HASTINGS
Centre Hastings
COUNTY

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Madoc Water, Wastewater and Stormwater Master Plan & Schedule 'B' Class EA for Treated Water Storage

Public Information Centre #2

June 11th, 2024

Welcome! Please sign in.

The Municipal Class Environmental Assessment Process

Class EA Process

The *Ontario Environmental Assessment (EA) Act*, R.S.O., 1990 requires that projects corresponding to municipal infrastructure projects, including roads, water, and wastewater projects follow an approved planning process set out in the Municipal Class EA document prepared by the Municipal Engineers Association (MEA).

Master Plan Process

Master Plans are conducted under the framework of the MEA Class EA Process. They are a planning tool that identifies infrastructure and other requirements for the existing and future land use, through the application of environmental assessment principles. The current Master Plan is intended to satisfy Phases 1 and 2 of the Municipal Class EA process (i.e., *Approach 1*).

Master Plan Approach 1

This approach concludes at the end of Phases 1 and 2. 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.

Schedule 'B' Municipal Class EA

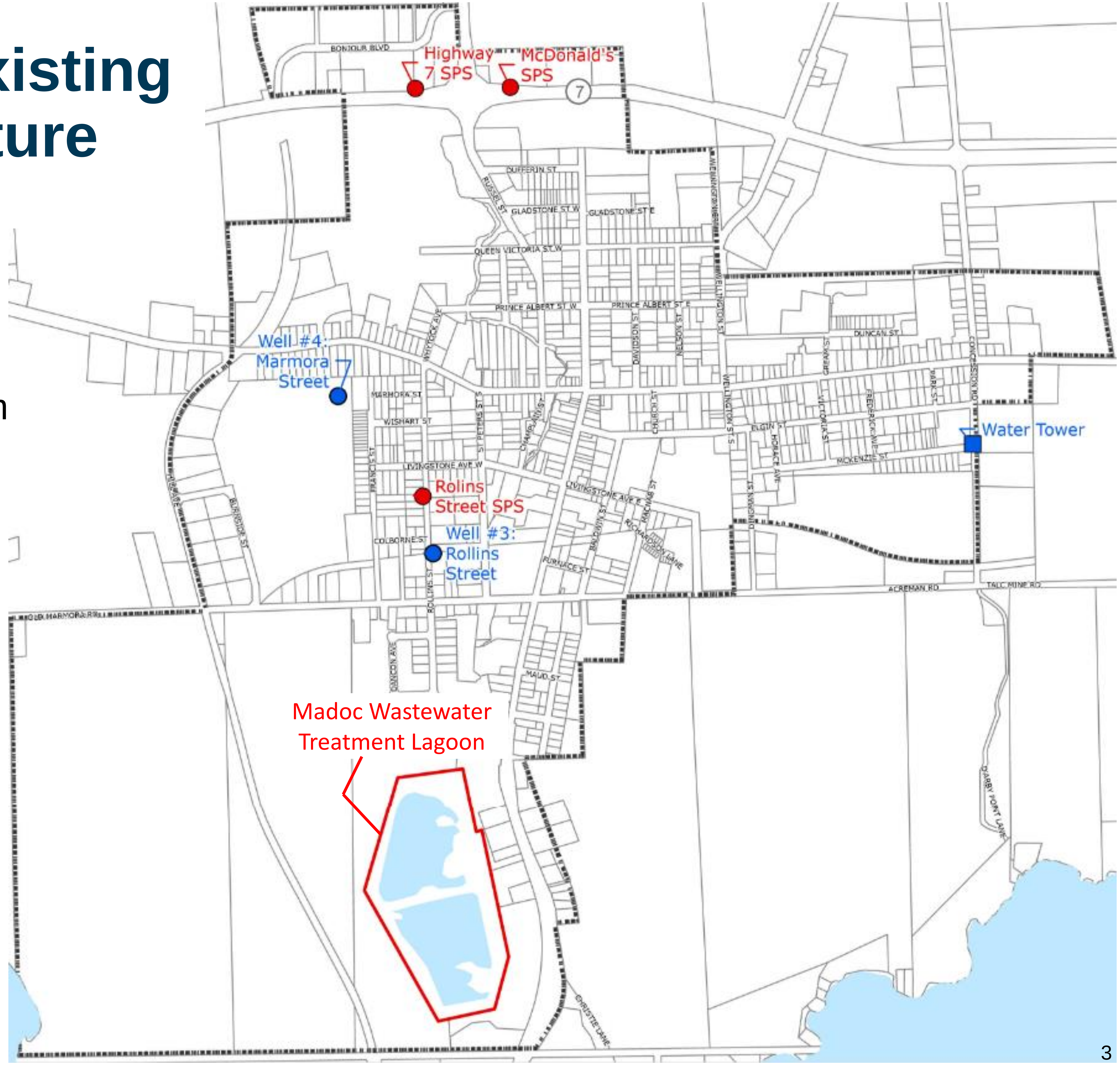
This assessment is prepared to identify and evaluate feasible alternative solutions to address the deficiency in treated water storage.

Madoc Water, Wastewater, and Stormwater Master Plan (Approach 1) & Schedule 'B' Class EA for Treated Water Storage

Overview of Existing Key Infrastructure

- Rollins Street Well #3
- Marmora Street Well #4
- Water Tower
- Water Distribution System
- Sanitary Collection System
- Three Sewage Pump Stations (SPS)
- Wastewater Treatment Lagoon
- Stormwater System

The existing serviced population in the Village of Madoc is approximately 1,500.



Master Plan Phase 2: Identification & Evaluation of Servicing Options

Objectives of the Madoc Water, Wastewater and Stormwater Master Plan Phase 2

- Model future water distribution, wastewater collection, and stormwater sewer systems for the Master Planning period of 20 years and establish required upgrades.
- Present an evaluation matrix with criteria by which servicing alternatives are evaluated against the natural, social/cultural, technical and financial considerations.
- Identify and evaluate alternative solutions to address treatment, capacity and storage issues.
- Recommend an overall implementation plan with proposed timelines and associated costs each of the planning timeframe.

Master Plan Methodology and Timeline

Master Plan Phase 1 – Identify Problem or Opportunity

Tasks:

- Review and collect background information.
- Develop residential, institutional, commercial, and industrial development and population growth projections for short, mid, and long-term scenarios.
- Define level of service for existing conditions.
- Review water supply and wastewater treatment lagoon capacity.
- Model water distribution, sanitary collection, and stormwater.
- Undertake public consultation activities.
- Finalize Master Plan Phase 1 Report.

Master Plan Phase 2 – Identify and Evaluate Alternative Solutions

Tasks:

- Identify servicing needs under future growth scenarios.
- Develop alternative servicing solutions.
- Develop an implementation/phasing plan.
- Undertake public consultation activities.
- Finalize Master Plan Phase 2 Report.
- Publish Master Plan Report for 30-day public review.

Project Timeline

Overview of Estimated Future Growth

Residential Developments

Development Timeframe	Additional Units	Estimated Population Increase
Short-Term (0-5 Years; 2024-2029)	155 units	400 people
Mid-Term (5-10 Years; 2029-2034)	341 units	891 people
Long-Term (10-20 Years; 2034-2044)	852 units	1,233 people
Build-Out (20- 30 Years; 2044-2054) ***(NOT CONSIDERED IN PHASE 2)***	1,032 Units	3,353 people

Institutional / Commercial / Industrial Developments

Development Timeframe	Development Type	Estimated Growth
Short-Term (0-5 Years; 2022-2027)	Long Term Care	128 Beds
Mid-Term (5-10 Years; 2027-2032)	Commercial	3.8 Hectares
Long-Term (10-20 Years; 2034-2044)	Commercial and Typical Industrial	10.3 Hectares
Build-Out (20-30 Years; 2044-2054) ***(NOT CONSIDERED IN PHASE 2)***	Commercial	2.5 Hectares

Maps of future developments are available
Please see a member of the project team.

Future Servicing Constraints (Updated from Phase 1)

Timeframe	Water Supply and Treatment	Water Storage	Wastewater Lagoon	Storm Water System	Water Distribution	Sanitary Sewer
Short-Term (0-5 Years)	Reach 59% of the existing capacity	Reach 112% of the existing capacity	Reach 104% of the existing capacity	40 pipe segments to be upsized, two outlets redirected flow to an approved outlet, such as Deer Creek	Existing system can support future growth: good pressure for average day flow, good fire flow availability for max day + fire flow, good pressure under peak hour flow. Design ongoing for minimal required watermain upgrade.	27 pipe segments require upgrades
Mid-Term (5-10 Years)	Reach 89% of the existing capacity	Reach 144% of the existing capacity	Reach 146% of the existing capacity	No upgrade required		
Long-Term (10-20 Years)	Reach 152% of the existing capacity	Reach 274% of the existing capacity	Reach 233% of the existing capacity	No upgrade required		One pipe upgrade required

Evaluation Methodology

Overall Evaluation Methodology

Major Criteria

Criteria	Description
Natural Environment Considerations	Natural features, natural heritage areas, areas of natural and significant interest, designated natural areas, watercourses and aquatic habitat.
Climate Change and Resiliency	Effects of climate change (e.g., impact of extreme weather events on water supply and wastewater generation), ability to mitigate climate change effects (e.g., contribution to greenhouse gas emissions, impacts on carbon sinks), ability to adapt to climate change impacts, i.e., resiliency and security of infrastructure.
Social and Cultural Environment Considerations	Proximity of facilities to residential, commercial and institutions, archeological and cultural features, designated heritage features, source water protection areas (i.e., intake protection zones and wellhead protection areas), land-use and planning designations.
Technical Feasibility	Constructability, maintaining or enhancing water/wastewater treatment, reliability and security of distribution/conveyance system, ease of connection to existing infrastructure and operating and maintenance requirements, addresses aging infrastructure, expandability.
Financial Considerations	Capital costs, Operation and Maintenance costs.

Impact Levels and Color System

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

Identification & Evaluation of Water Supply and Treatment Options

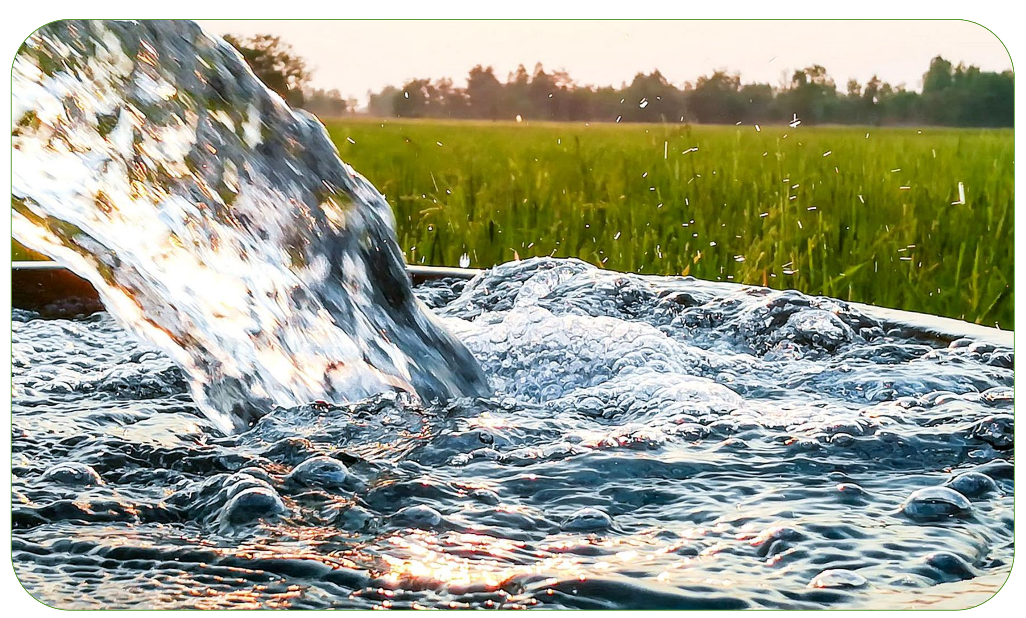
Water Supply and Treatment

Alternative 1 – Status Quo

- Re-designate Well #4 as a duty well
- Provides a sufficient capacity for mid-term (5-10 years).
- It is not sufficient for projected long-term (10-20 years) demand.
- ☒Not recommended.

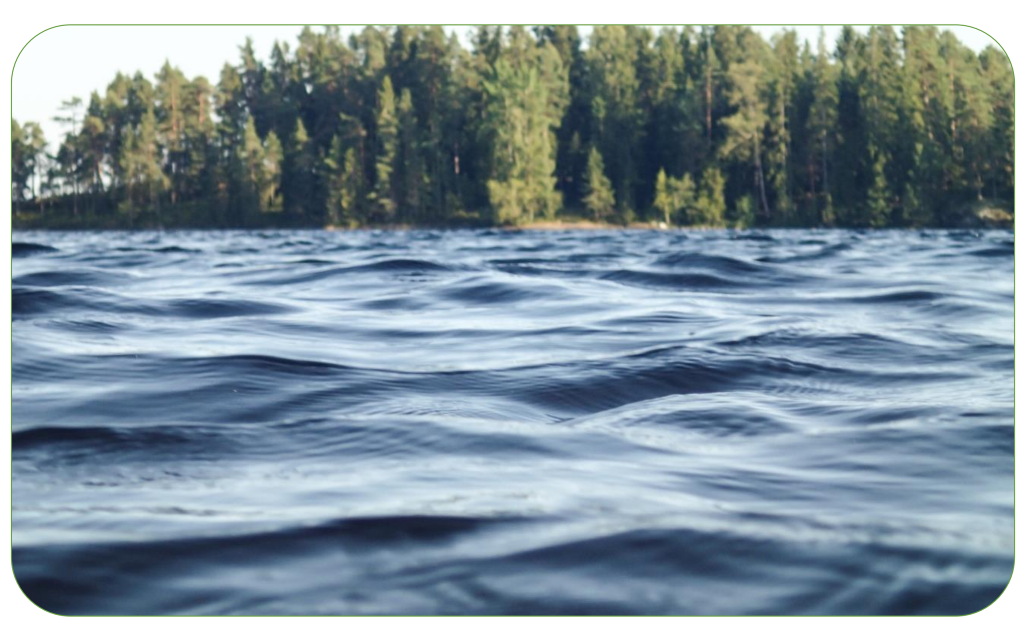
Alternative 2 – Increase Water Supply from Existing Well #3 and Well #4

- May be feasible and should be confirmed by a hydrogeological study
- Once confirmed, a Schedule ‘C’ Class EA will be triggered to evaluate water treatment plant alternatives.
- ☑Recommended to carry forward.



Alternative 3 – Maintain Water Supply from Existing Well #3 and Well #4 and Supplement with Water from a New Well

- Will be sufficient for projected long-term (10-20 years) water demand.
- A Water Supply Feasibility Study, Hydrogeological Study and a Schedule ‘B’ Water Supply Class EA are recommended to confirm the location of the new well and level of treatment requirements.
- ☑Recommended to carry forward.



Alternative 4 – Discontinue Water Supply from Existing Well #3 and Well #4 and Obtain water from Surface Water Source

- Existing aquifer has capacity and extensive work will be required to establish a new intake.
- If in the future, hydrogeological study finds existing aquifer cannot support build-out growth or that the groundwater quality deteriorates, this option may be reconsidered.
- ☒Not recommended.

Water Supply and Treatment Evaluation Matrix

	Alternative 2 – Increase Water Supply from Existing Well #3 and Well #4	Alternative 3 – Maintain Water Supply from Existing Well #3 and Well #4 and Supplement with Water from a New Well
Natural Environment	Preferred	Less Preferred
Climate Change Resiliency	Less Preferred	Preferred
Social, Cultural and Heritage Environment	Preferred	Preferred
Technical Feasibility	Preferred (Pending Hydrogeological study)	Preferred (Pending Hydrogeological study)
Financial Considerations	Preferred	Less Preferred
Overall Evaluation	**Preferred** (Pending Hydrogeological study)	**Less Preferred** (Pending Hydrogeological study)

Main Drivers of Evaluation

- Ability and reliability to support long-term growth
- Impacts from and ease of construction
- Complexity and requirement for level of treatment
- Capital, operation and maintenance costs

Identification & Evaluation of Wastewater Treatment Options

Wastewater Treatment

Alternative 1: Status Quo

- This alternative is not feasible as the anticipated developments within the study area cannot be accommodated by the existing capacity.
- ☒ Not recommended.

Alternative 2 – Maintain lagoon-based treatment and add third lagoon cell

- Significant impact to the natural environment.
- Meanwhile this alternative alone will not address the potential increase in level of treatment due to capacity expansion.
- ☒ Not recommended.

Alternative 3 – Add-on treatment system

- This alternative improves the effluent quality and addresses future treatment requirements.
- This alternative alone does not address storage volume constraint. Alternative 3 will need be combined with a discharge alternative.
- ☑Recommended to carry forward.

Alternative 4 – Convert to Mechanical Treatment Plant

- It provides the level of treatment requirement and is able to provide treatment beyond long-term growth scenario.
- Extensive design and construction and requires continuous discharge.
- ☑Recommended to carry forward.

Wastewater Discharge

Alternative 5 – Extend Discharge Window

- Addresses the storage volume constraints for long-term.
- This alternative alone will not address treatment constraints and should be combined with another treatment alternative.
- ☑Recommended to carry forward.

Alternative 6 – Direct and Continuous Discharge to Moira Lake

- Recommended to potentially further increase the discharge volume.
- This alternative alone will not address treatment constraints and should be combined with another treatment alternative.
- ☑Recommended to carry forward.

Identification of Wastewater Servicing Options

- Servicing Option 1: Extend Discharge Window
- Servicing Option 2: Extend Discharge Window and Implement Add-On Treatment System
- Servicing Option 3: Extend Discharge Window to Continuous Discharge, Implement Mechanical Treatment Plant, Direct Discharge to Moira Lake

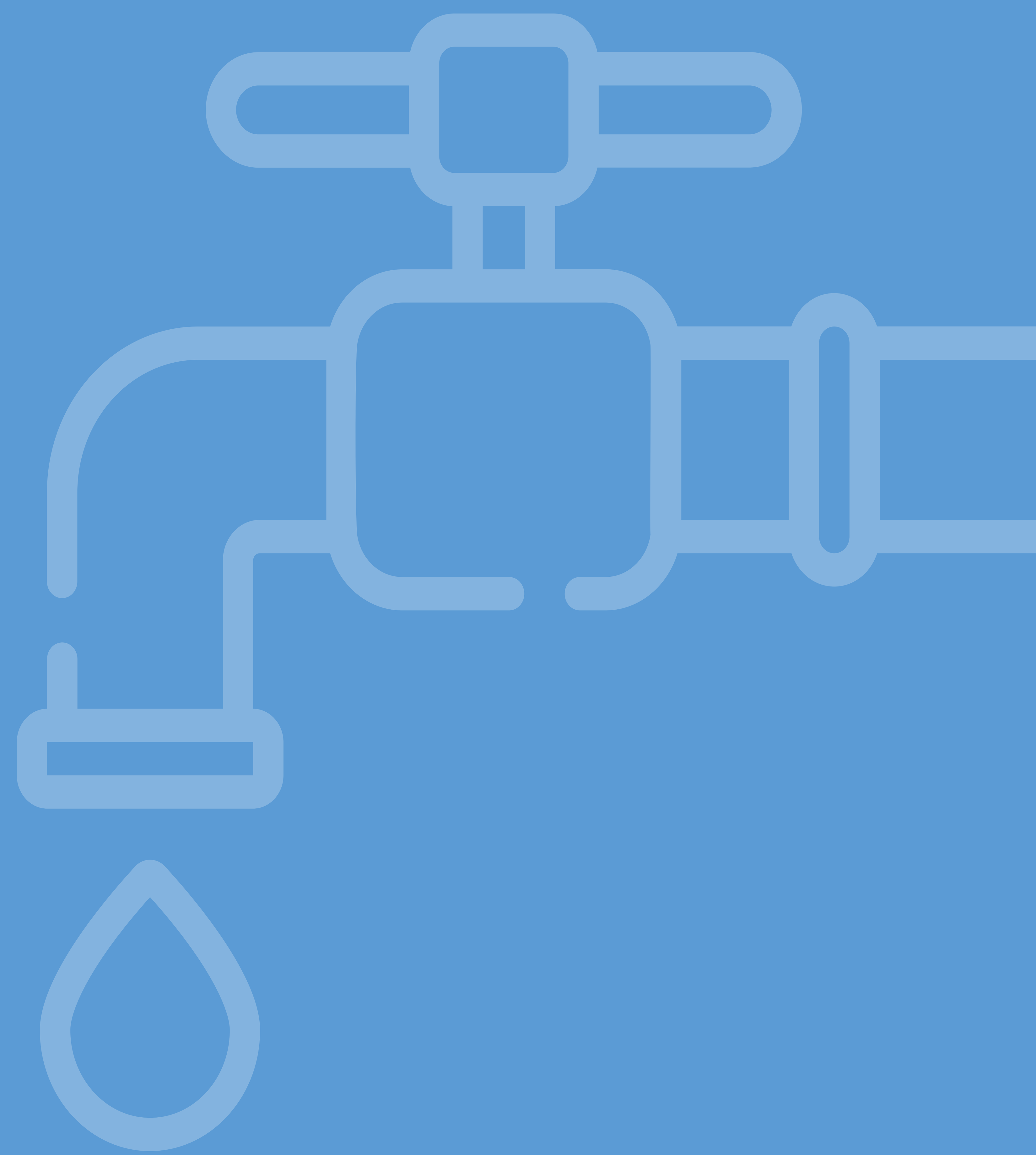
Wastewater Servicing Evaluation Matrix

	Servicing Option 1 Extend Discharge Window	Servicing Option 2 Extend Discharge Window + Add-On Treatment System	Servicing Option 3 Extend to Continuous Discharge + Direct Discharge to Moira Lake + Mechanical Treatment Plant
Natural Environment	Least Preferred	Preferred	Less Preferred
Climate Change Resiliency	Least Preferred	Preferred	Less Preferred
Social, Cultural and Heritage Environment	Less Preferred	Preferred	Least Preferred
Technical Feasibility	Least Preferred	Preferred	Less Preferred
Financial Considerations	Preferred	Less Preferred	Least Preferred
Overall Evaluation	**Least Preferred**	**Preferred**	**Less Preferred**

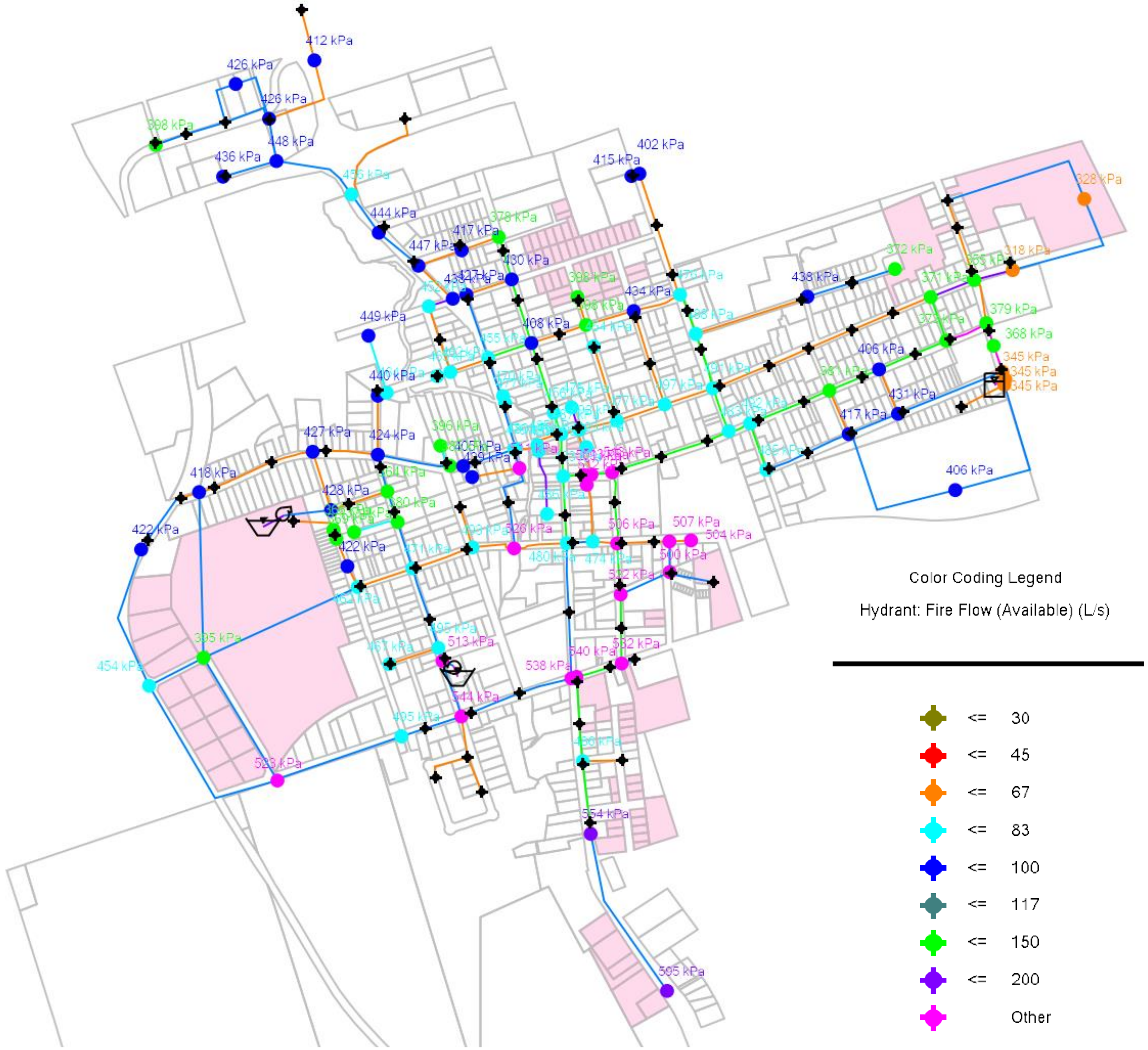
Main Drivers of Evaluation

- Impacts to natural environment and receiver stream
- Ability to support long-term growth
- Impacts from and ease of construction
- Complexity and requirement for level of treatment
- Capital, operation and maintenance costs
  (Opinion of Probable Construction Cost $10,000,000)

Water Distribution, Sanitary and Stormwater Servicing Solution



Future Water Distribution System



Water Distribution Flows under Long-Term (10-20 yrs) Conditions - Maximum Day Demand + Fire Flow

Water Distribution WaterCAD ® Modelling Results:

- The long-term scenario (10-20 years) is the only future scenario for which water distribution system upgrades are recommended.

Recommendations:

- Upgrade watermain along St. Lawrence Street East (Design Ongoing) - $410,000

Recommendations Sanitary System

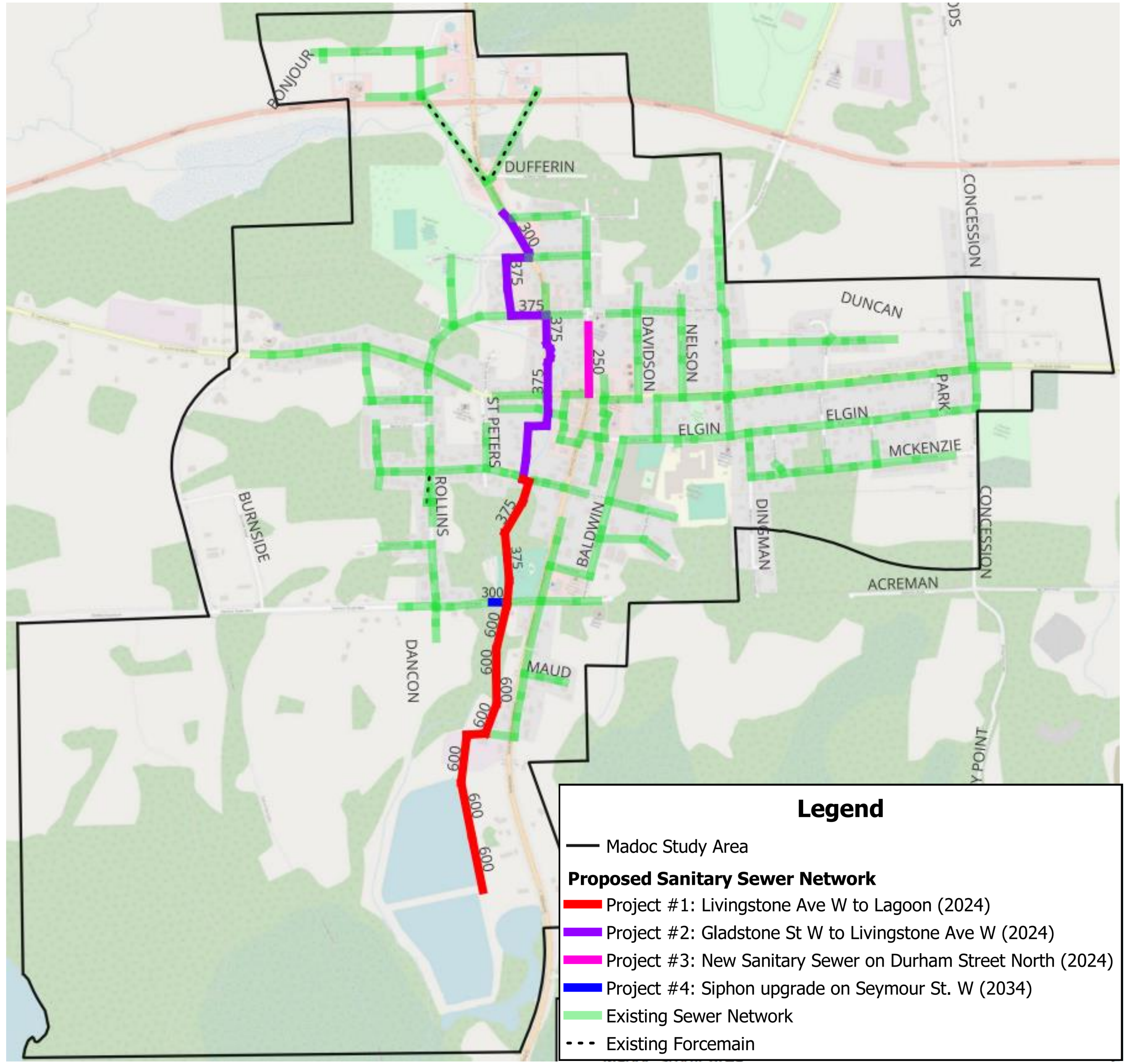
Short-term (0-5 years):

- Project 1: Upgrade sanitary sewer sections along Livingstone Ave. W to Seymour St. W (375mm) and Seymour St. W to Lagoon (600mm) - $3,300,000
- Project 2: Upgrade sanitary sewer sections along Highway 62 from Gladstone St. W to Livingstone Ave. W (375mm) - $3,000,000
- Project 3: Install a new 250mm sewer on Durham St. N and decommission existing sanitary sewers on private properties - $400,000

Mid-term (5-10 years): None required

Long-term (10-20 years):

- Project 4: Upgrade Siphon on Seymour St. W. - $500,000



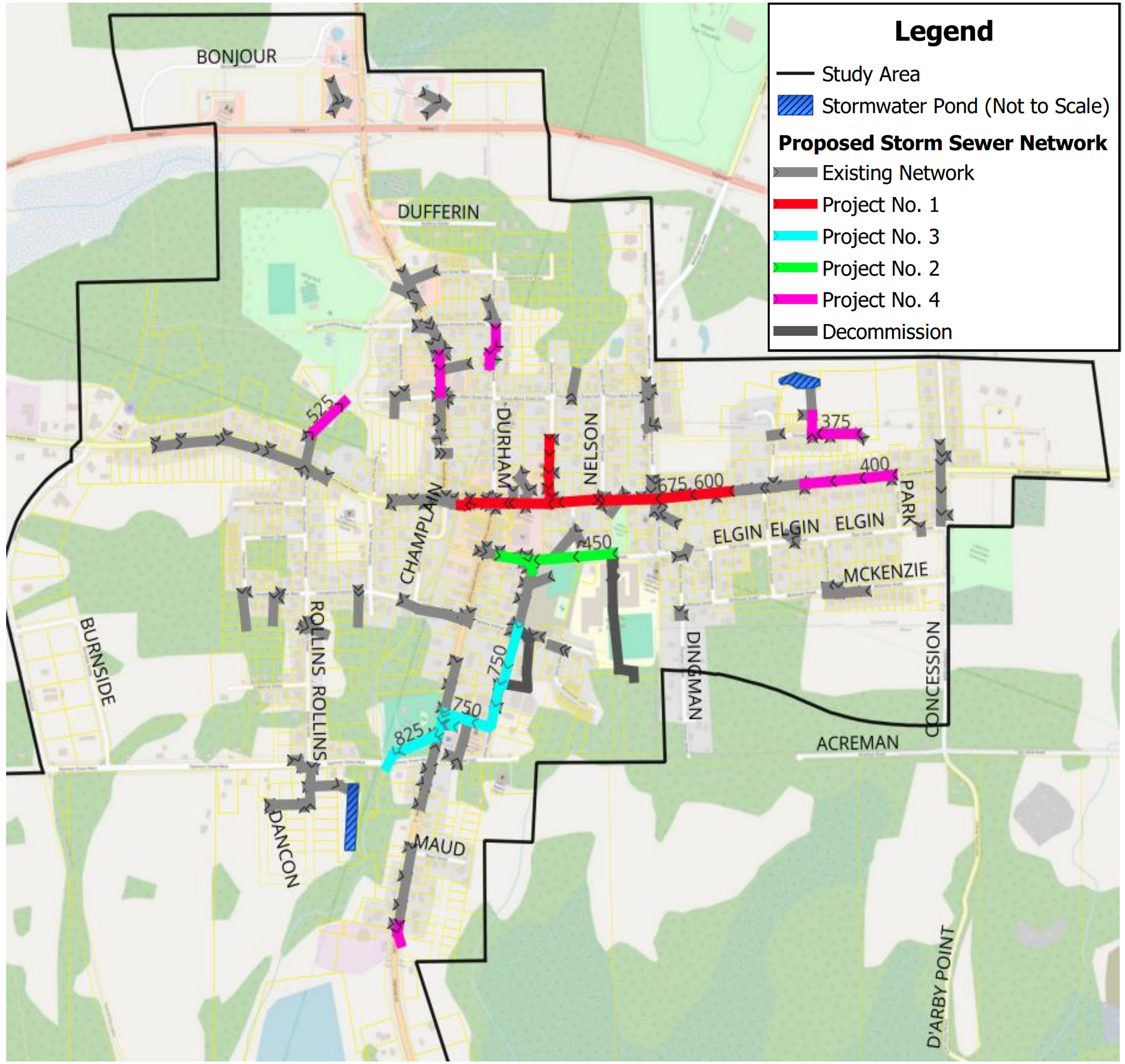
Recommendations Stormwater System

Short-term (0-5 years):

- Project 1: Connect St. Lawrence St. E sewer to St. Lawrence St. W sewer and upsize St Lawrence St. E Storm sewer from Wellington St. to Creek outlet - $3,200,000
- Project 2: Decommission existing storm sewer under Madoc Public School. Connect existing St. Lawrence St. E Sewer to existing sewer on Elgin St. and Baldwin St. - $1,300,000
- Project 3: Connect Livingstone Ave. to Durham St. S. - $2,100,000
- Project 4: Upsize various local surcharged pipes - $2,400,000

Mid-term (5-10 years): None required.

Long-term (10-20 years): None required.



Proposed Implementation Plan

Proposed Projects	Short-Term (Initiate within 0-5 Years)	Mid-Term (Initiate within 5-10 Years)	Long-Term (Initiate within 10+ Years)
Water Supply, Treatment and Storage	$7,500,000	$400,000	$12,900,000
Water Distribution	$410,000	0	0
Wastewater Collection	$6,700,000	0	$500,000
Wastewater Treatment System	$10,200,000	0	0
Stormwater System	$9,000,000	0	0

Detailed list of projects are available
Please see a member of the project team.

Climate Change Impacts and Resiliency

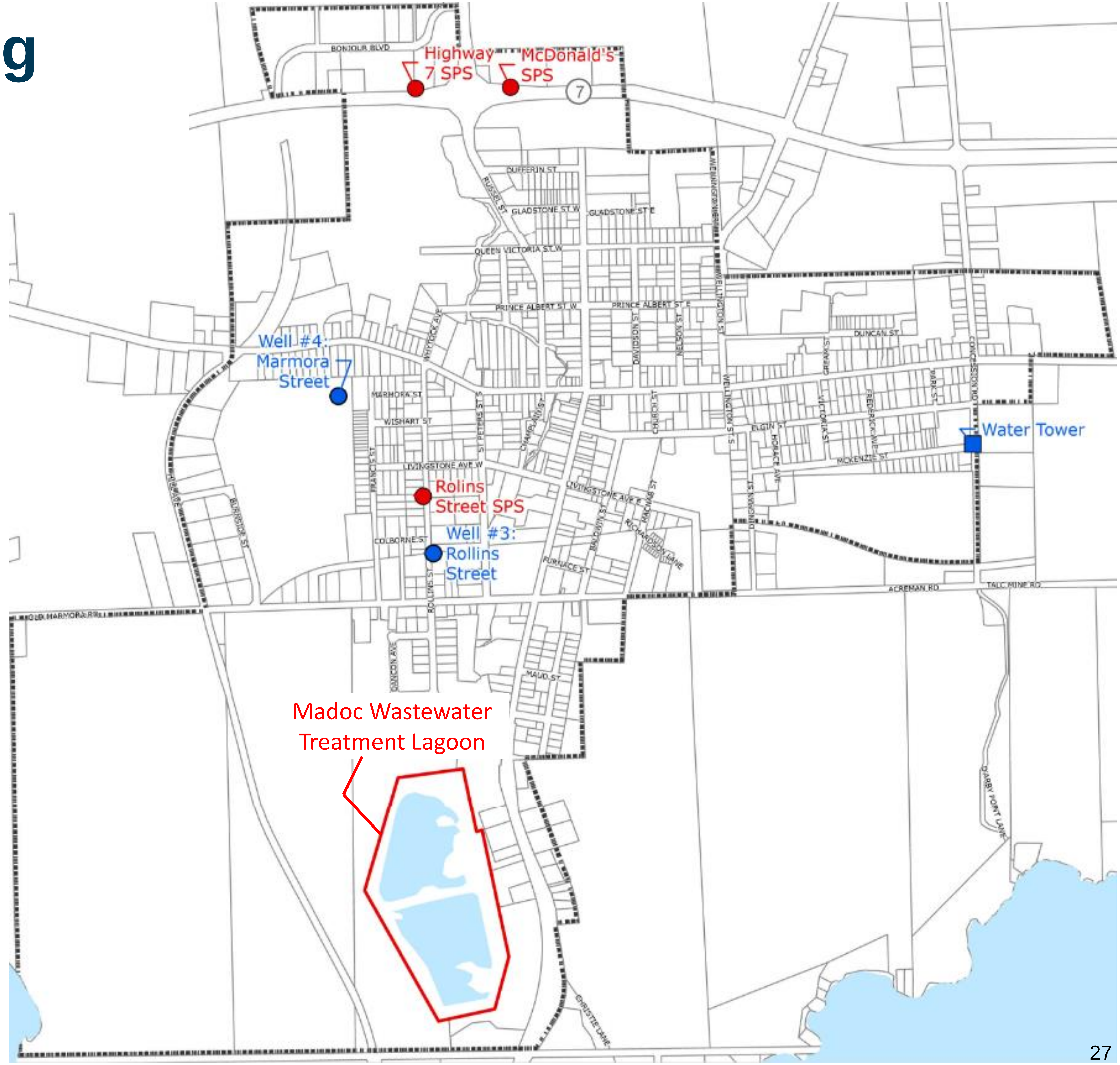
It is recommended that the Municipality consider the following aspects to mitigate climate change risks and adapt to potential future climate change events:

- Implement backup power systems at Well #3 and #4; and implement backup power systems at sewage pump stations and wastewater treatment lagoon;
- Consider upsizing sanitary and stormwater infrastructure to accommodate increased wet weather flows and Inflow & Infiltration (I&I) ;
- Undertake an I&I study and flow monitoring program to identify areas of high I&I;
- Disconnect roof leaders, combine storm water networks and combine sanitary sewer networks, and;
- Promote water conservations during summer and/or drought conditions.

Schedule 'B' Class EA for Treated Water Storage

Treated Drinking Water Storage

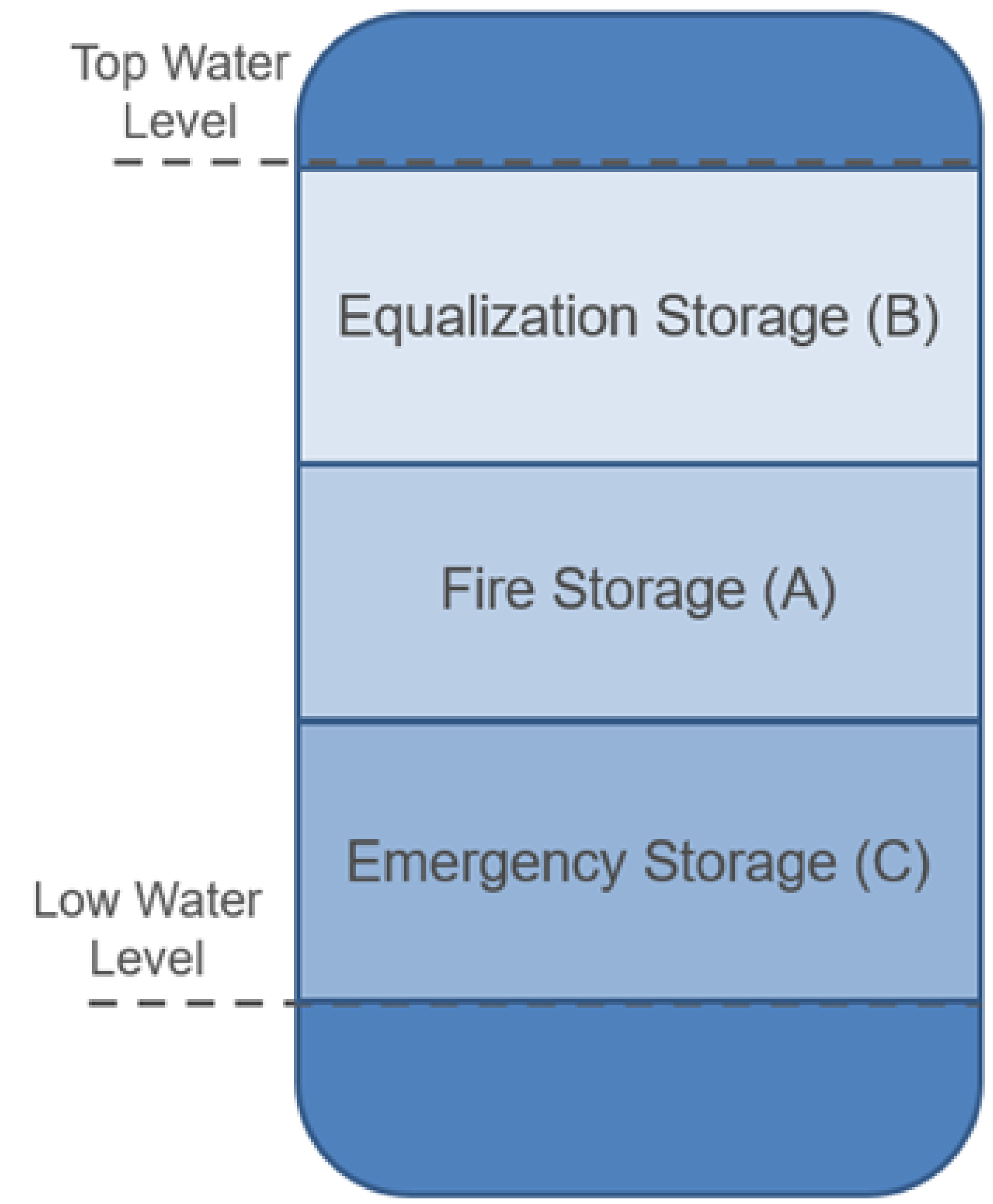
- The preferred type and location for new water storage needs to be identified in this Schedule B Class EA continued from Master Plan work.
- Existing elevated water storage tank is located at 119 McKenzie Street, originally constructed in 1981.
- Water storage deficiency is expected in short-term (2024-2029).
- An inspection in 2019 revealed the tank is in poor condition.
- Hydraulic water model from Master Plan recommends keeping existing hydraulic grade line to meet future long-term demand.



Water Storage Requirements

According to the **2008 Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems**, the total treated water storage within a system should be at least the total of the required **fire (A), equalization (B), and emergency (C) storage allowances.**

Parameter	Existing (2023)	Short Term (2024-2029)	Mid-Term (2029-2034)	Long-Term (2034-2044)
Equivalent Population	1,477	2,474	3,724	6,375
Fire Flow (L/s)	78	102	120	162
Duration (Hours)	2	2	2	3
A – Fire Storage (m^3)	564	735	862	1,748
B – Equalization Storage (m^3)	231	386	581	995
C – Emergency Storage (m^3)	199	280	361	686
Total Storage Requirement (A+B+C) (m^3)	993	1,401	1,804	3,428
Existing Useable Storage (m^3)	1,250	1,250	1,250	1,250
Deficit (m^3)	**n/a**	**151**	**554**	**2,178**



Problem/Opportunity Statement

The following Problem/Opportunity Statement has been developed for this Schedule ‘B’ Class EA :

Madoc is serviced by communal drinking water system consisting of Well #3 and Well #4, a water tower and water distribution network. The existing water tower is in need of repair and rehabilitation. Treated drinking water storage will not be sufficient to support projected growth within the Madoc servicing area for the next 20 years and beyond.

There is an opportunity through the Class EA process to ensure that Madoc has a treated drinking water storage solution which will address the existing and future conditions on the drinking water storage and distribution system.

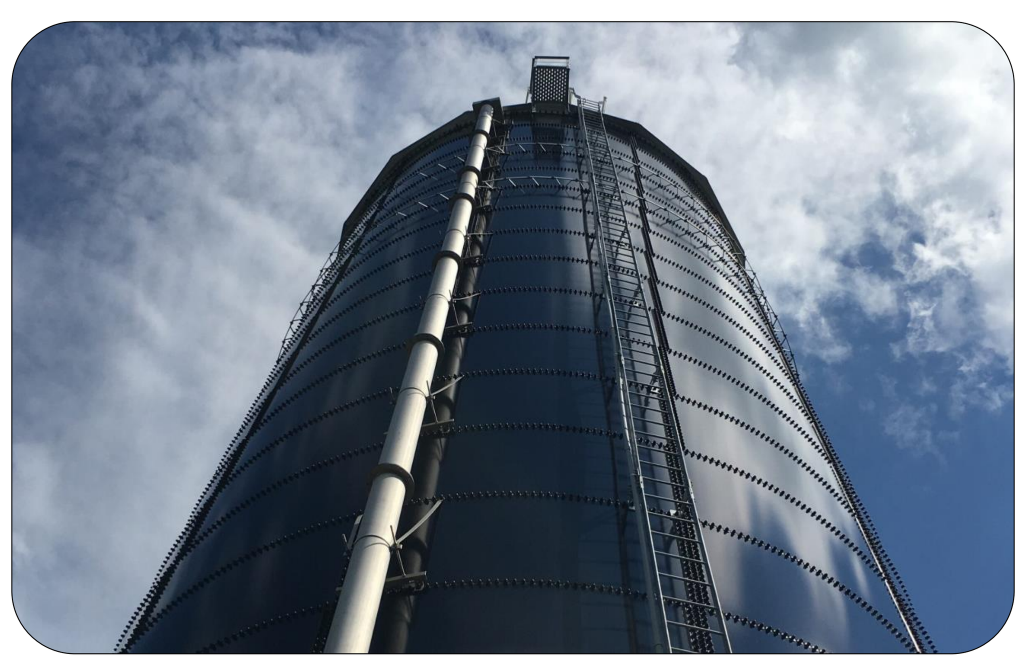
Approach

Approach 1 – Do Nothing

- ☑Recommended to carry forward as a baseline option.

Approach 2 – Decommission Existing Elevated Storage and Build New Storage

- Water model suggests the existing tower's ability to continue to maintain hydraulic grade line for long-term
- New storage will replace existing tower with an increased useable volume of 3,428 m^3.
- ☑Recommended to carry forward.

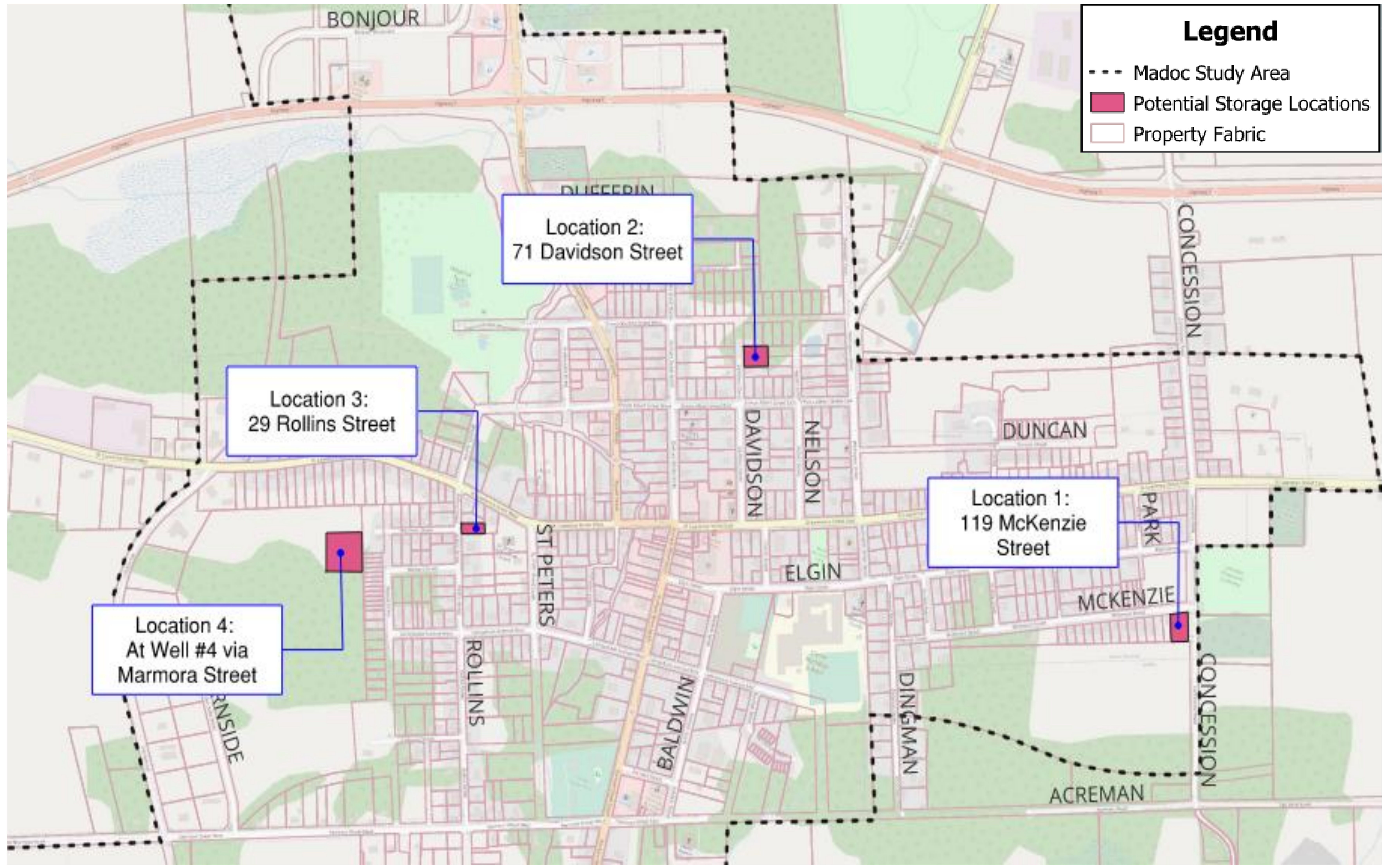


Approach 3 – Maintain Existing Elevated Storage and Build New Storage to Supplement

- Condition of the existing elevated tower is poor.
- Significant cost to rehabilitate the tower.
- ☒ Not recommended.

Potential Storage Locations

- Location 1: ☑Recommended to carry forward.
- Location 2: ☑Recommended to carry forward.
- Location 3: does not have adequate space for a storage solution. ☒ Not recommended.
- Location 4: ☑Recommended to carry forward.



Water Storage Configurations

Configuration 1: Below Grade Reservoir and Pumping Station

- A typical below-grade reservoir is constructed of reinforced concrete and covered with earth and vegetation.
- A pumping station is required to boost the pressure.
- Highest capital and life cycle costs among the four configurations.
- ☒ Not recommended

Configuration 2: At-Grade Reservoir and Pumping Station

- A typical at-grade reservoir is constructed of glass-fused-to-steel.
- Slightly lower capital and life cycle costs compared to a below-grade reservoir and pumping station; more complex pumping system infrastructure compared to a below-grade reservoir resulting in increased operating and maintenance costs.
- ☑Recommended to carry forward.

Configuration 3: New Elevated Storage Tank

- Typically, coated steel tanks located at the top of a pedestal.
- The water level in the elevated tank sets the pressure in the water distribution system.
- The elevated composite tank will have significant lower cost than a below- or at-grade reservoir and pumping station. However, the cost of a composite elevated tank is typically higher than a standpipe.
- ☒ Not recommended

Configuration 4: Standpipe

- Ground storage tanks typically constructed of glass-fused-to-steel to a height that will provide adequate system pressure in the operating range.
- Standpipes are often used in small systems where less volume is needed, or in situations where the site has a high ground elevation relative to the system pressure.
- ☑Recommended to carry forward.

Identification of Water Storage Alternative Solutions

- Alternative #1 – Do Nothing

- Alternative #2 – Decommission Existing Elevated Storage; Build a New Standpipe (1,800 m^3 Usable Volume) at McKenzie Street and Supplement Storage with At-Grade Reservoir (1,620 m^3) and Booster Station at Well #4

- Alternative #3 – Decommission Existing Elevated Storage; Build a New Standpipe (2,900 m^3 Usable Volume) at McKenzie Street and Supplement Storage with At-Grade Reservoir (600 m^3) and Booster Station at Well #4

- Alternative #4 - Decommission Existing Elevated Storage; Build a New Standpipe (1,800 m^3 of Useable Volume) at Davidson Street and Supplement Storage with At-Grade Reservoir (1,620 m^3) and Booster Station at Well #4

- Consider phased-approach to increase storage capacity over the planning period

Evaluation Matrix

Option	#1	#2	#3	#4
Phase 1	Do nothing/Status Quo	Build New Standpipe with 1800 m^3 of Useable Volume at 119 McKenzie Street (Location 1); Decommission Existing Tower	Build New Standpipe with 2900 m^3 of Useable Volume at 119 McKenzie Street (Location 1); Decommission Existing Tower	Build New Standpipe with 1800 m^3 of Useable Volume at 71 Davidson Street (Location 2); Decommission Existing Tower
Phase 2		Add 1620 m^3 At-Grade Reservoir and Booster Pump Station at Well #4 (Location 4)	Add 600 m^3 At-Grade Reservoir and Booster Pump Station at Well #4 (Location 4)	Add 1620 m^3 At-Grade Reservoir and Booster Pump Station at Well #4 (Location 4)
Natural Environment	Preferred	Less Preferred	Less Preferred	Least Preferred
Climate Change Resiliency	Least Preferred	Preferred	Preferred	Preferred
Social, Cultural and Heritage Environment	Least Preferred	Preferred	Preferred	Less Preferred
Technical Feasibility	Least Preferred	Preferred	Less Preferred	Least Preferred
Financial Considerations	Less Preferred	Preferred	Less Preferred	Least Preferred
Overall Evaluation	**Least Preferred**	**Preferred**	**Less Preferred**	**Least Preferred**

Main Drivers of Evaluation

- Ability to support long-term growth
- Location proximity to large diameter watermains
- Phased approach aligns with the growth rate
- Capital, operation and maintenance costs

Preferred Solution

The preferred solution is Alternative #2:

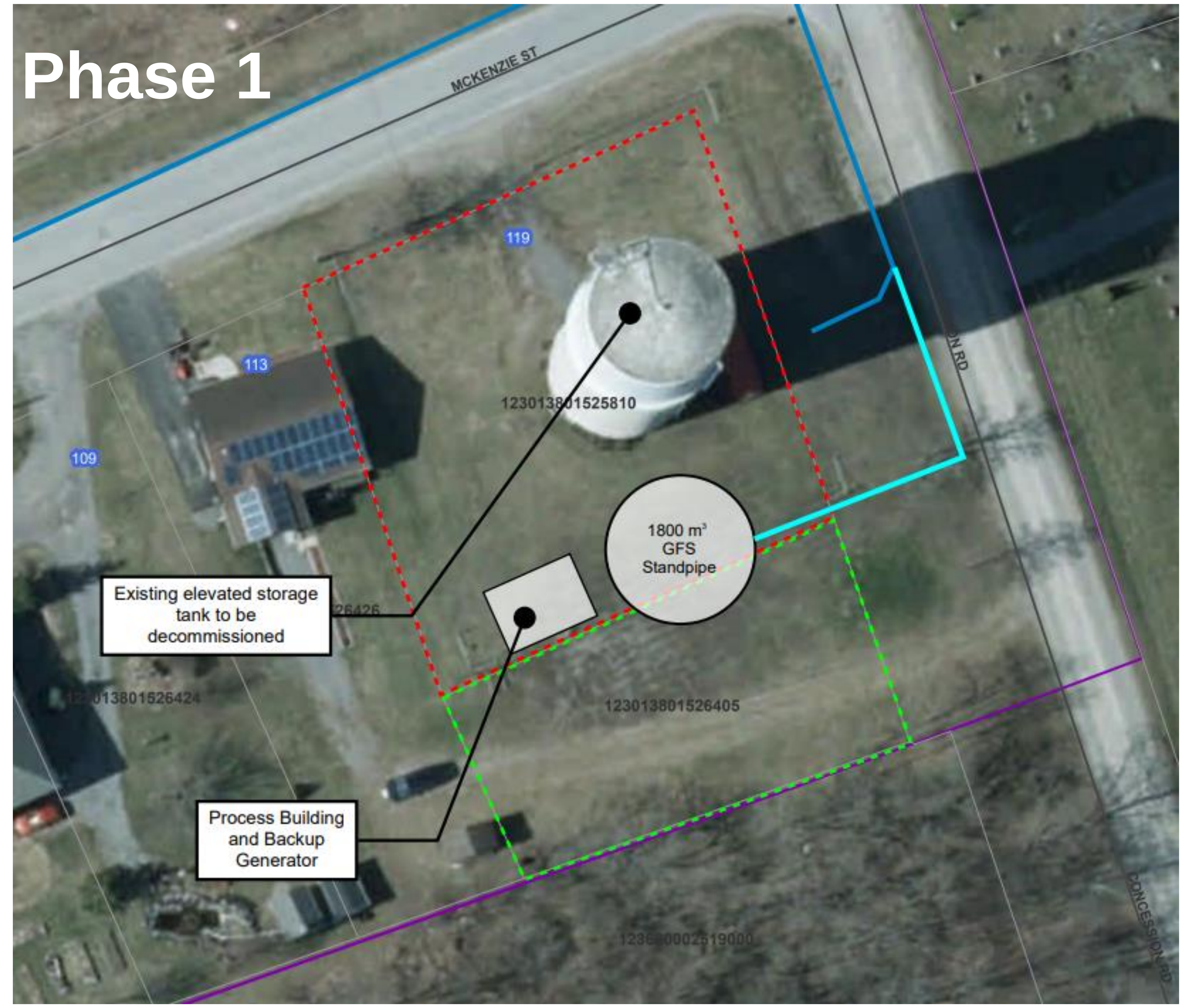
- Decommission Existing Elevated Storage
- Build a New Standpipe at McKenzie Street (land acquisition required)
- Supplement Storage with At-Grade Reservoir and Booster Station at Well #4

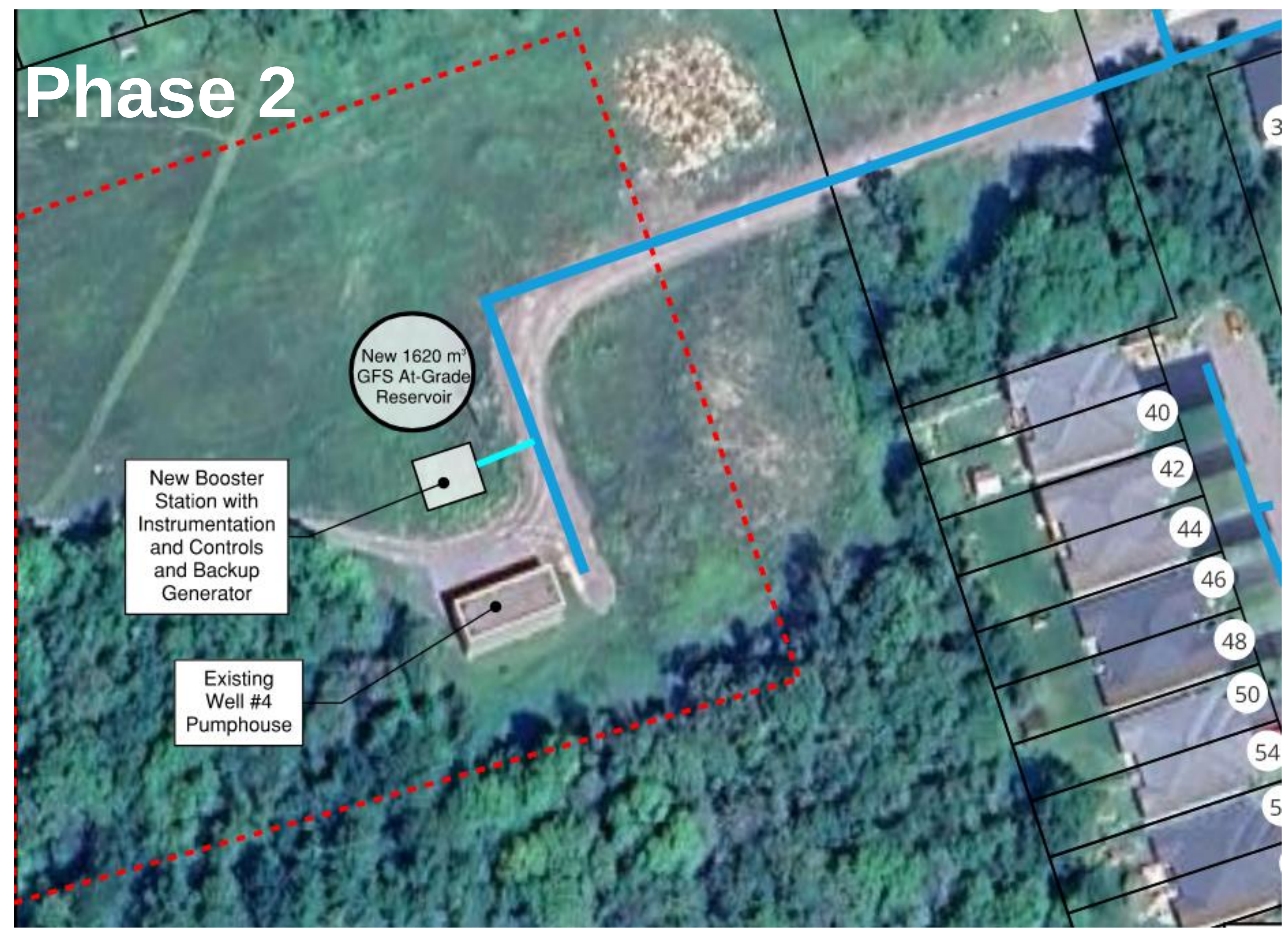
The storage solution can be built in two phases:

- Phase 1: New Standpipe at McKenzie Street
- Phase 2: New At-grade Reservoir and Booster Station at Well #4

Opinion of Probable Costs (+/- 30%):

- Phase 1: $7,300,000
- Phase 2: $4,400,000





Next Steps

Water, Wastewater and Storm Master Plan

1. Collect and address comments from Public Information Centre #2.
2. Finalize recommendations of the Phase 2 Master Plan.
3. Issue Notice of Master Plan.
4. Place Master Plan on public record for 30 days (Summer 2024).
5. The Municipality may choose to proceed with further studies and implementation as recommended by the Master Plan.

Schedule 'B' Treated Water Storage Class EA

1. Collect and address comments from Public Information Centre #2.
2. Finalize recommendations of the Schedule 'B' Class EA.
3. Issue Notice of Completion.
4. Schedule 'B' Class EA on public record for 30 days (Summer 2024).
5. The Municipality may choose to proceed with design and implementation as recommended by Schedule 'B' Class EA.

How to Participate

- Send written comments to the project contacts at Ontario Clean Water Agency and J.L. Richards listed below. Please respond by June 25th, 2024.

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Susan Jingmiao Shi, P.Eng., M.Eng.
Associate, Senior Environmental Engineer J.L. Richards & Associates Limited Phone: 343-302-5406 Email: sshi@jlrichards.ca

- Visit the Municipality website at https://www.centrehastings.com/our-municipality/water-resources/madoc-water-wastewater-and-stormwater-master-plan/ for more updates.