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Phase 2 Report

Mississippi Mills Water and Wastewater Infrastructure Master Plan

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ENGINEERS · ARCHITECTS · PLANNERS

Value through service and commitment

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1.0 Introduction

1.1 Background

The Municipality of Mississippi Mills (the Municipality) is experiencing a trend of increased development activity that is expected to continue. To accommodate this growth, the Municipality initiated a series of strategic planning studies under the brand of “MM2048 - Our Community, Our Future". These studies are being conducted in parallel using a coordinated and integrated approach. These studies include:

- Economic Development Strategy (How We Prosper)
- Planning Studies (How We Grow)
- Water and Wastewater Infrastructure Master Plan (How We Flow)
- Transportation Master Plan (How We Go)
- Community Services Master Plan (How We Play)
- Solid Waste Management Strategy (How We Dispose)
- Development Charges Background Study (How We Fund)

J.L. Richards & Associates (JLR) has been retained to complete the Water and Wastewater Infrastructure Master Plan, “How We Flow”. This new Master Plan will:

- Develop water and wastewater servicing strategies to align with updated population projections.
- Meet demand from existing and future service areas for Almonte for the next 25 years.
- Create tools for operational and capital improvements to the water and wastewater systems.
- Make recommendations to the Municipality for further studies and operational improvements they can undertake to improve the system in the future.
- Make recommendations regarding the need for new infrastructure to have capacity for future expansions.

JLR was originally retained in 2011 to complete the 2012 Almonte Ward Water and Wastewater Infrastructure Master Plan. Subsequently, JLR assisted the update of the 2012 Master Plan to reflect servicing demands in 2018.

The 2018 Master Plan included the following water distribution system recommendations:

- Condition upgrades at select wells.
- Upgrade Wells 7 and 8 to their demonstrated yield (mid-term).
- Upgrade Wells 3 and 5 to their demonstrated yield (long-term).
- Review alternative storage options, including the construction of a new reservoir to service 20-year growth projections.
- The construction of a new main service line along Victoria Street.
- Optimization of pressure zones in the northwest quadrant of the service area.
- Implementing a third river crossing to service new development and mitigate the risk from a failure of the Queen Street watermain bridge crossing.

The 2018 Master Plan included the following wastewater collection system recommendations:

- The capacity of the wastewater treatment plant (WWTP), including equalization potential in the old lagoons, should be confirmed, following a review of flows at the Gemmill's Bay sewage pumping station (SPS).
- Additional flow monitoring and a preliminary pump capacity investigation should be completed to better define the Gemmill's Bay SPS's long-term requirements.
- Expand the Spring Street SPS.
- Upgrades to several sewers downstream of the Spring Street SPS, and construction of a new trunk sewer along Victoria Street.
- Sewer extensions along Menzie Street, Paterson Street, and Houston Street to service growth.

Since the Master Plan was updated in 2018, the following changes have occurred within the Municipality:

- Lanark County produced new population projections.
- The Victoria Street trunk sewer and watermain were commissioned as recommended in the 2018 Master Plan update.
- An Official Plan Amendment expanded the Urban Boundary.
- A new water reservoir and booster pumping station were constructed as recommended in the 2018 Master Plan update.
- Twin forcemain assessment and preliminary pump capacity investigation at the Gemmill's Bay SPS to increase pumped flow to the WWTP found that the pump station should be replaced or refurbished.

1.2 Class Environmental Assessment Process

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

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

The MCEA process includes the following stages:

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

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

- ‘Exempt’ projects, most of which were formerly classified as Schedule ‘A’ and ‘A+’ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal environmental effects. While these projects are exempt from the MCEA process, proponents should consider whether notice about the project should be given or consultation on the project should be carried out. Furthermore, proponents are also responsible for obtaining any other applicable permits, approvals, and authorizations for the project.

- ‘Eligible for Screening to Exempt’ projects may be eligible for exemption based on the results of a screening process. Proponents may choose to complete the applicable screening process to determine whether the project is eligible for exemption or proceed with the applicable Schedule ‘B’ or Schedule ‘C’ process, as noted below.

- Schedule ‘B’ projects have the potential for some adverse environmental impacts. Terefore, the proponent is required to undertake the first two phases of the MCEA process. This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; and the preparation of a Project File which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. Generally, these projects include improvements and minor expansions to existing facilities or smaller new projects.

- Schedule ‘C’ projects have the potential for greater environmental impacts and are subject to the full MCEA process. This includes mandatory consultation with Indigenous Communities, the public, and other affected stakeholders as well as relevant review agencies; identifying, assessing, and refining alternative solutions to determine a preferred solution; and preparing the ESR which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

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

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

- **Approach No. 2:** This approach also concludes at the end of Phases 1 and 2 of the Municipal Class EA Process. However, the level of detail (i.e., investigation, consultation, and documentation) fulfills the requirements for Schedule 'B' projects.

- **Approach No. 3:** This approach involves the preparation of a Master Plan document at the conclusion of Phase 4 of the Municipal Class EA Process. The level of detail of the Master Plan document can fulfill requirements for Schedule 'B' and/or Schedule 'C' projects.

- **Approach No. 4:** This approach involves integration with the approvals under the Planning Act.

The Mississippi Mills Water and Wastewater Infrastructure Master Plan has followed Approach No.1, which involves the preparation of a report at the conclusion of Phases 1 and 2. The Master Plan has been completed at a broad level of assessment, which requires more detailed investigations at a project-specific level to fulfill the Municipal Class EA documentation requirements for any specific Schedule 'B' and 'C' projects identified within the Master Plan. It is recommended that, in the event of any future updates to the MCEA process, these changes be reviewed prior to commencing these future projects.

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

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

1.3 Phase 2 Methodology

Phase 2 of the Master Plan process will further evaluate the water and wastewater systems through hydraulic models and evaluation of the existing infrastructure. This Phase will ultimately identify alternative solutions to address the problems and opportunities identified in Phase 1, and select the preferred solutions. Solutions considered can include new construction, retrofits, upgrades, policy recommendations, future studies, and/or conservation measures to optimize the treatment and efficiency of the existing systems.

The following activities are planned for Phase 2:

- Water and Wastewater Conveyance: Model of the water distribution and wastewater collection systems for future development.
- Water Supply and Wastewater Treatment: Identify and evaluate alternate solutions to address capacity and treatment issues noted in Phase 1.
- Hold a Public Information Centre as part of the public consultation program to present proposed alternatives and recommended preferred solutions. The public and other stakeholders will be given the opportunity to review and comment on the information presented.

- Prepare a Master Plan Report to summarize Phase 2 findings, including costs and schedules, incorporating public feedback. It will be placed on record for a 30-day review period.

Condition assessments are not in the scope of this study.

1.4 Summary of Phase 1 Findings

A summary of the capacity limits in the existing water and wastewater systems determined during Phase 1 is included in Table 1 below. The planning periods considered as part of this Master Plan are the short-term, five-year scenario (2023-2028); mid-term, five-to-fifteen-year scenario (2028-2038); and long-term, fifteen-to-twenty-five-year scenario (2038-2048). Each column lists upgrades required in that period.

Table 1: Phase 1 Summary

<table>
<tr><th></th><th>Short –Term</th><th>Mid–Term</th><th>Long –Term</th></tr>
<tr><td>Water Distribution</td><td colspan="3">Upgrade select trunk watermains to supply minimum pressures and fire flows throughout Almonte, and service new developments.
Select aged watermains require condition upgrades.</td></tr>
<tr><td>Water Storage</td><td></td><td>Increase the water storage capacity.</td><td rowspan="2">Ensure expanded water storage facilities can supply future growth.</td></tr>
<tr><td>Water Supply</td><td>Increase the yields of Wells 7 & 8.</td><td>Develop an additional well.</td></tr>
<tr><td>Wastewater Conveyance</td><td colspan="3">Select aged sewer mains require condition upgrades or more detailed assessment.</td></tr>
<tr><td>Wastewater Pumping</td><td>Gemmill's Bay Sewage Pumping Station (SPS) requires a capacity upgrade.</td><td colspan="2" rowspan="2">Ensure expanded wastewater SPS and WWTP can supply future growth and have capacity for future expansions.</td></tr>
<tr><td>Wastewater Treatment</td><td>Wastewater Treatment Plant (WWTP) nearing 80% of its average day treatment capacity and requires expansion.</td></tr>
</table>

1.5 Problem/Opportunity Statement

The following Problem/Opportunity Statement was developed in Phase 1:

The Almonte Ward, located in the Municipality of Mississippi Mills, is serviced by communal potable water distribution and wastewater collection systems consisting of four well-based water treatment facilities, an elevated water storage tank, reservoir, booster pumping station, over 34 km of watermains, a wastewater treatment plant, one main sewage pumping station, forcemains, and over 11 km of trunk sanitary sewers.

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 assess the water and wastewater systems holistically and develop a strategic plan of actions that can be implemented over a logical 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.

2.0 Study and Overview

2.1 Study Area

The Municipality is an amalgamated municipality of three Wards: Almonte Ward, Ramsay Ward and Pakenham Ward. It is located along Highway 49, approximately three kilometres from the Ottawa city limits. Ramsay Ward and Pakenham Ward are predominantly rural and serviced primarily by private wells, septic systems, and holding tanks. The Almonte Ward is predominantly urban and serviced by communal potable water and wastewater systems.

The Almonte Ward potable water distribution system consists of five groundwater wells, an elevated potable water storage tank, at-grade reservoir with a booster pumping station, and a distribution system. The wells and tank are owned by the Municipality and are currently operated by the Ontario Clean Water Agency (OCWA). The Municipality operates and maintains the water distribution system. Refer to Figure 1 for a map of the distribution system.

The existing communal wastewater collection system was established in the 1960s and generally consists of gravity sewers, several sub-area pumping stations, a main pumping station, and an extended aeration activated sludge wastewater treatment plant. Septage is also received at the wastewater treatment plant. The wastewater collection system is owned and operated by the Municipality. OCWA is presently contracted to operate and maintain the pumping and treatment systems. Refer to Figure 2 for a map of the collection system.

This Master Plan Update considers the Study Area to be the entire boundary of the Almonte Ward within the Municipality and the White Tail Ridge Development Area in the Ramsay Ward, as illustrated in Figure 1 and Figure 2.

Future development areas adjacent to the Almonte Ward boundary were also considered as part of this Master Plan. The planning periods considered as part of this Master Plan are short-term (2023-2028), mid-term (2028-2038), and long-term (2038-2048).

2.2 Population Projections

Population projections for the MM2048 strategic planning studies were established in the Population Projection 2048 for Economic Development Vision report submitted by JLR on September 8, 2023, and included in Appendix A, for the following planning periods:

- Existing Conditions.
- Short-term 1 to 5 Years, or 2023-2028.
- Mid-term 5 to 15 Years, or 2028-2038; and
- Long-term 15 to 25 Years, or 2038-2048.

The expected Almonte population was developed for each planning period in the Master Plan based on consultation with Municipality, industry partners, and current development applications, as summarized in the following table.

Table 2: Estimated Almonte Population from Population Report

Year	Almonte Population
Existing (2021 Census)	6,098
2028	8,238
2038	11,718
2048	12,952

Almonte is expected to see 2,856 new housing starts between 2021 and 2048, based on the project population increase since the 2021 Census determined through consultation with developers, and a population density of 2.4 persons per household. Employment growth estimations were limited to the number of employees able to be serviced by the undeveloped employment lands currently within Almonte. This limit was established at the direction of the Municipality.

To establish future potable water storage requirements, the MECP recommends determining an ‘equivalent service population’. This equivalent service population determines the population equivalent to the demand from industrial, commercial, and institutional (ICI) usage (MECP, 2008). This process is outlined in Section 4.4 of this report.

2.3 Natural Environment

In 2012, Golder Associates (now WSP) prepared a Baseline Hydrogeology Assessment. The assessment found that overburden deposits in the area are generally thin and did not report useable overburden aquifers. The major aquifer utilized by the Almonte water system is located within the lower Nepean sandstone formation. A review of local water well records indicated some of the local wells obtain water from the carbonate formations that overlie the Nepean formation.

Based on available MNRF mapping, there is one area classified as a candidate life science ANSI, the Appleton Swamp (provincially significant wetland) within the Study Area. Refer to Figure 3 for the location of the wetland.

In 2012, Golder Associates completed a Desktop Environmental Site Assessment of the study area to identify potential environmental concerns which could impact geology and/or hydrogeology. The report identified several areas of environmental concern including historical and/or current presence of retail fuel outlets, underground storage tanks, dry cleaning facilities and dye works, landfills, and textile manufacturing facilities.

Consultation with the Municipality determined no significant changes occurred within the environment in this regard since 2012. Therefore, no updated environmental site assessments were undertaken as part of this Master Plan.

3.0 Identification and Evaluation of Servicing Strategies

3.1 Evaluation Methodology

Evaluation criteria were developed based on background information, experience on similar assessments, stakeholder comments, and consultation with the Municipality. The criteria fall within one of five categories: Natural Environment; Climate Change Resiliency; Social, Cultural, and Heritage Environment; Technical Feasibility; and Financial Considerations. The criteria are described in Table 3 below:

Table 3: Description of Evaluation Criteria

Major	Minor	Description
Natural Environment	Natural areas, terrestrial ecosystems, and wetlands	Impacts on natural areas, including terrestrial ecosystems and wetlands.
	Aquatic and terrestrial species	Impacts on construction and operations on aquatic and terrestrial species & their habitat, including species at risk
	Water quality and quantity	Impacts on water quality and quantity
Climate Change Resiliency	Climate Change Impacts	Impacts of climate change on the project such as elevated levels of precipitation, drought, and extreme weather.
	Ability to Mitigate	Ability of the project to mitigate climate change effects such as its contribution to greenhouse gas production and impacts on carbon sinks.
	Ability to Adapt	Ability of the project to adapt to impacts of climate change on the project, i.e., the resiliency and security of infrastructure.
Social, Cultural, & Heritage Environment	Archeological, cultural, and built heritage resources.	Impact of project on archeological, cultural, and built heritage resources.
	Air Quality and Noise	Impacts from air quality and noise changes during construction and operation.
	Construction and Operation	Impacts of construction and operation on the public including visual aesthetic and commuting.
	Community	Impacts on local Indigenous communities, lands, and/or way of life; community facilities, institutions, and businesses; and residents.
Technical Feasibility	Constructability	Potential for challenges and constraints during construction.
	Ease of Operation & Operational Flexibility	Ease of operation and operational flexibility of the system.
	Ability to Expand Infrastructure	Ease with which the system can be expanded to accommodate the increase in projected flow.
Financial Considerations	Capital Costs	Impact of estimated capital costs.
	Operation and Maintenance Costs	Impact of estimated operation and maintenance costs.

The relative level of impact of each potential solution on each criterion was assessed based on the scoring system summarized in Table 4. The option that ranked the highest according to the scoring system was recommended as the preferred solution and presented to stakeholders to solicit input prior to finalization.

Table 4: Detailed Evaluation Impact Levels

Evaluation Impact Level
Positive Impact
No Anticipated Impact
Negative Impact

3.2 Opinion of Probable Costs

All opinion of probable costs referred to in this Master Plan are based on a Class 'D' estimate class, which is generally defined as follows:

- Work Definition: A description of the intended solutions with such supporting documentation as is available (definition of project typically in the order of 1% to 5%).
- Intended Purpose: To aid in the screening of various options prior to recommending a preferred solution.
- Level of Effort: Limited and expected accuracy could range from -25% to +50%.
- Opinion of Probable Costs: Completed using 2023-dollar value.

Further study will be required to determine development charges (DC) study costs, and estimates for Class EA, design, project management, and construction work for some projects.

As all costs are in 2023 dollars, the Municipality should account for yearly increases in the budgeted cost due to inflation and other factors.

4.0 Potable Water System

4.1 Existing System

The Municipality's communal water system is supplied by five groundwater wells identified as 3, 5, 6, 7, and 8.

Well 3 is located near Ottawa Street. It is equipped with a vertical turbine pump, chlorination system and associated instrumentation. The well is enclosed within a vented weather-tight masonry block and brick pump house.

Well 5 is in the municipal works yard on the west side of the Mississippi River. It is equipped with a vertical turbine pump, a chlorination system and associated instrumentation. The well is enclosed within a vented weathertight masonry block and aluminum clad pump house.

Well 6 is in Gemmill Park, near Christian Street, on the west side of the Mississippi River. It is equipped with a vertical turbine pump, chlorination system and associated instrumentation. The well is enclosed within a vented weathertight masonry block and wood siding pump house.

Wells 7 & 8 are located on Patterson Street on the east edge of Town. Located approximately five metres apart in the same building, they are equipped with vertical turbine pumps, a chlorination system and associated instrumentation. The wells are enclosed within a vented weathertight masonry block and brick or vinyl siding pump house.

Table 5 summarizes operational characteristics of the wells.

Table 5 Well Operational Characteristics

Well	Year Constructed	Depth (m)	Size (mm)	Flow Parameter (L/s)				
				PTTW	DWWP	MDWL	Demonstrated Yield	Operating Limit (1)
3	1948	47.5	250	9.7	9.9	9.7	9.7	7.1
5	1970	38.1	203	9.5	9.5	9.5	9.5	6.4
6	1973	48.8	254	22.7	22.7	22.7	11.9 (2)	11.9
7 & 8	1990/1991	79.2	254	44.7(3)	44.8	44.7	75.7	44.7
TOTAL				131.2(3)	86.8	86.5	106.8	70.1

(1) Operational limitations provided by OCWA (November 2006) and confirmed in 2023.
(2) High turbidity/sediment levels limit the demonstrated yield to 11.9 L/s (operational limit).
(3) The PTTW authorizes both Well 7 & 8 to take 44.7 L/s, meaning the total authorization is a sum of five wells, 131.2 L/s. However, the system operation does not allow Wells 7 & 8 to operate separately, and the MDWL set a limit of 44.7 L/s for Wells 7 & 8 combined.

The wells operate in accordance with the following Certificates:

- Permit to Take Water (PTTW) No. 8175-AQPHA8, dated September 8, 2017, which allows for a total combined water taking capacity of 131.2 L/s (11,335 m^3/d). It expires on August 31, 2027.

- Drinking Water Works Permit (DWWP) No. 178-201, Issue No. 5, dated November 26, 2021.
- Municipal Drinking Water License (MDWL) No. 178-101, Issue No. 5, dated November 26, 2021, which outlines an approved total combined rated capacity of 86.5 L/s.

As indicated above, all wells except Well 6 are not operating at their full demonstrated yield potential and could be considered for additional supply. Well 6 will not be considered for operation beyond the observed operating limit (11.9 L/s) as pumping at higher rates result in increased sediment production and turbidity. Turbidity reduction may require substantial treatment, which is impractical or cost intensive.

Groundwater wells are known to produce water with elevated levels of hardness, as seen in the existing Almonte wells. It is understood some water users in the Almonte system utilize water softeners to treat this hardness.

Table 6 summarizes historic potable water demands for 2018 through to 2022 for the Almonte Ward. The 2008-2011 average/maximum values that were the design basis for the 2012 Master Plan, and the 2012-2016 average/maximum values used in the 2018 Master Plan update, are provided for reference.

Table 6: Historical Potable Water Demands (2018-2022)

Year	Average Day Demand		Maximum Day Demand	
	m^3/day	L/s	m^3/day	L/s
Average/Max (2008-2011)	1726	20	3893	38.1
Average/Max (2012-2016)	1729	20	3754	43.4
2018	1969	22.8	3024	35.0
2019	2047	23.7	3284	38.0
2020	2038	23.6	3571	41.3
2021	2367	27.4	3817	44.2
2022	2530	29.3	4624	53.5
Average/Max (2018-2022)	**2190**	**25.4**	**4624**	**53.5**

4.2 Design Criteria

Table 7 summarizes the water demand rates used as the design basis to evaluate the Municipality’s potable water system.

Table 7: Design Criteria–Water Demand Rates

Land Use	Design Criteria	Maximum Day Factor	Peak Hour Factor
Existing and Future Residential	350 L/cap/day	2.5	2.2
Existing and Future Light Industrial	35,000 L/ha/day	1.5	1.8
Existing and Future Commercial	28,000 L/ha/day	1.5	1.8

The existing average day demand of 25.4 L/s, when divided by the 2021 census population, results in a water demand comparable to the design value of 350 L/d per capita. However, the 25.4 L/s of historical demand includes industrial, commercial, and institutional (ICI) demands in addition to residential demands. Therefore, the design criteria value of 350 L/d for residential demands in both existing and future demand projections is a conservative estimate. The ICI demand is calculated separately in the future demand projections using the per-hectare demand criteria listed in the table above.

Water pumping stations or wells are rated on their 'firm' pumping capacity. Firm capacity is based on the capacity of the station or system, with the largest pump out of service. Pumping stations or well systems are sized based on maximum day flows for areas with sufficient water storage volume, and peak hour flows for areas without sufficient storage.

Storage capacities are based on the Ministry of Environment Conservation and Parks (MECP) Guidelines for Drinking Water Systems (MECP, 2008). The total storage capacity requirements for a pressure zone are the sum of the equalization storage, fire storage, and emergency storage allowances per the MECP guidelines. These design criteria are summarized in Table 8.

Table 8: Design Criteria–Water Infrastructure and Facilities

Component	Description	Design Criteria
Pumping or Well Systems	• With Adequate Zone Storage Available • Without Adequate Zone Storage Available	• Maximum Day Flows to Zone and All Subsequent Zones • Peak Hour Flows to Zone and Maximum Day Flows to All Subsequent Zones
Storage	• A–Fire Storage • B–Equalization Storage • C–Emergency Storage • Total	• Largest Expected Fire Volume • 25% of Maximum Day Demand • 25% of 'A' + 'B' • 'A' + 'B' + 'C'
Fire Flows (1)	**Existing Development** • Residential • Industrial Commercial and Institutional (ICI) **New Development** • Less than 3 m • Residential 3 to 10 m • Residential 10.1 to 30 m • Residential Over 30 m	**Ontario Building Code** • ~45 L/s • 100 to 150 L/s **Fire Underwriters Survey (2)** • 133 L/s (8,000 L/min) • 67 L/s (4,000 L/min) • 50 L/s (3,000 L/min) • 33 L/s (2,000 L/min)
System Pressure	▪ Normal Operating Conditions	▪ 275 kPa (40 psi) to 700 kPa (100 psi)
(1) This scenario was modelled assuming a minimum pressure of 140 kPa (20 psi) at any junction or hydrant within the service area. (2) Fire flow assessment criteria from the Fire Underwriters Survey, 2020.		

4.3 Water Supply Alternatives

An evaluation of potential options for water supply for the Almonte Ward was completed during Phase 2 of this Master Plan. The evaluation considered potential constraints with the existing wells and potential options for increasing the capacity of the system.

The water supply constraints are summarized in Table 9 below.

Table 9: Water Supply Constraints

Existing Parameters (L/s)	Period	Max Day Demand Design Basis (L/s)	Deficit (Existing Supply) (L/s)	Deficit from Full Yield (L/s)	Deficit Full Yield at Only Wells 7 & 8 (L/s)
Supply (Operating Limit): 70.1 **Full Yield:** 106.8 **Full Yield Only at Wells 7&8[(1)]:** 101.1	**Existing (2022)**	53.5	None	None	None
	Short–Term (2023-2028)	96.0	25.9	None	None
	Mid–Term (2028-2038)	140.6	70.5	33.8	39.5
	Long–Term (2038-2048)	159.0	88.9	52.2	57.9

(1) This total is equal to the current operating limits of Wells 3, 5, and 6 (7.1 + 6.4 +11.9 = 25.4 L/s), with an upgraded operating limit of 75.7 L/s for Wells 7 & 8.

It is generally best practice that municipalities investigate and undertake water conservation measures to reduce the demand on the water supply system. Investigating these measures is outside the scope of this Master Plan but as they are beneficial, they are recommended.

4.3.1 Short Term (2023-2028)

The demonstrated yields of Wells 7 & 8 were determined after a pumping test program conducted in 1990 and 1991. Previous studies suggest groundwater levels have not changed significantly since then, so the potential yield of the aquifer remains the same. If the yield of both Wells 7 & 8 were restored to their original rated capacities, approximately 37.7 L/s in supply can be gained.

Therefore, it is recommended that Wells 7 & 8 be improved to increase their supply. However, this only temporarily satisfies demand as the projected demand in the mid-term will exceed this improved capacity.

A Schedule ‘B’ Class EA will be needed to increase the Well 7 & 8 water supply, in addition to a Source Protection Plan amendment that will be triggered by the increased water taking. It is recommended that updated testing of Wells 7 & 8 be completed to confirm their original rated capacity or determine if an additional well is required on the same site to achieve a total yield of 75 L/s. During this work, the groundwater modelling should be updated to outline the Well Head Protection Areas resulting from the increased water taking.

The current average day demand remains consistent with the assumptions in the original Source Protection Plan from 2002. They currently do not require an update to the groundwater model. Refer to the Geofirma Report in Appendix B for more details.

The rehabilitation of Wells 3 and 5 to their original demonstrated yield were not considered as they will only gain approximately 5.7 L/s in supply. Previous studies suggest that the reduction from their original yield is not likely due to over-exploitation, but rather the plugging of fractures that conduct water to the well. Rehabilitation measures are not practical based on the limited yield that will be gained at a high financial cost. A study should be completed to determine if the operational costs of Wells 3 and 5 justify their continued use, or whether decommissioning them and replacing their contribution with other wells is more cost effective.

The rehabilitation of Well 6 to its original demonstrated yield was not considered as sediment production and increased turbidity have been observed in the well when pumping at rates higher than 11.9 L/s. It may be possible to reconstruct the well to prevent sand from entering the pump, but reducing turbidity may require substantial treatment which is not practical or cost effective.

While increasing water supply by drilling a new well is not a solution identified in the short-term, it is recommended that a potential future well site be identified. This includes completing water quality and quantity testing to verify the long-term variability of the groundwater source as identified in the previous hydrogeological studies. It is recommended the results of future well testing be considered during the future Source Water Protection Plan update and groundwater modelling if timing allows for it.

4.3.2 Mid Term (2028-2038)

As seen in Table 9, mid-term demand exceeds the water supply available from the system, regardless of how many wells are upgraded. To address this deficit, an initial screening of options was conducted as follows:

4.3.2.1 Option 1: Do Nothing

The ‘Do Nothing’ approach examines what may occur if none of the alternatives are implemented; it is generally carried forward for detailed review for comparison.

4.3.2.2 Option 2: Develop New Well(s)

Developing a new well consists of selecting a well site, undertaking tests to assess the capacity of the proposed site, drilling the new well, and installing the associated treatment system. New watermains will need to be constructed to connect the well to the existing trunk main. The well building or pumphouse would contain treatment systems such as a new sodium hypochlorite feed system, monitoring equipment, chlorine contact chambers, and/or other treatment systems identified in the later phases of the design.

This option would require a PTTW application, amendments to the DWWP and MDWL, an update to the Source Water Protection Plan, and studies required for design or by the MECP.

The available operational data and groundwater testing indicates that the Nepean Sandstone aquifer that serves the existing wells is vast and will be a viable water supply source. **Based on**

the viability of the current groundwater source, this alternative is recommended to be carried forward for detailed evaluation.

4.3.2.3 Option 3: New Water Treatment Plant

The construction of a new Water Treatment Plant (WTP) will consist of selecting a site, constructing the treatment plant building along with the intake, and installing watermains to connect the plant to the existing trunk main. The building will house the new mechanical and treatment systems. Treatment is typically achieved through coagulation, flocculation, sedimentation, filtration, and disinfection systems such as filters, activated carbon feed, and sodium hypochlorite feed systems. These are supported by various pumps and storage tanks such as those for backwashing filters. This option would require a PTTW application, an update to the Source Water Protection Plan, and studies required for design or by the MECP.

The WTP would have a much larger footprint compared to a well building. However, the Mississippi River runs through Almonte and would be a potential surface water source due to its accessibility. **Based on the availability of the Mississippi River as a potential surface water source, this alternative is recommended to be carried forward for detailed evaluation.**

The summary of the evaluation is in Table 10 below.

Table 10: Evaluation of Mid–Term Implementation Water Supply Options

Criteria	Option 1: Do Nothing	Option 2: New Well(s)	Option 3: New Water Treatment Plant
Natural Environment	No impact on water quality or quantity.	Local aquifer can support additional water supply from a new well(s).	Additional studies required to assess if surface water can support a new water treatment plant.
Evaluation:	No Impact	No Impact	Negative Impact
Climate Change	Makes Almonte's potable water infrastructure vulnerable to impacts of climate change (e.g., drought conditions).	Least infrastructure to develop and maintain water supply, which results in the least GHG emissions of the options. Increases well redundancy by developing additional well(s). Aquifer is a reliable source but reliance on groundwater limits the system's resiliency.	Larger infrastructure produces more GHG emissions from long-term operations and construction. Vulnerable to impacts of climate change and drought conditions of the Mississippi River.
Evaluation:	Negative Impact	No Impact	Negative Impact
Social, Cultural, & Heritage Environment	No impacts on social, cultural, and heritage resources, air quality, or the community. No construction or operation impacts.	Minimal impacts on social, cultural, and heritage resources, air quality, or the community. Minimal construction or operation impacts.	Highest impacts on social, cultural, and heritage resources, air quality, or the community. Highest construction or operation impacts.
Evaluation:	No Impact	No Impact	Negative Impact

Criteria	Option 1: Do Nothing	Option 2: New Well(s)	Option 3: New Water Treatment Plant
Technical Feasibility	Will not be able to supply water for mid-term growth.	Will be able to supply water for mid-term growth. Easily integrated into existing distribution system.	Will be able to supply water for mid-term growth. Challenging to integrate into existing distribution system.
Evaluation:	Negative Impact	Positive Impact	No Impact
Financial	No capital costs. Inaction may lead to high financial impacts in the future.	Lower capital and operational costs.	Highest capital and operational costs.
Evaluation:	No Impact	Positive Impact	Negative Impact
Overall Evaluation:	**Not preferred**	**Preferred**	**Not preferred**

The preferred solution to supplying the deficit is developing a new well. The location of the well should be determined based on separation distances from other wells, sources of contamination, and surface water as part of a Schedule ‘B’ Class EA. A test well should be drilled at the proposed location to determine the expected yield. It is recommended that with any new well, an additional well be considered to offer added redundancy and operational flexibility in the event of equipment breakdown and/or scheduled maintenance, like existing Wells 7 & 8.

4.3.3 Long–Term (2038-2048)

Any new well(s) installed in the mid-term should be developed such that they can supply long-term demand. Accelerated growth rates may require the water supply to be expanded in the long term.

The ability of Almonte’s potable water system to be resilient in the face of future long-term effects of climate change is limited by its reliance on groundwater as a water source. Current operational data and available groundwater testing indicates that the Nepean Sandstone formation is a vast regional aquifer that is expected to remain a viable source of supply. It is recommended that well monitoring for changes in supply and the groundwater levels be maintained over the long-term.

4.3.4 Potential Future Water Quality Treatment Requirements

The following section provides a summary of future potential water quality treatment requirements for consideration. These requirements could be adopted in Ontario based on emerging issues, Health Canada standards, and United States Environmental Protection Agency (US EPA) standards. It is recommended that OCWA continue to monitor testing requirements on an as-needed basis.

4.3.4.1 Perfluoroalkylated substances (PFAS)

PFAS are a group of synthetic chemicals, commonly being perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). According to Health Canada, these chemicals are widespread, typically used in industrial and consumer products (e.g., adhesives, cosmetics, cleaning products), specialized chemical applications (e.g., fire-fighting foams), and various coatings for paper and fabric.

Their carbon-fluoride bond prevents PFAS from breaking down easily, making them persistent in the environment. Health Canada Guidelines require drinking water to meet a maximum allowable concentration (MAC) of 0.2 µg/L PFOA, and 0.6 µg/L PFOS. The sum of PFOS and PFOA concentrations in drinking water, divided by their respective MAC, should not exceed one.

There are currently no specific requirements from the province of Ontario for monitoring PFAS. However, the provincial government may impose regulatory requirements related to PFAS removal, as potential exposure pathways and related health exposure risks are further researched and evaluated.

4.3.4.2 Disinfection By-Products (DBPs):

Trihalomethanes (THMs) and Haloactitic Acids (HAAs)

DBPs occur when naturally occurring organic materials in water react with disinfectants, i.e., chlorine. Provincial and Health Canada guidelines require a running annual average of quarterly THM and HAA sampling results to be less than 0.10 mg/L and 0.08 mg/L, respectively.

The 2018 Edition of the Drinking Water Standards and Health Advisories Tables published by the US EPA requires a running annual average THM and HAA limit of 0.08 mg/L and 0.06 mg/L, respectively. Since it is common for Canadian federal and provincial regulations to conform to changes in regulations published by the US EPA, it is possible this more stringent requirement may be adopted in the future.

The Municipality of Mississippi Mills Drinking Water System Annual Water Quality Reports from 2018 to 2022 indicate that under current operating conditions, the treatment system maintains average THM concentrations well below 80 ug/L and HAA concentrations well below 60 ug/L.

4.3.4.3 Iron and Manganese

The Ontario Drinking Water Quality Standards (ODWQS) establishes minimum water quality requirements for drinking water in the province of Ontario. The standard identifies Maximum Allowable Concentrations (MAC), Operational Guidelines (OG), and the Aesthetic Objectives (AO) for various elements and compounds. The ODWQS indicates AOs of 0.3 mg/L for iron and 0.05 mg/L for manganese.

Health Canada issued a Technical Document in 2019 “Guidelines for Canadian Drinking Water Quality: Guideline Technical Document–Manganese” that established a stricter AO for manganese of 0.02 mg/L, and a MAC of 0.12 mg/L. The Technical Document further indicates that utilities establish a treated water goal of 0.015 mg/L or less for the design and operation of manganese treatment systems.

While these requirements are not in the ODWQS and remain under evaluation, they are likely to be adopted by the MECP soon.

4.4 Water Storage Strategies

An evaluation of potential options for water storage for the Almonte Ward was completed during Phase 2 of this Master Plan. As mentioned in the introduction, the MECP recommends determining an equivalent service population to establish future potable water storage requirements.

The design rates listed in Table 7 and the future developments as determined in the Growth Report were used to determine the equivalent ICI service population. These calculations are summarized in Table 11.

Table 11: Equivalent Population

Contribution	Period	Short–Term (2023-2028)	Mid–Term (2028-2038)	Long–Term (2038-2048)
Residential	Population	8,238	11,718	12,952
	Average Day Demand (m^3/d)	2,883	4,101	4,533
Industrial	Cumulative Area (ha)	17.7	21.8	31.4
	Average Day Demand (m^3/d)	620	763	1,099
Commercial	Cumulative Area (ha)	3.7	17.9	
	Average Day Demand (m^3/d)	104	501	
Total Average Day Demand (m^3/d)		3,606	5,366	6,134
Equivalent Population		**10,304**	**15,330**	**17,524**

The water storage constraints identified in Phase 1 are summarized in Table 12 below.

Table 12: Water Storage Constraints

Period	Equivalent Population (1)	Volume (m^3)					
		Existing Storage (2)	‘A’	‘B’	‘C’	Required Storage	Deficit
Existing	6,098	5,330	1,718	1,334	763	3,814	None
Short–Term (2023-2028)	10,304	5,330	2,100	2,073	1,043	5,216	None
Mid–Term (2028-2038)	15,330	5,330	2,557	3,037	1,399	6,993	1,663
Long–Term (2038-2048)	17,524	5,330	3,675	3,433	1,777	8,885	3,555

(1) Equivalent population determined using a daily demand of 35,000 L/ha for light industrial lands, 28,000 L/ha for commercial lands, and 350 L/d per capita.
(2) Existing storage is inclusive of both the elevated tank (2,830 m^3) and at-grade storage reservoir (2,500 m^3).

4.4.1 Short–Term (2023-2028)

No water storage capacity constraints were identified in the short-term during Phase 1. Therefore, no further assessment of storage strategies was considered for this planning period.

4.4.2 Mid–Term (2028-2038)

The Almonte water system does not have any buffering water storage available beyond the capacity of the existing elevated tank and at-grade reservoir. While the combined volume provides sufficient fire flow storage (‘A’) and equalization storage (‘B’), additional water storage is required in the mid-term to ensure adequate emergency storage (‘C’) is available in the community. The mid-term water storage expansion should consider up-sizing to address the long-term deficit of 3,555 m^3 to avoid a subsequent water storage project in the 2038 to 2048 timeline.

To address this deficit, an initial screening of options was conducted as follows:

4.4.2.1 Option 1: Do Nothing

The ‘Do Nothing’ approach examines what may occur if none of the alternatives are implemented; it is generally carried forward for detailed review for comparison.

4.4.2.2 Option 2: Expansion of Booster Pumping Station and Reservoir

The current at-grade reservoir and booster pumping station site has sufficient space for an additional at-grade reservoir that can address the mid- and long-term water storage deficits. The booster pumping station building would require an expansion to house additional equipment and increased pumping capacity. In this option, most of the water storage will be at-grade and dependent on pumps to distribute water during high demand periods, such as peak hour and fire fighting.

To facilitate future pumping needs in the long-term, a dedicated high pressure watermain is required to connect the current elevated tank to the expanded pumping station. This watermain is assumed to run south from the pumping station, along County Rd 29, then head east at the future southwestern development to cross the Mississippi River and turn north at Old Almonte Rd to reach the elevated water tank. Existing and future development areas could connect to this high pressure watermain through individual Pressure Reducing Valve chambers installed periodically along the route to allow usable pressures enter the water distribution system.

This option would require maintenance of a new at-grade reservoir, additional high lift pumps in an expanded booster pumping station along with six to eight pressure reducing valve chambers. A Schedule ‘B’ Municipal Class EA is required prior to implementation of an expanded booster pumping station and reservoir. **Based the available space for an additional reservoir, this configuration is recommended to be carried forward for detailed evaluation.**

4.4.2.3 Option 3: New Booster Pumping Station and Reservoir

This option would consist of a 3,555 m^3 reservoir and booster pumping station. The configuration of the reservoir can be either at-grade or below grade. Below-grade reservoirs have less visual impact. The tank can be arranged to have two or more cells that can be taken offline independently, enabling maintenance or inspection activities to proceed while retaining some storage capacity.

A below-grade reservoir requires a much larger footprint relative to an at-grade reservoir configuration or elevated tank. Typical water depth for a below-grade reservoir is 3 to 5 m. As a result, a reservoir with a capacity of 3,555 m^3 would require a plan area of 600 to 1,000 m^2, in addition to the pumping station, berms, and other on-site facilities. An at-grade reservoir occupies less area than a below-grade reservoir of comparable volume due flexibility in diameters and heights. For example, a typical steel tank height of 10 m would require a plan area of 355.5 m^2 (for a total volume of 3,555 m^3), though a buried tank would require at least twice as much area. An at-grade reservoir is also advantageous as its cost is less dependent on the geology since it is above ground. Bedrock can be found at shallow depths in the Almonte Ward and can incur excessive costs during construction.

Both below and at-grade reservoirs require the same pumping station infrastructure. This consists of the continued maintenance of an additional pumping station building, high lift pumps, process piping, valves, and electrical and instrumentation equipment. An additional pumping station would increase operational maintenance that can be mitigated by either expanding the existing booster pumping station and water storage reservoir or replacing the elevated tower with additional volume. **Based on the increased long-term maintenance, it is not recommended that a new booster pumping station and reservoir be carried forward for detailed evaluation.**

4.4.2.4 Option 4: Elevated Tank Replacement

Elevated tanks are typically painted or coated steel tanks placed on a support structure, much like the existing elevated tower. The elevated tank water level corresponds to the instantaneous pressure in the system, which means no additional pumping is required beyond the existing well pumps and booster pumping station/reservoir that fill the elevated tank. An elevated tank has relatively lower operation and maintenance requirements when compared to a continually operating pumping station that has 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 sophisticated control systems to ensure safe and reliable water distribution system operation.

This option involves decommissioning the existing elevated tank and building a new, larger elevated tank with a total storage capacity of 6,385 m^3. Typical service life for a composite elevated storage tank is in the range of 80 to 100 years. The existing composite elevated storage tank was constructed in 1992 (i.e., 32 years old), and had the exterior surface recoated in 2013. Therefore, age replacement of the existing elevated tank is not warranted. However, a capacity expansion is required and remains beneficial.

The current elevated location can easily be integrated into the water distribution system near the current and long-term water supply well locations (i.e., Wells 7 & 8). Additional property behind the current water tower is anticipated to be available to locate the new tank and ease construction sequencing constraints. The existing tank would remain operational for the duration of the construction and removed following the successful commission of the new tank. This mitigates impacts to water service and fire protection for the duration of the elevated tank replacement.

A Schedule ‘B’ Municipal Class EA is required to prior to replacing the elevated storage tank. Assessment of alternative locations will require an assessment of trunk watermain requirements. The location should remain near the existing Wells 7 & 8 or the future supply well. **Based on the ease of long-term operation and integration into the existing water distribution system this configuration is recommended to be carried forward for detailed evaluation.**

4.4.2.5 Option 5: Second Elevated Water Storage Tank

This option involves maintaining the existing elevated tank and constructing a new elevated tank to fulfill water storage requirements. Operation of two elevated storage tanks in a single pressure zone presents challenges to control fill/drain cycles that could impact water quality. To address these operational challenges, a new pressure zone and extensive watermain upgrades will be needed to separate the two elevated storage tanks. The watermain upgrades are required to centralize water supply to a single pressure zone by connecting all wells dispersed through the urban Almonte Ward. **Based on the cost and complexity of forming a new pressure zone and scope of watermain upgrades, this configuration is not recommended to be carried forward for detailed evaluation.**

Table 13: Evaluation of Mid–Term Implementation Water Storage Options

Criteria	**Option 1: Do Nothing**	**Option 2: Expand Water Storage & Booster Pumps**	**Option 4: New Elevated Tank**
Natural Environment	No impact on water quality or quantity.	Higher impact due to new construction. Improves water distribution system.	Some impact due to new construction. Improves water distribution system.
Evaluation:	No Impact	Positive Impact	Positive Impact
Climate Change	Leaves Almonte potable water system vulnerable to impacts of climate change (ex. droughts).	Expanded infrastructure makes community more resilient. More GHG production.	New infrastructure makes community more resilient. Lower GHG emissions from less energy to maintain system pressure.
Evaluation:	Negative Impact	Positive Impact	Positive Impact
Social, Cultural, & Heritage Environment	No impacts on social, cultural, and heritage resources, air quality, or the community. No construction or operation impacts.	Some impacts on social, cultural, and heritage resources, air quality, or the community. Some construction and high operation impacts.	Low impacts on social, cultural, and heritage resources, air quality, or the community. Some construction and low operation impacts.
Evaluation:	No Impact	Negative Impact	Negative Impact
Technical Feasibility	Will not be able to support mid-term growth.	Requires the more infrastructure upgrades (reservoir, building, equipment, and high pressure watermain) and requires pumping to support mid-term growth and beyond. More complex system to operate and maintain.	Will be able to support mid-term and beyond. Ease of integration into existing distribution system. Easy to operate.
Evaluation:	Negative Impact	Negative Impact	Positive Impact
Financial	No capital costs. Inaction may lead to high financial impacts in the future from system failures.	Expanding the existing water booster pumping station can cost $12M to build. Highest operational costs of all options.	A new elevated tank can cost $15M to build. Operational costs are lowest of all options.

Criteria	Option 1: Do Nothing	Option 2: Expand Water Storage & Booster Pumps	Option 4: New Elevated Tank
Evaluation:	No Impact	Negative Impact	Negative Impact
Overall Evaluation:	**Not preferred**	**Not preferred**	**Preferred**

The preferred solution is the construction of a new elevated water tank in the mid-term while maintaining the existing at-grade storage tank. To facilitate this, a Schedule 'B' Class EA must be undertaken prior to the design and construction process. If this process determines a new elevated water tank location, such as at a new future well location, the requirement for new additional trunk watermain should be evaluated.

4.4.3 Long Term (2038-2048)

Any new elevated water storage tank installed in the mid-term should be sized such that it can address the long-term storage deficit.

4.5 Water Distribution Strategies

New watermains will need to be constructed to connect future developments to the existing Almonte potable water distribution system. In addition to these watermains, the existing network will need upgrades to maintain the level of service within the existing and future Almonte system, particularly regarding minimum water pressure and fire flow requirements.

The three sections below describe the system upgrades and new watermains required to achieve these requirements. The proposed future Almonte potable water distribution network, as modelled in WaterCAD, is included in Figure 4

4.5.1 Short–Term (2023-2028)

A watermain will be needed along the northern side of Country Road 29 to connect the future northwestern development to the existing watermain on County Road 16/Almonte St. A new Pressure Reducing Valve (PRV) on Malcom St. needs to be installed to keep Pressure Zone 1 isolated from Pressure Zone 2 (PZ2). In addition, PZ2 needs to be optimized by adding two new PRVs on the west of side Euphemia Street, where it intersects Almonte Street and Hope Street. The existing Almonte Street PRV can be decommissioned. The new Country Road 29 watermain extension will connect to the existing Hope Street and Wylie Street watermains that expands PZ1 in this area, resulting in increased pressure and fire flow availability.

To supply the future northwestern development, a watermain that crosses the Mississippi River (the "third crossing") needs to be installed at the northern end of Almonte. It is expected that this watermain infrastructure project is exempted from the Class EA process, since the installation under the river will involve trenchless construction and the connections are in established utility rights-of-way. However, the use of trenchless construction is dependent on soil conditions, so a geotechnical feasibility study should be undertaken to inform whether this construction approach is viable. If the feasibility study indicates that trenchless construction is not feasible, the Municipality should budget for a Class Environmental Assessment for crossing the river using a different construction method.

A watermain upgrade along Union St. from Carss St. to Princess St., with a trunk watermain from Princess St. to Martin St. is in progress (simultaneously with a sewer replacement from Carss St. to Main St.) and will be completed in the short-term. This upgrade is included in all future water modelling scenarios.

A watermain upgrade along Florence Street, from Victoria Street extending north of Adelaide Street is required by new developments east of County Road 17 in the north end of Almonte. The Florence Street watermain route aligns with anticipated local sanitary sewer upgrades also required by the new development areas. The upgrades will extend north from Victoria Street beyond Adelaide Street go in south of the development along Florence St. to Victoria St.

The Municipality is planning to upgrade the connection between the existing at-grade reservoir near Well 5 and County Road 29 to realize the potential of the booster pumping station. The existing connection constrained the ability of the high capacity pumps to operate. This can be further assessed in the future studies but is included in the list of short-term projects.

4.5.2 Mid–Term (2028-2038)

To supply the future southwestern development a second watermain that crosses the Mississippi River (the “fourth crossing”), will need to be installed in the southern end of Almonte. A Schedule ‘B’ Class EA will be required to establish the right-of-way location of the watermain since none currently exist. This project can also provide an opportunity for a sanitary forcemain to also be constructed across the river at the same time, as described in Section 5.5.3.

To supply the future southwestern development, a watermain will be needed along the southern side of County Road 29.

4.5.3 Long–Term (2038-2048)

The installation of a 450 mm trunk watermain along Patterson Street, from Ottawa Street to the elevated water tower, will be needed.

4.6 Modeling Results

The WaterCAD® software platform was used to update the existing water distribution system’s hydraulic model during Phase 1. For complete details regarding the modelling process and Phase 1 results, refer to the Water Model Technical Memorandum prepared by JLR for this Master Plan.

In Phase 2, the average day, maximum day, and peak hour demand scenarios were input into the model for the short-, mid-, and long-term growth periods to assess the ability of the existing infrastructure to support future growth. Some new watermains were added to connect the existing potable water system to future development areas. Each future development area was modelled as a representative loop with a single demand node.

The results of this modelling are summarized in Table 14, Table 15, and

Table 16 under the “No Upgrade” headings for each period.

As seen in these tables, the potable water distribution system is unable to supply adequate fire flow to Almonte as growth increases, culminating in 30% of nodes being unable to supply 45 L/s of fire flow in the long-term, the minimum fire flow recommended in the OBC for typical two-storey residences. Similarly, under peak hour demand, the potable water distribution system is unable to maintain a minimum pressure of 275 kPa in 38% of the nodes in the long-term growth scenario. These results indicate the inadequacy of the existing distribution system and highlight the need for upgrades.

Potential upgrades were entered into the model in iterations until the nodes could supply minimum pressures recommended by the MECP and fire flows recommended by the OBC. These upgrades were discussed in the previous sections and are depicted in Figure 4. As seen in Table 14, Table 15, and

Table 16 under the "With Upgrade" headings, these upgrades improve the potable water distribution system's ability to service existing and new developments into the long-term.

Refer to Appendix C for more detailed WaterCAD® results, including the model inputs and outputs.

Table 14: Percentage of Nodes within Listed Pressure Ranges during Average Day Demand

Pressure Range (kPa)			Existing	Short–Term		Mid–Term		Long–Term	
				No Upgrade	With Upgrade	No Upgrade	With Upgrade	No Upgrade	With Upgrade
Less than		**276**	0%	0%	0%	0%	0%	0%	0%
276	up to	**350**	3%	3%	3%	5%	3%	4%	2%
350	up to	**400**	16%	17%	16%	16%	16%	14%	14%
400	up to	**450**	20%	20%	21%	20%	22%	15%	21%
450	up to	**500**	19%	20%	20%	22%	19%	19%	20%
500	up to & incl.	**552**	18%	17%	20%	19%	21%	21%	17%
Greater than		**552**	24%	23%	21%	17%	20%	27%	26%

Table 15: Percentage of Nodes within Listed Fire Flow Ranges during Maximum Day Demand

Fire Flow Range (L/s)			Existing	Short–Term		Mid–Term		Long–Term	
				No Upgrade	With Upgrade	No Upgrade	With Upgrade	No Upgrade	With Upgrade
Less than		**30**	2%	4%	2%	4%	2%	3%	1%
30	up to	**45**	4%	4%	2%	17%	2%	27%	1%
45	up to	**67**	17%	18%	6%	17%	2%	8%	2%
67	up to	**83**	21%	17%	13%	3%	9%	3%	6%
83	up to	**100**	3%	4%	11%	5%	3%	7%	3%
100	up to	**117**	5%	5%	10%	10%	6%	4%	5%
117	up to	**150**	11%	7%	9%	5%	14%	12%	15%
150	up to & incl.	**200**	14%	14%	19%	26%	26%	24%	24%
Greater than		**200**	21%	27%	28%	12%	35%	10%	43%

Table 16: Percentage of Nodes within Listed Pressure Ranges during Peak Hour Demand

Pressure Range (kPa)			Existing	Short–Term		Mid–Term		Long–Term	
				No Upgrade	With Upgrade	No Upgrade	With Upgrade	No Upgrade	With Upgrade
Less than		**276**	0%	0%	0%	9%	0%	38%	0%
276	up to	**350**	6%	11%	8%	34%	17%	29%	10%
350	up to	**400**	17%	21%	21%	24%	18%	19%	21%
400	up to	**450**	18%	15%	13%	24%	23%	11%	20%
450	up to	**500**	23%	24%	26%	6%	23%	3%	27%
500	up to & incl.	**552**	20%	18%	18%	2%	16%	1%	18%
Greater than		**552**	17%	11%	13%	0%	3%	0%	3%

When comparing the existing potable water distribution system to the long-term water distribution system with upgrades, the overall level of service improves across Almonte, including existing areas. This can be seen when comparing the Existing and Long–Term With Upgrade results in Table 14, Table 15, and
Table 16.

For example, the percent of junctions able to supply more than 200 L/s of flow doubles from 21% to 43%. Without upgrades, the percent of junctions able to supply this flow would have dropped to nearly a third at 10%. The percentage of nodes exceeding 552 kPa of pressure either is comparable or decreases in the long-term. All nodes continue to be able to supply the minimum required pressure with upgrades.

Therefore, the long-term potable water distribution system, including new developments and the proposed upgrades, can maintain or improve the level of service in Almonte.

4.7 Watermain Condition Upgrade Costing

The age and material of the existing watermains in Almonte was provided by the Municipality to determine the need for upgrades. Note, age may not be the sole requirement for replacement and condition assessments are recommended to confirm these requirements. A summary of this assessment, including costs to upgrade the watermains, is included below in Table 17.

Table 17: Costs for Watermain Condition Upgrade

Study Period	Diameter (mm)	Length (m)	Total
Deficient	20	95	$203,000
	50	12	$27,000
	150	7203	$15,101,000
	200	899	$1,958,000
Total Deficient		**8209**	**$17.3 M**
Short Term (2023 to 2028)	15	17	$36,000
	25	60	$128,000
	50	125	$267,000
	150	1671	$3,503,000
	200	502	$1,094,000
	250	7	$14,000
Total Short Term		**2381**	**$5.05 M**
Mid Term (2028 to 2038)	15	26	$56,000
	25	289	$618,000
	150	3147	$6,597,000
Total Mid Term		**3461**	**$7.3 M**
Long Term (2038 to 2048)	15	26	$56,000
	25	241	$517,000
	150	1219	$2,555,000
Total Long Term		**1486**	**$3.13M**

4.8 Summary of Potable Water System Strategies

A summary of the preferred solutions and watermain upgrades, including their costs, is included in Table 18 below. Locations of these projects are also depicted in Figure 5.

Table 18: Potable Water System Solutions and Costs

Project Type	Project	Short–Term (0-5 Years)	Mid–Term (5-15 Years)	Long–Term (15-25 Years)	Details
Water Distribution	Third River Crossing	$6.5M	-	-	Length: 425 m Diameter: 300 mm
	County Road 29 Extension North	$2.3M	-	-	Length: 1,110 m Diameter: 300 mm
	Connection between Third River Crossing and County Road 29	$2.5M	-	-	Length: 1,250 m Diameter: 300 mm
	Upgrade watermain along Florence Street	$680,000	-	-	Length: 375 m Diameter: 250 mm
	Optimize Pressure Zones and Install New PRVs	$100,000	$300,000	$300,000	
	Fourth River Crossing	-	$17M	-	Length: 800 m Diameter: 300 mm
	Country Road 29 Extension South	-	$2.2M	-	Length: 1,070 m Diameter: 300 mm
	Connecting Existing Reservoir to County Road 29	$325,000	-	-	Length: 160 m Diameter: 300 mm
Water Supply	Increase Capacity of Wells 7 & 8 (New Well)	$2M	$500,000	-	
	Well site selection and well testing	$500,000	-	-	
	New Well(s) installation and expansion	-	$7M	$1M	
Water Storage	Increase Capacity of Elevated Tank	-	$15M		
Water Distribution	Paterson St WM Upgrade	-	-	$580,000	Length: 285 m Diameter: 300 mm
	Watermain Condition Upgrades	$22.3M(1)	$7.3M	$3.1M	
	Watermain Condition Assessments	-	-	-	Recommended study
Studies	Schedule 'B' Class EA to increase the water supply at Wells 7 & 8	$250,000	-	-	
	Schedule 'B' Class EA to establish a new well location	-	$300,000	-	
	Schedule 'B' Class EA for a new elevated water storage tank	$200,000	-	-	
	Geotechnical feasibility study for the Third Crossing	$200,000	-	-	
	Schedule 'B' Class EA for the Fourth Crossing	-	$300,000	-	
	TOTAL	**$37.8M**	**$49.9M**	**$5M**	

Table Notes:
(1) Includes condition upgrades for both deficient ($17.3 M) and short term ($5.05 M) watermains.

5.0 Wastewater System

5.1 Existing System

The Almonte Ward is the only region within the Municipality serviced by a communal wastewater collection system. The existing wastewater system was established in the 1960s and consists of thirty kilometres of gravity sewers and forcemains, several sub-area pumping stations, a main pumping station, and an extended aeration activated sludge WWTP with tertiary treatment. The WWTP is designed to receive septage from surrounding rural areas, along with sewage from Almonte Ward. The wastewater collection system is owned and operated by the Municipality. OCWA is presently contracted to operate and maintain the pumping and treatment systems.

All wastewater generated in the Almonte Ward service area is conveyed to the Gemmill's Bay SPS, which houses three dry-pit centrifugal pumps (each rated for 163 L/s at 44.31 m TDH) in a dry well/wet well configuration and conveys wastewater to the WWTP via one 500 mm forcemain. A redundant 400 mm forcemain to the original wastewater lagoons remains in ground but is currently not in operation. The Gemmill's Bay SPS was upgraded in 2012, but is currently experiencing bypasses as described below in Table 21. The Spring Street SPS drainage area includes the Riverfront Estates Developments, and other areas south of the SPS. The Spring Street SPS was upgraded in 2018.

The remaining sub-area sewage pumping stations consist of the following:

- Christian Street SPS: a Prefabricated Fiberglass Reinforced Plastic packaged pumping station, installed in 2010.
- Hope and Glass SPS: a below grade concrete dry well/wet well system constructed in 1970.
- Island SPS: a below grade steel dry well/wet well system constructed in 1970).
- Riverfront SPS.
- Robert Street SPS: a below grade single concrete well system constructed in the 1980s).
- and White Tail Ridge SPS.

These pumping stations are not located along any trunk sewers and, therefore, were not reviewed as part of this Master Plan.

The wastewater collection system consists of polyvinyl chloride, ductile iron, concrete, asbestos cement, and vitrified clay piping ranging from 100 mm to 1200 mm in diameter. Some piping is the original infrastructure which dates to 1930 or earlier. New installations of linear sanitary sewer infrastructure is approved under the Municipality's Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) No. 178-W601.

The Mississippi Mills WWTP operates in accordance with Environmental Compliance Approval (ECA) No. 1637-AC8NT7, dated August 8, 2016, which allows for an average day treatment capacity of 4,700 m^3/day and a maximum treatment capacity of 14,100 m^3/day. The WWTP can accommodate peak flows up to 28,200 m^3/day that bypass the treatment process for temporary storage in the equalization pond. Following the peak flow event, the equalization pond is drained to the WWTP for treatment. The Gemmill's Bay and Spring Sewage Pumping Stations (SPSs) operate in accordance with Environmental Compliance Approval (ECA) No. 178-W601, dated November 10, 2022.

Table 19 summarizes key wastewater system infrastructure operational characteristics.

Table 19: Wastewater System Operational Characteristics

Infrastructure	Average Day Flow Rated Capacity	Maximum Flow Rated Capacity
WWTP	4,700 m^3/d	14,100 m^3/d
Gemmill's Bay SPS	N/A	Firm capacity: 225 L/s (19,440 m^3/d) (1) 3 pumps each rated for 163 L/s at 44.31 m TDH
Spring Street SPS	N/A	Firm Capacity: 58.3 L/s 2 pumps each rated for 58.3 L/s at 15.6 m TDH
(1) For firm capacity, refer to the Technical Summary Report for the Gemmill's Bay SPS Twin Forcemain Upgrade (JLR, 2021) in Appendix D.		

When the maximum daily flow exceeds the maximum rated capacity of the WWTP, the headworks can direct bypass flows to the equalization pond for future treatment. The equalization pond is a lagoon cell used during peak flow attenuation. It has a surface area of 5.2 ha and a depth of 1.8 m, providing a storage volume of 94,000 m^3. Two 82 L/s transfer pumps convey attenuated flow back to the WWTP headworks for treatment. The attenuation pond operation should be assessed to realize its full potential capacity and operating limits.

Table 20 summarizes historic raw influent wastewater flows recorded at the Gemmill's Bay SPS from 2018 to 2022 in Almonte Ward. The 2012 and 2018 Master Plan historic averages are included for reference.

Table 20: Historic Raw Influent Wastewater Flows (2018-2022)

Year	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)
Average/Max (2012-2016)	2,667	24,082
Average/Max (2008-2011)	2,935	15,046
2018	3,803	13,780
2019	4,293	19,665
2020	3,952	14,226
2021	3,067	16,013
2022	3,608	15,713
Average/Max (2018-2022)	3,745	19,665
Per Capita Average Day Flow (L/d)	614	
Maximum Day Peaking Factor	5.25	

Based on the 2021 Almonte Ward census population of 6,098 people, and the average day flow from the past five years, an equivalent per capita flow rate of approximately 614 L/c/d was calculated. This is higher than the 2018 equivalent per capita flow rate of 529 L/c/d.

The average flow rate of 3,745 m^3/day is nearing 80% of the WWTP average day capacity of 4,700 m^3/day. Reaching 80% of a WWTP's capacity typically triggers the initiation of a planning study for future plant expansions. A calculation of the uncommitted reserve capacity of the WWTP should be completed in accordance with MECP Guideline D-5-1 *Calculating and Reporting*

Uncommitted Reserve Capacity at Sewage and Water Treatment Plants to ensure the capacity is not exceeded.

Between 2017 to 2021, the WWTP experienced two effluent quality exceedances. Both were for monthly average TSS quality, which was only slightly exceeded in August and September 2019. Therefore, the WWTP is efficiently treating wastewater.

The Gemmill's Bay SPS design capacity is listed as 326 L/s in 2010 Design Report (TRG). This appears to be the summation of two individual pumps, each rated at 163 L/s, which is not representative of a single forcemain pump station. The Technical Summary Report prepared by JLR for the Gemmill's Bay SPS Twin Forcemain Upgrade includes OCWA's flow testing results and is provided in Appendix D. The highest pump flow achieved by two pumps during this test was 225 L/s.

Raw sewage bypasses have occurred at the Gemmill's Bay SPS since 2012. They are not reflected in historic flow to the WWTP. Table 21 summarizes bypass events from 2018 to 2023. Bypass flows are chlorinated using pucks prior to being discharged into the Mississippi River through a shoreline outfall pipe.

Table 21: Raw Sewage Bypasses at Gemmill's Bay SPS (2018–2023)

Year	Events	Total Duration		Volume (m^3)
		Hours	Minutes	
2018	1	1	6	Unknown
2019	2	2	30	
		27	3	
2020	1	3	21	
2021	1	5	4	
2022	1	5	23	
2023	5	27	30	43,111
		31		7,031
		23		8,528
		8	51	2,644
		3	44	1,693

These bypasses were caused by heavy rainfall events, except the events in 2018 and July 2023. The 2018 event occurred after the float did not reset to its normal state after it was installed in the wet well. This was also the cause for the bypass in July 2023. The data indicates the frequency of raw sewage bypasses at the Gemmill's Bay SPS will likely increase over time, as new development and wastewater loads are added to the wastewater collection system.

5.2 Design Criteria

Table 22 summarizes the residential wastewater generation rates used to assess and size the Municipality's wastewater collection system. For more information, refer to the Wastewater Conveyance System Technical Memorandum prepared by JLR for this Master Plan, dated September 8, 2023, and included in Appendix E.

Table 22: Wastewater System Design Criteria

Parameter	Average Day Flow	Infiltration Allowance or Extraneous Flow (L/s/ha)	Peaking Factor
Existing Residential (per capita)	185 L/day	0.03	1.42
Future Residential (per capita)	350 L/day	0.33	Monitored Pattern
Future Industrial (per ha)	35,000 L/day	0.33	
Future Commercial (per ha)	28,000 L/day	0.33	

Wastewater pumping facilities are rated on their 'firm' pumping capacity. The firm capacity is based on the capacity of the station with the largest pump out of service. Pumping stations are sized based on peak flows.

Wastewater treatment facilities are designed based on the average and peak flows, depending on the treatment process (e.g., aeration tanks are sized for average day flows, whereas settling tanks are sized for peak flows). The following design parameters have been used for the WWTP sizing (refer to Table 23).

Table 23: Wastewater Treatment Design Criteria

Parameter	Value	Comment
Existing		
Equivalent Per Capita Day Flow	614 L/cap/day	Based on historic flows measured at the WWTP. Equivalent flow that includes ICI.
Maximum Day Factor	5.25	Based on historic flows measured at the WWTP. Equivalent flow that includes ICI.
Future Development		
Per Capita Day Flow	350 L/Cap/day	Consistent with wastewater collection system design criteria for future development areas.
Industrial (per ha)	35,000 L/day	
Commercial (per ha)	28,000 L/day	
Maximum Day Factor	3.0	Typical WWTP design maximum day factor.

5.3 Wastewater Treatment Strategies

An evaluation of potential options for wastewater treatment for the Almonte Ward was completed during Phase 2 of this Master Plan. The wastewater treatment constraints identified in Phase 1 were refined in Phase 2.

The WWTP design criteria was separated between existing and future development to avoid overestimating future wastewater contribution based on existing conditions. The current average day flow (ADF) to maximum day flow (MDF) factor of 5.25 is indicative of higher inflow and infiltration in the existing, older vintage sewer sections. Generally, new sewer construction in future development areas is less susceptible to inflow and infiltration. Therefore, a lower maximum day factor of three was applied to future development areas.

Undertaking a Stormwater and Drainage Master Plan would be beneficial in assessing the impacts of inflow, infiltration, and drainage on the wastewater system.

The Peak Instantaneous Flow (PIF) was obtained from the updated hydraulic wastewater model (JLR, 2023). The existing and future ADF and MDF values are presented in Table 24 below.

Table 24: Future Wastewater Treatment Plant Requirements

	Average Daily Flow (m^3/d)	Maximum Daily Flow (m^3/d)	Exceeds Peak Flow Capacity
Rated Capacity	**4,700**	**14,100**	**28,200**
Existing	3,780	19,700	No
Short-Term (2023-2028)	5,817	25,812	No
Mid-Term (2028-2038)	8,495	33,846	**Yes**
Long-Term (2038-2048)	9,589	37,128	**Yes**

The average and maximum day treatment capacity of the WWTP will need to be increased in the short term.

The following table is an updated comparison of the WWTP's bypass flows that would be directed to the attenuation pond and to the river, based on the MDF projections.

Table 25: Bypass Flow Projections

	Maximum Daily Flow (m^3/d)	Bypass to Attenuation Ponds (m^3/d)	Bypass to River (m^3/d)
Existing	19,700	5,680	None
Short-Term (2023-2028)	25,812	11,712	None
Mid-Term (2028-2038)	33,846	19,746	**5,646**
Long-Term (2038-2048)	37,128	23,028	**8,928**

To achieve the bypass flow rate, a capacity upgrade is required a the Gemmill's Bay SPS since it is currently operating below its design capacity of 325 L/s (28,100 m^3/day). The firm capacity of the Gemmill's Bay SPS is limited to 225 L/s (19,440 m^3/d), which is less than the current maximum daily flow. Therefore, the frequency of the bypass events is expected to increase in the near term.

Based on the WWTP design basis, the WWTP constraints were assessed for each process and summarized in Table 26 below.

Table 26: Wastewater Treatment Constraints

Unit Process	Flow Capacity (m^3/d)	Source	Design Basis	Required Long-term Capacity (m^3/d)	Deficit (m^3/d)	Notes
Screening	28,100	Design Brief	Design Peak Instantaneous Flow	44,117	16,017	Two units, each with 28,100 m^3/d capacity. Reduced redundancy will allow for adequate hydraulic capacity.
Grit Removal	28,100	Design Brief	Design Peak Hourly Flow	44,117	16,017	Two units, each with 28,100 m^3/d capacity. Reduced redundancy will allow for adequate hydraulic capacity.
Aeration	5,335	Calculated (maximum Organic Loading Rate and actual BOD)	Design Average Flow and Loading, Peak Daily Total Kjeldahl Nitrogen Loading	9,589	4,254	If further study confirms that aeration system can be re-rated to 5,335 m^3/d, still not enough to meet short-term ADF of 5,817 m^3/d
Secondary Clarifier	17,478	Calculated (Surface Overflow Rate)	Design Peak Hourly Flow, Peak Daily Solids Loading	37,128	19,650	In the short-term, could use the peak flow attenuation lagoon to balance flows to capacity
Tertiary Treatment	19,673	Design Brief	Design Peak Hourly Flow	37,128	17,455	Can use the peak flow attenuation lagoon in the short-term to balance flows to capacity.
Disinfection	16,934	Design Brief	Design Peak Hourly Flow	37,128	20,194	Can use the peak flow attenuation lagoon in the short-term to balance flows to capacity.
Sludge Return	9,400	Design Brief	50% to 200% Design Average Flow	19,178	9,778	Could use the reduced rate of 50-100% ADF. If new clarifiers are being built, then new RAS pumps should also be built.
Sludge Treatment	Unknown - data required	Design Brief	Maximum Monthly Mass Loading and Flow	Unknown Data required		
Outfall	21,600	Calculated (gravity flow)	Design Peak Instantaneous Flow	44,117	22,517	

Table Notes:
This table compares the current design flow capacity of individual processes to the capacity required in the long-term. A flow deficit is calculated for each design basis parameter. Potential solutions to address these deficits are given for each individual process.

This table assumes equalization is available to manage the difference between peak instantaneous flow and maximum day flow for all processes downstream of the headworks.

The existing design flows and the deficit to long-term capacity requirements, as listed in Table 17, are summarized in Figure 6 for each individual process.

The capacity of each treatment process listed in the original design brief, and historical treatment data, indicate opportunities to increase the WWTP rated capacity in the short-term to address the impending flow requirements. It is not expected that the re-rated WWTP capacity will address flow requirements beyond the short-term. However, it will increase the available time for the implementation of alternative solutions to increase the system capacity, which are discussed in the following sections of this report.

5.3.1 Short–Term (2023-2028)

As seen in Table 26, short-term maximum daily flows exceed the peak flow capacity of the existing WWTP. To address this deficit, the expansion of the existing WWTP was considered.

An expansion of the existing WWTP will start with a Schedule ‘C’ Class EA to refine the scope of potential upgrades prior to the design and construction process. The WWTP upgrade will consist of improving the capacity of the screening, grit removal, aeration, secondary clarifier, tertiary treatment, disinfection, biosolids attenuation, and outfall systems to make up the deficits as depicted in Figure 6. This will be achieved through the construction of new infrastructure for additional capacity.

WWTP upgrades should be constructed such they can be expanded to address mid- and long-term demands, while considering room for possible expansions beyond the timeline of this study. For example, there should be consideration of the reservation of space for a future new, twin, WWTP outfall to address long-term peak flows in accordance with MECP’s WWTP design recommendations. The WWTP construction and operation should be coordinated with the Gemmill’s Bay SPS.

Some opportunities to improve short-term capacity by optimizing the existing infrastructure during the WWTP expansion process were identified in Table 26 These optimization strategies include utilizing the peak flow attenuation lagoon to balance flows and considering increasing hydraulic capacity by reducing the peak flow redundancy.

The option of doing nothing or expanding the WWTP were evaluated. This evaluation is summarized in Table 27.

Table 27: Evaluation of Short–Term Wastewater Treatment Options

Criteria	Option 1: Do Nothing	Option 2: Expand Existing WWTP
Natural Environment	Negative impact on environment due to inability to treat high wastewater flows.	Will improve system's ability to treat wastewater flows and limit bypasses.
Evaluation:	No Impact	Positive Impact
Climate Change	Makes Almonte's wastewater infrastructure vulnerable to impacts of climate change (ex. Floods resulting in bypasses).	Improved infrastructure makes community more resilient. Some GHG production from facility.
Evaluation:	Negative Impact	Positive Impact
Social, Cultural, & Heritage Environment	Bypasses impact the community, air quality, and operation. Limited capacity restricts population growth.	Some impacts on social, cultural, and heritage resources, air quality, or the community. Some construction or operation impacts.
Evaluation:	Negative Impact	Negative Impact
Technical Feasibility	Will not be able to support short-term growth.	Will be able to support short-term growth.
Evaluation:	Negative Impact	Positive Impact
Financial	No capital costs. Inaction may lead to high financial impacts in the future.	Higher capital and operational costs.
Evaluation:	No Impact	Negative Impact
Overall Evaluation:	**Not preferred**	**Preferred**

It is recommended that the wastewater treatment plant is expanded in the short-term.

Based on the current WWTP's compact layout, limited opportunity exists to readily expand tankage and the treatment processes for the existing facility. This Master Plan assumed that expanding the WWTP, by twinning it, is required to accommodate the future development in the short-term and remain expandable to accommodate the long-term treatment requirements. A Schedule 'C' Class EA is required to expand the WWTP to refine the scope of upgrades and potential treatment options prior to implementation. During the Class EA, it is recommended the MECP be consulted on potential introduction of nitrate limits to the current wastewater treatment requirements.

5.3.2 Mid –Term (2028-2038)

The WWTP upgrades installed in the short-term should be expandable such that they can supply the mid-term storage deficit.

5.3.3 Long–Term (2038-2048)

The WWTP upgrades installed in the short-term should be expandable such that they can supply the long-term storage deficit.

5.4 Wastewater Pumping Strategies

An evaluation of potential options for wastewater pumping for the Almonte Ward was completed during Phase 2 of this Master Plan. The wastewater pumping constraints identified in Phase 1 are summarized in Table 28 below.

Table 28: Wastewater Pumping Constraints at Gemmill's Bay Pumping Station

Study Period	Design Capacity (L/s)[1]	Operational Capacity (L/s)[2]	Projected Peak Flows (L/s)[3]	Deficit (L/s)
Existing	325	225	398	173
Short–Term (2023-2028)	325	225	435	210
Mid–Term (2028-2038)	325	225	485	260
Long–Term (2038-2048)	325	225	511	286

Table Notes:
(1) Design capacity is noted as 326 L/s in 2010 Design Report (TRG), which appears to be the summation of 2 individual pumps each rated at 163 L/s.
(2) Firm capacity based on 2018 OCWA pump testing. Refer to the Technical Summary Report for the Gemmill's Bay SPS Twin Forcemain Upgrade (JLR, 2021).
(3) Flows determined by utilizing the land-use planning projections and hydraulic wastewater model. This does not account for historic raw sewage bypasses at the Gemmill's Bay SPS.

As seen in Table 28, the existing flows are beyond the capacity of the Gemmill's Bay pumping station, which is evidenced by the sharp increase in wastewater bypasses as seen in Table 21. As mentioned earlier in this section, the Gemmill's Bay SPS design capacity is listed as 326 L/s in 2010 Design Report (TRG), which appears to be the summation of two pumps rated at 163 L/s, which is not representative of how a single forcemain pump station operates. The Technical Summary Report prepared by JLR for the Gemmill's Bay SPS Twin Forcemain Upgrade includes OCWA's flow testing results, which indicate that the highest pump flow achieved by two pumps during this test was 225 L/s.

There are smaller pumping stations in the system which were not assessed during this Master Plan as they are not located along any trunk sewers. However, it is recommended that condition assessments be undertaken at these pumping stations for the Municipality's planning purposes.

5.4.1 Short Term (2023-2038)

Since existing wastewater flows are already exceeding the Gemmill's Bay pumping station's capacity, to address this deficit, the expansion of the existing pumping station was considered. The summary of the evaluation is shown in Table 29 below.

Table 29: Evaluation of Short–Term Wastewater Pumping Options

Criteria	Option 1: Do Nothing	Option 2: Gemmill's Bay Expansion
Natural Environment	Negative impact on environment due to inability to treat high wastewater flows.	Will improve system's ability to treat wastewater flows and limit overflows.
Evaluation:	No Impact	Positive Impact
Climate Change	Makes Almonte's wastewater system vulnerable to impacts of climate change (ex. increased storm intensity resulting in raw sewer overflows).	Improved infrastructure makes community more resilient.
Evaluation:	Negative Impact	Positive Impact
Social, Cultural, & Heritage Environment	Overflows impact the community, air quality, and operation. Increase in bypass frequency of wastewater flow to the Mississippi river. Limited capacity restricts population growth.	Some impacts on social, cultural, and heritage resources, air quality, or the community. Some construction or operation impacts.
Evaluation:	Negative Impact	Positive Impact
Technical Feasibility	Will not be able to support short-term growth.	Will be able to support short-term growth.
Evaluation:	Negative Impact	Positive Impact
Financial	No capital costs. Inaction may lead to high financial impacts in the future.	Higher capital and operational costs.
Evaluation:	No Impact	Negative Impact
Overall Evaluation:	**Not preferred**	**Preferred**

It is recommended that Gemmill's Bay pumping station is upgraded to address the current and short-term pumping deficit. This upgrade enables the system to utilize the currently unused equalization ponds for wastewater storage while the WWTP expansion is constructed. Upgrading the Gemmill's Bay pumping station requires the construction of a brand-new pumping station to achieve the required capacity. During construction of a new pumping station, operations can continue at Gemmill's Bay, mitigating the need for costly construction sequencing measures.

A Schedule 'B' Class EA will be required to be conducted to determine the scope and requirements of the new pumping station. As the proposed expansion site is close to a river, it is likely an archaeological assessment of the area will be required. The site's proximity to a heritage district within Almonte may require coordination with the local heritage committee.

5.4.2 Mid–Term (2028-2038)

The Gemmill's Bay pumping station upgrades installed in the short-term should be expandable such that they can supply the mid-term deficit.

5.4.3 Long–Term (2038-2048)

The Gemmill's Bay pumping station upgrades installed in the short-term should be expandable such that they can supply the long-term deficit.

5.5 Wastewater Collection Strategies

It is generally best practice that municipalities investigate the separation of stormwater and wastewater collection systems to improve wastewater quality and quantity. Investigating these options is outside the scope of this study, but can be completed during a future Stormwater and Drainage Master Plan.

5.5.1 Short–Term (2023-2028)

In the short-term, 40 m of sewer along Martin St. North, between Maude St. and Edward St., requires an upgrade from a 225 mm to 300 mm diameter pipe to resolve the high hydraulic grade level (HGL) that extends further north to the upstream sewers along Martin St.

In the long-term scenario, an additional 100 m sewer section along Martin St. North requires an upgrade. Refer to the long-term upgrades section below for complete details. There is an opportunity to implement the long-term Martin St. North upgrades with the short-term upgrades as a single short-term project. However, the sewer sections requiring upgrades are not continuous, as the sewer along Martin St. North between Victoria St. and Edward St. does not require upgrades.

5.5.2 Mid-term (2028-2038)

No upgrades to sewers are required in the mid term beyond condition upgrades.

5.5.3 Long–Term (2038-2048)

A new 650 m long, 300 mm diameter sewer is required along Houston Dr., Paterson St., Ottawa St., and St. James St. to convey peak flow from future developments to the Victoria St. trunk sewer.

As mentioned in the short-term section, 100 m of sewer along Martin St. North, from Victoria St. to Main St., requires an upgrade from 300 mm to 450 mm diameter pipe to convey the future peak flow from new developments.

A 27 m long section of 450 mm diameter sewer on Martin St. N, between Ottawa St. and Queen St., slightly exceeds the 1:25 year wet weather design criteria by 20 mm. Since the obvert of this sewer section is shallow, currently located at 1.8 m below grade, a long-term opportunity exists to consider re-grading this sewer to reduce the HGL. Prior to advancing this sewer re-grading, it is recommended future sanitary sewer flow be monitored in this area to confirm whether peak flows are consistent with the long-term Master Plan projections. In addition, future service connections could be directed away from this 27 m sewer section to Ottawa St. and/or be equipped with backflow preventers to mitigate potential back-up to work around this shallow sewer section.

In the potable water system upgrades section, a fourth river crossing was recommended to be constructed in southern Almonte. While beyond the timeline of this Master Plan, an opportunity exists for the Municipality to consider installing a sanitary forcemain along the same river crossing. This could allow flexibility for a new sewer outlet that could service future developments beyond the Master Plan timeline. It is expected that wastewater collected from future development areas in this Master Plan will be pumped to Industrial Drive. However, it could be beneficial to reserve space in the future Pumping Station site and wet well for additional flow and to allow for potentially changing the forcemain outlet location from Industrial Drive to the southern river crossing.

Refer to Figure 7 for the proposed upgrade locations.

5.6 Sewer Condition Upgrade Costing

The age and material of the existing sewers in Almonte was provided by the Municipality to determine the need for upgrades. Note, age may not be the sole requirement for replacement and condition assessments are recommended to confirm these requirements. A summary of this assessment, including costs to upgrade the sewers, is included below in Table 30.

Table 30: Costs for Sewer Condition Upgrades

Study Period	Diameter (mm)	Length (m)	Total
Deficit	100	192	$350,000
	150	212	$390,000
	200	1065	$1,950,000
	225	1963	$4,110,000
	250	553	$1,160,000
	300	463	$1,130,000
	375	481	$1,020,000
	450	643	$1,480,000
	525	482	$920,000
	600	174	$370,000
Deficit Total		**6229**	**$12.87 M**
Short term (2023 to 2028)	200	1165	$2,140,000
	250	426	$890,000
	300	462	$1,120,000
	375	57	$120,000
Short Term Total		**2110**	**$4.270 M**
Mid term (2028 to 2038)	100	248	$460,000
	150	609	$1,120,000
	200	2176	$3,990,000
	250	288	$600,000
	300	51	$120,000
	450	95	$220,000
Mid Term Total		**3468**	**$6.51 M**
Long term (2038 to 2048)	100	343	$630,000
	150	138	$250,000
	200	2007	$3,680,000
	250	783	$1,640,000
	300	396	$960,000
	375	22	$50,000
	525	280	$540,000
	600	11	$20,000
	1200	269	$840,000
Long Term Total		**4250**	**$8.61 M**

5.7 Summary of Wastewater System Strategies

A summary of the preferred wastewater treatment, pumping and collection servicing strategies and sewer upgrades, including their costs, is included in Table 31 below. These are also depicted in Figure 7.

Table 31: Wastewater System Solutions and Costs

Project Type	Project	Short–Term (0-5 Years)	Mid–Term (5-15 Years)	Long–Term (15-25 Years)	Notes
Wastewater Pumping	Gemmill's Bay SPS Upgrade	$15M	-	-	
	Condition Assessments of six minor SPSs	$120,000	-	-	
Wastewater Treatment	Wastewater Treatment Plant Expansion	$75M	-	-	
Wastewater Collection	Martin St. N Upgrade	$100,000	-	-	Length: 40 m Diameter: 300 mm
	Houston Dr., Paterson St., Ottawa St., and St. James Upgrades	-	-	$1.5M	Length: 650 m Diameter: 300 mm
	Martin St. North Upgrades	-	-	$230,000	Length: 100 m Diameter: 450 mm
	Sewer Condition upgrades	$17M (1)	$6.5M	$8.6M	Table 30
	Sewer Condition Assessments	-	-	-	Recommended study
Studies	Schedule 'C' Class EA for the WWTP Expansion	$350,000	-	-	-
	Schedule 'B' Class EA for the Gemmill's Bay SPS Expansion	$250,000	-	-	-
	Stormwater and Drainage Master Plan	$200,000	-	-	-
TOTAL		**$108M**	**$6.5M**	**$10.3M**	

Table Notes:
(1) Includes condition upgrades for both deficient and short-term sewers.

6.0 Considerations and Mitigation Measures

Construction and operation of the works proposed in this Master Plan can have environmental impacts. Table 32 summarizes these potential impacts, identified by the MECP, and provides measures to mitigate these impacts. It is recommended that impacts and mitigation measures be further reviewed and updated during the project-specific Class EA planning and design stages.

Table 32: Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure
Source Water Protection	Almonte has four Well Head Protection Areas (WHPAs), one at each well site. The recommended projects in this Master Plan are intended to improve the performance and reliability of the drinking water systems in the 25-year planning horizon.
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 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.
Ecosystem Protection and Restoration	Generally, construction activities should avoid impacting ecosystem form and function. Consultation with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO), and local conservation authorities should be completed during the Class EA projects to determine if special measures or additional studies will be needed to preserve and protect sensitive features within the area and assess whether the provisions of the Rouge Park Management Plan apply.
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. 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).
Surface Water	The planning and design process should include measures 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.
Groundwater	The potential for impacts related to groundwater conditions will be assessed through geotechnical/ hydrogeological studies during the design phase for the proposed works.
Excess Material Management	Projects 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 and Municipality policy.
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.

Impact	Mitigation Measure
Servicing, Utilities and Facilities	Consultation with Hydro One confirmed that high voltage transmission facilities exist in the study area. Hydro One and the Ministry of Transportation should be consulted on individual projects during the Class EA and/or during design.
Mitigation and Monitoring	Design/construction reports for the proposed projects should center the 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 project's Class EA and/or design.
Permits and Approvals	The projects identified in this Master Plan may require specific permits and approvals which will be identified and obtained during the project's Class EA and/or design. These may include: • Environmental Compliance Approval (ECA) • Drinking Water Works Permit Amendment • Municipal Drinking Water License Amendment • Permit to Take Water • Environmental Activity and Sector Registry (EASR) • Species at risk permits • MTO permits. • Building Permit • Site Plan Approval • Approvals under the Impact Assessment Act, 2019. • Department of Fisheries and Oceans • Navigation Protection Program • Mississippi Valley Conservation Authority permits
Archaeology	A Schedule 'B' Class EA will be required for the Gemmill's Bay pumping station expansion. A Stage 1 Archaeological Assessment will likely be required as part of this Class EA due to the site's proximity to a river, however, based on new Municipality policy developed in consultation with Alderville First Nation, a Stage 2 Archaeological Assessment will be required. Stage 2 Archaeological Assessments may also be required for other projects identified in this Master Plan under the new policy. Refer to Section 7.0 for more details on the new policy. The proposed pumping station expansion area is also located close to a heritage district, so consultation with the local heritage committee is recommended.
Climate Change–Mitigation	New construction may contribute to climate change through the production of greenhouse gas (GHG) emissions such as those from heavy vehicles during construction. They may also include negatively impacting the landscape's ability to remove and store atmospheric carbon through the removal of trees and other carbon capturing species. Operations can also contribute to climate change through GHG production from biological waste produced by the WWTP facility or electricity usage. 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.
Climate Change–Adaptation	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. WWTPs and wells may typically experience negative impacts to functionality and reliability due to changing climatic conditions such as drought, flooding, and ice storm damage. The recommended projects presented will enhance the Municipality's climate resiliency by improving servicing quantity, quality, and reliability.

7.0 Public and Agency Consultation

Effective consultation is key to successful environmental assessment planning. Through an effective consultation program, the proponent can generate meaningful dialogue between project planners and stakeholders/rights holders, including, but not limited to, the public, stakeholder agencies and interest groups. Refer to Appendix F for documented consultation activities for this Master Planning process.

At the beginning of this Master Planning process, a Public Consultation Plan was developed and subsequently a Notice of Project Initiation was published in the local newspaper, on the Town's website and distributed to potential stakeholders. A project mailing list was developed identifying stakeholders, and list was updated throughout the process to reflect any changes.

Public Information Centres (PICs) were held regarding this Master Plan on April 13, 2023, and January 18, 2024. The PICs included informal discussions and viewing of information boards on the project. In advance of the PICs, notices were placed in the local newspaper and on the project website. A direct mailing was also sent to individuals on the project mailing list.

Table 33 below provides a summary of public comments received regarding this Class EA. Refer to Appendix F for written correspondence received from the public.

Table 33: Public Stakeholder Comments

Stakeholder	Comment	Action
Comment #1 from Municipality website in January 2024.	"Pakenham must have a review of its potentially deadly infrastructure regarding the wastewater systems especially in the village. It's been an ongoing issue for decades with no real solution. Now is the time."	"We recommend taking your concerns to Council, as Pakenham is beyond the scope of the How We Flow - Water & Wastewater Infrastructure Master Plan."
Comment #2 from Municipality website in January 2024.	"Very helpful information - well presented and Luke was great to have a conversation with."	"Thank you for your interest and your positive feedback."
Comment #3 from Municipality website in January 2024.	"The water in Almonte is very hard. I understand the option of expanding the existing wells. This option means homeowners/residents/taxpayers have to spend approximately $2,000 to install a water softener. Additionally, there is the expense and inconvenience of buying salt and hauling it to the softener and lifting it, often, down stairs and the pollution from plastic. As well, the water softeners cost homeowners approximately $200 every year and a half to get cleaned. Even with this the water is still leaving spots and stains and for many the odour and taste are not palatable to drink. Did you do a survey to find out how many people are drinking the water? Often people are buying bottled water, with more expenses and plastic pollution or have a filtration system like reverse osmosis or use Britta or similar water purification. Also, homeowners/residents/taxpayers now pay approximately $50 a month and have been for at least 6 years for these wells added to our water bill. I know these are not expenses to the municipality, but they are expenses for the homeowner/resident/ taxpayer. Were these costs and the quality of water difference factored into your alternative analysis? What were the results?	"Hardness is an aesthetic water quality objective that is often exceeded in public or private groundwater well based systems. A survey of the number of people drinking water from this system was not completed. However, the current well production records, which are summarized in the Water & Wastewater Infrastructure Master Plan, indicate an average day consumption rate of 25 L/s, or 2.16 million L/day. Based on a daily consumption rate of 350 L/person/day, this works out to approximately 6,170 people who drink from this system, which is in line with Almonte's population in the most recent census (2021). The costs incurred by individual residential treatment systems and the impact on water

Stakeholder	Comment	Action
	Ottawa has great water. Why not use our water from the Mississippi? Thank you for the consultation. I look forward to hearing a response from you."	quality were not factored into the analysis of alternative solutions. The construction of a new surface water treatment plant that draws water from the Mississippi River was assessed as part of the Water and Wastewater Infrastructure Master Plan. It was not the preferred alternative due to the negative impacts to the assessed environment and incurring the highest cost to construct and operate, especially compared to maintaining the current groundwater-based system. "
Comment #4 from Municipality website in January 2024.	"This is a very comprehensive report. In all cases the presentations reflect a new professionalism in planning. I agree with the recommendations, new water tank, new river crossings, etc. I would really like to see more attention to the effects of runoff into the waterways. I see reference to retention ponds in new residential housing and I hope they are not eliminated during the development stages. But there is a lot of current runoff that I would like to see addressed. I know it is difficult, but can we look at the issue and determine if there might be at least a few solutions? Thanks."	"Thank you for your interest and your positive feedback. The effects of runoff into waterways are analyzed through stormwater management. This is beyond the scope of How We Flow - Water & Wastewater Infrastructure Master Plan."
Comment #5 from Municipality website in February 2024.	"I wish to thank the Municipality for hosting the Public Information Centers 1 and 2. I was especially impressed by the transparency and engagement shown by the Water & Wastewater Infrastructure and the Transportation Master Plan. I was pleased to see that both of those projects follow the principles outlined in the 2023 Community Engagement Strategy. As an interested member of the public, it was refreshing to be invited to reflect and provide input after being well-informed regarding the pressures, priorities and possibilities faced by the Municipality on these projects. It was clear that community input from Information Center # 1 had been heard and incorporated into the work of those projects. I trust this approach will be used for the other projects as well, as you "continue to build community stakeholder trust". (Community Engagement Strategy, p.1)"	"Thank you for your interest and your positive feedback."

Stakeholder	Comment	Action
Comment #6 from Municipality website in February 2024.	“The town of Almonte is split North/ South by the Mississippi River. Most major fresh water well supply is on the east side of the river. The west side remains difficult and expensive to service for Water supply. River crossings are extremely expensive and potentially harmful to the environment. The current housing conditions mandate that economic and environmental concerns be given a higher priority when considering growth areas. Current growth areas on the west side of the river remain expensive to service for Fresh water and transportation. Limiting growth on the west side will reduce the infrastructure costs for future development significantly. The significant costs for infrastructure improvements are the burden of the taxpayer regardless if the money is Municipal, Provincial or Federal. Despite the current areas designated for future growth, the council must consider the overall cost to the taxpayer and consider every option to reduce that cost. The report indicates there is a new well potential on the west side of Almonte however the schematic indicates a location on the east side. If there is potential for a well on the west side, even a lower producing well, would that be enough to stabilize the pressure on the west side if further development is restricted? The taxpayer needs a cost effective and environmentally sound growth mandate to keep our community beautiful and affordable.”	"The proposed new well is indeed located on the east side of the Mississippi River and this error in the report will be corrected. Limited groundwater potential exists on the west side of the river. Based on the available information, there is likely insufficient yield to address the projected water supply deficit."

Comment #7 from Municipality website in February 2024.	“Water and Wastewater Infrastructure:
	
	• no evidence of any fresh or wastewater use-reduction reduction strategies
	• savings through water conservation methods should be investigated, costed, and included.
	• water conservation strategies should include:
	  ○ mandatory use of low-volume flush toilets on all new builds and renovations
	  ○ incentives for installed toilets to be updated to low flow models
	  ○ restrictions on use of well water for lawn/garden
		“Savings through water conservation measures were not assessed as part of the current Water and Wastewater Master Plan.
		
		The groundwater supply remains viable long-term, based on the vastness of the Nepean Sandstone formation and currently available information.
		
		Centralizing water storage to an elevated reservoir limits the amount of pumping. The wells only pump once to fill the elevated tank,

Stakeholder	Comment	Action
	○ incentives for residents to landscape residential lots with other than classic grass lawns ○ implementation of residential and/or municipal grey water systems to reduce demand for both freshwater consumption and wastewater treatment. • no consideration in this plan for risk of future failure or diminished supply from existing wells – longer, drier, and hotter summers are likely to affect the water table and therefore available supply. • not sure how an elevated water reservoir results in less GHG – you still have to run a pump to raise the elevation of the water in the reservoir to create the necessary pressure."	which maintains pressure in the system. Expanding at-grade storage still requires the well pumps to fill the elevated and at-grade tank, but also requires a second set of high lift pumps to drain the at-grade tank and pump this water back into the water distribution system. This increased pumping results in more energy use and GHG production in the long term."

Table 34 provides a summary of agency and developer comments received regarding this Class EA. Refer to Appendix F for written correspondence from these groups.

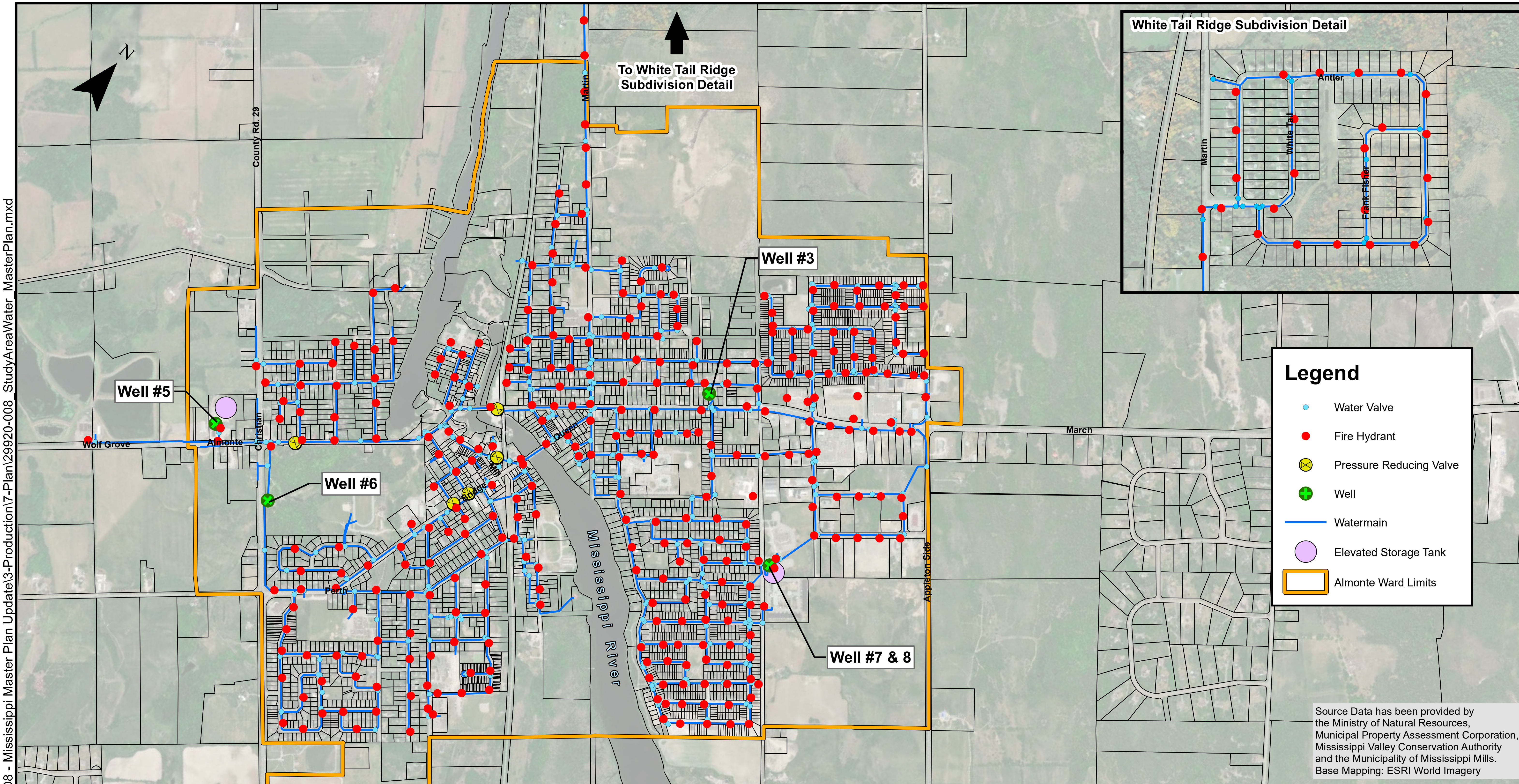
Table 34: Review Agency and Developer Comments

Agency/Developer	Comment	Action
Ministry of Environment, Conservation, and Parks (MECP)	Provided guidance in letter dated April 13, 2023.	Noted.
Hydro One	Confirmed that Hydro One has existing high voltage Transmission facilities in the study area. Stated that Hydro One must be consulted during all stages of the project.	Noted.
Novatech (Developer)	Concern regarding the existing available fire flow demands, in relation to imposing FUS fire flow calculations on new development (vs OBC). Also concerned regarding the proposed timing and phasing of future infrastructure upgrades in the Municipality.	Noted.
Strathburn Almonte Regional Inc. (Developer)	Requested to be added to the stakeholder mailing list.	Added to list.
Menzie Almonte Inc (Developer)	Requested to be added to the stakeholder mailing list.	Added to list.
Houchaimi Holdings Inc. (Developer)	Requested to be added to the stakeholder mailing list.	Added to list.

Table 35 provides a summary of comments received from Indigenous groups regarding this Class EA. Refer to Appendix F for written correspondence from these groups and further details supplied by the Municipality regarding the consultation process.

Table 35: Indigenous Comments and Consultation

Stakeholder/ Rights Holder	Comments	Actions
Alderville First Nation (AFN)	Meeting held on January 30, 2024, between AFN representative and Municipality. Two policies applying to the Municipality's Master Plans moving forward were determined. They are: • Policy 1 – Project Level Indigenous Consultation Policy The Municipality will consult with local Indigenous groups in preparation for capital Municipal infrastructure construction and maintenance projects. Consultation shall occur at an early stage to allow substantial time for meaningful communications between all stakeholders. The Municipality shall engage in consultation which includes the identification of culturally significant land and traditional harvesting areas as well as preferred archaeological practices and procedures and receiving knowledge on archaeological significant areas. • Policy 2 – Municipality Wide Archeologic Policy The Municipality shall complete archeological studies for all land disruptive projects, including projects that are not identified by legislation or regulation as needing archaeological studies or lands deemed to be heavily disturbed and possibly exempt from study. Land disruptive projects initiated by the Municipality, within 300 m of a water body, will include a Stage 2 Archeological Assessment.	Recommendations for future archaeological studies were updated to meet the new policy requirements.
Hiawatha First Nation (HFN)	Acknowledged receipt of consultation documents and requested future updates. Noted that HFN are treaty and inherent rights holders rather than "stakeholders" on April 25, 2024.	Report and correspondence updated accordingly.
Metis Nation of Ontario (MNO)	Acknowledged receipt of consultation documents on December 7, 2023.	Noted.



PROJECT:

MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN UPDATE

DRAWING:

STUDY AREA AND OVERVIEW OF THE WATER DISTRIBUTION SYSTEM

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DESIGN:	AG
DRAWN:	KTK
CHECKED:	MB
JLR #:	29920-008

DRAWING #:

FIGURE 1

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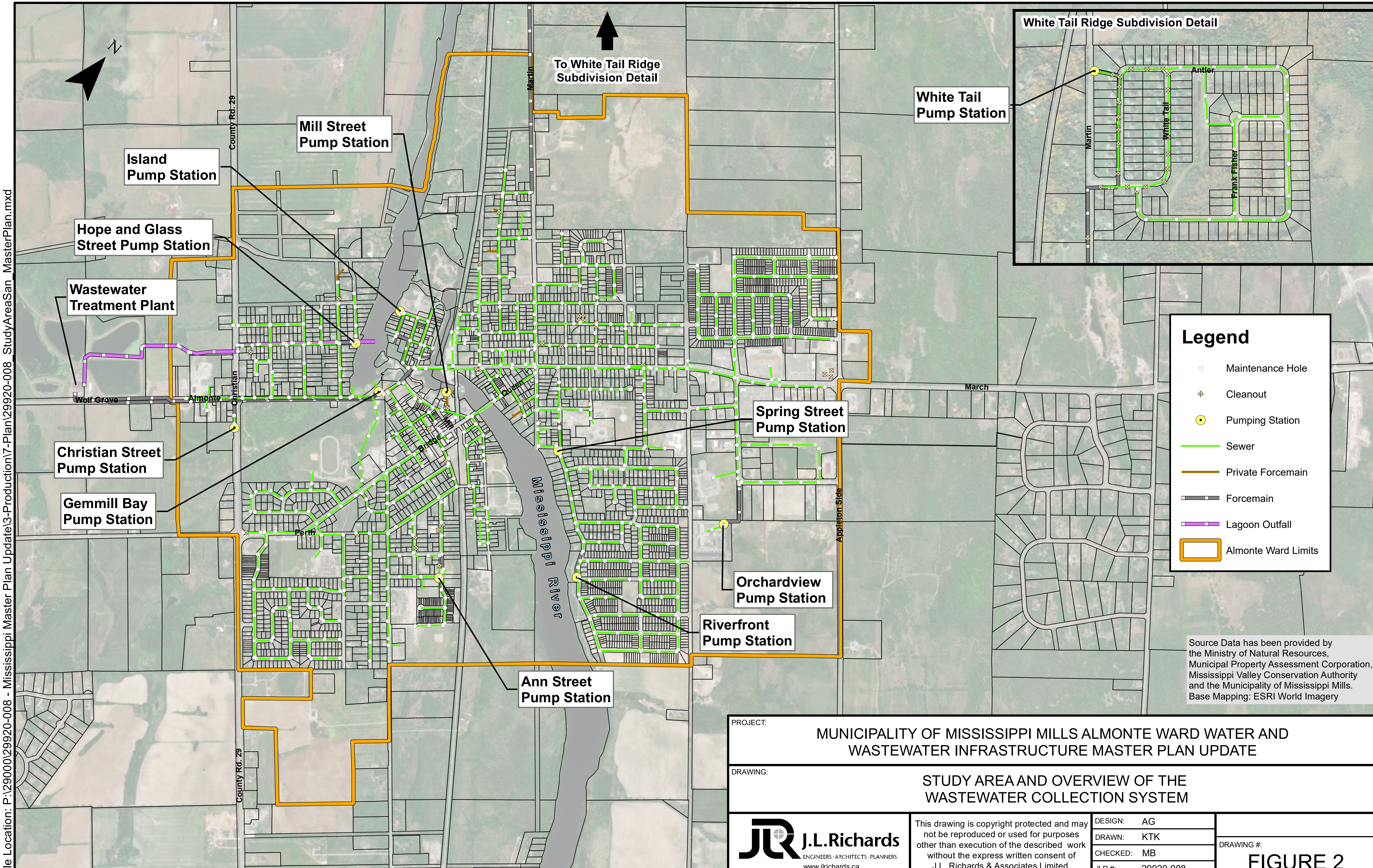

PROJECT:

MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN UPDATE

DRAWING:

STUDY AREA AND OVERVIEW OF THE WASTEWATER COLLECTION SYSTEM

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FIGURE 2

File Location: P:\29000\29920-008 - Mississippi Master Plan Update\3-Production\7-Plan\29920-008_StudyAreaSan_MasterPlan.mxd

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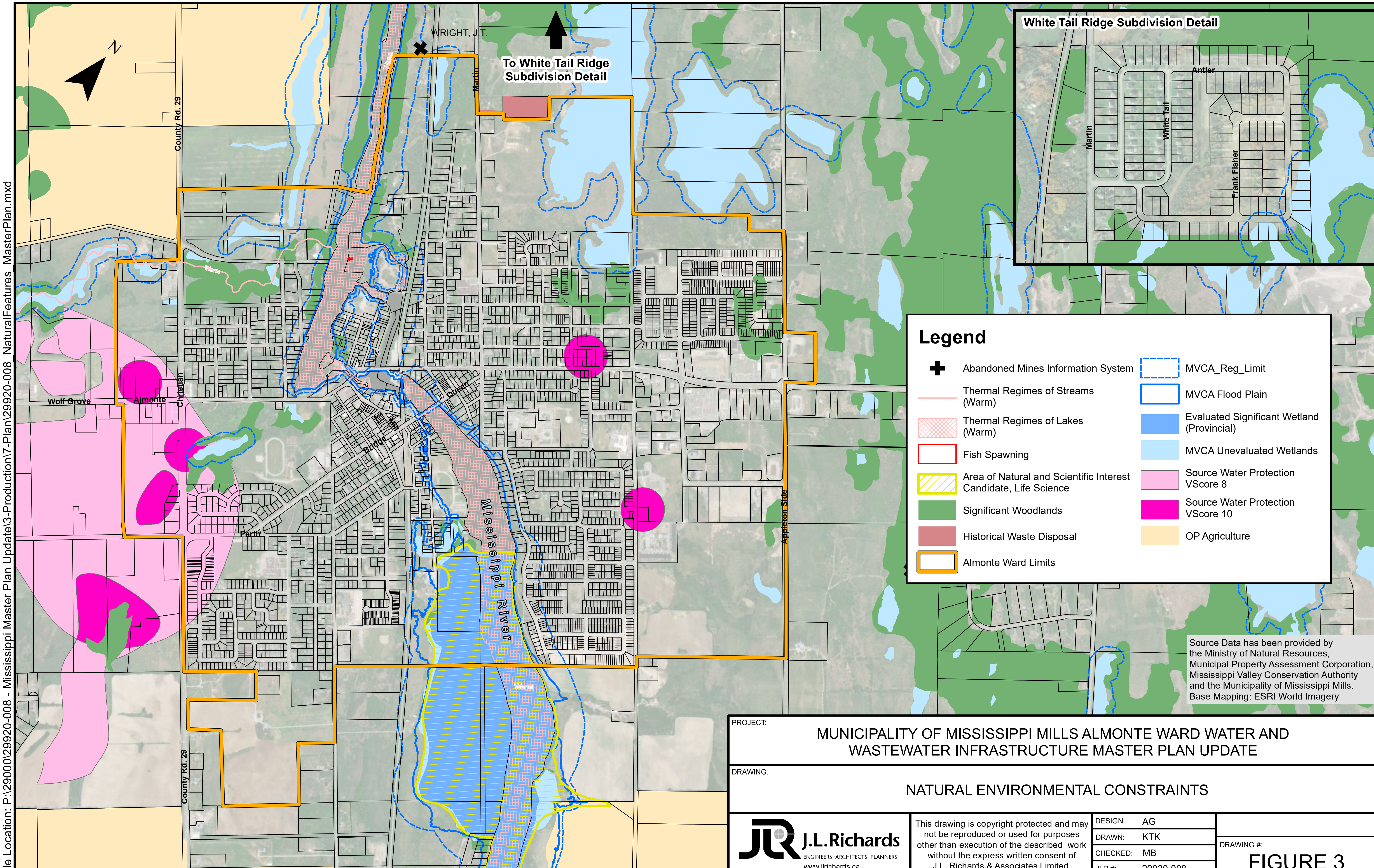

PROJECT:

MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN UPDATE

DRAWING:

NATURAL ENVIRONMENTAL CONSTRAINTS

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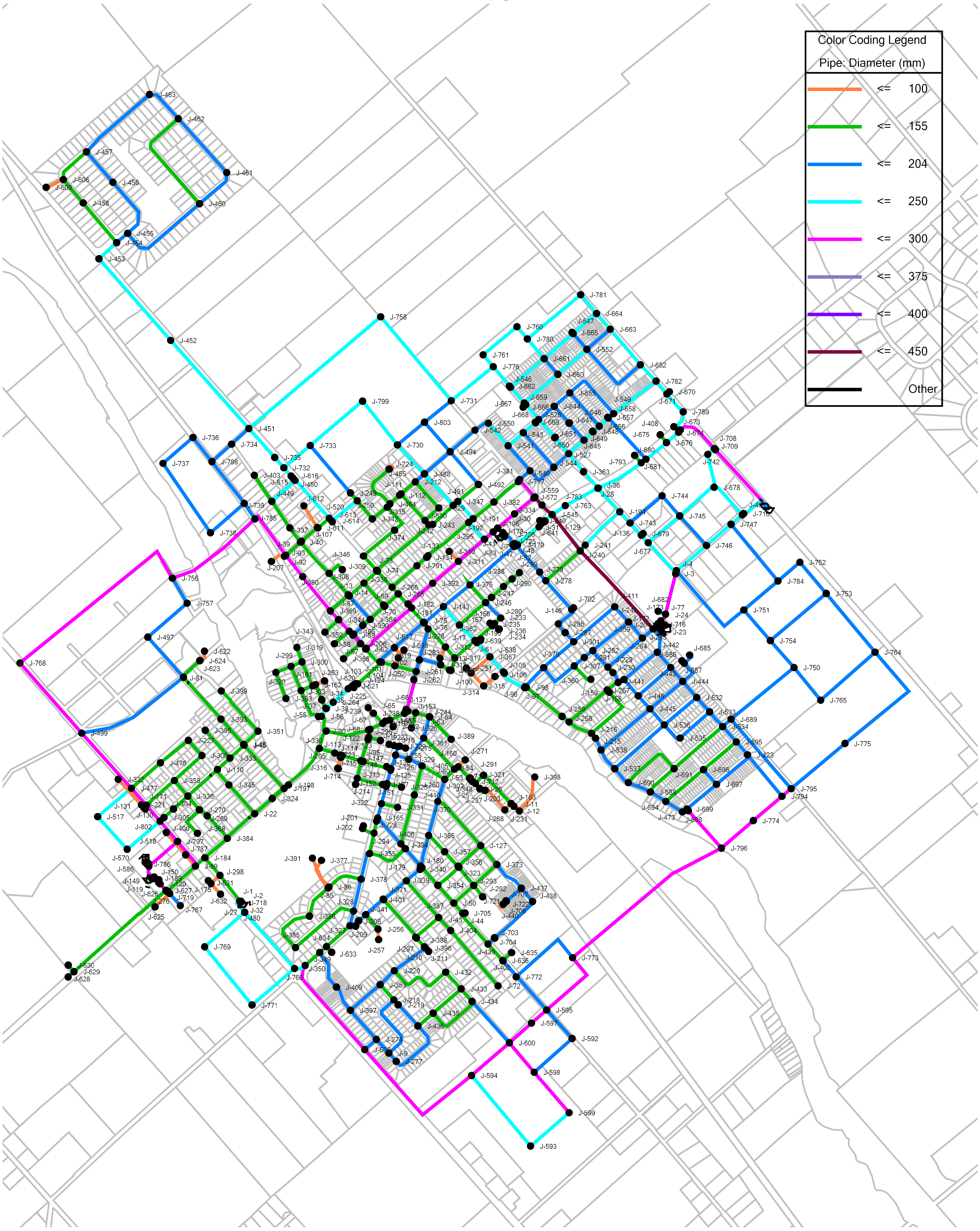
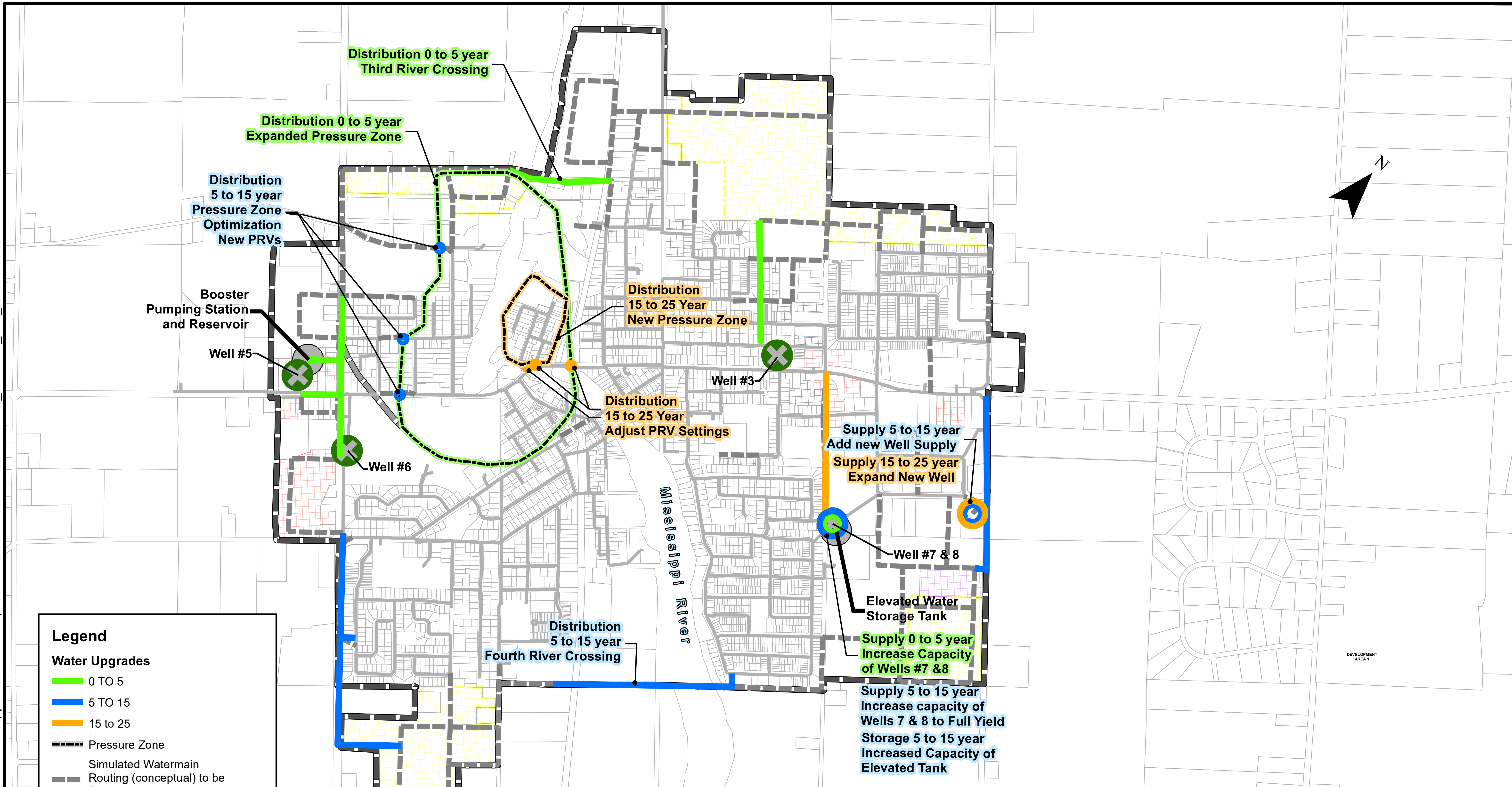
DRAWING #: FIGURE 3

File Location: P:\29000\29920-008 - Mississippi Master Plan Update\3-Production\7-Plan\29920-008 NaturalFeatures MasterPlan.mxd

Plot Date: February 12, 2024 2:09:52 PM

Mississippi Mills Almonte Water Master Plan
Proposed Long Term Water Distribution System
With Upgrades





PROJECT:

MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN UPDATE

DRAWING:

SUMMARY OF POTABLE WATER SYSTEM UPGRADES

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FIGURE 5

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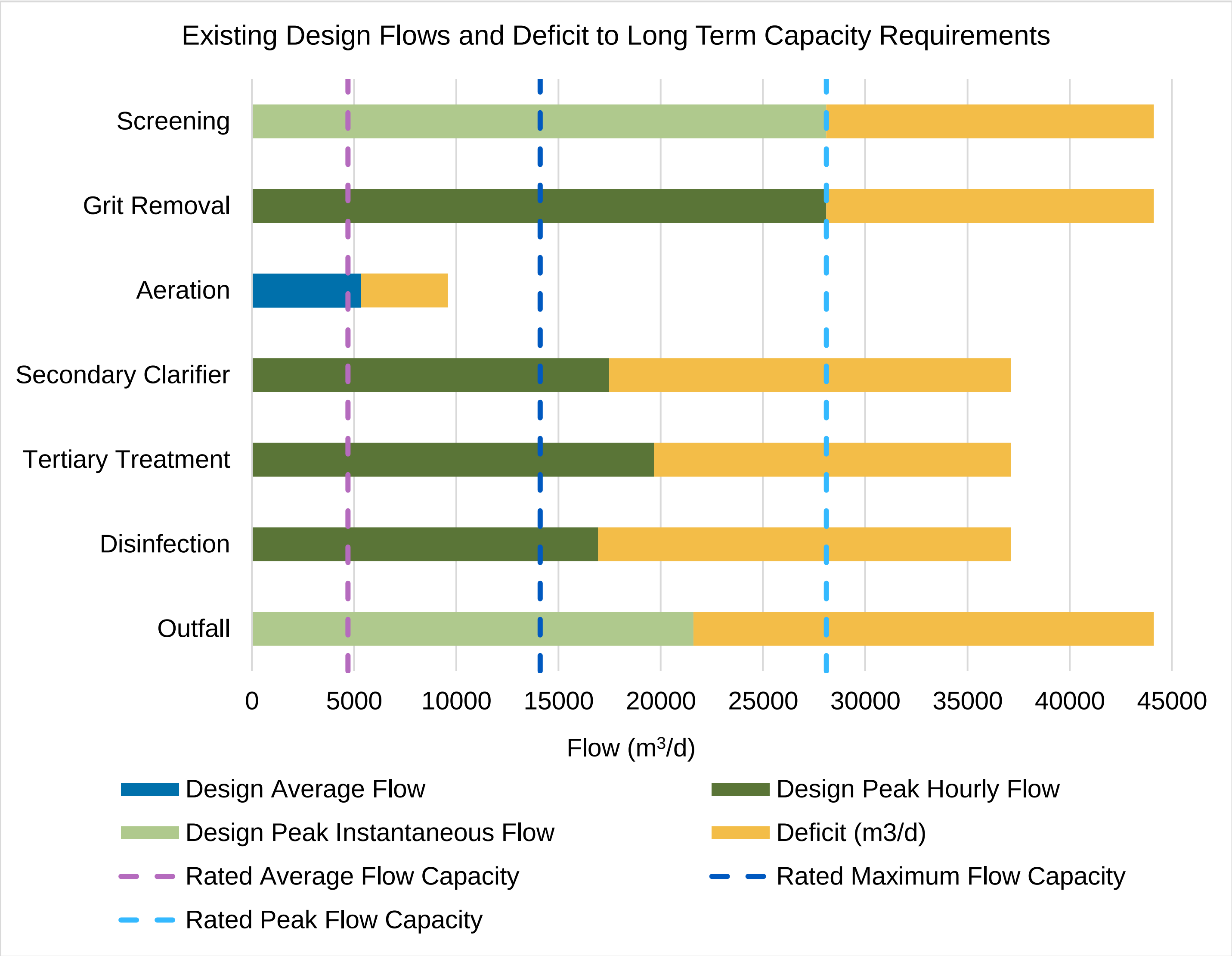
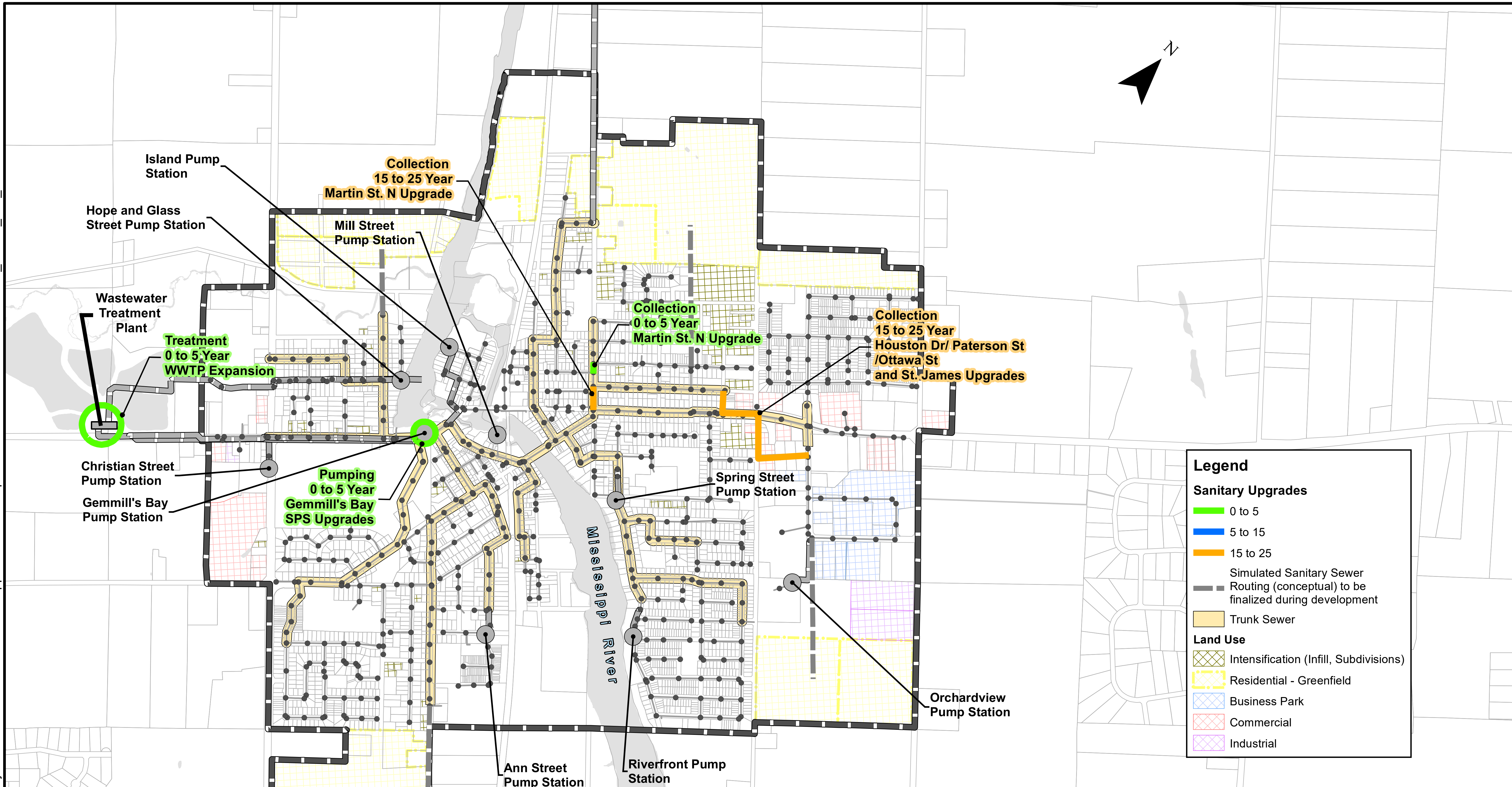


Figure 6: Existing Design Flows and Deficit to Long–Term Capacity



PROJECT:

MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD WATER AND WASTEWATER INFRASTRUCTURE MASTER PLAN UPDATE

DRAWING:

SUMMARY OF WASTEWATER SYSTEM UPGRADES

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JLR #:	29920-008

DRAWING #: FIGURE 7

File Location: \\jlrichards\Corp\Projects\29000\29920-008 - Mississippi Master Plan Update\3-Production\7-Plan\29920-008_ExSan_PIC_Buildout.mxd

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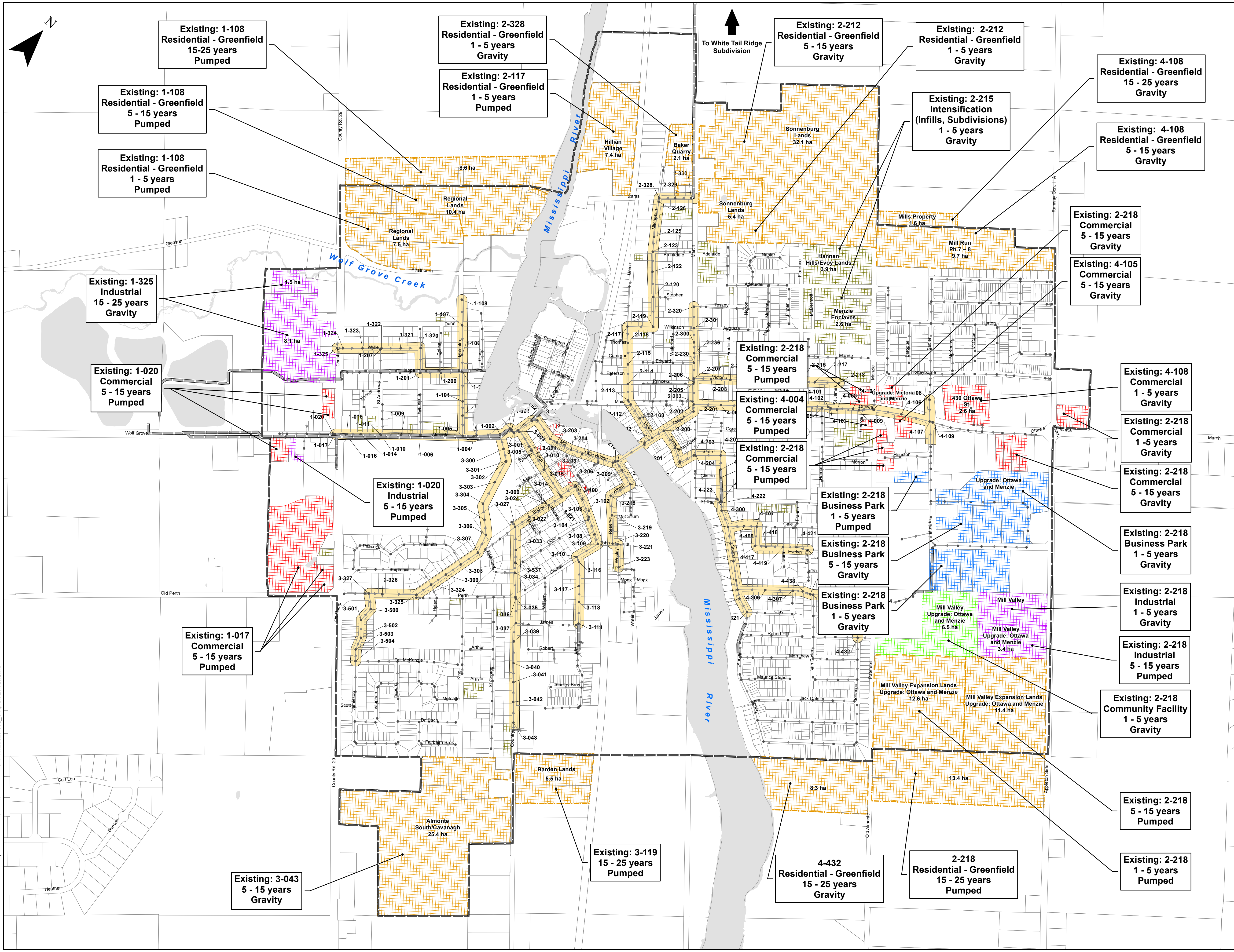

Legend

- Almonte Ward Limits

Land Use
- Intensification (Infill, Subdivisions)
- Residential - Greenfield
- Residential - Community Facility
- Business Park
- Commercial
- Industrial

Sanitary
- Maintenance Hole
- Sewer
- Forcemain
- Lagoon Outfall
- Trunk Sewer

No.	ISSUE / REVISION	DD/MM/YY

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 0 50 100 200 300 400 Meters

CLIENT: Mississippi Mills

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

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PROFESSIONAL STAMP | PROFESSIONAL STAMP

PROJECT:
MUNICIPALITY OF MISSISSIPPI MILLS ALMONTE WARD ECONOMIC DEVELOPMENT VISION
MISSISSIPPI MILLS, ONTARIO

DRAWING:
DEMAND INPUTS FOR THE WASTEWATER HYDRAULIC MODEL

DESIGN: AG
DRAWN: KTK
CHECKED: MB
JLR #: 29920-008
DRAWING #: **FIGURE 8**

File: P:\29000\29920-008 - Mississippi Master Plan Update\3-Production\7-Plan\29920-008_SimplifiedModel.mxd

PLOT DATE: September 18, 2024 1:37:27 PM

9.0 Limitations

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