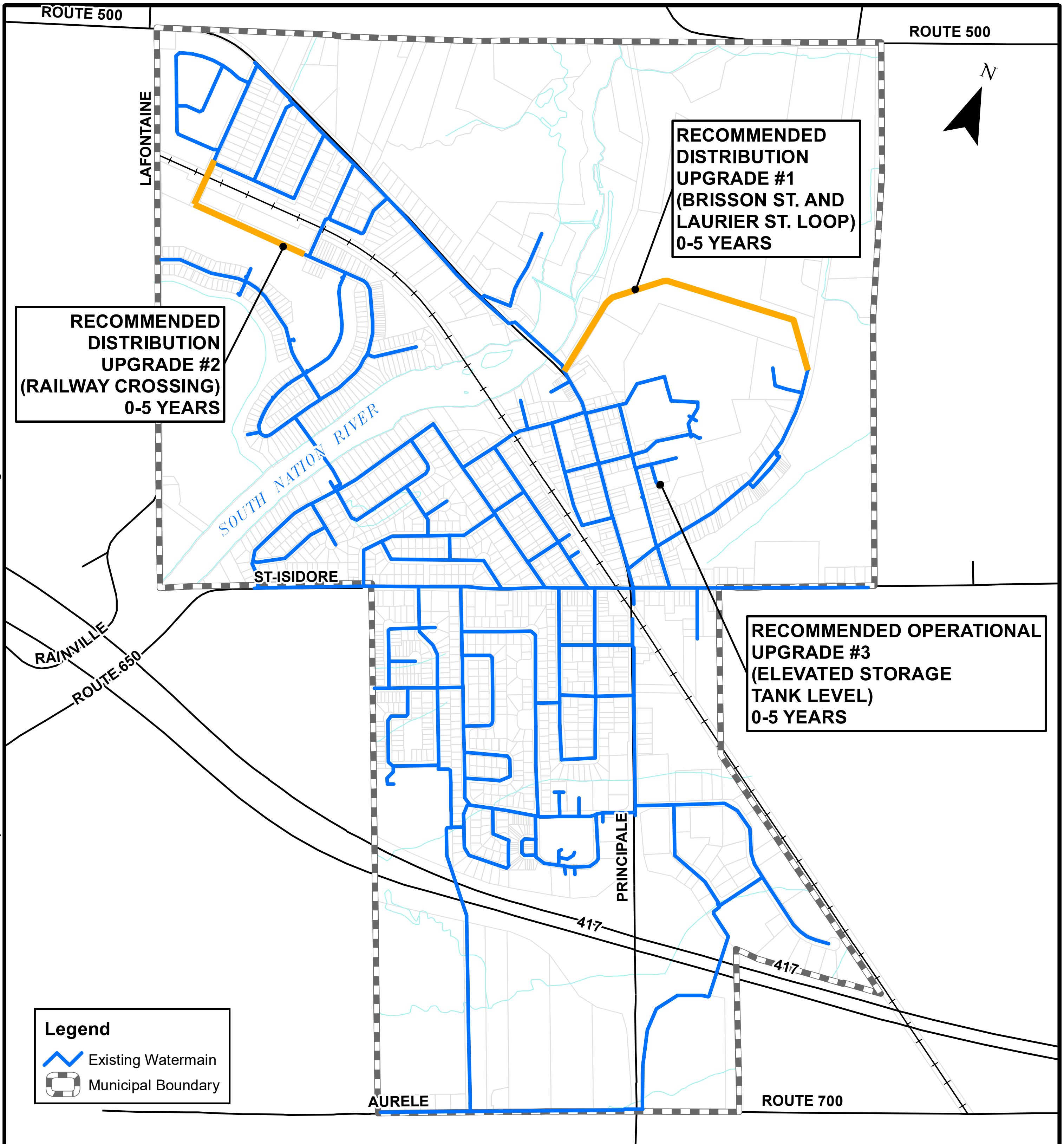
<u>Post-Upgrade Deficiencies</u>

The following list identifies the areas that remained below the target FUS fire flow requirements after the recommended upgrades were applied in the model. Refer to the accompanying 'Post-Upgrade Deficiencies' model schematic in in Figure 7 and Appendix C.

- Riviere Nation North Road (refer to discussion in Section 2.4.2.1);
- Elementary school water service off Laurier Street (this water service may not supply any hydrants);
- East end of St. Isidore Road (dead-end watermain);
- Principale Street north of Duhamel Street (dead-end watermain);

- Dead-end watermain on Racine Street in the industrial area (the FUS fire flow requirements for these sites would vary and on-site measures could be taken to reduce the requirement or supplement the fire flow); and
- Various extents of the existing 150 mm watermains where the available fire flow is close to the targeted FUS fire flow.

As detailed by the MECP guidelines, *water distribution systems should be designed to provide a balance between hydraulic water supply needs and water quality*. In some instances, upgrades to improve fire flow may result in a decrease in water quality as a result of increased retention time and water age. Watermains smaller than or equal to 150 mm do not always have capacity to deliver fire flows to meet today's standards. These watermains were constructed in a time where design and construction standards were different from present-day. At this time, no distribution system upgrades are recommended to address these minor deficiencies as an increase in pipe sizes may reduce water quality and/or would not be economically justifiable.



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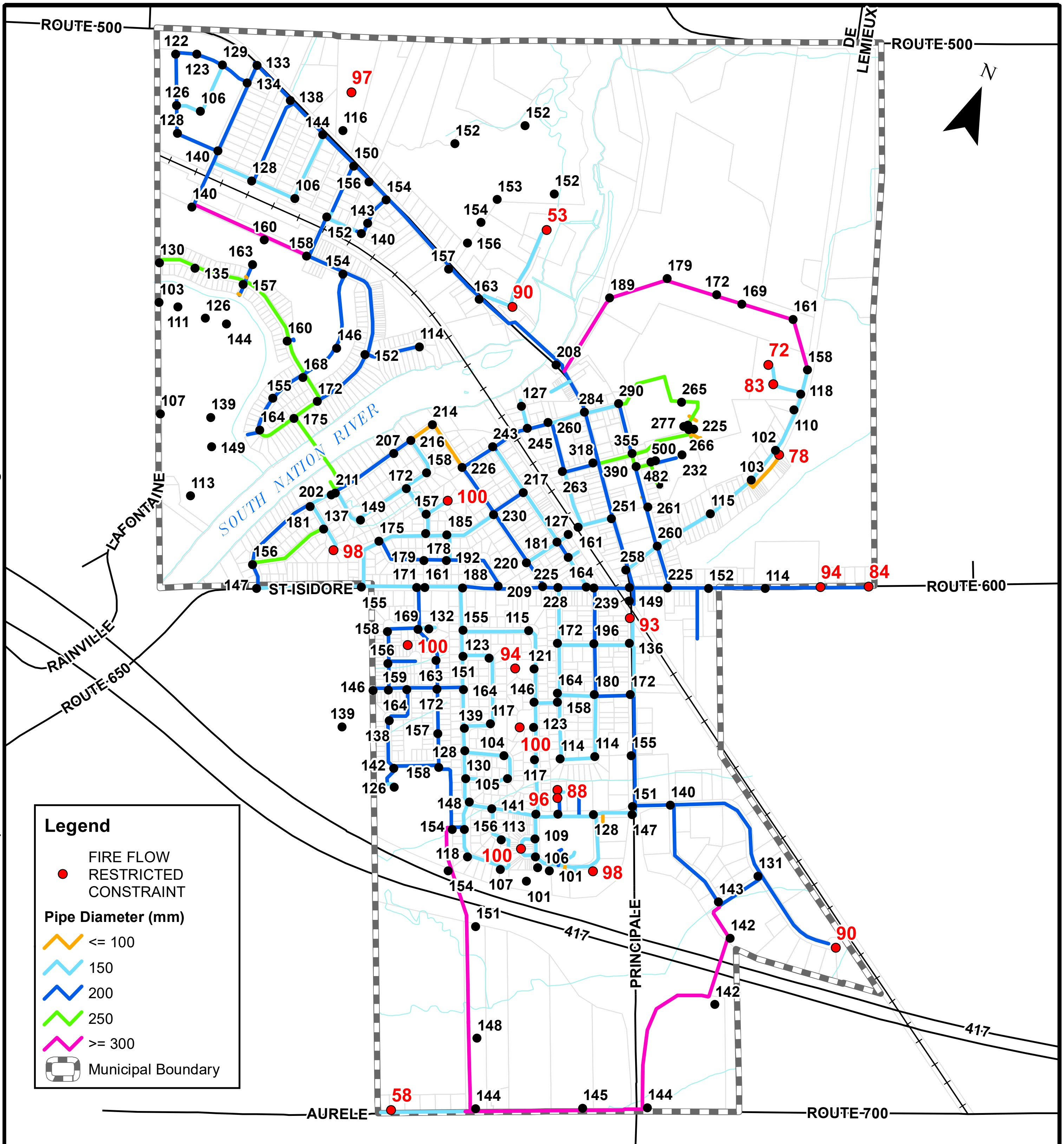

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MAXIMUM DAY DEMAND PLUS FIRE FLOW CONDITIONS POST-UPGRADES (0-5 YEARS)

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FIGURE 7

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2.5 Conveyance System & Sewage Pumping Stations

The typical approach for determining the system upgrades required in the sanitary network is to determine the requirements in the scenario with the highest development (10-25-years) and work backwards. In the development of alternative solutions, the main principle considered is to determine if the infrastructure will be able to adequately convey the projected flow from developments, then progressively work backwards through the other analysis period to determine the timing of these upgrades. This ensures that the upgrades recommended for the 0-5-year time period would not need to be revised to meet the 5-10-year and 10-25-year requirements.

In order to improve system capacity upstream of pump station (PS) 1 and 6 the following measures can be undertaken:

- Upgrade of Pump Stations
- Gravity Sewer Infrastructure Improvements

2.5.1 Future Condition Attributes

The parameters used to determine the capacity in the system under future conditions were consistent with the City of Ottawa Sewer Design Guidelines. The average residential flow used to calculate domestic flows remains at 350 L/cap/day, the same as under existing conditions. In order to account for wet weather inflow and infiltration a general allowance of 0.28 L/s is applied to the peak extraneous flow calculation.

These previous design coefficients were only applied in areas where new developments are to be built and not in existing areas where infill developments are being constructed.

The future residential flow downstream of each sewer reach was calculated using a consistent unit density value of 2.375 person per unit.

2.5.2 Upgrade of Pump Stations

To determine the efficiency and capacity of a pump station, the peak flow upstream of the pump station is often compared to its rated capacity. In instances where the peak flow surpasses the rated capacity, it is recommended to upgrade the pump station to increase its rated capacity and in turn, be able to accommodate additional flows from future developments.

An upgrade of PS 1 under existing conditions, in addition to localized system improvements, would alleviate the downstream capacity constraints by enabling flows from the southern side of the South Nation River including the proposed Nation View development and the East of Laurier residential development to be conveyed to the pump station. Additionally, an upgrade to PS 6 in 0-5 years will be required to facilitate development on the northern side of the river, primarily from the Casselman Developments Lands, Industrial (Lettuce/Herb Production Facility), North of Principale, Projet Martineau-Hughes and West of Sarah developments.

Under future conditions, it is assumed that the pumps have been adequately upgraded to accommodate the total peak design flow upstream. In doing so, the peak flows listed below will differ from the peak flows stated in the Phase 1 existing conditions report, in which we assumed that the pump station would only accept flows up to its rated capacity.

2.5.2.1 Existing Conditions

Under existing conditions, the peak flow for PS 1 exceeds the rated capacity. The following table summarizes the results at each pump station.

Table 11: Existing Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)
1	118	189
2	20.5	14
3	37	14
4	18.5	4
5	20.5	13
6	40.5	28

It is recommended to implement upgrades once the pump station rated capacities have been exceeded in order to optimize their efficiency and therefore PS 1 should be upgraded under existing conditions. Upgrades should be future proofed to account for flows from longer term developments or phased to facilitate future developments.

2.5.2.2 Short-term (0-5 Year) Development

In the short-term (0–5-year) development scenario, peak flows received at PS 1 continue to exceed the pump station rated capacity. The planned developments for this time period have also resulted in peak flows beyond the rated capacity of PS 6. The new peak flows at each pump station are summarized as follows:

Table 12: Short-term (0-5 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	191	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	5	Within capacity
5	20.5	14	Within capacity
6	40.5	69	Beyond rated capacity

PS 1 was identified for upgrades under existing conditions and the upgrades should have accounted for the 0–5-year development. 0-5 year developments will trigger the need for upgrades of PS 6. Upgrades should be future proofed to account for loadings from long term developments.

2.5.2.3 Mid-term (5-10 Year) Development

Under the mid-term (5-10 year) development scenario, the peak flows at each pump station are as follows:

Table 13: Mid-term (5-10 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	216	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	7	Within capacity
5	20.5	14	Within capacity
6	40.5	73	Beyond rated capacity

The flows into PS 1, 4 and 6 have increased from the previous time period. Flows entering PS 1 and PS 6 remain above their rated capacities while flows entering PS 4 have increased but remain below the pump station rated capacity. Upgrades of PS 1 and PS 6 identified under previous time periods should have accounted for future flow or phasing of it.

2.5.2.4 Long-term (10-25 Year) Development

In the long-term (10–25-year) development scenario, the peak flows upstream of each pump station are found below:

Table 14: Long-term (10-25 Year) Pumping Station Capacity Assessment

Pump Station	Rated Capacity (L/s)	Peak Flow (L/s)	Operating Condition
1	118	258	Beyond rated capacity
2	20.5	19	Within capacity
3	37	15	Within capacity
4	18.5	7	Within capacity
5	20.5	14	Within capacity
6	40.5	75	Beyond rated capacity

Flows entering PS 2, 3, 4 and 5 have remained unchanged from the previous development period (5-10-year). Flows to PS 1 and PS 6 have increased over this same period.

2.5.2.5 Summary of Pump Station Upgrades

In summary, PS 1 and PS 6 peak flows exceed their rated capacities over the 25-year development period. PS 1 and PS 6 will require upgrades under existing conditions and 0-5-year conditions respectively, to be able to accommodate the first stages of development. These comparisons demonstrate an imminent need for upgrades of the two pumps listed previously.

2.5.3 Linear Infrastructure Capacity Improvements

2.5.3.1 Existing Conditions

Pipes were identified for capacity improvements where there was no residual capacity in the sewer, or the pipe was operating beyond 100% capacity. Incoming flow was either upstream loading or from upstream peak pump capacity flows.

Under existing conditions, a total of nine (9) sanitary sewer reaches are identified as being in need of upgrade. Where upgrades have been identified under the existing conditions, the upgrade size identified has been assessed as sufficient for up to the 25-year build-out period.

It should be noted that four (4) of the pipe upgrades are triggered by the rated capacity flow from upstream pump stations and limiting pump station capacity. Based on the outcome of future pump station analysis studies, there may not be a need for these upgrades. Two (2) of the pipe upgrades are to maintain pipe sizes where pipe sections immediately upstream and downstream are being upsized as part of the projects.

Table 15 below summarizes the upgrades identified using the design sheets in Appendix D.

Table 15: Upgrades under Existing Conditions

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Development	Approximate Length (m)
620-615	St Isidore Rd between Desnoyers St and Isabelle St (1)	300	375	PVC	Existing	60
615-535	St Isidore Rd between Desnoyers St and Isabelle St (1)	300	375	PVC		50
535-530	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	375	PVC		75
530-525	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	375	PVC		110
525-520	St Isidore Rd between Desnoyers St and St-Joseph St (1)	300	450	PVC		90
305B-300	Montcalm St between Principale St and St-Joseph St	500	600	PVC		40
300-290	Montcalm St between Principale St and St-Joseph St	500	600	PVC		50
290-255	Montcalm St between Principale St and St-Joseph St	500	600	PVC		100

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Development	Approximate Length (m)
255-90	Montcalm St between Principale St and St-Joseph St	500	600	PVC		110
(1) Note that the proposed new diameter for St. Isidore sewer upgrade has residual capacity for future development (beyond the Village boundary) and that the size of the sewer pipes shall be finalized during design.						

2.5.3.2 0-5 Year Development

In the 0-5-year development scenario no additional pipes, other than those identified in the existing condition, require upgrades. Design sheets for this time period are contained in Appendix D.

2.5.3.3 5-10 Year Development

In the 5-10-year development scenario no additional pipes, other than those identified in the existing condition, require upgrades. Design sheets for this time period are contained in Appendix D.

2.5.3.4 10-25 Year Development

Under the 10-25-year growth conditions, an additional 22 pipes are identified as requiring capacity improvements due to development in this time period. All of these upgrades service lands south of the river.

Table 16 below summarizes the upgrades identified using the design sheets in Appendix D.

Table 16: Upgrades under the Long-Term (10-25 Year) Time Period

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
1094-1090	Principale St between Racine St and Jeanne Mance St	350	450	PVC	Developments South of Highway 417	90
1090-1085	Principale St between Racine St and Jeanne Mance St	350	450	PVC		80
1085-1080	Principale St between Racine St and Jeanne Mance St	350	450	PVC		90
1080-1070	Principale St between Racine St and Jeanne Mance St	350	450	PVC		80

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
1070-1045	Jeanne Mance St between Principale St and Saint Joseph St	350	450	PVC		120
520-515	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC	South of Highway 417	105
515-505	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		60
505-500	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		100
500-460	Saint Joseph St between St Isidore Rd and Dollard Street	450	525	PVC		90
205-165	Principale St between St Isidore Rd and Brisson St	200	300	PVC	East of Laurier	55
165-160	Principale St between St Isidore Rd and Brisson St	250	300	PVC		90
160-155	Principale St between St Isidore Rd and Brisson St	250	300	PVC		90
155-150	Principale St between St Isidore Rd and Brisson St	250	300	PVC		85
150-115	Principale St between St Isidore Rd and Brisson St	250	300	PVC		85
115-110	Principale St between St Isidore Rd and Brisson St	300	450	PVC		80
110-90	Principale St between St Isidore Rd and Brisson St	300	450	PVC		75
90-85	Principale St between St Isidore Rd and Brisson St	525	600	PVC	East of Laurier and South of Highway 417	40
85-83	Principale St between St Isidore Rd and Brisson St	525	600	PVC		75
83-316	Principale St between St Isidore Rd and Brisson St	525	600	PVC		60

MH From - MH To	Location	Existing Diameter (mm)	New Diameter (mm)	Material	Triggering Developments	Approximate Length (m)
316-80	Principale St between St Isidore Rd and Brisson St	525	600	PVC		10
80-317	Principale St between St Isidore Rd and Brisson St	525	600	PVC		20
317-318	Principale St between St Isidore Rd and Brisson St	525	600	PVC		15

2.5.3.5 Recommended Linear Infrastructure Upgrades

The infrastructure identified as in need of upgrades, has been identified as the following seven projects, five of which address the linear infrastructure constraints and two others to improve the pump station capacities. Refer to Figure 8 identifying the extents of the projects.

Table 17 below summarizes the upgrade lengths included in each of the projects.

Table 17: Recommended Linear Infrastructure Project Upgrade

Project	Description	New or Upgraded Diameter (mm)	Approximate Total Length (m)
1a	Upgrade existing sanitary sewer sections along St. Isidore west of Principale. This project is triggered by insufficient flow under existing conditions.	375	300
1a		450	100
1b	Upgrade existing sanitary sewer sections along Montcalm, including a railway crossing. These sections are currently under capacity.	600	300
2	New sewer (approx. 700 m) to connect Brisson to Laurier for the proposed Nationview Development.	450	700
3	Upgrade existing sanitary sewer sections (approx. 450 m) along Principale and Jeanne Mance St. This project is triggered by development south of the HWY 417.	450	450
4	Upgrade existing sanitary sewer sections (approx. 750 m) along Principale St. between St-Isidore and Montcalm. This project is triggered by	300	390
4		450	155

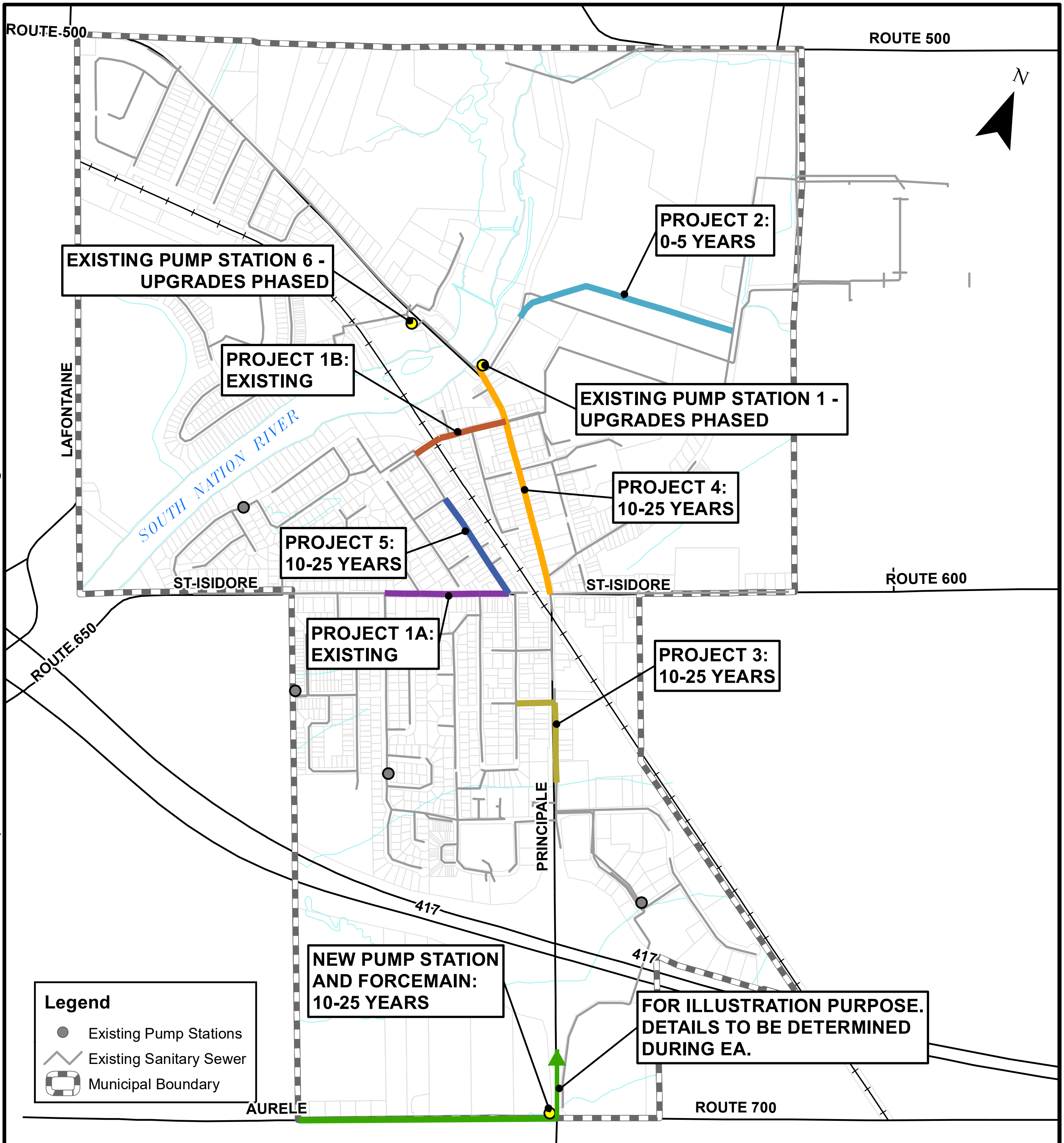
Project	Description	New or Upgraded Diameter (mm)	Approximate Total Length (m)
4	development south of the HWY 417 and East of Laurier Street.	600	205
5	Upgrade existing sanitary sewer sections (approx. 350 m) along St. Joesph St. This project is triggered by development south of the HWY 417.	525	350

Both pump station upgrades required to improve capacities are also being dealt with as separate projects, as identified in Section 2.5.2. For PS 1, this will also include upgrades of the immediate incoming sewers.

Note that the proposed new diameter for St. Isidore sewer upgrade has residual capacity for future development (beyond the Village boundary) and that the size of the sewer pipes shall be finalized during design.

2.5.4 Wastewater Servicing South of Highway 417

Phase 1 Report has identified the future development south of Highway 417 in the long-term (10-25 years). The sanitary servicing in this area will need to be implemented in that timeframe to accommodate the proposed development, as well as existing residential/commercial/industrial properties currently on septic systems. Connections will be made to convey wastewater collected in this area to the Municipality’s sanitary collection system north of the Highway. The proposed wastewater servicing generally involves new sanitary sewers that runs along Aurele Road, a new Pumping Station (PS 7) and a new forcemain that discharges to a manhole north of Highway 417.



PROJECT:

CASSELMAN WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN

CASSELMAN, ONTARIO

DRAWING:

SANITARY NETWORK FUTURE PROJECTS

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DESIGN:	ML
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CHECKED:	ML/BP
JLR #:	16953-118

DRAWING #: FIGURE 8

File Location: P:\16000\16953-118 - Casselman Infrastructure Masterplan\3-Production\1-Civil\GIS\16953-118 Figure8.mxd

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2.6 Sewage Treatment System

The Casselman Sewage Treatment System (STS) is a seasonal-discharge lagoon-based system with polishing treatment. The treatment process consists of:

- Two (2) facultative lagoons (Cells A and B), each with an effective storage volume of 115,000 m^3
- One (1) aerated lagoon (Cell C), with an effective storage volume of 330,000 m^3
- An alum dosing system for phosphorus precipitation.
- One Moving Bed Biofilm Reactor (MBBR) to provide post-lagoon nitrification (ammonia removal), with a rated capacity of 3,500 m^3/d and peak flow rate of 5,000 m^3/d, and
- One disk filter to provide polishing removal of suspended solids and phosphorus, with a peak flow rate of 10,000 m^3/d.

The following four alternative options have been identified to achieve the rated capacity expansion required for the STS, understanding that the limitation to future expansion is the allowable seasonable discharge to the South Nation River.

- Alternative 1: Status Quo
- Alternative 2: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity
    - Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage
    - Alternative 2b: Expand Lagoon Discharge Window to Year-Round
- Alternative 3: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

2.6.1 Alternative 1: Status Quo

The "Status Quo" alternative represents what would likely occur if none of the alternative STS solutions were implemented and the existing STS was not expanded nor upgraded to accommodate future wastewater flows. Moreover, the assumption with respect to this alternative is that the discharge window and allowable discharge rates will remain unchanged.

The Phase 1 master planning analysis of future conditions showed that the rated capacity of the STS would be reached sometime between 2026-2037. Moreover, the rated capacity of the STS would require nearly doubling by 2047 to accommodate 25-year growth anticipated in the Master Plan. Therefore, the "status quo" or "do nothing" approach is not feasible as the anticipated future wastewater flows from intense growth within the Municipality cannot be accommodated by the existing lagoon capacity.

For the above stated reasons, this alternative has not been carried forward into the detailed evaluation as it does not address the Problem and Opportunity Statement.

2.6.2 Alternative 2: Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity

As described above for Alternative 1, the STS rated capacity cannot accommodate future wastewater flows anticipated in the Municipality within the Master Plan timeframe. Therefore, an alternative to expand the lagoon rated capacity and adding future treatment units is presented herein. Two sub-options have been developed to capture the different discharge scenarios.

2.6.2.1 Alternative 2a: Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage

Note, that under the current ECA the STS operates with an allowable discharge between October 1 and May 15. The Winter/Spring season permits a total allowable effluent discharge volume of 502,500 m^3 between January 1 and May 15. The Fall season permits a total allowable effluent discharge volume of 267,650 m^3 between October 1 and December 31.

This alternative would include maintaining the existing lagoon discharge window, construction of a new lagoon to provide additional storage for future flow, and a new MBBR and new Disc Filter Trains to allow increased effluent flow release during the discharge window.

The existing lagoon holding capacity would require expansion to accommodate the increase in wastewater influent to the STS. It is estimated that a maximum storage volume of 460,000 m^3 is required to meet future growth, which would require an additional 130,000 m^3 storage.

The Municipality would have to purchase new lands in order to expand the lagoon footprint. Given the near doubling rated capacity requirement within 25-years, the land required to accommodate future wastewater flows will be significant. In addition, as per the MECP Guideline D-2, "*Compatibility between Sewage Treatment and Sensitive Land Use*", an additional 150 m of buffer land area is recommended for separation from the facility producing odours to the property line of sensitive land uses. As previously presented, Figure 5 shows municipally owned lands. No land near the STS is currently owned by the Municipality, so the alternative is contingent on the Municipality being able to acquire nearby lands to the existing site.

2.6.2.2 Alternative 2b: Expand Lagoon Discharge Window to Year-Round

This alternative would involve expanding the lagoon discharge window to year-round, maintaining the lagoon storage capacity and installing baffles, providing an additional Disc Filter for redundancy, and new effluent disinfection and phosphorus removal dosing systems.

An Assimilative Capacity Assessment of the South Nation River was completed and appended to the Master Plan to support the development of this alternative (see Appendix E). Consultations with the MECP and South Nation Conservation (SNA) were also completed to determine the feasibility of expanding the discharge rates and discharge windows of the lagoon ECA. The proposed effluent discharge rates, water quality objectives and limits summarized in the tables below have been agreed to by the MECP.

Table 18: Proposed Casselman STS Maximum Monthly Effluent Discharge Rates and Minimum Dilution Ratios

MONTH	MAXIMUM DAILY DISCHARGE RATE	MINIMUM DILUTION RATIO
January	5,750 m^3/d	12.4
February	5,600 m^3/d	12.4
March	7,250 m^3/d	12.3
April	10,000 m^3/d	72.9
May	4,500 m^3/d	40.5
June	2,150 m^3/d	26.2
July	1,050 m^3/d	26.2
August	900 m^3/d	26.3
September	910 m^3/d	26.2
October	2,250 m^3/d	13.1
November	6,050 m^3/d	13.1
December	8,750 m^3/d	12.4

Table 19: Proposed Casselman STS Effluent Water Quality

PARAMETER	AVERAGING PERIOD	OBJECTIVE	LIMIT
$cBOD_5$	Monthly	10 mg/L	12 mg/L
TSS	Monthly	10 mg/L	12 mg/L
TP	Monthly	0.20 mg/L	0.30 mg/L
TAN			
Dec 1 to Mar 31	Monthly	9.2 mg/L	11.5 mg/L
Apr 1 to May 31	Monthly	4.8 mg/L	6.0 mg/L
Jun 1 to Sep 30	Monthly	1.0 mg/L	1.3 mg/L
Oct 1 to Nov 30	Monthly	4.0 mg/L	5.0 mg/L
E.coli			
May 1 to Oct 31	Monthly	150 CFU/100 mL	200 CFU/100 mL
pH	Single Grab	6.8 to 7.8	6.0 to 8.0

Table 20: Proposed Casselman STS Effluent Loading Limits

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
$cBOD_5$	Annual	52.5
TSS	Annual	52.5
TP	Annual	1.31
TAN		
January	Monthly	66.1
February	Monthly	64.4
March	Monthly	83.4
April	Monthly	60.0
May	Monthly	27.0
June	Monthly	2.80
July	Monthly	1.37
August	Monthly	1.17

PARAMETER	AVERAGING PERIOD	LIMIT (kg/d)
September	Monthly	1.18
October	Monthly	11.3
November	Monthly	30.3
December	Monthly	100.6

In consultation with the supplier of the MBBR and Disc Filter systems, the following comments were provided:

- The proposed maximum flow rate through the MBBR and disk filter is equal to the existing peak design flow rates; therefore, the units can hydraulically handle the new monthly flow rates.
- The proposed TAN objectives appear to be achievable with the existing system, which will need to be confirmed using process modelling by the supplier. The stricter TAN objectives during the summer were not a concern given the expected warm temperatures during this period.
- The proposed TP objective is reasonable for a disk filter; however, the following upgrades should be considered:
    - Provision of a second disk filter to provide redundancy. Given the difference between allowable discharge in April (10,000 m^3/d) and the following six months (900 – 4,500 m^3/d), any prolonged system failure during April could result in excess wastewater accumulating in the lagoons which could not be discharged, resulting in an emergency overflow.
    - Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- A new disinfection system will need to be implemented in order to ensure E.Coli. limits and objectives are met.
- Improve flow path within the existing lagoon cells to improve pre-treatment, and to increase MBBR aeration capacity.

2.6.3 Alternative 3: Abandon Lagoon Treatment; Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round

Another alternative to increase the STS rated capacity would be to abandon the existing lagoon STS, covert to a mechanical STS and expand the discharge window to year-round.

Generally speaking, a mechanical treatment plant could provide more effective treatment than the current lagoon STS for a much smaller footprint. However, mechanical systems run on a continuous basis and discharge instantaneously to the receiver stream as soon as the wastewater is treated, so this alterative would require an ECA amendment to allow for continuous discharge all year around and the treated effluent requirements will be consistent with that presented in Table 18,Table 19 and Table 20. Additional raw wastewater or treated wastewater equalization storage may be necessary to balance the allowed effluent discharge flow rates.

This option presents significant capital investment as a mechanical treatment plant involves a multitude of unit processes that are not typically required in a lagoon-based treatment system, such as screening, grit removal, concrete tanks for biological treatment (e.g., aeration tanks and clarifiers), sludge treatment and disposal.

2.6.4 Evaluation Matrix

Table 21 provides a descriptive summary and evaluation of each alternative listed above.

2.6.5 Recommended Sewage Treatment System Alternative

The recommended strategy is Alternative 2b – Maintain Lagoon-Based Treatment System; Expand Lagoon Rated Capacity; Expand Lagoon Discharge Window to Year-Round. The proposed alternative will involve:

- Maintaining existing lagoon storage and treatment facilities and improve flow path within the existing lagoon cells.
- Maintaining existing MBBR treatment process and its rated capacity.
- Provision of a second disk filter to provide redundancy.
- Provision of a coagulation chamber to provide a secondary point of coagulant dosing, to ensure that all reactive phosphorus is precipitated into particulate form prior to filtration.
- Provision of a disinfection system to provide disinfection of effluent.
- Construction of a new building to house the disk filters and chemical systems.

In order to increase the capacity of the Casselman STS, a Schedule ‘C’ Municipal Class EA will need to be completed prior to design and construction. Equipment redundancy (i.e., disc filter and disinfection) should be reviewed and discussed during the Class EA and confirmed with the MECP prior to commencement of the detailed design. The opportunity to phase this project can also be reviewed during the Schedule ‘C’ Class EA.

Table 21: Sewage Treatment System Evaluation Matrix

	Alternative 2a – Maintain Current Lagoon Discharge Window and Provide Additional Lagoon Storage	Alternative 2b – Expand Lagoon Discharge Window to Year-Round	Alternative 3 – Abandon Lagoon Treatment, Convert to a Mechanical Treatment Plant on Existing Site and Expand Discharge Window to Year-Round
Natural Environment	• Increased footprint of the lagoon site (via construction of a new lagoon cell) will disturb the terrestrial environment around the existing agricultural land use. • Increased level of treatment for effluent will benefit the aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.	• Proposed work is limited to the existing site boundary. No significant disturbance is anticipated for terrestrial environment. • Increased level of treatment for effluent will benefit aquatic life and river water quality.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Social and Cultural Environment	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • Lagoon expansion is contingent on the Municipality being able to acquire nearby lands to the existing site that will not impact residents (i.e., odor). • Increasing lagoon footprint would require cultural heritage resource screening and potential impacts on undisturbed sites. • Future land use will be affected for areas surrounding the expanded lagoon site.	• The STS could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage, source water protection, archaeological resources as project is contained within the existing site boundary.	• The mechanical plant could accommodate future wastewater flows anticipated in the Master Plan timeframe. • No impact anticipated with respect to land use planning, cultural heritage, source water protection, archaeological resources as project is contained within the existing site boundary.
Evaluation	**Least Preferred**	**Preferred**	**Preferred**
Technical Feasibility	• Consultation with the MECP has confirmed the feasibility of maintaining discharge window and increasing effluent flow rate. • The storage solution can be affected by climate change (i.e., increased extreme weather events) and the Municipality runs the risk of insufficient storage. • For growth beyond the 25-year, additional storage will still be required. • This alternative represents inefficient use of the site with respect to the future wastewater flows.	• Consultation with the MECP has confirmed the feasibility of expanding discharge window and allowing the lagoon to discharge year-round. • This alternative involves the least construction and most efficient use of the existing infrastructure.	• A mechanical treatment plant will provide improved wastewater treatment compared to a lagoon STS for the same footprint. • The operations staff will need to be trained to operate and maintain a more complicated, new treatment system. • The level of treatment will be comparable to Alternative 2b.
Evaluation	**Less Preferred**	**Preferred**	**Less Preferred**
Financial Considerations	• Municipality will have to purchase new lands to expand the lagoon footprint. • Capital costs will include expanding the lagoon and construction, operation and maintenance of new treatment trains.	• Capital costs will include installation of new Disc Filters, disinfection, coagulant system, and improve flow path within the existing lagoon cells. • O&M costs will involve increased costs for the new treatment process and increased flow. • O&M costs for the MBBR system will likely remain the same.	• Capital costs could include decommissioning the lagoon STS and constructing a new mechanical treatment plant. • There will be significant increase to O&M costs to run the new STS facility with additional processes.
Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**
Overall Evaluation	**Less Preferred**	**Preferred**	**Least Preferred**

3.0 Recommended Servicing Strategy, Implementation and Timing

There are a number of projects for water and wastewater infrastructure that have been identified as a result of this Master Plan. Considering the combined overall costs of these projects and that various projects are based on a number of evaluation factors; it is reasonable to expect that the projects identified would be implemented in a prioritized fashion.

Based on the various evaluations including overall problem identification Table 22 below has been developed to allow the Municipality to appropriately plan and phase the identified projects. A brief summary of the rationale and assumptions have also been included so that the list can also be potentially re-visited in the future as conditions may change and a re-ordering of the Municipality's priorities can be considered based on changing conditions and available information or previous upgrade projects that could affect future projects. It should be noted that certain projects could be advanced sooner if the Municipality deems this to be feasible.

The following tables provide the Opinion of Probable Costs for the proposed upgrades as outlined previously. It shall be noted that the Opinion of Probable Costs (OPC) were completed using 2023 dollars value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each alternative solution and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Master Plan is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters should be confirmed during the upcoming Class EA and detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

Table 22: Overall Implementation Plan

Infrastructure Type	Initiation Date	Project (Class EA Schedule)	Description	Opinion of Probable Cost
PROPOSED SHORT-TERM PROJECTS (INITIATE ON 0-5 YEARS)				
Water Supply, Water Treatment, Water Storage	2024	Water Supply Phase 1 (Schedule B MCEA)	Complete the required EA, design and construction to switch water supply to Clarence-Rockland water system.	$ 74,200,000
	2024	Water Treatment Plant Condition Upgrades (Schedule A MCEA/ Exempt)	Complete the required upgrades at the WTP based on the results from the Condition Assessment completed and summarized in the Master Plan Phase 1 Report.	$ 1,400,000
	Ongoing	Water Quality Treatment System Upgrades (Schedule A MCEA/ Exempt)	At present the Municipality is conducting a water quality testing study to determine strategies to optimize the removal of Mn and Organics that are the precursors to THM formation to meet water quality objectives.	$ 1,600,000
Water Distribution	2024	New Watermain Section – Brisson to Laurier (Schedule A MCEA/ Exempt)	Add a new watermain (1 km 300 mm dia.) between Brisson and Laurier Street to provide looping existing watermain sections; to provide adequate fire flow for the next 25 years along Laurier Street near Sainte-Euphémie Pavillion, Casselman Catholic Elementary School.	$ 1,500,000
	2024	New Watermain Section – Carpe/Argile Street to Sarah/Francess Street (Schedule A MCEA/ Exempt)	Add a new watermain to connect Argile (through Carpe Street) to Sarah/Francess Street. Note, a section of this total length will cross the existing railway through horizontal directional drilling (HDD).	$ 1,600,000
Wastewater Collection	2024	Sewage Pumping Station No.1 Expansion Phase 1 (Schedule B MCEA with Screening)	SPS No.1 is at capacity under existing conditions. SPS No.1 rated capacity will be upgraded in a phased approach such that in Phase 1 the capacity will be expanded from 118 L/s to 236 L/s to meet the 10-year demand and beyond; this cost assumes no new building construction is required. Complete the required design, expansion and upgrades for the pump station. Twin the forcemain to the lagoons. Install new screen.	$ 7,400,000
	2023	Sanitary Sewer Upgrades Project 1A (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections along St. Isidore west of Principale. This project is triggered by insufficient flow under existing conditions (refer to Figure 13 in Phase 1 MP report).	$ 1,900,000
	2027	Sanitary Sewer Upgrades Project 1B (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections along Montcalm, including a railway crossing. These sections are currently under capacity.	$ 1,300,000
	2024	Sanitary Sewer Upgrades Project 2 (Schedule A MCEA/ Exempt)	New sewer (700 m) to connect Brisson to Laurier for the proposed Nationview Development.	$ 3,400,000
	2026	Sewage Pump Station No. 6 Expansion (Schedule B MCEA with Screening)	Upgrade existing pumps to rated capacity of 74 L/s from 40.5 L/s	$ 1,500,000
Sewage Treatment System	2024	Casselman Lagoon Expansion (Schedule C MCEA)	Complete the required EA, design and construction to allow year-round lagoon discharge and accommodate expansion to meet long-term growth at a rated capacity of 4,050 m^3/d, consisting of new disk filter, chemical dosing, disinfection, flow path improvement, and a new process building.	$ 9,000,000
			TOTAL SHORT-TERM COSTS	$ 104,800,000
PROPOSED MID- AND LONG-TERM PROJECTS (INITIATE IN 5-25+ YEARS)				
Infrastructure Type	**Initiation Date**	**Project**	**Description**	**Opinion of Probable Cost**
Water Supply, Water Treatment, Water Storage	2032+	Water Supply Phase 2 (Schedule B MCEA)	Provide additional water supply and storage capacity to meet long-term growth.	$ 12,100,000
Wastewater Collection	2032+	Sewage Pumping Station No.1 Expansion Phase 2 (Schedule B MECA with Screening)	Complete the required expansion and upgrades. SPS No.1 rated capacity will be upgraded in a phased approach such that in Phase 2 the capacity will be expanded from 236 L/s to 259 L/s to meet the 25-year demand. Replace existing pumps with larger pumps to accommodate firm capacity.	$ 1,200,000
	2030+	Sewage Pumping Station, Sanitary Sewer Servicing South of Hwy. 417 Construction (Schedule B MCEA with Screening)	Complete the required EA, design and new construction of sanitary sewer, pumping station and forcemain to service industrial, residential properties south of the HWY 417.	$ 11,070,000
	2032+	Sanitary Sewer Upgrades Project 3 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 450 m) along Principale and Jeanne Mance St. This project is triggered by development south of the HWY 417.	$ 1,900,000
	2032+	Sanitary Sewer Upgrades Project 4 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 750 m) along Principale St. between St-Isidore and Montcalm. This project is triggered by development south of the HWY 417 and East of Laurier Street.	$ 3,200,000
	2032+	Sanitary Sewer Upgrades Project 5 (Schedule A MCEA/ Exempt)	Upgrade existing sanitary sewer sections (approx. 350 m) along St. Joesph St. This project is triggered by development south of the HWY 417.	$1,500,000
			TOTAL MID- AND LONG-TERM COSTS	$ 30,970,000

4.0 Potential Impacts and Mitigation Measures

The proposed works in Table 22 will lead to potential impacts to the environment, construction strategy and site management, and/or cultural heritage resources. Table 23 presented below summarizes potential impacts, along with mitigation measures. It is recommended that impacts and mitigation measures be further reviewed and updated during the Class EA project specific planning and design stages.

Table 23: Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure
The Environment	
Source Water Protection	Vulnerable areas, where drinking water sources are most at risk, were reviewed within the study area. It was found that a section of the South Nation River that runs through Casselman is designated a Source Water Intake Protection Zone (IPZ) 1. There are areas designated IPZ 2, as well as groundwater recharge and groundwater quality vulnerability within the Municipality. These areas have been depicted in Figure 5 in the Phase 1 Master Plan Report. The recommended projects resulting from completion of this Master Plan are intended to improve the performance and reliability of the drinking water systems in the 25-year planning horizon. The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to IPZs within Casselman.
Climate Change	Climate change mitigation measures reduce the project's impacts on climate change, such as greenhouse gas (GHG) emissions and changes to the landscape that negatively affect its carbon sequestration and storage capacity. The project's GHG emissions can be categorized as operating carbon (emitted during the operation phase) and embodied carbon (emitted during the manufacturing and construction phase). Operating carbon consists of direct emissions from combustion of fossil fuels on site while indirect emissions are from consuming energy (ex. electricity) that was generated from off-site combustion of fossil fuels. Climate change adaptation refers to the impact of climate change on a project, i.e., the resilience or vulnerability of infrastructure to changing climatic conditions. Impacts of climate change on municipal water and wastewater projects include property-specific concerns such as flooding and system-wide impacts on water demand and electricity consumption.

	The recommended projects presented will enhance the Municipality's climate adaptation. Switching the water supply to Clarence-Rockland enhances the Municipality's climate adaptation as the current water supply, South Nation River, is anticipated to worsen in terms of water quantity/quality to climate change. The recommendation to allow the lagoons to discharge year round will mitigate risks associated with lagoon storage and potential overflows. Further review and consideration for greenhouse gas emissions, impacts on carbon sinks, and resilience or vulnerability is requried for the proposed undertakings during their respective Class EA. For instance, pumping required to transmit water from Clarence-Rockland to Casselman may increase GHG emissions; however longer term, ceasing to maintain and operate the Casselman WTP may decrease the Municipality's overall carbon footprint.
Contaminated Sites	Additional studies to identify waste disposal sites, contaminated sites and underground storage tanks and excess material management may be required as part of specific Class EAs or during project design.
Ecosystem Protection and Restoration	In general, any construction activities that may impact ecosystem form and function must be avoided where possible. Existing natural environmental features within the Master Plan study area are detailed in the Phase 1 Report and depicted in Figure 5. Some ecosystem features of note within or located near the study area include a section of the South Nation River that runs through Casselman that is a fish habitat and in the northeast corner of the municipal boundary there is a section of areas of natural and scientific interest (ANSI). The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to fish habitats that reside in the South Nation River and improve these ecosystems in the river upstream and downstream of the current WTP intake. Consultation with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and applicable, local conservation authorities should be completed during the Class EA projects to determine if special measures or additional studies will be necessary to preserve and protect sensitive features within the projects area.
Species at Risk	In general, investigation of species at risk should be completed during the projects Class EA and mitigation measures should be embedded in the design and implemented during project construction. For instance, construction activities can be

	maintained within the existing site boundary or right-of-way to minimize disruption to wildlife habitat; work can be staged to avoid spawning and breeding periods. The proponent/ consultant retained to complete the proposed Class EA projects should review the "Client's Guide to Preliminary Screening for Species at Risk" (MECP, May 2019) identified within the MECP letter (see correspondence in Appendix F).
Surface Water	Known surface waters within the Master Plan study area include the the South Nation River that runs through the Municipality of Casselman. Details on the location of surface waters and other existing natural environmental features have been detailed in the Phase 1 Report and depicted in Figure 5. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g., spills, erosion, pollution) are mitigated as part of the proposed undertakings. For instance, a stormwater management plan should be developed during the design and implementation stage and sedimentation and erosion control should be implemented during construction. The recommended long term strategy of switching water supply to Clarence-Rockland will eliminate any risk posed to surface waters within Casselman. The proponent/ consultant retained to complete the proposed Class EA projects should review the requirements identified within the MECP letter (see correspondance in Appendix F). Note, there are potential approval requirements as a result of the proposed new water supply Class EA Schedule B; this will be addressed during this undertaking.
Groundwater	There are areas designated groundwater recharge and groundwater quality vulnerability within the Municipality. These areas have been depicted in Figure 5 in the Phase 1 Master Plan Report. At this time there are no existing groundwater wells within the study area. The potential for impacts related to groundwater conditions will be assessed through geotechnical/ hydrogeological studies during the Class EA and/or design phase for the proposed works.
Construction Strategy and Site Management	
Excess Material Management	Projects activities involving the management of excess soil should

	be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). All waste generated during construction must be disposed of in accordance with Ministry requirements.
Air Quality, Dust and Noise	Increased dust and noise can be anticipated from the various construction works of the proposed projects; impacts to air quality may occur during proposed wastewater treatment plant, sewage pumping station, or sanitary sewer upgrades projects. The potential for impacts related to air quality, dust, and noise will be assessed during the Class EA and/or design phase for the proposed works. Dust and noise control mitigation measures (ex. the MECP recommends non-chloride dust-suppressants) should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the projects area are not adversely affected during construction activities.
Servicing, Utilities and Facilities	In consultation with Hydro One, it was noted that there are existing distribution assets within the study area. Ministry of Transportation (MTO) also noted that there are requirements for freeway crossings of services that would narrow down the Highway 417 crossing location, such as this Master Plan. The Ministry has authority over land use within 45 m of the Highway 417 right-of-way and 395 m from the center-point of the highway intersection. Any development within this area requires Ministry approvals, and proponents must obtain MTO permits before commencing any activities. Watermain construction that involves crossing the highway must be planned outside of the highway interchange area and must comply with the requirements of the applicable Ontario Provincial Standard Specifications, including OPSS 701, which specifically addresses watermain construction. For guidance on the installation method of any pipeline within the MTO right-of-way and highway crossing, please refer to the Highway Corridor Management Manual (2022). Early consultation with the MTO is highly recommended for activities within the control area. Pre-consultation requests with the MTO can be submitted online using the Highway Corridor Management Online Services. (see Appendix F for full correspondence). Hydro One and MTO should be consulted on individual projects during the Class EA and/or during design. Moreover, all underground and overhead infrastructure (transmission lines, telephone/internet, oil/gas, etc.) and/or potential disturbances to crossings should be identified as part of the Class EA projects and during design.

Mitigation and Monitoring	Design and construction reports/plans for the proposed projects should be based on a best management approach that centers on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas. A list of proposed mitigation and monitoring measures should be developed during the Class EA projects and/or during design for projects.
Permits and Approvals	The projects identified in this Master Plan may require specific permits and approvals; these will be identified and obtained during the projects specific Class EA and/or design. These may include: • Environmental Compliance Approval (ECA) Sewage and Air/Noise • Drinking Water Works Permit Amendment • Municipal Drinking Water License Amendment • Permit to Take Water • Environmental Activity and Sector Registry (EASR) • Conservation authority permits • Species at risk permits • MTO permits • Building Permit • Site Plan Approval • Approvals under the Impact Assessment Act, 2019. In consultation with Ministry of Natural Resources and Forestry (MNRF) it was noted that the local District office at Kemptville.Inforequest@ontario.ca should be consulted to obtain information regarding permits or authorizations that may be required as a result of the master plan (see Appendix F for full correspondence). The proponent/ consultant retained to complete the proposed Class EA projects should complete this consultation to obtain the required permits/approvals.
Cultural Heritage Resources	
Disturbance or destruction of archaeological resources Displacement of known and/or potential built heritage resources and/or cultural heritage landscapes by removal and/or demolition and/or disruption	Undertake archaeological assessment(s) to identify and evaluate resources. All archaeological assessment work must be carried out by licensed archaeologists. Identify and evaluate Built Heritage Resources and Cultural Heritage Landscapes. Avoidance, through alternative route selection. Demolition shall be considered a last resort.

5.0 Cultural Heritage Conditions

Cultural heritage resources, which includes archaeological resources, built heritage resources and cultural heritage landscapes, is an important aspect of the cultural environment and may be impacted by the proposed undertakings.

The Ministry of Citizenship and Multiculturalism (MCM) provides screening checklists to determine if the study area has cultural heritage resources. As part of this Master Plan, the MCM was consulted to determine if there are any known archaeological sites within the study area, i.e. the Municipality of Casselman. The MCM noted that there are no known archaeological assessments completed specific to this project to date. They confirmed two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.1.

For all proposed projects, the potential for disruption to cultural heritage resources is dependent on the preferred alternatives. As the Master Plan provides high level solutions for water and wastewater infrastructure needs within Casselman, in many instances an exact location for project implementation has not been defined as part of this Master Plan. Upon initiation of the project specific Class EAs identified in Table 22, cultural heritage resources screenings should be completed to determine if further assessments are to be undertaken once a preferred location is defined. When applicable, an archaeological assessment should be completed by an archaeologist licensed under the Ontario Heritage Act and/or a Cultural Heritage Existing Conditions Report should be completed by a qualified heritage consultant. The assessment report and/or existing conditions report must be submitted for MCM review prior to the completion of the Class EA and prior to any ground disturbance.

For the recommended water distribution projects (see Section 2.4.2.2 and Figure 6), the two linear infrastructure upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources. Upgrades to the elevated storage tank involve increasing the tank water level, therefore no cultural heritage resources impact assessment is required as this is an operational upgrade.

For the WTP, the preferred alternative is completing short-term upgrades within the existing plant and in the long-term building a transmission pipe from the Clarence-Rockland WTP to supply to Casselman (see Section 2.2.4.2). A water transmission main route is proposed within existing rights-of-way based on an initial feasibility study; therefore, no cultural heritage resources will likely be impacted. However, the exact piping route would need to be determined through completion of a Schedule B MECA for switching the water supply to Clarence-Rockland at which time cultural heritage resources screening shall be completed.

Similarly for wastewater, sanitary pipe upgrades are recommended within existing infrastructure corridors and are therefore not anticipated to impact cultural heritage resources (see Section 2.5.3.5 and Figure 8). SPS No. 1 and No. 6 upgrades will be contained within the existing sites (see Section 2.5.2.5 and Figure 8), therefore no impact to cultural heritage resources is anticipated but screening will be completed upon initiation of these Schedule B MECA projects. A new SPS is proposed to service development areas south of the Highway 417 (see Section 2.5.4 and Figure 8). A preferred location for this new SPS has not been defined as part of this Master Plan as it is dependent on future development areas which are anticipated in 10-25 years.

The location of the new SPS would be determined during a Schedule B MECA, at which time cultural heritage resources screening should be completed to inform the preferred location.

The preferred wastewater treatment project is contained within the existing site boundary therefore no impact to cultural heritage resources is anticipated but screening will be completed as part of the recommended Schedule C MCEA for the Casselman STS.

6.0 Public Consultation

6.1 Stakeholder and Review Agency Consultation Activities

Consultation includes project initiation notification to the public and potential stakeholders, one council presentation, notification and completion of a public information center (PIC), notice of Master Plan completion and 30-day review period at the end of the study.

A Project Initiation Notice was posted on the Municipality's website (https://en.casselman.ca/services/water_and_sewer) on June 9, 2022. Project initiation letters were also distributed directly to potential stakeholders, with an invitation to provide comments if applicable. A council presentation was held May 23, 2023. A Notice of PIC was posted on the Municipality's website (same link provided above) and distributed to stakeholders on March 13, 2024. The PIC was completed on April 3, 2024. A Notice of Master Plan was posted on the Municipality's website (same link provided above) and distributed to stakeholders on May 10, 2024. The final Master Plan report was made available on the website for the 30-day review period, which ended June 12, 2024.

Refer to Appendix F for a copy of all Notices, council presentation and PIC slides, stakeholder responses received to date and an updated stakeholder tracking list. Table 24 below provides a summary of all comments received to date and how they have been addressed in the Master Plan.

Table 24: Summary of Stakeholder Comments

Stakeholder	Summary of Comment	Summary of Action
Ministry of Transportation (MTO)	2023-06-09 – Email confirmation of receipt of Notice of Commencement and the following comment: "Please note that the MTO has requirements for freeway crossings of services such as this that would narrow down the Highway 417 crossing location."	Noted and comment has been addressed in Table 23 of this report.
	2024-03-22 – Letter response with comments from the Notice of PIC, which included: • The Ministry has authority over land use within 45 m of the Highway 417 right-of-way and 395 m from the center-point of the	Noted and comment has been addressed in Table 23 of this report.

Stakeholder	Summary of Comment	Summary of Action
	highway intersection. Any development within this area requires Ministry approvals, and proponents must obtain MTO permits before commencing any activities. • Watermain construction that involves crossing the highway must be planned outside of the highway interchange area and must comply with the requirements of the applicable Ontario Provincial Standard Specifications, including OPSS 701, which specifically addresses watermain construction. • For guidance on the installation method of any pipeline within the MTO right-of-way and highway crossing, please refer to the Highway Corridor Management Manual (2022). • Early consultation with the MTO is highly recommended for activities within the control area. Pre-consultation requests with the MTO can be submitted online using the Highway Corridor Management Online Services. 2024-05-10 – Email response to the Notice of Master Plan stating comments provided March 22, 2024 for the PIC remain the same.	Comments from the letter received March 22, 2024 have been addressed, as noted above.
South Nation Conservation	2023-06-13 – Email confirmation of receipt of Notice of Commencement and the following comment: • “Possibly, once you identify the data needed for your project, please, email a data request to the contact. Data share agreements will be required.”	Noted, for future Class EA/ design projects.
Ministry of the Environment, Conservation and Parks (MECP)	2023-06-21 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • List of First Nation and Metis communities to consult;	Noted and comments have been addressed in Table 23 of this report, which provides information on how each identified item from the “Areas of Interest” document would

Stakeholder	Summary of Comment	Summary of Action
	• Instructions on submission of final report; • Attached MECP “Areas of Interest” document; • Attached “A Proponent’s Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities”; • And Attached “Client’s Guide to Preliminary Screening for Species at Risk”. 2024-05-10 – Email response to the Notice of Master Plan stating consultation completed for the project appears complete and no further comments for the Master Plan at this time.	be dealt with as part of the Master Plan; in Section 6.2, for future projects consultation; and the identified First Nation group has been consulted. Noted, no action.
Hydro One	2023-06-23 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • Confirmation that Hydro One has existing distribution assets within the study area. Request for continued consultation throughout Master Plan and subsequent Class EAs.	Noted and comments have been addressed in Table 23 of this report.
Ministry of Citizenship and Multiculturalism (MCM)	2021-06-24 – Letter response with preliminary comments in response to the Notice of Study Commencement, which included: • Advice on how to incorporate consideration of cultural heritage by outlining the technical cultural heritage studies and the level of detail required to address cultural heritage in master plans. • Instructions on screening for archaeological potential and on determining requirement for archaeological assessment. • Reporting any existing cultural heritage and/or archaeological resources in the master plan area.	Comments have been addressed in Section 5.0 of this report.

Stakeholder	Summary of Comment	Summary of Action
	2024-01-10 – JLR inquired on archeological potential in the vicinity of the key infrastructure within the municipal boundary. MCM responded with the following: • At this time, there are no known archaeological assessments that have been undertaken specific to this project. • There are two known archaeological sites within the Municipality of Casselman: located approximately 400 m and 600 m from SPS No.6 and SPS No.1. 2024-05-10 – Letter response to the Notice of Master Plan with detailed report comments.	Noted in Section 5.0 of this report. JLR provided a response email back to the MCM on July 2, 2024, noting which comments have been addressed in this report. MCM accepted responses and confirmed that all comments have been addressed and no additional comments or questions at this time (by email on July 4, 2024).
Ministry of Natural Resources and Forestry (MNRF)	2023-06-29 – Email confirmation of receipt of Notice of Commencement and the following comment: • "Please contact the local District office at Kemptville.Inforequest@ontario.ca to obtain information regarding permits or authorizations that may be required as a result of the master plan."	Noted and comment has been addressed in Table 23 of this report.
City of Clarence-Rockland	2024-04-04 – The City called to request a copy of the PIC presentation once complete.	JLR provided copy of PIC slides.

6.2 Future Consultation Requirements

Future public and stakeholder consultation will be undertaken for the projects in Table 22 in accordance with the consultation requirements of their identified project Schedule, as detailed in the Section 1.3 of the Phase 1 Report.

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Appendix A

Casselman Surface and Groundwater Supply Feasibility Study (January 2024)

Appendix B

Piped Water Supply Feasibility Study (January 2024)

Appendix C

Water Model

Appendix D

Wastewater Model

Appendix E

Assimilative Capacity Study of the South Nation River (February 2024)

Appendix F

Public Consultation Documents

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