ARNPRIOR

Town of Arnprior

Regular Meeting of Council Agenda

Date: Monday, November 25th, 2024

Time: 6:30 p.m.

Location: Council Chambers – 105 Elgin Street West, Arnprior

1. **Call to Order**
2. **Roll Call**
3. **Land Acknowledgement Statement**
4. **Adoption of Agenda (Additions / Deletions)**
5. **Disclosures of Pecuniary Interest**
6. **Question Period**
7. **Adoption of Minutes of Previous Meeting(s) (Except Minutes of Closed Session)**
   a) **Regular Meeting of Council – November 12th, 2024** (Page 1-11)
8. **Awards / Delegations / Presentations**
9. **Public Meetings**
10. **Matters Tabled / Deferred / Unfinished Business**
11. **Notice of Motion(s)**
12. **Staff Reports**
   a) **Municipal Grant Application – Arnprior Special Olympics**, Graeme Ivory, Director of Recreation (Page 12-31)

b) **Zoning By-Law Amendment No. 5/24 (107 Baskin Drive East)**, Alix Jolicoeur, Manager of Community Services / Planner (Page 32-39)

c) **Water and Wastewater Master Plan**, John Steckly, General Manager, Operations and Ryan Wall, Engineering Officer (Page 40-315)

d) **Building Condition Assessment (BCA) for the Water Filtration Plant (WFP) and Water Pollution Control Centre (WPCC)**, Patrick Foley, Engineering Officer, Facilities and Assets (Page 316-517)

e) **Bill 185 – Development Charges By-Law Amendment**, Jennifer Morawiec, General Manager, Client Services / Treasurer (Page 518-534)

f) **2025 Calendar of Meetings**, Oliver Jacob, Deputy Clerk (Page 535-540)

13. Committee Reports and Minutes

a) **Mayor's Report**

b) **County Councillor's Report**

c) **Committee Reports and Minutes**

i) **Accessibility and Age Friendly Advisory Committee Minutes – October 2nd, 2024** (Page 541-544)

ii) **Culture and Diversity Advisory Committee Minutes – October 7th, 2024** (Page 545-549)

iii) **Environmental Advisory Committee Minutes – October 21st, 2024** (Page 550-553)

14. Correspondence & Petitions

a) **Correspondence**

i) Correspondence Package No. I-24-NOV-20

ii) Correspondence Package No. A-24-NOV-15

15. By-laws & Resolutions

a) By-laws

i) **By-law No. 7537-24 – Adopt Zoning By-Law Amendment No. 5/24 (107 Baskin Drive East)** (Page 554-555)

ii) **By-law No. 7538-24 – Amend Development Charges By-Law** (Page 556-559)

iii) **By-law No. 7539-24 – Amend User Fees and Charges By-law (Schedule E – Nick Smith Centre Advertising & Sponsorship Opportunities)** (Page 560-564)

b) Resolution

i) **Municipal Grants Application – Arnprior Community Choir and Valley Concert Band (2025 Music! Music! Music! Event)** (Page 565)

16. Announcements

17. Media Questions

18. Closed Session

One (1) Matter pursuant to Section 239(2)(c) of the Municipal Act, 200, as amended, to discuss a proposed or pending acquisition or disposition of land by the municipality or local board (Property Acquisition); and

One (1) Matter pursuant to Section 239(2)(k) of the *Municipal Act, 2001*, as amended, to discuss a position, plan, procedure, criteria or instruction to be applied to any negotiations carried on or to be carried on by or on behalf of the municipality or local board (Integrity Commissioner Services).

19. Confirmatory By-law

By-law No. 7540-24 to confirm the proceedings of Council

20. Adjournment

Please note: Please see the Town's website to view the live stream. The meeting recording will also be uploaded to YouTube for future viewing.

The agenda is made available in the Clerk's Office at the Town Hall, 105 Elgin Street West, Arnprior and on the Town's website. Persons wishing to receive a print item on the agenda by email, fax, or picked up by hand may request a copy by contacting the Clerk's Office at

613-623-4231 ext. 1840. The Agenda and Agenda items will be prepared in an accessible format upon request.

Full Distribution: Council, C.A.O., Managers and Town Administrative Staff

E-mail to: Metroland Media; Oldies 107.7 / My Broadcasting Corporation; Valley Heritage Radio

ARNPRIOR

Minutes of Council Meeting
November 12, 2024 6:30 PM
Town Hall, Council Chambers – 105 Elgin St. W. Arnprior, ON.

Council and Staff Attendance

Council Members Present (In-Person):
Mayor Lisa McGee
County Councillor Dan Lynch
Councillor Lynn Cloutier
Councillor Tom Burnette
Councillor Chris Toner
Councillor Chris Couper
Councillor Billy Denault

Council Members Present (Electronic):
None

Town Staff Present:
Robin Paquette, CAO
Jennifer Morawiec, General Manager, Client Services / Treasurer
Kaila Zamojski, Town Clerk
Oliver Jacob, Deputy Clerk
Graeme Ivory, Director of Recreation
Alix Jolicoeur, Manager of Community Services / Planner
Patrick Foley, Engineering Officer, Facilities and Assets

Council Members Absent:
None

1. Call to Order

Mayor Lisa McGee called the Regular Council Meeting to order at 6:30 PM and welcomed those present.

2. Roll Call

The roll was called, with all Members of Council being present.

3. Land Acknowledgement Statement

Mayor Lisa McGee asked everyone to take a moment to acknowledge and show respect for the Indigenous Peoples as traditional stewards of the land we operate on, by stating:

> "I would like to begin by acknowledging that the land on which we work, and gather is the traditional unceded territory of the Anishinaabe People. This Algonquin Nation have lived on this land for thousands of years, long before the arrival of the European settlers, and we are grateful to have the opportunity to be present in this territory."

4. Adoption of Agenda

Resolution Number 359-24
Moved by Lynn Cloutier
Seconded by Tom Burnette

Be It Resolved That the agenda for the Regular Meeting of Council dated Tuesday, November 12th, 2024 be adopted.

Resolution Carried

5. **Disclosures of Pecuniary Interest**

Councillor Chris Couper declared a pecuniary interest in item 15(b)(i) on the October 28th, 2024 Regular Meeting of Council Agenda, noting:

> "I, Chris Couper, declare a pecuniary interest in this item as I live in close proximity to the subject lands"

6. **Question Period**

None

7. **Adoption of Minutes of Previous Meeting(s)**

Resolution Number 360-24
Moved by Chris Toner
Seconded by Lynn Cloutier

That the minutes of the Regular Meeting of Council listed under Item 7 (a) on the Agenda be adopted (Regular Meeting of Council – October 28th, 2024).

Resolution Carried

8. **Awards/Delegations/Presentations**

None

9. **Public Meetings**

a) **Zoning By-Law Amendment No. 5/24 (107 Baskin Drive East)**

Resolution Number 361-24 (6:32 PM)
Moved by Chris Couper
Seconded by Dan Lynch

That Council move into a public meeting regarding an application for Zoning By-Law Amendment No. 5/24 related to 107 Baskin Drive East.

Resolution Carried

The public meeting was opened at 6:32 PM. Alix Jolicoeur, Manager of Community Services and Planner, provided an overview presentation, attached as Appendix A and forming part of these minutes, outlining the proposed Zoning By-Law Amendment No. 5/24 for the subject property located at 107 Baskin Drive East.

Following the presentation, the meeting was opened to the public for comment. No members of the public provided comments.

The public meeting was declared closed at 6:35 PM.

Resolution Number 362-24 (6:35 PM)
Moved by Chris Couper
Seconded by Dan Lynch

That Council resume to the Regular Meeting of Council.

Resolution Carried

10. Matter Tabled/ Deferred/ Unfinished Business

None

11. Notice of Motions

None

12. Staff Reports

a) Zoning By-Law Amendment No. 6/24 (400 Division Street), Manager of Community Services / Planner

Resolution Number 363-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That Council receives an application for an amendment to Zoning By-law 6875-18 for land legally described as McNab Concession A, part of Lot 5 to allow construction of a sales office / model home prior to draft plan approval;

Further That pursuant to Section 34(12) of the Planning Act, Council holds a public meeting on December 9th, 2024, regarding the proposed amendment, to allow for public review and comment.

Resolution Carried

b) Arena Sponsorship and Advertising Opportunities – Engineering Officer and Director of Recreation

Resolution Number 364-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That Council authorize the Director of Recreation to negotiate sponsorship opportunities for the Nick Smith Centre and enter into agreements for these assets; and

Further That Council enact a by-law to amend the User Fees and Charges By-Law 7463-24, Schedule E to include the sponsorship and advertising rates as outlined herein.

Resolution Carried

c) Review of Pound Keeper Services (2025 to 2028) – Deputy Clerk

Resolution Number 365-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That Council receives Report Number 24-11-12-03 as information; and

Further That Council adopt a by-law authorizing the Mayor and Clerk to enter into a service agreement for 2025 to 2028 with the Arnprior and District Humane Society for the provision of pound keeper services for the municipality.

Resolution Carried

d) Renfrew and Area OPP Detachment Board – 2025 Budget – CAO

Resolution Number 366-24
Moved by Lynn Cloutier
Seconded by Chris Toner

That Council receive the 2025 Budget information provided by the Renfrew and Area OPP Detachment Board; and

Further That Council supports the 2025 Budget as presented; and

Further That Council confirms its responsibility under the Act to pay the OPP detachment board an equal share of the amount set out in the board's estimates.

Resolution Carried

Mayor Lisa McGee left the council table at 7:21 PM.
Deputy Mayor Tom Burnette assumed the role of Chair in the Mayor's absence.
Mayor Lisa McGee returned to the Council table at 7:23 PM.

e) Council Composition Survey Results, 2026 Municipal Election Alternative Voting Method and 2025 Ad-Hoc Council Renumeration Committee – CAO and Town Clerk

Resolution Number 367-24
Moved by Lynn Cloutier
Seconded by Dan Lynch

That Council accept this report for information;

And That Council endorses the following for the upcoming 2026 Municipal and School Board Election with respect to Council composition:

a) That Council maintains the current size of Council at seven (7) members.

b) That Council rename the “County Councillor” position to be the “Deputy Mayor” and that the position will be the representative at County Council, as well as hold the position of Deputy Mayor, for the full Council term, effective the next 2026-2030 term of Council.

c) That Council direct staff to bring forward amendments to the current Council Composition By-law and Procedure By-law to reflect the renaming of the County Councillor position to Deputy Mayor and the amendment of the rotational Deputy Mayor to a dedicated Deputy Mayor position, beginning the 2026-2030 term of Council.

And That Council endorses the following for the upcoming 2026 Municipal and School Board Election:

d) That Council direct the Town Clerk to bring forward a by-law authorizing an alternative voting method (Internet / Telephone) for the 2026 Municipal and School Board Election.

e) That Council maintain the existing at-large election system.

f) That Council maintain the existing first past-the-post election model for the 2026 Municipal and School Board Election.

And That Council authorize recruitment of citizen members to participate on a 2025 Ad- Hoc Council Remuneration Committee with a mandate to conduct a market review and make recommendations for Council compensation, to take effect the following 2026-2030 term of Council.

Resolution Divided

At the request of Councillor Cloutier, Council considered the following motion to divide the recommendation into two distinct resolutions.

Resolution Number 368-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That Council divide Items (b) and (c) in paragraph one (1) from Resolution No. 367-24 and consider them separately from the remainder of the resolution.

Resolution Carried

Councillor Chris Toner left the Council table at 7:47 PM.
Councillor Chris Toner returned to the Council table at 7:48 PM.

Resolution Number 369-24
Moved by Tom Burnette
Seconded by Dan Lynch

That Council endorses the following for the upcoming 2026 Municipal and School Board Election with respect to Council composition:

b) That Council rename the “County Councillor” position to be the “Deputy Mayor” and that the position will be the representative at County Council, as well as hold the position of Deputy Mayor, for the full Council term, effective the next 2026-2030 term of Council.

c) That Council direct staff to bring forward amendments to the current Council Composition By-law and Procedure By-law to reflect the renaming of the County Councillor position to Deputy Mayor and the amendment of the rotational Deputy Mayor to a dedicated Deputy Mayor position, beginning the 2026-2030 term of Council.

At the request of Councillor Denault, a recorded vote was taken:

Councillor Tom Burnette	Yes
Councillor Lynn Cloutier	No
Councillor Chris Couper	Yes
Councillor Billy Denault	No
County Councillor Dan Lynch	Yes
Councillor Chris Toner	Yes
Mayor Lisa McGee	Yes

Resolution Carried

Resolution Number 370-24
Moved by Billy Denault
Seconded by Lynn Cloutier

That Council accept this report for information;

And That Council endorses the following for the upcoming 2026 Municipal and School Board Election with respect to Council composition:

a) That Council maintains the current size of Council at seven (7) members.

And That Council endorses the following for the upcoming 2026 Municipal and School Board Election:

d) That Council direct the Town Clerk to bring forward a by-law authorizing an alternative voting method (Internet / Telephone) for the 2026 Municipal and School Board Election.

e) That Council maintain the existing at-large election system.

f) That Council maintain the existing first past-the-post election model for the 2026 Municipal and School Board Election.

And That Council authorize recruitment of citizen members to participate on a 2025 Ad- Hoc Council Remuneration Committee with a mandate to conduct a market review and make recommendations for Council compensation, to take effect the following 2026-2030 term of Council.

Resolution Carried

13. Committee Reports and Minutes

a) Mayor's Report

None

b) County Councillor's Report

County Councillor Lynch reported the following from the County of Renfrew:

- At the October 30th, 2024 County Council meeting, the following delegations were received by County Council:
  - Jason Hagan, Program Manager, and Keith Taylor, Chief Investment Officer from One Investments provided an overview of their investment services across Ontario. County Councillor Lynch asked the General Manager, Client Services / Treasurer if the Town of Arnprior participated in the One Investment program.
    - In response to County Councillor Lynch, the General Manager, Client Services / Treasurer advised that the Town of Arnprior currently participates in this program.
  - Jennifer White, Executive Director from Family Children Services of Renfrew County provided an overview of their programs and services and to seek support through advocacy from the County of Renfrew regarding provincial funding shortfalls for their organization.
- Since March 2024, mesa Paramedic outreach teams with the County of Renfrew's Emergency Services Department have had approximately 1,480 encounters with individuals, of which 1,257 occurred in Pembroke.
- The following County Paramedics were recognized with the below noted awards:
  - i. Governor General's Exemplary Service Award: Heather Lavigne, Brent Daechsel, John Greene and David Rowe.
  - ii. Ontario Association of Paramedic Chiefs (OAPC) Humanitarian Award: Acting Commander Steve Osipenko.

iii. McNally Project Award for Emergency Scholars: Acting Commander Chelsea Lanos

- On October 31st, 2024, County Councillor Lynch attended the CNL Environmental Stewardship Committee meeting.
- On November 1st, 2024, County Councillor Lynch attended the ribbon cutting ceremony for the new paramedic facility in Eganville, ON.
- Through the Renfrew County Community Futures Development Corporation, the Town of Arnprior and Entreprise Renfrew County will be hosting a Content Creation Workshop with Amanda Talker Media as the speaker.
- The Holiday Edition of Taste of the Valley will be held on December 14th, 2024 at the Renfrew Armouries from 10:00 AM to 3:00 PM.
- The Renfrew County Food Guide is now available online as an initiative of the Ottawa Valley Tourism Association. Of note, Needham Farms and Cold Bear Brewing are listed as places to visit.

c) Committee Reports and Minutes

i. Environmental Advisory Committee Meeting Minutes – September 16th, 2024

Resolution Number 371-24
Moved by Lynn Cloutier
Seconded by Chris Toner

That Council receive the Advisory Committee Minutes listed under Item Number 13 (c) (i) as information.

Resolution Carried

14. Correspondence & Petitions

a) Correspondence Package No. I-24-NOV-19

Resolution Number 372-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That the Correspondence Package Number I-24-NOV-19 be received as information and filed accordingly.

Resolution Carried

County Councillor Dan Lynch noted the following items:

- Page 30 – Hosted by the Ministry of Citizenship and Multiculturalism, the Province of Ontario is currently accepting submissions with upcoming deadlines on November 15th, 2024 (Ontario Volunteer Service Awards) and December 15th, 2024 (June Callwood Outstanding Achievement Award for Voluntarism).
- Page 40 – In the Fall Economic Statement, the Government of Ontario has proposed to extend the temporary rate cuts on gasoline and fuel taxes until June 30th, 2025.
- Page 43 – Ontarians can now receive their free flu shot and the new, updated COVID-19 vaccine at local pharmacies, public health units and primary care providers across the province.
- Page 49 – In the Fall Economic Statement, the Government of Ontario has proposed providing financial support of $200.00 (per person) to all eligible Ontario taxpayers in early 2025.
- Page 60 – The Government of Ontario is increasing the financial assistance to veterans and their family through the Soldiers' Aid Commission which will allow eligible veterans and their family members to receive up to $3,000 each year, up from $2,000, to help pay for essential services and supports.
- Page 90 – Enbridge Gas Inc. has applied to increase its natural gas rates effective April 1, 2025 to recover costs associated with meeting its obligations under the *Greenhouse Gas Pollution Pricing Act* and the regulations under the *Ontario Emissions Performance Standards*, as well as to recover other related account balances.
- Page 92 – The City of St. Catharines adopted a resolution in support of investigating the feasibility and potential benefits of innovative pilot projects to improve environmental outcomes and to minimizes the City's carbon footprint in an environmentally sustainable manner. They note that the Federation of Canadian Municipalities (FCM) has established Green Municipal Fund to support these types of projects. County Councillor Lynch asked if the Town has considered such innovative environmental projects as had been suggested by the City of St. Catharines.
    - In response to County Councillor Lynch, the CAO noted that the Town has not considered bio resin as an element of Town road projects to date; however, Town staff will continue to watch the progression of this project with interest.
- Page 100 – The Town of Petawawa adopted a resolution to support the Municipality of Tweed in their call for the Province of Ontario to immediately implement sustainable funding for small rural municipalities by reabsorbing the cost of the Ontario Provincial Police (OPP) services back into the provincial budget with no cost recovery from municipalities. County Councillor Lynch asked if Town staff have considered bringing forward a resolution on this issue.

- In response to County Councillor Lynch, the CAO noted that both the Association of Municipalities of Ontario (AMO) and the Eastern Ontario Wardens' Caucus (EOWC) have been actively working with the Government of Ontario on this file and the Town is supportive of their work.

Councillor Chris Couper noted the following:

- Page 89 – The Local Immigration Partnership of Renfrew and Lanark (LIP) is currently hosting a survey for newcomers which is open to those who are born outside of Canada, over the age of 16 years, and live, work and study in Renfrew or Lanark Counties.

15. By-laws & Resolutions

a) By-laws

Resolution Number 373-24
Moved by Chris Couper
Seconded by Dan Lynch

That the following by-law be and is hereby enacted and passed:

i. By-law No. 7535-24 – Pound Keeper Services – Arnprior and District Humane Society

Resolution Carried

16. Announcements

County Councillor Dan Lynch made the following announcements:

- Hosted by the Royal Canadian Legion Branch No. 174, the Remembrance Day ceremony took place yesterday (November 11th, 2024) and County Councillor Lynch expressed gratitude to all those who attended to pay tribute to local veterans, active service members, and those who gave the ultimate sacrifice in service of their country. He also thanked Arnprior Regional Health for offering free parking at the Arnprior and District Memorial Hospital for attendees which was greatly appreciated, particularly by those seniors who attended.

- The Opportunity Shop will be holding a Christmas Sale at the Arnprior and District Museum on Wednesday, November 13th, 2024 and Thursday, November 14th, 2024.

- The Arnprior and McNab/Braeside Men's Shed will be hosting a Christmas Craft Sale at the Nick Smith Centre Community Hall on Sunday, November 24th, 2024 from 10:00 AM to 2:00 PM.

17. Media Questions
None

18. Closed Session
None

19. Confirmatory By-Law

Resolution Number 374-24
Moved by Billy Denault
Seconded by Tom Burnette

That By-law No. 7536-24, being a By-law to confirm the proceedings of the Regular Meeting of Council held on November 12th, 2024, be and is hereby enacted and passed.

Resolution Carried

20. Adjournment

Resolution Number 375-24
Moved by Lynn Cloutier
Seconded by Billy Denault

That this meeting of Council be adjourned at 7:59 PM.

Resolution Carried

Signatures

Lisa McGee, Mayor

Kaila Zamojski, Town Clerk

ARNPRIOR

Town of Arnprior Staff Report

Subject: Municipal Grant Application – Arnprior Special Olympics
Report Number: 24-11-25-01
Report Author and Position Title: Graeme Ivory, Director of Recreation
Department: Recreation
Meeting Date: November 25, 2024

Recommendation:

That Council waive 50% of the user fees and charges for the Arnprior Special Olympics municipal grant request for the use of the Nick Smith Centre Community Pool with two (2) lifeguards on Sunday afternoons (from 12:00 p.m. to 2:00 p.m.) on eighteen (18) dates; for use of Diamond 2 at McLean Avenue on Monday evenings (from 6:30-8:00 p.m.) on 13 dates; and the use of the green space at Robert Simpson Park on 6 dates at a total value of $2,703.93; and

Further That the Arnprior Special Olympics be advised that it is mandatory to carry sufficient liability insurance and have the Town of Arnprior added as an additional insured.

Background:

The Town's Municipal Grants Policy helps to define the purpose, scope and procedures for Council to provide municipal grants to organizations that provide programs or services that address an identifiable need or problem in the community and bestow some community-wide benefit. Municipal Grant streams authorized under the policy include:

- Support Funding (Maximum 1 request per year, $3,000 limit per request)
- In-Kind Support – Partnership (Maximum 2 requests per year)
- In-Kind Support – Single (Maximum 2 requests per year)
- Festivals & Event Support – (Maximum 1 request per year, $5,000 limit per request)

In order to qualify for Municipal Grant Funding applicants are required to complete the application form and meet various qualification criteria, including demonstration of financial need. Applications are received and evaluated based on the qualifications and eligibility criteria listed in Section 3 of the Municipal Grants Policy. Depending on the funding stream, applications received come to Council in the form of a Staff Report or through an Action Item.

Council has waived the rental fees for the Nick Smith Centre Community Pool and Ball Diamonds for the Arnprior Special Olympics for a number of years for their weekly programming.

Discussion:

The Arnprior Special Olympics submitted a grant request under the In-Kind – Partnership Stream requesting 100% of the fees to be waived for the use of the Nick Smith Centre Community Pool for 18 rentals every Sunday from 12:00-2:00 p.m. starting November 10, 2024 through to March 30, 2025 with three exclusion dates. This is equivalent to a total cost of $4,896.00, not inclusive of HST.

Arnprior Special Olympics also requested 13 rentals of Diamond #2 at McLean Avenue Park for 90-minutes each rental from May 26, 2025 through to August 25, 2025 with one exclusion date. This is equivalent to a total cost of $511.87, not inclusive of HST.

They also requested the use of the green space at Robert Simpson Park on 6 Thursdays. There is no cost for the use of this space, but it was noted in their request.

Table 1: In-Kind Support Request Values

Rental Period	Cost / Rental	Value ($)
Nick Smith Centre Community Pool 18 Rentals (36 hours of rental time) November 10, 2024 – March 30, 2025	$72.00 / hour (Pool) $64.00 / hour (Guards)	$4,896.00
Ball Diamond Rentals Rentals 13 Rentals (19.5 hours of rental time) May 26, 2025 – August 25, 2025	$26.50 / day	$511.87
Total Value of Request		**$5,407.87**

The request was evaluated based on the qualification and eligibility criteria outlined in the Municipal Grants Policy, outlined in “Appendix A: Evaluation Matrix – Arnprior Special Olympics”, and was found to be in compliance with the requirements. However, it does not demonstrate financial need.

In the financial reports submitted by Arnprior Special Olympics, their 2023-2024 budget showed an anticipated deficit of $12,570; however, their final financial report showed a surplus of $29,323 after exceeding their budgeted revenues by more than $15,000 and their expenses coming over $26,000 below budget. In their application for the 2024-

2025 year, Arnprior Special Olympics is again projecting an operating deficit of $13,000.

Arnprior Special Olympics has a bank balance of $90,000 which includes their 2024 surplus. After further discussions with the Arnprior Special Olympics leadership, the amount they have in savings supports their emergency travel fund, new uniforms, coaching education, new equipment and operational deficits which would cover approximately $60,000 - $70,000 of the total amount in their savings.

Options:

Other options for Council consideration include:

1. Choose to support the Arnprior Special Olympics request at a difference percentage, as determined by Council;

2. Choose to support the Arnprior Special Olympics request for use of facilities covering the cost of $3,103.87; however, require Arnprior Special Olympics to cover the cost of lifeguards for the swims at a cost of $2,304.00.

3. Choose not to support the Municipal Grant Request. Staff does not recommend this, as Arnprior Special Olympics offers inclusive athletic programming to approximately 60 athletes (ages 8-70) in our community that have intellectual and/or physical disabilities.

Policy Considerations:

The Municipal Grants Policy aligns with the Town's Strategic Plan of effective service delivery, as well as growth and expansion. Providing Municipal Grants to eligible organizations, allows the Town of Arnprior to have various programs and events, which compliment or support those offered by the municipality, which contributes to the overall growth of the Town.

Financial Considerations:

This Municipal Grant Request falls under the In-Kind Partnership Support stream, where support is provided through waiving of user fees and charges. While other revenue-generating programs could be using the Community Pool and Ball Field during the times requested by the Arnprior Special Olympics, staff do not consider this a barrier for approving the space for them at this time.

Meeting Dates:

N/A

Consultation:

N/A

Documents:

Appendix A – Evaluation Matrix – Arnprior Special Olympics

Appendix B – Application Form – Arnprior Special Olympics

Signatures

Reviewed by Department Head: Graeme Ivory

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

Appendix A – Evaluation Matrix – Arnprior Special Olympics

Applicant: Arnprior Special Olympics	Meets Criteria	Notes
Qualification Criteria		
A not-for-profit or charitable organization operating in the Town of Arnprior (other community groups may be considered based on demonstrated benefit to overall community)	Yes	
Hosting a program, activity, event or service that primarily benefits the residents of the Town of Arnprior	Yes	
Using the Municipal Grant for operating program, activity, event or service, not capital projects or debt payments	Yes	
Demonstrates financial need	No	
Demonstrates having explored additional sources of potential funding from other levels of government, the private sector, donations, fundraising efforts, etc. where applicable	Yes	
Completed and submitted the appropriate application form a minimum of 60 days prior to their need	No	
Eligibility Criteria		
1. Overall contribution to community Arnprior Special Olympics chapter is 23 years old and offers inclusive athletic programming to approximately 60 athletes in our community ages 8 to 70. The athletes may have intellectual and/or physical disabilities. Arnprior Special Olympics is 100% managed by volunteers and receive no government funding. Funding is generated exclusively through fundraising and donations. 100% of the funds are exclusively used for sports programming via our tight fiscal governance. Thus, support from the town benefits participants, via sports, by reducing financial burden on the athletes and their caregivers.	Yes	

2. Supports & promotes Town's vision, values and strategic priorities Arnprior Special Olympics programming is best aligned with Community Well-Being. Special Olympic athletes are active members of the community and certainly enrich Arnprior's diversity. As with all residents, the athletes benefit greatly from access to sport facilities for personal growth athletically and socially. Due to the challenging economic position of the majority of the athletes, programming is provided at the least cost to lower financial barriers and enable maximum participation.	Yes	
3. Financial Management of the community organization Arnprior Special Olympics does not receive Provincial or National funding. All money raised locally is spent on local programming for athletes as per our financial governance model established by Special Olympics Ontario. Typically we have many fundraising activities including: Police Services Torch Run, Bingos, Bowl-a-thon and Raffles. The largest fundraiser is our Annual Golf Tournament in July.	Yes	
4. Demonstrated support of volunteers Arnprior Special Olympics is 100% managed by volunteers	Yes	
5. Demonstrated the benefits to the residents of the Town of Arnprior Providing inclusive programming to residents with intellectual and/or physical disabilities that does not exist otherwise in Arnprior.	Yes	
Notes		

ARNPRIOR
· WHERE THE RIVERS MEET ·

Town of Arnprior
105 Elgin Street West
Arnprior, ON.
K7S 0A8
613-623-4231

Municipal Grants Application

General Information	**Submission Date:** 30 Sept 24		
Name of Organization:	Arnprior Special Olympics - Arnprior Community		
Street Address:	14 Maple Drive		
City/Town:	Arnprior	Postal Code:	K7S 3V3
Contact Person:	Victoria Murdoch	Position/Title:	Community Coordinator
Telephone:	613-623-8254	Fax Number:	
E-mail:			
What is your organization's status?	Charitable ☐	Not-for-profit ☑	Other ☐
Authorization:	I declare that I am authorized to sign this grant request on behalf of Arnprior Special Olympics. [insert name of organization] V Murdoch. [signature] Oct 2 2024. [date]		Name (print): Vicki Murdoch Position/Title: Community Coordinator Phone: 613-623-8254

Please provide project/event date(s) or any relevant timelines related to this request.

Required to begin sport activity at the community pool in October.

NOTICE WITH RESPECT TO COLLECTION OF PERSONAL INFORMATION: Personal information collected on this application form is collected under the authority of the Municipal Act, 2001 and will be used for the purpose of processing the application and for administrative purposes. Questions about the collection and use of this information in accordance with the Municipal Freedom of Information and Protection of Privacy Act may be made to the Town Clerk, 105 Elgin Street West, Arnprior, ON K7S 0A8 or by phone: (613) 623-4231 ext. 1817.

ARNPRIOR
· WHERE THE RIVERS MEET ·

Town of Arnprior
105 Elgin Street West
Arnprior, ON.
K7S 0A8
613-623-4231

Grant Request	Please check applicable request	Brief description of request (i.e. dollar amount and/or type of in-kind support, staffing requirements)
Support Funding (**complete Parts A and B**)	☐	
In-Kind Support (Partnership) (**complete Parts A and B**)	☑	Use of facilities: Nick Smith Centtre pool, with 2 life guards; ABBA diamond #2 and Robert Simpson Park for regular weekly sport activity for athletes
In-Kind Support (Single) (**complete Part A**)	☐	
Festivals and Events Support Funding (**complete Parts A and B**)	☐	

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Part A (to be completed for all municipal grant requests)

Organization/Grant Information
What is the function of your organization (mandate/key objections)?
Special Olympics Ontario mission: to provide year round sports training and athletic competition for individuals with intellectual disabilities.
Please provide an overview of the service, program or event being supported with this funding.
Programming is provided for swimming, softball and bocce. Approximately 15-25 athletes participate in each sport. These sport activities take place on town facilities.
Please explain how this service, program or event benefits the Town of Arnprior and its residents.
Special Olympics Arnprior chapter is 23 years old and offers inclusive athletic programming to approximately 60 athletes age 8 to 70. The athletes may have intellectual and / or physical disabilities. Arnprior Special Olympics is 100% managed by volunteers and receive no government funding. Funding is generated exclusively through fundraising and donations. 100% of the funds are exclusively used for sports programming via our tight fiscal governance. Thus, support from the town benefits participants, via sports, by reducing financial burden on the athletes and their caregivers.

Does your organization use volunteers?	If yes, how many volunteers are involved and in what capacity? (e.g. administration, service level, etc.)
Yes ☑ **No** ☐	Arnprior Special Olympics is lucky to have 45 volunteer coaches and 30 additional volunteers who donate their free time to assist our athletes. The community council provides leadership and program direcction. Council is made up of 8 volunteers and 1 athletic representative.

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Please select target population that will benefit from this request.	**Age Range:**	**Number of participants benefitting from this request:**
	☑ Children (Ages 0-12) ☑ Youth (Ages 13-18) ☑ Adults (Ages 19-59) ☑ Seniors (Ages 60+)	☐ 1-50 ☑ 51-100 ☐ 101-499 ☐ 500-1000 ☐ >1000

Does this request align with the Town of Arnprior's Strategic Plan, as determined by Council? Please explain.	
Key Priorities • Economic Development – Attraction, retention and marketing initiatives and economic impact	

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• Community Well Being – Community support, arts and culture, recreational and leisure, health and well being support initiatives	Arnprior Special Olympics programming is best aligned with community well being. Special Olympics athletes are active members of the community and certainly enrich Arnprior's diversity. As with all residents, the athletes benefit greatly from access to sport facilities for personal growth athletically and socially. Due to the challenging economic position of the majority of the athletes, programming is provided at the least cost to lower financial barriers and enable maximum participation.	
Has your organization received support from the Town of Arnprior in previous years? **Yes** ☑ **No** ☐	If yes, please provide additional details below.	
	Dollar ($) value received:	
	Service/ Program/ Festival/ Event grant support was received for:	
	Type of grant support received:	☐ Support Funding ☐ In-Kind Support ☑ In-Kind Partnership ☐ Festival and Event Support Funding
	Was Town staff support provided? **If yes, in what capacity?**	At Nick Smith Centre, 2 life guards have been provided to support the swim program that runs from October to March.

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	If this submission/request differs from previous year(s), please describe the difference? The submission does not fiffer from that requested previously.

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Part B (to be completed for the following Streams: Support Funding, In-kind Partnership, Festivals and Events)

Financial Information
Indicate your organizations fundraising policy. Comment on your organizations fundraising plans for the current year and upcoming years. (If Applicable)
Arnprior Special Olympics (ASO) does not receive any Provinical or National funding. All money raised locally is spent on local programming for athletes per our financial governance model established by Special Olympics Ontario. Programming expenses include sports equipment, tournament registration fees, transportation to events, team uniforms and coach training. Typically we have many fundraising activities. These events include: Police Services Torch Run, Bingos, Bowl-a-thons and Raffles. The largest one is the Golf Tournament, typically held in July.
Does your organization raise enough money through fundraising to cover its expenses? If not, indicate your organizations plan to pay these expenses. (If Applicable)
Yes. Arnprior Special Olympics (ASO) is 100% aligned to funds that can be raised. The ASO budget for programming is determined by what can be raised. ASO has been successful covering the budget and offering great programming for athletes in part due to the generous support of the Town of Arnprior.
Indicate if you received funding or are seeking funding from sources other than the municipality.
Donations from various sponsors are sought. Arnprior Special Olympics is governed by Special Olympics Ontario. This means that each chapter is responsible for raising funds required for their programming.

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Funding provided must benefit the residents of the Town of Arnprior. Please indicate how the funding would be used to benefit the residents of Arnprior.
The Arnprior Special Olympics (ASO) chapter has provided athletic programming to approximately 60 locat athletes age 8 - 70. ASO programs that utilize town facilities include swimming, softball, snowshoeing and bocce. Local Special Olympic athletes and their caregivers benefit from this opportunity for athletic and social connection.
In what way is your organization working on becoming self-sufficient?
Arnprior Special Olympics (ASO) is self sufficient from the perspective that ASO can generate funds via fundraising. Annual budget commitments are offset by funds raised. The goal is to maximize programming while reducing financial barriers faced by the athletes.
What effect would the denial of all or a part of this request have on your organization and/or the event/activity/program/service you are applying for?
Denial of this request would most certainly raise program costs. These costs would result in higher participation costs for athletes and programming would also have to be reduced. Cost increases to financially challenged athletes would reduce the level of participation.

Has your participation been greater, less or more than last year? (If Applicable)
Arnprior Special Olympics participation has been stable - there were approximately 60 athletes in 2024.

Part B (cont'd)

Projected Budget	
Please fill out the projected budget for your organization's festival/event/initiative/project below.	
Revenue Description	**Budget Amount**
Grants – Federal and/or Provincial	$
Grants – Town of Arnprior	$
Donations/Sponsorships	$ 2K
Earned Income	$
Applicant Contribution	$
User Fees	$ 8K
Membership Fees	$
Fundraising Efforts	$ 40K
Other (please specify)	$
Other (please specify)	$
Other (please specify)	$
Other (please specify)	$
Total Revenue	$ 50K

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Expenses Description	**Budget Amount**
Salaries and Benefits	$
Advertising and Promotion	$
Entertainment	$
Administration	$ 1K
Facilities Rental	$ 11K
Prizes and Awards	$
Other (please specify) Volunteer (coach) training	$ 5K
Other (please specify) Equipment and uniforms	$ 3K
Other (please specify) Tournament costs	$ 32K
Other (please specify) Fundraising expense	$ 11K
Total Expenses	**$** 63K

Please attach the listed documentation to your completed application.	☐ Most recent financial statements ☐ Financial statement from previous year or previous festival/event ☑ Budget for program, service, festival/event ☐ Proof of incorporation, if applicable ☑ Proof of insurance (required if funding is approved)
______ (initial)	I hereby acknowledge that the Town of Arnprior requires any successful applicant to provide a follow-up report, as described in the Municipal Grants Policy.

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Conditions of Assistance

a) Any Grant funding provided by the Town of Arnprior must be applied to current expenses associated with the approved project, and not be used to subsidize any other project of the applicant, or to reduce or eliminate accumulated deficits.

b) The Town of Arnprior must be notified in writing of any significant changes and/or purpose of the supported activity or event. In the event that the activity or event is not completed, or does not move forward, the Town of Arnprior reserves the right to request the return of any grant funding provided.

c) Receipt of a grant does not guarantee funding the following or any subsequent year.

d) The applicant acknowledges and agrees that the Town of Arnprior shall not be liable for any incidental, indirect, special or consequential damages, injury or any loss of use, revenue or profit of the organization arising out of or in any way related to the approved program/event/ service.

e) Where applicable, the Town of Arnprior must be acknowledged on promotional materials related to the funded activities/event, including but not limited to brochures, print ads, programs, posters, signage and media releases, as well as websites, e-newsletters, and social media campaigns, where possible. The Marketing and Economic Development Officer will require information from the applicant, in advance on what materials/ electronic formats the Town's logo will be included on to ensure compliance with the Town's brand guidelines.

f) The Town of Arnprior reserves the right to an onsite presence, or formal role, at Festivals and Events. Failure to acknowledge the Town's support may result in the inability of an organization to obtain grant support in future years.

(initial)	I acknowledge that I have read and understand the Condition of Assistance for receipt of Town of Arnprior Municipal Grants. I also acknowledge that I have read and agree to follow the Town of Arnprior's Municipal Grants Policy.

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2023-2024 (FY 24) Final

Arnprior SOO Budget

Revenue / Fundraising	BUDGET REVENUE	Y-T-D FY24	Y-T-D FY24
Registration Fees- Hosted Events	5,720	$ 7,437	130%
Fundraising Events	41,000	$ 53,413	130%
Donations (Corp. & Memorial)	500	$ 1,742	348%
Total Anticipated Revenue	47,220	$ 62,592	133%
Expenses	**BUDGET EXPENSES**	**Y-T-D FY24**	**Y-T-D FY24**
Equipment	1,065	$ 608	57%
Uniforms	-		#DIV/0!
Tournaments - Hosted	2,810	$ 1,340	48%
Away Tournaments Registration	4,130	$ 2,320	56%
Away Tournaments Travel	8,220	$ 2,526	31%
Away Tournaments food & misc.	665	$ 258	39%
Facility fees & Storage	8,000	$ 8,424	105%
Office/Postage/web/misc.	500	$ 96	19%
Training	5,000	$ 170	3%
Team jackets/clothing/bags	3,000	$ 2,627	88%
Fundraising Expenses	11,000	$ 10,699	97%
Meeting Costs	-		#DIV/0!
Publicity/ Notices	-		#DIV/0!
Volunteer Recognition	1,000		0%
Travel Emergency Fund	10,000		0%
Regionals (qualifiers)	100		0%
Provincials	1,500	$ 1,400	93%
Nationals	2,800	$ 2,800	100%
Worlds	-		#DIV/0!
Total Anticipated Expenses	59,790	$ 33,268	56%
Revenue less Expenses	(12,570)	$ 29,323	-233%

- Golf tournament held at Madawaska (July 2023)
- Facility Fees (cost increase)
- Team travel (includes budgeted emergency fund not utilized)
- Anticipated a budget deficit and there was actually a budget surplus

2024 Golf Tournament

Arnprior SO Golf Tournament 2024 (FY24)		
Financial Brief		
REVENUE	**Amount**	**Comments**
Sponsorships	$ 8,340	
Dinners	$ 30	
Teams	$ 15,150	
Games & Auctions	$ 3,386	
Total	**$ 26,906**	
EXPENSES	**Amount**	**Comments**
Sand Point GC	$ 11,086	
Signage	$ 57	
Expenses	$ 172	
Total	**$ 11,314**	
Profit	**$ 15,592**	

- Profit down slightly but significant fundraising in May which included:
  - Bowlathon $7.5K
  - Raffle $9.5K

2024-2025 Budget (FY25)

July 1, 2024-June 30, 2025

Arnprior SOO Budget — Fiscal Year 25 (FY25) Budget Amounts (July 1, 2024 to June 30, 2025)

	Angela	Renee	Brenda	Vicki / Renee	Chris	Malcolm	Catherine / Vicky	Vicky / Renee	Dave	Renee	Vicki		ACTUAL FY24 (MMM)
Revenue / Fundraising	General	Basketball	Bowling	Swimming	Floor Hockey	Soccer	Softball	Snow shoeing	Bocce	Athletics	Golf	BUDGET REVENUE	Y-T-D FY24
Registration Fees- Hosted Events		$2,850	$0	$2,500	$2,500	$0	$0	$0	$120	$0	$0	7,970	$ 7,437
Fundraising Events	$35,000	$4,000	$2,000	$0	$0	$0	$0	$0	$0	$0	$0	41,000	$ 53,413
Donations (Corp. & Memorial)	$500											500	$ 1,742
Total Anticipated Revenue	$35,500	$6,850	$2,000	$2,500	$2,500	$0	$0	$0	$120	$0	$0	49,470	$ 62,592
Expenses	General	Basketball	Bowling	Swimming	Floor Hockey	Soccer	Softball	Snow shoeing	Bocce	Athletics	Golf	BUDGET EXPENSES	Y-T-D FY24
Equipment		$400	$0	$0	$400	$300	$300	$300	$400	$0	$50	2,150	$ 608
Uniforms		$0	$0	$0	$0	$0	$0	$0	$0	$500	$0	500	
Tournaments - Hosted		$2,885	$0	$1,500	$1,000	$0	$0	$0	$500	$0	$0	5,885	$ 1,340
Away Tournaments Registration		$1,500	$380	$1,000	$240	$300	$500	$300	$500	$500	$300	5,520	$ 2,320
Away Tournaments Travel		$2,500	$0	$1,225	$1,385	$0	$1,500	$400	$1,000	$0	$1,500	9,510	$ 2,526
Away Tournaments food & misc.		$450	$0	$0	$175	$0	$300	$300	$0	$50	$300	1,575	$ 258
Facility fees & Storage	$2,500	$850	$5,570	$0	$650	$245	$0	$150	$0	$190	$500	10,655	$ 8,424
Office/Postage/web/misc.	$500											500	$ 96
Training	$5,000											5,000	$ 170
Team jackets/clothing/bags	$0											-	$ 2,627
Fundraising Expenses	$11,000											11,000	$ 10,699
Meeting Costs	$200											200	
Publicity/ Notices	$0											-	
Volunteer Recognition	$1,000											1,000	
Travel Emergency Fund	$10,000											10,000	
Regionals (qualifiers)	Summer					$0	$0		$0	$0	$0	-	
Provincials	Spring											-	$ 1,400
Nationals	Winter											-	$ 2,800
Worlds	~~No cost for world games~~											-	
Total Anticipated Expenses	$30,200	$8,585	$5,950	$3,725	$3,850	$845	$2,600	$1,450	$2,400	$1,240	$2,650	63,495	$ 33,268
Number of athletes	THESE NUMBERS (count of athletes per sport) NEED TO BE RE-EVALUATED												
Cost per athlete	200												
Revenue less Expenses		-$1,735	-$3,950	-$1,225	-$1,350	-$845	-$2,600	-$1,450	-$2,280	-$1,240	-$2,650	(14,025)	$ 29,323

- Storage fee attached to general and not include in sport budget. Fee is increasing.
- Facility fees are being included with the sport budget.

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Town of Arnprior Staff Report

Subject: Zoning By-law Amendment 5/24 – 107 Baskin Drive East
Report Number: 24-11-25-02
Report Author and Position Title: Alix Jolicoeur, Manager of Community Services / Planner
Department: Community Services
Meeting Date: November 25, 2024

Recommendations:

That Council adopts a by-law to amend Zoning By-law 6875-18 to change the zoning for 107 Baskin Drive East, known legally as Concession 12 part of Lot 2, Parts 7 and 8 on registered Plan 49R-6886; and part of Part 1 on registered Plan 49R-2437, Town of Arnprior, from “Airport Development Zone (A-D)” to “Employment Zone Holding Symbol 4 (EMPL(H4))” to allow the broader range of Employment Zone uses; and

Further That Council has considered all written and oral submissions received on this application, the effect of which has helped Council make an informed decision.

Background:

107 Baskin Drive East, the former Arnprior Aerospace Inc. facility, is currently listed for sale. The owner of the property identified that the current Airport Development zoning of the property limits the uses permitted as-of-right and has identified that potential purchasers would generally require a zoning by-law amendment. To permit a wider range of employment uses, an application has been submitted to amend the zoning of the subject lands from Airport Development to Employment Zone.

Owner: Arnprior Aerospace Inc.
Description of Subject Lands: 107 Baskin Drive East
Legal Description: Concession 12 part of Lot 2, Parts 7 and 8 on registered Plan 49R-6886; and part of Part 1 on registered Plan 49R-2437
Area of Land: 10.17 ha
Existing Structures: The site includes three buildings plus outbuilding storage, totaling approximately 166,846 sq. ft. of space.
Building 1 - located on the westernmost portion of the site, 36,000 sq. ft. of manufacturing and warehouse space

Building 2 - centrally positioned, 52,056 sq. ft., including 9,000 sq. ft. of ground floor office space, 9,140 sq. ft. of second-floor office space, and a mix of warehouse and light manufacturing areas, with an additional 11,560 sq. ft. concrete mezzanine
Building 3 - on the eastern end, 57,430 sq. ft., featuring 5,600 sq. ft. of ground floor office space and 9,830 sq. ft. of second-story office space
Outbuilding Storage - 21,260 sq. ft. of outbuilding storage.

Official Plan: Airport Area
Zoning: Airport Development zone

Summary of Proposal

The applicant is seeking the amendment to change the zoning of the subject property from Airport Development zone to Employment zone to permit a wider variety of employment uses.

Context

The subject lands are located south of Highway 417, west of Baskin Drive East and east of Bev Shaw Parkway as per the Key map in Figure 1.

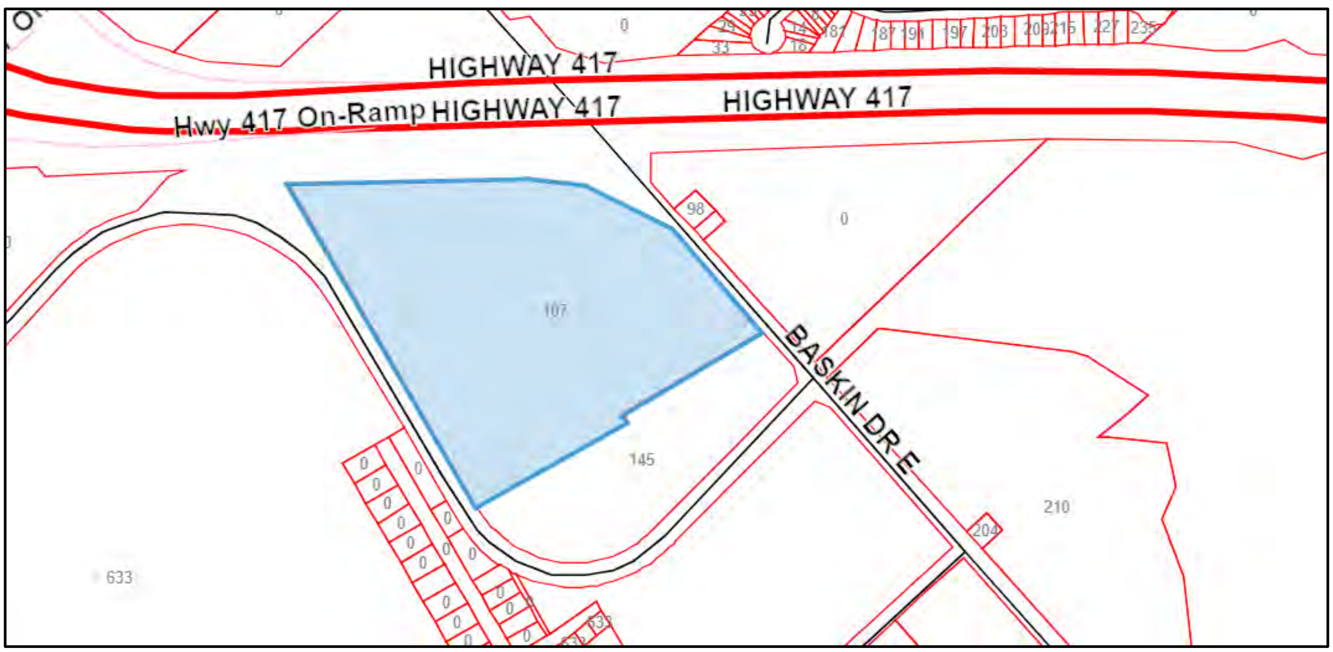


Figure 1 - Key Map showing the location of 107 Baskin Drive East.

South of the subject property are federally owned vacant lands.

West of the subject property, across Bev Shaw Parkway, is the airport and associated hangars. Figure 2 shows a street view of the airport and hangars from Bev Shaw Parkway.

Figure 2 - Street view of the airport and hangars from Bev Shaw Parkway

East of the subject property, across Baskin Drive East are 98 Baskin Drive East and two vacant parcels of land. These lands are zoned Employment Lands with Holding symbol 4 (EMPL(H4)). 98 Baskin Drive has an existing detached dwelling.

Figure 3 - 98 Baskin Drive East and vacant land

Figure 4 is an aerial photograph of the area from 2020.

Figure 4 - Aerial photo from 2020

Discussion:

Provincial Planning Statement, 2024

The Provincial Planning Statement, 2024 (PPS, 2024) requires that decisions made on planning matters must be consistent with the policies of the PPS, 2024

The PPS, 2024 section 2.8 Employment states:

> “1. Planning authorities shall promote economic development and competitiveness by:
> a) providing for an appropriate mix and range of employment, institutional, and broader mixed uses to meet long-term needs;
> b) providing opportunities for a diversified economic base, including maintaining a range and choice of suitable sites for employment uses which support a wide range of economic activities and ancillary uses, and take into account the needs of existing and future businesses;…”

The proposed zoning by-law amendment is consistent with the policies in the PPS, 2024 as it would permit a broader mix and range of employment use to meet long-term needs and would provide greater opportunity for a diversified economic base.

Official Plan Policies

107 Baskin Drive East is designated a combination of Airport Area and Environmental Protection. No change of zoning is proposed for the area designated Environmental Protection.

The Airport Area designation applies to the airport and adjacent lands that could be subject to aircraft noise nuisance or to development limitations in accordance with Transport Canada “Aviation: Land Use in the Vicinity of Airports” TP 1247E, as amended. The intent of this designation is to support the continued operation of the airport, provide for opportunities for development or redevelopment on lands not required for airport use, prevent incompatible development from locating on and adjacent to the airport, unless the impacts can be appropriately mitigated.

The requested amendment to change the zoning from Airport Development zone to Employment zone would permit a wider variety of employment uses. No additional development of the land has been proposed at this time.

Section A3 of the Official Plan sets out goals and objectives. Providing opportunities for economic development and the creation of jobs is identified as one of the eight goals of the Official Plan. The strategic objectives to achieve this include:
“b) Provide for the broadest range of employment and commercial uses and flexible development standards, where appropriate;
c) Pre-zone lands for employment and commercial uses wherever possible and appropriate and ensure that a sufficient supply of employment lands is available for development at all times and in appropriate locations;

…
e) Encourage opportunities for a range of job opportunities and a broad range of commercial and service facilities geared specifically to meet the needs of residents and visitors to the Town;"

The proposed zoning by-law amendment is consistent with the Official Plan policies. The proposed zoning by-law amendment would allow for a broader range of employment uses which are already permitted on adjacent and nearby sites. The broader range of employment uses that the zoning amendment would allow is consistent with the goals and objectives of the Official Plan which includes providing opportunities for economic development and the creation of jobs.

Zoning By-law Provisions

The current zoning of the lands is Airport Development zone. The Airport Development zone permits the following uses:

- Municipal airport uses
- Flight school
- Airport terminal
- Hangar
- Hangar, cluster
- Auxiliary industrial uses dependent on upon the aircraft industry.

The permitted uses in the Airport Development zone are limiting, particularly given the size of the existing building on the subject property (166,846 sq. ft.) and the limited businesses that would fall under "Auxiliary industrial uses dependent on upon the aircraft industry".

The proposed zoning by-law amendment seeks to rezone the subject lands from Airport Development Zone to Employment Zone.

The Employment Zone permits the following uses:

- Accessory outdoor storage
- Animal clinic
- Banquet hall
- Brewery
- Business office
- Business service use
- Cannabis related facility
- Car wash
- Commercial fitness centre
- Commercial recreation use, private
- Commercial self-storage use
- Community centre
- Contractor's yard or shop
- Funeral home
- Industrial use

- Kennel and kennel, day
- Light equipment sales and rental use
- Motor vehicle body shop
- Motor vehicle repair garage
- Motor vehicle rental establishment
- Motor vehicle sales and rental establishment
- Outdoor storage use
- Parking lot, commercial
- Private club
- Repair shop
- School, commercial trade
- Trade and convention centre
- Transport terminal Warehouse

Employment Zones on adjacent and nearby sites include Holding symbol 4 (H4). Employment Zone Holding symbol 4 allows all uses except a cannabis related facility with the holding symbol in place. In order to permit a cannabis related facility the holding symbol needs to be removed and is subject to the following conditions for removal, "A cannabis related facility may be permitted provided Council is satisfied that noise and odour from the facility will not create adverse effects on residential uses."

Staff recommend approval of a zoning by-law amendment to change the zoning from Airport Development Zone (A-D) to Employment Zone with Holding symbol 4 (EMPL(H4))." The addition of Holding symbol 4 would allow the full range of Employment Zone uses, however, if conversion of the site to a cannabis related facility was proposed a zoning by-law amendment to remove the Holding symbol would be required to and the application would need to demonstrate that it met the conditions for removal. This approach would keep the proposed Employment zoning consistent with existing Employment zoning in the area.

Process

Notice of a public meeting was issued to all property owners within 120 m, and to required agencies and individuals. The public meeting was held November 12, 2024.

Following a decision by Council staff will circulate notice of the decision as required under the *Planning Act*, which will begin the 20-day appeal period. If no appeals are received the decision is final at the end of the appeal period.

Options:

1. Council could determine to refuse the application for zoning by-law amendment. This option is not recommended by staff as it would not be consistent with the PPS, 2024 policies and Town of Arnprior Official Plan policies.

2. Council could approval the zoning by-law amendment without Holding symbol 4. This would allow a cannabis related facility without the need to meet conditions

for removal of the holding symbol. This option is not recommended as it would not be consistent with the Employment zoning of adjacent and nearby properties which all have Holding symbol 4 and could result in adverse noise and odour impacts on residential uses.

Policy Considerations:

As outlined above.

Financial Considerations:

Not applicable

Meeting Dates:

1. Council direction – October 15, 2024 – approved going to public meeting
2. Public meeting – November 12, 2024
3. Council decision – November 25, 2024

Consultation:

The zoning by-law amendment application was circulated to the County of Renfrew, Renfrew County District School Board, Renfrew County Catholic District School Board, Conseil des Ecole Catholique Centre-est, Enbridge Gas, Ontario Power Generation, Hydro One Networks Inc., McNab/Braeside, City of Ottawa, Ministry of Municipal Affairs and Housing, Arnprior Fire Chief, the Arnprior Chief Building Official, General Manager of Operations, and CAO for comment prior to the public meeting.

Documents:

1. Site Plan – Existing Site Conditions

Signatures

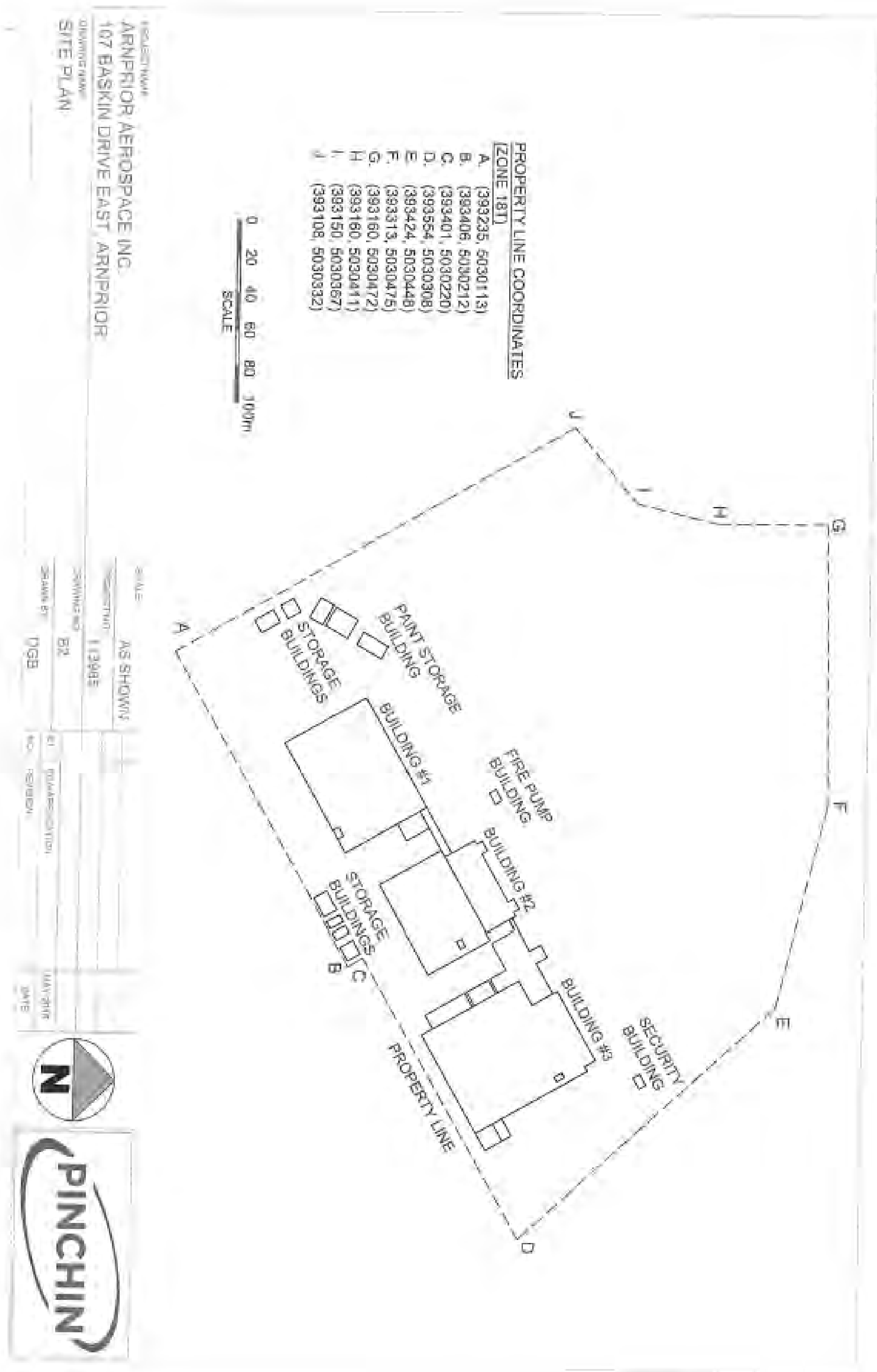
Reviewed by Department Head: Alix Jolicoeur

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

Document 1 – Site Plan – Existing Site Conditions



ARNPRIOR

Town of Arnprior Staff Report

Subject: Water and Wastewater Master Plan

Report Number: 24-11-25-03

Report Author and Position Title: John Steckly, General Manager, Operations

Department: Operations

Meeting Date: November 25, 2024

Recommendations:

That Council adopt the Town of Arnprior Water and Wastewater Master Plan, prepared by Stantec Consulting Limited, for use as a long-range planning tool to guide future infrastructure policy planning; and

Further That Council direct staff to prioritize and incorporate the master plan recommendations into the long-range capital forecast (LRCF).

Background:

The Town of Arnprior awarded a contract to Stantec Consulting Ltd. (Stantec) to develop a town-wide Water and Wastewater Master Plan (W&WWMP) to identify the infrastructure required to accommodate the ultimate (20 year) growth of the Town as well as provide interim scenarios to allow development to proceed in a logical progression. Specifically, the scope of the project was to provide a review of the Town's current water and wastewater systems, identify any current or projected future capacity constraints within these systems, and identify and prioritize capital water and wastewater investments to accommodate growth to the year 2042.

The W&WWMP was completed in accordance with the Master Planning provisions of the Municipal Class Environmental Assessment (MCEA) process under Ontario's Environmental Assessment Act. Under the MCEA process, the W&WWMP is considered to be a long-range planning document, which integrates infrastructure requirements for existing and future land use with EA principles. At a minimum, the W&WWMP should address Phases 1 and 2 of the MCEA process and should include: key principles of environmental planning; integrated process with other planning initiatives; strategic level assessment of options to address overall system needs, potential impacts and mitigation; recommendations which can be implemented through the completion of separate projects; and, include a description of the required specific projects.

Phase 1 of the MCEA process identifies the problems or deficiencies in the system while Phase 2 identifies the alternative solutions to address the problems and establishes the preferred solution. The W&WWMP provides a basis for future investigations that would be necessary to satisfy the requirements for specific Schedule B and Schedule C projects in the later phases of the Municipal Class EA process.

In accordance with the Environmental Assessment Act, Council approval of the W&WWMP is required in order to implement further work required on individual water distribution and wastewater collection projects recommended in the W&WWMP that require further Environmental Assessment approval.

Discussion:

The W&WWMP identifies and evaluates both existing and future conditions. The existing social and economic environment as well as the Town's potable water system and wastewater collection system were studied. The Town's existing hydraulic water model and wastewater collection system model were updated based on the "high scenario" population growth projections outlined in Town's *Growth Management Strategy Report* (Watson & Associates Economists Ltd, 2022), with further input from the Planning and Operations Departments on their distribution, and then analyzed to evaluate future water demands and wastewater generation. Population is projected to increase from approximately 10,000 in 2022 to 13,900 by 2042 (high scenario).

Total population projections were created for each milestone year, 2027, 2032, and 2042 based on known projections for proposed residential developments or based on an assumed 60 persons per hectare design value for residential lands where information was not available. The projections derived from this exercise may be considered ambitious when accounting for the recent slowdown in the market over the past two years, however should these projections prove to be high, the Town will be better positioned to respond to future growth rather than underestimating growth and being forced to play catch up. The following breakdown provides a summary of the anticipated upgrades and associated costs that will be required to the Town's current water and wastewater infrastructure to the year 2042, however should growth occur more slowly than anticipated, the need for the supporting infrastructure can be delayed to subsequent years. Annual monitoring of capacity absorption will be important in forecasting infrastructure upgrades in the future.

Water Distribution System

Considering the model results and the review of watermain upgrades previously proposed and/or completed as part of the 2013 W&WWMP, no upgrades to existing pipes are currently required to accommodate growth. That said, expansion of the existing distribution pipe network to growth areas that are not currently serviced directly by the existing system were identified (e.g., development by Tartan Homes at Van

Dusen Dr) and extension/upsizing of watermains specifically for future growth areas (i.e., upsize the existing 150 mm dia. watermains on Elizabeth St to 250 mm and extend the new 250 mm dia. watermain to provide connection between growth areas on Baskin Drive East and the existing 250 mm dia. pipe on Charles St).

Further, a reliability analysis was conducted to assess the performance of the system under various future (2042) emergency/failure scenarios. The twinning of the 400mm diameter river crossing is recommended for reliability. That said, a new river crossing is currently proposed to be installed in 2025 which could reduce the likelihood of failure and defer the need for twinning until a later year.

Potable Water Treatment

As discussed in Chapter 2 (Section 5), additional treatment, storage, and pumping needs are required to satisfy future capacity requirements in the 20-year planning horizon. The following table summarizes the results of the growth capacity assessment, which includes hydraulic trigger years in which the demand requirements reach the available capacity, and additional capacity needed to meet future (2042) demands.

Infrastructure	Hydraulic Trigger Year	Projected Population at Hydraulic Trigger Year	Additional Capacity Required by 2042
Treatment	2038	16,130	631 m3/d
Storage	2033	14,430	1,592 m3
High Lift Pumping	2034	14,620	45 L/s

The growth capacity assessment is based on the projected growth as presented in Chapter 2 (Section 5) of this report. Details of upgrades on treatment, storage, and pumping capacities should be explored based on the actual growth rate of the community during detailed design. It is recommended that actual system treatment/consumption (e.g., SCADA) and growth rate in the Town (e.g., master plan updates, official plans, etc.) be monitored on a regular basis to confirm the actual time when system upgrades are required. Additional measures, such as water conservation program, water leakage management, water restrictions for industrial properties, and process optimization, could be used to optimize water use and therefore decelerate demand growth.

Wastewater Collection System

The scope of the W&WWMP assignment was to complete an assessment of the Town's "trunk" sanitary sewer system and considered pipes of 300mm in diameter or larger. A hydraulic model analysis of the "trunk" system was then completed using a 25 year SCS II 6 hour distribution event, and the system was assessed using the hydraulic grade line (HGL) elevation as the main indicator of issues within the collection system. As a result, the pipes under dry weather flow (DWF) scenarios are all free-flowing and no HGL issues associated to pipe surcharge are identified. The wet weather flow (WWF) assessment shows 3 key locations of potential constraints, for which solutions are developed as part of the servicing strategy. The areas include Riverview Dr/Fourth Ave/Mulvihill Cr, Daniel St (north of Rock Ln), and Edward St (south of William St).

No pump station capacity concerns are observed under DWF conditions. In the 10-year and 25-year storm design event however, PS #1, PS #2 and PS #3 are at capacity in existing conditions. These pump stations were never designed to handle these design events, however current best practice/guidelines recommend that pump stations should be designed for a firm capacity at least capable of handling the 10-year design event. Recommendations include first reviewing the upstream Inflow and Infiltration (I/I) to determine if flows can be reduced or eliminated from the system before they reach the pump stations.

Wastewater Treatment

There was no capacity constraints identified at the WPCC under existing nor future growth conditions. A historical downward trend in average flows to the WPCC has been observed due to decreased water consumption at the Nylene facility and the elimination of watermain dead-end flushers continuously discharging into the sanitary sewers (replaced with bi-weekly hydrant flushing and looping of dead-end watermains). This trend is expected to stabilize with growth, as population increases while water consumption decreases.

Therefore, from an overall WPCC capacity perspective, the following is recommended:

- Maintain activities to reduce I/I into the sanitary collection system;
- Develop criteria to monitor and further assess the Albert St CSO, e.g., using the MECP's F-5-5 guideline.
- Continuously update the WPCC committed capacity assessment, as new development interests are identified; and,
- Monitor the impact of upstream infrastructure upgrades on incoming flows to the WPCC.

Outside Interests

As part of the W&WWMP exercise, staff identified two areas outside of the municipal boundaries, which could potentially be considered for connection to the existing municipal water and wastewater infrastructure in the future. The W&WWMP includes a discussion of the systems' capacities to accommodate the demands and flows from these areas. As discussions with outside interests continue and growth within the Town progresses, the capacities in the potable water and wastewater collection infrastructure should be reviewed as part of confirming the serviceability of these new areas, and other new areas identified in the future. In summary, the following findings and recommendations were provided:

- No constraints servicing two outside interest areas with respect to watermain flow capacity in both existing conditions and 2042 conditions with proposed solutions.

- Area 1 - McNab Braeside (Division St at Duncan Dr) may be serviced from new sewer along Division St and connecting to existing 300 mm to 600 mm diameter trunk sewers on Elgin St W, which mostly have residual capacity to accommodate Area 1’s PWWF.

- PWWF for Area 2 – City of Ottawa (Madawaska Blvd at Connifer Ln) is within residual capacity of existing 600 mm to 750 mm diameter sewers along Madawaska Blvd. This area would also drain into PS #3, and may need to be considered in proposed PS #3 upgrades’ design and as serviceability solutions for Area 2 are developed.

- The Town should also continue updating its WFP and WWTP reserve capacity assessment should these lands be considered further for development.

Options:

i) Council could adopt the Water and Wastewater Master Plan as presented as a planning tool to support future decision-making with respect to Waterworks services and facilities.

ii) Council could provide feedback or direction to staff for the inclusion of further amendments to the Water and Wastewater Master Plan.

Policy Considerations:

The Town of Arnprior 2024-2027 Strategic Plan includes Growth and Asset Management among the Town’s five key priority areas and includes the following statement within the Town’s mission statement:

> “The Town of Arnprior is dedicated to fostering sustainable growth and implementing effective asset management practices that enhance the quality of life for our residents and preserve the unique character of our community We aim to foster sustainable development that enhances our community's prosperity while preserving our natural resources and heritage. Our commitment to growth and asset management is rooted in a vision that embraces economic progress, environmental stewardship, and the well-being of our residents.”

The adoption of the W&WWMP is considered to be an effective asset management tool to manage sustainable growth within the community.

Financial Considerations:

The following conclusions and recommendations arose from the proposed implementation plan & capital project costs:

The total infrastructure project opinion of probable costs (OPC) is **$42,359,000**, of which:

- $17,305,000 will fund wastewater collection system existing gravity sewer upgrades and sewer separations;
- $12,096,000 will fund existing sanitary pump station and forcemain upgrades;
- $5,096,000 will fund existing watermain upgrades and pressure reduction measures; and,
- $7,882,000 will fund WFP upgrades.

The total study & activities OPC is **$850,000** including studies associated with sanitary pump stations monitoring & I/I management, wastewater collection network, WPCC, water distribution network, and the WFP.

The impact of climate change on the proposed upgrades was also assessed. Infrastructure needs and sizing to increase resilience to climate change amount to an additional **$5,642,000**, being comprised of $21,000 for upsizing sewers; $914,000 for sewer upgrades; $756,000 upsizing sanitary PSs and forcemains; and, $3,951,000 for upsizing the WFP treatment capacity, clearwell and high-lift pumping capacity.

Furthermore, the Town can also undertake planning and operational measures to address the impacts of climate change, such that the recommended infrastructure upgrades could be deferred, or their sizing reduced. The required sizing should be reviewed in future planning endeavours and as the projects advance through design stages, considering the effectiveness of additional activities undertaken by the Town to address the impacts of climate change.

A prioritization exercise will need to be conducted to incorporate the master plan recommendations into the long-range capital forecast (LRCF) and / or amend projects that are already include in the LRCF.

Meeting Dates:

1. Environmental Advisory Committee Meeting – November 18, 2024

Consultation:

- Stantec Consulting Limited

Documents:

1. Document 1: Town of Arnprior Water & Wastewater Master Plan Update, November 15, 2024, Prepared by Stantec Consulting Ltd. (Appendices available upon request)

Signatures

Reviewed by Department Head: John Steckly

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

MASTER PLAN REPORT

Town of Arnprior Water & Wastewater Master Plan Update

November 15, 2024

Prepared for:
Town of Arnprior

Prepared by:
Stantec Consulting Ltd.

Project Number:
163401723

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	Draft	CR/CZ	20240306	JS/MT	20240320	FR/MT	20240326
1	Final	CR/CZ	20241115	JS/MT	20241115	MT	20241115

The conclusions in the Report titled **Master Plan Report** are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Town of Arnprior (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

Prepared by: ______________________ ______________________
Signature Signature

Christène Razafimaharo, P.Eng. Chuyi Zheng, EIT
Printed Name Printed Name

Reviewed by: ______________________ ______________________
Signature Signature

Marc Telmosse, P.Eng. Jasmin Sidhu, P.Eng.
Printed Name Printed Name

Approved by: ______________________
Signature

Marc Telmosse, P.Eng.
Printed Name

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Executive Summary

The Town of Arnprior retained Stantec Consulting Ltd (Stantec) to update its Water and Wastewater Master Plan (W&WWMP) (Stantec, 2013), to better understand its existing systems conditions and to assess its ability to service future growth areas. This W&WWMP update involves a comprehensive review and assessment of the Town's sanitary sewer collection and potable water distribution systems. The W&WWMP update also includes a review of the existing municipal drinking water and wastewater treatment facilities with goals of understanding current system capacity constraints and of developing a timeline that identifies future expansion requirements to meet anticipated growth requirements over a 5-year (2027), 10-year (2032) and 20-year (2042) planning horizon.

This Master Plan was conducted in accordance with the requirements of the Environmental Assessment (EA) Act, as outlined in the Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (MCEA) document (October 2000 as amended in 2007, 2011, 2015 and 2023). Consultation was conducted from the onset of and throughout the Master Planning process, as required by the MCEA. The existing social and economic environment, as well as the potable water system and wastewater collection network are studied. Extensions and upgrades to the existing municipal potable water and wastewater infrastructure systems will be required to service the needs of existing users and future development lands.

Class D opinions of probable costs (OPC) and timelines were developed for projects which will be undertaken by the Town and funded by the Town and/or through development charges. The OPC consist of construction costs, capital costs & risk components (35% of construction costs), and contingency (40% of construction + capital costs & risk components). Project timelines were established, considering the concurrent implementation of water and wastewater infrastructure projects, and aligns them with the Town's other planned capital projects (e.g., road rehabilitation), where feasible. The impact of climate change on the proposed upgrades was also assessed.

Executive Summary Table 1 presents the OPC for the infrastructure projects, based on baseline growth projections, as well as the additional costs to increase resilience to climate change.

Planning and operational measures can be undertaken to address the impacts of climate change, such that the recommended infrastructure upgrades could be deferred, or their sizing reduced. The required sizing should be reviewed in future planning endeavours and as the projects advance through design stages, considering the effectiveness of additional activities undertaken by the Town to address the impacts of climate change.

Executive Summary Table 2 presents the OPC for additional studies, planning and operational activities that the Town could undertake.

Executive Summary Table 1: Summary of Opinion of Probable Cost – Infrastructure Projects

Project Type	Opinion of Probable Cost[1] Baseline Growth Projections (2023$)							Additional Total Cost for Increased Climate Change Resilience (2023$)
	Horizon	3-5 Years		5-10 Years		10-20 Years		
	Total Site Costs ($)	Required	Study Dependent	Required	Study Dependent	Required	Study Dependent	
Wastewater collection system existing gravity sewer upgrades and sewer separations	$17,305,000	$11,340,000	$2,006,000	$3,683,000	$276,000	-	-	+$935,000
Existing sanitary pump stations and forcemain upgrades	$12,096,000	-	-	-	$10,395,000	-	$1,701,000	+$756,000
Existing watermain upgrades and pressure reduction measures	$5,096,000	$151,000	$4,367,000	$578,000	-	-	-	-
Water Filtration Plant (WFP) upgrades	$7,862,000	-	-	$7,862,000	-	-	-	+$3,951,000
Total	**$42,359,000**	**$11,491,000**	**$6,373,000**	**$12,123,000**	**$10,671,000**	**-**	**$1,701,000**	**+$5,642,000**

Notes
(1) The OPC is inclusive of construction costs, capital costs & risk components (35% of construction costs), and contingency (40% of construction + capital costs & risk components).

Executive Summary Table 2: Summary of Opinion of Probable Cost – Studies & Activities

Study/Activity Type	Opinion of Probable Cost (2023$)					
	Horizon / Frequency Total Site Study Costs ($)	Annually	Every 5-10 Years (or as Development Occurs, or per Other Requirements)	3-5 Years	5-10 Years	10-20 Years
Sanitary pump stations monitoring and inflow/infiltration management	$130,000	-	-	$50,000	$80,000	-
Overall wastewater collection network studies & activities	$190,000	$110,000	$80,000	-	-	-
Wastewater Treatment Plant (WWTP) studies and activities	$190,000	$60,000	$30,000	-	$100,000	-
Overall water distribution network studies and activities	$150,000	$100,000	-	-	$50,000	-
WFP studies and activities	$190,000	-	-	-	$190,000	-
Total	**$850,000**	**$270,000**	**$110,000**	**$50,000**	**$420,000**	**-**

This Master Plan also includes the following assessments:

- **Identification of new infrastructure needed to service growth areas**: These constitute local service to development areas, which will be "direct developer responsibility" per the Development Charges Background, hence no OPC was presented for this infrastructure. Nonetheless, preliminary alignments and sizes were identified and documented as part of the overall servicing solution recommended in this Master Plan.

- **Serviceability of outside interests**: The Town has identified two areas outside its municipal boundaries, which could connect to the existing municipal water and wastewater infrastructure. This Master Plan includes a discussion of the systems' capacities to accommodate the demands and flows from these areas. As discussions with outside interests continue and growth within the Town progresses, the capacities in the potable water and wastewater collection infrastructure should be reviewed as part of confirming the serviceability of these new areas, and other new areas identified in the future.

This Master Plan presents a long-term plan for providing potable water and wastewater infrastructure to meet future growth requirements. Nonetheless, growth projections may change over time and aging infrastructure may also affect the systems' performance. Therefore, it is recommended that this Master Plan be reviewed and updated regularly. Per the MCEA document, potential changes which may trigger the need for a review of the Master Plan include:

- Major changes to the assumptions;

- Major changes to the components of the Master Plan;

- Significant new environmental effects; and,

- Major changes in the proposed timing of projects.

1 Introduction

1.1 Background

Stantec Consulting Ltd (Stantec) was retained by the Town of Arnprior (the Town) to update its Water and Wastewater Master Plan (W&WWMP) (Stantec, 2013), to better understand its existing systems conditions and to assess its ability to service future growth areas. This W&WWMP update involves a comprehensive review and assessment of the Town's sanitary sewer collection and potable water distribution systems. The W&WWMP update also includes a review of the existing municipal drinking water and wastewater treatment facilities with goals of understanding current system capacity constraints and of developing a timeline that identifies future expansion requirements to meet anticipated growth requirements over a 5-year, 10-year and 20-year planning horizon.

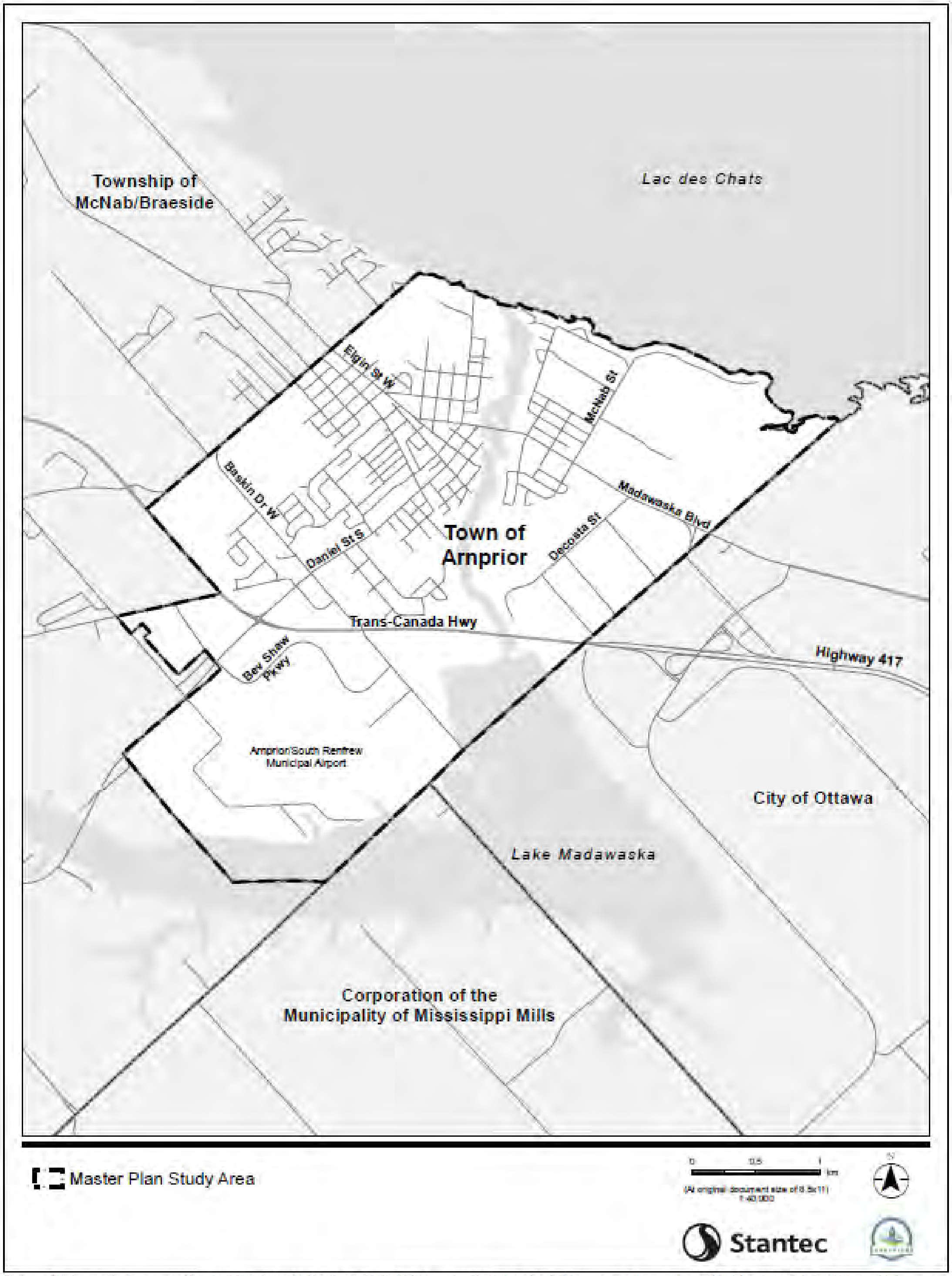
1.2 Study Area

The Town of Arnprior is situated in the Renfrew County, west of the City of Ottawa, accessible via Highway 17. Based on the Statistics Canada 2021 Census (last revised in September 2023), the Town had a population of 9,629 and occupied an area of 13.04 km^2. The Town's population has experienced an increase of 9.5% from the 2021 population.

The Madawaska River runs through the center of the Town and serves as the source of water for the municipal drinking water system, and discharges into the Ottawa River, which is the receiving stream for treated sewage effluent. **Figure 1-1** shows the study area of the Town of Arnprior.

1.3 Problem & Opportunity Statement

Water and wastewater servicing solutions will be required to meet the needs of existing users and future development lands. The first step of the W&WWMP is to gain an understanding of how the existing water and wastewater systems operate, and to determine the opportunities and constraints in the systems under existing and future (growth) conditions.



Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Figure 1-1: Study Area

2 Environmental Assessment Master Planning Process

The following sections describes the Municipal Class Environmental Assessment, and how the Master Plan process is conducted in accordance with its requirements.

2.1 Overview

All municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EA Act) and its requirements to prepare an Environmental Assessment (EA) for applicable public works projects. The Ontario Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (MCEA) document (October 2000 as amended in 2007, 2011, 2015 and 2023) provides municipalities with a five-phase planning process approved under the EA Act to plan and undertake all municipal infrastructure projects, including works associated with water supply and storage, in a manner that protects the environment as defined in the Act.

Key components of the EA planning process include:

- Consultation with potentially interested parties early and throughout the process;
- Consideration for a reasonable range of alternative solutions;
- Consideration of effects on the environment and ways to avoid/reduce impacts (mitigation);
- Systematic evaluation of alternatives;
- Clear and transparent documentation; and
- Traceable decision-making.

The MCEA provides a consistent method of identifying and assessing technical and environmental impacts and concerns before improvements or additions to municipal infrastructure are undertaken. Planning in this way provides reassurance that potential impacts from all municipal projects are addressed and mitigated, prior to implementation.

2.1.1 TYPES OF PROJECTS

The MCEA Document provides a framework by which projects are classified as exempt, eligible for screening, Schedule B, or Schedule C. Classification of a project is based on a variety of factors including the general complexity of the project and level of investigation required, and the potential impacts on the environment that may occur. It is the responsibility of the proponent to identify the appropriate schedule for a given project, and to review the applicability of the chosen schedule at various stages throughout the project. Each of the schedules require a different level of documentation and review to satisfy the requirements of the EA, and thus comply with the EA Act as noted below.

Exempt projects (formerly classified as Schedule A and A+ projects) are minor operational and/or maintenance activities, which are limited in scale, have minimal adverse impacts on the environment. These projects are exempt from the requirements of the EA Act and may be implemented without following the procedures outlined in the EA planning process or undertaking public consultation. Examples of Exempt projects include watermain and sewer extensions where all such facilities are located within the municipal road allowance or an existing utility corridor.

Eligible for Screening to Exempt projects may be eligible for exemption, based on the outcome of a screening process to determine whether the project is eligible for exemption from the EA Act. The relevant screening processes to follow are outlined in the MCEA Document Appendix 1. The screening process must be fully and accurately complete for a project to proceed with an exemption. The projects would otherwise be required to undergo the process to meet the requirements of Schedule B or Schedule C projects. Examples of Eligible for Screening to Exempt projects include repairs or replacement of an existing water treatment plant intake in the same location, increases in pumping station capacity in a new building within the existing pumping station site, or constructing new pumping stations or storage facilities where the facilities are not located in or adjacent to an environmentally sensitive natural area, residential or other sensitive land use.

Schedule B projects have the potential for some adverse environmental and social effects. The proponent is required to undertake a screening process involving mandatory contact with potentially affected members of the public, Indigenous communities, and relevant review agencies so that they are aware of the project and that their concerns are addressed. Schedule B projects require that Phases 1 and 2 of the EA planning process be followed, and a Project File be prepared and submitted for a mandatory 30-day review by the public, agencies, and Indigenous communities. If all comments or concerns received within this 30-day review period can be addressed, the proponent may proceed to project implementation (Phase 5). Schedule B projects generally include improvements and minor expansion to existing facilities or smaller new projects.

Schedule C projects have the potential for significant environmental impacts and must follow the full planning and documentation procedures specified in the MCEA document (Phase 1 to 4). An Environmental Study Report (ESR) must be prepared and filed for review by the public, review agencies and Indigenous communities. If concerns are raised that cannot be resolved, then the Part II Order procedure may be invoked. Projects generally include the construction of new facilities and major expansions to existing facilities.

The schedule in which a project applies determines the planning and design phases that must be followed. The five phases are as follows:

- Phase 1: Identification of problem or opportunity;
- Phase 2: Identification of alternative solutions;
- Phase 3: Definition of alternative methods to implement the preferred solution;
- Phase 4: Publication of an Environmental Study Report; and

- Phase 5: Implementation of the solution.

Consultation is a key element of EA planning and is required during different phases to ensure public participation. **Figure 2-1** summarizes the different schedules and phases of the Class EA process, and **Figure 2-2** provides details on the activities within each phase of the process.

2.1.2 SCOPE OF WATER & WASTEWATER MASTER PLAN

This study considers the capacity of the existing water distribution and wastewater collection systems and other proposed improvements needed to accommodate the growth projections and associated development outlined in the Official Plan. The Master Plan provides a framework by which future infrastructure requirements can be addressed. The Municipal Class EA process identifies four approaches to the Master Planning process. The document recommends that the proponent adapts and tailors the details of the approach to best suit their needs as long as the approach is in keeping with the requirements and intent of the Class EA process.

As per the framework provided in the Class EA document, the Town of Arnprior Water & Wastewater Master Plan was initiated and conducted in accordance with Approach #1 of the Master Planning Process, involving analyses on a system scale, to enable the Town to identify needs and establish broader infrastructure alternatives and solutions.

This study therefore addresses Phases 1 and 2 of the EA process. Phase 1 of the Class EA process identifies the problems or opportunities in the system. Phase 2 identifies the alternative solutions to address the problems and establish the preferred solution. Specific projects required to achieve the preferred solution described in the Master Plan may be identified, however more detailed investigations at the project-specific level are required to fulfil the MCEA requirements for specific Schedule B and C projects identified within the Master Plan.

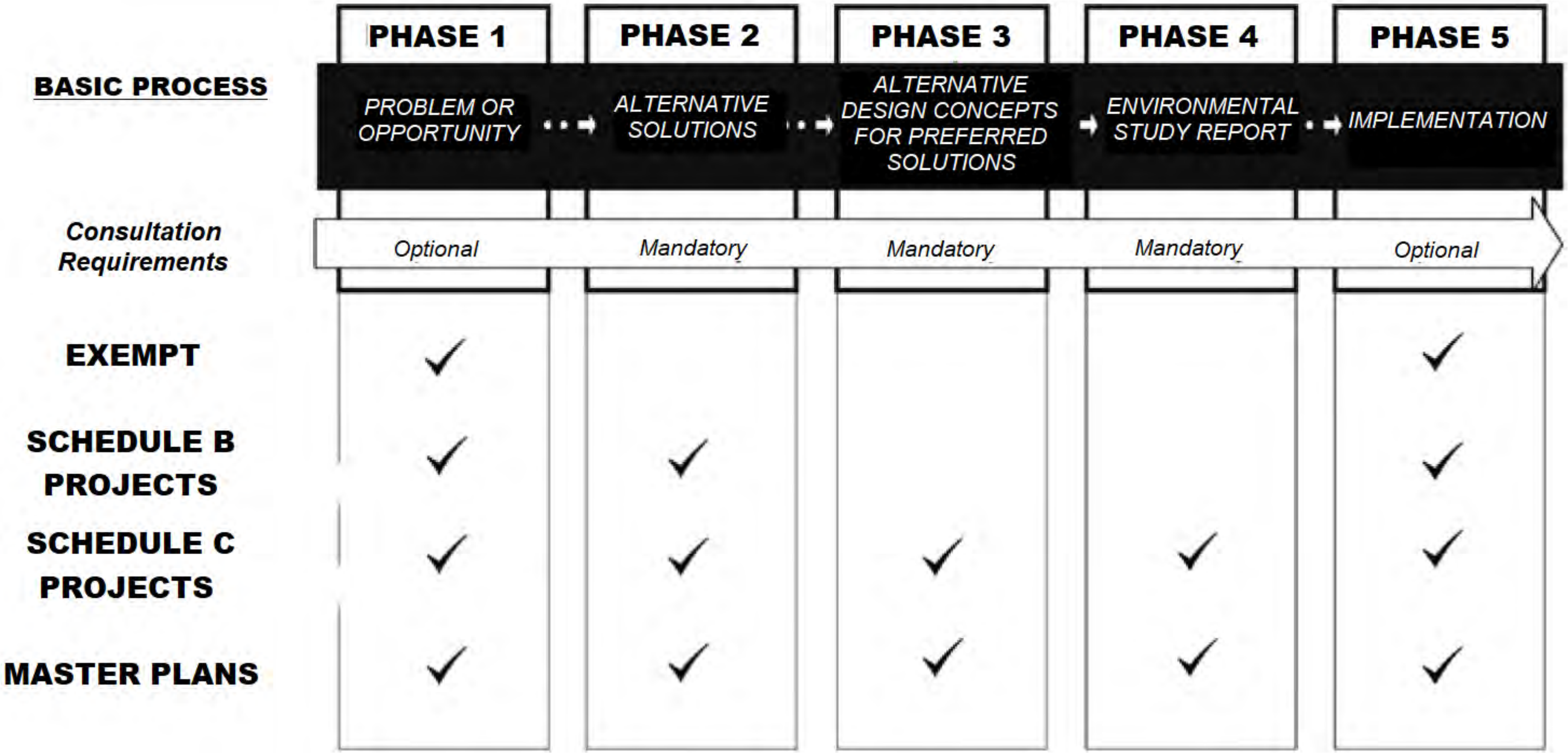


Figure 2-1: Summary of the Municipal Class EA Process (Source: Adapted from Municipal Engineers Association, 2023)

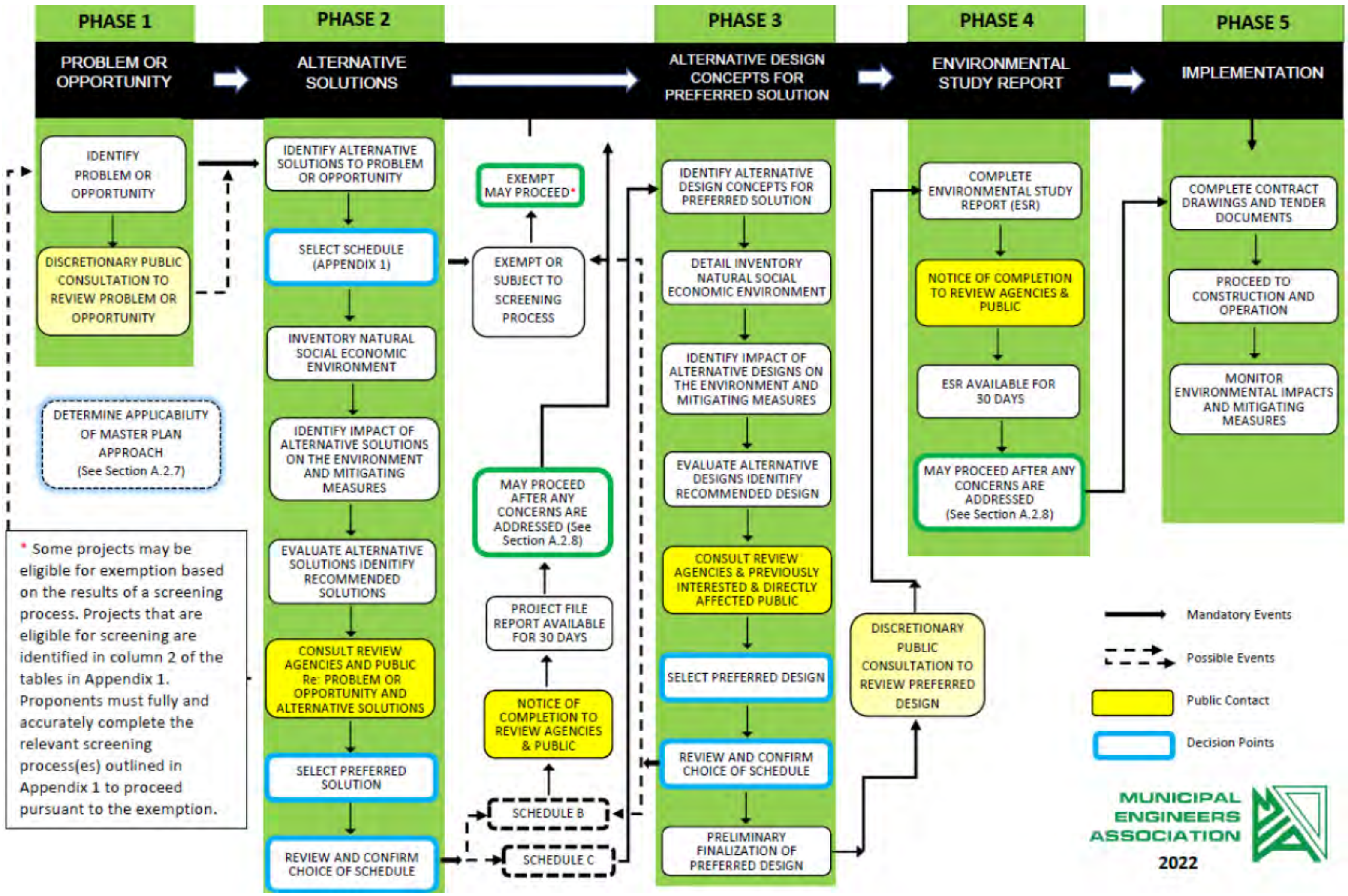


Figure 2-2: Municipal Class EA Planning and Design Process (Source: Municipal Engineers Association, 2023)

2.2 Consultation & Communication

Consultation from the onset of and throughout the process is a key component of the EA planning process. An effective consultation program can foster meaningful dialogue between the project planners and stakeholders, allowing an exchange of ideas and broadening of the information base for better decision-making.

2.2.1 STAKEHOLDER CONTACT LIST

A comprehensive study contact list consisting of government agencies, Town staff, utilities, emergency service providers, Indigenous Nations, Indigenous Organizations, local organizations and special interest groups and members of the public who expressed interest in the study was developed at the onset of the study. This list was updated as the study progressed. The latest version of this contact list is provided in **Appendix G.1**.

2.2.2 TOWN OF ARNPRIOR PROJECT WEBSITE

The Town of Arnprior Project Website (https://renfrew-county.civilspace.io/en/projects/water-and-wastewater-master-plan) is a central location to provide information on the project and its timeline. Interested members of the public can sign up to receive notifications on project updates. Project material are available for the public to view and provide feedback.

2.2.3 NOTICE OF STUDY COMMENCEMENT

The purpose of the Notice of Study Commencement was to inform the public and external agencies about the study and to seek initial input in relation to the study. The notice briefly outlined the objective of the study, the Class EA process, study area location map and contact information for project team representatives.

The Notice of Study Commencement was communicated as follows:

- On the Town's website: https://www.arnprior.ca/en/news/notice-of-study-commencement-water-and-wastewater-master-plan.aspx
- Via email to the contact mailing list.

A copy of this notice is provided in **Appendix G.2** of this document.

2.2.4 NOTICE OF PUBLIC INFORMATION CENTRE (PIC)

The purpose of the Notice of Public Information Centre (PIC) was to announce the date and location of the PIC. The notice briefly outlined the objective of the study, the Class EA process, study area location map and contact information for project team representatives. The Notice of PIC for this study was posted on the Town's website on February 9th, 2024 and emailed to all contacts in the Contact List. A copy of this notice is provided in **Appendix G.3** of this document.

2.2.5 PIC

An in-person PIC was held on February 28th, 2024 at the Nick Smith Center (77 James St, Arnprior). Poster boards presenting the objective of the study, the Class EA process and the W&WWMP's servicing alternatives and recommendations were presented. A copy of the boards are provided in **Appendix G.3** of this document.

Attendees were able to provide feedback and ask questions to the Town and Stantec representatives. Further information on the PIC and on the feedback and questions received is presented in the PIC Summary Report provided in **Appendix G.3** of this document.

Approximately 10 people attended the PIC and one (1) written comment was provided. The verbal comments received from attendees and any communication via project email were received up to February 28, 2024 are summarized below.

- Local land developers attended the PIC and asked questions about the Town of Arnprior's W&WW MP capacity to service the proposed developments.
  - Project representatives explained that upgrades identified in the W&WW MP place the Town in good shape to accommodate the 20-year growth projections for the Town. When asked about specific sites, it was explained that no major issues have been found in the development of the W&WW MP that relate to those land development sites specifically.
- Written comment conveyed their thanks for the invitation and indicated it was very informative, easy to follow the different options and they believed the proposed plan 'is a good one'. They appreciated the Project Team's efforts in taking good care of the Town.

2.2.6 AGENCY CONSULTATION

The following agencies provided comments in response to the Notices of Commencement and PIC.

- Ministry of Environment, Conservation and Parks (Received March 13, 2024):
  - Indicated contact list should include:
    - Algonquins of Ontario (AOO)
    - Algonquins of Pikwàkanagàn First Nation
    - Alderville First Nation
    - Curve Lake First Nation
    - Hiawatha First Nation
    - Mississaugas of Scugog Island First Nation

        - Williams Treaties communities, cc. Karry Sandy McKenzie, William Treaties First Nations Process Co-ordinator at inquiries@williamstreatiesfirstnations.ca
        - Kawartha Nishnawbe
        - Kitigan Zibi Anishnabeg First Nation
        - If archeological studies are undertaken, include: Huron-Wendat

- Ministry of Citizenship and Multiculturalism (Received April 27, 2022):
    - Description of the existing conditions related to cultural heritage resources need to be included in the MP.
    - Existing Conditions subsection of the MP to include a historical summary of the study area's development, identifying all known or potential built heritage resources and cultural heritage landscapes.
        - As projects proceed through the Class EA process, heritage resources and landscapes will be identified.
    - Community and Indigenous input should be sought to identify locally recognized and potential cultural heritage resources.
    - Advise MHSTCI whether any technical cultural heritage studies will be completed for the MP, provided to MHSTCI before issuing the Notice of Completion.
        - No technical studies were completed as part of this study.

2.2.7 INDIGENOUS CONSULTATION

Invitations to consult were sent to Indigenous Nations along with the Notice of Commencement, PIC and Notice of Master Plan.

As a result of the MECP letter being issued after the PIC Notice, a follow up letter was issued to the Indigenous Nations that were not previously contacted to inform them of the Project and invite them to submit any comments.

No responses were received.

2.2.8 DRAFT MASTER PLAN REPORT

The Draft Master Plan Report was submitted to the Town staff for comments before a Final Draft is prepared and provided to Town Council.

2.2.9 NOTICE OF STUDY COMPLETION / FINAL MASTER PLAN REPORT

The Notice of Study Completion will be published on the project website when the Master Plan report is made available for public review. The Notice will also be distributed via mail and email to agencies, key stakeholders, Indigenous Nations and the public on the study mailing list. This notice will briefly outline the Recommended Solutions and note the Master Plan will be posted to the project website for a 30-day public review period. Comments received throughout the 30-day review period will be addressed and records from the 30-day review period will be included in the Environmental Study Report (ESR).

Those who wish to review the Master Plan report will be encouraged to do so and submit comments to the project contacts provided by a specified date.

3 Existing Conditions

This section provides an overview of the existing natural, social & economic environments of the Town of Arnprior. The existing water and wastewater infrastructure assessed in this W&WWMP is also introduced.

3.1 Natural Environment

The Town boasts a significant amount of aquatic natural environment features including Lake Madawaska, the Madawaska River, which bisects the Town, and the Ottawa River. The Nopiming Crown Game Preserve, the Nopiming Provincially Significant Wetland occur in the northeast portion of the Town and Significant Woodlands are found in the northwest quadrant of the Town. Several smaller features (e.g., creeks, unevaluated wetlands, floodplains and wooded areas) occur throughout the town in both undeveloped and developed and are also considered as potential constraints to development. The total area of land bounded by the Town is 13.04 square kilometres (km^2).

The Madawaska River is 230 km long and drains an approximate area of 8,740 km^2. At its source, Source Lake in Algonquin Park, to its confluence with the Ottawa River at Arnprior, the Madawaska River drops 224 metres.

As the development of sewage pumping stations are usually proposed in low-lying areas to incorporate the use of gravity-fed sewer systems, the identification of floodplains are important to this Plan. Development within floodplains requires additional environmental surveys, mitigation measures and potentially permitting considerations.

Also of importance is the possibility of high groundwater tables throughout the Town given the proximity to large aquatic features. High groundwater has the potential to impact proposed infrastructure such as gravity-fed sewer systems. The design of future gravity-fed systems must consider the impact of high groundwater and to avoid them, if feasible. Alternative sewer technologies such as pressure of vacuum-based systems might be considered if areas are deemed to be prone to high groundwater conditions.

3.1.1 DESKTOP BACKGROUND REVIEW

A background desktop review was conducted by searching the Natural Heritage Information Centre (NHIC; NDMNRF 2022) for species at risk (SAR), wildlife concentration areas, and natural heritage areas. Data records provided by the NHIC are at a 1 x 1 km scale and grid squares that overlap with the Town were searched. The Aquatic Species at Risk map (DFO 2022) was searched for records of aquatic SAR and/or SAR habitat within aquatic features (e.g., Lake Madawaska, Madawaska River, Ottawa River).

As part of the public and government review process, the *Town of Arnprior Water and Wastewater Master Plan* (the Plan) was submitted on June 14, 2013 (Stantec 2013) to the Ministry of Natural Resources (now the Ministry of Natural Resources, and Forestry (MNRF). In response to the Plan, the MNRF provided a list of potential SAR to be considered during the Town's review of the Plan. The SAR identified with potential habitat within the Town are included in this desktop background review. A detailed site investigation is recommended once the Plan is finalized to assess areas with potential SAR habitat (i.e., determine permitting requirements under the ESA/SARA and mitigation measures) and natural heritage features.

At least two Restricted Species were identified during the 2022 desktop review of NHIC records. Restricted Species listed by the NHIC are typically sensitive species that are subject to the illegal trade market (e.g., American Ginseng (*Panax quinquefolius*), Spotted Turtle (*Clemmys guttata*). An information request to the Ministry of Environment, Conservation and Parks (MECP) to provide information on the Restricted Species may be required as part of the planning process.

For this report, SAR are species designated as endangered, threatened, or special concern under the provincial *Endangered Species Act, 2007* (ESA) or federal *Species at Risk Act, 2002* (SARA). **Table 3-1** lists SAR with records within the Town.

Table 3-1: Species at Risk with the Potential to Occur within the Town of Arnprior

Common Name	Scientific Name	ESA	SARA, Schedule 1
HERPTILES			
Blanding's Turtle[1,2]	*Emydoidea blandingii*	Threatened	Endangered
Midland Painted Turtle[1]	*Chrysemys picta marginata*	Not Listed	Special Concern
Northern Map Turtle[1,2]	*Graptemys geographica*	Special Concern	Special Concern
Snapping Turtle[2]	*Chelydra serpentina*	Special Concern	Special Concern
Eastern Milksnake[1,2]	*Lampropeltis triangulum*	Not Listed	Special Concern
Western Chorus Frog (Great Lakes – St. Lawrence – Canadian Shield population)[1,2]	*Pseudacris triseriata*	Not Listed	Threatened
BIRDS			
Barn Swallow[2]	*Hirundo rustica*	Threatened	Threatened
Bobolink[1,2]	*Dolichonyx oryzivorus*	Threatened	Threatened
Chimney Swift[1,2]	*Chaetura pelagica*	Threatened	Threatened
Eastern Meadowlark[1,2]	*Sturnella magna*	Threatened	Threatened
Eastern Wood-pewee[1]	*Contopus virens*	Special Concern	Special Concern
Loggerhead Shrike[1,2]	*Lanius ludovicianus*	Endangered	Endangered
Peregrine Falcon[1]	*Falco peregrinus*	Special Concern	Special Concern
Short-eared Owl[1,2]	*Asio flammeus*	Special Concern	Special Concern
Wood Thrush[1]	*Hylocichla mustelina*	Special Concern	Threatened
INSECTS			
Monarch[2]	*Danaus plexippus*	Special Concern	Special Concern
AQUATIC			
Hickorynut[3]	*Obovaria olivaria*	Endangered	Endangered
American Eel[1]	*Anguilla rostrata*	Endangered	Not Listed

Common Name	Scientific Name	ESA	SARA, Schedule 1
Lake Sturgeon (Great Lakes – Upper St. Lawrence River population)[1]	*Acipenser fulvescens*	Endangered	Under consideration for addition
River Redhorse[3]	*Moxostoma carinatum*	Special Concern	Special Concern
MAMMALS			
Eastern Small-footed Myotis[4]	*Myotis leibii*	Endangered	Not Listed
Little Brown Myotis[4]	*Myotis lucifugus*	Endangered	Endangered
Northern Myotis[4]	*Myotis septentrionalis*	Endangered	Endangered
Tri-colored Bat[4]	*Perimyotis subflavus*	Endangered	Endangered
PLANTS			
Black Ash[1,5]	*Fraxinus nigra*	Endangered	Under consideration for addition
Butternut[1,2]	*Juglans cinerea*	Endangered	Endangered
RESTRICTED RECORDS			
Restricted Species[1]	n/a	Endangered	Endangered
Restricted Species[1]	n/a	n/a	n/a
Notes: [1] NHIC desktop review 2022 [2] MNR 2013 correspondence [3] DFO Aquatic SAR mapping 2022 [4] Atlas of Mammals in Ontario (Dobbyn 1994) [5] MECP has temporarily suspended ESA authorization requirements for Black Ash while they determine the best approach for protection and recovery of the species.			

The following natural heritage features were identified by NHIC within the Town:

- Nopiming Provincially Significant Wetland
- Nopiming Crown Game Preserve
- Gillies Grove
- Arnprior Stand

3.1.2 OFFICIAL PLAN (NATURAL HERITAGE PROTECTION)

The Town of Arnprior Official Plan (OP) was approved by the County of Renfrew in November 2017 and went into effect on December 19, 2017. The OP sets out policies and land use designations that are used by the Town to guide development. One of the planning and development goals stated in the OP is "*to protect and enhance significant natural heritage features, areas and function in the Town*".

Section C8.4 of the OP states that "*land designated Parks and Open Space Area shall be planned to both accommodate public use and minimize the impacts of that public use on the environment and adjacent residential areas. The development of … infrastructure should be carried out in a manner that protects and enhances any adjacent natural heritage features and functions*". The following Land Use categories that could provide habitat for SAR or other environmentally sensitive features have been identified in Schedule A within the Town: Parks and Open Space Area, Environmental Protection Area, and Environmental Protection Area – Wetlands.

Section D1.1 of the OP states that "*the diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, be maintained, restored, or where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features*." Development and site alteration are not permitted in Significant Wetlands and are only permitted within Significant Woodlands, Significant Valleylands, Significant Wildlife Habitat, and Significant Areas of Natural and Scientific Interest (ANSI) if "*it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions*."

Additionally, development and site alteration are not permitted in fish habitat, habitat of endangered species and threatened species "*except in accordance with provincial and federal requirements*."

The following Natural Heritage Features and Areas were identified within Schedule C of the Town's OP:

- Significant Wetlands
    - Nopiming Provincially Significant Wetland
- Wooded Area
- Significant Woodlands
    - Gilles Grove
    - Shoreline Natural Corridor
- Fish Spawning Area
    - Mapped between the Ontario Power Generation (OPG) Arnprior Weir and the Ottawa River
- Wintering Area
    - Associated with the Nopiming Crown Game Preserve
- Constraint Area (karst topography)
- Natural Heritage Areas

3.2 Social and Economic Environment

3.2.1 POPULATION

In 2022, the Statistics Canada 2021 Census data reported a population of 9,890 in Arnprior, which has been increasing at an annual rate of approximately +1.5%.The subsequent September 2023 revision of the 2021 Census reported a population of 9,629, which is less than the existing population considered in this Master Plan. This reduction in the reported population may be due to amendments in the 2021 Census, such as revised dwelling counts when considering usual occupancy. The impact of a reduced existing population basis should be considered as part of detailed investigations of the projects identified in this Master Plan.

3.2.2 HOUSEHOLDS

The September 2023 revision of the 2021 Census reported a total of 4,458 private dwellings, which has been increasing at an annual rate of approximately +1.6%. The average household size is 2.2, which is unchanged from the 2016 Census average household size.

3.2.3 CULTURAL HERITAGE

The 2017 Town of Arnprior OP outlines objectives for the conservation of cultural heritage resources. Furthermore, the MCEA requires consideration of cultural environment heritage, including built heritage resources, throughout the EA process. Therefore, as part of project-specific detailed investigations, cultural heritage resources that retain heritage attributes should be identified and avoided where possible. Where avoidance is not possible, potential effects to these attributes should be identified and minimized.

3.2.4 ARCHAEOLOGICAL POTENTIAL

The study area is located within the Ottawa Valley, which has the potential for the recovery of pre- and post-contact Indigenous and Euro-Canadian archaeological resources. Therefore, appropriate archaeological investigations are required for certain infrastructure projects in accordance with the MCEA process. Any projects identified as a Schedule B or C project will require an archaeological assessment to be completed.

3.2.5 ECONOMIC ENVIRONMENT

The Town of Arnprior's statement on business and industry (as posted on the Town's website, https://www.arnprior.ca/en/ecdev/why-arnprior.aspx) describes the current and future direction of the economic environment:

Arnprior is open and ready for business. Economic Development is a key priority in the Town's Strategic plan which means your business is our top priority. We have streamlined our processes and enhanced our procedures to help accelerate planning & development applications. Our Economic Development department is readily available to assist you with every aspect of relocating or opening your business in

Arnprior. Arnprior is open and ready for business. Economic Development is a key priority in the Town's Strategic plan which means your business is our top priority. We have streamlined our processes and enhanced our procedures to help accelerate planning & development applications. Our Economic Development department is readily available to assist you with every aspect of relocating or opening your business in Arnprior.

A component of this W&WWMP is to ensure that future commercial and industrial sites supporting the economic development within the Town can be appropriately serviced with municipal water and wastewater services.

3.2.6 OFFICIAL PLAN (GROWTH)

The 2017 Town of Arnprior OP sets out the policies and land use designations that are to be used by the Town of Arnprior to guide development, and the number of lots required to support the projected growth. The W&WWMP is prepared with consideration given to the long-term objective of *"continued business growth and support."*

3.3 Existing Wastewater and Water Infrastructure

3.3.1 EXISTING WASTEWATER COLLECTION NETWORK

The Town's existing wastewater collection network consists of the following:

- Approximately 60 km of sewers, ranging in diameter from 75 mm to 900 mm.
    - The W&WWMP considers the trunk-level infrastructure, which consists of approximately 23 km of sewers with diameters greater than 300 mm or sewers in specific areas of interest to the Town.
- 5 communal pumping stations (PSs), 1 small PS in a municipal building near the beach (Robert Simpson Park), 3 privately owned stations.
    - At the trunk level, 4 of the 5 communal PSs are assessed in the W&WWMP.
- Wastewater in the Town is conveyed to the wastewater treatment plant (WWTP) on Albert St, downstream of the Arnprior Dam, on the left bank of the Madawaska River. The last WWTP expansion was completed in 2011.
- Under extreme events, sanitary flows can overflow to the stormwater collection system or to the Madawaska River at different locations, discussed in **Chapter 1** (**Section 4**).

Further details on the existing wastewater collection system are provided in **Chapter 1** (**Section 4**). The hydraulic model updates and existing infrastructure assessment are presented in **Chapter 2** (**Section 5**). Servicing solutions are developed in **Chapter 3** (**Section 6**), and cost estimates presented in **Chapter 4** (**Section 7**).

3.3.2 EXISTING POTABLE WATER DISTRIBUTION SYSTEM

The Town's existing potable water distribution network consists of the following:

- A Water Filtration Plant (WFP), located on the south side of Havey St, which takes its raw water from the Madawaska River. The WFP was last upgraded in 2010. The WFP provides storage in its clearwells and pumping from high-lift pumps (HLPs).
- An elevated storage tank (EST) on Hartney St, constructed in 1993.
- Approximately 65 km of watermains, ranging in diameter from 50 mm to 600 mm (excluding service lines less than 50 mm in diameters).
- Approximately 315 hydrants.

Further details on the existing potable water distribution system are provided in **Chapter 1** (**Section 4**). The hydraulic model updates and existing infrastructure assessment are presented in **Chapter 2** (**Section 5**). Servicing solutions are developed in **Chapter 3** (**Section 6**), and cost estimates presented in **Chapter 4** (**Section 7**).

4 Chapter 1: Background Review and Data Gap Analysis

The purpose of **Chapter 1** is to review the Town's most recent water and wastewater infrastructure updates, and identify additional information required to update the hydraulic models and complete the system assessments in the next tasks. The methodology for assessing the Town's infrastructure is also reviewed, considering current design and assessment standards. The 2022 flow monitoring program for the wastewater collection system is also presented.

4.1 System Review and Data Gap Analysis

4.1.1 BACKGROUND REPORTS

The Town provided various reports, which are used throughout this W&WWMP. The background information available was reviewed and is summarized in this section. The reports pertain to the following topics:

- Growth and land use
- Infrastructure master planning
- Facility planning and design.

4.1.1.1 Growth and Land Use

The following reports were provided as background information for updated growth projections and land use information:

- <u>Town of Arnprior Official Plan (Meridian Planning, 2017)</u>

  The Town's 2017 Official Plan (2017 OP) provides direction on long-term growth management and land use planning to the 2036 horizon. The 2017 OP presents growth projections for population, institutional, commercial and industrial (ICI) areas, and total land areas, for 2036 and intermediate horizons. However, the growth projections are provided as totals over the Town, which are not spatially distributed. The 2017 OP also designates land-use across the Town.

  The 2017 OP's 2036 projections were not used in the current W&WWMP, as they were superseded by revised projections as presented in the Town's *Growth Management Strategy – Draft Report* (Watson & Associates Economists Ltd, 2022), with input from the Town on their distribution. The 2017 OP's existing land-use designation were superseded by information provided in the latest parcel geographic information system (GIS) data provided by the Town (see **Section 4.1.5.1**).

- Growth Management Strategy – Draft Report (Watson & Associates Economists Ltd, 2022)

  As part of the Town's OP review, a growth management strategy (GMS) is being developed to re-assess population and employment growth to the year 2051. Total population and employment forecasts to 2051 are presented. The GMS identifies vacant residential and employment lands and the total available land and unit supply.

  The timeline of development for the development areas is not specified in the GMS. Assumptions are made on the phasing of these developments for each intermediate horizon in this W&WWMP, informed by discussions with the Town, to identify associated water and wastewater infrastructure requirements in **Chapter 2** (**Section 5**).

- Water and Sewage Plant Committed Capacity / Uncommitted Reserve Capacity Spreadsheet Assessment (Town of Arnprior, 2022)

  To estimate committed and remaining capacity at the water filtration plant (WFP) and wastewater treatment plant (WWTP), the Town has provided a list of registered and draft approved lots. This includes an estimate of population for these lots, a calculation of the equivalent total water demands and sewage flow (representing committed hydraulic reserve capacity), and of the remaining uncommitted reserve capacity at both facilities.

  The timeline of the development of the lots was confirmed with the Town and used as part of the growth projections and to identify associated water and wastewater infrastructure requirements in **Chapter 2** (**Section 5**).

4.1.1.2 Infrastructure Master Planning

The following reports were provided as background information on infrastructure master planning:

- Town of Arnprior 2008 Master Traffic Study (CastleGlenn Consultants Inc., 2009)

  The Town's Master Traffic Study identifies infrastructure requirements to accommodate planned growth and improvements to existing traffic and parking conditions, for the planning horizons 2015 and 2025. Recommended infrastructure upgrades identified as part of this W&WWMP can be prioritized based on integration with proposed traffic projects.

  The Town's Transportation Master Plan (TMP) is also being updated in 2022. If available, findings of the updated TMP can be used to prioritize recommended infrastructure upgrades identified as part of this W&WWMP in **Chapter 4** (**Section 7**), based on integration with proposed traffic projects.

- Town of Arnprior Water and Wastewater Master Plan (Stantec Consulting Ltd., 2013)

  The 2013 W&WWMP assessed infrastructure needs for the following horizons: 2011 (as existing conditions), 2016, 2021 and 2031. Projects to meet those future infrastructure needs were identified and are summarized in **Table 4-1** (sanitary) and **Table 4-2** (potable water).

  The status of the projects identified was confirmed with the Town and with the GIS database (for 2016 and 2021 projects). Hydraulic models were updated accordingly in **Chapter 2** (**Section 5**). The current W&WWMP uses updated growth projections to update the infrastructure recommendations and identify new requirements up to the year 2042.

- 2015 Sanitary Sewer and Water Model Calibration and Sanitary Sewer System (Stantec Consulting Ltd., 2016)

  As developments in the Town were occurring faster than originally projected in the 2013 W&WWMP, the 2016 horizon was re-assessed based on updated population information. Based on this assessment, capacity restrictions in the sanitary collection system and risks of basement flooding were identified. No combined sewer overflows (CSOs) were observed, however the WWTP and all PS (except PS#2) were noted to be at their capacity under the target design event for existing conditions. The updated populations for 2016 had a negligible impact on pressures and fire flows in the water distribution system.

  The current W&WWMP includes an assessment of existing conditions for the year 2022, based on the populations presented in **Section 4.1.5.3** and the criteria outlined in **Section 4.2**.

Table 4-1: Sanitary Servicing Projects from 2013 W&WWMP

Project Location	Project Description	Timing	Status
Area 5 Northwest of Staye Court Dr	575m of 300mm diameter sewer (on privately owned land) to connect into the existing 300mm diameter sewer located along Frieday Street	2016	Not built
Area 8 East of DeCosta St along Madawaska Blvd	150m of 375mm diameter sewer along Madawaska Blvd to existing 600mm diameter existing sewer at the corner of Madawaska Boulevard and DeCosta Street	2016	Built
Area 3 East of Baskin Dr	New 8.3L/s pump station and approximately 100m of 100mm diameter forcemain (both on privately owned land) tied into the existing 400mm diameter trunk sewer located along Baskin Drive East	2021	Not built
Area 1 White Lake Rd/VanDusen Dr	New 10L/s pump station and approximately 670m of 100mm diameter forcemain (270 on privately owned land and 400m on new road alignment or White Lake Rd) tied into the existing 400mm diameter trunk sewer located along Vanjumar Drive	2031	Not built
Area 3 East of Baskin Dr	Increase of the pump station capacity noted above in 2021 from 8 L/s to 15 L/s	2031	Not built

Table 4-2: Water Servicing Projects from 2013 W&WWMP

Project Location	Project Description	Timing	Status
Daniel St 1 (Havey St to Charles St)	564m of 400mm diam. watermain	2016	Built
Havey St (WTP to Daniel St)	456m of 600mm diam. watermain	2016	Built
Daniel St 2 (Charles St to Staye Court Dr)	616m of 400mm diam. watermain	2021	Not built
Staye Court Dr (Daniel St to Hwy 17)	519m of 400mm diam. watermain	2031	Not built
Victoria St (John St to Elgin St)	669m of 300mm diam. watermain	2031	Not built
Elgin St (Victoria St to Norma St)	344m of 300mm diam. watermain	2031	Not built
Norma St (Elgin St to Caruso St)	422m of 300mm diam. watermain	2031	Not built
Caruso St (Norma St to Ida St)	80m of 300mm diam. watermain	2031	Not built
White Lake Rd/Vandusen Dr	1,920m of 300mm diam. watermain	2031	Not built

The Town also provided a list of planned long-term infrastructure projects, which will have an impact on the resulting flows in the system. They were therefore considered when identifying future problem areas and system improvements. These projects are presented in **Sections 5.5.1.2** (wastewater) and **5.5.2.1** (potable water).

4.1.1.3 Facility Planning and Design

The following documents pertaining to water and wastewater facilities' planning and design were provided.

Sanitary Pumping Station Design Briefs

Sanitary pumping station (PS) design briefs for 4 of the Town's 5 PSs were provided. The Town noted that a design brief for PS #4 was not available but provided its Certificate of Authorization (CoA). These reports are used to review and validate how the PSs are modelled. Detailed information and data gaps on the sanitary PSs are further discussed in **Section 4.1.2.3**.

- Draft Design Brief – Sewage Pumping Stations Nos. 2 and 3 – Town of Arnprior (Trow Consulting Engineers Ltd., 2002)
- Design Report for Replacement of Pumping Station No. 1 – Town of Arnprior (Robinson Consultants Inc. Consulting Engineers, 1999)
- Madawaska Village Sanitary Pumping Station Design Brief (Stantec Consulting Ltd., 2007)

Water Filtration Plant Reports

- Town of Arnprior Walter E. Prentice Water Filtration Plant Schedule 'C' Class Environmental Assessment Environmental Study Report (J.L. Richards & Associates Ltd., 2007)

The Town undertook a Class Environmental Assessment (EA) study from 2005 to 2007 for the expansion of the WFP to a 20-year horizon (i.e., the year 2025).

The findings of the study can be compared to updated growth information in the assessment of treatment and storage capacity available in the short- to medium-term horizons, as part of the WFP performance review in **Chapter 2** (**Section 5**).

Detailed information and data gaps on the WFP are further discussed in **Section 4.1.3.3**.

- Arnprior Water Filtration Plant Annual Summary Reports (Corporation of the Town of Arnprior, 2008, 2009, 2010)

Annual summary reports on daily raw and treated water flows from the WFP were provided for 2008 to 2010. Additional data in Excel format was provided for 2016 to 2020, and subsequently for 2006-2015 and 2021.

These reports and data received are used as part of the WFP performance review in **Chapter 2** (**Section 5**), to identify triggers for additional treatment studies and anticipated plant expansion needs.

4.1.2 SANITARY SEWER NETWORK DATA

4.1.2.1 Previous Master Plan Hydraulic Model

The Town's sanitary sewer model was developed as part of the 2013 W&WWMP in PCSWMM. The model was originally built based on geographic information system (GIS) data provided by the Town. It is a trunk-level model, consisting of sanitary sewers equal or greater than 300 mm in diameter, and including 4 of the Town's 5 pumping stations. The model was re-calibrated in 2015 using additional (newer) flow monitoring data, and the existing conditions and growth assessments were updated. Additional analyses were completed by Stantec since the latest model update to assess development impacts on the Daniel St sanitary sewers and alternative solutions in the MacDonald/Edey St area to handle additional development inflows. During this work, pipes in the Edey St, MacDonald St, McGonigal St W and John St N areas were added to the model and inverts were updated based on information provided by the Town.

The re-calibrated 2015 model with the infrastructure and invert updates completed for the MacDonald/ Edey St work is used as the basis for the current W&WWMP's model update, with the addition of the Allan Dr sewers, as requested by the Town.

4.1.2.2 Geographic Information System (GIS) Data

The Town provided a geographic information system (GIS) database of geospatial features which is used as part of the current W&WWMP. The sewer asset geodatabase layers form the basis from which to review and update the Town's wastewater hydraulic model network, along with land use, population, parcel data, and elevation data.

These sources of information are also used for mapping. Additional background layers provided include municipal boundaries, parcels, buildings, park space, transportation networks (roads) and watercourses have also been collected (and are documented as base mapping features in **Section 4.1.4**).

Additional shapefiles that may be useful for the W&WWMP and/or hydraulic model development were collected as the need arises. GIS data availability for the sanitary sewer network is summarized in **Table 4-3**. Sanitary collection system infrastructure is illustrated in **Figure 4-1**.

A review of the initial sanitary collection system GIS layers showed that some sewer inverts were missing. Updated GIS layers were provided by the Town, where some previously missing invert information was added. Remaining data gaps may limit the addition of sewers to the model unless the missing information can be obtained from drawings or field measurements. Data gaps are discussed in further details as part of the Engineering Validation (**Section 4.1.2.5**).

Table 4-3: Sanitary Collection System Critical GIS Layers and Data Available

GIS Layer Name and Description	Key Attributes	Missing Information	Use
SAN_MH Sanitary Maintenance Holes (MH)	MHID Ground Elevation Status Installation Year	Depth	Model review and update/build
Sanitary_Manholes Updated GIS Data of Sanitary MH	MHID Ground Elevation Status Installation Year	Depth *(partially provided in updated GIS data of sanitary sewers)*	Model review and update/build
SAN_NODE Miscellaneous Sanitary System Nodes	ID Comment	Ground Elevation Depth	Model review and update/build
SAN_INOUT Pump Station Overflow	ID Status	-	Model review and update/build
SAN_SEWER Sanitary Sewers	Pipe ID Status Type Pipe Size Installation Year	Upstream Invert Downstream Invert Pipe Slope	Model review and update/build
Sanitary_Main Updated GIS Data of Sanitary Sewers	Pipe ID Status Type Pipe Size Installation Year Upstream Invert *(partially available)* Downstream Invert *(partially available)*	Upstream Invert *(partially available)* Downstream Invert *(partially available)* Pipe Slope *(can be inferred from available inverts)*	Model review and update/build
SAN_PS Sanitary Pumping Stations (PSs)	PS Name PS Location Status Installation Year	-	Model review and update/build

Stantec

Legend

- Sanitary Pump Station (PS)
- Wastewater Treatment Plant (WWTP)
- Overflow to Stormwater Sewer System
- Pump Station Overflow (PSO)

Sanitary Sewer Pipes - Diameter

- 75 mm ≤ Diameter ≤ 200 mm
- 200 mm < Diameter ≤ 300 mm
- 300 mm < Diameter ≤ 450 mm
- 450 mm < Diameter ≤ 650 mm
- 650 mm < Diameter ≤ 900 mm
- Unknown Diameter

Combined Sewer Pipes - Diameter

- 75 mm ≤ Diameter ≤ 200 mm
- 200 mm < Diameter ≤ 300 mm
- 300 mm < Diameter ≤ 450 mm
- 450 mm < Diameter ≤ 650 mm
- 650 mm < Diameter ≤ 900 mm
- Forcemains
- Municipal Boundary

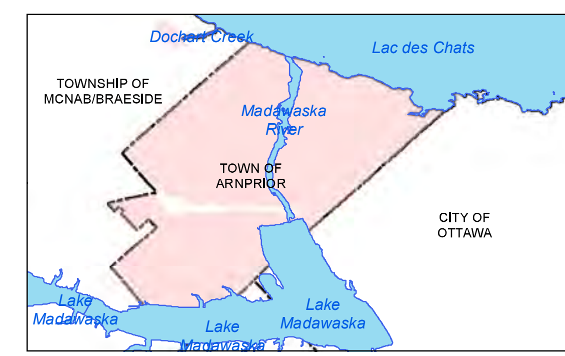
N

0 250 500 Meters

(At original document size of 11x17)
1:15,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *0837ARNP.sid*, *Parcels.shp*, *Roads_CL.shp*, *SAN_INOUT.shp*, *SAN_PS.shp* and *SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: PS: Pump Station; CSO: Combined Sewer Overflow; WWTP: Wastewater Treatment Plant



Project Location

Arnprior, ON

Prepared by GB on 2022-07-20
Revised by CR on 2022-10-27

Client/Project

163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

4-1

Title

Sanitary Sewer Network from GIS

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4.1.2.3 Pumping Stations

The Town is currently serviced by a total of nine sanitary pumping station (PS), including five communal pumping stations, one small station in a municipal building near the beach (Robert Simpson Park), and three privately owned stations. The communal PS #4 is outside the model extent, therefore, only four of the five communal PSs are assessed in the W&WWMP. **Table 4-4** provides an overview of each PS and data available. The location of the PSs is shown in the sanitary infrastructure map (**Figure 4-1**).

As part of the existing infrastructure assessment presented in **Chapter 2** (**Section 5**), the Town also provided SCADA and reports to Council from 2017 to 2022, including reports of PS bypass (date of occurrence and volume).

Table 4-4: Overview of Pumping Stations and Data Available

Pumping Station Name	Location	Data Provided	Missing Information	Use
PS #1	Elgin St E / Claude St	Design Report Certificate of Approval Pump Head-Discharge Curves Pump On/Off Levels Facility Drawings	SCADA *[provided by Town in **Chapter 2** (**Section 5**)]*	Model review and update/build
PS #2	McNab St / Seventh Ave	Design Report Certificate of Approval Pump Head-Discharge Curves Pump On/Off Levels Facility Drawings (obtained from previous W&WWMP files)	SCADA *[provided by Town in **Chapter 2** (**Section 5**)]*	
PS #3	Madawaska Blvd / Bridge St	Design Report Certificate of Approval Pump Head-Discharge Curves Pump On/Off Levels Facility Drawings (obtained from previous W&WWMP files)	SCADA *[provided by Town in **Chapter 2** (**Section 5**)]*	
PS #4	McLean Ave / Riverview Dr	Facility Drawings (obtained from previous W&WWMP files) Certificate of Approval	Design Report *(Town has confirmed that no design report is available)* SCADA *(Town has indicated that no SCADA is available)*	
PS #5	Wolff Cres	Design Report Certificate of Approval Pump Head-Discharge Curves Pump On/Off Levels Facility Drawings	SCADA *[provided by Town in **Chapter 2** (**Section 5**)]*	

4.1.2.4 Other Special Hydraulic Structures and Boundary Conditions

Special hydraulic structures represent important points in the system where attention to how these are coded in the model is required, given the potential impact on flow distribution and/or resulting water levels. **Figure 4-2** illustrates the location of each of these special hydraulic structures.

Bifurcation nodes (flow splits and high points) were identified as part of the Engineering Validation of the hydraulic model (see **Section 4.1.2.5**). In total, 39 bifurcation locations were identified within the entire system, including 11 locations within the current extent of the hydraulic model. These locations were closely reviewed in preparation for calibration as they may have impacts on the distribution of flow measured in the flow monitoring program. As-built or as-designed drawings were reviewed where available, to ensure that the connectivity is accurately represented in the hydraulic model.

Wastewater in the Town is conveyed to the wastewater treatment plant (WWTP) on Albert St, downstream of the Arnprior Dam, on the left bank of the Madawaska River. The WWTP facility and treatment processes are not modelled in its entirety in the hydraulic model and is instead represented as a simplified outfall. Level boundary conditions were applied to the outfall to represent the WWTP's raw sewage inlet channel capacity. The inlet channel capacity was estimated based on the following data:

- Level sensor data – provided for the period from January 2021 to December 2021
  - Reference elevation from WWTP facility drawings – provided
- Rainfall data – collected as part of the flow monitoring program
- WWTP drawings with elevations – provided
- Typically observed levels – provided

As part of the existing infrastructure assessment presented in **Chapter 2** (**Section 5**), the Town also provided WWTP daily data for 2016 to 2021 and 2023 (partial year, up to April 2023), along with the reports to Council from 2017 to 2022, in addition to SCADA for 2022. This data is used to identify historical trends in the flows to the WWTP and compare them against the WWTP's average day and peak hour flow capacities stated in the facility's certificate of authorization (CoA)

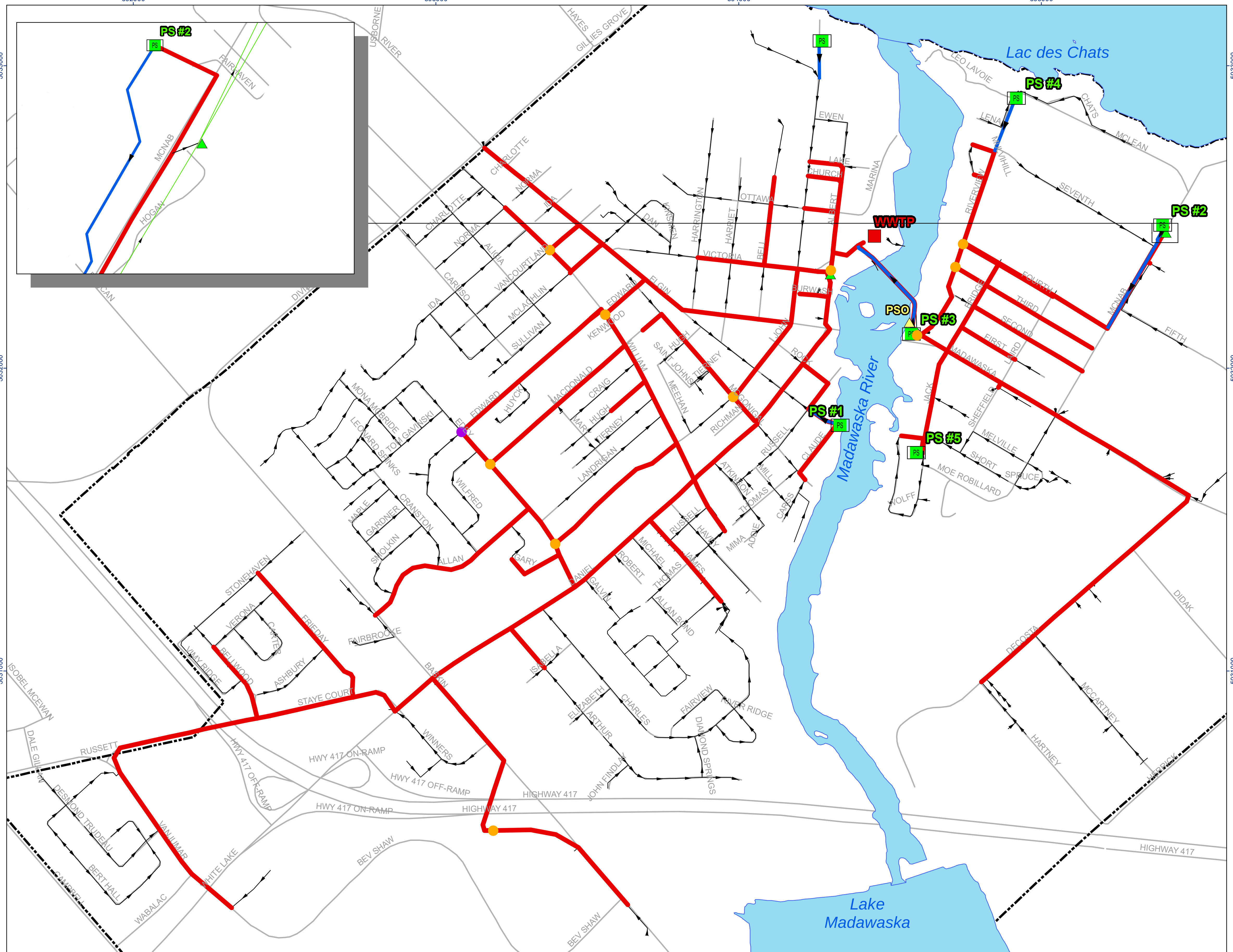
Outfalls into the Madawaska River are also represented as boundary conditions. The Town's two overflows are already in the trunk-level sewer model:

- Albert St Combined Sewer Overflow (CSO)
- PS#3 Overflow

Based on a review of updated GIS data provided, it was identified that the Albert St CSO was reconfigured to bypass into the stormwater sewer system (and discharges into the Madawaska River). A preliminary assumption is that these overflows are free outfalls. The model calibration presented in **Chapter 2** (**Section 5**) did not indicate the need to model these outfalls as submerged for the selected calibration events.

Based on GIS information and previous W&WWMP drawings (as-built), a bypass to the stormwater sewer system on McNab St was identified upstream of PS#2. The Town has provided updated as-built drawings confirming the configuration, dimensions and inverts of the bypass, which were used to add this bypass to the model.

The locations of special hydraulic structures and boundary conditions applied within the study area are presented in **Figure 4-2**.



Stantec

Legend

- Local Sanitary Collection System (Not Modelled)
- Trunk Sewer (Modelled Pipes)
- Forcemains
- Stormwater Collection System (Not Modelled)
- Wastewater Treatment Plant (WWTP)
- Overflow to Stormwater Sewer
- Sanitary Pump Station (PS)
- Pump Station Overflow (PSO)
- Bifurcation Nodes - High Points
- Bifurcation Nodes - Flow Splits
- Municipal Boundary

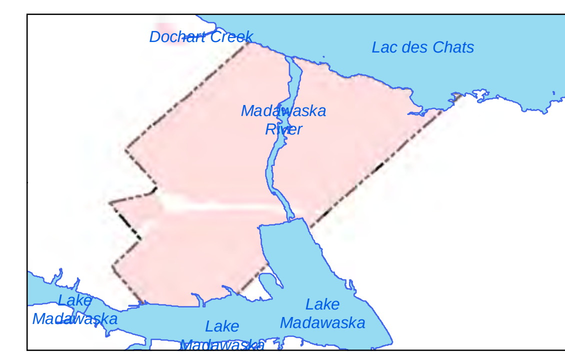
N

0 250 500 Meters

(At original document size of 11x17)
1:13,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Arnprior_Road_Network_2020.shp, SAN_INOUT.shp*, and *SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: CSO: Combined Sewer Overflow; PSO: Pump Station Overflow; WWTP: Wastewater Treatment Plant



Project Location
Arnprior, ON

Prepared by CR on 2022-09-20
Revised by CR on 2022-10-27

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
4-2

Title
Sanitary Sewer Network Special Hydraulic Structures

4.1.2.5 Engineering Validation

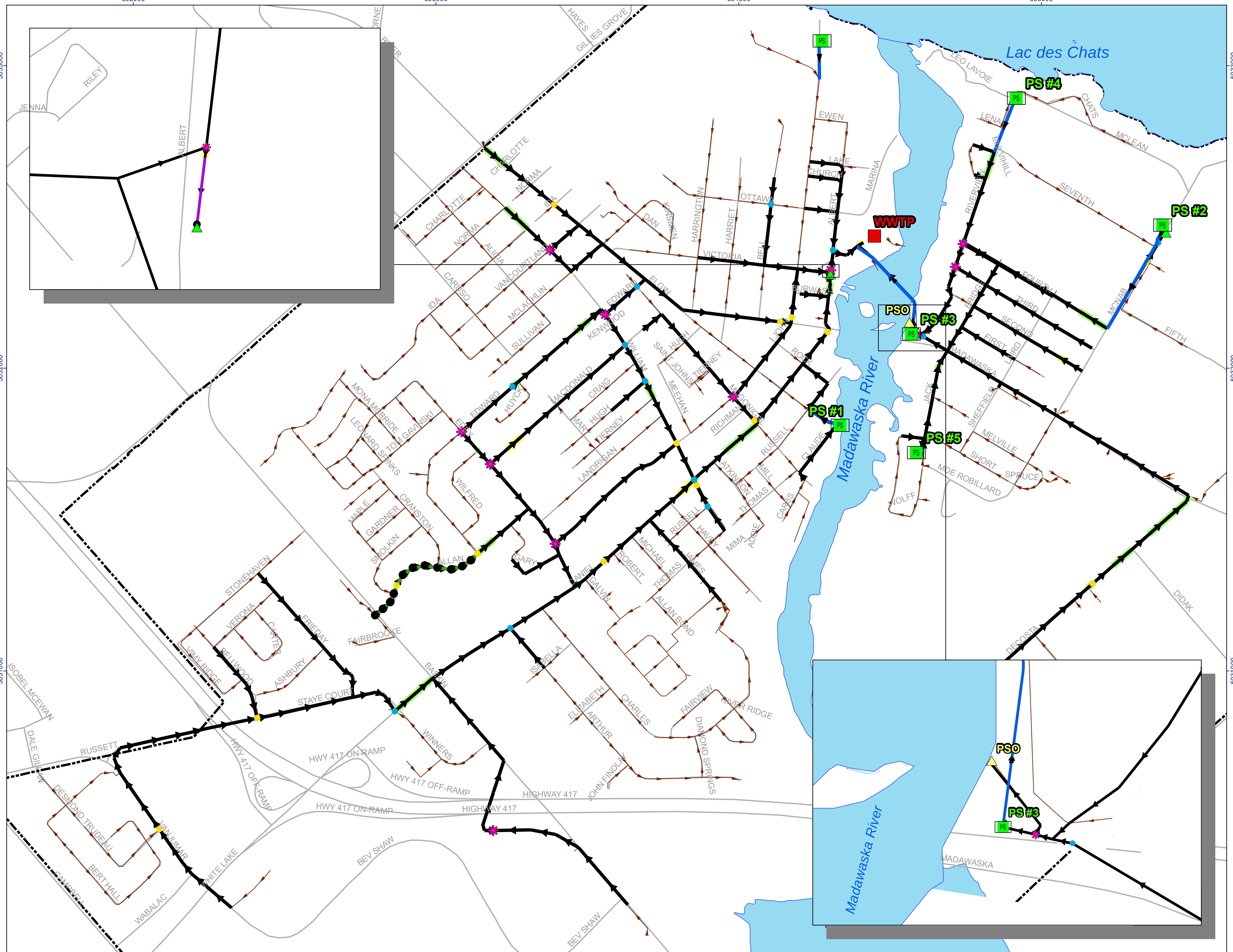
The hydraulic model was updated to include the GIS data most recently provided by the Town, within the existing model extent (i.e., where pipes have been replaced since the last model update). As requested by the Town, the model was expanded along Allan Dr (pipes were added based on GIS data). As part of our routine model review/update process, an engineering validation was completed on the most recent version of the Town's hydraulic model. This evolving engineering validation methodology is performed in InfoWorks ICM, which has robust validation and documentation tools. The validation is completed to identify data gaps, errors and warnings which may require correcting as part of this W&WWMP. Engineering validation errors and warnings are summarized and quantified in **Table 4-5**.

The most predominant issues observed within the study area are Missing Ground Elevation, Pipes Above Ground, Adverse Slopes, Missing Upstream (US) Inverts, and Inconsistent Profile Inverts, each affecting up to 7% of the elements in the study area. Some of these issues were generated when updating the model with GIS data, where ground elevation or pipe invert information was missing. Other issues are warnings, which may have been generated for a valid configuration, and require a review. Finally, the current engineering validation approach raised errors or warnings in locations where the previous model included inferences and simplified configurations. These errors and warnings required a verification of the following model inputs:

- Pipe inverts: these were verified using the following data sources (listed from higher to lower level of certainty):
  - As-built or as-designed drawings – partially available, were requested as needed in specific locations
  - GIS database sewer inverts – provided for most sewers within model extent
  - Inferences based on pipe slopes or obvert matching
  - Assumptions based on standard pipe slopes and required cover
- Ground elevation at MHs: these were verified using the following data sources (listed from higher to lower level of certainty):
  - GIS database MH Elevation data – information is partially available
  - High-resolution LiDAR – available
  - Survey points (20 m x 20 m resolution) – available.

Errors for pump stations are identified based on the availability of PS information as noted in **Section 4.1.2.3**. Upon reviewing facility drawings, design reports and CoAs, the required information for each PS (discharge rates, on/off levels, and wet well inverts and dimensions) was identified, and thus no errors for pump stations were raised.

Figure 4-3 illustrates the distribution of errors within the study area.



Stantec

Legend

- Municipal Boundary
- Local Sanitary Collection System (Not Modelled)
- Trunk Sewers (Modelled)
- Forcemains
- Wastewater Treatment Plant (WWTP)
- Overflow to Stormwater System
- Pump Station Overflow (PSO)

Junction Errors & Warnings

- Inconsistent Profile - Diameter
- Inconsistent Profile - Inverts
- Bifurcation Nodes - High Points & Flow Splits
- Missing Ground Elevation or Added Node

Conduit Errors & Warnings

- Steep Slope
- Flat Pipe (not Missing Upstream & Downstream Invert)
- Adverse Slope
- Pipe Above
- Missing Downstream Invert

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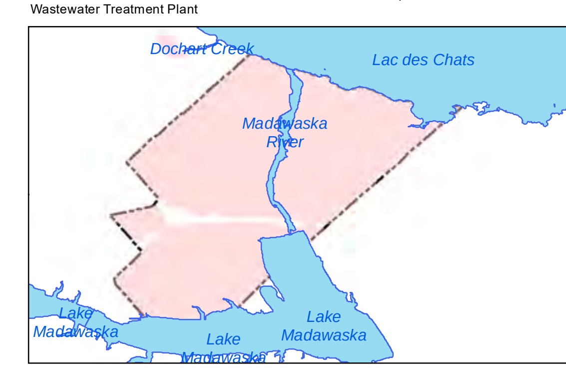
Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Arnprior_Road_Network_2020.shp*, *SAN_INOUT.shp*, and *SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: CSO: Combined Sewer Overflow; PSO: Pump Station Overflow; WWTP: Wastewater Treatment Plant



Project Location
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Prepared by CR on 2022-09-20
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Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
4-3

Title
Sanitary Sewer Model Engineering Validation Errors & Warnings

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Table 4-5: Engineering Validation Errors and Warnings

Error	Description	Object Type	Error Severity	Error Severity Rationale	Engineering Validation Check Note	Quantity of Errors in Study Area	Number of Records in Study Area	% of Errors in Study Area
Missing Downstream Invert	Downstream invert = 0	Conduit	Error	Pipe inverts must be inputted.	MDSI	1	327	0.3%
Inconsistent Profile based on Inverts	Downstream invert > upstream invert	Junction	Error/warning	Typically, not valid and indicates surrounding invert(s) are incorrect. Can also identify conduit has settled or was constructed this way.	IPI	16	323	5%
Pipe Above Ground	Pipe obvert (and possibly invert) above ground elevation	Conduit	Error	Ground levels and/or pipe inverts are incorrect and must be adjusted.	PAG	12	327	4%
Adverse Slope	Negative sloped pipe	Conduit	Warning	May be valid; however, could be indicative of incorrect inverts or a reversed pipe. Can also identify conduit has settled or was constructed this way.	AS	23	321	7%
Flat Slope	Pipe with 0% slope	Conduit	Warning	May be valid; however, may result in capacity constraints.	FS	1	321	0.3%
Steep Slope	Pipe slope > 5%	Conduit	Warning	May be valid; however, may result in model instabilities.	SS	10	321	3%
Missing Ground Elevation	Ground elevation = 0	Junction	Error	Node ground elevations must be inputted.	MGE	13	323	4%
Bifurcation Node - High Point	System high point with 2+ outgoing pipes	Junction	Warning	Helps to identify where backwater over high points may affect the contributing drainage areas used in calibration.	BNHP	1	323	0.3%
Bifurcation Node - Flow Split	Flow split (incoming pipe(s) and 2+ outgoing pipes)	Junction	Warning	Helps to identify where flow splits may affect the contributing drainage areas used in calibration.	BNFS	10	323	3%
Inconsistent Profile based on Diameter	Downstream diameter < upstream diameter	Junction	Warning	May be valid; however, could indicate that surrounding diameter(s) may be incorrect.	IPD	19	323	6%
Missing Downstream Node	Connectivity issue, no downstream node	Junction	Error	Downstream node must be added	MDSN	1	327	0.3%

4.1.3 WATER DISTRIBUTION NETWORK DATA

4.1.3.1 Previous Master Plan Hydraulic Model

The Town's water distribution model was originally developed and calibrated in 2011. It is an all-pipe model in InfoWater Pro, including the Town's water filtration plant (WFP) and elevated storage tank. Minor updates to the model facilities and piping were made as part of the 2013 W&WWMP. The model's demands were updated in 2015. Additional analyses were completed by Stantec since the latest model update to provide boundary conditions in support of development requests. During this work, updates to the model were made to reflect watermain upgrades (on Havey St and Daniel St), new developments (Campbell Farms, Village Creek, Callahan Subdivisions), and to obtain better agreement with field data (by adjusting C-values on some pipes).

The 2015 model with the updates described above is used as the basis for the current W&WWMP's model update. The model is updated to reflect recent watermain replacements and upgrades and is expanded to reflect newer developments in the Town.

4.1.3.2 GIS Data

The Town provided a geographic information system (GIS) database of geospatial features which is used as part of the current W&WWMP. The water distribution asset geodatabase layers form the basis from which to review and update the Town's water distribution hydraulic model network, along with land use, population, parcel data, and elevation data.

These sources of information are also used for mapping. Additional background layers provided include municipal boundaries, parcels, buildings, park space, transportation networks (roads) and watercourses have also been collected (and are documented as base mapping features in **Section 4.1.4**).

GIS data availability for the water distribution network is summarized in **Table 4-6**. Water distribution system infrastructure is illustrated in **Figure 4-4**.

Based on a review of the water distribution system GIS layers, elevation information is partially missing at the nodes and for 253 out of the 425 hydrants in the database. Elevation data gaps were addressed by using the ground elevation data provided by the Town (discussed as a Base Mapping feature in **Section 4.1.4**). The hydrant leads do not have diameters or material, however this is not a critical data gap, as the hydrant leads are not included in the hydraulic model.

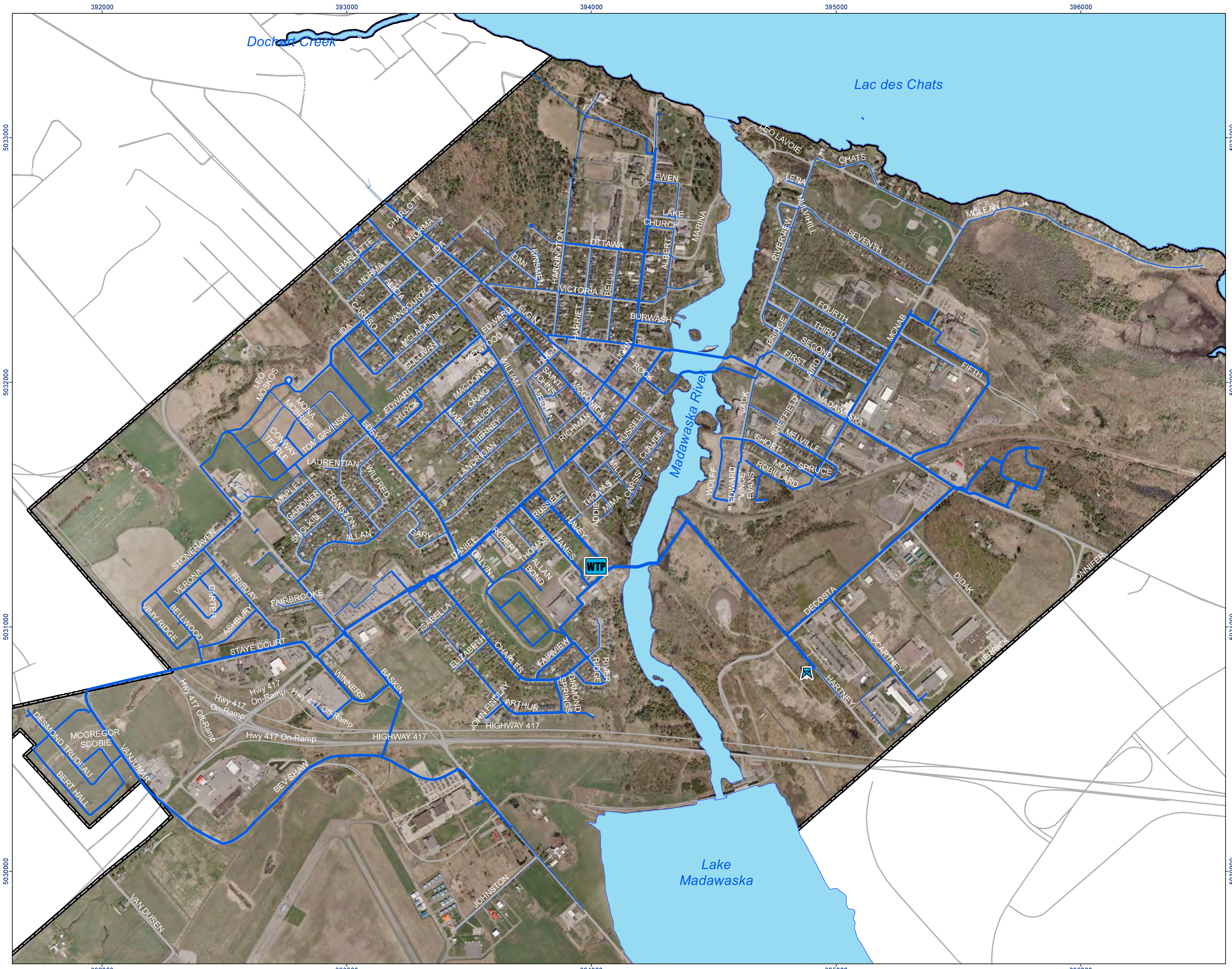
Table 4-6: Town of Arnprior Critical GIS Layers and Data Available – Watermain Distribution Network

GIS Layer Name	Key Attributes	Missing Information	Use
WATERMAIN Watermains	Pipe ID Diameter Material Installation Year Condition Status/Ownership	-	Model review and update/build
WTR_NODE Water Nodes	ID Node Type	Elevation	
VALVE Valves	Valve ID Elevation Installation Year Condition Status/Ownership Comment/Function	-	
WTR_HYDRANT Hydrants	Hydrant ID Elevation Installation Year Condition Status/Ownership Comment/Status	Elevation (partially)	
WTR_HYDLEAD Hydrant Leads	Pipe ID Status/Ownership Installation Year Condition	Diameter Material	

The Town identified some additional watermain replacements/additions that were not reflected in the previously provided GIS data. The additional watermain replacements/additions were therefore incorporated into the model and are summarized in **Table 4-7**.

Table 4-7: Additional Watermain Replacements/Additions Identified by the Town

Location	Year of Installation	Description of Watermain Replacements/Additions
Alicia St between Division St and McLachlin St S	2021	The 150 mm diameter watermain was replaced with new 200 mm PVC watermain.
Craig St between William St W and Mary St	2022	The 100 mm diameter watermain was replaced with new 150 mm PVC watermain.
Hugh St S between William St W and Edey St	2022	The 100 mm diameter watermain (west Mary St) and 150 mm diameter watermain (east of Mary St) were replaced with new 150 mm PVC watermains.
Baskin Dr W between Stonehaven Way and Allan Dr	2023	New 200 mm diameter watermain is currently under construction to service the future development at 115 Baskin Dr W.



Stantec

Legend

Watermains - Diameter (mm)

- < 75 mm
- 75 mm - 150 mm
- 150 mm - 225 mm
- 225 mm - 350 mm
- 350 mm - 600 mm
- WTP Water Filtration Plant (WFP)
- Water Tower
- Municipal Boundary

N

0 250 500 Meters

(At original document size of 11x17)

1:16,000

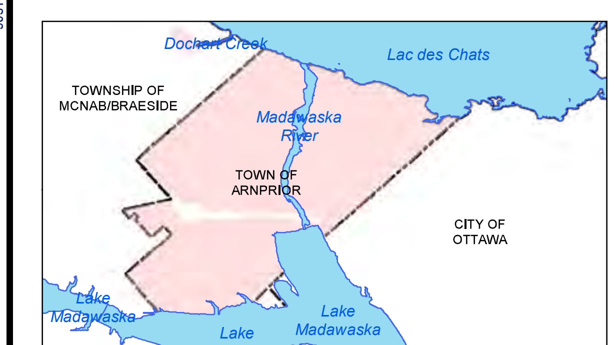
Notes

1. Coordinate System: NAD 1983 UTM Zone 18N

2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *0837ARNP.sid*, *Parcels.shp*, *Roads_CL.shp*, *WTR_NODE.shp* and *WTRMAIN.shp* provided by the Town of Arnprior

3. Background: Contains information licensed under the Open Government Licence – Ontario

4. Abbreviations: WFP: Water Filtration Plant



Project Location

Arnprior, ON

Prepared by GB on 2022-08-04
Revised by CR on 2022-08-04

Client/Project

163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

4-4

Title

Water Distribution Network from GIS

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Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

4.1.3.3 Water Distribution Facilities

The Town takes its raw water from the Madawaska River, which is treated at the Arnprior Water Filtration Plant (WFP), located on the south side of Havey St. Per the 2009 Certificate of Approval, the WFP has a treatment capacity of 10,340 m^3/d (120 L/s). Treated water storage is provided at the WFP by two concrete clearwells with a total capacity of 3,971 m^3 (volumes of clearwell 1 and 2 are 2,167 m^3 and 1,804 m^3 respectively as per the Town's DWWP dated March 31, 2021), and is discharged into the distribution network by high-lift pumps (HLPs). The WFP is equipped with 3 HLPs, each with a rated capacity of 125 L/s at a total dynamic head (TDH) of 70 m. The treatment, clearwell and pumping capacities were confirmed using the Drinking Water Works Permit (DWWP) and Municipal Drinking Water License (MDWL) provided, to verify that they are still valid for the hydraulic model update and WFP performance review.

The WFP facility and treatment processes are not modelled in their entirety in the hydraulic model, and are instead represented by the 3 HLPs, drawing water from a fixed head reservoir. Based on a preliminary review of SCADA provided, the HLPs are operated to maintain the elevated storage tank (EST) on Hartney St between 60% and 80% full. This was confirmed with the Town. Pump curves and duty setpoints were provided by Town in **Chapter 2** (**Section 5**) and are used to update and validate the controls in the hydraulic model.

Within the distribution network, the EST located at 433 Hartney St provides balancing, fire flow and emergency storage. The EST has a rated capacity of 2,365 m^3 (624,800 liquid gallons) as per the Gallonage Chart of the EST provided by the Town. EST drawings were provided by the Town and are used to confirm volume and typical operational elevations, to update and validate the hydraulic model inputs and results.

Table 4-8 provides an overview of the major water distribution facilities and data available.

Table 4-8: Overview of Water Distribution Facilities and Data Available

Facility Name	Location	Data Provided	Missing Information	Use
WFP (including HLPs)	Havey St / Madawaska River	DWWP, MDWL WFP Expansion Environmental Study Report Annual Summary Reports (2008-2010) Certificate of Approval As-Built Drawings SCADA Daily WFP Data (2006-2021)	Pump Controls/Operation Information Pump Curves *[provided by Town in **Chapter 2 (Section 5)**]*	Model review and update/build Performance review
EST	Hartney St	SCADA Drawings DWWP	-	Model review and update/build

4.1.3.4 Hydrant Data

The Town has equipped one hydrant on Alicia St with a remote pressure and temperature sensor. Readings of temperature and pressure data can be accessed from an online platform. The pressure readings can be used to validate the modelled pressures in the vicinity of the hydrant.

As part of the water distribution model calibration and validation presented in **Chapter 2** (**Section 5**), the Town also provided hydrant flow test data from 2018, including 324 tests performed at 320 hydrants located across the Town.

4.1.4 BASE MAPPING

The GIS database of geospatial features provided by the Town includes municipal boundaries, parcels, buildings, park space, transportation networks (roads) and watercourses. Geospatial features pertaining to linear infrastructure are described in **Section 4.1.2.2** (sanitary sewer) and **Section 4.1.3.2** (water distribution).

Ground elevation data from LiDAR imagery was provided. Ground elevation data is used in sanitary modelling to address maintenance hole rim elevation data gaps and to assess the risk of basement or surface flooding, as well as in potable water modelling to address surface elevation data gaps to assess the adequacy of system pressures.

Parcels were also provided as a GIS shapefile, which includes land use attributes for each parcel. The type of potable water and sanitary servicing received by each parcel is also indicated, which can be used to estimate the number of properties connected to the existing water distribution and sanitary collection systems. Residential population and employment data per parcel is not specified. This information is required to obtain a distribution of current water demands and sanitary flows across the Town, used as inputs into the hydraulic models. As described in **Section 4.1.5**, this data gap is addressed by using a similar approach to the 2013 W&WWMP, where total population for the Town of Arnprior was distributed based on residential parcel areas.

Table 4-9 lists the available GIS data for base mapping.

Table 4-9: Town of Arnprior Critical GIS Layers and Data Available – Base Mapping

GIS Layer Name and Description	Key Attributes	Missing Information	Use
0837ARNP Aerial Image	-	-	Graphics, flow monitoring characterization, infrastructure solutions
Export_Arnprior_Road_Network_2020, Arnprior_Roads_20220324 Road Network(1)	Road Name Classification/Ownership Date Added	-	Graphics
OBOUNDARY Official Town Boundary	-	-	Graphics
dtm_1m_utm18_w_10_103_North **dtm_1m_utm18_w_10_103_South** LIDAR data at a 1 m x 1 m Resolution	Ground Elevation	-	Model update
WATER_BODY Waterbodies	Name	-	Graphics
PARKLAND Parklands	Name Area Ownership Park Type	-	Graphics, flow monitoring characterization, infrastructure solutions
Arnprior_PropertyParcels_ wAssessment_20220324 Town Property Parcels	Land Use Area Water Servicing Type Sanitary Servicing Type	Population per Parcel Employment per Parcel	Graphics, model update, flow monitoring characterization, model calibration, existing population distribution, future population projections
Res_Parcels_Dec2021 Residential Sites under Active Development Applications and Vacant Residential Land(2)	Status Area Number of Units(3)	-	Future population projections
Employment_Parcels_Dec2021 Vacant Employment Lands(2)	Status Gross Area(3) Net Area(3)	-	Future employment projections

Notes

(1) Multiple road network layers were provided. *Export_Arnprior_Road_Network_2020* is mainly used for mapping, as it includes roads outside the Town's municipal boundaries as of 2020. *Arnprior_Roads_20220324* includes streets in newer subdivisions, built after 2020.
(2) Parcels identified for residential and employment supply in the Town's GMS (2022).
(3) Residential supply (number of units) and employment land supply (gross and net area) are provided in separate spreadsheets.

4.1.5 POPULATION AND LAND USE

4.1.5.1 Land Use

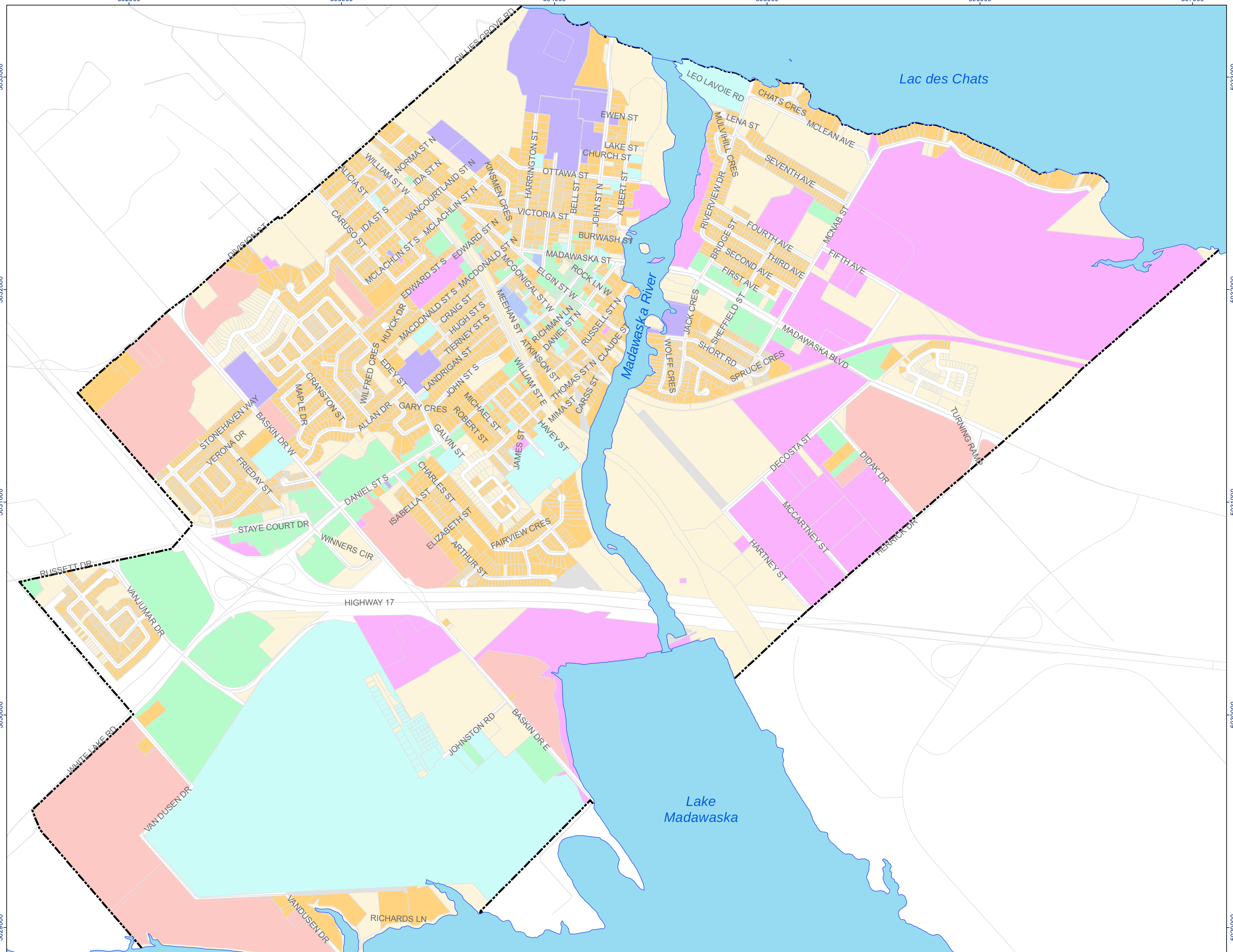
Figure 4-5 illustrates the generalized land use classifications within the study boundary while the land use types are summarized in **Table 4-10**. This classification is based on the Town's Parcels shapefile, which includes a land use attribute. Land use classification is used in the modelling stages to evaluate the water demand and sanitary sewage flow generation. It is also used in conjunction with other data sets to provide context for flow monitoring data interpretation.

Table 4-10: Land Use Classification

Land Use Classification		Land Use Area (ha)	Percentage of Total (%)
Residential	Residential	301.2	23.3%
Industrial/ Commercial/ Institutional (ICI)	Government	1.4	0.1%
	Commercial	75.4	5.8%
	Industrial	237.5	18.3%
	Institutional	32.3	2.5%
Other	Vacant	307.3	23.7%
	Special Purpose(1)	170.6	13.2%
	Farm	130.3	10.1%
	Unassessed	38.2	3.0%
Total		1,294.2	100.0%

Notes
(1) "Special Purpose": comprises a variety of land uses, including (but not limited to) religious buildings, curling club, marina, and airport buildings. For modelling purposes, no population (and hence, no water demand or sanitary flow) is allocated to these parcels.

Overall, the Town has diverse land use features, with no one land use type occupying more than a half of the total area. Residential areas occupy ~23% of the land uses, and ICI areas ~27%. The remaining areas (other land uses; 50%) are predominantly composed of vacant areas (~24% of total land use in the Town), which show potential for development and growth in the Town. Other land uses include parcels tagged as "Special Purpose", which comprise a variety of land uses, including (but not limited to) religious buildings, curling club, marina, and airport buildings. For modelling purposes, no population (and hence, no water demand or sanitary flow) is allocated to these parcels.



Stantec

Legend

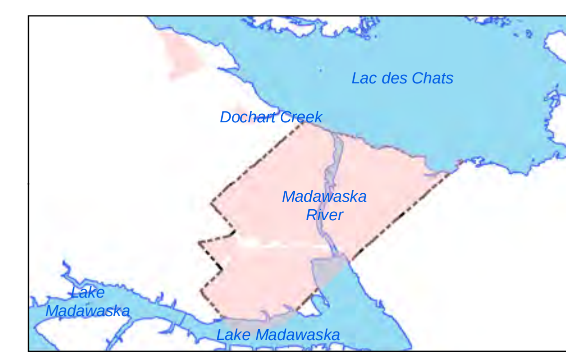
Land Use

- Commercial
- Farm
- Government
- Industrial
- Institutional
- Residential
- Special Purpose
- Unassessed
- Vacant
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Roads.shp*, and *Arnprior_PropertyParcels_wAssessment_20220324.shp, OBOUNDARY* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by GB on 2022-07-25
Revised by CR on 2022-08-03

Client/Project
163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
4-5

Title
Land Use Classification

\\Ca0218-ppfss01\01-634\active\1634_01723\planning\drawing\gis\MXDs\tm1_figs\fig2-5_arn_land_use_map_20220912.mxd Revised: 2022-09-13 By: crazalimaharo

4.1.5.2 Water Consumption/ Billing Records

As land use varies across the Town, water consumption records can be used to derive per capita water usage and wastewater generation rates. For sanitary modelling, the per capita water usage is an indicator of population-derived sewage generation, and therefore is used to cross-reference the sewage rates calculated by flow monitoring data.

For water distribution modelling, water consumption records are used to identify top water consumers and allocate their demands to specific junctions in the model. The remaining water demand in the distribution system is obtained by subtracting the top users' demands from the bulk WFP treated flow and distributed across the remaining model junctions.

Water consumption records for top water users and approximately 2,000 residential and ICI users were available for the 2013 W&WWMP; updated water consumption records were provided by the Town and are considered in subsequent hydraulic modelling update steps.

4.1.5.3 Current Population

Population data for existing conditions is provided in the Town's 2022 GMS Report and is derived from the Statistics Canada 2021 Census data. The 2021 population was 9,890 and has been increasing at an annual rate of approximately +1.5%. Using this annual growth rate, a 2022 baseline population of 10,038 people can be assumed for the W&WWMP. The distribution of population across the Town is estimated based on residential parcel information. This data is initially used to estimate per capita sanitary sewage output (L/c/d) from the flow monitoring data and forms the input in the base sanitary hydraulic models for generating dry weather sewage flow.

Following the completion of the sanitary model calibration presented in **Chapter 2** (**Section 5**), the subsequent September 2023 revision of the 2021 Census reported a population of 9,629, which is less than the original 2021 population considered in this Master Plan. This reduction in the reported population may be due to amendments in the 2021 Census, such as revised dwelling counts when considering usual occupancy. While this population reduction would result in an increase in the dry weather flow per capita sanitary parameters (L/c/d), the impact on the wet weather flow calibration and results is minor. The peak wet weather flows remain the main driver of the Master Plan-level capacity assessment and infrastructure recommendations.

Growth projections are presented and assessed as part of modelling growth interests in **Chapter 2** (**Section 5**).

4.2 Design/Assessment Standards Review and Selection

4.2.1 SANITARY SEWER NETWORK

4.2.1.1 Collection System Assessment Criteria

Following the hydraulic model update and calibration, the existing sanitary sewer network was assessed, to identify existing capacity constraints and flooding risks in the Town. Existing flows were generated based on current population and land use (**Section 4.1.5**) and parameters derived from the analysis of flow monitoring data as part of the calibration [**Chapter 2** (**Section 5**)]. The assessment uses a 25-year SCS II 6-hour rainfall distribution event.

For the existing conditions assessment, the collection system performance is evaluated based on hydraulic grade lines (HGLs). The resultant HGLs are assessed to identify if basement or surface flooding risks are generated, whereby:

- The risk of basement flooding is evaluated based on a depth of 1.8 m from crown, which was selected as a representative distance between the underside of footing (USF) and ground surface. The MH cover elevation is assumed representative of the crown of the road, as most MHs are located along the centerline of the roadway.
- Surface flooding occurs when the HGL is at or above surface. HGL issues are defined by locations that do not meet the freeboard criteria (i.e., freeboard is < 1.8 m).

Pipe surcharge state can help define the issues within the system but is not considered in the criteria. Pipe surcharge state is identified using a combination of the flow capacity utilization within the pipe (q/Q) and the depth ratio (d/D). Pipes can either be bottlenecked (undersized and flowing above the pipe's capacity), experiencing backwater conditions due to downstream bottlenecks, or free flowing.

The approach described above is consistent with that of the 2013 Master Plan.

4.2.1.2 Pumping Stations (PS) Assessment Criteria

The capacities of the PSs are assessed by identifying the incoming flow and comparing it to the PS's firm capacity (largest pump offline). To do so, PSs are modelled as ideal (flow in = flow out) for the existing conditions assessments. Their current operational configurations are represented in the model for calibration to replicate the hydraulic conditions within the network as best as possible. The assessment presents results from a 25-year SCS II 6-hour rainfall distribution event, consistent with the event used in the 2013 Master Plan. Results from a 10-year design event are also presented, to align with the Ministry of the Environment, Conservation and Parks (MECP) level of service recommendations for PS design. PS bypass history is also used to supplement the PS capacity assessment.

4.2.1.3 Wastewater Treatment Plant (WWTP) Assessment Criteria

The capacity of the WWTP is assessed by identifying the peak hour flow (PHF) and comparing it to the WWTP's PHF capacity stated in the facility's certificate of authorization (CoA). The occurrence and volume of bypass at the Albert St CSO is also reported. The assessment presents results from a 25-year SCS II 6-hour rainfall distribution event, consistent with the event used in the 2013 Master Plan.

Historical data is also used to identify historical trends in the flows to the WWTP and compare them against the WWTP's average day and peak hour flow capacities stated in the facility's CoA. This approach supplements the model findings, with greater consideration for the various design flows for WWTPs as defined by the MECP. This approach is also consistent with that applied in other nearby municipalities.

4.2.2 WATER DISTRIBUTION NETWORK

Following the hydraulic model update, the existing water distribution network was assessed, to identify existing capacity constraints in the Town in terms of pressures and fire flows. Existing water demands were generated based on current population, land use (**Section 4.1.5**), WFP SCADA and billing records. Storage capacity was also assessed, to ensure that there is sufficient balancing, fire flow and emergency storage in the system.

4.2.2.1 System Pressure Objectives

As per the MECP *Design Guidelines for Drinking-Water Systems*, normal operating pressures in a distribution system range from 350 to 480 kPa (50 to 70 psi) and should not be less than 275 kPa (40 psi). Minimum pressures should not decrease below 140 kPa (20 psi) at any point in the system and should not exceed 700 kPa (100 psi). Pressure reducing measures are required to service areas where pressures greater than 560 kPa (80 psi) are anticipated. These operating pressures are in line with typical industry standards, the 2013 W&WWMP, and more recent assessments conducted in the Town.

Table 4-11 provides a summary of the pressure scenarios and the corresponding recommended pressures.

Table 4-11: Recommended Operating Pressures

Pressure Scenario	Pressure	
	kPa	psi
Minimum Maximum Day + Fire Flow (MXDY+FF)	140	20
Minimum peak hour (PKHR)	275	40
Minimum recommended	350	50
Maximum recommended	480	70
Maximum Average Day (AVDY) recommended	560	80
Maximum all conditions	700	100

4.2.2.2 Fire Flow Objectives

For the assessment of balancing, fire flow and emergency storage, the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems (2019) provide fire flow requirements for sizing water storage in a table (Table 8-1), which outlines required fire flow and duration, based on equivalent populations. For a 2022 population of 10,038 people in the Town of Arnprior, this corresponds to a fire flow rate of 189 L/s (11,000 L/min) for a duration of 3 hours, which are used in the MECP formula for calculating storage requirements:

Total Treated Water Storage Requirement = A + B + C

Where:

- A = Fire storage (m^3)
- B = Equalization storage (25% of MXDY demand); and
- C = Emergency storage [25% of (A+B)].

The MECP guidelines also refer communities to the FUS method [presented in *Water Supply for Public Fire Protection* (2020)] for fire flow calculations for fire protection requirements provided by a centralized distribution system. For the assessment of fire flow in the water distribution system and for the sizing of watermains in new developments, it is recommended that the required fire flow be determined using the latest version of the FUS guidelines, based on the type and size of buildings within the development.

In existing areas where the FUS cannot be met, other municipalities (e.g., City of Ottawa) also refer to the Ontario Office of the Fire Marshal (OFM) guidelines (1999), which support the Ontario Building Code (OBC) Part 3 on *Fire Protection, Occupant Safety and Accessibility*. The maximum fire flow required using the OFM method is 150 L/s (9,000 L/min). It is recommended that the FUS guidelines first be used for the assessment of fire flow in the water distribution system in existing areas. Should there be deficiencies in fire flows, the OFM guidelines could be used as a secondary assessment.

It should be noted that these fire flows are used for system-wide assessments, however the actual fire flow available at hydrants can vary depending on various factors, including the number of hydrants, hydrant lead piping restrictions, local watermain and feedermain capacity, and (partially) closed valves. Therefore, hydraulic modelling and hydrant testing should be considered prior to the development of land to confirm actual fire flow availability.

The approach described above is consistent with that of the 2013 Master Plan.

4.3 2022 Flow Monitoring Program

Flowmetrix was engaged to collect data for the 2022 flow monitoring program. This consisted of 6 flow meters installed across the Town in early-April of 2022 and remained operational through to late-July 2022. The flow monitoring data is available on Flowmetrix's portal online, and a detailed flow monitoring report was prepared by Flowmetrix and is provided in **Appendix A.2**. Details on the selected flow monitoring sites and data collected are presented in **Chapter 2** (**Section 5**). Data from the 6 flow meters (FMs) are used in **Chapter 2** (**Section 5**) for the sanitary model calibration, in conjunction with the relevant rain gauge data.

4.4 Chapter 1 Conclusions

Chapter 1 presents the background review and data gap analysis for the Town of Arnprior W&WWMP Update, including the following discussions:

- Review of background reports (**Section 4.1.1**);
- Review of sanitary sewer network data (**Section 4.1.2**);
- Review of water distribution network data (**Section 4.1.3**);
- Review of base mapping features (**Section 4.1.4**);
- Review of existing population and land use information (**Section 4.1.5**);
- Review and selection of design assessment and standards (**Section 4.2**); and the
- Documentation of the 2022 flow monitoring program. (**Section 4.3**).

The information provided is used to update the hydraulic models and assess the existing systems in **Chapter 2** (**Section 5**).

5 Chapter 2: Existing Infrastructure Assessment

The purpose of **Chapter 2** is to present the updates to the wastewater collection system and water distribution system hydraulic models. The existing systems' performance is then assessed using the updated models. This chapter also presents growth projections and the resulting wastewater flows generated and water demands. The existing infrastructure's performance is then assessed under these growth conditions.

5.1 Hydraulic Model Updates

The Town's previous Master Plan wastewater collection and potable water distribution system hydraulic models were updated to reflect existing conditions in each system. These updates consisted of infrastructure and flow (wastewater flows and water demand) updates and are detailed in the following sub-sections. The models were calibrated and validated to available measurements, as discussed in **Section 5.1.1.6** (wastewater model) and **Section 5.1.2.**3 (potable water model).

5.1.1 WASTEWATER COLLECTION SYSTEM MODEL

The wastewater collection system model is a trunk-level model in PCSWMM, consisting of sanitary sewers equal or greater than 300 mm in diameter, and including 4 of the Town's 5 pumping stations (PSs). As discussed in **Chapter 1** (**Section 4**), the Town's re-calibrated 2015 model (2015 W&WWMP Update), last updated in 2018 for the MacDonald/Edey St assessment, was used as the basis for the current W&WWMP's model update. Throughout these model updates, sewers with diameters less than 300 mm have also been added to the model upon request, depending on the assessment needs. The 2018 model update involved adding the bifurcation at Edey St/MacDonald St, to redirect flows from Edey St to MacDonald St. The model's infrastructure and wastewater flows were updated, and the model re-calibrated, to represent existing conditions during the flow monitoring period (April 2022 to July 2022).

As requested by the Town, the model extent was expanded to include the Allan Dr sewers. In general, the model's trunk-level infrastructure was updated using geographic information system (GIS) data, PS data, and additional information provided for special hydraulic structures and boundary conditions. **Chapter 1** (**Section 4**) provides details on the data available, the hydraulic model updates and its engineering validation. The following sub-sections document additional updates made to the model after the **Chapter 1** (**Section 4**) submission.

5.1.1.1 Infrastructure

5.1.1.1.1 Ground Elevation Updates

Maintenance hole (MH) top of grate (TOG) elevations were partially available in the Town's geographic information system (GIS) database. These elevations were primarily used to confirm or update the model's elevations. Elevations at major facilities (e.g., pumping stations, WWTP) were updated based on drawings, where available.

As discussed in **Chapter 1** (**Section 4**), locations with missing ground elevations within the sewer network were identified. These data gaps were addressed using high-resolution LiDAR data. Elevations at select locations were further updated using LiDAR data as part of sewer invert profile modifications, which are discussed in **Section 5.1.1.1.2**.

5.1.1.1.2 Sewer Invert Profile

Sewer invert elevations or MH TOG elevation and sewer invert depths provided were used to verify and update inverts in the hydraulic model. If issues in the updated sewer profiles which could affect the calibration were identified [see Engineering Validation in **Chapter 1** (**Section 4**)], adjustments (fixes) were made and documented within the hydraulic model file. Notably, the following profiles were updated during calibration, to improve the fits between modelled and monitored data (see **Section 5.1.1.6** for a discussion of model calibration and results):

- Updated MH TOG elevation using LiDAR data and the resulting sewer invert elevations (based on provided depth) along Daniel St, from Atkinson St to Elgin St (upstream and downstream of flow monitor (FM) 2 [refer to **Section 5.1.1.3** for details on the flow monitoring program and sites)];
- Updated MH TOG elevation using LiDAR data and the resulting sewer invert elevations (based on provided depth) along De Costa St, from approximately 200 m south of Didak St to Madawaska Blvd (upstream and downstream of FM 6 [refer to **Section 5.1.1.3** for details on the flow monitoring program and sites)];
- Updated inverts at the intersection of Albert St and Victoria St based on as-built drawings.

The profiles before and after the adjustments are illustrated in **Appendix A.1**, along with additional profile updates. It is recommended that the Town confirm the inverts and resulting profiles along these sections, as well as in areas where engineering validation issues were identified in **Chapter 1** (**Section 4**), which can be integrated in the next W&WWMP update.

5.1.1.1.3 Pumping Stations

As discussed in **Chapter 1** (**Section 4**), the Town is currently serviced by a total of seven sanitary pumping stations (PSs), including five communal pumping stations, one small station in a municipal building near the beach (Robert Simpson Park), and one privately-owned pump station. The five communal PSs are assessed in the W&WWMP. **Table 5-1** summarizes how each PS was represented in the model. Boundary conditions applied at the overflows are discussed in **Section 5.1.1.6.1**.

Table 5-1: Sanitary Model Updates – Pumping Stations

Pumping Station Name	Location	Number of Pumps	PS Operations	Overflow/Bypass
PS #1	Elgin St E / Claude St	2	Head-discharge curve from design report Pump on/off levels from design report and/or drawings	Wet well overflow to Madawaska River – added based on drawings
PS #2	McNab St / Seventh Ave	2		Upstream bypass to stormwater collection system – added based on drawings
PS #3	Madawaska Blvd / Bridge St	3		Upstream overflow to Madawaska River – reviewed based on drawings
PS #4	McLean Ave / Riverview Dr	Outside of modelled extent		
PS #5	Wolff Cres	2	Head-discharge curve from design report Pump on/off levels from design report and/or drawings	None

5.1.1.1.4 Albert St Weir and Overflow

As discussed in **Chapter 1** (**Section 4**), the reconfigured Albert St CSO was updated in the hydraulic model. The weir at MH-NW-MN-1706 was added to the model. The weir elevation of 78.74 m was added based on a DEM ground elevation of 80.04 m and a depth of 1.3 m (as provided in the Town's GIS database). Flows from the weir discharge into a 750 mm diameter sanitary sewer, which discharges into a 1,200 mm diameter stormwater sewer and into the Madawaska River. The discharge into the stormwater sewer is represented as a model boundary condition, as discussed in **Section 5.1.1.6.1**.

5.1.1.2 Population and Areas

The population and areas contributing to wastewater flow generation were updated to reflect existing (2022) conditions, and capture growth which has occurred in the Town since the 2013 W&WWMP update. As described in **Chapter 1** (**Section 4**), a 2022 baseline population of 10,038 people was assumed for the W&WWMP. The distribution of population across the Town was estimated based on residential parcel GIS data. Based on a review of residential parcel GIS data against the wastewater collection system network layout, it is estimated that 8,984 people and 160 ha of ICI properties are serviced by the Town's sewer network. Remaining residential and ICI area are presumably serviced by decentralized systems which do not discharge directly into the Town's sewer network (e.g., septic tanks).

For Inflow and Infiltration (I/I) generation purposes, effective areas consisting of a 100 m buffer around all sanitary sewers were generated (50 m in each direction). This resulted in a total effective area of 448 ha.

5.1.1.3 Flow Monitoring

As presented in **Chapter 1** (**Section 4**), Flowmetrix was engaged to collect data for the 2022 flow monitoring program. This consisted of 6 flow meters (FMs) installed across the Town in early-April of 2022 and remaining operational through to late-July. The flow monitoring data is available on Flowmetrix's portal online, and a detailed flow monitoring report was prepared by Flowmetrix and is provided in **Appendix A.2**. Data from the 6 FMs is used for the wastewater collection system model calibration, in conjunction with the relevant rain gauge (RG) data.

5.1.1.3.1 Flow Meter Sites

The 6 FMs were installed in trunk sewers, providing coverage for the main branches of the wastewater collection system and thus capturing growth across different areas of the Town. A temporary rain gauge was installed at 73 James St (Water Filtration Plant and Public Works Garage yard) for the duration of the flow monitoring program. **Table 5-2** summarizes the flow meter locations, pipe characteristics, and contributing area (metershed) characteristics. The metershed characteristics include the metershed areas (based on the parcels allocated to the metershed), the residential (RES) population, and the industrial, commercial, and institutional (ICI) areas.

The hydraulic model was used to trace the contributing metersheds and create a schematic illustrating the flow meters and their connectivity, as shown in **Figure 5-1**. **Figure 5-2** illustrates the location of the flow meters and the rain gauge, as well as the metersheds and the sewer age (installation year).

Table 5-2: Flow Metershed Characteristics

FM ID	FM Name and Location	MH ID	Meter Location (Upstream or Downstream Pipe)	Pipe Size (mm)	Rain Gauge ID	Total[1] Parcel-Based[2] Contributing Area (ha)	Incremental[3] Parcel-Based Contributing Area (ha)	Total[1] RES[4] Population	Incremental[3] RES[3] Population	Total[1] RES[4] Area (ha)	Incremental[3] RES[3] Area (ha)	Total[1] ICI[4] Area (ha)	Incremental[3] ICI[3] Area (ha)	Total[1] % RES[4] Area	Land Use Classification[5]	General Metershed Sewer Installation Year	General Metershed Type
FM 1	ARN-1 Staye Court Dr	MH-SW-MN-1092	Upstream	600	Arnprior-RG	58	58	889	889	21.2	21.2	18	18	54.4%	Mixed Use	> 2000	Separated
FM 2	ARN-2* Daniel St/CN Recreation Trail	MH-NW-MN-236	Upstream	600		252	193	4,424[6]	3,536[(6)]	103.3	82.1	50	32	67.5%	Mixed Use	Mixed	Mixed (Separated and Combined)
FM 3	ARN-3 Elgin St W/Madawaska St	MH-NW-MN-448	Upstream	600		49	49	1,253	1,253	28.9	28.9	4	4	86.7%	RES	Mixed	Mixed (Separated and Combined)
FM 4	ARN-4 Riverview Dr	MH-NE-MN-1314	Upstream	400		38	38	554	554	13.2	13.2	16	16	45.1%	ICI	< 2000	Separated
FM 5	ARN-5* Madawaska Blvd	MH-NE-MN-1328	Downstream	750[(7)]		113	67	1,007	1,007	22.3	22.3	61	19	26.8%	ICI	Mixed	Separated
FM 6	ARN-6 Decosta St	MH-NE-MN-1508	Upstream	400		46	46	-	-	0.0	0.0	42	42	0.0%	ICI	< 2000	Separated

<u>Notes</u>:

(1) Total contributing areas, populations and ICI areas include areas/populations draining to upstream FMs (FM in series).
(2) Parcel-based area refers to the area of all parcels draining to each meter; includes non-effective areas like parking lots, parks, etc.
(3) Incremental areas and populations refer to only the areas/populations between the upstream FM and the FM of focus.
(4) Percent (%) RES area is based on total area of RES and ICI parcels [RES area / (RES + ICI area)].
(5) Land Use Classification is generalized based on % RES;
- o < 50% is considered ICI,
- o Between 50% and 75% is considered Mixed, and,
- o > 50% is considered RES.

(6) The sum of the incremental values does not equal the total value due to rounding.
(7) FM 5 pipe diameter measured by FlowMetrix and confirmed with as-built drawings of PS #3 (drawing reference: *C-102-3*; Trow Consulting Engineers Ltd., 2004); previous model diameter input of 600 mm was updated accordingly.

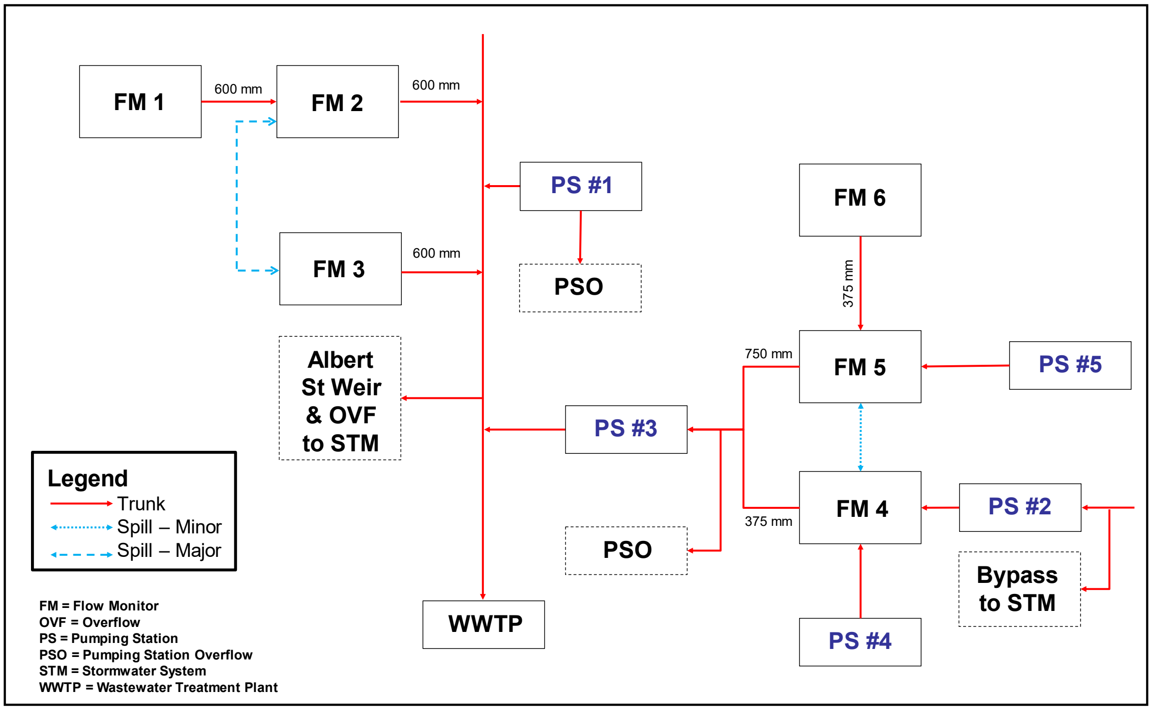
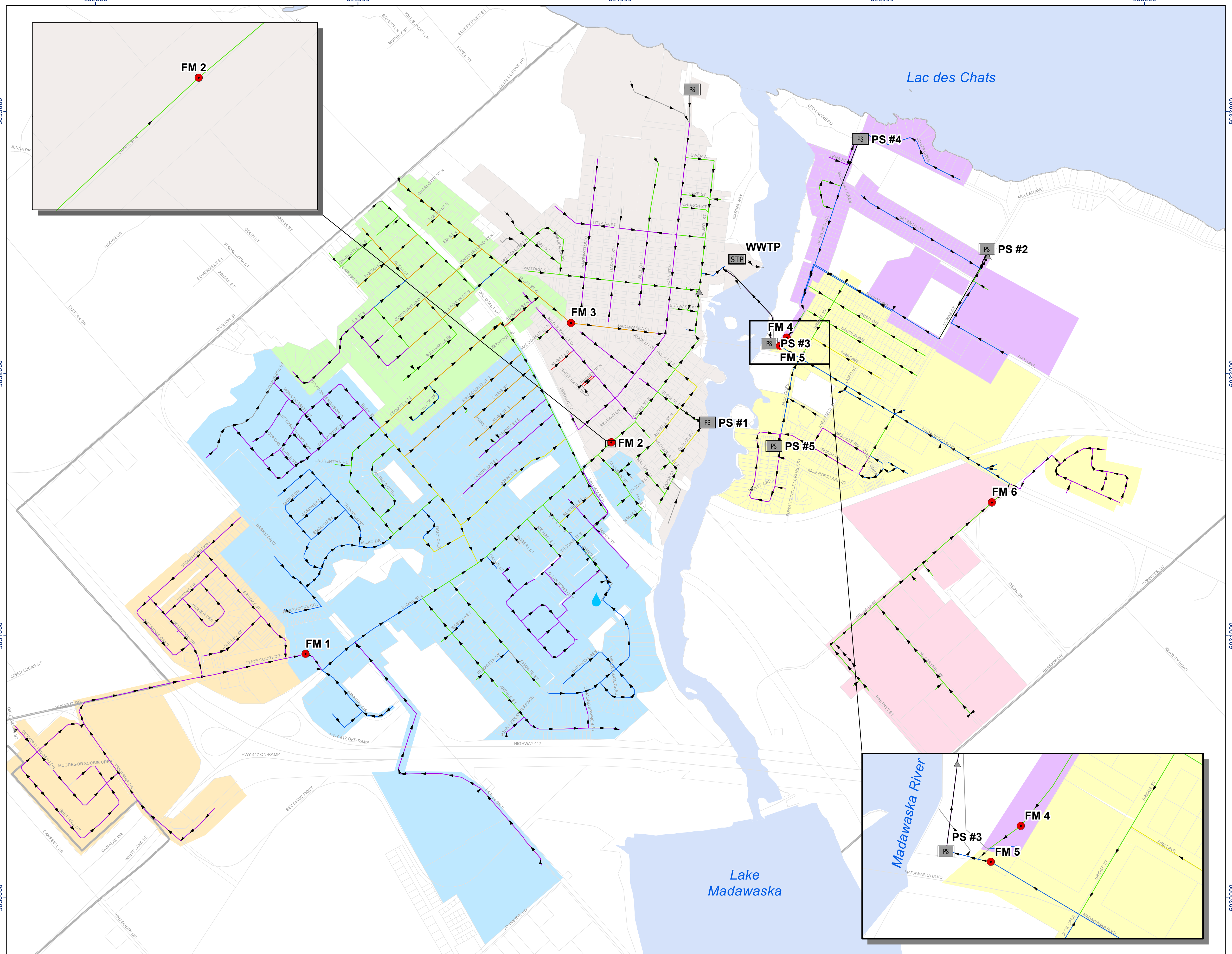


Figure 5-1: 2022 Flow Meter Schematic

As shown in **Figure 5-1**, FM 2 is located downstream of FM 1 and drains through the Daniel St N trunk to the WWTP. FM 5 is located downstream of FM 6 and drains through the Madawaska Blvd trunk to PS #3. FM 5 is also downstream of PS #5. PS #2 is upstream of FM 4, which, like FM 5, also drains to PS #3. FM 3 drains through Elgin St W to the WWTP.

A weir is located at Albert St and Victoria St, where wastewater can overflow into a storm sewer, which discharges into the Madawaska River. PS #1 and PS #3 have overflows (PSOs), which also discharge into the river. There is also a bypass upstream of PS #2, which discharges into the stormwater collection system.

Bifurcation manholes (more than 1 outgoing pipe) that define flow splits (FSs) or high points (HPs) within the system were previously identified as special hydraulic structures [see **Chapter 1** (**Section 4**)]. If located along a metershed boundary, these bifurcations can result in hydraulic connectivity between sub-systems depending on the chamber and pipe orientation, and the flow conditions observed. The flow schematic indicates the presence of major spill points between the FM 2 and FM 3 metersheds, where the upstream inverts of the outgoing pipes from the FS or HP are similar in elevation, thus resulting in frequent or consistent hydraulic connectivity, potentially even during low flow conditions. The flow schematic also indicates the presence of minor spill points between the FM 4 and FM 5 metersheds, where a larger offset is observed between the upstream inverts of the outgoing pipes, and hydraulic connectivity with the system of higher elevation likely occurs less frequently and potentially only during higher flow conditions. With spill points identified between metersheds, calibration can prove challenging due to the contributing upstream area varying with fluctuating flow conditions.



Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)

Sanitary Sewer Installation Date

- Not Stated
- 1910 - 1919
- 1920 - 1939
- 1940 - 1959
- 1960 - 1979
- 1980 - 1999
- 2000 - 2020
- Forcemains
- Rain Gauge
- Flow Meter

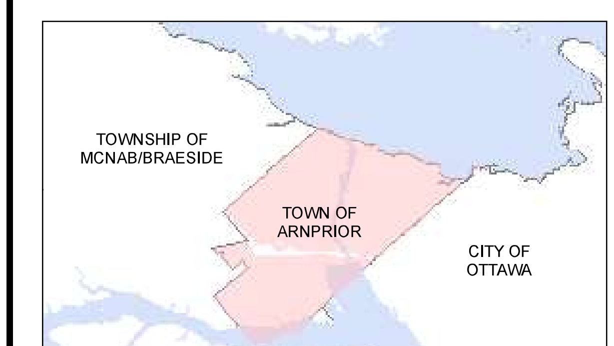
Flow Metershed

- FM 1
- FM 2
- FM 3
- FM 4
- FM 5
- FM 6
- Unmonitored

N

0 250 500 Meters
(At original document size of 11x17)
1:15,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location Prepared by CR on 2023-02-14
Arnprior, ON
Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update
Figure No.
5-2
Title
2022 Flow Monitoring Program Meter & Rain Gauge Locations

C:\Users\crazafimaharo.CORP\Documents\Local_Work_Tmp\Local-163401723-ArnpriorMP\gis_local\MXDs\tm2_figs\fig2-2_arn_san_fm_map_wFMsheds_wPPEage_20230214.mxd Revised: 2023-02-14 By: crazafimaharo

5.1.1.3.2 Flow Meter Data Availability

Flow monitoring data is available at each monitor between April 6th and July 19th, 2022. Although velocity and depths were continuously monitored throughout the duration of the program, there are periods of variable data, including data drift, velocity dropouts, and the effects of silt and debris. Data variability and quality is discussed in **Section 5.1.1.3.3**.

5.1.1.3.3 Flow Meter Data Quality Review

The meter data for all flow meters between April 2022 and July 2022 was reviewed on a macro-level to identify periods of missing data, questionable readings (depth/velocity), backwater and surcharge. This review is the first step in identifying appropriate periods of data for the selection of the dry weather flow (DWF) periods and wet weather flow (WWF) events. This flow meter data quality assessment is illustrated in **Appendix A.3**. Key observations from this macro data review are listed below, which are considered in the selection of calibration periods and the evaluation of subsequent calibration results:

- **Velocities at all FMs generally decrease throughout the flow monitoring period** – Higher velocities (and flows) are observed in April and May, where the wastewater flows experience latent snowmelt. This drift is particularly pronounced in FM 6. This drift could be due to a reduction in groundwater contributions, as the weather becomes warmer and groundwater levels decrease. Observed velocities throughout the flow monitoring program at all FMs are shown in **Figure 5-3** (figure exported from FlowWorks website). Observed flows and depths are illustrated in the flow monitoring report by FlowMetrix, provided in **Appendix A.2**

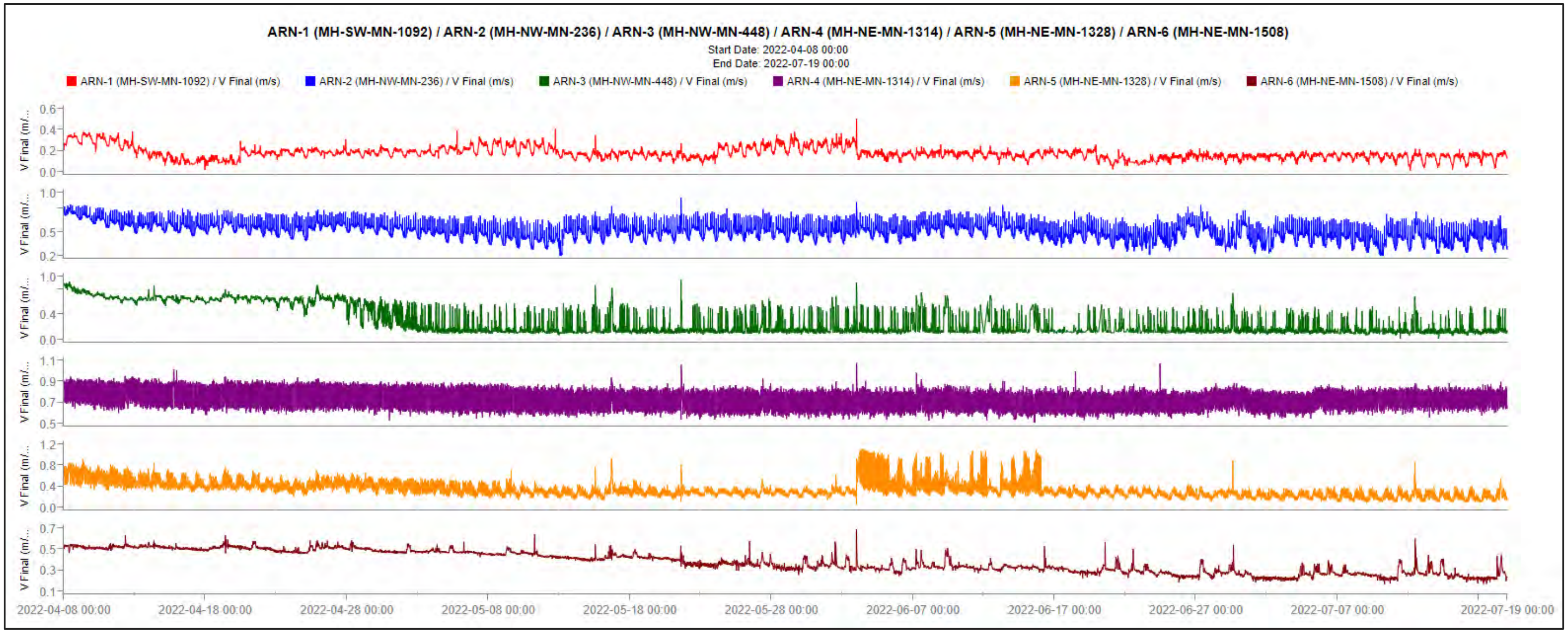


Figure 5-3: 2022 Flow Monitoring Program Velocity Data at all FMs (Entire Period) – Figure Exported from FlowWorks Website

- **FM 3 had a prolonged period of questionable data quality** – Starting on April 28th, 2022, velocity readings at FM 3 decrease on average, while a significant amount of noise is observed in the data. A response to wet weather events can still be observed. Flowmetrix observed whirlpooling flow during site visits. The velocity decrease is possibly due to upstream blockage. This may pose challenges during calibration (especially DWF calibration), as the cause of this velocity decrease is unclear and can therefore be difficult to represent in the model. Flow monitoring data at FM 3 for the entire period is shown in **Figure 5-4**.

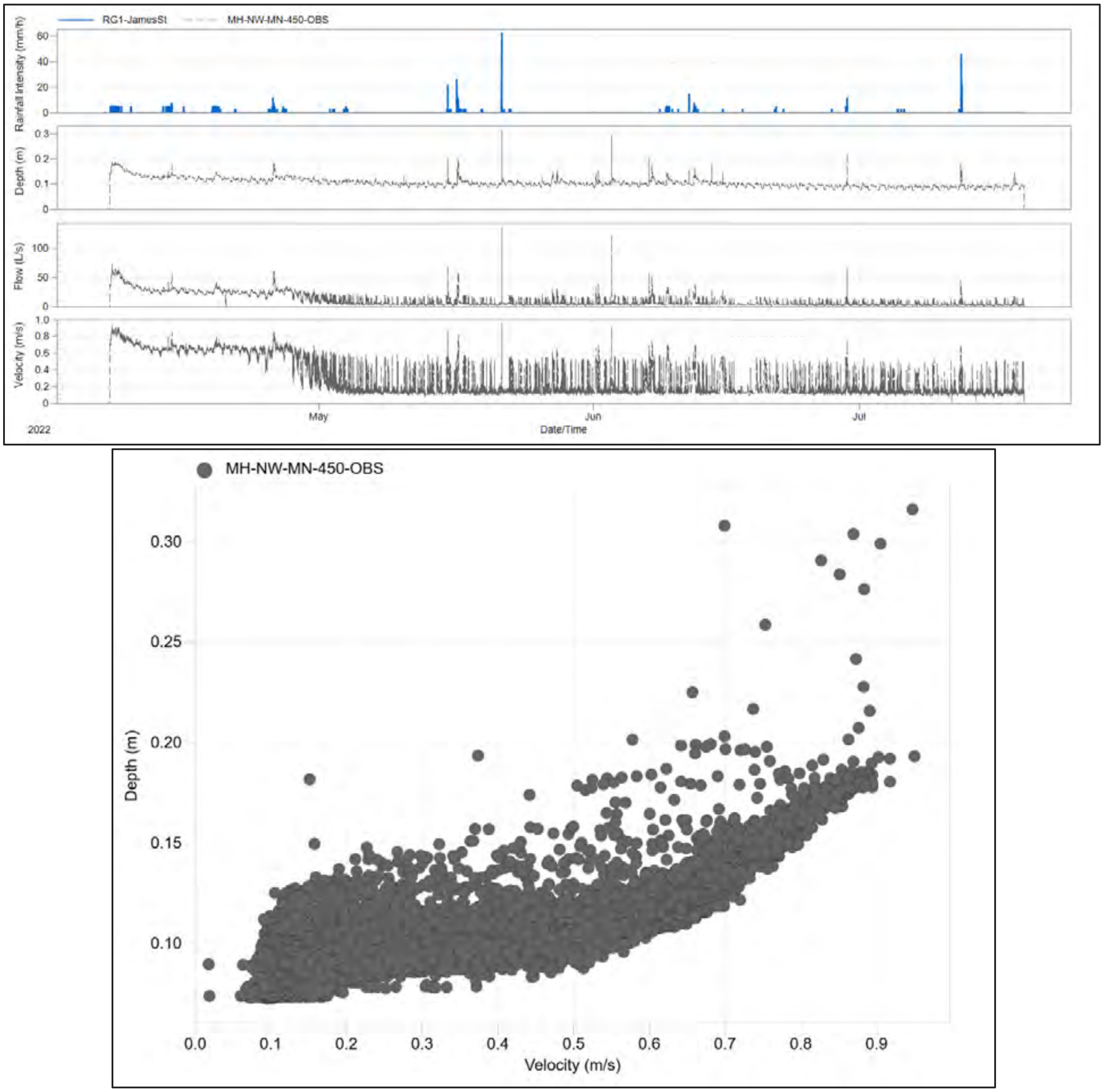
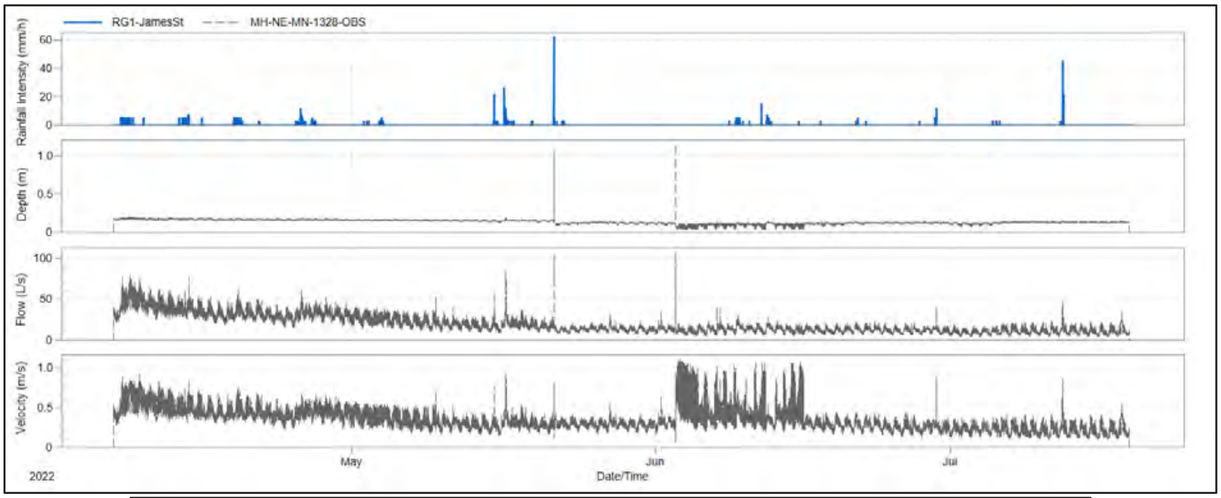


Figure 5-4: 2022 Flow Monitoring Program Data at FM 3 (Entire Period)

- **FM 5 had a significant period of questionable data quality** – On June 3rd, 2022, the pipe at FM 5 experiences backwater and is surcharged. The cause of this backwater is unknown, and cannot be compared to rainfall data, which is missing from May 24th, 2022 to June 8th, 2022 (see discussion of rainfall data quality in **Section 5.1.1.4.1**). Following this, from June 4th, 2022 to June 16th, 2022, velocity and depth readings at FM 5 show fluctuations, with an increase in noise, as shown in **Figure 5-5**. Due to these data quality issues, this period is not used during calibration. The cause of these data quality issues could not be confirmed by Flowmetrix, but could be due to a blockage.



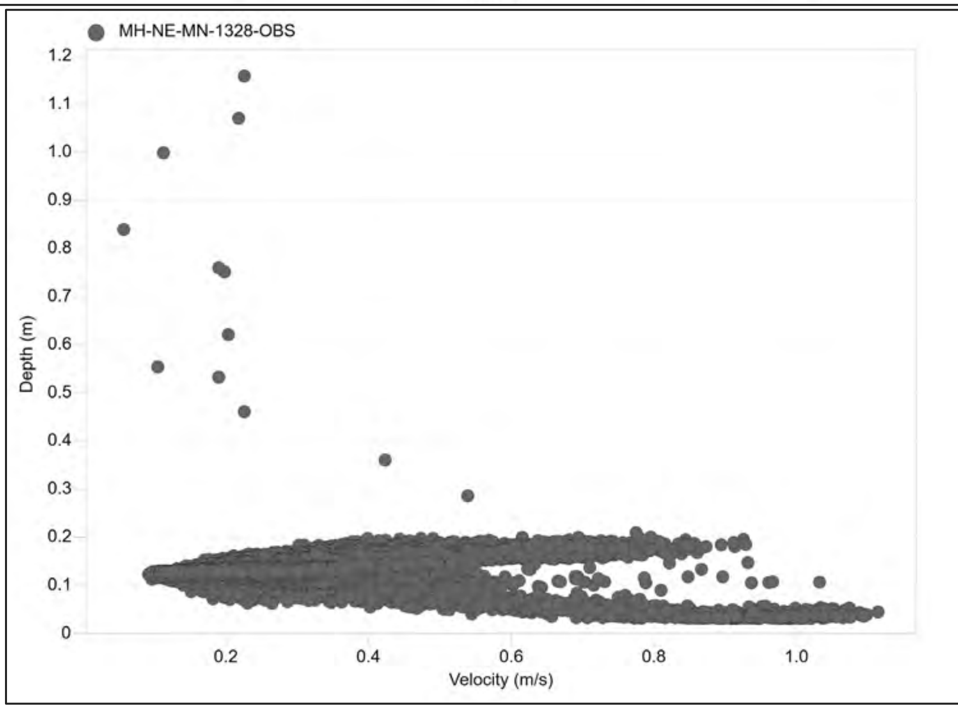


Figure 5-5: 2022 Flow Monitoring Program Data at FM 5 (May 31st, 2022 to June 18th, 2022)

- **Pump station influence** – FM 2, FM 4, and FM 5 experience notable fluctuations in flow patterns consistent with the presence of nearby pumps, as identified in **Section 5.1.1.3.1**. Pump station influence can present challenges in calibration, as operational changes occurring in pump stations can be difficult to represent in the model. Additionally, information on private pump stations is unknown. Flow monitoring data during a sample dry period is shown in **Figure 5-6** (FM 2), **Figure 5-7** (FM 4), and **Figure 5-8** (FM 5).

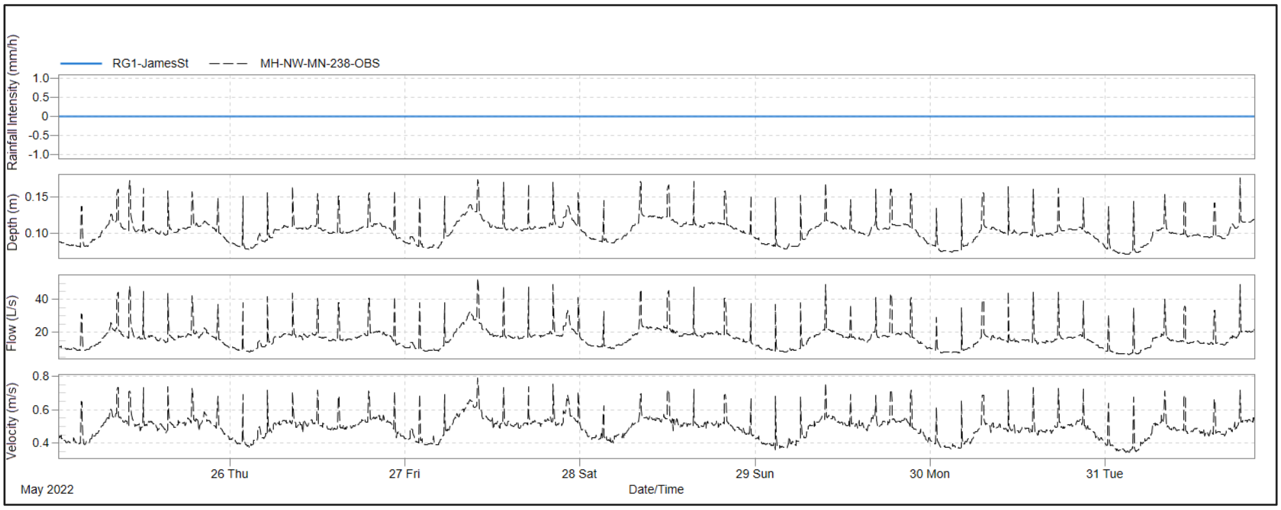


Figure 5-6: 2022 Flow Monitoring Data at FM 2 (Sample Dry Period from May 25th to May 31st, 2022)

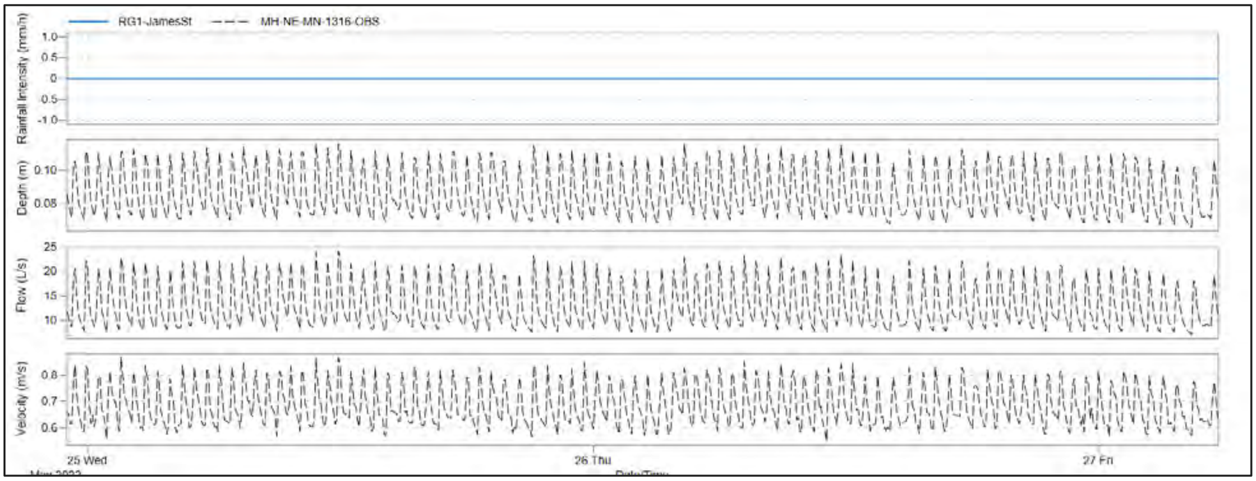


Figure 5-7: 2022 Flow Monitoring Data at FM 4 (Sample Dry Period from May 25th to May 27th, 2022)

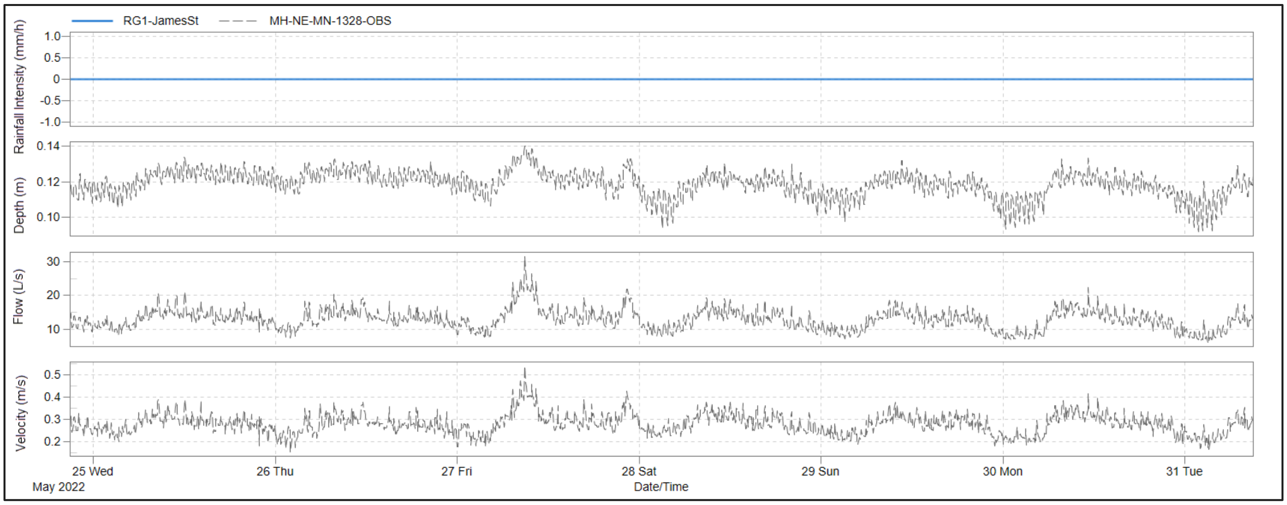


Figure 5-8: 2022 Flow Monitoring Data at FM 5 (Sample Dry Period from May 25th to May 31st, 2022)

- **Two meters experience backwater conditions and surcharge** – FM 4 and FM 5 both experience backwater conditions (sudden decrease in velocity) and are surcharged (measured depth exceeds pipe diameter) during the May 21st, 2022 rainfall event and on June 3rd, 2022. No rainfall was recorded on June 3rd, 2022 due to rain gauge data dropout from May 24th, 2022 to June 8th, 2022 (see **Section 5.1.1.4.1**). A review of Environment and Climate Change Canada (ECCC; Environment Canada) historical weather data from the nearest station (daily total precipitation at Appleton) indicates that there may have been a rainfall in this area on that day. Backwater conditions can present challenges during model calibration as the hydraulic conditions within a surcharged pipe can fluctuate and be difficult to replicate.

- Three-day weekends (Friday to Sunday) with significant pattern variations are observed at FM 6 – Almost no flow is observed in FM 6 on weekends, including Fridays, as shown in Figure 5-9 for a sample week. This suggests that activity in the ICI areas upstream of FM 6 generally stops from Friday to Sunday. Differences can be observed in calibration, as flow generation on Fridays are assigned the weekday pattern.

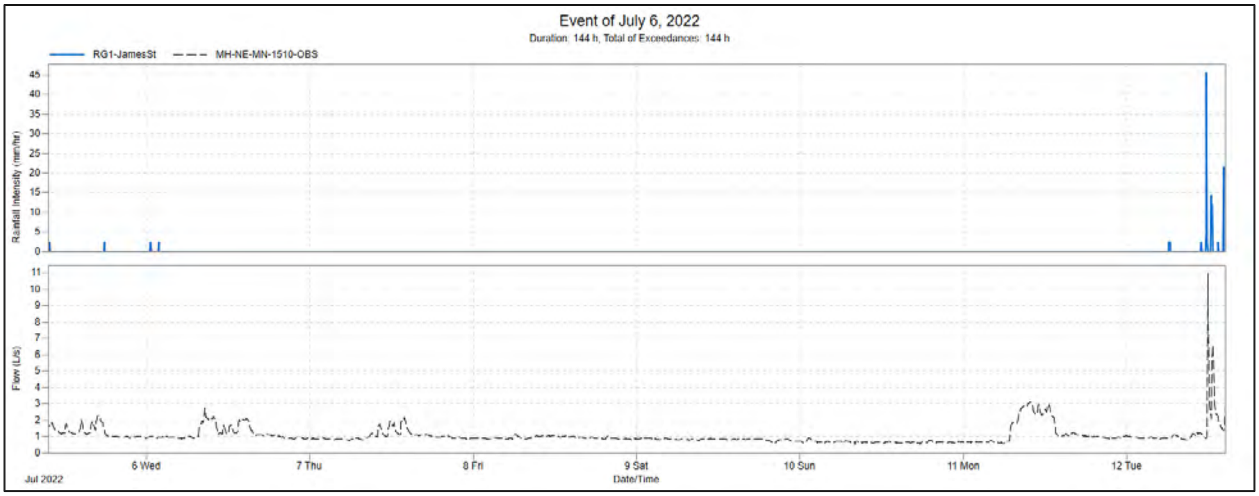


Figure 5-9: 2022 Flow Monitoring Data at FM 6 (Sample Week from July 5th to July 12th, 2022)

- **The flow meter data quality is acceptable for calibration** – The majority of the flow meters showed reasonable response to the WWF events and presented generally consistent data (diurnal patterns) for DWF calibration.

5.1.1.4 Rainfall Data

Along with the 6 FMs, a temporary rain gauge (RG) was installed at 73 James St (Water Filtration Plant and Public Works Garage yard) throughout the duration of the flow monitoring program from early-April to late-July 2022. The rainfall data collected was assessed in conjunction with the flow monitoring data and used to select the DWF periods and WWF events used for calibration. The following sections detail the assessment findings and selected periods.

5.1.1.4.1 Data Quality and Quantity Review

Figure 5-10 presents the cumulative rainfall measured at the James St RG during the flow monitoring program period from April 7th, 2022 to July 16th, 2022. Throughout this period, the rain gauge collected 170 mm in cumulative rainfall. Flowmetrix reported a rain gauge data collection failure from May 24th, 2022 to June 8th, 2022, where rainfall data was unavailable. This data availability issue was considered when selecting DWF periods and WWF events. Rainfall data was otherwise generally good and acceptable for calibration.

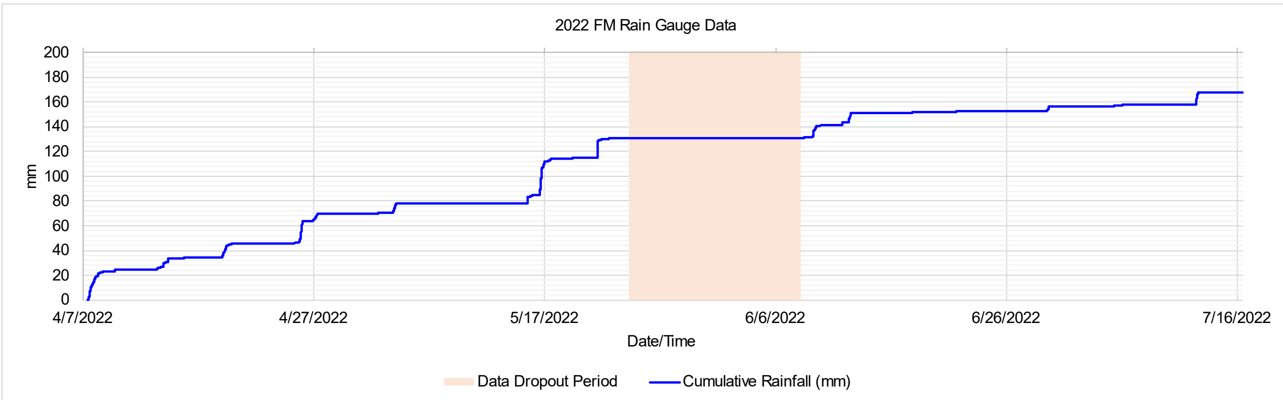


Figure 5-10: Cumulative Rainfall Volume at the James St Rain Gauge

5.1.1.4.2 Dry Weather Flow Calibration Periods

Periods of DWF were defined by no more than 1 mm of rain in the previous 7 days. Periods of 6 consecutive days of dry weather were targeted for calibration. A total of 21 DWF days were identified between early-April 2022 and late-July 2022. Most of these DWF days fall within 4 separate periods. The periods were selected to straddle the flow monitoring program period, and to include a variety of weekday and weekend days, for a more representative calibration. The selected DWF periods are as follows:

- DWF Period 1: May 6th, 2022 (00:00) to May 12th, 2022 (00:00); and,
- DWF Period 2: July 6th, 2022 (00:00) to July 12th, 2022 (00:00).

5.1.1.4.3 Storm Events Summary

The rain gauge data was processed to identify storm events. Storm event volume, duration and peak intensities were considered when identifying potential events for use in calibration. **Table 5-3** summarizes the 7 most significant rainfall events identified.

The selected WWF events were plotted against the Intensity-Duration-Frequency (IDF) curves for the nearest Environment Canada rain gauge in Shawville, Québec, as shown in **Figure 5-11**. All the identified events correspond to an event with a 1:2-year return period or less. While the May 21st, 2022 WWF event generated the most significant response in the system, it is still classified as a 1:2-year storm. Therefore, only smaller events were captured during the monitoring period from which to base the WWF calibration. The observed events are considered acceptable for use in calibration, however, using smaller events for this purpose can in some cases results in unrealistic extrapolated responses when more extreme events are simulated [i.e., the design event(s)].

Table 5-3: Storm Event Characteristics

Event Rank(1)	Start Time	End Time	Duration (hr)	Total Volume (mm)	Average 5 Minute Peak Intensity (mm/hr)	Event Return Period(2)
1	5/21/22 14:35	5/21/22 15:39	1.08	15.0	62.4	≤ 1:2-year
2	7/12/22 6:10	7/12/22 14:14	8.08	10.2	45.6	< 1:2-year
3	5/16/22 13:30	5/17/22 0:30	11.00	27.6	26.4	< 1:2-year
4	5/15/22 10:25	5/15/22 21:50	11.42	6.4	21.6	< 1:2-year
5	6/11/22 19:00	6/11/22 19:15	0.25	2.4	14.4	< 1:2-year
6	6/29/22 12:00	6/29/22 15:45	3.75	3.8	12.0	< 1:2-year
7	4/25/22 7:55	4/26/22 0:55	17.00	17.8	12.0	< 1:2-year

Notes:
(1) Events ranked based on average 5-minute peak intensity.
(2) Return frequency based on IDF curves at the ECCC Shawville, Québec station.

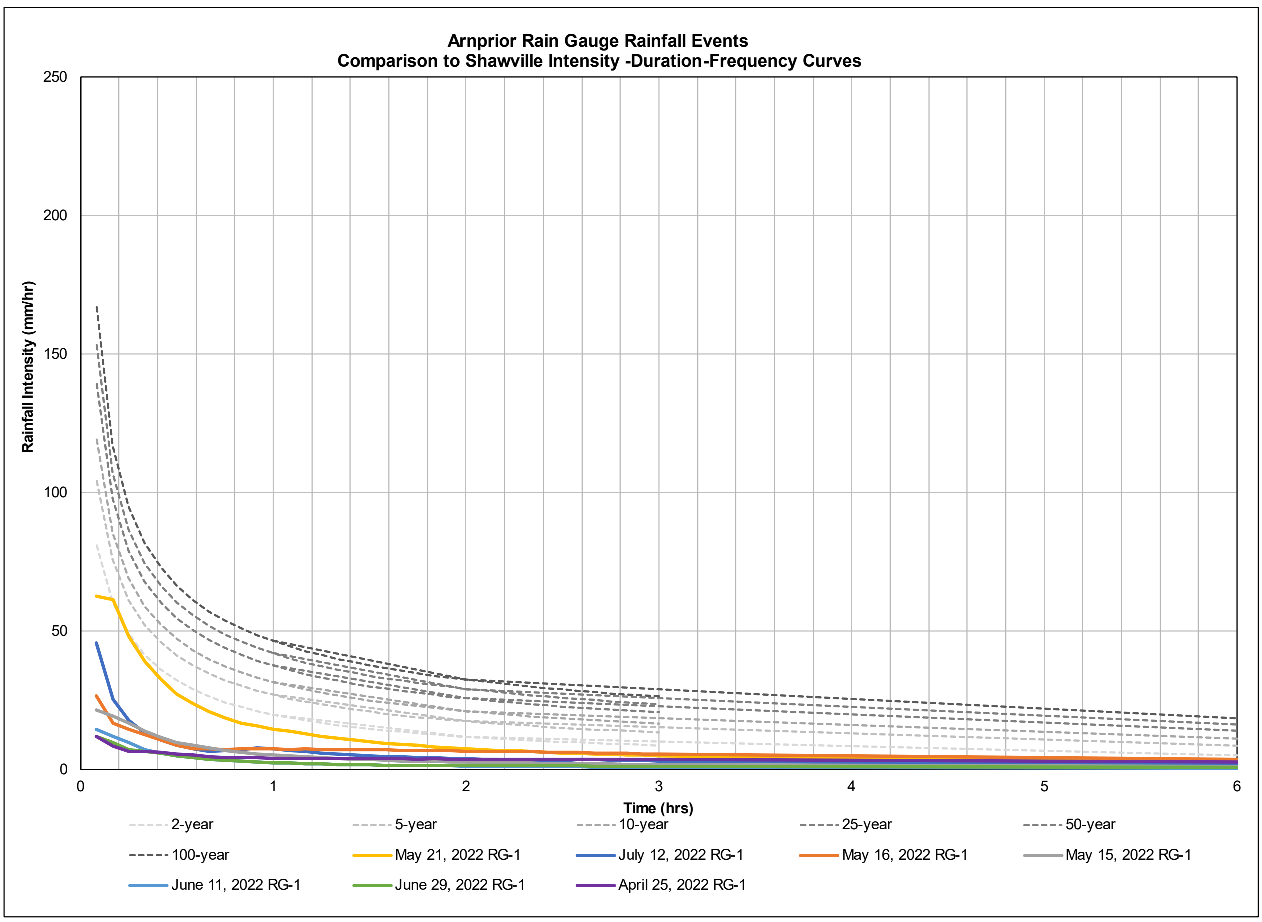


Figure 5-11: Comparison of 2022 FM Rainfall Events to IDF Curves

5.1.1.4.4 Selection of Wet Weather Flow Calibration Events

The intent of the rainfall event review was to define and use 2 WWF events. Although short in duration, the May 21st event was selected, as it produced the highest peak intensity and good responses at the FMs. Likewise, the July 12th event produced the second highest peak intensity and good responses in most FMs. Refer to **Table 5-3** for event details.

The wet weather events selected for calibration are therefore as follows:

- WWF Event 1: May 21st, 2022 (12:00) to May 22nd, 2022 (0:00), referred to as the May 21st, 2022 event; and,
- WWF Event 2: July 12th, 2022 (3:00) to July 12th, 2022 (21:00).

5.1.1.5 Other Wastewater Collection System Data

Along with the FM and rainfall data collected as part of the 2022 flow monitoring program, Supervisory Control and Data Acquisition (SCADA) data at the WWTP and PS facilities and records of CSO volumes for 2022 were provided. While this information is not used for a direct calibration of the model parameters, it is used to validate the modelled results at these different facilities and provide context on the system's performance.

5.1.1.5.1 SCADA Data Review

Along with the FM and rainfall data collected as part of the 2022 flow monitoring program, SCADA data at the WWTP and PS facilities was provided for 2021 and 2022. Since data for 2022 was provided for the entire year, it overlaps with the flow monitoring period, and is used to validate the calibrated model's results. The following sub-sections provide a review of the SCADA data requested and provided by location.

PS SCADA Data

SCADA data was provided for all PSs and is used to validate the modelled PS performance. **Table 5-4** presents the SCADA data availability for the PSs, and the following sub-sections provide details on each location.

In general, as noted in **Section 5.1.1.1.3**, control setpoints (on/off levels) for the PSs were applied in the model based on design briefs. However, the PSs' current operations may differ from design operations, such that the level cycles observed in the data can differ from the modelled cycles. Pump curves were also used when provided in design briefs, which can also differ from the current pump operation. This can create discrepancies when comparing observed and modelled wet well level ranges and cycles. Differences are thus also expected in the pump running statuses. Provided pump running statuses were not used to adjust the PS operation in validation, as the calibration fits at downstream meters are considered adequate for W&WWMP purposes (see **Section 5.1.1.6**) and because operational set points can fluctuate regularly.

Table 5-4: PS SCADA Data Availability

Facility	Location	SCADA Data Available	Timeframe and Temporal Resolution
PS #1	Elgin St E / Claude St	Wet well levels (mm) Individual pump running status (on/off)	January 2022 to December 2022 (1-minute timestep)
PS #2	McNab St / Seventh Ave	Wet well levels (mm) Individual pump running status (on/off)	
PS #3	Madawaska Blvd / Bridge St	Wet well levels (mm) Individual pump speed (rpm)	
PS #4	McLean Ave / Riverview Dr	Wet well levels (mm) Individual pump running status (on/off)	
PS #5	Wolff Cres	Wet well levels (m) Individual pump flow (L/s)	

PS #1

The following SCADA data was provided for PS #1:

- **Wet well levels** (in mm) from January 2022 to December 2022 at a 1-minute timestep: this data is compared against the modelled wet well levels.
- **Individual pump running status** (on/off) from January 2022 to December 2022 at a 1-minute timestep: this data is not used, as pump running status depends on current PS operations and can therefore deviate from PS design setpoints (as inputted into the model). Since the calibration results downstream of this PS for the selected periods and events were acceptable (see **Section 5.1.1.6**), adjustments to align to the observed individual pump running status were not considered necessary.

PS #2

The following SCADA data was provided for PS #2:

- **Wet well levels** (in mm) from January 2022 to December 2022 at a 1-minute timestep: data is missing for prolonged durations; it is therefore not used.
- **Individual pump running status** (on/off) from January 2022 to December 2022 at a 1-minute timestep: this data is not used, as pump running status depends on current PS operations and can therefore deviate from PS setpoints (as input into the model). Since the calibration results downstream of this PS for the selected periods and events were acceptable (see **Section 5.1.1.6**), adjustments to align to the observed individual pump running status were not considered necessary.

PS #3

The following SCADA data was provided for PS #3:

- **Wet well levels** (in mm) in each of the two connected chambers from January 2022 to December 2022 at a 1-minute timestep: the wet well levels between the two connected chambers should be similar; however, due to sensor calibration issues, the levels are inconsistent, until this discrepancy is corrected in mid-November 2022. This data is therefore not used.

- **Individual pump speed** (rpm) from January 2022 to December 2022 at a 1-minute timestep: this data is not used, as measured pump speed is not directly comparable with a modelled output.

PS #4

The following SCADA data was provided for PS #4:

- **Wet well levels** (in mm) from January 2022 to December 2022 at a 1-minute timestep: this data is not used.

- **Individual pump running status** (on/off) from January 2022 to December 2022 at a 1-minute timestep: this data is not used.

PS #4 resides outside the extent of the hydraulic model; thus, this data is not used.

PS #5

The following SCADA data was provided for PS #5:

- **Wet well levels** (in m) from January 2022 to December 2022 at a 1-minute timestep: this data is compared against the modelled wet well levels.

- **Individual pump flow** (L/s) from January 2022 to December 2022 at a 1-minute timestep: this data is compared against the modelled flow through the pumps.

WWTP SCADA Data

Inlet channel level SCADA data from 2021 was provided for the WWTP. This data is used to establish the boundary conditions applied in the hydraulic model (see **Section 5.1.1.6.1**).

Influent and effluent channel 2022 flow measurements were provided for the WWTP. Based on a review of drawings, it was identified that the two datasets of influent flows were measured in the channels downstream of the grit tanks. For this analysis, it was assumed that these flows could be added to represent the total incoming flow to the WWTP, for a comparison with the modelled flows into the WWTP (upstream of the grit tanks). There may however be discrepancies due to hydraulic losses through the grit tanks, such that the measured flows within the influent channels may be less than incoming flows to the WWTP. **Table 5-5** presents the SCADA data availability for the WWTP.

Table 5-5: WWTP SCADA Data Availability

Facility	Location	SCADA Data Available	Timeframe and Temporal Resolution
WWTP	233 Albert St	Inlet channel level data (mm)	January 2021 to December 2021 (1-minute timestep)
		Influent channel(1) flow (L/s) Effluent channel flow (L/s)	January 2022 to December 2022 (1-minute timestep)

Note:
(1) Two sets of flow measurements were provided for each influent channel, downstream of the grit tanks at the WWTP. For this analysis, it was assumed that these flows could be added to represent the total incoming flow to the WWTP.

5.1.1.5.2 CSO Records

The level in the Albert CSO is monitored using a level logger that is maintained by Capital Controls. The flows are then estimated based on these levels. The data from this logger is connected to the Town's SCADA system through the WWTP and an alarm is triggered during any bypasses. The data is read and reset following each event. **Table 5-6** lists CSO occurrences in 2022, as reported by the Town as of December 1st, 2022.

Of the 3 CSO occurrences that were recorded in 2022, only 2 of them (on May 21st and on June 3rd) align with the flow monitoring program period. As noted in **Section 5.1.1.4.1**, rainfall data was unavailable from May 24th, 2022 to June 8th, 2022. A review of Environment Canada historical weather data from the nearest active station (daily total precipitation at Appleton) indicates that there may have been a rainfall in this area on that day. However, this data is only available at a daily resolution and thus, the model cannot be validated to the June 3rd CSO occurrence.

A wet weather flow calibration event was selected for May 21st, 2022, which aligns with a CSO occurrence. However, the CSO volume reported on that day is an estimation, as the Town noted that the flow meter lost power due to a widespread outage. In general, accurate measurements of CSO volumes can be difficult to obtain. Therefore, the calibration does not focus on reproducing this CSO volume, but only validating the occurrence of the CSO.

Table 5-6: CSO Occurrences in 2022

CSO Occurrence	Date	CSO Volume (m^3)
1	May 21st, 2022	Estimated 500 m^3(1)
2	June 3rd, 2022	56 m^3
3	August 26th, 2022	5.5 m^3

Note:
(1) Town noted that the flow meter lost power due to a widespread outage

5.1.1.6 Model Calibration and Validation

The selected 2022 flow monitoring periods and events are used to establish the DWF and WWF parameters, including the residential and ICI sewage generation rates, diurnal patterns, groundwater infiltration (GWI) rates, resulting baseflows, and rainfall derived infiltration and inflow (RDII). Areas without monitor coverage are allocated average parameters from the monitored areas based on the unmonitored area's characteristics. A total of 2 DWF and 2 WWF events have been selected for calibration.

The process of adjusting model parameters to better correlate results with observed data is referred to as model calibration. This calibration process was achieved using an iterative approach until an acceptable fit to the observed flow was obtained. Dry and wet weather targets have been adopted in accordance with the *Chartered Institution of Water and Environmental Management (CIWEM) Urban Drainage Group (UDG) Code of Practice for the Hydraulic Modelling of Urban Drainage Systems,"* ver. 01, dated November 2017*.* The target guidelines are outlined in **Section 5.1.1.6.2** (DWF) and **Section 5.1.1.6.3** (WWF).

The initial calibration parameters for each metershed were extracted from the flow monitoring data, using the US Environmental Protection Agency (EPA) flow monitoring data analysis software Sanitary Sewer Overflow Analysis and Planning (SSOAP) toolbox. The parameters were then applied to the updated existing areas and populations within each metershed, representative of 2022 conditions (see **Section 5.1.1.2**).

5.1.1.6.1 Boundary Conditions

Boundary condition locations originally identified in **Chapter 1** (**Section 4**) were reviewed during model calibration. **Table 5-7** presents the boundary conditions applied in the model, which are presented in detail in the following sub-sections.

Table 5-7: Boundary Conditions for Calibration

Location Description	MH/ Modelled Node ID	Boundary Condition Type	FM Metershed	Value Applied
Private PS (WFP Sludge Discharge) Inflows	MH-NW-MN-328	Inflow	FM 2	DWF Calibration: Inflows based on FM data WWF Calibration: +26.6 L/s every 3 hours(1)
PS #1 Overflow to Madawaska River	D9435231822	Level	Unmonitored	Free Flowing
PS #2 Overflow to Stormwater System	D9541132448	Level	Unmonitored	Free Flowing
PS #3 Overflow to Madawaska River	OT-NE-MN-1700	Level	Unmonitored	Free Flowing
Albert St Overflow to Stormwater System	D9430232311	Level	Unmonitored	Free Flowing
WWTP Inlet Channel	WWTP	Level	Unmonitored	78.31 m(2)

Notes:
(1) Average inflow pattern extracted from flow monitoring data.
(2) Based on typical WWTP inlet channel elevation range of 400-430 mm under dry weather conditions (per operations staff); higher end selected based on review of 2021 SCADA. Boundary condition applied under both dry and wet weather conditions, based on review of resulting overflows at the Albert St weir.

Private PS Inflows (WFP Sludge Discharge, Upstream of FM 2)

As identified from the flow monitoring data (**Section 5.1.1.3.3**), flows in FM 2 are influenced by inflows from an upstream private PS. These inflows may be attributed to the WFP sludge discharge pumps, based on a review of GIS data and the WFP CoA. The corresponding inflows were extracted from the flow monitoring data and imported into the model as an incoming 'inflow' hydrograph directly upstream of FM 2. For DWF calibration, the observed inflows from the flow monitoring data during each DWF calibration period were used. For WWF calibration and system assessment, an average inflow pattern of +26.6 L/s approximately every 3 hours was used.

PS #1 Overflow to Madawaska River

PS #1 has an overflow pipe that allows the relief of excess flows from the pumping station wet well to the Madawaska River. It is initially assumed that the downstream river levels do not impact the overflow and is thus modelled as a free outfall (no boundary condition applied). The validity of this assumption was assessed during calibration and did not suggest any required adjustments and therefore, the initial assumption was maintained.

PS #2 Overflow to Stormwater System

A bypass is located upstream of PS #2, which discharges into the stormwater collection system and eventually into the Madawaska River when triggered. The bypass pipe is included in the model and drains to a free outfall (i.e., the stormwater sewer is not modelled). The validity of this assumption was assessed during calibration and was maintained.

PS #3 Overflow to Madawaska River

An overflow pipe is located upstream of the PS #3 wet well, discharging into the Madawaska River. The overflow pipe is modelled with a free outfall, which was reviewed in calibration and maintained.

Albert St Overflow to Stormwater System

Overflows at the Albert St weir are first conveyed into a 12 m long 750 mm diameter sanitary sewer, which discharges into a 1200 mm diameter stormwater sewer pipe and eventually drains into the Madawaska River. The Albert St weir and sanitary sewer are included in the model with a free outfall (i.e., the stormwater sewer is not modelled). Since these overflows are meant to relieve the system when surcharged, it can be initially assumed that the downstream water levels do not impact the overflows. The validity of this assumption was reviewed during calibration and did not suggest any required adjustments.

WWTP Inlet Channel

The WWTP is not modelled. Rather, a dummy pipe is used to represent the WWTP inlet channel, which drains directly into an outfall node. The boundary condition applied at the WWTP inlet channel was based on information provided by Town operations staff, a review of 2021 inlet channel SCADA levels and resulting overflows at the Albert St weir, and drawings of the WWTP.

The WWTP drawings showed an inlet channel invert elevation of 77.88 m. Town operations staff provided the following ranges of inlet channel level for different conditions:

- Dry weather levels: 400-430 mm
- Light rain: 500 mm
- Maximum level (triggering a plant bypass): 900 mm.

Based on a review of 2021 SCADA data, the reported upper range of the dry weather levels (430 mm) is representative of the typical levels observed in the inlet channel under dry weather conditions. An inlet channel level of 78.31 m was therefore applied as a fixed head on the outfall node under dry weather conditions.

The 2021 SCADA data showed a peak inlet channel depth of 880 mm. This value is close to the maximum level of 900 mm reported by Town operations staff. However, an inlet depth of 880 mm results in a water level boundary condition of 78.76 m, which is higher than the Albert St weir elevation in the model (78.74 m), and results in a continuous CSO.

The Albert St weir elevation is set in the model using the provided measured depth and the DEM rim elevation. The modelled overflows are triggered based on flow, the weir elevation, and the boundary condition at the WWTP. For the Albert St weir elevation provided, different wet weather boundary conditions at the WWTP were trialled:

- Applying the peak inlet channel depth of 880 mm throughout the entire simulation (including during dry periods) resulted in unrealistic results, generating sanitary sewer overflows (SSOs) before and after the wet weather event;
- Applying the peak inlet channel depth of 880 mm only for the duration of the rainfall event was also tested during calibration, however it did not yield the expected overflows at the Albert St weir (see discussion in **Section 5.1.1.6.4**).

The 2021 SCADA data otherwise shows an inlet channel depth range of 500-600 mm under wet weather conditions, which aligns with the levels reported by operations staff. This range could be appropriate for the majority of rainfall events. At this stage however, these levels cannot be directly correlated to specific rainfall events.

5.1.1.6.2 Dry Weather Calibration

Approach

The DWF parameters (sewage rate, GWI, and average diurnal pattern) were determined for each sanitary flow meter using the US EPA flow monitoring data analysis software SSOAP. As previously done in the 2013 W&WWMP, the GWI was derived using the Stevens-Schutzbach formula based on average and minimum flows, and was subtracted from the average dry weather flow observed to determine the average sewage flow per meter. This represents the dry weather infiltration into the sewer and is applied as a constant base flow. The Stevens-Schutzbach formula to calculate the GWI component (in million gallons/day, MGD) is as follows:

$$GWI = \frac{0.4 \times MDF}{1 - \left(0.6 \times \left(\frac{MDF}{ADF}\right)\right)^{ADF^{0.7}})}$$

Where MDF is the minimum dry weather flow (in MGD) and ADF is the average dry weather flow (in MGD). The resulting GWI (in MGD) is then converted into L/s.

Parameters extracted from the flow monitoring data analysis are initially applied to the residential population and ICI areas for wastewater generation, and to the effective areas for the constant GWI. The flow hydrograph produced by the model at each meter site is compared to the monitored, or observed flow. The parameters (GWI rates, wastewater generation rates, and diurnal patterns) are then adjusted within a reasonable range until an acceptable fit to the observed flow is obtained. This is completed for the two separate periods, both consisting of 6 full dry weather days (144 hrs). In addition to matching the overall general response, the flow hydrographs should meet the following CIWEM criteria for goodness-of-fit:

- The alignment of the peaks and valleys of the time series should be within 1 hour;

- The peak flows should be within ± 10% of each other; and,
- The volume should be within ± 10%. Care should be taken to exclude periods of missing or inaccurate data.

Calibration is intended to establish a representative model of the system, but often does not perfectly reflect real-life conditions. Slight differences can be observed for various reasons, including varying system hydraulics, as well as inconsistent field conditions (e.g., sediment depth, minor defects and obstructions, and/or differences between the actual pipe condition, size, or slope and the available data applied in the model). As discussed in **Section 5.1.1.6.1**, boundary condition assumptions may also result in variations observed between modelled and monitored data, as does variable facility operation (i.e., pump stations) and ongoing maintenance activities such as flushing.

Calibration Challenges and Assumptions

The following notes outline challenges and assumptions encountered during DWF calibration:

- In dry weather flow, the magnitude of the flows tends to be small. With smaller flows, under- or overestimating the peak flows in the model by even a few L/s can result in percent fits that fall outside of the targeted range. The magnitudes should be considered to provide context for the suitability of the DWF calibration fits presented;
- The available design briefs and drawings for all PSs incorporated in the model were reviewed and where necessary, the model was updated. The design information represented the most up-to-date source of information for each PS at the time of calibration. However, current PS operations may differ from the original design, due to pump impeller wear, or changes in on/off levels, etc. Nonetheless, where a FM is influenced by an upstream PS, the FM data can be used to validate that the pump station operation in the model is reasonable. Additionally, the SCADA data provided post-calibration and presented in **Section 5.1.1.5.1** can be used to validate the calibrated results, as discussed further in **Section 5.1.1.6.4**. Validation of PS response may not lead to adjustments in PS operation within the model due to the uncertainties involved with the stations. Since the intent of calibration is to produce a model that can be used to assess the existing and future conditions of the system, tweaks made to match the current operation of the PS may not be appropriate for the model’s future use;
- GWI rates can vary substantially depending on the soil condition, climate, location, and season. It is important to consider the DWF period over which the calibration is being completed. GWI rates are anticipated to be higher in the May calibration period than in July, due to the effect of spring melt. Typical GWI design rates can range anywhere from 0.02 to 0.12 L/s/ha (approx. 1,000 L/ha/d to 11,000 L/ha/d). Higher or lower rates are also possible; and,
- The ICI wastewater flow rate can vary considerably depending on the type of commerce, industry, or institution present. Typical ICI flow rates can vary from as low as 1,500 L/ha/d to as high as 75,000 L/ha/d. Water consumption records were used as a reference to validate wastewater flows. These water consumption rates are reported in **Table 5-8**.

Results

Table 5-8 presents the final DWF parameters derived through model calibration for each metershed. The calibrated diurnal patterns are presented in **Appendix B.3**. **Table 5-9** and **Table 5-10** present the resulting calibration fits between the modelled and observed data for DWF period 1 (May 6th – 12th, 2022) and DWF period 2 (July 6th – 12th, 2022), respectively. The peak flow and volume percent fits are colour-coded based on the following:

- Peak flow:
    - **Green**: if it falls within the targeted range of -10% to +10%;
    - **Yellow**: if it falls within -10% to -15% or +10% to +15%; and,
    - **Red**: if it is less than -15% or greater than +15%.
- Volume:
    - **Green**: if it falls within the targeted range of -10% to +10%;
    - **Yellow**: if it falls within -10% to -15% or +10% to +15%; and,
    - **Red**: if it is less than -15% or greater than +15%.

The corresponding DWF calibration graphs are shown in **Figure 5-12** (peak flow) and **Figure 5-13** (volume). Hydrographs for each event and each FM (observed vs modelled) are provided in **Appendix B.1**.

Table 5-8: Final Dry Weather Flow Parameters

Flow Monitor		Metershed Characteristics							Calibrated Parameters					
		Total(1) Area-Based(2) Tributary Area	Total(1) Existing Residential Population	Total Existing ICI Area	Water Consumption Rates(3)				Average Dry Weather Flow	Groundwater Infiltration		Average Sewage Flow		
					Residential Parcels		ICI Parcels					Total	Residential	ICI
		(ha)		(ha)	(L/s)	(L/c/d)	(L/s)	(L/ha/d)	(L/s)	(L/s)	(L/s/ha)	(L/s)	(L/c/d)	(L/ha/d)
FM 1	ARN-1 Staye Court Dr	54	889	18	2.5	242	0.2	810	4.5	1.0	0.018	3.5	235	5,501
FM 2	ARN-2* Daniel St/CN Recreation Trail	217	4,424[6]	32	8.7	170	1.2	2,072	8.9	2.2	0.010	6.7	120	1,000
FM 3	ARN-3 Elgin St W/Madawaska St	49	1,253	4	2.3	156	0.1	1,142	4.3	0.5	0.010	3.8	235	8,600
FM 4	ARN-4 Riverview Dr	29	554	16	0.7	107	7.8	41,602	13.0	1.4	0.050	11.6	235	54,000
FM 5	ARN-5* Madawaska Blvd	74	1,007	19	2.1	181	3.2	4,571	20.5	3.7	0.050	16.8	235	20,000
FM 6	ARN-6 Decosta St	19	-	42	-	-	1.9	3,940	1.5	1.0	0.050	0.5	-	1,131
Average (Monitored Areas)		***-***	***-***	***-***	***-***	***171***	***-***	***9,023***	***-***	***-***	***0.031***	***-***	***216***	***15,039***
Total (Monitored Areas)		***368***	***7,238***	***131***	***31.6***	***-***	***14.3***	***-***	***52.8***	***9.7***	***-***	***43.1***	***-***	***-***
Unmonitored Areas		*80*	*1,746*	*29*	*5.2*	*164*	*1.8*	*5,263*	*12.1*	*2.5*	*0.031*	*9.6*	*216*	*15,039*

Notes:

1. Total Area-Based Tributary Area, Total Existing Residential Population and Total Existing ICI Area includes all areas/populations draining to upstream FMs (FM in series).
2. Area-Based Tributary area refers to the area draining to each meter, based on the contributing effective areas only. Effective areas are defined by a 100 m buffer around all pipes and are meant to represent the effective area contributing groundwater and rainfall derived I/I to each sewer segment.
3. The Water Consumption Rates presented are based on 100% of the average water consumption rates from August 2021 to August 2022.

* FM is downstream of one or more other FMs (FM in series)

333Table 5-9: 2022 Dry Weather Calibration Results for Period 1 (May 6th – May 12th, 2022) – Peak Flow and Volume

Flow Monitor		Data Quality Notes	Calibration Results – Peak Flow			Calibration Results - Volume		
			Monitored Peak Flow (L/s)	Modelled Peak Flow (L/s)	Peak Flow Percent Fit	Monitored Volume (m^3)	Modelled Volume (m^3)	Volume Percent Fit
FM 1	ARN-1 Staye Court Dr	-	8.9	6.0	-32.7%	2,528	2,333	-7.7%
FM 2	ARN-2* Daniel St/CN Recreation Trail	Upstream private PS (WFP sludge discharge) influence is observed	42.6	42.1	-1.2%	6,402	6,396	-0.1%
FM 3	ARN-3 Elgin St W/Madawaska St	Data quality issues observed after April 2022	22.6	5.7	-74.8%	2,571	2,249	-12.5%
FM 4	ARN-4 Riverview Dr	Upstream PS influence is observed	25.1	23.4	-7.1%	7,217	6,750	-6.5%
FM 5	ARN-5* Madawaska Blvd	Upstream PS influence is observed	52.6	19.0	-63.8%	10,690	5,849	-45.3%
FM 6	ARN-6 Decosta St	Overall drift throughout FM period; flow generation patterns and peaks are inconsistent, and Fridays appear to be part of the weekend	9.2	1.7	-81.0%	1,489	788	-47.1%

Notes:
* FM is downstream of one or more other FMs (FM in series)

Table 5-10: 2022 Dry Weather Calibration Results for Period 2 (July 6th – July 12th, 2022) – Peak Flow and Volume

Flow Monitor		Data Quality Notes	Calibration Results – Peak Flow			Calibration Results - Volume		
			Monitored Peak Flow (L/s)	Modelled Peak Flow (L/s)	Peak Flow Percent Fit	Monitored Volume (m^3)	Modelled Volume (m^3)	Volume Percent Fit
FM 1	ARN-1 Staye Court Dr	-	6.3	6.0	-4.3%	1,964	2,333	18.8%
FM 2	ARN-2* Daniel St/CN Recreation Trail	Upstream private PS (WFP sludge discharge) influence is observed	42.3	37.6	-11.1%	5,516	6,392	15.9%
FM 3	ARN-3 Elgin St W/Madawaska St	Data quality issues observed after April 2022	14.5	5.7	-60.7%	1,754	2,249	28.2%
FM 4	ARN-4 Riverview Dr	Upstream PS influence is observed	24.4	23.3	-4.8%	7,439	6,755	-9.2%
FM 5	ARN-5* Madawaska Blvd	Upstream PS influence is observed	22.7	19.0	-16.1%	5,518	5,850	6.0%
FM 6	ARN-6 Decosta St	Overall drift throughout FM period; flow generation patterns and peaks are inconsistent, and Fridays appear to be part of the weekend	3.1	1.7	-44.2%	515	788	53.0%

Notes:
* FM is downstream of one or more other FMs (FM in series)

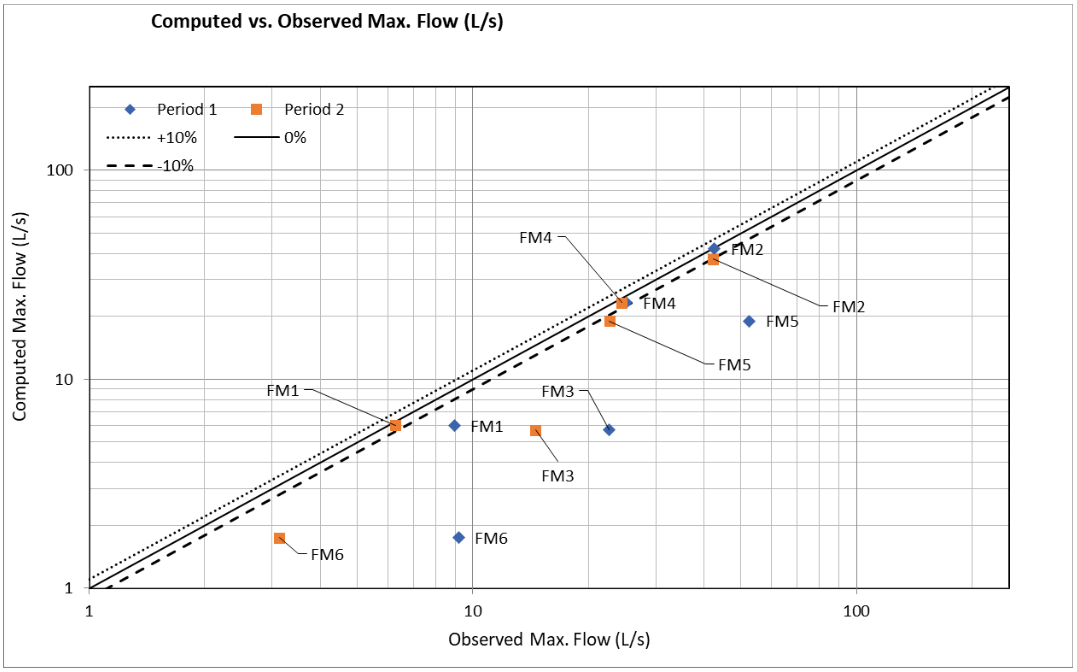


Figure 5-12: 2022 Dry Weather Calibration Results – Peak Flow

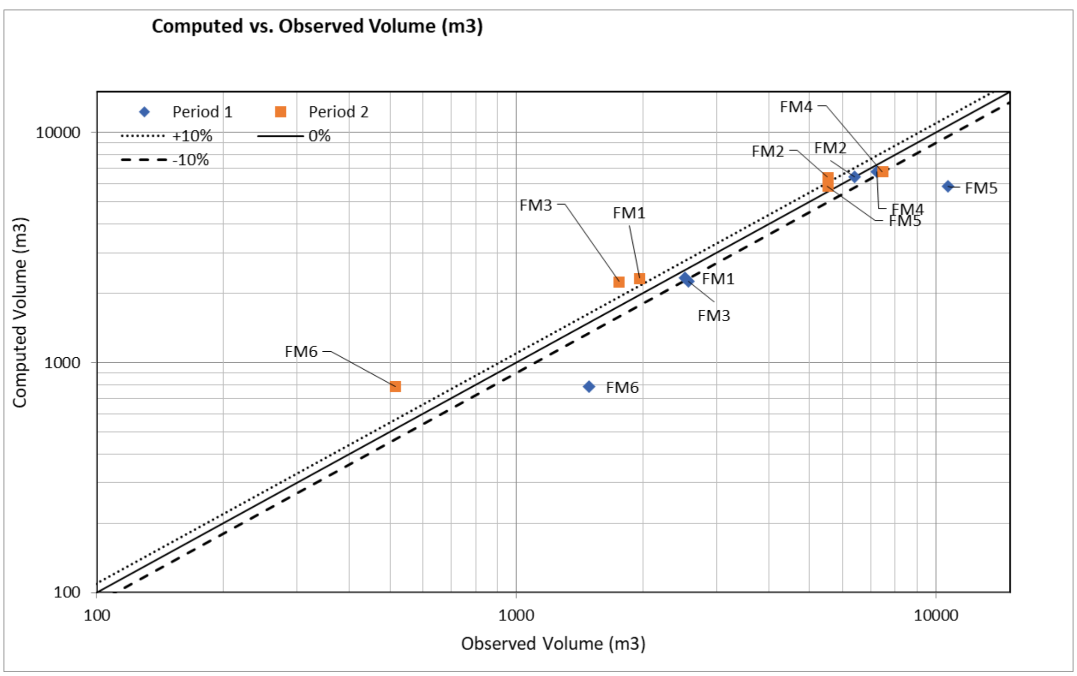


Figure 5-13: 2022 Dry Weather Calibration Results – Volume

The following sub-sections present overarching results and considerations for all the FMs, as well as individual calibration results per FM.

Overall DWF Calibration Results and Considerations (All FMs)

The following are considerations which are applicable to multiple FMs when interpreting the calibration results:

- In order to generate the diurnal patterns for calibration (presented in **Appendix B.3**), the hourly flows are averaged, smoothing out the flow pattern and reducing the noise generated in the modelled response. This can yield differences on days where the observed diurnal pattern deviates from the averaged pattern, yielding discrepancies in the peak flows.
- As noted in the DWF **Calibration Challenges and Assumptions**, the magnitude of DWF flows should be considered when evaluating the resulting calibration fits. This is especially the case for FM 1 and FM 6, where the magnitude of the absolute differences (in L/s) is small.
- Seasonal differences will lead to lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May). Therefore, while the calibration can yield a good volume fit to DWF Period 1 (May), the modelled volume in DWF Period 2 (July) may be higher than observed. This nonetheless means that the resulting parameters are conservative for drier periods of the year.
    - Seasonal differences may also lead to underestimated volumes in DWF Period 1 (May), and overestimated volumes in DWF Period 2 (July), as seen for most FMs. The calibration results therefore straddled both events, such that any further adjustments in one event could negatively affect the resulting fits in the other event.
- While the water consumption rates are provided in **Table 5-8** for reference and are used as a guide during calibration, they do not necessarily equate to sewage generated (i.e., lawn watering or industrial process water use). Thus, some metersheds see considerable differences between water consumption and sewage generation ranges, such as at FM 1, FM 3, FM 4, and FM 5. These differences can be explained by the following:
    - To maintain consistency with the 2013 MP, a standard residential sewage generation rate of 235 L/c/d was applied to most metersheds. The ICI water consumption rate was then adjusted in calibration to match the observed total sewage flow generation, thus resulting in differing ICI and residential sewage generation distributions than seen in the water consumption rates.
    - Total sewage flows can differ from total water consumed in a metershed for reasons such as uncertainties in the water consumption records, such as missing water consumption records or 0 values reported, or water consumption practices that do not generate equivalent sewage flows. Water consumption records are presented and discussed in **Section 5.1.2.2**.
    - A better understanding of sewage flows from large ICI facilities is needed to confirm the higher ICI sewage flow generation rates within the FM 4 and FM 5 metersheds.

FM 1 (Staye Court)

The DWF calibration at FM 1 yields a good calibration fit in terms of volume but a low peak flow fit during the DWF Period 1 (May). Conversely, the peak flow fit is good, but the volumes are overestimated during the DWF Period 2 (July). As noted in the **Overall DWF Calibration Results and Considerations (All FMs)**, calibration results are straddling both events due to seasonal differences, and any further adjustments in one event could negatively affect the resulting fits in the other event. Discrepancies due to smoothed out modelled diurnal flow patterns also contribute to deviations in peak flow. Finally, the magnitude of DWF flows should be considered. The peak observed and modelled FM 1 flows are less than 10 L/s, such that the magnitude of the absolute difference (in L/s) is small.

The GWI rate for FM 1 is 0.018 L/s, which is on the lower end of the range of GWI rates applied (0.01 L/s/ha to 0.05 L/s/ha) and is representative of the newer residential sanitary systems (from the 2000's or newer) within this metershed.

The residential sewage generation rate was maintained at 235 L/c/d, as applied in the 2013 W&WWMP, which is similar to the water consumption rate. The ICI water consumption rate was adjusted in calibration to match the observed total sewage flow generation. The resulting ICI sewage flow generate rate is higher than the water consumption rate. Differences between water consumption rates and sewage flow generation rates are discussed in the **Overall DWF Calibration Results and Considerations (All FMs)**.

FM 2 (Daniel St/CN Recreation Trail)

The DWF calibration at FM 2 yields a good calibration fit in terms of peak flows and volumes during the DWF Period 1 (May). The calibration fits are lower during the DWF Period 2 (July). Since the volume fits are straddling both events due to seasonal differences, any further adjustments in one event could negatively affect the resulting fits in the other event. As initially identified in **Section 5.1.1.3.3**, FM 2 flows are influenced by an upstream private PS (WFP sludge discharge) , which was modelled as an inflow directly upstream of FM 2 (see **Section 5.1.1.6.1**). While minor discrepancies can still be observed in the calibration, this approach yields a good estimate of peak flows in FM 2 for the purposes of assessing the system performance and long-term infrastructure planning.

The GWI rate for FM 2 is 0.01 L/s/ha, which is on the lower end of the range of GWI rates applied (0.01 L/s/ha to 0.05 L/s/ha) and is representative of the predominantly newer residential sanitary systems within this metershed.

The residential sewage generation rate at FM 2 was reduced to 120 L/c/d. This may be explained by the higher residential population within this metershed, as reported in **Table 5-2**, along with newer developments where more efficient connections and appliances are likely used. The ICI flow generation rate is 1,000 L/ha/d, which is likely due to the sizes of the ICI parcels being larger than within the denser core of the Town. The ICI areas were determined based on the provided GIS parcel data, which is often larger than the actual ICI building area, such that areas which do not generate wastewater were not systematically discounted from the ICI areas.

FM 3 (Elgin St W/Madawaska St)

The DWF calibration at FM 3 yields low calibration fits in terms of peak flows and volumes during both DWF periods (May and July). As initially identified in **Section 5.1.1.3.3**, there are data quality issues at FM 3 after the end of April, thus affecting both DWF Periods in May and July. The source of these issues is unknown and high sporadic peaks are observed in the data, which cannot be replicated in the model. This results in peak flow discrepancies at FM 3. These peaks resemble the effect of an upstream PS or of sump pumps. No private PS was identified upstream of FM 3 in the Town's GIS data. Due to the data quality issues, no attempt was made at replicating the observed peaks as inflows. Since the volume fits are straddling both events due to seasonal differences, any further adjustments in one event could negatively affect the resulting fits in the other event.

The GWI rate for FM 3 is 0.01 L/s/ha, which is on the lower end of the range of GWI rates applied (0.01 L/s/ha to 0.05 L/s/ha).

The residential sewage generation rate was maintained at 235 L/c/d, as applied in the 2013 W&WWMP, which is higher than the water consumption rate. The ICI water consumption rate was adjusted in calibration to match the observed total sewage flow generation. Differences between water consumption rates and sewage flow generation rates are discussed in the **Overall DWF Calibration Results and Considerations (All FMs)**.

FM 4 (Riverview Dr)

The DWF calibration at FM 4 yields good calibration fits in terms of peak flows and volumes during both DWF periods (May and July).

The GWI rate for FM 4 is 0.05 L/s/ha, which is on the higher end of the range of GWI rates applied (0.01 L/s/ha to 0.05 L/s/ha). This higher rate may be due to most pipes being located in proximity to the Madawaska River, while also coinciding with areas where the sanitary pipes are older (1960 – 1999). Sewer age is illustrated in **Figure 5-2**, and land use classifications per metershed are reported in **Table 5-2**. This relatively higher GWI rate, however, is within typical ranges of design GWI parameters.

As identified in **Section 5.1.1.3.3**, FM 4 is highly influenced by upstream PSs (PS #2, PS #4), and the observed DWF hydrograph does not exhibit typical wastewater generation diurnal patterns because of this. The residential sewage generation rate at FM 4 was maintained at 235 L/c/d. The ICI flow generation rate is 54,000 L/ha/d. This area is downstream of the Nylene Canada ULC facility (Nylene facility), which is one of the largest water users within the Town (based on a review of water consumption data, with an average daily consumption of 666 m^3/d, as reported in **Section 5.1.2.2**). The ICI rate applied for this metershed is also considered on the higher end of the typical rates. While the Town has indicated that flows from the Nylene facility have generally decreased, its exact contributions to sewage flows are not well understood and are not quantified, and therefore are potentially compensated for in the residential per capita rate as well. It is therefore recommended that the Nylene sewage generation rates be confirmed to improve this understanding.

FM 5 (Madawaska Blvd)

The DWF calibration at FM 5 yields low calibration fits in terms of peak flows and volumes during the DWF Period 1 (May), and a low calibration fit in terms of peak flows but a good volume fit during the DWF Period 2 (July). As identified in **Section 5.1.1.3.3**, there is noise in the monitored data during DWF conditions, which can be due to nearby pumping station influence. This noise results in several instantaneous elevated readings, which generates peaks which are not easily reproduced in the model, leading to the peak flow discrepancies observed. Furthermore, since the volume fits are straddling both events due to seasonal differences, any further adjustments in one event could negatively affect the resulting fits in the other event.

The GWI rate for FM 5 is 0.05 L/s/ha, which is on the higher end of the range of GWI rates applied (0.01 L/s/ha to 0.05 L/s/ha), as most of the pipes are located in proximity to the Madawaska River, while also coinciding with areas where the sanitary pipes are older (1950 – 1979). Sewer age is illustrated in **Figure 5-2**, and land use classifications per metershed are reported in **Table 5-2**. This relatively higher GWI rate, however, is within typical ranges of design GWI parameters.

The residential sewage generation rate at FM 5 was maintained at 235 L/c/d, as applied in the 2013 W&WWMP, which is higher than the water consumption rate. The ICI water consumption rate was adjusted in calibration to match the observed total sewage flow generation. The resulting ICI sewage flow generate rate of 20,000 L/ha/d is higher than the water consumption rate, and is on the higher end of the ICI rates throughout the Town. Differences between water consumption rates and sewage flow generation rates are discussed in the **Overall DWF Calibration Results and Considerations (All FMs)**. FM 5 is located downstream of large ICI facilities. A better understanding of sewage flows from large ICI facilities is recommended to confirm the higher ICI sewage flow generation rates within the FM 5 metershed.

FM 6 (De Costa St)

The DWF calibration at FM 6 yields poor peak flow and volume calibration fits for both DWF periods (May and July). Since the volume fits are straddling both events due to seasonal differences, any further adjustments in one event could negatively affect the resulting fits in the other event. Furthermore, there is noise observed in the monitored data during DWF conditions, which can often be attributed to the lower magnitude flows observed and corresponding measurement inaccuracies that can occur in these conditions. Outlier flow measurements are observed during the DWF Period 1 (May), due to irregular observed sewage flow generation. Discrepancies due to smoothed out modelled diurnal flow patterns also contribute to deviations in peak flow. However, the magnitude of DWF flows should be considered. When considering the actual values (< 10 L/s), the discrepancy is minimal.

The GWI rate for FM 6 is 0.05 L/s/ha, which is on the higher end of the range of GWI rates applied (0.01 L/s/ha to 0.05L/s/ha), as most of the pipes are located in proximity to the Madawaska River, while also coinciding with areas where the sanitary pipes are older (1960 – 1979). Sewer age is illustrated in **Figure 5-2**, and land use classifications per metershed are reported in **Table 5-2**. This relatively higher GWI rate, however, is within typical ranges of design GWI parameters.

The FM 6 metershed is exclusively composed of ICI properties. The ICI flow generation rate is 1,131 L/ha/d, which is on the lower end of the ICI rates applied throughout the Town. The sizes of the ICI parcels within this metershed are larger than within the denser core of the Town. The ICI areas were determined based on the provided GIS parcel data, which is often larger than the actual ICI building area, such that areas which do not generate wastewater were not systematically discounted from the ICI areas.

5.1.1.6.3 Wet Weather Calibration

Approach

The WWF event-based calibration was carried out for the 2 selected events discussed in **Section 5.1.1.4.4**. The modelled flow rates, volumes, and depths are compared to the observed values from the corresponding rainfall event to determine the calibration fits. The hydrographs should closely follow each other both in shape and in magnitude, until the flow has substantially returned to DWF conditions. In addition to the shape, the observed and modelled hydrographs are targeted to meet the following criteria:

- The timing of the peaks and valleys should be similar for the duration of the event;
- The peak flow rates at each significant peak should be in the range of -15% to +25%;
- The volume of flow should be within -10% to +20%;
- The surcharge depths should be in the range of -0.1 m to +0.5 m; and,
- Where data of high confidence is available, the non-surcharged depths at key points should be within the range ±0.1 m.

The RDII in a sanitary system is often estimated using the RTK method, where the “R” is the percentage of rainfall in a given metershed that is observed in the sewer, the “T” is the time it takes to see the peak flow response to a rainfall occurrence (Time to Peak), and the “K” is the ratio of the Time to Peak to the recession time. **Figure 5-14** shows how these parameters work together to create three distinct unit hydrograph responses, representing the fast initial inflow response (R1, T1, K1), moderate infiltration response (R2, T2, K2) and slow infiltration response (R3, T3, K3). The fast response is attributed to cross-connections such as roof downspouts or catchbasins; the moderate response is associated with foundation drains or low-lying MHs; and the slow response is via migrating surface water through the ground into cracks and pipe/MH deficiencies.

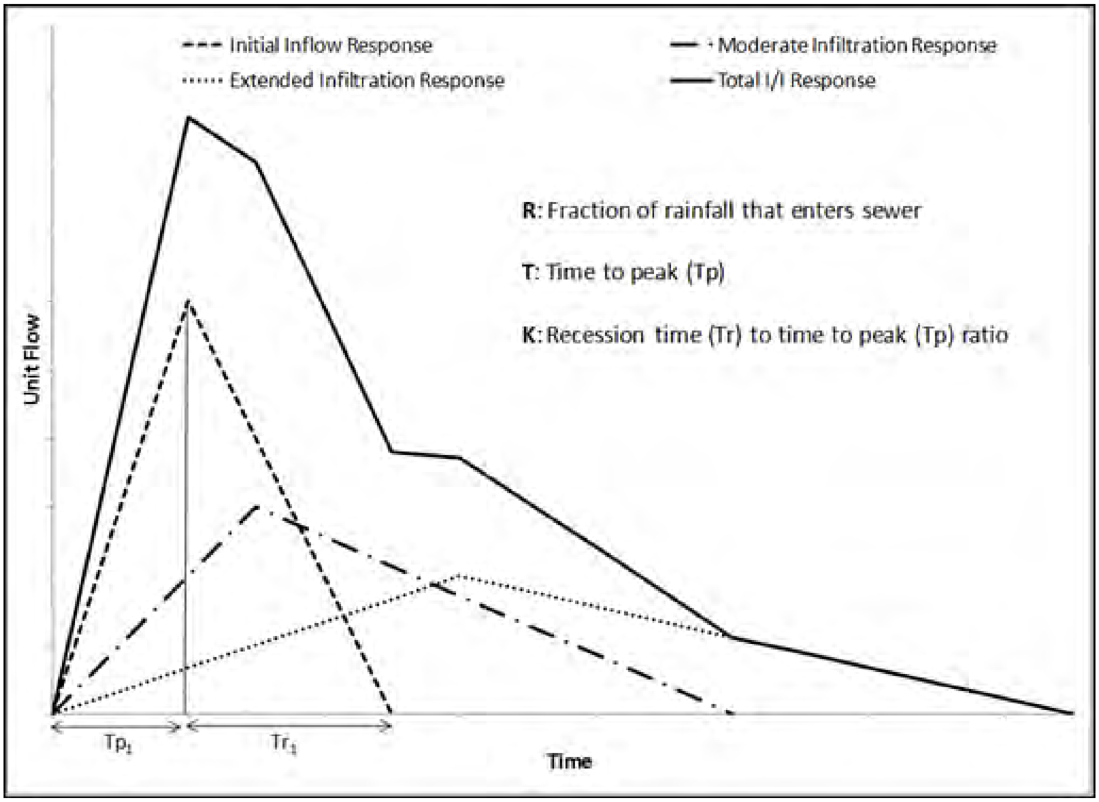


Figure 5-14: Definition of RTK Parameters

RTK parameters are derived from monitoring data and applied on a metershed basis to the contributing effective areas. Through hydrograph separation, the wet weather hydrograph is isolated per rain event. The volume under the curve represents the wet weather volume, which is compared to the total rainfall depth over the effective tributary area to the FM (i.e., total rainfall volume) to generate the total R, or volumetric runoff coefficient. The value becomes the target for distributing the R1, R2 and R3 parameters per unit hydrograph. The combination of RTKs is adjusted within a range per characteristic response to generate the overall RDII response. Generally, the “R” values are adjusted to match the shape/volumes of the WWF events, and the “T” and “K” values adjusted to improve peaks timing.

Calibration Challenges and Assumptions

Beyond the targets mentioned in the WWF Calibration **Approach**, several other factors should be considered during the WWF calibration process:

- The presence of surcharging makes calibration more difficult. It is crucial that the correct diameters, slopes, and materials are being applied in the model to be able to replicate the same backflow conditions at the same time as the monitored data. This is not unique to the pipe where the flow monitor is located, but also the pipes upstream and downstream which may be contributing to the surcharged conditions. FM 4 and FM 5 experience surcharging during this calibration period, which are further discussed in the WWF Calibration **Results**;

- WWF Event 1 (May 21st) was selected as the primary event due to its peak intensity. When there is a large response difference between WWF Event 1 (May 21st) and WWF Event 2 (July 12th), the calibration focuses on matching WWF Event 1 (May 21st) to produce a more conservative model;
- The calibration focuses on matching peak flow. When an event has a long duration, such as WWF Event 2 (July 12th), it can consist of multiple rainfall peaks. This presents an opportunity for volume discrepancies due to attempting to meet the largest peak flow values and over or under-estimating smaller peaks observed earlier or later in the event; and,
- Geospatial variations in rainfall across the Town during an event can lead to different timing and unattainable response matches in the model due to using rainfall measured at the single rain gauge located at 73 James St. This can produce differences in the timing of the peaks and valleys, as well as magnitude and response patterns.
- Based on validating the PS #5 performance under a 10-year event and 25-year event using historical PS bypass data (see **Section 5.2.1.3**), the RTK parameters for the FM 1 metershed were applied to areas upstream of PS #5. Otherwise, the RTK parameters for FM 5 were developed considering a large metershed including ICI areas with potential cross-connections, which are not representative of the subcatchments upstream of PS #5. The pipes in the FM 1 metershed and the pipes upstream of PS #5 have the same age (see **Figure 5-2**), hence there is more confidence in applying the FM 1 parameters to the subcatchment upstream of PS #5.

Results

The final RTK parameters for the WWF calibration are presented in **Table 5-11** and the final total R distribution is shown per metershed in **Figure 5-15**.

Table 5-11: Final Wet Weather RTK Calibration Parameters

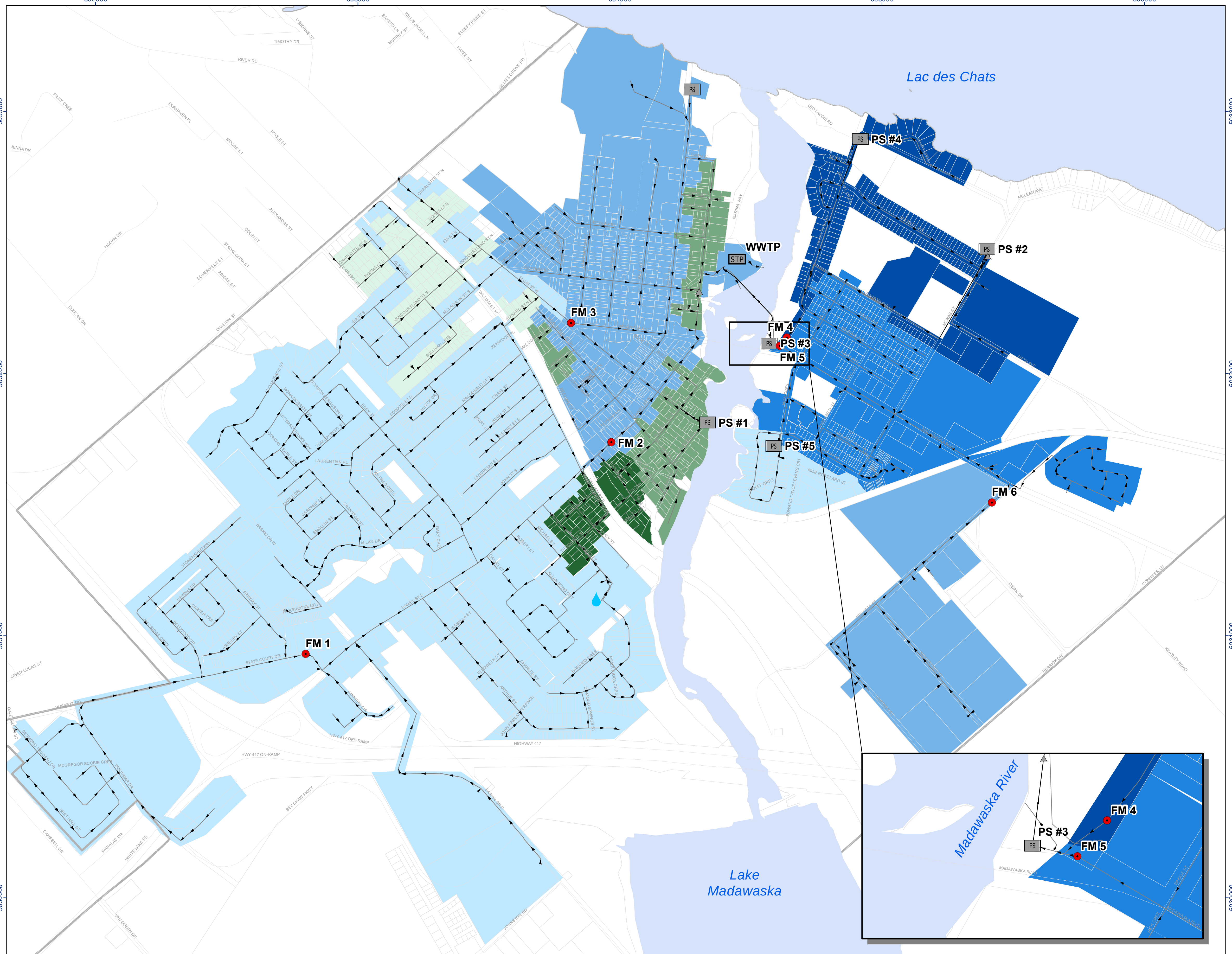
Flow Monitor		Area Type	Calibrated Parameters									
			Total R	R1	T1	K1	R2	T2	K2	R3	T3	K3
FM 1 (1)	ARN-1 Staye Court Dr	Separated	0.31%	0.3%	0.5	0.1	0.01%	0.55	0.2	-	-	-
FM 2	ARN-2* Daniel St/CN Recreation Trail	Separated	0.90%	0.5%	0.1	2	0.3%	0.5	3	0.1%	2	6
		Combined	9.00%	5.0%	0.001	2	3.0%	0.005	3	1.0%	1	4
FM 3	ARN-3 Elgin St W/Madawaska St	Separated	1.00%	0.5%	0.01	1	0.3%	0.2	2	0.2%	0.01	4
		Combined	5.00%	2.2%	0.005	1	1.8%	0.2	2	1.0%	0.8	4
FM 4	ARN-4 Riverview Dr	Separated	3.80%	1.8%	0.005	3	1.5%	0.3	4	0.5%	0.5	5
FM 5	ARN-5* Madawaska Blvd	Separated	2.50%	1.4%	0.01	1	1.0%	0.5	2	0.1%	1	3
FM 6	ARN-6 Decosta St	Separated	1.40%	0.6%	0.01	0.5	0.5%	0.01	3	0.3%	0.5	5
Average (Monitored Areas) Applied to Unmonitored Areas		***Separated***	1.65%	0.9%	0.106	1.3	0.6%	0.343	2.4	0.2%	0.633	3.5
		Combined	7.00%	3.1%	0.003	1.5	2.4%	0.103	2.5	1.0%	0.405	4

Note:
* FM is downstream of one or more other FMs (FM in series)
(1) The RTK parameters for FM 1 were also applied to the subcatchments upstream of PS #5, which is located upstream of FM 5.

Table 5-12 and **Table 5-13** show the resulting calibration fits between the modelled and monitored data for WWF Event 1 (May 21st) and WWF Event 2 (July 12th), respectively. These calibration fits are colour-coded based on the following:

- Peak flow:
  - **Green**: if it falls within the targeted range of -15% to +25%;
  - **Yellow**: if it falls within -25% to -15% or +25% to +35%; and,
  - **Red**: if it is less than -25% or greater than +35%.
- Depths:
  - **Green**: if it is in the targeted depth range of ±0.1 m;
  - **Yellow**: if it is within -0.2 m to -0.1 m or +0.1 m to +0.6 m; and,
  - **Red**: if it is less than -0.2 m and greater than 0.6 m.
- Volume:
  - **Green**: if it falls within the targeted range of -10% to +20%;
  - **Yellow**: if it falls within -20% to -10% or +20% and +30%; and,
  - **Red**: when it is less than -20% and greater than 30%.

Hydrographs for each event and each FM (observed vs modelled) are provided in **Appendix B.2**.



Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)
- Sanitary Sewer
- Forcemains
- Rain Gauge
- Flow Meter

Total R by Flow Metershed - Separated Areas

- ≤ 1.00 %
- 1.01 - 2.00%
- 2.01 - 3.00%
- 3.01 - 4.00%

Total R by Flow Metershed - Combined Areas

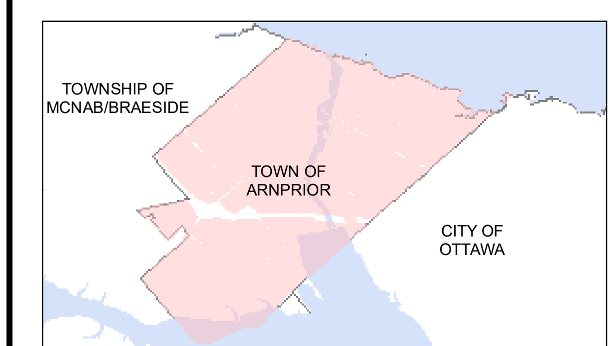
- ≤ 5.00%
- 5.01 - 7.00%
- 7.01% - 9.00%

N

0 250 500 Meters
(At original document size of 11x17)
1:15,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location
Arnprior, ON

Prepared by CR on 2024-01-04
Revised by CR on 2024-02-01

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
5-15

Title
Total R per Metershed

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Table 5-12: 2022 Wet Weather Calibration Results for Event 1 (May 21st, 2022) – Peak Flow, Volume and Maximum Depth

Flow Monitor		Data Quality and Calibration Period Notes	Calibration Results – Peak Flow			Calibration Results - Volume			Calibration Results – Maximum Depth		
			Monitored Peak Flow (L/s)	Modelled Peak Flow (L/s)	Peak Flow Percent Fit	Monitored Volume (m^3)	Modelled Volume (m^3)	Volume Percent Fit	Monitored Maximum Depth (m)	Modelled Maximum Depth (m)	Maximum Depth Fit (m)
FM 1(1)	ARN-1 Staye Court Dr	Observed dry weather wastewater flow generation is lower than average pattern following the storm event	14.9	14.7	-1.0%	198	244	22.7%	0.16	0.12	-0.04
FM 2	ARN-2* Daniel St/CN Recreation Trail	Upstream private PS (WFP sludge discharge) influence is observed; average pattern is applied (see description in **Section 5.1.1.6.1**)	135.4	137.3	1.4%	1,113	909	-18.3%	0.31	0.29	-0.01
FM 3	ARN-3 Elgin St W/Madawaska St	Data quality issues observed after April 2022	135.9	132.8	-2.3%	507	479	-5.6%	0.32	0.21	-0.11
FM 4	ARN-4 Riverview Dr	Upstream PS influence is observed	60.3	63.1	4.8%	751	734	-2.3%	0.74	0.19	-0.55
FM 5	ARN-5* Madawaska Blvd	Upstream PS(1) influence is observed	104.1	97.2	-6.6%	761	733	-3.7%	1.07	0.19	-0.88
FM 6	ARN-6 Decosta St	Overall drift throughout FM period; flow generation patterns and peaks are inconsistent, and Fridays appear to be part of the weekend	24.1	22.3	-7.6%	112	106	-5.2%	0.19	0.13	-0.06

Note:
* FM is downstream of one or more other FMs (FM in series)
(1) The RTK parameters for FM 1 were also applied to the subcatchments upstream of PS #5, which is located upstream of FM 5.

Table 5-13: 2022 Wet Weather Calibration Results for Event 2 (July 12th, 2022) – Peak Flow, Volume and Maximum Depth

Flow Monitor		Data Quality and Calibration Period Notes	Calibration Results – Peak Flow			Calibration Results - Volume			Calibration Results – Maximum Depth		
			Monitored Peak Flow (L/s)	Modelled Peak Flow (L/s)	Peak Flow Percent Fit	Monitored Volume (m^3)	Modelled Volume (m^3)	Volume Percent Fit	Monitored Maximum Depth (m)	Modelled Maximum Depth (m)	Maximum Depth Fit (m)
FM 1(1)	ARN-1 Staye Court Dr	Observed dry weather wastewater flow generation is lower in July than in May (see DWF calibration in **Section 5.1.1.6.2**)	8.0	7.5	-5.4%	269	325	20.7%	0.12	0.09	-0.03
FM 2	ARN-2* Daniel St/CN Recreation Trail	Upstream private PS (WFP sludge discharge) influence is observed; average pattern is applied (see description in **Section 5.1.1.6.1**) Peaks in FM data observed before peaks in RG data (due to geospatial variation in rainfall across the Town)	54.2	71.0	30.9%	1,101	1,055	-4.2%	0.19	0.20	0.01
FM 3	ARN-3 Elgin St W/Madawaska St	Data quality issues observed after April 2022 Peaks in FM data observed before peaks in RG data (due to geospatial variation in rainfall across the Town)	45.3	53.2	17.4%	432	483	11.8%	0.18	0.13	-0.05
FM 4	ARN-4 Riverview Dr	Upstream PS influence is observed	25.6	40.0	56.3%	1,000	960	-4.1%	0.12	0.15	0.03
FM 5	ARN-5* Madawaska Blvd	Upstream PS(1) influence is observed Peaks in FM data observed before peaks in RG data (due to geospatial variation in rainfall across the Town)	47.1	51.1	8.6%	874	933	6.8%	0.15	0.14	-0.01
FM 6	ARN-6 Decosta St	Overall drift throughout FM period; flow generation patterns and peaks are inconsistent, and Fridays appear to be part of the weekend	11.0	7.6	-31.1%	90	128	43.0%	0.10	0.07	-0.03

Note:
* FM is downstream of one or more other FMs (FM in series)
(1) The RTK parameters for FM 1 were also applied to the subcatchments upstream of PS #5, which is located upstream of FM 5.

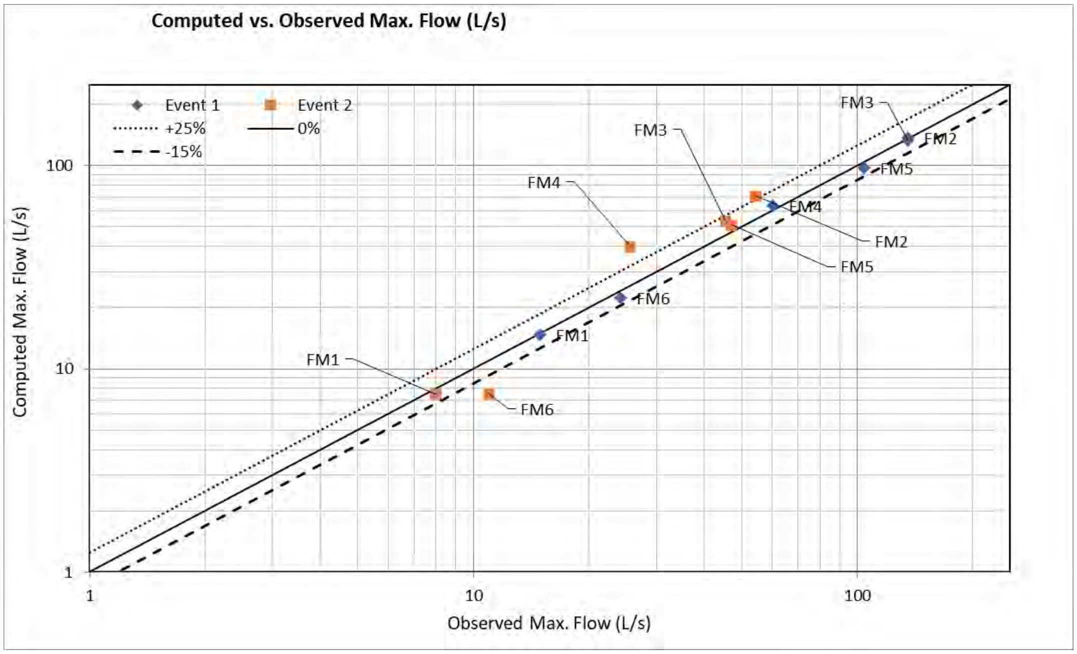


Figure 5-16: 2022 Wet Weather Calibration Results – Peak Flow

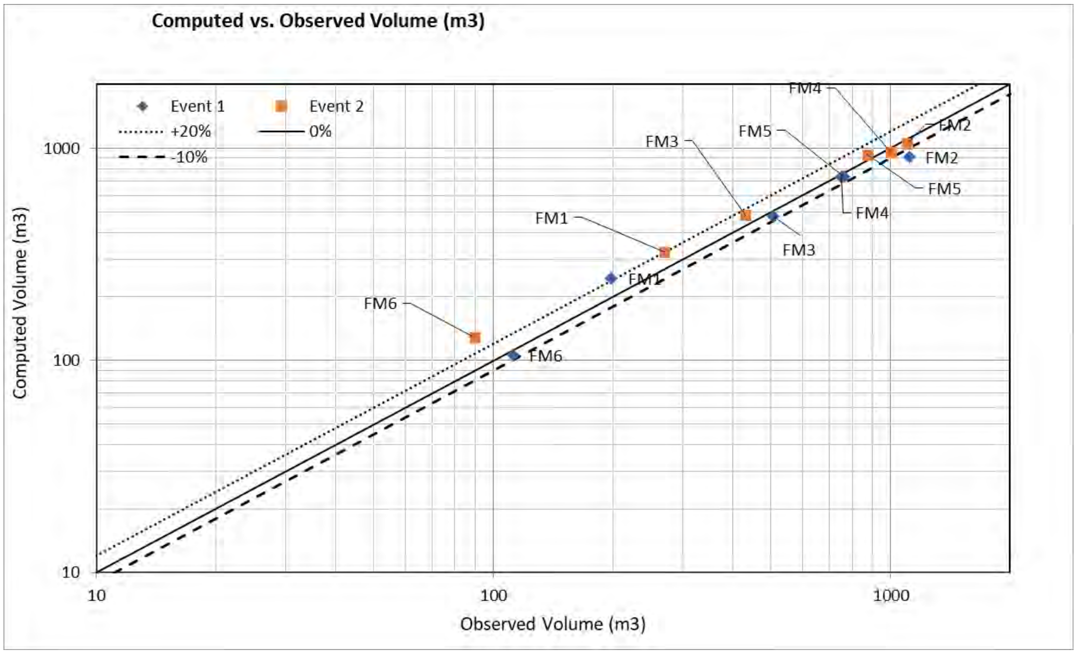


Figure 5-17: 2022 Wet Weather Calibration Results – Volume

The following sub-sections present overarching results and considerations for all the FMs, as well as individual calibration results per FM.

Overall WWF Calibration Results and Considerations (All FMs)

In general, the calibration targets were achieved. The following items should also be considered when assessing the calibration results:

- Generally, the WWF Event 1 (May 21st) calibration fits are better than the WWF Event 2 (July 12th) calibration fits. This is due to WWF Event 1 being the primary focus for calibration, due to its peak intensity. This results in a more conservative calibration.
- Overall drift throughout the flow monitoring period (as identified in **Section 5.1.1.3.3**) results in lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May). This can translate into discrepancies observed in the WWF calibration.
- The response to WWF Event 2 in the flow monitors FM 2, FM 3 and FM 5 is observed before the peak rainfall at the rain gauge. This is potentially due to geospatial variations across the Town during this event, depending on the travel direction of rainfall, which would not have been captured by a single rain gauge.
- Combined systems tend to see higher total R values than separated sanitary systems due to the additional connections from catchbasins, roofs and/or foundation drains. Generally, the lower total R values are established in metersheds with newer developments that employ more modern design guidelines which prevent roof and foundation drain connections to sanitary sewers. Newer systems are also often tighter, yielding less rainfall-derived infiltration to the piping network.
- Differences in the actual and modelled parameters related to pipe hydraulics can have an impact on the depth fits, such as the pipe roughness (pipe condition), pipe slope (pipe inverts), pipe diameter, and silt and debris conditions. These can differ within the pipe at an FM location, but also within the overall metershed, leading to discrepancies in depths.

FM 1 (Staye Court)

The WWF calibration at FM 1 yields a good peak flow and maximum depth fit under both WWF Events 1 (May 21st) and 2 (July 12th). The volume fit at FM 1 during WWF Event 1 (May 21st) is lower, but improves from 22.7% to 7.9% when excluding the dry weather hours which directly follow the rainfall (after 16:00). The observed data shows that the dry weather flow pattern immediately after this storm event is less than the typical observed diurnal pattern. The volume fit at FM 1 during WWF Event 2 (July 12th) improves from 20.7% to 5.6% when excluding the dry weather hours preceding the event (before 10:00). As noted in the DWF calibration (**Section 5.1.1.6.2**), dry weather flow volumes in July are overestimated due to seasonal differences leading to lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May), and overall drift throughout the flow monitoring period (as identified in **Section 5.1.1.3.3**) also leading to lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May).

The total R value for FM 1 is 0.31%, which is on the lower end of the values applied throughout the Town, as the FM 1 metershed is composed of separated sanitary areas which see less RDII, and where newer developments employ more modern design guidelines which prevent roof and foundation drain connections to sanitary sewers. Newer systems are also often tighter, yielding less rainfall-derived infiltration to the piping network. Sewer age is illustrated in **Figure 5-2**, and sewer type is illustrated in **Chapter 1** (**Section 4**).

FM 2 (Daniel St/CN Recreation Trail)

The WWF calibration at FM 2 yields a good peak flow and maximum depth fit during the WWF Event 1 (May 21st). The volume fit at FM 2 during WWF Event 1 (May 21st) improves from -18.3% to -3.0% when excluding the dry weather hours before and after the rainfall (i.e., before 13:00 and after 17:00). As noted in the DWF calibration (**Section 5.1.1.6.2**), dry weather flow volumes in May are underestimated due to seasonal differences. The WWF calibration at FM 2 yields a good volume and maximum depth fit during WWF Event 2 (July 12th); the peak flow is overestimated during this event; however a conservative calibration is maintained. Also, as noted in the **Overall WWF Calibration Results and Considerations (All FMs)**, WWF Event 1 was the primary focus of the calibration, rather than WWF Event 2. The response to WWF Event 2 (July 12th) in FM 2 is observed before the peak rainfall at the rain gauge, due to potential geospatial variations across the Town during this event.

The total R values within the FM 2 metershed are 0.90% in separated sanitary areas and 9.00% in combined areas. The lower total R value of 0.90% is representative of systems that see less RDII. Differences in R values between combined and separated areas are discussed in the **Overall WWF Calibration Results and Considerations (All FMs)**. Sewer age is illustrated in **Figure 5-2**, and sewer type in **Chapter 1** (**Section 4**).

FM 3 (Elgin St W/Madawaska St)

The WWF calibration at FM 3 yields a good peak flow and volume fit during the WWF Event 1 (May 21st). The maximum depth does not closely match the measured depth, which can also be due to blockages. In general, depth fit targets can be challenging to achieve due to potential differences in pipe and metershed hydraulics (pipe roughness, slope) and variable sediment, silt, and debris conditions in the field. The calibration at FM 3 yields good fits during the WWF Event 2 (July 12th). The response to WWF Event 2 is observed before the peak rainfall at the rain gauge, due to potential geospatial variations across the Town during this event (see discussion in **Overall WWF Calibration Results and Considerations (All FMs)**.

The total R values within the FM 3 metershed are 1.00% in separated sanitary areas and 5.00% in combined areas. Differences in R values between combined and separated areas are discussed in the **Overall WWF Calibration Results and Considerations (All FMs)**. Sewer age is illustrated in **Figure 5-2**, and sewer type in **Chapter 1** (**Section 4**).

FM 4 (Riverview Dr)

The WWF calibration at FM 4 yields a good peak flow and volume fit during the WWF Event 1 (May 21st). The maximum depth does not closely match the measured depth. Since FM 4 experiences surcharging during WWF Event 1, matching the observed maximum depth can be challenging due to discrepancies related to pipe hydraulics, as discussed in the **Overall WWF Calibration Results and Considerations (All FMs)**. Furthermore, FM 4 is located downstream of PS #2 and PS #4, as well as directly upstream of PS #3, as initially identified in **Section 5.1.1.3.3**. The observed surcharging could have therefore been caused by downstream constraints at PS #3 or by other downstream blockages, which are not replicated in the model.

The WWF calibration at FM 4 yields a good volume and maximum depth fit during the WWF Event 2 (July 12th). FM 4 is influenced by upstream PSs. The modelled peak flow is higher than observed in WWF Event 2 due to the PS discharge occurring simultaneously with the initial short-term inflow response in the metershed. As noted previously, current PS operations can differ from the original design, therefore there can be uncertainty in the timing of the PS discharge. Nonetheless, this yields conservative results for system performance assessment and long-term infrastructure planning using peak flows.

The total R value for FM 4 is 3.80%, which is on the upper end of the values applied throughout the Town for separated sanitary areas but is still considered reasonable.

FM 5 (Madawaska Blvd)

The WWF calibration at FM 5 yields a good peak flow and volume fit during the WWF Event 1 (May 21st). The maximum depth does not closely match the measured depth. Since FM 5 experiences surcharging during WWF Event 1, matching the observed maximum depth can be challenging due to discrepancies related to pipe hydraulics, as discussed in the **Overall WWF Calibration Results and Considerations (All FMs)**. Furthermore, FM 5 is located downstream of PS #5, as well as directly upstream of PS #3. The observed surcharging could have therefore been caused by downstream constraints at PS #3 or by other downstream blockages, which are not replicated in the model.

The WWF calibration at FM 5 yields good fits during the WWF Event 2 (July 12th). The response to WWF Event 2 (July 12th) in FM 5 is observed before the peak rainfall at the rain gauge due to potential geospatial variations across the Town during this event (see discussion in **Overall WWF Calibration Results and Considerations (All FMs)**.

The total R value for FM 5 is 2.50%, which is on the upper end of the values applied throughout the Town for separated sanitary areas but is still considered reasonable.

FM 6 (De Costa St)

The WWF calibration at FM 6 yields good fits during the WWF Event 1 (May 21st). The peak flow and volume fits during the WWF Event 2 (July 12th) are lower. The volume fit at FM 6 during WWF Event 2 (July 12th) improves from 43.0% to 27.1% when excluding the dry weather hours before and after the rainfall (i.e., before 11:00 and after 18:00). As noted in the DWF calibration (**Section 5.1.1.6.2**), dry weather flow volumes in July are overestimated due the following:

- Seasonal differences leading to lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May).

- Overall drift throughout the flow monitoring period (as identified in **Section 5.1.1.3.3**) also leading to lower observed volumes in DWF Period 2 (July) compared to DWF Period 1 (May).
  - Therefore, while the calibration can yield a good volume fit to DWF Period 1 (May), the modelled volume in DWF Period 2 (July) may be higher than observed.
- As identified during the FM data quality review (**Section 5.1.1.3.3**), FM 6 experiences significant drift in velocity throughout the flow monitoring period and observed flows in July are lower than in May. This results in an overestimated DWF volume in July (**Section 5.1.1.6.2**), which is reflected in the WWF Event 2 (July 12th) calibration results.

The total R value for FM 6 is 1.40%, which is around the average value throughout the Town for separated sanitary areas.

5.1.1.6.4 Pumping Station and Wastewater Treatment Plant Validation

As described in **Section 5.1.1.5**, additional data (SCADA and CSO volumes) were obtained post-calibration. While this information is not used for a direct calibration of the model parameters, it can be used to validate the modelled results at the PSs and WWTP and provide context on the system's performance.

Pumping Station Validation

With the exception of PS #5, flow measurements through the PSs were unavailable, and therefore modelled flows through the PSs cannot be validated. Wet well level data was provided for all PSs. However, data quality issues in the SCADA data limit the ability to validate the results (missing data at PS #2 and inconsistent wet well levels at PS #3). Overall, it is recommended that operational setpoints and pump/system curves at each PS be confirmed. Updated PS wet well level and flow data corresponding to these setpoints should be collected and used as part of the calibration. Additionally, current pump performance should be evaluated (pump tests), to identify the impact of current pump condition on performance (i.e., changes in pump and system curves, efficiency, head losses).

The following are findings from the model validation for each PS.

PS #1

The modelled wet well levels at PS #1 during the DWF Period 1 (May) and the WWF Event 1 (May 21st) are generally lower than observed in the SCADA, and the modelled levels cycle less frequently than observed. As previously noted, this is due to differences between the PS design information (used in the model) and current PS operation and performance.

Comparisons to wet well levels during DWF Period 2 (July) and WWF Event 2 (July 12th) is not feasible due to data quality issues.

Flows through PS #1 are small in magnitude, and therefore, variations from SCADA at this PS likely have minimal impacts on the calibration.

The Town reported PS overflows of 0.28 m^3 at PS #1 during the WWF Event 1 (May 21st). This PS overflow is not replicated in the model. This discrepancy, while minor, may be due to differences between how the PS is modelled and current operations.

PS #2

No validation was performed at PS #2, as no flow data was available and wet well level data was missing during the selected events.

PS #3

No validation was performed at PS #3, as no flow data was available and wet well level data was inconsistent during the selected events.

The Town reported a PS overflow of 16 m^3 at PS #3 during the WWF Event 1 (May 21st). This PS overflow is not replicated in the model. This discrepancy, while minor, may be due to differences between how the PS is modelled and current operations.

PS #4

No validation was performed at PS #4, which is not included within the model extent.

PS #5

The modelled wet well levels at PS #5 during all DWF periods and WWF events are generally higher than observed in the SCADA, and the modelled levels cycle more frequently than observed. As previously noted, this may be due to differences between the PS design information (used in the model) and current PS operation and performance. This may also be due to the downstream calibration at FM 5, which can lead to higher flows in some areas. While PS #5 receives flows from a newer residential subdivision (Madawaska Village) and therefore lower flows are generally expected, this residential subdivision is included in the larger metershed of the downstream FM 5, which also includes areas with higher I/I. Therefore, the RTK parameters for the FM 1 metershed were applied to areas upstream of PS #5. Otherwise, the RTK parameters for FM 5 were developed considering a large metershed including ICI areas with potential cross-connections, which are not representative of the subcatchments upstream of PS #5. The pipes in the FM 1 metershed and the pipes upstream of PS #5 have the same age (see **Figure 5-2**), hence there is more confidence in applying the FM 1 parameters to the subcatchment upstream of PS #5. It is recommended that flows downstream of the subdivision flowing into the PS be monitored to confirm the flows to the PS, and better understand the wet well storage cycles.

The modelled pump flows at PS #5 during all DWF periods and WWF events are generally higher than observed in the SCADA, and the modelled pump cycles are more frequent than observed (as noted from the wet well level validation). The differences in the modelled and observed pump flows are generally small, due to the small order of magnitude of the flows through PS #5 (flows are less than 10 L/s). These differences therefore have minimal influence on the downstream calibration of FM 5.

As observed in the DWF calibration (see **Section 5.1.1.6.2**), volumes in July tend to be overestimated due to seasonal differences, which contributes to the higher flows and more frequent cycling in the model.

Wastewater Treatment Plant and CSO Validation

Incoming flows to the WWTP can be compared to the influent channel flow measurements at the WWTP, downstream of the grit tanks. Along with this dataset, the reported CSO volumes can also be used as part of the WWTP validation. The following are findings from the model validation using the available data:

- On average, the modelled flows to the WWTP under DWF conditions are generally lower than the measured flows. The measured average DWF during DWF Period 1 (May) was 70 L/s, and was 61 L/s during the DWF Period 2 (July), whereas the modelled average DWF during both DWF periods was 54 L/s.
    - Flows to the WWTP are influenced by flows from unmonitored areas. While average parameters based on monitored areas have been applied to unmonitored areas, there remain differences which may be attributed to differences in metershed characteristics;
    - Flows to the WWTP are also influenced by the PS #3 forcemain (river crossing), and hence by the operations of PS #3 (see discussion of discrepancies at PS in **Pumping Station Validation**).
- The observed peak influent flow at the WWTP during WWF Event 1 (May 21st) is 510 L/s, whereas the modelled peak incoming flow is 499 L/s (-2.2% peak flow fit), providing a good fit, and therefore a good representation of the hydraulics of the system downstream of the monitored areas in WWF conditions.
- The Town has reported an estimated overflow volume of 500 m3 at the Albert St CSO on May 21st, 2022, and also noted that the flow meter lost power due to a widespread outage. An overflow volume of 113.5 m3 is modelled for this event, which is less than the estimated reported volume. Differences in the CSO volume can be due to the following:
    - Uncertainties in the elevation of the Albert St weir, or in the invert measurements at this location, which will influence the volume of sewage which will overflow during a CSO;
    - The dynamic hydraulics between the Albert St weir elevation and the incoming flows to the WWTP, whereby an increase in modelled flows can increase the modelled CSO volume, but also lead to an overestimation of flows to the WWTP;
    - The dynamic hydraulics between the Albert St weir elevation and the inlet channel level boundary condition at the WWTP (see **Section 5.1.1.6.1**). Testing a higher boundary condition level of 880 mm at the WWTP for the duration of the rainfall event yields a larger modelled CSO volume of 174 m^3, which is still not equivalent to the observed CSO volume; and,

- o In general, accurate measurements of CSO volumes can be difficult to obtain. Therefore, while the CSO volume is not reproduced by the model, the occurrence of the CSO is represented.

5.1.1.6.5 Model Limitations

Notwithstanding the calibration challenges and assumptions discussed in the **Section 5.1.1.6.2** (dry weather calibration) and in **Section 5.1.1.6.3** (wet weather calibration), the model development is within the normal application of large-scale planning studies and therefore all subsequent results should be interpreted according to this level of detail currently available. The following describes limitations within the model in reference to the calibration:

- Uncertainty in the boundary conditions can impact the calibration. Where feasible, inflows due to private PSs were represented, to produce a conservative assessment of peak flows within the system. The impact and source of these inflows should be considered if pipe capacity issues arise during system assessment;
- Though the model was updated with the most recently available GIS data, adjustments in pipe inverts and sizes were needed to resolve Engineering Validation errors deemed critical for calibration. These adjustments were based on available record drawings and LiDAR elevation data. Nonetheless, there are remaining unresolved Engineering Validation issues, such that the real site conditions in some locations might not be accurately captured. Following this master plan, the model adjustments and the remaining issues should be investigated, to further improve the representativeness of the model for future model update and calibration efforts;
- The effects of the DWF calibration are carried forward into WWF calibration. Though the magnitude is minimal in comparison to heavy rainfall events, when the DWF calibration did not fall within the targeted fit, it is possible that poor fits carry over or influence the results of WWF calibration;
- Relatively small storm events were observed in the flow monitoring period of April to July 2022, with return periods of 1:2-years or less in general. Linear extrapolation to larger events may not be fully reflective of the actual response to such events. Future flow monitoring, model updates and recalibration are recommended to account for the magnitude of events observed during calibration;
- Sediment may be present in the pipes, which is not represented in the model. This can result in discrepancies between the modelled and observed depths, but is often temporary in nature due to flushing programs and large WWF events potentially dislodging debris and build-up. Providing frequent sewer flushing programs for Town’s sewers can help to reduce sediment and its impact to flow conditions.

5.1.2 POTABLE WATER DISTRIBUTION SYSTEM MODEL

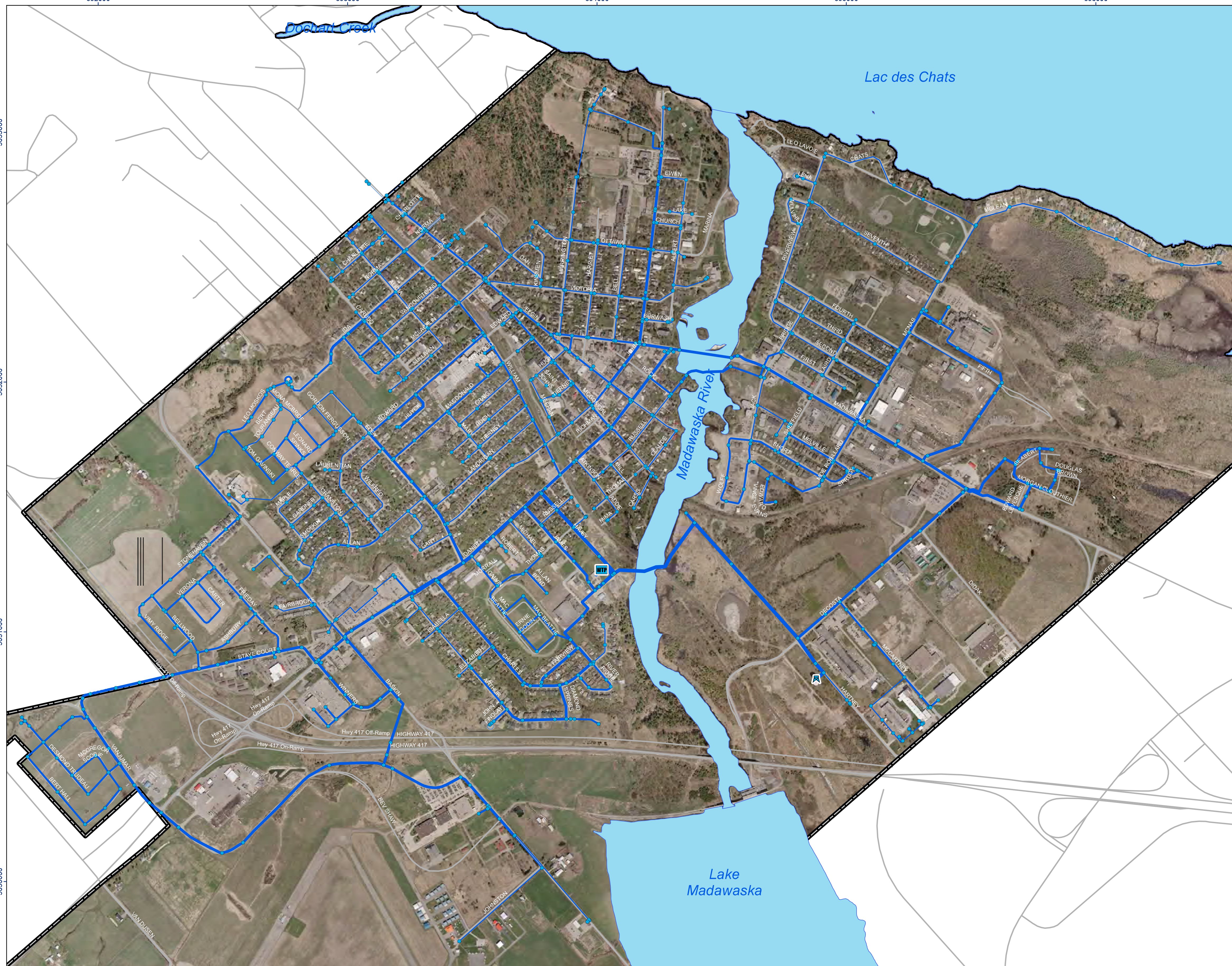
The water distribution model is an all-pipe model in Innovyze's InfoWater Pro software, including the Town's water filtration plant (WFP) and elevated storage tank (EST). As discussed in **Chapter 1** (**Section 4**), the 2015 model with the updates to support development requests (i.e., watermain upgrades on Havey St and Daniel St, new developments at Campbell Farms, Village Creek, Callahan Subdivisions, and roughness coefficient adjustments based on field data) was used as the basis for the current W&WWMP's model update. The hydraulic model was modified to reflect the updated infrastructure in the water distribution system, reflect current system operations, and reflect recent growth and water consumption in the Town. With the updated infrastructure and demands, the model's performance was validated against available SCADA (July 1 – 5 and July 7 - 8, 2022), hydrant pressure data (June 12 – July 11, 2022), and 2018 hydrant flow test data.

5.1.2.1 Infrastructure

The modelled water distribution system network was compared to the Town's current GIS watermain database to identify any recent upgrades and reflect existing conditions. The updates included:

- Adding new pipes for new service areas;
- Abandoning older pipes which are no longer in service; and,
- Adding replacement pipes.

Also, updates regarding pipe alignment and size were made to the model where discrepancies were found between the two sets of data. The updated water distribution system network is shown in **Figure 5-18**.



Legend

Modelled Watermains - Diameter (mm)

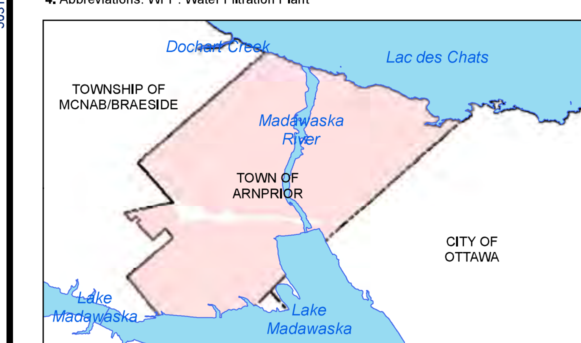
- < 75 mm
- 75 mm - 150 mm
- 150 mm - 225 mm
- 225 mm - 350 mm
- 350 mm - 600 mm
- Modelled Junctions
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:16,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *0837ARNP.sid*, *Arnprior_PropertyParcels_wAssessment_20220324.shp*, *Arnprior_Roads_20220324.shp* and *WTR_NODE.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: WFP: Water Filtration Plant



Project Location
Prepared by CZ on 2023-01-31

Arnprior, ON

Client/Project
163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-18

Title
Updated Water Distribution Network (Existing Conditions)

C:\Users\chzheng\Documents\My Documents\temp\163401723 Arnprior Water Master Plan\figures\Ch2\mxd\fig2-18_arn_wtr_updated_ex_cond_dist_network_20230131.mxd Revised: 2023-03-01 By: chzheng

No changes were made to the roughness coefficients of all pipes that were in the base model (i.e., the 2015 hydraulic model with the updates described above). For updated or added pipes, roughness coefficients were applied based on the assignment rules as outlined in **Table 5-14** below.

Table 5-14: Assignment Rules for Roughness Coefficients of Updated or Added Watermains

Scenario	Pipe Material	Assignment of Roughness Coefficient
There is pipe in the base model that has the same pipe size, material, and age near the updated/added pipe.	N/A	The same roughness coefficient as the pipe in the base model is applied.
There is no pipe in the base model that has the same pipe size, material, and age near the updated/added pipe.	PVC / HDPE	Roughness coefficient is assigned according to Table 4.4 in the City of Ottawa Water Distribution Design Guidelines (i.e., roughness coefficient based on pipe size).
	CU (Copper)	A roughness coefficient of 130 is applied for all copper pipes, as the roughness coefficients of all other copper pipes in the base model are 130 in despite of pipe size and age.
	DI / CI	The same roughness coefficient as the pipe in the base model that have the same pipe size, material, and same or close age is assigned.

In general, surface elevations of model junctions were kept as per the base model. For junctions added to the model, ground elevations were assigned based primarily on the provided LiDAR data at a 1 m x 1 m resolution, as well as the survey points (20 m x 20 m resolution).

Upon reviewing the provided data for water distribution facilities (e.g., SCADA, as-built / as-design drawings, Municipal Drinking Water Licence [MDWL], Drinking Water Works Permit [DWWP], and environment study reports), the hydraulic parameters of the elevated storage tank (EST) and WFP were verified, and the following modifications were made to the model for existing conditions:

- Initial level of the EST was set to 7.77 m which is the average level in the EST based on 2022 SCADA data. The initial EST water level of 7.77 m is equivalent to approximately 70% of the overall volume and is within the observed operating range of 58 to 83% full.
- Reservoir head at the WFP was updated to 91.62 m which is the average water level in in both Clearwell #1 and Clearwell #2 according to 2022 SCADA data. The head of 91.62 m is equivalent to about 84% full of the reservoir based on the top water level (TWL) of 92.20 m and bottom of clearwell elevation of 88.54 m shown on the hydraulic profile as part of the 2011 Arnprior Water Filtration Plant Expansion as-built drawings.
- As confirmed by 2022 SCADA data, only one high lift pump (HLP) at the WFP would be called into service at a time, and the HLP was set to open when water in the EST is less than 60% of the overall volume (i.e., level in the EST drops below 6.79 m) and closed when water in the EST achieves 80% of the overall volume (i.e., level in the EST reaches 8.74 m).

- The Town provided a test pump curve (dated July 13, 2021) for the WFP's HLPs. By comparing the test pump curve with the design pump curve that was used in the base model (see **Figure 5-19**), differences between the two curves were considered marginal with the rated test-based curve operating slightly above the design curve. Therefore, the design pump curve was maintained and used in the analysis of this network.

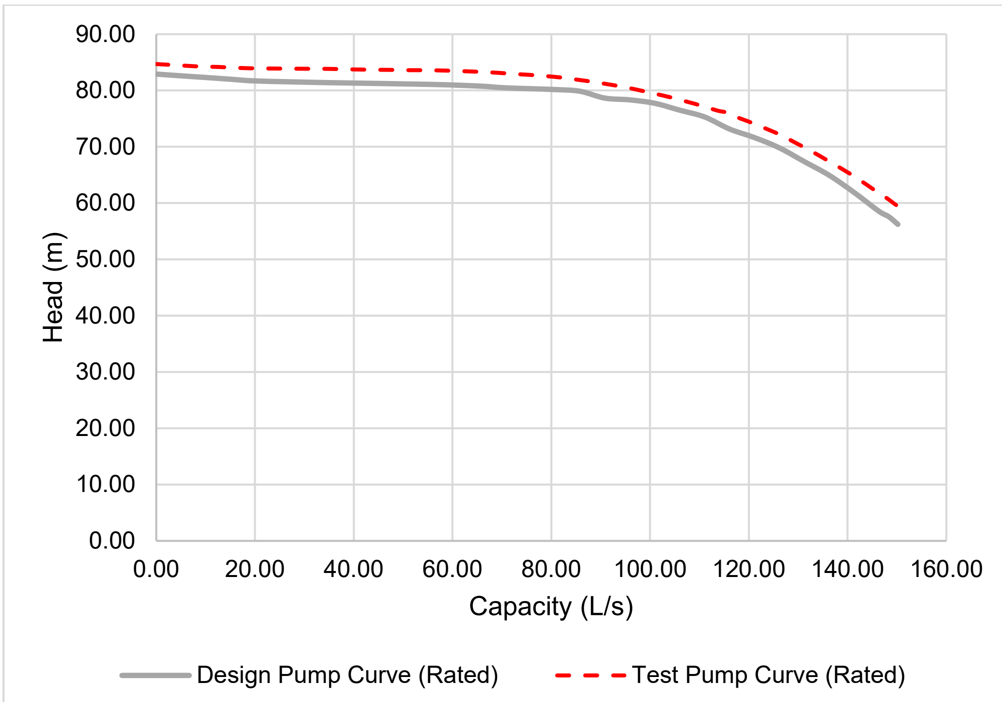


Figure 5-19: Design and Test Pump Curves for HLPs at the WFP

5.1.2.2 Existing Water Demands

Water demands in the model were updated to reflect changes in demand and growth that has occurred in the Town since the last model update in 2015, and to integrate recent consumption records.

Annual WFP treated water flow data was provided by the Town. Six years of data, from January 2016 to December 2021, was used to calculate the total existing system average day (AVDY) demand of 4,146 m^3/d (average from 2016 to 2021). The average of annual maximum daily treated flow from 2016 to 2021 (i.e., 5,933 m^3/d) was assumed as the total maximum day (MXDY) demand which resulted in a MXDY peaking factor of 1.43. It is noted that all outlier flows (e.g., high flows due to watermain breaks, refilling of the EST, and reported clearwell issue) based on the *Water & Sewage Plant Committed Capacity / Uncommitted Reserve Capacity Spreadsheet Assessment* (Town of Arnprior, 2022) were excluded from the calculation of total MXDY demand.

The Town also provided water consumption records (monthly / bimonthly metered data) for the existing metered services area from July 2021 to August 2022. The average daily consumption for each user was calculated. For the hydraulic model update, the water consumption data of each metered site was joined with property parcels by either matching the property number or geocoding based on address.

Figure 5-21 illustrates the distribution of water consumption based on available metered data. To allow for a more reflective distribution of system demands within the model, the top water consumers (i.e., users with high water consumption) were identified based on the calculated average daily water consumption rates and a threshold of 5 m^3/d which is the 99^{th} percentile (refer to **Figure 5-20**). This yielded 38 high water users which account for an average water consumption of 1,232 m^3/d, which represents approximately 30% of the Town's overall AVDY demand. Water consumptions associated with top water consumers were then assigned to the nearest model junctions as AVDY demands, and the peaking factor of 1.43 was applied to establish MXDY demands.

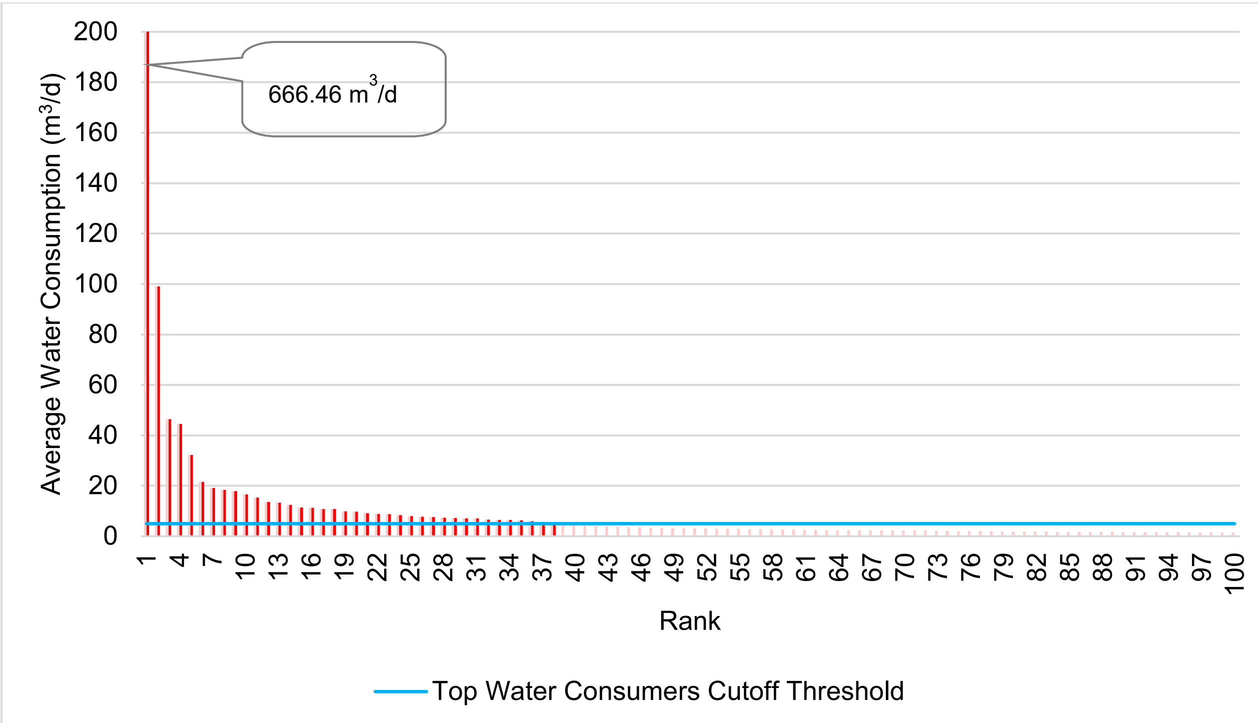
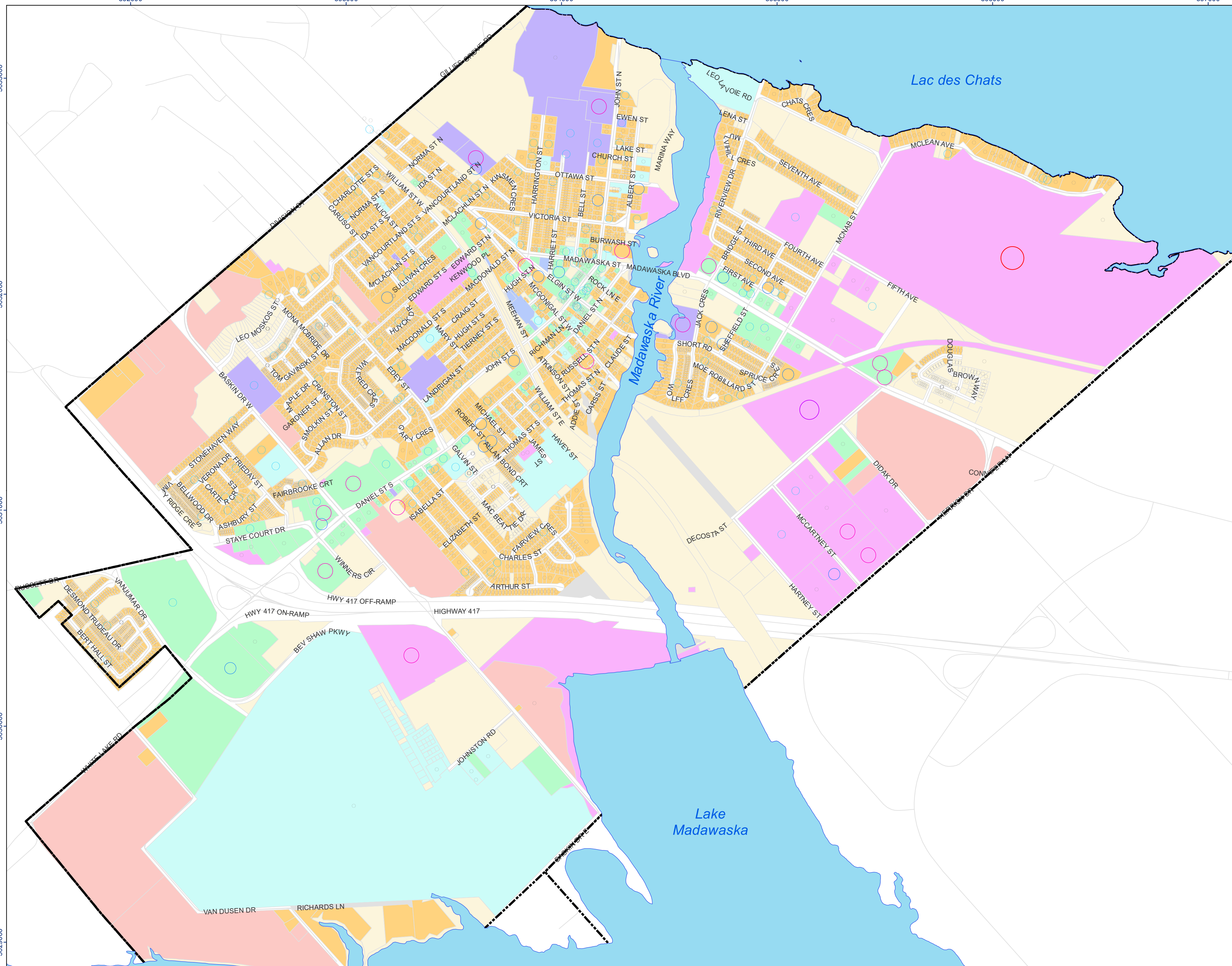
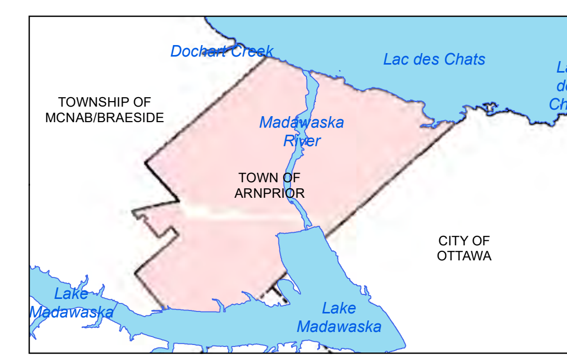


Figure 5-20: Top 100 Average Water Consumption





Stantec

Legend

Water Consumption (July 2021 - August 2022 Average)

- < 1 m3/d
- 1 m3/d - 5 m3/d
- 5 m3/d - 10 m3/d
- 10 m3/d - 50 m3/d
- 50 m3/d - 100 m3/d
- 100 m3/d - 666 m3/d

Land Use

- Commercial
- Farm
- Government
- Industrial
- Institutional
- Residential
- Special Purpose
- Unassessed
- Vacant
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario

Project Location Prepared by CZ on 2023-01-31
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-21

Title
Water Consumption Based on Metered Data

C:\Users\chzheng\Documents\My Documents\temp\163401723 Arnprior Water Master Plan\figures\Ch2\mxd\fig2-25_arn_wtr_billing_data_map_20230131.mxd Revised: 2023-02-07 By: chzheng

It should be noted that the total average daily water consumption of all metered sites is about 2,806 m^3/d, which is about 32% lower than the total average daily treated flow of 4,146 m^3/d at the WFP. The difference between the WFP output and the total metered water consumption could be considered as non-revenue water (NRW), which typically includes authorized unbilled consumption (e.g., potential non-metered properties, water for flushing and firefighting) and various water losses (e.g., leaks and overflows and inaccuracies in metering).

By subtracting the total water consumption of top water users from the total AVDY and MXDY demands, the remaining demands were then proportionally distributed to non-hydrant model junctions based on the number of metered properties with non-zero water consumption that are spatially allocated to the junction (i.e., total remaining demand x [number of metered properties with non-zero water consumption that are spatially allocated to the junction / total number of metered properties that have non-zero water consumption]). **Table 5-15** summarizes the water demand parameters used in the hydraulic model update, as described previously.

Table 5-15: Existing Conditions Estimated Water Demands

Parameter	Units	AVDY	MXDY
Total WFP Treated Flow(1)	m^3/d	4,146	5,933
Maximum Day Peaking Factor(2)	-	1.43	
Total Water Consumption by Top Water Consumers(3)	m^3/d	1,232	1,763
Remaining Demand	m^3/d	2,914	4,170

Notes:

(1) Based on annual WFP treated water flow data, the total AVDY demand is the overall average from 2016 to 2021. The total MXDY demand is taken as the average of annual maximum daily treated flow from 2016 to 2021.
(2) Maximum day peaking factor was calculated by dividing the total MXDY demand by total AVDY demand.
(3) Top water consumers are identified as the water users with average daily consumption greater than 5 m^3/d.

To model the water distribution network over an extended period of time, the same 72-hr patterns as the base model were applied, which are typical mixed-use diurnal patterns for both AVDY and MXDY demand conditions.

5.1.2.3 Model Calibration and Validation

Preliminary results generated by the updated model were validated against recorded data provided by the Town, including system responses observed at the WFP and EST (i.e., SCADA data), pressure readings at the hydrant near 263 Alicia St (i.e., iHydrant data), and hydrant flow data from 2018 for 324 tests performed at 320 hydrants located across the Town. Of the 324 hydrant flow tests, 316 either had an associated hydrant in the GIS database or complete data results with pressure drop greater than 10% during the test (the drop between the static and residual pressures should be at least 10% to obtain satisfactory results). Therefore, the model was only validated against these 316 hydrant test results.

Table 5-16 presents the comparison of the model output to the SCADA and iHydrant data. In general, the model results are within the range of recorded values for discharge pressures at the WFP, levels in the

EST (percent full), and pressure at the iHydrant location. The modelled discharge flow from the WFP was higher than that observed which may be due to pump curves not reflecting actual pump performance during the SCADA period, or the variation in the actual duty setpoints of the HLPs with respect to levels in the EST (i.e., the actual start and stop setpoints fluctuated around 60% and 80% full of the EST).

Table 5-16: Model Calibration/Validation Results (SCADA and iHydrant Data vs. Model Output)

Source	**WTP**		**EST**	**iHydrant Location (263 Alicia St)**
	Discharge Pressure (psi)	**Discharge Flow (L/s)**	**Elevated Storage Tank Level (%)**	**Pressure (psi)**
Typical Range of Measured Values	73 - 95	120.0 - 135.0	57.7 - 83.0	70 - 90
Ranged of Simulated Values - under AVDY demand conditions	80 - 88	141.0 - 145.0	60.2 - 79.9	75 - 83
Ranged of Simulated Values - under MXDY demand conditions	80 - 87	141.6 - 146.0	60.4 - 79.6	75 - 82

As the hydrant flow test data used for model validation were completed over the course of 2018 under varying system operating conditions (or boundary conditions), hydrant test results were first categorized into groups based on their corresponding combination of SCADA discharge flow at the WFP and level in the EST for the associated timestep. These groupings of boundary conditions were then applied in a series of validation runs (MXDY + fire flow steady-state simulation), and the model result (i.e., available fire flow at a residual pressure of 20 psi) at the junction closest to the test hydrant was compared to corresponding hydrant fire flow data under the specific group of boundary conditions. **Table 5-17** presents the comparison of the model output to the hydrant test data. About 43% of the modelled available fire flows were within 25% of recorded values, and around 67% of the modelled flows were within 50% of recorded data. Locations with high differences are mainly in areas where watermains have been upgraded or additional looping has been added since 2018 (e.g., watermain along William St upgraded in 2018 leads to differences between modelled and tested flows at Charlotte St and Norma St, new looping near Mac Beattie Dr added in 2020 results in differences between modelled and tested flows in area near Fairview Cres). Given that the tests were completed in 2018 (and prior to network and demand changes due to recent development), overall, the fit of dataset to the output of the updated model was considered reasonable for master planning purposes. However, it is recommended that future calibration efforts are considered to further improve the reporting of the available fire flows in the network.

Table 5-17: Model Calibration/Validation Results (Hydrant Flow Test Data vs. Model Output)

% Difference, Abs [(Modelled Flow - Tested Flow) / Tested Flow]	Comparison of Available Fire Flow at 20 psi	
	Count	% of Total
≤ 10%	65	21%
10% - 25%	71	22%
25% - 50%	77	24%
50% - 75%	50	16%
75% - 100%	29	9%
> 100%	24	8%
Total	316	100%

5.2 Existing Hydraulic Conditions Assessment

Following the updates presented in **Section 5.1**, the wastewater collection and water distribution system hydraulic models were used to assess the existing infrastructure under existing flow and demand conditions.

5.2.1 WASTEWATER COLLECTION SYSTEM

As presented in **Section 5.1.1**, the trunk-level wastewater collection system model's infrastructure and wastewater flows were updated, and the model re-calibrated, to represent existing conditions during the flow monitoring period (April 2022 to July 2022). The calibrated model is then used to assess the performance of the existing system's sewers, pump stations and WWTP under a design event.

5.2.1.1 Boundary Conditions

The boundary conditions applied in the model for the existing conditions assessment are consistent with those applied for the WWF events during calibration, as presented in **Table 5-7** of **Section 5.1.1.6.1**. Notably, the DWF inlet channel level is applied as a boundary condition at the WWTP, and the inflows from the private PS (WFP sludge discharge) upstream of FM 2 are modelled using the same pattern developed for the WWF calibration.

5.2.1.2 Collection System

As described in **Chapter 1** (**Section 4**), the existing sanitary sewer network is assessed to identify existing capacity constraints and flooding risks in the Town.

For the existing conditions assessment, the collection system performance is evaluated based on hydraulic grade lines (HGLs). The resultant HGLs are assessed to identify if basement or surface flooding risks are generated, as described in **Chapter 1** (**Section 4**). Pipe surcharge state can help define the issues within the system but is not considered in the criteria. Pipe surcharge state is identified using a combination of the flow capacity utilization within the pipe (q/Q) and the depth ratio (d/D). Pipes can either be bottlenecked (undersized and flowing above the pipe's capacity), experiencing backwater conditions due to downstream bottlenecks, or free flowing.

Under DWF conditions, all pipes are free-flowing and do not experience surcharge. HGLs are within 1.8 m of ground surface in some locations with shallow sewers, which are illustrated in **Figure 5-22**.

In line with the 2013 W&WWMP's approach, the WWF assessment uses a 25-year SCS II 6-hour rainfall distribution event based on records from the nearby Environment Canada station in Shawville, Québec. As noted in the model limitations (**Section 5.1.1.6.5**), the model was calibrated to small events (equivalent to a 2-year event or less). When extrapolating the flows to a more extreme event, this can result in a conservative system response.

Figure 5-22 shows the results of the existing collection system assessment under the 25-year design event. MHs and sewers are rendered as follows:

- MH HGL (freeboard):
  - **Black**: HGL is more than 1.8 m below ground surface (i.e., low risk of basement flooding);
  - **Yellow**: HGL is within 1.8 m of ground surface (i.e., potential for basement flooding); and,
  - **Red**: HGL is above ground surface (i.e., potential for basement and surface flooding).
- Pipe surcharge state:
  - **Black**: free-flow within sewer;
  - **Yellow**: sewer surcharged, peak flow within free-flow capacity of the sewer (i.e., under backwater conditions);
  - **Red**: sewer surcharged, peak flow greater than free-flow capacity of the sewer (i.e., sewer is under capacity and causing bottleneck); and,
  - **Purple** halo: shallow sewers with less than 1.8 m between the sewer obvert and the ground surface.

Yellow nodes located on shallow (purple) sewers indicate that the HGL is within 1.8 m of ground surface, as commonly observed with shallow sewers. These locations are not discussed further when evaluating the system's performance. Sewer invert and ground elevations in these areas should be confirmed to ensure that the data used is accurate.

Pump Station (PS) Representation: The collection system assessment assumes ideal pumps (flow in = flow out), such that the design flows are conveyed downstream of the pump stations and potential downstream constraints can be identified. The incoming flows to each PS are also assessed against the firm capacity.

The problem areas are as follows:

- **Problem Area PA-1 – Riverview Dr/Fourth Ave/Mulvihill Cr**: Risks of basement flooding are observed along Riverview Dr and Mulvihill Cr, due to sewer capacity issues along Riverview Dr, which propagate upstream. The 450 mm diameter sewers on Riverview Dr, north of Fourth Ave, are undersized for the flows observed in the 25-year design event. The sewer along Riverview Dr, however, does have an adverse (and almost flat) slope, based on the invert information received. It is therefore recommended that the inverts along these sewers be confirmed, prior to implementing the solutions developed in **Chapter 3** (**Section 6**). No future projects are planned that will impact flows to this problem area.

- **Problem Area PA-2 –Daniel St**: Risks of basement flooding are observed along the shallow sewers on Albert St just upstream of the CSO location, and on Daniel St, upstream of Madawaska Blvd. While these sewers are shallow, some upstream sewers also experience capacity constraints in the 25-year event, thus indicating that the 600 mm diameter sewers are also undersized. These sewers receive flows from upstream combined sewer areas within the FM 2 and FM 3 metersheds; however, they do themselves fall within the unmonitored area. The planned sewer separations presented in **Table 5-27** are expected to alleviate the flows to the Daniel St trunk sewer, and reduce the extent of the pipe capacity constraints under future conditions (see results in **Section 5.5.1.3**). No HGL issues due to pipe constraints are observed. The sewers experiencing bottlenecked conditions, however, consist of some inferred inverts applied to eliminate the adverse slopes produced when using provided inverts. It is therefore recommended that the inverts along these sewers be confirmed, prior to implementing the solutions developed in **Section 6.5**.

- **Problem Area PA-3 – Edward St**: While no HGL issues are observed along Edward St, the existing 200 mm diameter sewer south of William St is bottlenecked. Flows from the Callahan Developments are partially diverted from Edey St to Edward St at the bifurcation between the two streets. Sewer separation along Edward St is planned downstream, north of William St (project SEW-FUT-16 in **Table 5-27**), but does not impact flows to this problem area.

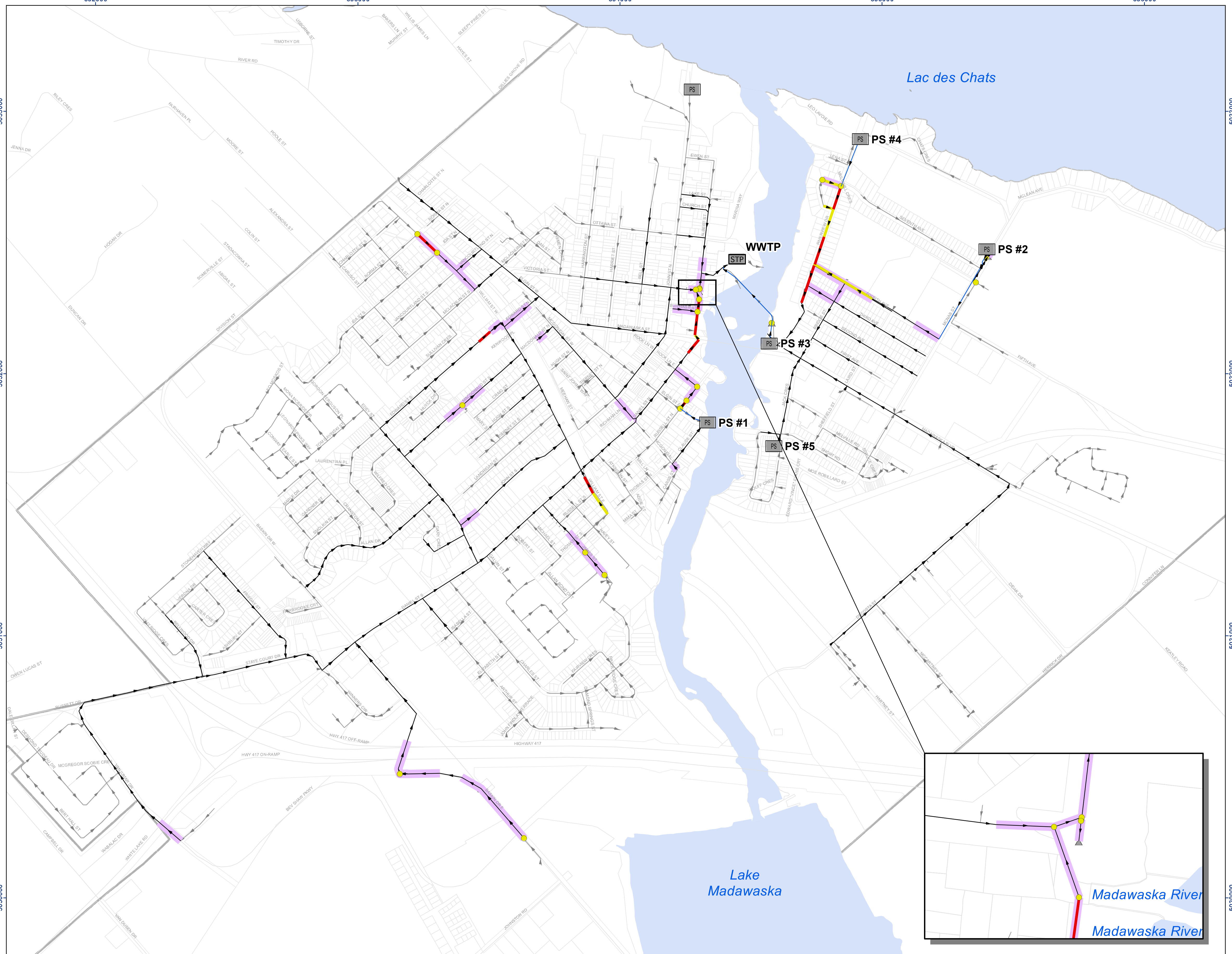
Under existing conditions, issues are also identified in the following areas:

- **William St W (Northwest of Daniel St)**: Risks of basement flooding are observed along William St W, indicating that the 450 mm diameter sewer is undersized for the 25-year design event. This sewer receives flows from combined areas. These HGL issues and surcharging may however be due to the most upstream sewer having an adverse slope, based on the invert information received. It is therefore recommended that the inverts along these sewers be confirmed, prior to implementing any solutions that may be developed in **Chapter 3** (**Section 6**). Sewer separations along Charlotte St S and Ida St are planned in 2036 (project SEW-FUT-11 in **Table 5-27**), which will eliminate these HGL issues in the future (see **Section 5.5.1.3**), hence this area is not further assessed as a problem area.

- **Russell St, downstream of PS #1**: Risks of basement flooding are observed along the sewers on Russell St, directly downstream of the PS #1's forcemain. These sewers and PS #1 receive flows from upstream combined sewer areas which fall within the unmonitored area. The sewer directly downstream of the forcemain experiences bottlenecked conditions. Sewer separations along Claude St are planned in 2030 (project SEW-FUT-8 in **Table 5-27**), as well as along Russell St in 2031 (project SEW-FUT-9 in **Table 5-27**), which eliminate these HGL issues in the future (see **Section 5.5.1.3**), hence this area is not further assessed as a problem area.

- **William St E (Southeast of Daniel St)**: While no HGL issues are observed along William St E, the 375 mm diameter sewer is undersized for the 25-year design event. This sewer receives flows from separated and combined subcatchments. Sewer separations along James St are planned in 2033 (project SEW-FUT-10 in **Table 5-27**), which will eliminate these HGL issues in the future (see **Section 5.5.1.3**), hence this area is not further assessed as a problem area.

Other HGL issues (risks of basement flooding) are observed throughout the system, however these are due to shallow sewers rather than pipe capacity issues and are not further addressed in this chapter. Nonetheless, these results should be compared to reported basement flooding occurrences and the installation of backwater valves considered where necessary.



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Legend

- PS Sanitary Pump Station (PS)
- Overflow
- STP Wastewater Treatment Plant (WWTP)
- Sanitary Sewer (Not Modelled)
- Forcemains

HGL Freeboard

- At or Above Surface
- Within Basement Level (Within 1.8 m of Surface)

Pipe Surcharge State

- Bottleneck (Undersized Sewer)
- Backwater Conditions
- Free-Flowing Conditions
- Shallow Pipes (Obvert Within 1.8 m of Surface)

N

0 250 500 Meters

(At original document size of 11x17)
1:15,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant

Project Location — Prepared by CR on 2023-01-06

Arnprior, ON

Client/Project — 163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

5-22

Title

Existing Conditions - 25-Year SCS II 6 Hour Event

An intense rainstorm occurred in the evening of September 7th, 2023, during which several sewer service line backups and basement flooding occurrences were reported at the following locations:

- Arnprior Public Library (21 Madawaska St),
- Sullivan Cr (4 reports),
- 59 Madawaska St, and
- 191 John St N.

Furthermore, overflows were observed at the Albert St weir and combined sewer overflow (CSO), at PS #1, and PS #3.

The Town reported a rainfall depth of 33.8 mm to 43 mm during approximately 30 minutes, which, based on the intensity-duration-frequency (IDF) curves for the Environment and Climate Change Canada (ECCC) Appleton Station (see **Chapter 2** (**Section 5**) and **Figure 5-23**), is equivalent to a 100-year event (i.e., with a 1% chance of annual occurrence).

With the exception of PS #3, all the locations listed above are downstream of combined areas. As shown in the future conditions assessment (**Section 5.5.1.3),** the planned sewer separations are expected to alleviate sewers, notably the Daniel St trunk sewer. It is recommended that the Town continue its efforts towards sewer separations and monitor the resulting flows to confirm their impacts. PS #3 is located downstream of industrial, commercial, and institutional (ICI) areas which may have roof drain connections to the sanitary sewers, or other potential cross-connections. The capacity of PS #3 is further discussed in the following PS capacity assessment.

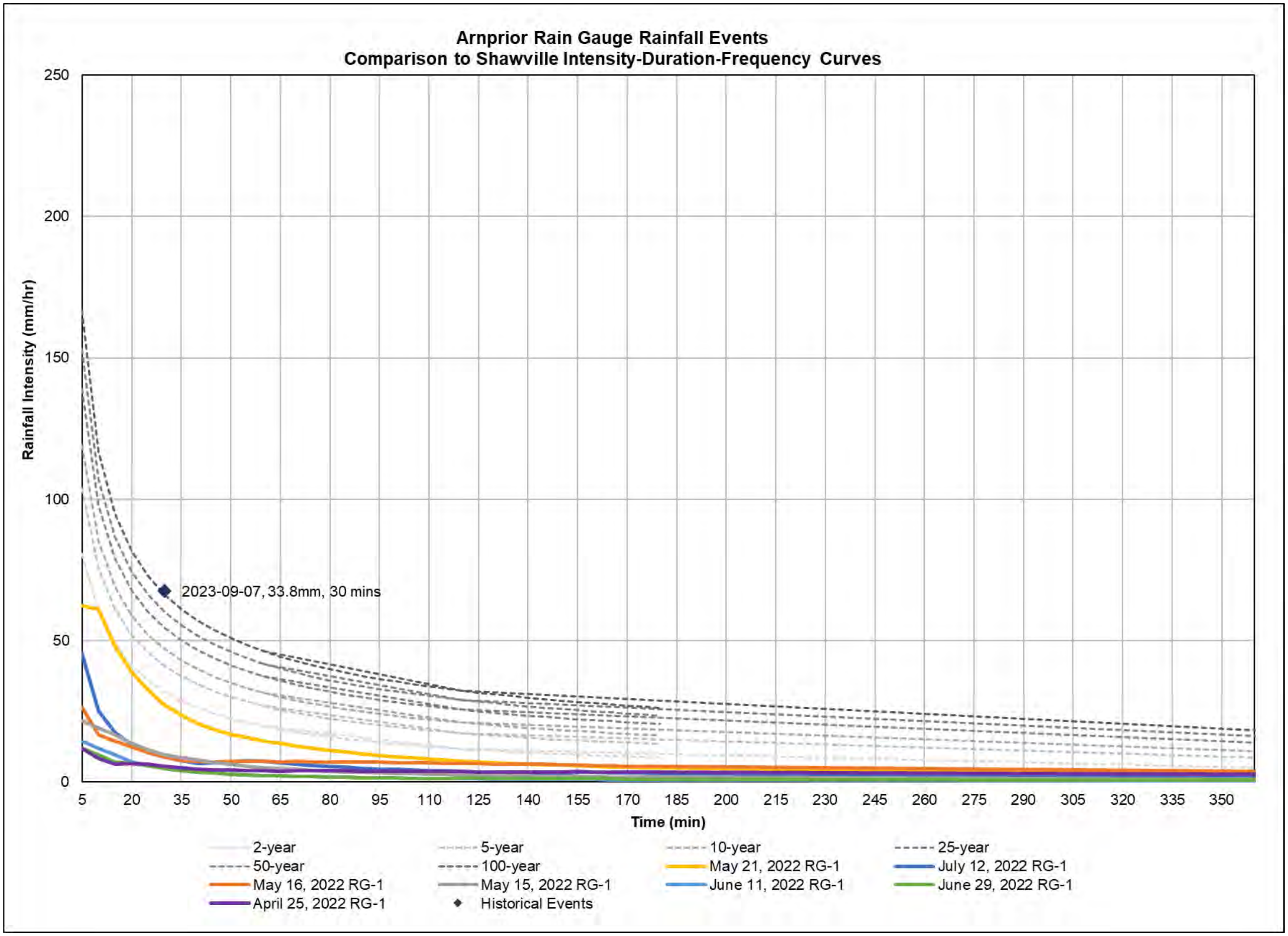


Figure 5-23: 2022 Flow Monitoring and 2023 Historical Events Comparison with IDF Curves

5.2.1.3 Pumping Stations

As described in **Chapter 1** (**Section 4**), the capacities of the PSs are assessed by identifying the incoming flow and comparing it to the PS's firm capacity (largest pump offline). The existing PSs capacities are compared to the revised peak modelled incoming flows under DWF conditions, the 10-year design event, and the 25-year design event, for each growth horizon, with and without the future (planned) projects presented in **Table 5-27**. Per the MECP guidelines, PSs should be designed for a firm capacity at least capable of handling the 10-year design event. Additionally, the PSs bypass history from 2017 to 2022 was also reviewed at each PS. The results are summarized in **Table 5-18**. The PSs were modelled as ideal (flow in = flow out) for the existing conditions assessments. PS #4 was not explicitly modelled; therefore its capacity is not assessed.

Table 5-18 shows the comparison of the PS's firm capacity (i.e., largest pump out of service) against the modelled incoming flows under DWF conditions, the 10-year design event, and the 25-year design event. As noted in the model limitations (**Section 5.1.1.6.5**), the model was calibrated to an event equivalent to a 2-year event, i.e., with a 50% probability of occurring every year. Extrapolating the flows to a less frequent event such as the 25-year event (i.e., with a 4% probability of occurring every year) can result in conservative peak flows throughout the system, including those incoming to the PSs.

No PS capacity concerns are observed under DWF conditions. In the 10-year and 25-year design events however, PS #1, PS #2 and PS #3 are already at capacity in existing conditions, such that backwater and HGL issues upstream of the PSs may occur. Nonetheless, where multiple pumps are present at a PS, flows exceeding the PS's firm capacity could still be conveyed when all pumps operate simultaneously (if possible). These findings should therefore be validated against historical (anecdotal) evidence of PS performance under large events, to confirm whether any operational or PS backup issues have been experienced, and if any impacts on the sanitary collection system were observed under these conditions.

For example, the Town's 2022 Annual Report includes reports of PS bypass at PS #1 and PS #3. Considering the review of the PSs bypass history, PS #2 and PS #5 have not experienced bypasses between 2017 and 2022, however PS #1 was bypassed twice between 2020 and 2022, and PS #3 has experienced yearly bypasses between 2020 and 2022, for a total of 5 bypasses. Both PS #1 and PS #3 also experienced overflows during the intense rainstorm reported by the Town on September 7th, 2023.

PS #1 is located downstream of combined areas. It is expected that the Town's planned sewer separations on McGonigal St and Claude St (project SEW-FUT-8 in **Table 5-27**) will help reduce the flows to PS #1 once implemented by the 10-year horizon. Once sewer separation is completed, monitoring is recommended to confirm the efficacy of the sewer separation and the resulting impact on inflow and infiltration (I/I) to PS #1. Other PSs are not impacted by the other planned projects.

PS #3 is located downstream of ICI areas which may have roof drain connections to the sanitary sewers, or other potential cross-connections. These may contribute to the peak flows exceeding the PS firm capacity observed under WWF conditions. Under existing conditions, addressing potential sources of upstream I/I could decrease the peak flows within the PS's firm capacity and defer potential upgrades. However, the efficacy of I/I reduction measures would need to be confirmed with updated monitoring, also considering the impact of upstream growth on flows.

No bypass at PS #2 due to heavy precipitation were observed. Applying parameters which were calibrated over large metersheds can also lead to higher flows in some areas. Therefore, flows upstream of PS #2 should be monitored and confirmed prior to undertaking PS upgrades.

PS #5 receives flows from a newer residential subdivision (Madawaska Village). As part of the model calibration (see **Section 5.1.1.6.3**), the RTK parameters for the FM 1 metershed were applied to areas upstream of PS #5. Otherwise, the RTK parameters for FM 5 were developed considering a large metershed including ICI areas with potential cross-connections, which are not representative of the subcatchments upstream of PS #5. The pipes in the FM 1 metershed and the pipes upstream of PS #5 have the same age (see Figure 5 2), hence there is more confidence in applying the FM 1 parameters to the subcatchment upstream of PS #5. As a result, the peak flows are within the PS's firm capacity. This is supported by the Town's reports, where no bypasses have historically been observed at PS #5. Nonetheless, it is recommended that flows downstream of the subdivision flowing into the PS be monitored to confirm that PS #5 does not experience capacity issues.

Table 5-18: Existing Conditions PS Capacity Assessment

Name	Location	Number of Pumps at PS	Firm Capacity (Largest Pump Out of Service) (L/s)	Peak Modelled Incoming Flows (L/s)			Number of Bypasses (3) per Year					
				DWF	10-Year Design Event	25-Year Design Event	2017	2018	2019	2020	2021	2022
PS #1	Elgin St E at Claude St	2	25	0.7	81	96	-	-	-	1	-	1
PS #2	McNab St at Seventh Ave	2	59	8.5	71	84	-	-	-	-	-	-
PS #3	Madawaska Blvd, west of Bridge St	3(1)	275	28	278	323	-	-	-	1	1	3
PS #5	Wolff Cres	2	7	1.6	5.4	6.1	-	-	-	-	-	-

Note:
(1) The pumps at PS #3 are equipped with variable frequency drives (VFDs).
(2) Bypasses due to heavy precipitation or snowmelt (not due to equipment failure), as reported in the Town's reports to Council from 2017 to 2022.

5.2.1.4 Wastewater Treatment Plant

Similarly to the PSs, the WWTP's capacity is assessed based on comparing the incoming flow to the plant's capacity. Based on the *Certificate of Approval* (issued February 17th, 2010), the WWTP has a peak hour flow (PHF) capacity of 685 L/s (59,200 m^3/d). The modelled incoming PHF under DWF is 64 L/s (5,530 m^3/d), which is within the WWTP's PHF capacity. The modelled incoming PHF under the 25-year design event is 676 L/s (58,392 m^3/d), nearing the WWTP's PHF capacity. As a result of the level boundary condition applied at the WWTP (maximum depth of 600 mm), a CSO is triggered at the Albert St/Victoria St weir, at a peak flow rate of 387 L/s and a volume of 862 m^3. Applying the WWTP's PHF capacity of 685 L/s (59,200 m^3/d) as a flow limit into the WWTP, the resulting CSO at the Albert St/Victoria St weir increases to a peak flow rate of 710 L/s and a volume of 1,156 m^3. While HGLs from Albert St/Victoria St to the WWTP increase, no new HGL issues (new locations of basement flooding or surface flooding risk) are observed in the sanitary collection system.

As noted in the model limitations (**Section 5.1.1.6.5**), the model was calibrated to an event equivalent to a 2-year event, i.e., with a 50% probability of occurring every year. Extrapolating the flows to a less frequent event such as the 25-year event (i.e., with a 4% probability of occurring every year) can result in conservative incoming flows to the WWTP.

These findings should be validated against historical (anecdotal) evidence of WWTP performance under large events, to confirm plant bypasses (CSOs at Albert St) have occurred, and if any impacts on the sanitary collection system were observed under these conditions. While the model provides peak instantaneous flow and overflow results, the WWTP capacity assessment considers historical average daily flows and peak hour flows, which are compared against the corresponding CoA design flows. presents the modelled incoming flows to the WWTP, and the modelled overflows at the Albert St weir and combined sewer overflow (CSO) under existing conditions, as well as WWTP bypass history for 2016-2022. In general, it is expected that the Town's planned sewer separations will help reduce the peak flows to the WWTP and the bypass volumes at the Albert St CSO. Nonetheless, flows should be monitored as sewer separation projects are completed, to confirm the resulting reduction in flows.

Table 5-19: Updated Modelled Incoming Flows to WWTP, Albert St CSO Volumes and WWTP Bypass (CSO) History

Location	Modelled Parameter	Existing (2022) Modelled Incoming Flows (L/s) With Existing Infrastructure Only		Number of Bypasses (1,2) per Year						
		DWF	25-Year Design Event	2016	2017	2018	2019	2020	2021	2022
WWTP PHF Capacity = 685 L/s	Peak Instantaneous Flow	74	1,014	2	3	2	1	1	2	3
	Peak Hourly Flow	64	676							
Albert St CSO(1)	Overflow Volume	0	862							

Notes:
(1) Per the WWTP's Certificate of Authorization (CoA), the Albert St weir and overflow constitutes the WWTP bypass. Town operations staff have noted that bypasses (and hence, overflows at Albert St) are triggered when the levels in the WWTP inlet channel reach 900 mm.
(2) Bypasses as reported in the reports to Council and daily WWTP data provided from 2016 to 2022.

The Town's reports to Council and available SCADA data were analyzed to compare the measured flows against the WWTP's CoA average day and peak hour design flows. The historical (2016-2023) data is provided in **Figure 5-24**.

The 2017-2023 average daily flows were within the WWTP's average daily design flow, suggesting that the WWTP does not experience capacity issues. Our review of this data shows there is a decreasing trend in average flows to the WWTP. The Town has attributed this decreased water consumption to the Nylene facility (based on meter readings from 2011 to 2021), as well as to the elimination of dead-end watermain flushers which would continuously discharge into the sanitary sewers (replaced with bi-weekly hydrant flushing program and looping of dead-end watermains). This decreasing trend is expected to stabilize with growth.

The peak hour flows in 2018-2022 were within the WWTP's peak hour design flow, which also supports that the WWTP did not experience capacity issues during this time period. This aligns with the conclusions based on the average daily flows. Overall, the WWTP is expected to have capacity to service future growth within the MP's 20-year planning horizons.

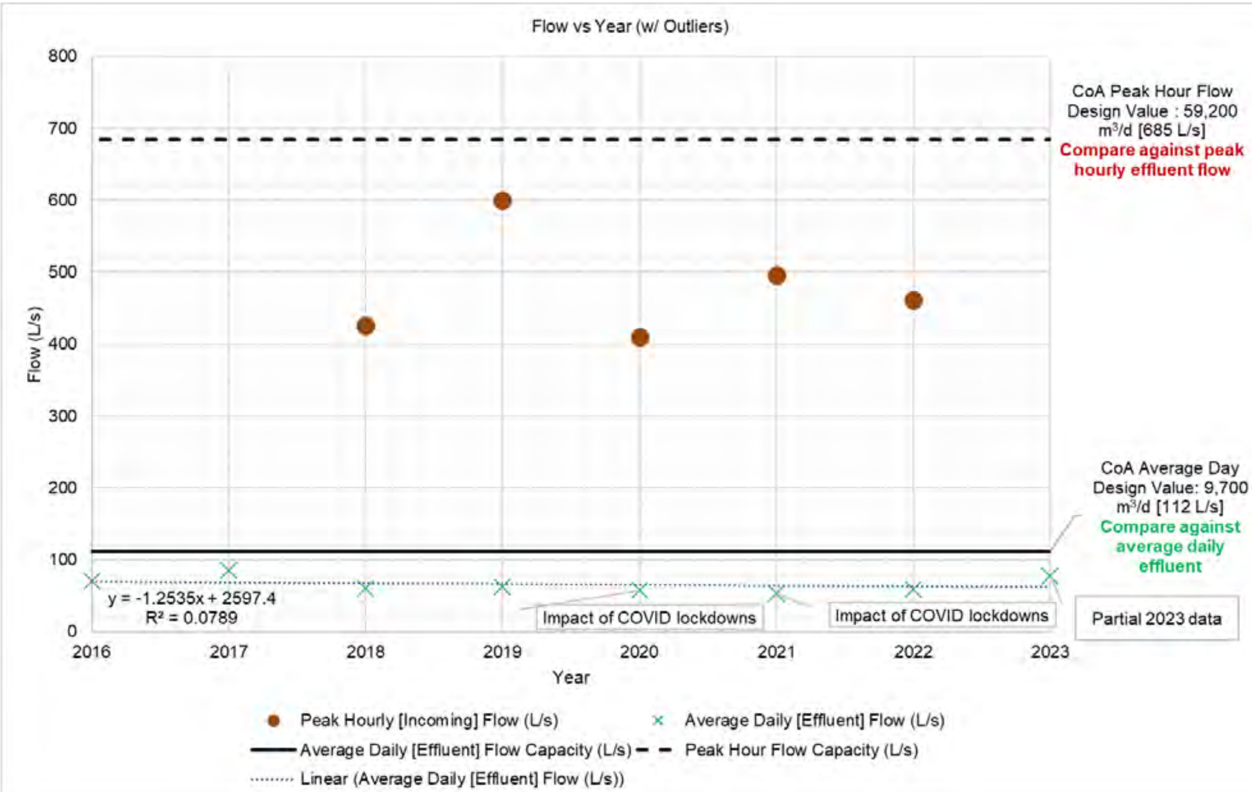


Figure 5-24: Historical (2016-2023) WWTP Flows

5.2.1.4.1 Effects of COVID-19 Pandemic

The onset of the COVID-19 pandemic in early 2020 has led to changes in daily habits with the implementation of work-from-home (WFH) policies. While the effects today may be reduced compared to those in 2020, deviations may be seen in residential and ICI diurnal flow generation, with potential increase in residential flow generation and decrease in ICI activity and flow generation. These changes in diurnal habits do not impact extreme WWF conditions, which are used for the assessment of the wastewater collection system. Nonetheless, should this be of interest to the Town beyond this MP, multi-year diurnal flows to the WWTP should be assessed to quantify potential changes due to changes in daily habits. Diurnal flows to other key locations within the system (e.g., downstream of ICI areas) could also be monitored, to understand the changes as they also relate to land use.

5.2.1.4.2 Climate Change Considerations

Climate change can lead to more intense extreme events, with higher intensity events gaining in frequency, increasing the risk of issues within the sanitary collection system. It therefore needs to be considered in planning for future solutions.

The impact of climate change is analyzed as part of developing a servicing strategy for growth, which is presented in **Chapter 3** (**Section 6**). The climate change analysis consist of a sensitivity analysis of the proposed solutions under a higher rainfall intensity scenario. For a selected shared socioeconomic pathway (SSP) climate change scenario, the online IDF_CC Tool from the Institute for Catastrophic Loss Reduction (ICLR) was used to predict the design event's rainfall under this SSP scenario. This rainfall was input in the hydraulic model, and the performance of the system with the infrastructure solutions was assessed for sensitivity. Recommendations for monitoring the system were made, and opportunities to size the solutions based on this sensitivity analysis were identified.

5.2.2 POTABLE WATER SYSTEM

As described in **Section 5.1.2**, the hydraulic model was updated to reflect the existing water distribution system and current system operations and validated against available recorded data. The validated model was then further updated to incorporate the additional watermain replacements/additions identified by the Town (refer to **Table 4-7**), and used to assess the performance of the WFP and existing water distribution system under different demand conditions.

5.2.2.1 Water Treatment Plant

The WFP was upgraded in 2010 and has a MXDY flow capacity of 10,340 m^3/d with respect to treatment as per the Town's MDWL dated March 31, 2021. **Table 5-20** provides the historical AVDY and MXDY treated water flows of the WFP. For MXDY treated water flows, all outlier flows (e.g., high flows due to watermain breaks, refilling of the EST, and reported clearwell issue) identified in *Water & Sewage Plant Committed Capacity / Uncommitted Reserve Capacity Spreadsheet Assessment* (Town of Arnprior, 2022) were excluded. The highest MXDY flow observed from 2016 to 2021 is 6,490 m^3/d which occurred in 2020. This maximum flow rate corresponds to 63% of the current WFP's rated treatment capacity. If a design value of 280 L/c/d is considered as per the City of Ottawa Water Distribution Design Guidelines as well as a MXDY demand peaking factor of 1.43, the remaining treatment capacity available at the WFP is equivalent to approximately 9,600 persons or approximately 3,000 single family home (SFH) equivalents (at 3.2 persons per SFH).

Table 5-20: Historical System Demands

Year	WFP's Rated Treatment Capacity (m^3/d)	AVDY Treated Water Flow at WFP (m^3/d)	MXDY Treated Water Flow at WFP [1]			Residual Treatment Capacity (Rated Capacity – MXDY)	
			Flow in m^3/d	% of Rated Treatment Capacity	Month when the Flow Occurred	Flow in m^3/d	% of Rated Treatment Capacity
2016	10,340	4,580	6,154	60%	August	4,186	40%
2017	10,340	4,473	6,471	63%	July	3,869	37%
2018	10,340	4,000	5,852	57%	July	4,488	43%
2019	10,340	3,819	5,397	52%	July	4,943	48%
2020	10,340	3,997	6,490	63%	August	3,850	37%
2021	10,340	4,007	5,235	51%	June	5,105	49%

Note:
(1). This table excludes all anomalies in WFP maximum daily treated flow data (e.g., high flows due to watermain breaks, refilling of the EST, and reported clearwell issue) based on *Water & Sewage Plant Committed Capacity / Uncommitted Reserve Capacity Spreadsheet Assessment* (Town of Arnprior, 2022).

5.2.2.1.1 Effects of COVID-19 Pandemic

As with the observations and effects noted on the wastewater treatment plant, changes to daily habits due to work-from-home policies in 2020 had impacts on residential and ICI diurnal demands. While the effects today may be reduced compared to those in 2020, deviations may be seen in residential and ICI diurnal demand, with potential increase in residential demands and decrease in those associated with ICI activity.

At a macro level, the effect of the pandemic is less discernible when looking at historical annual treated water flows at the WFP from 2016 to 2021, as illustrated in **Figure 5-25**. In general, the annual average daily treated flow decreased from 2016 to 2019. As noted by the Town, several dead-end bleeder/flusher valves were successfully eliminated since 2017, which correlates to the decrease in annual average daily flow from 2017 to 2019. In 2020 and 2021, the average daily treated flow increased slightly; however, there is no obvious trend in water consumption/production before and during the COVID pandemic. In terms of maximum daily treated water flows, the maximum daily flow increased markedly in 2020, but no continuing trend was observed from 2016 to 2021.

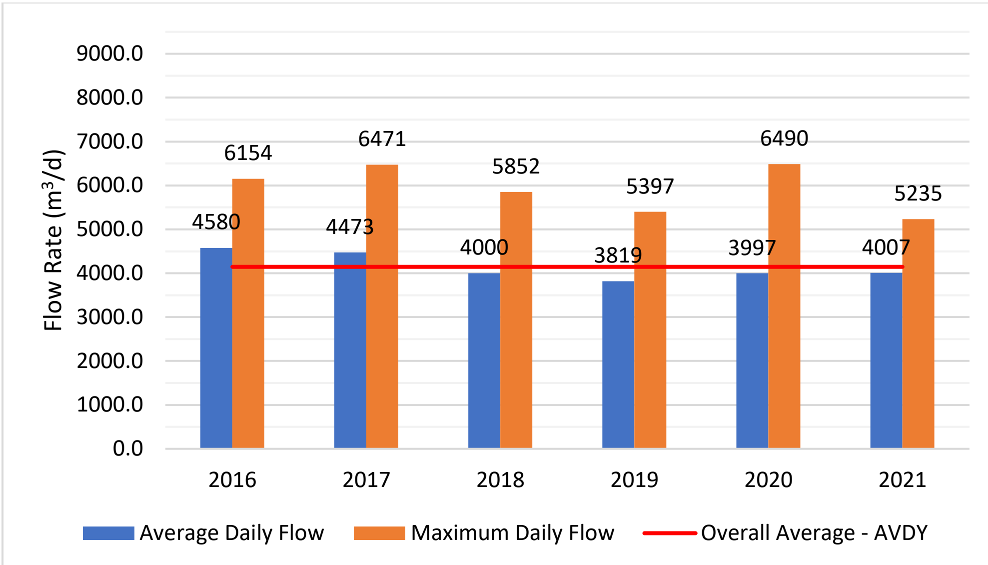


Figure 5-25: 2016 - 2021 WFP Treated Water Flows (Annual Average and Maximum Daily Flows)

Although no obvious trends were discovered on annual water consumption pre and during COVID pandemic, changes in monthly water consumption pattern were observed in 2020. As shown in **Figure 5-26**, the highest monthly average daily flows in 2020 occurred in March and April which is inconsistent with the typical monthly water use trend as in all the other years (i.e., highest water consumption typically occurred during summer months). The relatively high-water consumption in March and April 2020 may be partially the result of COVID pandemic (e.g., WFH policies) considering the lockdowns in Ontario started in March 2020, as well as due to the watermain break at the Madawaska River crossing in April 2020. Since these changes in monthly average daily flow were observed only in 2020 but not in 2021, the effects on monthly water consumption today may be reduced and thus would likely not impact the existing conditions. Nonetheless, should this be of interest to the Town beyond this MP, multi-year diurnal flows from the WFP may be assessed to quantify potential changes due to changes in daily habits.

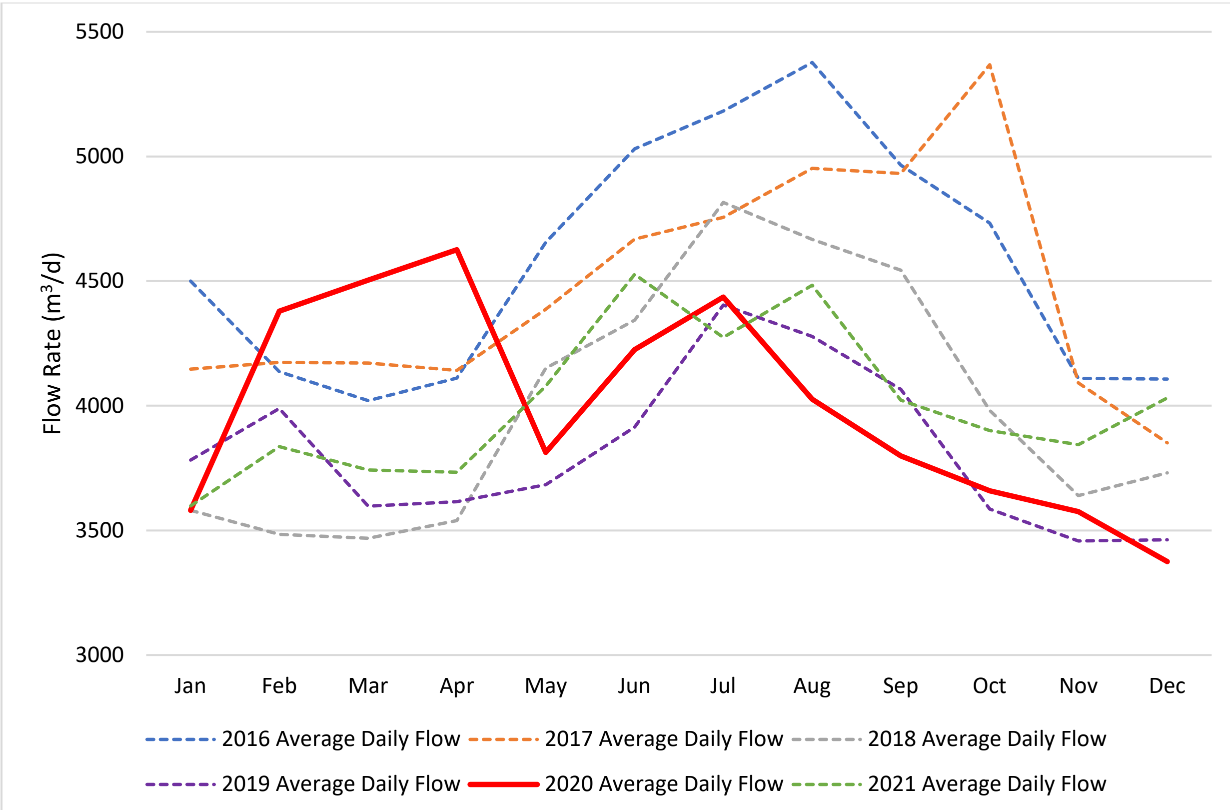


Figure 5-26: 2016 - 2021 WFP Treated Water Flows (Monthly Average Daily Flow)

5.2.2.1.2 Climate Change Considerations

Climate change will likely lead to higher climate variability with more extreme weather events, which increase the risk to potable water infrastructure. Examples of potential risks or impacts on potable water infrastructure include higher outdoor water demand (OWD) resulting from increased temperatures or decreased precipitation; greater risk of watermain breaks caused by increased freeze-thaw cycles, cold extremes, warm extremes, or drought; and/or facility (e.g., WFP, EST) failure resulting from flooding or extreme and shock weather events.

The impact of climate change was evaluated as part of the servicing alternatives development and is discussed in **Chapter 3** (**Section 6**). For the preferred servicing strategy, a sensitivity analysis was performed on the 2042 scenarios to further explore the impacts of increased OWD on MXDY water consumption, as well as the proposed infrastructure upgrades' response in terms of level of service. The MXDY increase was determined during the sensitivity analysis.

Moreover, certain climate parameters may be correlated to the occurrence of emergency scenarios (e.g., pipe breaks). Certain emergency scenarios (e.g., failure of key feedermains, WFP) may also be simulated, in order to identify potential opportunities with respect to system redundancy/reliability.

5.2.2.2 Storage

The EST located at 433 Hartney St has a rated capacity of 2,365 m^3 (624,800 liquid gallons) as per the Gallonage Chart of the EST provided by the Town. This tank has minimum and maximum operating elevations of 141.8 m and 152.5 m, respectively. Treated water storage is also provided at the WFP by two concrete clearwells with a total capacity of 3,971 m^3 (volumes of clearwell 1 and 2 are 2,167 m^3 and 1,804 m^3 respectively as per the Town's DWWP dated March 31, 2021). Water in the EST is fed from the two clearwells by the HLPs that are operated based on the water level in the EST. According to SCADA data, the EST typically operates between 60% (148.59 m) to 80% (150.54 m) of the overall volume. The pumps would start when percent full in the EST drops below 60% and stop when it reaches 80%.

Based on the MECP formula as discussed in **Chapter 1** (**Section 4**), the total treated water storage requirement for a 2022 population of 10,038 people in the Town is 4,406 m^3, as presented in **Table 5-21** below. This calculated treated water storage requirement is less than the total available system storage of 6,336 m^3. Thus, the total capacity of the EST and clearwells at the WFP is sufficient to meet the storage needs for existing conditions.

Table 5-21: Treated Water Storage Requirement for the System Providing Fire Protection

MXDY Demand	Fire Flow Requirement		Fire Storage (A)	Equalization Storage (B = 25% of MXDY Demand)	Emergency Storage [C = 25% of (A + B)]	Total Treated Water Storage Requirement (A + B + C)
m^3/d	L/s	hrs	m^3	m^3	m^3	m^3
5,933	189	3	2,041	1,483	881	4,406

5.2.2.3 Pumping

The WFP currently operates three identical HLPs, each of which has a design flow of 125 L/s (10,800 m^3/d) and total dynamic head (TDH) of 70 m at the duty point. As confirmed by SCADA data, the three HLPs alternate duties. Under existing conditions, the duty pump is controlled to operate based on the water level in the EST, as described in **Section 5.2.2.2**.

With the largest pump out of service, the firm capacity of the HLPs is 250 L/s (21,600 m^3/d). Assuming that 50% of the EST's operating volume (i.e., 1,182.5 m^3) would be available for fire flow conditions, the volume is equivalent to a flow rate of 109 L/s (9,460 m^3/d) over a 3-hour fire duration. By summing the firm capacity of the HLPs and the available fire flow from the EST, the total capacity becomes 359 L/s (31,060 m^3/d).

The current MXDY demand of 69 L/s (5,933 m^3/d) plus the MECP fire flow of 189 L/s (16,330 m^3/d) is equal to 258 L/s (22,263 m^3/d), which is less than the total available capacity of 359 L/s (31,060 m^3/d). Therefore, the total capacity considering the firm capacity of the HLPs and the available fire flow from the EST is sufficient to meet the existing system needs.

5.2.2.4 Distribution Pipe Network

Model results for existing AVDY, MXDY, and MXDY + fire flow demand scenarios are presented in the following subsections. AVDY and MXDY scenarios were run over an extended period of time (72-hr) assuming one HLP to be called into service and controlled by the water level in the EST as described in **Section 5.1.2.1**. For MXDY + fire flow scenario, a steady-state simulation was run with two HLPs in service (i.e., assuming the largest pump is offline).

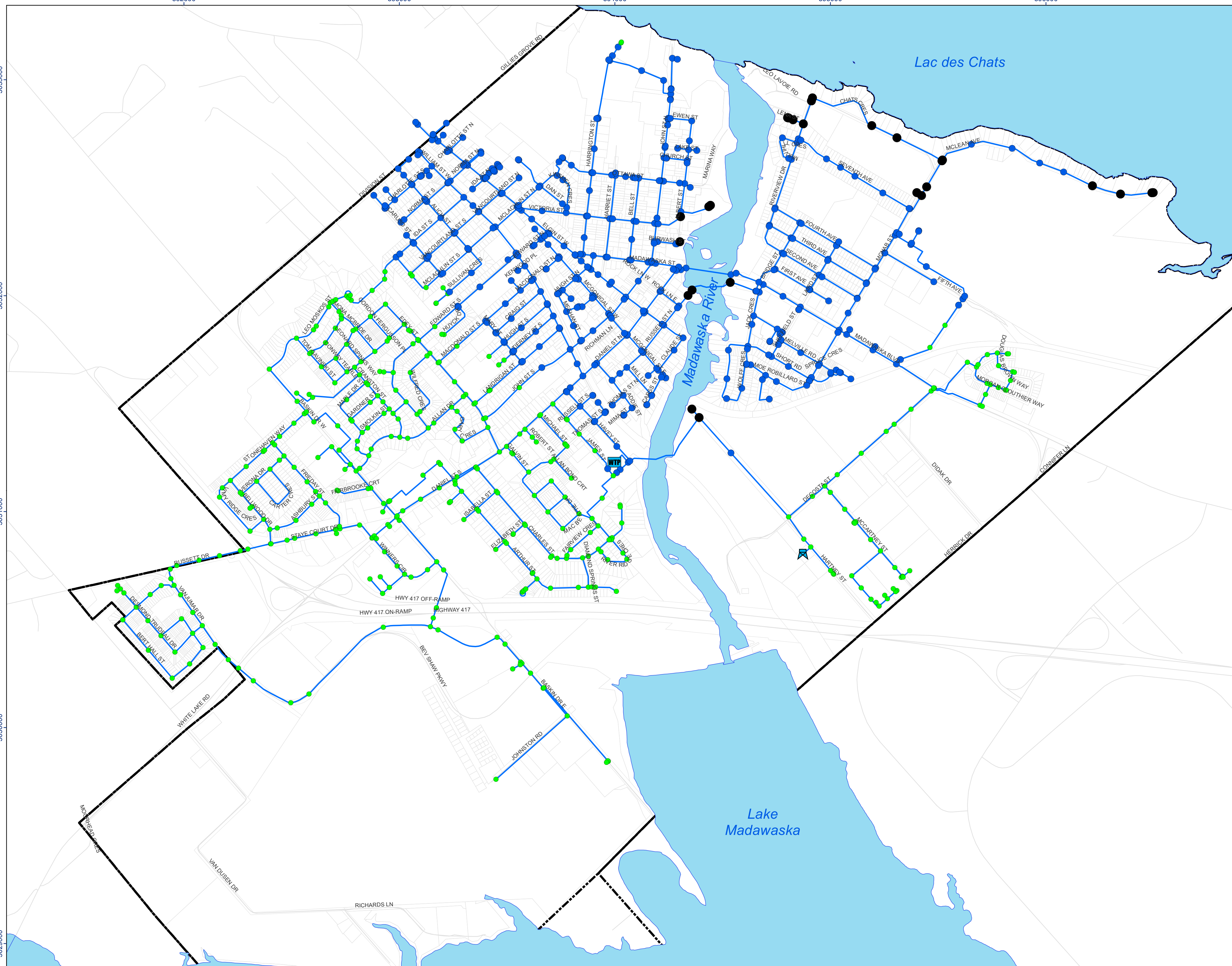
5.2.2.4.1 System Head / Pressures

Figure 5-27 shows model results for maximum pressures under AVDY demands throughout the existing water distribution system. Hydraulic modelling shows maximum pressures ranging from 61 to 108 psi, with the EST operating between 60 to 80% full. Maximum pressures are mostly above the MECP's recommended maximum operating pressure of 70 psi, areas with maximum pressures above 80 psi but below 100 psi are anticipated in lower elevation areas, northeast of Caruso St, Mary St, and Havey St, and north of the Canadian National Railway corridor. There are a few areas with maximum pressures greater than 100 psi in low-lying areas along the shorelines of the Ottawa and Madawaska Rivers.

Figure 5-28 presents model results for minimum pressures under MXDY demands (at peak hour [PKHR]) throughout the existing water distribution system. Hydraulic modelling shows the EST operates between 60 to 80% full, and minimum pressures ranging from 53 to 101 psi which are above the MECP's recommended minimum operating pressure of 50 psi. No minimum pressures less than 40 psi are anticipated.

5.2.2.4.2 Fire Flows

Figure 5-29 shows model results for available fire flows at a residual pressure of 20 psi under MXDY plus fire flow demands throughout the existing water distribution system. Available fire flows in the system are generally greater than 33.33 L/s (2,000 L/min) which meets the minimum fire flow requirement of 2,000 L/min as per the FUS guidelines. Available fire flows less than 33.33 L/s are observed in a few areas throughout the Town. These areas are generally serviced by a local watermain with a diameter less than 150 mm and/or are located along a dead-end watermain, which limit fire flow availability.



Stantec

Legend

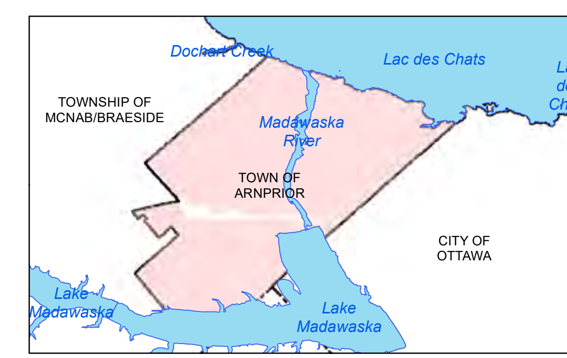
Maximum Pressure

- Max. Pressure ≤ 40 psi
- 40 psi < Max. Pressure ≤ 60 psi
- 60 psi < Max. Pressure ≤ 80 psi
- 80 psi < Max. Pressure ≤ 100 psi
- Max. Pressure > 100 psi
- Watermains
- WTP Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-11-08

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
5-27

Title
Model Results: Existing Conditions (2022) – AVDY Maximum Pressures

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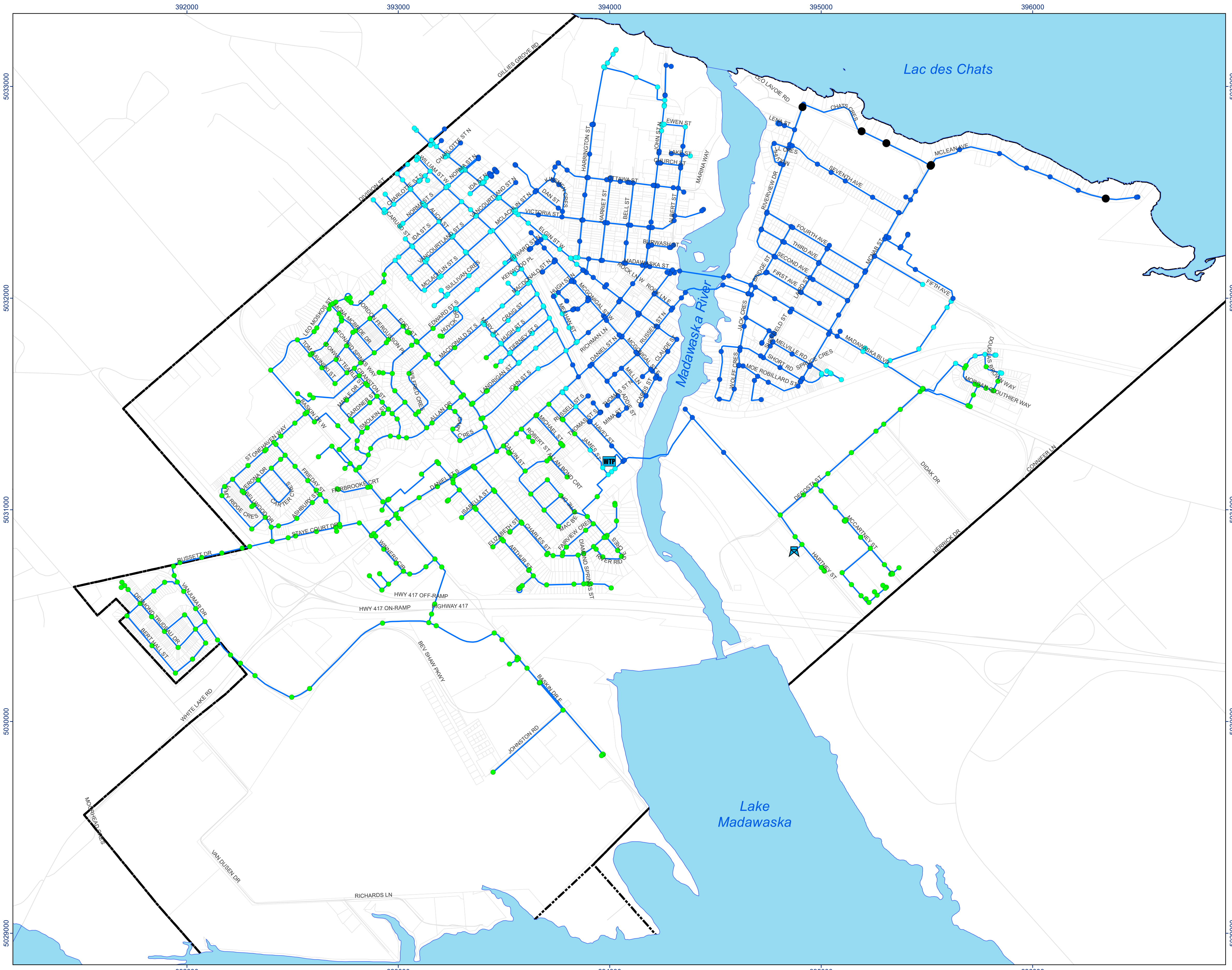


Legend

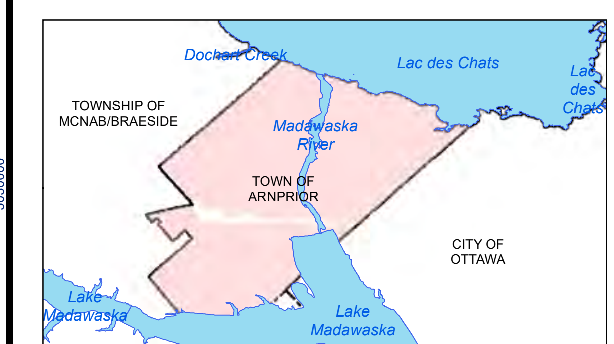
Minimum Pressure

- Min. Pressure ≤ 20 psi
- 20 psi < Min. Pressure ≤ 40 psi
- 40 psi < Min. Pressure ≤ 50 psi
- 50 psi < Min. Pressure ≤ 70 psi
- 70 psi < Min. Pressure ≤ 80 psi
- 80 psi < Min. Pressure ≤ 100 psi
- Min. Pressure > 100 psi
- Watermains
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp,* and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location Prepared by CZ on 2023-11-08
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-28

Title
Model Results: Existing Conditions (2022) – MXDY Minimum Pressures

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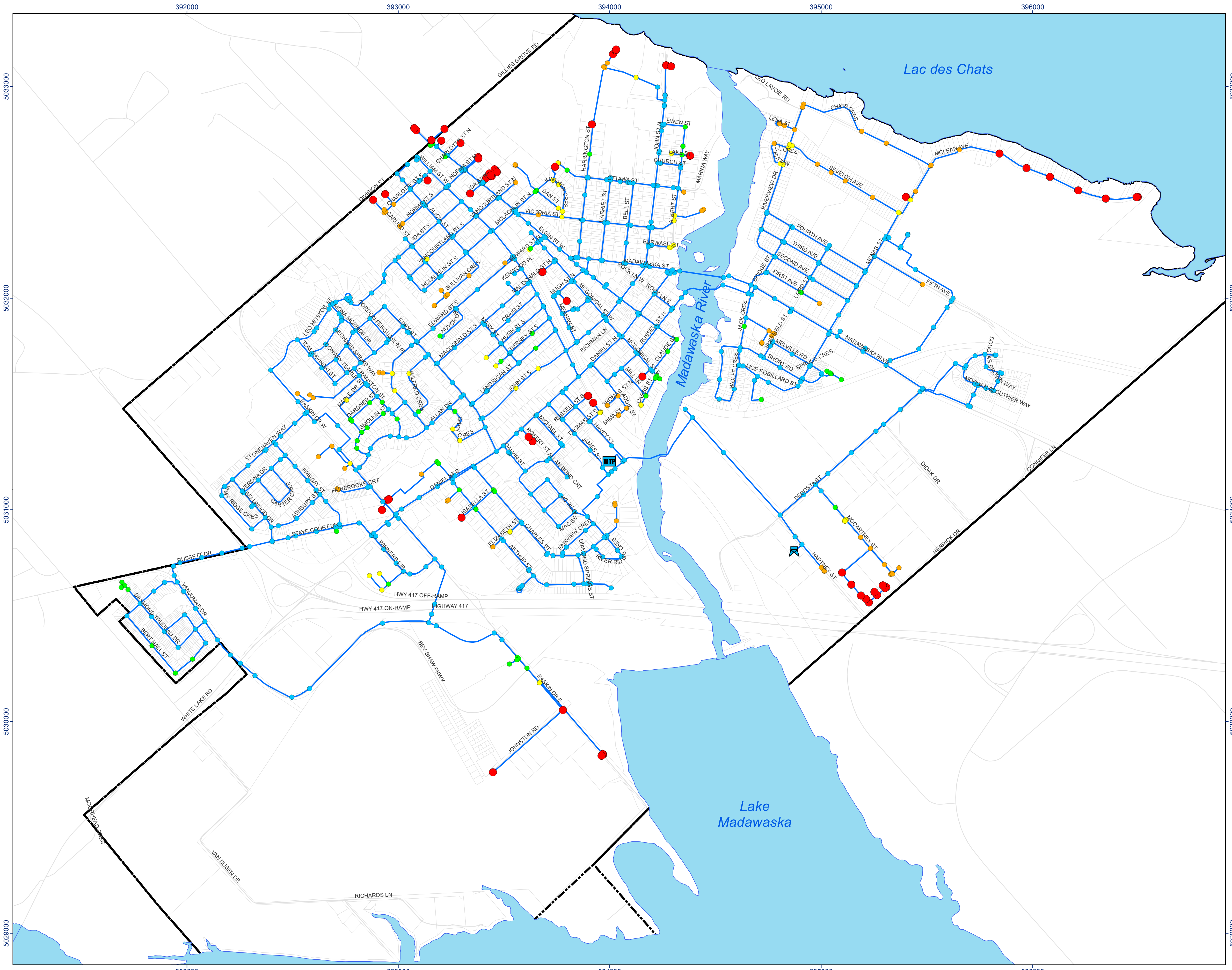

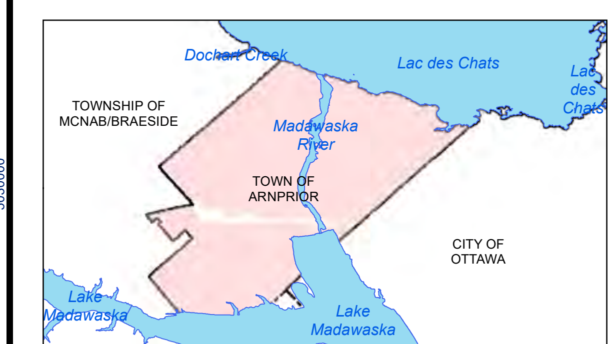

Stantec

Legend

Available Fire Flow at 20 psi (AFF)

- AFF < 33.33 L/s
- 33.33 L/s ≤ AFF ≤ 75 L/s
- 75 L/s < AFF ≤ 100 L/s
- 100 L/s < AFF ≤ 125 L/s
- AFF > 125 L/s
- Watermains
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
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Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario

Project Location Prepared by CZ on 2023-11-08
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-29

Title
Model Results: Existing Conditions (2022) – MXDY Available Fire Flow at 20 psi

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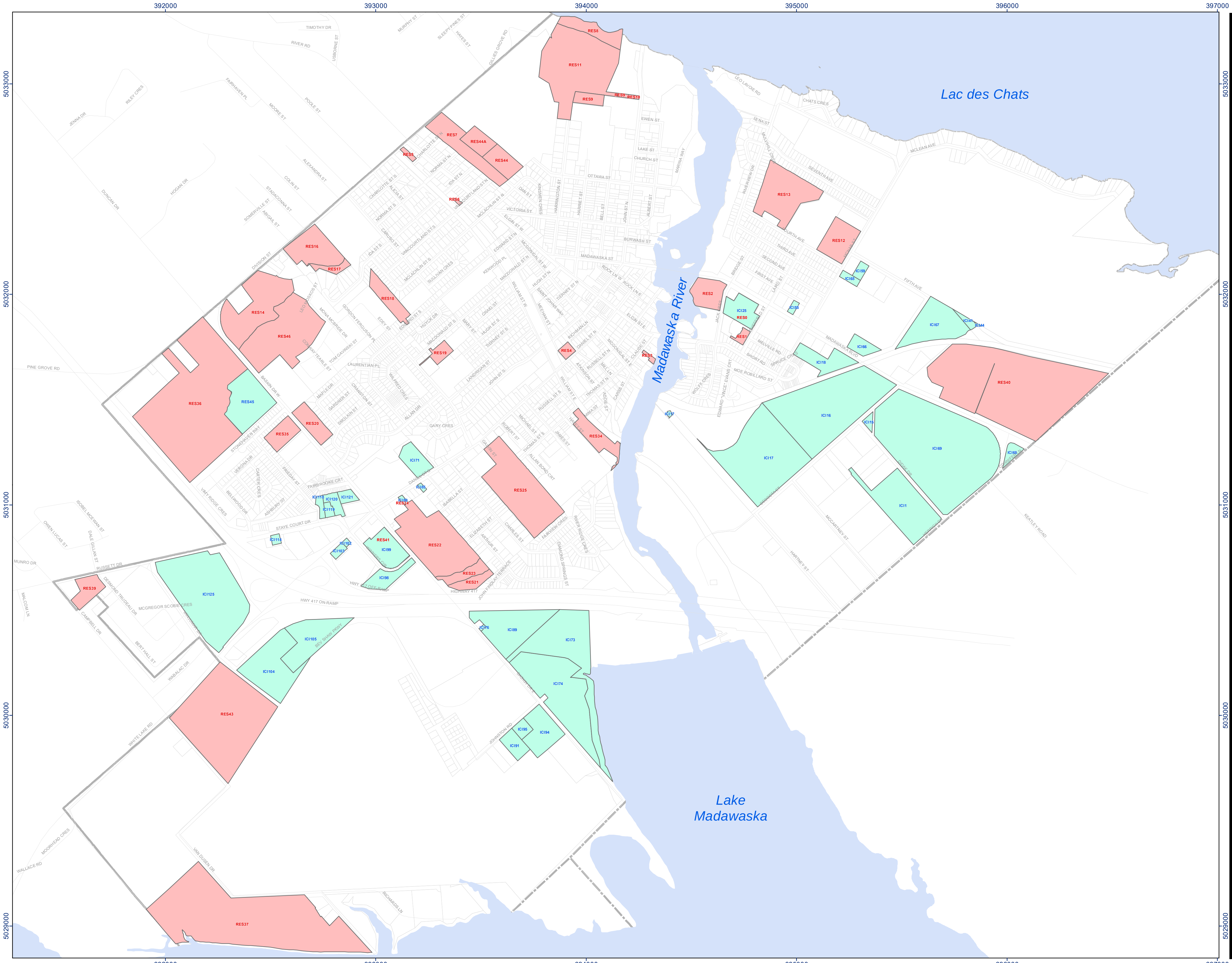
5.3 Growth Projections

This Master Plan aims to identify infrastructure needs to service growth in the Town. This section therefore presents growth projections for the established 5-year (2027), 10-year (2032), and 20-year (2042) horizons.

5.3.1 GROWTH AREAS INSIDE TOWN BOUNDARIES

Growth projections were established with input from the Town and using the information from the background studies described in **Chapter 1** (**Section 4**) pertaining to growth and land use. Potential residential and ICI growth areas were initially identified based on the information presented in the *Growth Management Strategy – Draft Report* (Watson & Associates Economists Ltd., 2022; 2022 GMS), with additional information from the *Water & Sewage Plant Committed Capacity / Uncommitted Reserve Capacity Spreadsheet Assessment* (Town of Arnprior, 2022). This information was reviewed with the Town, to confirm the anticipated buildout population/area and timeline (horizon) of each development. The growth areas identified in these background studies and for which information was provided are all within the Town's existing boundaries.

Residential and ICI growth areas are shown in **Figure 5-30**. Detailed growth projection information for each area is provided in **Appendix C.1**.



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Legend

- Potential Residential Growth Areas
- Potential ICI Growth Areas

N

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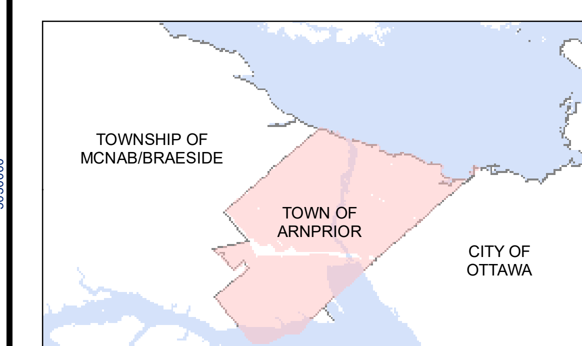
Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Arnprior_PropertyParcels_wAssessment_20220324.shp, Employment_Parcels_Dec2021.shp,Res_Parcels_Dec2021.shp, Export_Arnprior_Road_Network_2020.shp*, OBOUNDARY provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: ICI = Industrial, Commercial, Institutional



Project Location Prepared by CR on 2023-02-13
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-30

Title
Growth Areas

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5.3.2 GROWTH AREAS OUTSIDE TOWN BOUNDARIES

The population projections presented herein currently only pertain to growth areas identified within the Town's existing boundaries. However, it is understood that the Town has interest in understanding the ability of its infrastructure to accommodate additional growth outside of its current boundary. This potential was explored as part of **Chapter 3** (**Section 6**). Refer to **Section 6.6** for details about outside interests.

5.3.3 POPULATION PROJECTIONS

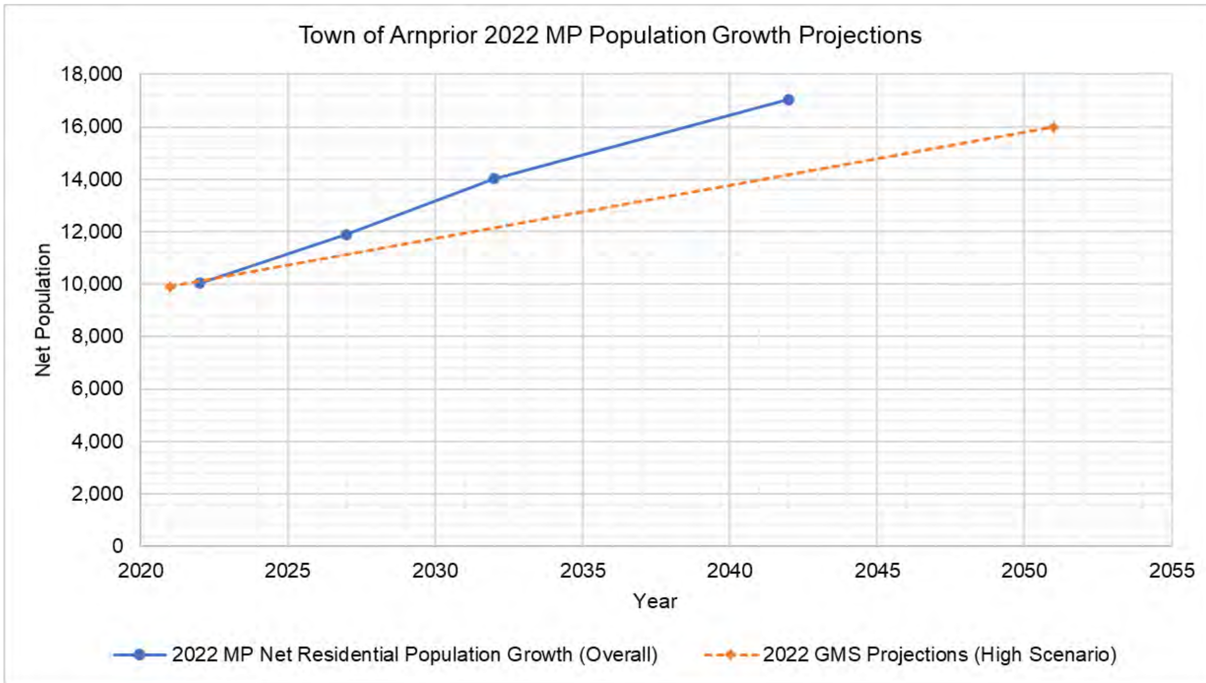
Table 5-22 shows the projected total population and ICI area within each horizon. Note that the ICI area is typically based on total parcel area and does not reflect only developed portions of each parcel. **Table 5-22** also shows the existing population or ICI area, which is subtracted within each horizon, to account for existing site redevelopments. **Figure 5-31** illustrates projected residential populations, showing a comparison between the 2022 W&WWMP projections and the 2022 GMS growth projections. The 2022 W&WWMP projections are generally more aggressive than the 2022 GMS growth projections. A similar comparison with comparable conclusions is presented in the 2013 MP.

Figure 5-32 illustrates projected ICI areas. Total ICI areas are projected to generally increase within the 20-year horizon. ICI areas will experience small decreases due to the conversion of ICI areas into residential areas. The 2022 GMS does not present ICI area projections; therefore, no comparison is presented in **Figure 5-32**.

Population projections, as they specifically apply to each system, are discussed in **Section 5.4.1** (wastewater flow generation) and **Section 5.4.2** (water demand calculations).

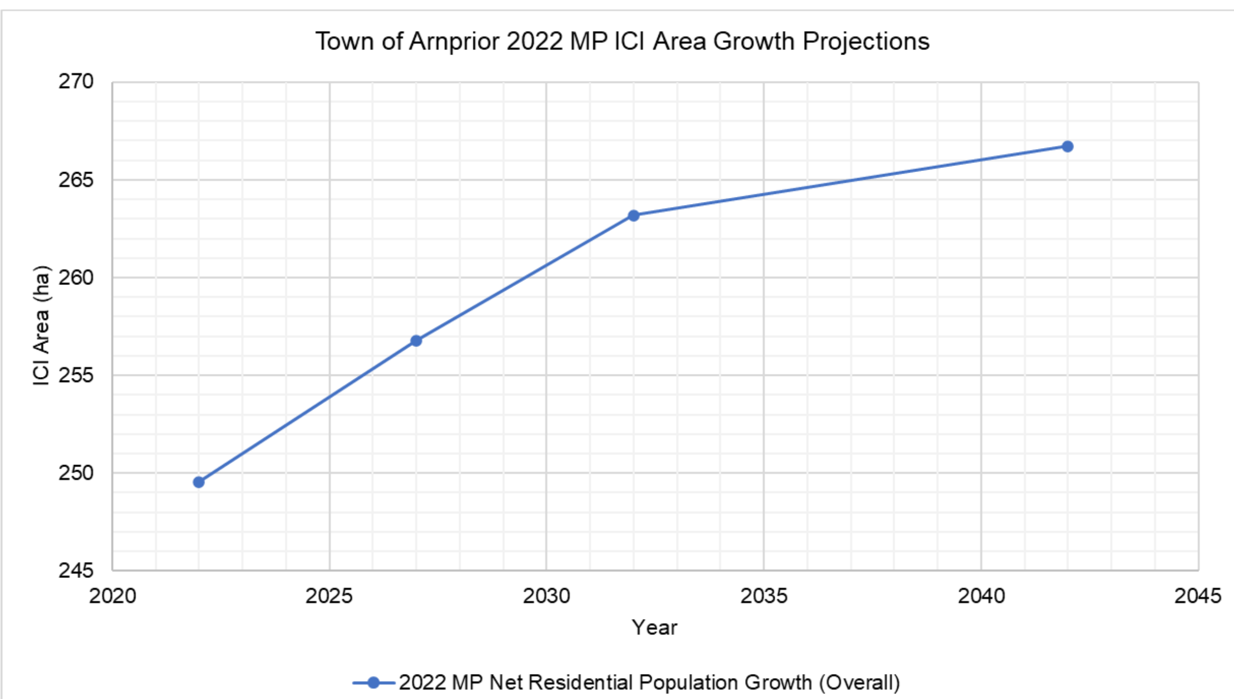
Table 5-22: Summary of Growth Projections

2022 W&WWMP Town of Arnprior Growth Projections													
Horizon	**Existing (2022)**	**5-Year Horizon (2027)**				**10-Year Horizon (2032)**				**20-Year Horizon (2042)**			
	Total	**Redeveloped (Removed)**	**Added**	**Net Growth**	**Total**	**Redeveloped (Removed)**	**Added**	**Net Growth**	**Total**	**Redeveloped (Removed)**	**Added**	**Net Growth**	**Total**
Population	***10,038***	-	+1,860	+1,860	***11,898***	-48	+2,166	+2,118	***14,016***	-	+3,035	+3,035	***17,051***
ICI Area (ha)	***250***	-2.7	+9.9	+7.2	***257***	-1.6	+8.0	+6.4	***263***	-	+3.5	+3.5	***267***



***Note**: refer to **Appendix C** for detailed projections.*

Figure 5-31: Town of Arnprior 2022 W&WWMP Population Projections



***Note**: refer to **Appendix C** for detailed projections.*

Figure 5-32: Town of Arnprior 2022 W&WWMP ICI Area Projections

5.4 Future Wastewater Generation and Water Demands

This section presents the parameters which, along with the growth projections presented in **Section 5.3**, are used to generate future wastewater flows and water demands.

5.4.1 WASTEWATER FLOWS

Future wastewater flows are generated considering the growth information provided by the Town for redevelopments and new developments. It should be noted that the future population serviced by the wastewater collection system only considers the current areas serviced by the existing collection system, i.e., 8,984 people and 160 ha of ICI properties, as presented in **Section 5.1.1.2**. The growth projections presented in **Section 5.3** are added onto the existing serviced population and ICI areas. Properties currently not serviced by the wastewater collection system under existing conditions are assumed to remain so under future conditions unless the property is being redeveloped and considered as part of the growth projections.

5.4.1.1 Future Wastewater Generation Parameters

Future wastewater generation parameters were determined based on the hydraulic model calibration (see **Section 5.1.1.6**) and on the City of Ottawa Design Guidelines. The parameters consist of GWI and sewage generation rates, diurnal patterns and RTK hydrographs.

For infill developments or vacant property development within existing subcatchment areas, it is assumed that the existing sewers within the right-of-way (ROW) remain. As such, the existing calibrated metershed GWI and I/I parameters (GWI rates, RTK hydrographs and effective areas) are maintained for these areas (i.e., total GWI flow and I/I generated remain unchanged). Design parameters for sewage generation within the infill developments are applied. Diurnal sewage generation is assumed to follow the calibrated pattern for the existing metershed. To account for the replacement of existing development by infill developments, the average sewage flows from the existing developments are subtracted when appropriate.

For new developments in new areas (e.g., new subdivisions), which are not within the existing sanitary subcatchments, it is assumed that new separated sewers will be installed. Therefore, calibrated parameters for representative metersheds were applied. The calibrated GWI rate and RTK hydrograph for FM 1 were applied, as FM 1 comprises newer developments and new sewers in the Town, where infiltration is low (see sewer age in **Figure 5-2**). Since the layout of the new sewers within these new developments is unknown, the effective area was conservatively assumed to correspond to the total development area per horizon. Design parameters for sewage generation within the new developments was also applied. Diurnal sewage generation was assumed to follow the calibrated patterns for representative metersheds based on land use. Thus, the FM 1 diurnal pattern was applied to new residential developments, and the FM 6 diurnal pattern was applied to new ICI developments.

Table 5-23 summarizes the future wastewater generation parameters used in this assessment.

Table 5-23: Future Wastewater Generation Parameters

Parameter	Redevelopments or Development (Occupancy) of Vacant Properties within Existing Subcatchments	New Developments (New Subcatchments)
GWI Rate	Calibrated Metershed GWI Rate (see **Table 5-8**)	0.05 L/s/ha[2]
Residential Sewage Generation Rate	280 L/c/d[2]	
Light Industrial Sewage Generation Rate	35,000 L/ha/d[2]	
Commercial and Institutional Sewage Generation Rate	28,000 L/ha/d[2]	
Residential Diurnal Pattern	Calibrated Metershed Diurnal Pattern (see **Appendix B.3**)	FM 1 Diurnal Pattern[3]
ICI Diurnal Pattern		FM 6 Diurnal Pattern[4]
RTKs (RDII Response)	Calibrated Metershed RTKs (see **Table 5-11**)	FM 1 RTKs[5]

Notes:
(1) Assumed representative of a typical GWI rate for a new separated system.
(2) Design parameter from the City of Ottawa Design Guidelines.
(3) Assumed representative of a typical pattern for a new residential development.
(4) Assumed representative of a typical pattern for a new ICI development.
(5) Assumed representative of a RDII response for a new separated system.

5.4.1.2 Future Wastewater Flows

The parameters presented in **Section 5.4.1.1** are applied to the growth projections presented in **Section 5.3** for the serviced area to generate future flows added to the wastewater collection system.

Table 5-24 summarizes the future wastewater flow generation for redevelopments and new areas. For each horizon, the total flows added to the existing conditions flows are presented. Future wastewater flow generation for redevelopments are added to the existing sanitary subcatchments, whereas new subcatchments are created for new growth areas. Total peak DWF increases due to the increase in population (or the development of ICI areas) upon redevelopment. It should be noted that only the sewage flow component of the DWF increases, as the total GWI generated by the existing subcatchments is not affected by the redevelopment, as explained in **Section 5.4.1.1**. Total peak WWF, however, does not change (increase) from existing peak WWF, as the total RDII generated by the existing subcatchments is not affected by the redevelopment, as explained in **Section 5.4.1.1**.

The existing subcatchments that were updated and the new subcatchments that were added are illustrated in **Figure 5-33**. Detailed future wastewater flows generated by growth areas per subcatchment are presented in **Appendix C**.

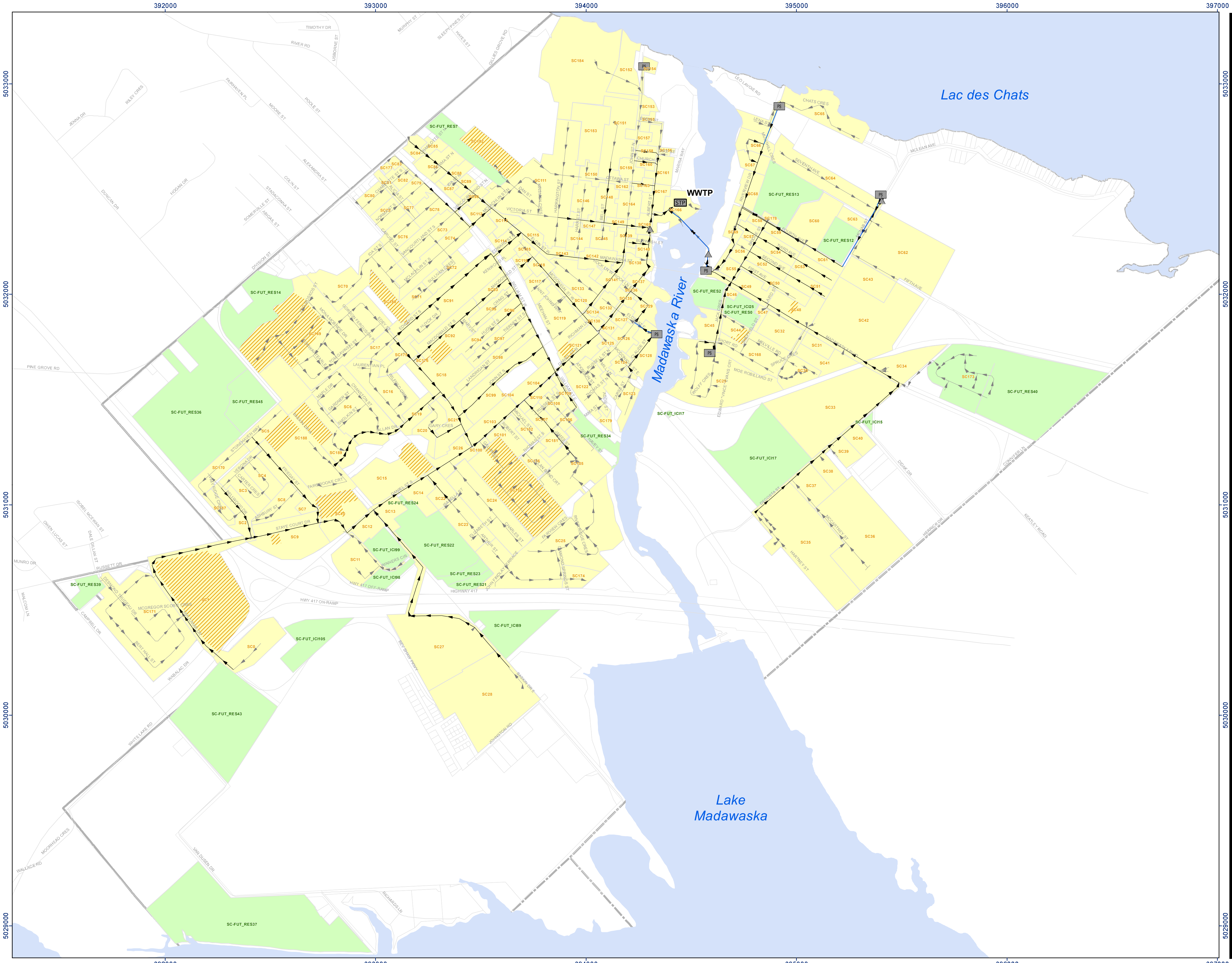
Table 5-24: Summary of Future Wastewater Flow Generation (Flow Added to Existing Conditions)

Parameter	Redevelopments/ Development (Occupancy) of Vacant Properties			New Developments			Total (Redevelopments + New Developments)		
	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)
Additional Peak DWF (L/s) *In addition to existing flows*	+4.6[(1)]	+5.8[(1)]	+9.6[(1)]	+8.2	+22.2	+39.0	+12.8	+28.0	+48.6
Additional Peak WWF (L/s) *In addition to existing flows*	-[(2)]	-[(2)]	-[(2)]	+12.6	+38.5	+69.6	+12.6	+38.5	+69.6
Total Additional Flow (DWF + WWF) (L/s) *In addition to existing flows*	+4.6	+5.8	+9.6	+20.8	+60.8	+108.8	+25.4	+66.5	+118.2

Notes:

(1) DWF = GWI + sewage; total peak DWF increases due to the increase in population (or the development of ICI areas) upon redevelopment. It should be noted that only the sewage flow component of the DWF increases, as the total GWI generated by the existing subcatchments is not affected by the redevelopment, as explained in **Section 5.4.1.1**.

(2) Total peak WWF in redevelopments does not change (increase) from existing peak WWF, as the total RDII generated by the existing subcatchments is not affected by the redevelopment, as explained in **Section 5.4.1.1**.



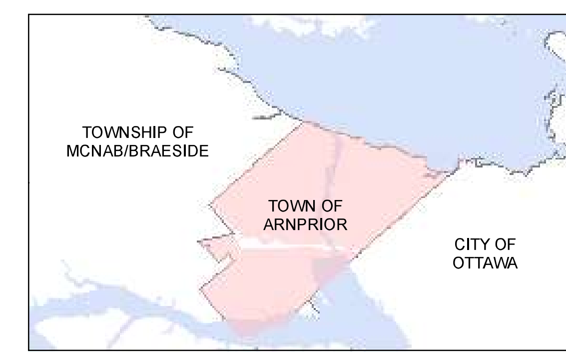
Legend

- Existing Subcatchment (Unchanged)
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment
- Overflow
- Wastewater Treatment Plant (WWTP)
- Sanitary Pump Station (PS)
- Forcemains
- Trunk Sanitary Sewer (Modelled)
- Local Sanitary Sewer (Not Modelled)

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Arnprior_PropertyParcels_wAssessment_20220324.shp*, *Employment_Parcels_Dec2021.shp*, *Res_Parcels_Dec2021.shp*, *Export_Arnprior_Road_Network_2020.shp*, *OBOUNDARY* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: ICI = Industrial, Commercial, Institutional



Project Location Prepared by CR on 2023-02-13
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-33

Title
Sanitary Subcatchments (Future Conditions)

5.4.2 POTABLE WATER DEMANDS

Future potable water flows are populated according to the growth information provided by the Town for redevelopments and new developments. By using the growth projections described in **Section 5.3**, future potable water demands for each planning horizon (i.e., 5-, 10-, and 20-year horizon) were calculated and applied to the existing water distribution system in the model.

5.4.2.1 Future Potable Water Demand Parameters

Table 5-25 summarizes the parameters used to calculate the future water demand for each growth area. The listed future water demand parameters were established based on primarily the City of Ottawa Water Distribution Design Guidelines as well as the MECP Design Guidelines for Drinking-Water Systems.

Table 5-25: Future Potable Water Demand Parameters

Parameter	Value Used	Unit
Average Day Demand, Residential (1)	280	L/c/d
Average Day Demand, Light Industrial (1)	35,000	L/gross ha/d
Average Day Demand, Commercial and Institutional (1)	28,000	L/gross ha/d
Maximum Day Peaking Factor, Residential (PF x AVDY) (2)	1.9	-
Maximum Day Peaking Factor, Light Industrial (PF x AVDY) (3)	1.5	-
Maximum Day Peaking Factor, Commercial and Institutional (PF x AVDY) (3)	1.5	-

Notes
(1) Design parameter from the City of Ottawa Water Distribution Design Guidelines.
(2) Design parameter from the MECP Design Guidelines for Drinking-Water Systems.
(3) Design parameter from the City of Ottawa Water Distribution Design Guidelines and is consistent with value used in the 2013 W&WWMP update.

5.4.2.2 Future Potable Water Demands

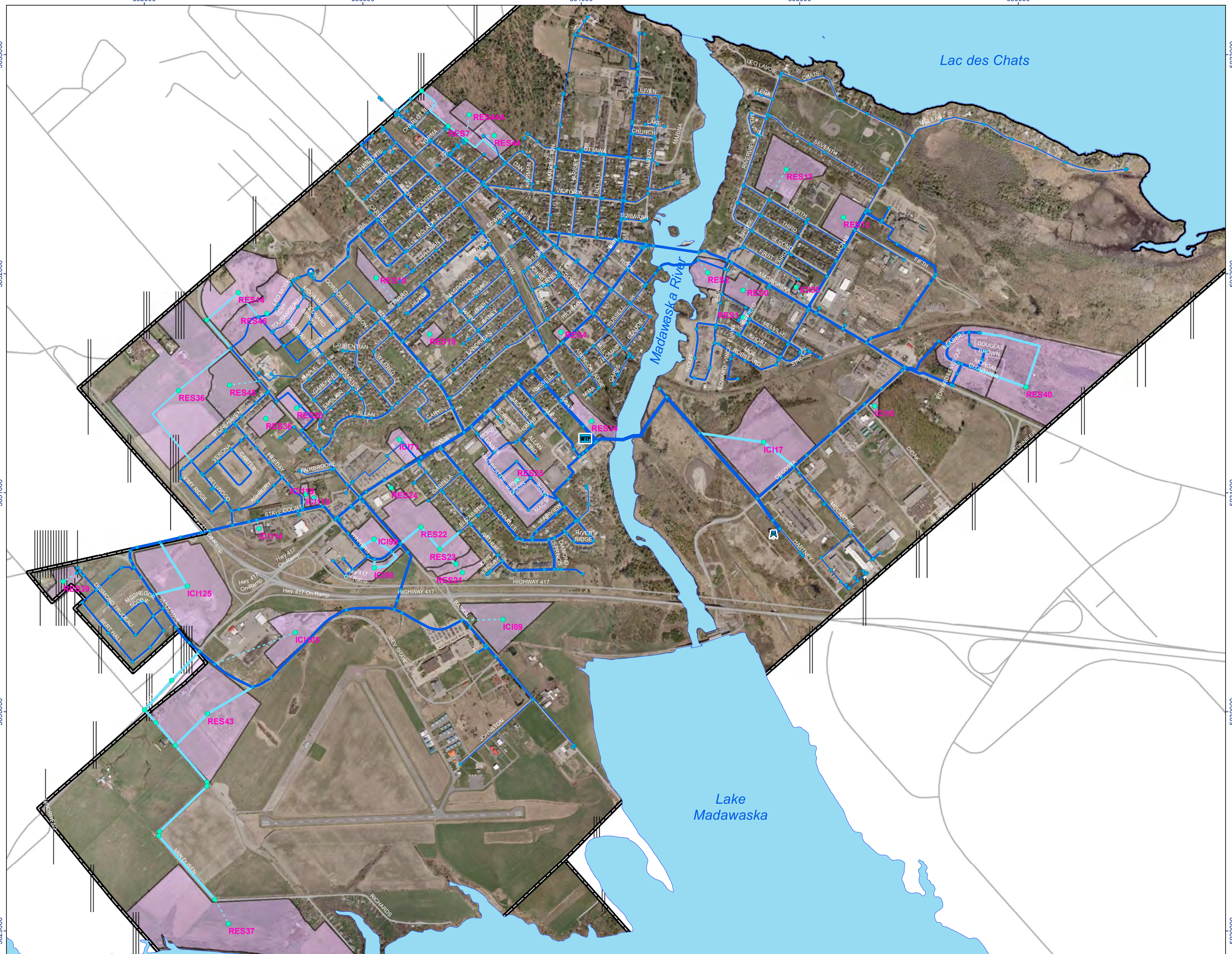
The parameters listed in **Table 5-25** were applied to the growth projections presented in **Section 5.3** for growth areas to generate future water demands for each planning horizon. **Table 5-26** summarizes the future water AVDY and MXDY demands generated by growth areas for each horizon. Detailed future water demands for each growth area are included in **Appendix C.3**. For redevelopments, the water consumption based on provided billing records for the existing properties is relatively small compared to the future demands. Considering that water demands were proportionally allocated to the distribution system under existing conditions, future water demands accounting for the entire redeveloped area were used as a conservative approach without subtracting existing water consumption.

Table 5-26: Summary of Future Potable Water Demands

Future Water Demands	Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)
Addition of AVDY Demand (L/s)	-	9.27	10.08	13.40
Total AVDY Demand (L/s)	47.99	57.26	67.34	80.74
Total AVDY Demand (m^3/d)	4,146	4,947	5,818	6,976
Addition of MXDY Demand (L/s)	-	16.32	17.94	24.04
Total MXDY Demand (L/s)	68.67	84.99	102.93	126.98
Total MXDY Demand (m^3/d)	5,933	7,343	8,894	10,971

To apply future water demands, a new node was added for each growth area in the model. A dummy pipe was created for each infill development to connect the added node to the existing water distribution system, whereas looped distribution mains were added for new subdivisions. For the added distribution mains, a diameter the same as the connected existing watermain was initially proposed, and the roughness coefficient was assigned based on the City of Ottawa Water Distribution Design Guidelines. The nodes, dummy pipes, and distribution mains that were added for future growth areas are illustrated in **Figure 5-34**. All added distribution mains were assumed based on the configuration of distribution system and location of new subdivisions. The Town has also indicated that the future water demands originally associated with growth area ICI105 could be re-allocated to the proposed car wash at adjacent site (i.e., Antrim Truck Stop at 580 White Lake Rd), as area ICI105 is proposed to be storage units with no anticipated water demands except for fire protection. Therefore, these future water demands (i.e., average day (AVDY) demand of 1.31 L/s and maximum day (MXDY) demand of 1.96 L/s under 2027 conditions) were re-assigned to the node near to the entrance of Antrim Truck Stop at Bev Shaw Pkwy.

It should be noted that growth area RES37 at Van Dusen Dr (Tartan Homes) with approximately 285 residential units is currently not serviced by the water distribution system. To service the RES37 area, a new watermain was initially proposed within the ROW extending from the existing distribution network at Bev Shaw Pkwy and along White Lake Rd and Van Dusen Dr. The City of Ottawa Water Distribution Design Guidelines define residential areas serving 50 or more dwellings and connecting to a single feedermain as vulnerable service areas, which may pose issues of reliability in the event of a watermain break. Details of the second watermain required to feed the RES37 area were investigated as part of the development of solutions in **Chapter 3** (**Section 6**).



Stantec

Legend

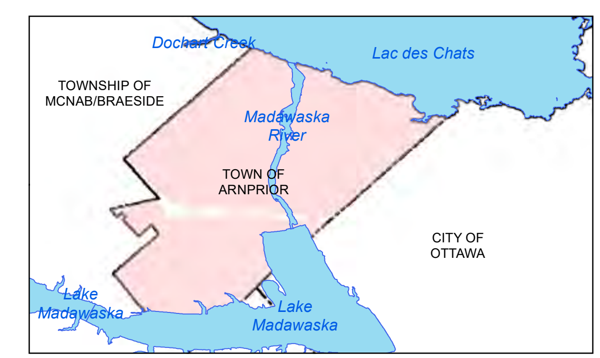
- Nodes Added for Growth Areas
- Dummy Pipes Added for Growth Areas
- Distribution Mains Added for Growth Areas
  - 150 mm - 225 mm
  - 225 mm - 350 mm
- Growth Areas with Future Water Demands
- Modelled Watermains - Diameter (mm)
  - < 75 mm
  - 75 mm - 150 mm
  - 150 mm - 225 mm
  - 225 mm - 350 mm
  - 350 mm - 600 mm
- Modelled Junctions
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 200 400 600 Meters

(At original document size of 11x17)
1:18,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *0837ARNP.sid*, *Arnprior_PropertyParcels_wAssessment_20220324.shp*, *Arnprior_Roads_20220324.shp* and *WTR_NODE.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: WFP: Water Filtration Plant



Project Location
Arnprior, ON

Prepared by CZ on 2023-02-16
Revised by CZ on 2024-01-16

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
5-34

Title
Water Distribution Network (Future Conditions Without Solutions)

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5.5 Do Nothing Alternative Assessment

The existing wastewater collection and potable water distribution systems were assessed under future conditions by applying the future flows and water demands developed in **Section 5.4**. This is equivalent to an assessment of the "do nothing" alternative as part of the Municipal Class Environmental Assessment (EA) process.

5.5.1 WASTEWATER COLLECTION SYSTEM

Similarly to the existing conditions assessment presented in **Section 5.2.1**, the existing wastewater collection system's performance is assessed under future (growth) conditions, by adding the flows generated in **Section 5.4.1** to the hydraulic model.

5.5.1.1 Boundary Conditions

The boundary conditions applied to the model for the future (growth) conditions system assessment remain unchanged from the boundary conditions applied under existing conditions and are presented in **Section 5.2.1.1**.

5.5.1.2 Planned Future Projects

The Town provided a list of planned long-term infrastructure projects, which will have an impact on the resulting flows in the system. They were therefore considered when identifying future problem areas and system improvements. The planned future wastewater collection system projects are summarized in **Table 5-27** and illustrated in **Figure 5-35**. The planned future projects notably consisted of:

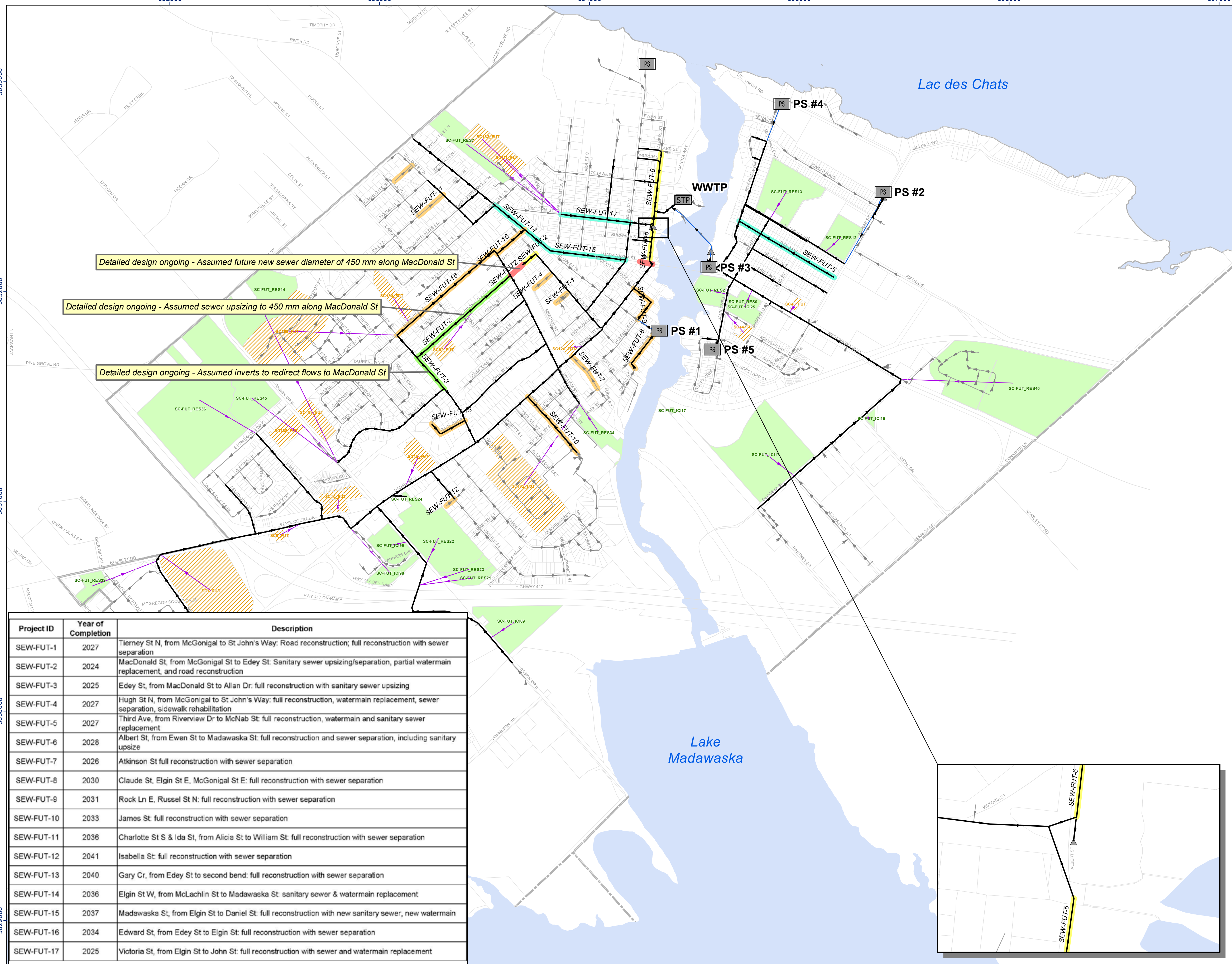
- **Sewer separations**: sewer separations were modelled by updating the RTK hydrographs applied at the loading nodes along the sewers being separated. The RTK hydrographs were updated by decreasing the R1 (short-term R) parameter, which represents disconnecting catchbasin leads. The R1 value was reduced to 0.9%, which was determined through calibration for unmonitored areas. Once sewer separation is completed, flows should be monitored to confirm the efficacy of separation and the resulting parameters.

- **Edey St redirection (projects SEW-FUT-2 and SEW-FUT-3 in Table 5-27)**: the Town is currently undertaking a project to redirect flows along Edey St. Existing flows from Edey St and Allan Dr are eastbound to Daniel St, and the future redirection will divert Allan Dr and Edey St flows west, and then northbound to MacDonald St. Based on conceptual design drawings, a new sewer will be installed on MacDonald St, connecting William St and McGonigal St. Detailed design information (inverts, new sewer diameters) are unavailable, therefore updated inverts along Edey St were assumed to redirect the flows as intended. The existing 250 mm and 300 mm diameter sewers along MacDonald St were upsized to 450 mm diameter, as they will be receiving flows from the existing 450 mm diameter sewers on Edey St. These assumptions should be confirmed once detailed design information is available and updated in the model.

Table 5-27: Planned Wastewater Collection Infrastructure Projects

Project ID	Year of Completion(1)	Description
SEW-FUT-1	2027	Tierney St N, from McGonigal to St John's Way: Road reconstruction; full reconstruction with sewer separation
SEW-FUT-2	2024	MacDonald St, from McGonigal St to Edey St: Sanitary sewer upsizing/separation, partial watermain replacement, and road reconstruction
SEW-FUT-3	2025	Edey St, from MacDonald St to Allan Dr: full reconstruction with sanitary sewer upsizing
SEW-FUT-4	2027	Hugh St N, from McGonigal to St John's Way: full reconstruction, watermain replacement, sewer separation, sidewalk rehabilitation
SEW-FUT-5	2027	Third Ave, from Riverview Dr to McNab St: full reconstruction, watermain and sanitary sewer replacement
SEW-FUT-6	2028	Albert St, from Ewen St to Madawaska St: full reconstruction and sewer separation, including sanitary upsize
SEW-FUT-7	2026	Atkinson St full reconstruction with sewer separation
SEW-FUT-8	2030	Claude St, Elgin St E, McGonigal St E: full reconstruction with sewer separation
SEW-FUT-9	2031	Rock Ln E, Russell St N: full reconstruction with sewer separation
SEW-FUT-10	2033	James St: full reconstruction with sewer separation
SEW-FUT-11	2036	Charlotte St S and Ida St, from Alicia St to William St: full reconstruction with sewer separation
SEW-FUT-12	2041	Isabella St: full reconstruction with sewer separation
SEW-FUT-13	2040	Gary Cr, from Edey St to second bend: full reconstruction with sewer separation
SEW-FUT-14	2036	Elgin St W, from McLachlin St to Madawaska St: sanitary sewer and watermain replacement
SEW-FUT-15	2037	Madawaska St, from Elgin St to Daniel St: full reconstruction with new sanitary sewer, new watermain
SEW-FUT-16	2034	Edward St, from Edey St to Elgin St: full reconstruction with sewer separation
SEW-FUT-17	2025	Victoria St, from Elgin St to John St: full reconstruction with sewer and watermain replacement

Note:
(1) Year of completion inferred from long-range capital forecasts (final year of planned capital investment).



Project ID	Year of Completion	Description
SEW-FUT-1	2027	Tierney St N, from McGonigal to St John's Way: Road reconstruction; full reconstruction with sewer separation
SEW-FUT-2	2024	MacDonald St, from McGonigal St to Edey St: Sanitary sewer upsizing/separation, partial watermain replacement, and road reconstruction
SEW-FUT-3	2025	Edey St, from MacDonald St to Allan Dr: full reconstruction with sanitary sewer upsizing
SEW-FUT-4	2027	Hugh St N, from McGonigal to St John's Way: full reconstruction, watermain replacement, sewer separation, sidewalk rehabilitation
SEW-FUT-5	2027	Third Ave, from Riverview Dr to McNab St: full reconstruction, watermain and sanitary sewer replacement
SEW-FUT-6	2028	Albert St, from Ewen St to Madawaska St: full reconstruction and sewer separation, including sanitary upsize
SEW-FUT-7	2026	Atkinson St full reconstruction with sewer separation
SEW-FUT-8	2030	Claude St, Elgin St E, McGonigal St E: full reconstruction with sewer separation
SEW-FUT-9	2031	Rock Ln E, Russel St N: full reconstruction with sewer separation
SEW-FUT-10	2033	James St: full reconstruction with sewer separation
SEW-FUT-11	2036	Charlotte St S & Ida St, from Alicia St to William St: full reconstruction with sewer separation
SEW-FUT-12	2041	Isabella St: full reconstruction with sewer separation
SEW-FUT-13	2040	Gary Cr, from Edey St to second bend: full reconstruction with sewer separation
SEW-FUT-14	2036	Elgin St W, from McLachlin St to Madawaska St: sanitary sewer & watermain replacement
SEW-FUT-15	2037	Madawaska St, from Elgin St to Daniel St: full reconstruction with new sanitary sewer, new watermain
SEW-FUT-16	2034	Edward St, from Edey St to Elgin St: full reconstruction with sewer separation
SEW-FUT-17	2025	Victoria St, from Elgin St to John St: full reconstruction with sewer and watermain replacement

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Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)
- Trunk Sanitary Sewer (Modelled)
- Local Sanitary Sewer (Not Modelled)
- Forcemains

Future Sewer Projects

- New Sewers
- Sewer Redirection (with Upsizing)
- Sewer Replacement (no Upsizing)
- Sewer Separation
- Sewer Separation (with Upsizing)

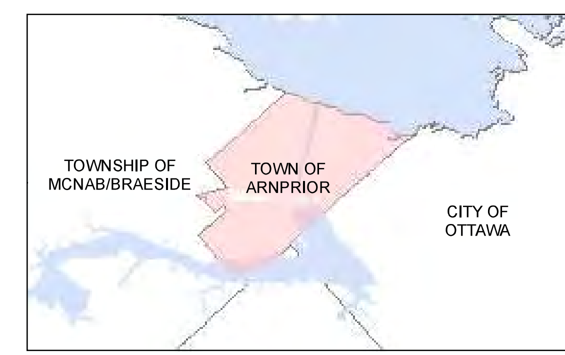
Growth Areas

- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment

N

0 250 500 Meters
(At original document size of 11x17)
1:19,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location Prepared by CR on 2023-11-06
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-35

Title
Planned Wastewater Collection Infrastructure Projects

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Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

5.5.1.3 Collection System

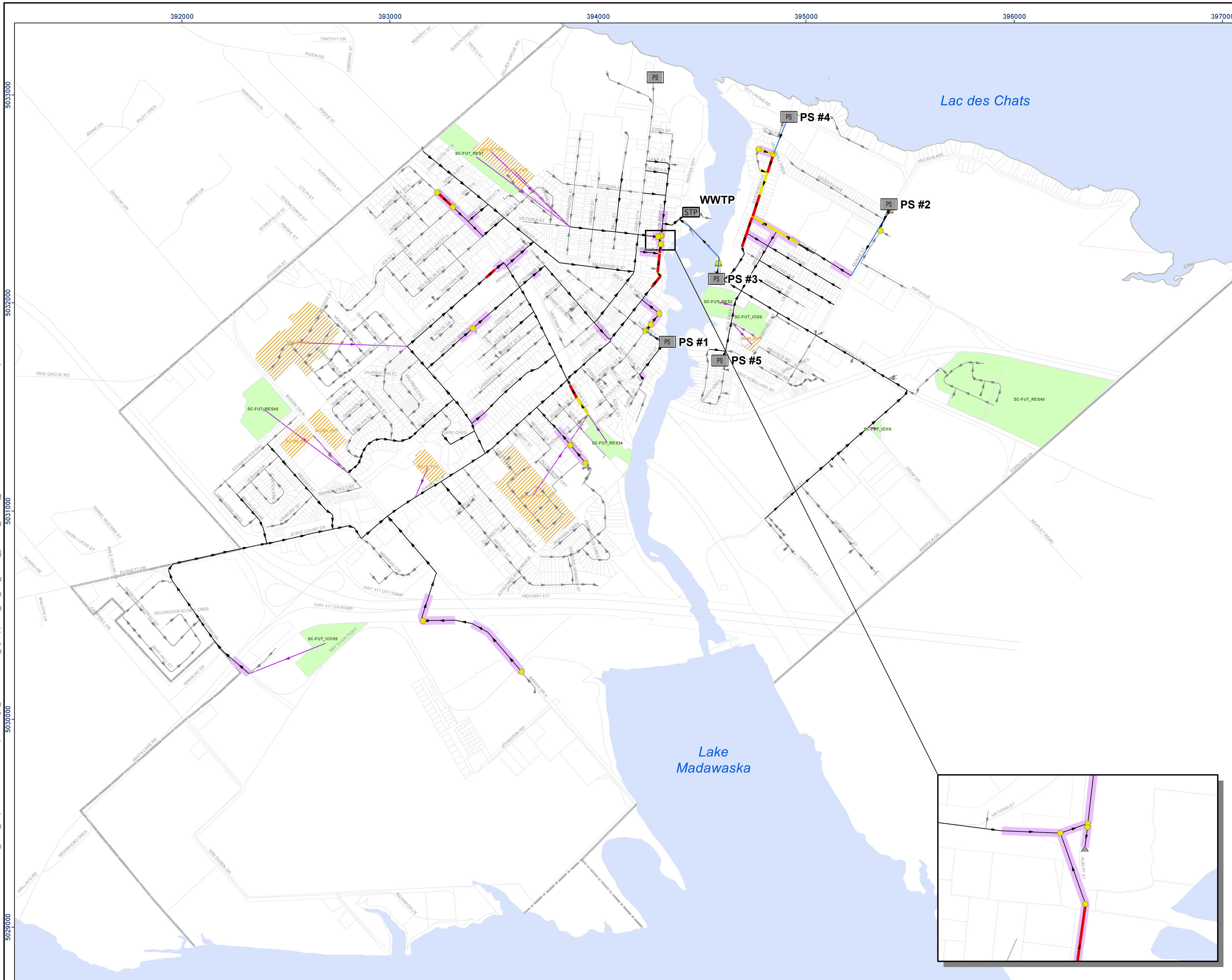
The existing sanitary collection network, including the planned projects listed in **Table 5-27**, is assessed to identify if additional capacity constraints and HGL and surcharge issues arise under future (growth) conditions. The assessment is based on the same HGL criteria outlined in **Section 5.2.1.1** and the same scenarios (DWF and WWF under a 25-year SCS II 6-hour rainfall distribution event). The results are illustrated in **Figure 5-36** (2027), **Figure 5-37** (2032) and **Figure 5-38** (2042). The planned projects listed in **Table 5-27** were included in the future conditions, based on their projected year of completion. **Figure 5-38** (2042) also shows the location of problem areas for which servicing solutions were developed.

The pipes under DWF are all free-flowing and no HGL issues associated to pipe surcharge are identified. The WWF assessment shows 3 key locations of potential constraints, for which solutions are developed as part of the servicing strategy.

The problem areas are as follows:

- **Problem Area PA-1 – Riverview Dr/Fourth Ave/Mulvihill Cr**: Risks of basement flooding are observed along Riverview Dr and Mulvihill Cr, due to sewer capacity issues along Riverview Dr, which propagate upstream. The 450 mm diameter sewers on Riverview Dr, north of Fourth Ave, are undersized for the flows observed in the 25-year design event, under existing and future conditions. The sewer along Riverview Dr, however, does have an adverse (and almost flat) slope, based on the invert information received. It is therefore recommended that the inverts along these sewers be confirmed, prior to implementing the solutions developed in **Section 6.5**. No future projects are planned that will impact flows to this problem area.
- **Problem Area PA-2 –Daniel St**: In the future, and considering the planned sewer separations listed in **Table 5-27**, a short section of 600 mm diameter sewers along Daniel St, south of Madawaska St, remains bottlenecked. However, no HGL issues due to pipe constraints are observed. The sewers experiencing bottlenecked conditions, however, consist of some inferred inverts applied to eliminate the adverse slopes produced when using provided inverts. It is therefore recommended that the inverts along these sewers be confirmed, prior to implementing the solutions developed in **Section 6.5**.
- **Problem Area PA-3 – Edward St**: While no HGL issues are observed along Edward St, the existing 200 mm diameter sewer south of William St is bottlenecked. Flows from the Callahan Developments are partially diverted from Edey St to Edward St at the bifurcation between the two streets. Sewer separation along Edward St is planned downstream, north of William St (project SEW-FUT-16 in **Table 5-27**), but does not impact flows to this problem area.

Other HGL issues (risks of basement flooding) are observed throughout the system, however these are due to shallow sewers rather than pipe capacity issues and are not further addressed in this chapter. Nonetheless, these results should be compared to reported basement flooding occurrences and the installation of backwater valves considered where necessary.



Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)
- Sanitary Sewer (Not Modelled)
- Forcemains

HGL Freeboard

- At or Above Surface
- Within Basement Level (Within 1.8 m of Surface)

Pipe Surcharge State

- Bottleneck (Undersized Sewer)
- Backwater Conditions
- Free-Flowing Conditions
- Shallow Pipes (Obvert Within 1.8 m of Surface)

Growth Areas

- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment

N

0 250 500 Meters
(At original document size of 11x17)
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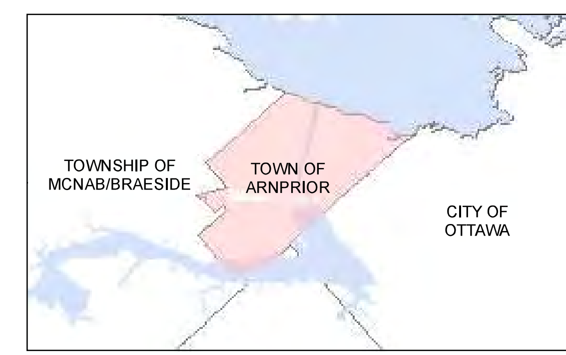
Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location Prepared by CR on 2023-01-06

Arnprior, ON

Client/Project 163401723

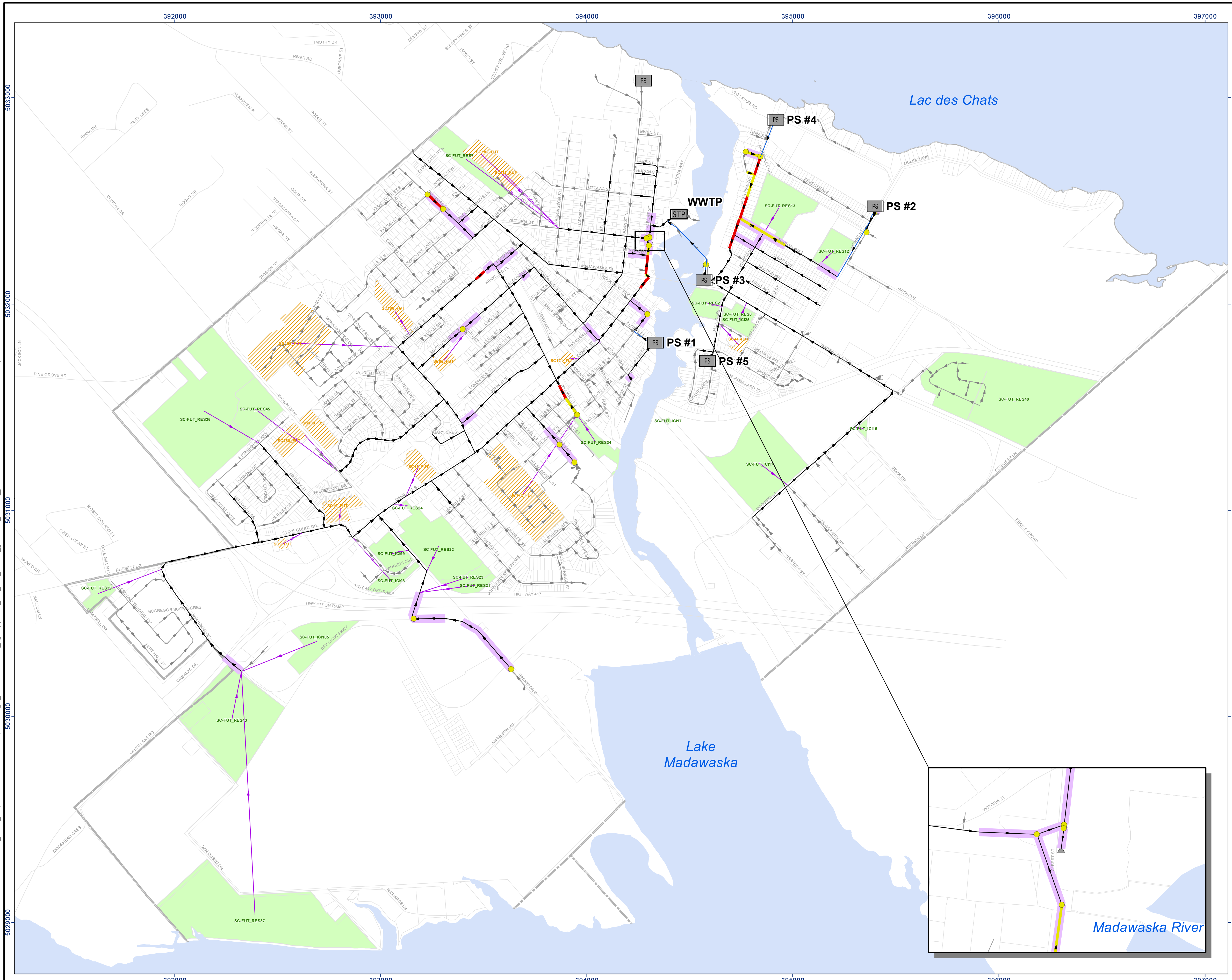
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

5-36

Title

2027 Growth Conditions with Projects Planned by 2027 - 25-Year SCS II 6 Hour



Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant
- Sanitary Sewer (Not Modelled)
- Forcemains

HGL Freeboard

- At or Above
- Within Basement Level (Within 1.8 m of Surface)

Pipe Surcharge State

- Bottleneck (Undersized Sewer)
- Backwater Conditions
- Free-Flowing Conditions
- Shallow Pipes (Obvert Within 1.8 m of Surface)

Growth Areas

- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment

N

0 250 500 Meters

(At original document size of 11x17)
1:19,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant

Project Location Prepared by CR on 2023-01-06

Arnprior, ON

Client/Project 163401723

Town of Arnprior
2022 W&WW Master Plan Update

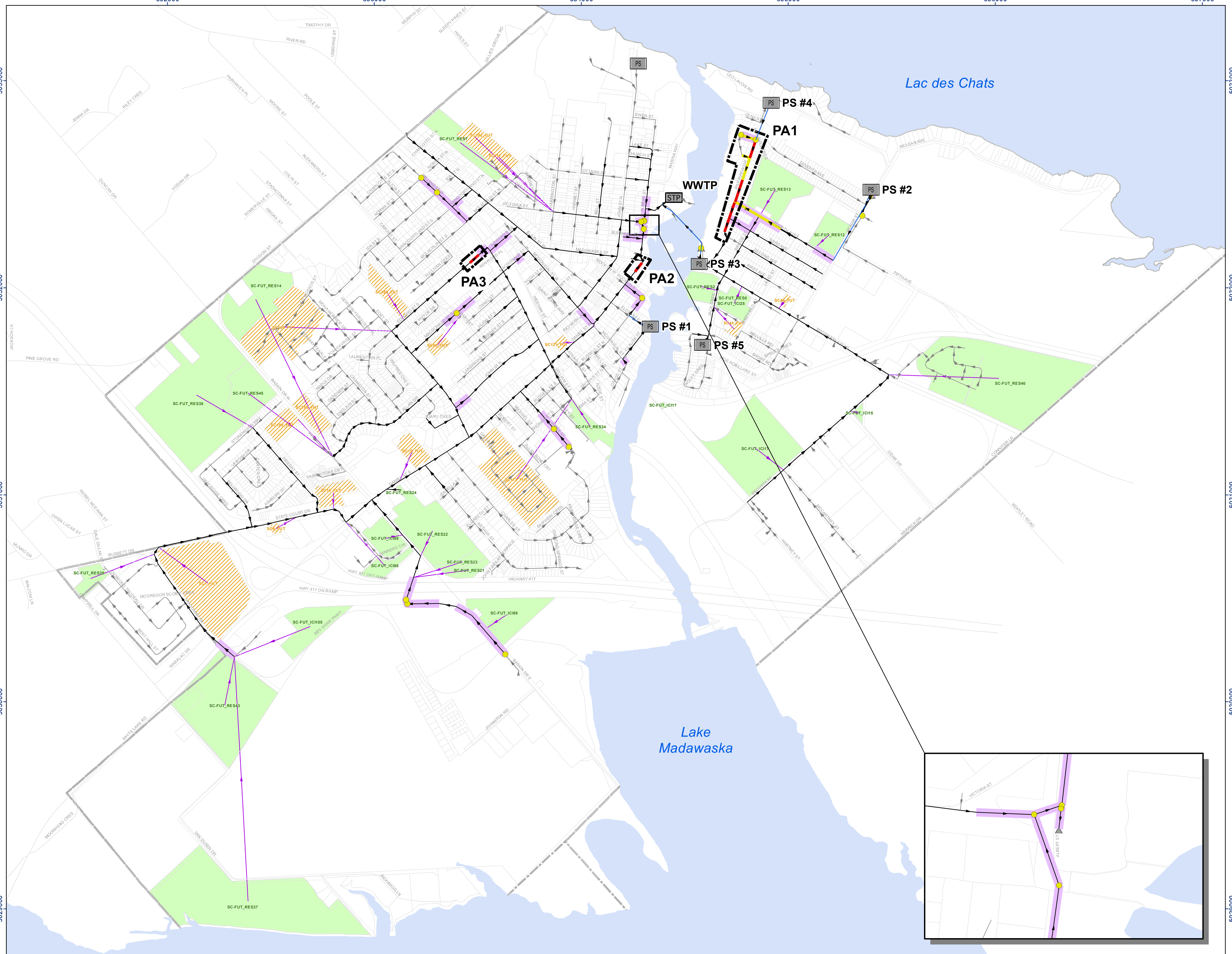
Figure No.

5-37

Title

2032 Growth Conditions with Projects Planned by 2032 - 25-Year SCS II 6 Hour

C:\Users\crazafimaharo.CORP\Documents\Local_Work_Tmp\Local-163401723-ArnpriorMP\gis_local\MXDs\tm3_figs\appA3-3_arn_san_results_grw2032_2032Pj_20231109.mxd Revised: 2023-11-09 By: crazafimaharo



Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)
- Sanitary Sewer (Not Modelled)
- Forcemains

HGL Freeboard

- At or Above Surface
- Within Basement Level (Within 1.8 m of Surface)

Pipe Surcharge State

- Bottleneck (Undersized Sewer)
- Backwater Conditions
- Free-Flowing Conditions
- Shallow Pipes (Obvert Within 1.8 m of Surface)
- Problem Areas

Growth Areas

- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment

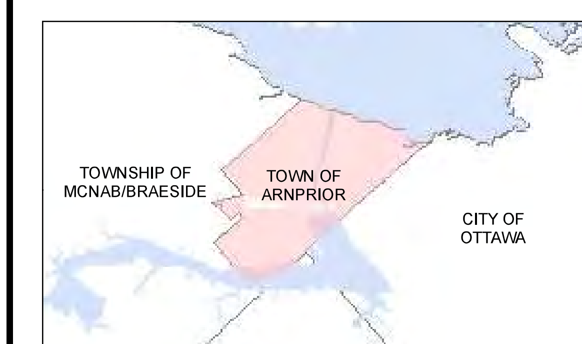
N

0 250 500 Meters

(At original document size of 11x17)
1:19,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location Prepared by CR on 2023-11-07

Arnprior, ON

Client/Project 163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

5-38

Title

2042 Growth Conditions with Project Planned by 2042 – 25-Year SCS II 6 Hour Event and Problem Areas

C:\Users\crazafimaharo.CORP\Documents\Local_Work_Tmp\Local-163401723-Arnprior\MP\gis_local\MXDs\tm3_figs\fig2-2_arn_san_results_grw2042_wSewerSep-Edey_20231107.mxd Revised: 2023-11-08 By: crazafimaharo

5.5.1.4 Pumping Stations

The existing PSs capacities are compared to the revised peak modelled incoming flows under DWF conditions, the 10-year design event, and the 25-year design event, for each growth horizon, with and without the future (planned) projects presented in **Table 5-27**. Per the MECP guidelines, PSs should be designed for a firm capacity at least capable of handling the 10-year design event. Additionally, the PSs bypass history from 2017 to 2022 was also reviewed at each PS. The results are summarized in **Table 5-28.**

No PS capacity concerns are observed under DWF conditions. In the 10-year and 25-year design event however, PS #1, PS #2 and PS #3 are already at capacity in existing conditions (see **Section 5.2.1.3**), which is exacerbated by growth at PS #3. The peak incoming flows to PS #5 are within the PS's firm capacity under existing conditions. The peak incoming flows to PS #1, PS #2 and PS #5 under the 10-year and 25-year design event do not increase (i.e., no growth is expected upstream of these PSs).

PS #1 is located downstream of combined areas. It is expected that the Town's planned sewer separations on McGonigal St and Claude St (project SEW-FUT-8 in **Table 5-27**) will help reduce the flows to PS #1 once implemented by the 10-year horizon. Once sewer separation is completed, monitoring is recommended to confirm the efficacy of the sewer separation and the resulting impact on inflow and infiltration (I/I) to PS #1. Other PSs are not impacted by the other planned projects.

The peak incoming flows to PS #3 under the 10-year design event will increase by +28 L/s to 306 L/s in the 20-year horizon, and under the 25-year design event will increase by +15 L/s to 338 L/s, as overall growth is expected east of the Madawaska River. PS #3 is also located downstream of ICI areas which may have roof drain connections to the sanitary sewers, or other potential cross-connections. These may contribute to the high peak flows observed under WWF conditions.

Also, as noted in the model limitations (**Section 5.1.1.6.5**) and under existing conditions (**Section 5.2.1.3**), the model was calibrated to an event equivalent to a 2-year event, i.e., with a 50% probability of occurring every year. Extrapolating the flows to a less frequent event such as the 25-year event (i.e., with a 4% probability of occurring every year) can result in conservative peak flows throughout the system, including those incoming to the PSs.

Section 5.2.1.3 (existing conditions) includes a discussion of the PSs' bypass history, which corroborate the constraints identified at PS #1 and PS #3. Servicing solutions and recommendations to address the PS constraints and accommodate future growth are developed in **Section 6.5**.

Table 5-28: Updated Modelled Incoming Flows to PSs and Bypass History

Name	Location	Number of Pumps at PS	Firm Capacity (Largest Pump Out of Service) (L/s)	DWF Peak Modelled Incoming Flow (L/s) With Existing Infrastructure Only *With Planned Projects(1)*				10-Year Design Event Peak Modelled Incoming Flow (L/s) With Existing Infrastructure Only *With Planned Projects(1)*				25-Year Design Event Peak Modelled Incoming Flow (L/s) With Existing Infrastructure Only *With Planned Projects(1)*				Number of Bypasses (3) per Year					
				Existing	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	Existing	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	Existing	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	2017	2018	2019	2020	2021	2022
PS #1	Elgin St E at Claude St	2	25	0.7	0.7 *0.7*	0.7 *0.7*	0.7 *0.7*	81	81 *81*	81 *44*	81 *44*	96	96 *96*	96 *53*	96 *53*	-	-	-	1	-	1
PS #2	McNab St at Seventh Ave	2	59	8.5	8.5 *8.5*	8.5 *8.5*	8.5 *8.5*	71	71 *71*	71 *71*	71 *71*	84	84 *84*	84 *84*	84 *84*	-	-	-	-	-	-
PS #3	Madawaska Blvd, west of Bridge St	3(2)	275	28	29 *29*	34 *34*	43 *43*	278	280 *280*	297 *297*	306 *306*	323	324 *324*	329 *329*	338 *338*	-	-	-	1	1	3
PS #5	Wolff Cres	2	7	1.6	1.5 *1.5*	1.5 1.5	1.5 1.5	5.4	5.4 *5.4*	5.4 5.4	5.4 5.4	6.1	6.1 *6.1*	6.1 6.1	6.1 *6.1*	-	-	-	-	-	-

Notes:
(1) Future (planned) projects presented in **Table 5-27.**
(2) The pumps at PS #3 are equipped with variable frequency drives (VFDs).
(3) Bypasses due to heavy precipitation or snowmelt (not due to equipment failure), as reported in the Town's reports to Council from 2017 to 2022.

5.5.1.5 Wastewater Treatment Plant

The WWTP's PHF capacity (685 L/s [59,200 m^3/d]) is compared against the projected DWF and 25-year design event incoming flows, as shown in , with and without the future (planned) projects presented in **Table 5-27**. This table also presents the expected overflow volume at Albert St under each horizon, and the WWTP's bypass history. Town operations staff have noted that bypasses (and hence, overflows at Albert St) are triggered when the levels in the WWTP inlet channel reach 900 mm.

The modelled incoming flows under DWF conditions are within the WWTP's PHF capacity and does not result in overflows at the Albert St CSO. The 25-year design event results in existing conditions (**Section 5.2.1.4**) shows the modelled PHF's within (but nearing) the WWTP's PHF capacity, with a CSO being triggered at the Albert St/Victoria St weir. Under growth conditions without the future (planned) projects, the peak modelled incoming flows and CSO volumes further increase and are projected to exceed the WWTP's PHF capacity by the 10-year horizon. In general, it is expected that the Town's planned sewer separations will help reduce the peak flows to the WWTP and the bypass volumes at the Albert St CSO. Nonetheless, flows should be monitored as sewer separation projects are completed, to confirm the resulting reduction in flows.

These findings are subject to the same limitations described in **Section 5.2.1.4**. The model was calibrated to an event equivalent to a 2-year event, i.e., with a 50% probability of occurring every year. Extrapolating the flows to a less frequent event such as the 25-year event (i.e., with a 4% probability of occurring every year) can result in conservative peak incoming flows to the WWTP.

While the model provides incoming flow and overflow results, the WWTP capacity assessment considers historical average daily flows and peak hour flows, which are compared against the corresponding CoA design flows. The Town's reports to Council and available SCADA data were analyzed to compare the measured flows against the WWTP's CoA average day and peak hour design flows. The historical (2016-2023) data is provided in **Figure 5-24.**

The peak hour flows in 2018-2022 were within the WWTP's peak hour design flow, which also supports that the WWTP did not experience capacity issues during this time period. This aligns with the conclusions based on the average daily flows. Overall, the WWTP is expected to have capacity to service future growth within the MP's 20-year planning horizons. However, this should be confirmed by updating the WWTP's capacity assessment regularly (e.g., every 5 years), as growth occurs and planned sewer separation projects are completed. Flows should be monitored as sewer separation projects are completed, to confirm the resulting reduction in peak wet weather flows, and as growth occurs, to quantify the changes in average flows.

Furthermore, it is recommended that further monitoring and calibration be conducted to capture less frequent events (such as 5-year, 10-year events). This would help confirm the modelled incoming flows to the WWTP under large events, and the resulting overflows under these conditions.

Table 5-29: Modelled Incoming Flows to WWTP (Existing and Future), Albert St CSO Volumes and WWTP Bypass (CSO) History

Location	Modelled Parameter	DWF Peak Modelled Incoming Flows (L/s) With Existing Infrastructure Only *With Planned Projects(1)*				25-Year Design Event Peak Modelled Incoming Flow (L/s) With Existing Infrastructure Only *With Planned Projects(1)*				Number of Bypasses (2,3) per Year						
		Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)	2016	2017	2018	2019	2020	2021	2022
WWTP PHF Capacity = 685 L/s	Peak Instantaneous Flow	74	84 *83*	99 *98*	126 *125*	1,014	1,017 *992*	1,020 *963*	1,040 *914*	2	3	2	1	1	2	3
	Peak Hourly Flow	64	73 *73*	86 *86*	111 *110*	676	684 *667*	694 *651*	716 *645*							
Albert St CSO	Overflow Volume	0	0	0	0	862	904 *843*	958 *837*	1,056 *823*							

Notes:
(1) Future (planned) projects presented in **Table 5-27.**
(2) Per the WWTP's Certificate of Authorization (CoA), the Albert St weir and overflow constitutes the WWTP bypass. Town operations staff have noted that bypasses (and hence, overflows at Albert St) are triggered when the levels in the WWTP inlet channel reach 900 mm.
(3) Bypasses as reported in the reports to Council and daily WWTP data provided from 2016 to 2022.

5.5.2 POTABLE WATER SYSTEM

By applying the future demands as described in Section **5.4.2.2**, the performance of the WFP and existing water distribution system is evaluated under future (growth) conditions.

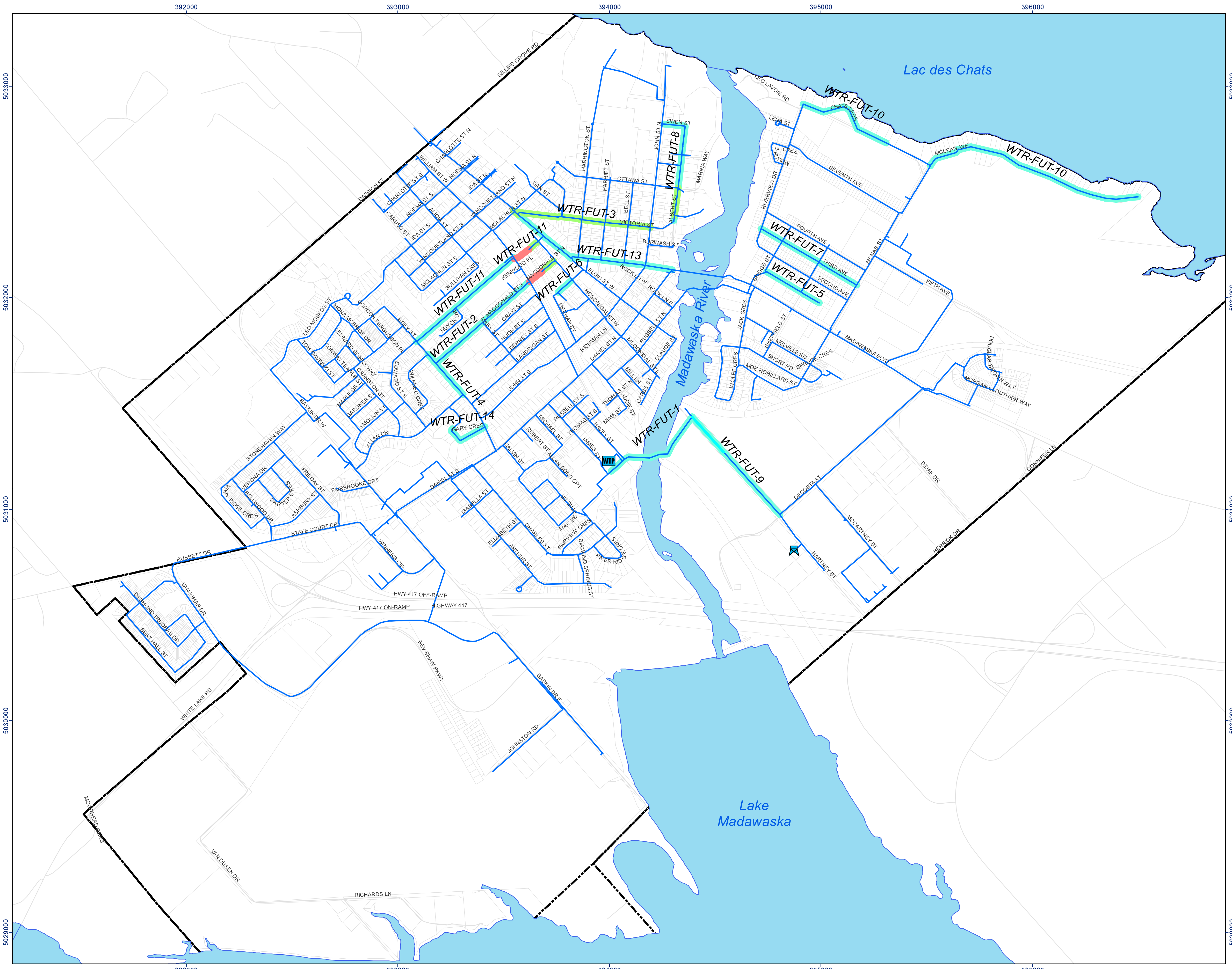
5.5.2.1 Planned Future Projects

The Town provided a list of planned long-term infrastructure projects, which includes additional planned waterwork projects as summarized in **Table 5-30** and illustrated in **Figure 5-39**. All planned waterworks with anticipated year of completion prior to 2042 were therefore incorporated into the model. It is noted that the planned watermain upsizing projects at Daniel St, Staye Court Dr, Elgin St, Norma St, and Caruso St are based on the recommendations from the 2013 W&WWMP. These projects will be deferred past 2042 due to the additional conveyance capacity and looping provided by the new/upgraded watermains post-2011 (refer to **Section 6.5.2.2** for detailed discussion).

Table 5-30: Planned Waterwork Projects

Count	Project Name	Project ID	Year of Completion(1)	Planning Horizon	Planned Waterworks	Notes
1	River Crossing Phase I - 400mm Watermain Replacement	WTR-FUT-1	2024	2027	Replace the existing 400mm river crossing (CI watermain installed in 1957) near the WFP between James St and Hartney St.	It is noted that the configuration of the new watermain river crossing will be changed, and the stub of 300mm watermain near the river will be eliminated altogether.
2	MacDonald St from McGonigal St to Edey St - sanitary sewer upsizing/separation, partial watermain, and road reconstruction	WTR-FUT-2	2024	2027	Replace the existing 200mm DI watermain (installed in 1990) on MacDonald St from Edey St to William St. Upsize the existing 100mm CI watermain (installed in 1910) on MacDonald St (between McGonigal St and William St) to 200mm and extend the 200mm watermain to William St (connecting to the replaced pipe at William St).	
3	Victoria (John to Elgin) - Full reconstruction and Upsize Watermain 300mm	WTR-FUT-3	2025	2027	Upsize the existing 100mm and 150mm DI watermains (installed in 1966) on Victoria St from John St to Elgin St to 300mm.	
4	Edey St from MacDonald St to Allan Dr - full reconstruction with ss upsizing	WTR-FUT-4	2025	2027	Replace the existing 250mm CI watermain (installed in 1966) on Edey St from Wilfred Cres to Allan Dr.	
5	First Avenue Full Reconstruction - Bridge St. to End	WTR-FUT-5	2026	2027	Replace the existing 150mm DI/PVC watermains (installed in 1955) on First Ave.	
6	Hugh St. N. from McGonigal to Saint Johns Way; Full reconstruction, WM, sewer separation, sidewalk one side only	WTR-FUT-6	2027	2027	Replace the existing 150mm CI watermain (installed in 1910) on Hugh St N from McGonigal St to Saint Johns Way.	
7	Third Avenue from Riverview Dr. to McNab St. Full Recons; narrow road from 10m to 8.5.m wide, sidewalk on one side only, wm and ss replacement	WTR-FUT-7	2027	2027	Replace the existing 150mm DI watermain (installed in 1960) on Third Ave from Riverview Dr to McNab St.	
8	Albert St. and Ewen St - Full Reconstruction and Sewer Separation, incl sanitary upsize to Madawaska	WTR-FUT-8	2028	2032	Upsize the existing 100mm CI watermain (installed in 1914) on Albert St near Marina Way to 150mm. Replace the existing 150mm CI watermains (installed in 1920 and 1966) on Albert St and Ewen St (from Victoria St to John St).	
9	River Crossing Phase II - WM replacement to Decosta	WTR-FUT-9	2029	2032	Replace the existing 400mm CI watermain (installed in 1957) on Hartney St from the connection point of river crossing to Decosta St.	
10	McLean Ave and Chats Cr - Watermain and Road Grade Raise (Flooding mitigation)	WTR-FUT-10	2031	2032	Replace the existing 150mm DI watermain (installed in 1986) on both McLean Ave and Chats Cres.	The existing 150mm PVC watermain (installed in 2008) on McLean Ave is to remain.
11	Full Reconstruction w/ Sewer Sep Edward Street from Edey to Elgin Street	WTR-FUT-11	2034	2042	Replace the existing 200mm DI watermains (installed in 1914 and 1970) on Edward St from Edey St to William St. Upsize the existing 150mm watermain (installed in 1910) on Edward St (between McGonigal St and William St) to 200mm and extend the 200mm watermain to William St (connecting to the replaced pipe at William St).	
12	Elgin Street West Sanitary Sewer and Watermain - McLachlin St to Madawaska Street	WTR-FUT-12	2036	2042	Upsize the existing 150mm PVC watermain (installed in 1992) on Elgin St W near McLachlin St to 200mm. Replace the existing 200mm PVC watermains (installed in 1992) on Elgin St W from McLachlin St to Madawaska St.	
13	Madawaska Street (Elgin to Daniel) Full Reconstruction (new ss, new wm, streetscaping/ landscaping, lighting)	WTR-FUT-13	2037	2042	Replace the existing 200mm DI watermains (installed in 1970 and 1995) and 300mm DI watermain (installed in 1957) on Madawaska St from Elgin St to Daniel St.	
14	Gary Cr Full Recon. /Sew/Sep - Edey St. to Second Bend	WTR-FUT-14	2040	2042	Replace the existing 150mm CI watermain (installed in 1957) on Gary Cres from Edey St to the second bend.	
15	Full Reconstruction: Arthur Street from Daniel to John Findlay	WTR-FUT-15	2044	Post-2042	Replace the existing 150mm DI watermain (installed in 1966) and 200mm PVC watermain (installed in 1966) on Arthur St from Daniel St to John Findlay Terrace.	
16	Daniel Street WM Replacement (Pt 2) - Charles St. to Staye Court Dr. (400mm)	WTR-FUT-16	N/A	Post-2042	Upsize the existing 250mm DI watermain (installed in 1987) on Daniel St from Charles St to Staye Court Dr to 400mm.	Based on the analysis with the current growth projections, the additional conveyance capacity and looping provided by the new/upgraded watermains post-2011 helps defer the need for the Daniel St, Staye Court Dr, Elgin St, Norma St, and Caruso St watermain upsizing projects that were previously proposed in the 2013 W&WWMP to past 2042.
17	Staye Court (Daniel to Hwy 17) - Upsize Watermain 400mm / Staye Court - Urbanization and Watermain	WTR-FUT-17	N/A	Post-2042	Upsize the existing 250mm DI watermain (installed in 1987) on Staye Court Dr from Daniel St to Bellwood Dr to 400mm.	
18	Elgin (Victoria to Norma) - Upsize Watermain 300mm	WTR-FUT-18	N/A	Post-2042	Upsize the existing 150mm and 200mm PVC watermains (installed in 1992/1993) on Elgin St from Victoria St to Norma St to 300mm.	
19	Norma (Elgin to Caruso) - Upsize Watermain 300mm	WTR-FUT-19	N/A	Post-2042	Upsize the existing 150mm CI watermain (installed in 1920 and 1960) on Norma St from Elgin St to Caruso St to 300mm.	
20	Caruso (Division to Ida) Watermain Loop, Norma (Alicia to Caruso), Charlotte (Alicia to Caruso)	WTR-FUT-20	N/A	Post-2042	Upsize the existing 150mm PVC watermain (installed in 1969) on Caruso St (between Ida St and Norma St) to 300mm and extend the 300mm watermain to Norma St to provide looping.	

Note:
(1) Year of completion inferred from long-range capital forecasts (final year of planned capital investment).



Stantec

Legend

- Watermains
- WTP Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

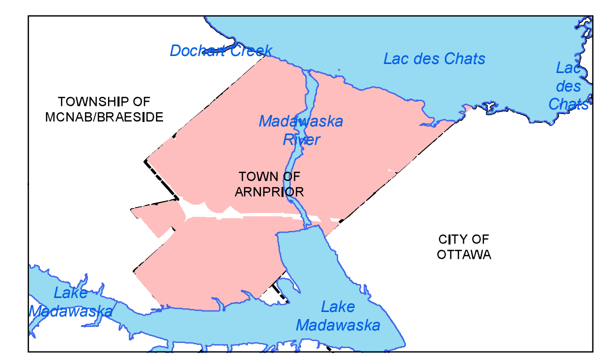
Planned Potable Water Infrastructure Projects

- New Watermain
- Watermain Replacement (no Upsizing)
- Watermain Upgrade (with Upsizing)

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location Prepared by CZ on 2023-11-08
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
5-39

Title
Planned Potable Water Infrastructure Projects

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5.5.2.2 Water Filtration Plant

With the established future water demands, the treatment capacity of the WFP was assessed for future conditions, as shown in **Table 5-31** and **Figure 5-40**. Based on the analysis, using the average of historical maximum demand from 2016 to 2021, the WFP's rated treatment capacity of 10,340 m^3/d would be capable of supplying the projected population's MXDY demand until the end of 2038, or when the Town's reaches a population of approximately 16,130 people.

The growth projections currently suggest that an additional treatment capacity of about 631 m^3/d would be required in the 20-year planning horizon to accommodate population growth in the Town, considering the MXDY demand of 5,933 m^3/d applied for existing conditions.

Table 5-31: Future (Growth) Conditions WFP Treatment Capacity Assessment

	Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)
Population Projections (ppl)	10,038	11,899	14,016	17,050
Total MXDY Demand (L/s)	68.67	84.99	102.93	126.98
Total MXDY Demand (m^3/d)	5,933	7,343	8,894	10,971
WFP's Rated Treatment Capacity (m^3/d)	10,340	10,340	10,340	10,340
Residual Treatment Capacity (m^3/d)	4,407	2,997	1,446	-
Residual Treatment Capacity (% of Rated Capacity)	43%	29%	14%	-
Additional Treatment Capacity Required (m^3/d)	-	-	-	631
Additional Treatment Capacity Required (% of Rated Capacity)	-	-	-	6%

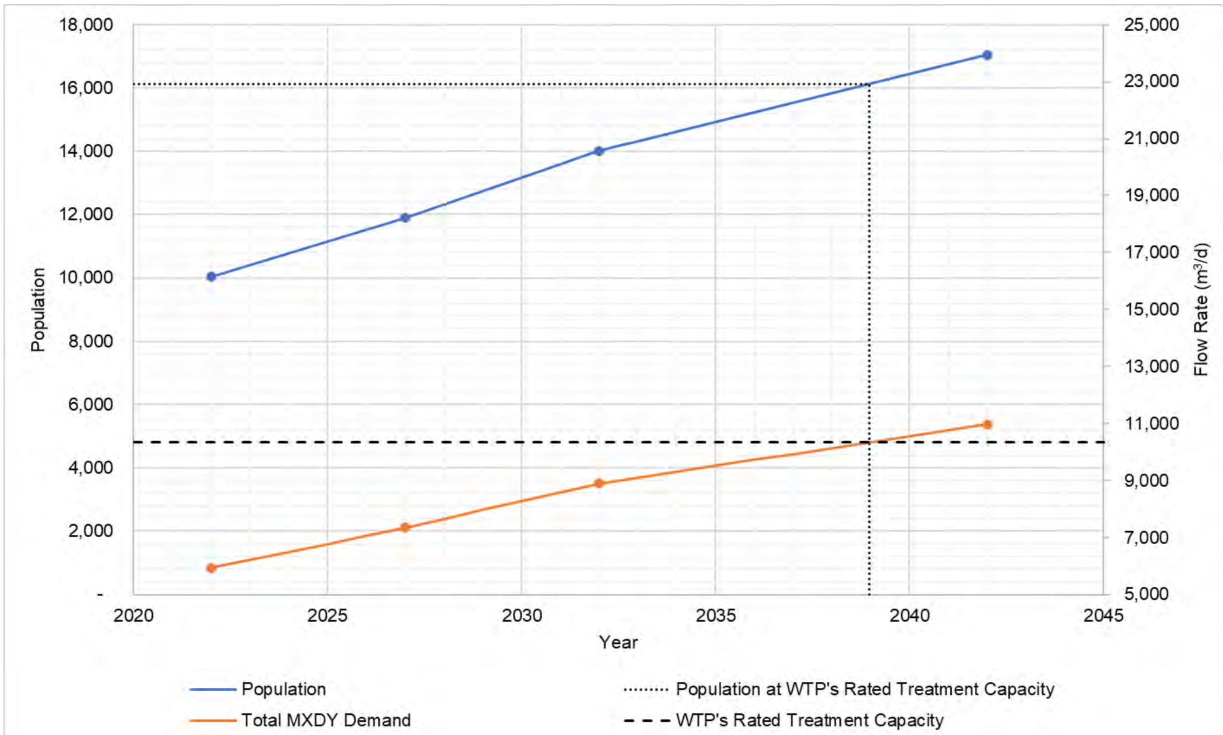


Figure **5**-40: Potable Water Treatment Requirements

5.5.2.3 Storage

The system's future storage capacity was evaluated using the MECP formula and recommended fire flow requirements, based on the projected population and future water demands, as presented in **Table 5-32** and **Figure 5-41**. Considering both the storage provided by the EST and clearwells at the WFP, the total available storage volume of 6,336 m^3 would meet projected MXDY demand and corresponding fire flow requirements until the middle of the year 2033, or at a projected population of approximately 14,430 people. In the 20-year planning horizon, it is anticipated that an additional storage volume of 1,592 m^3 would be required to service the projected growth in the Town.

It should be noted that the fire flows and durations used to calculate the total required storage volume were interpolated from the MECP fire flow requirements based on projected population. It is recommended that the fire flow requirements for future conditions to be reviewed with the Town to minimize the possibility of storage oversizing.

Table 5-32: Future (Growth) Conditions Potable Water Storage Capacity Assessment

	Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)
Population Projections (ppl)	10,038	11,899	14,016	17,050
Total MXDY Demand (L/s)	68.67	84.99	102.93	126.98
Total MXDY Demand (m^3/d)	5,933	7,343	8,894	10,971
Fire Flow Required (Interpolated) (L/s)	189.00	209.67	227.50	250.00
Duration (Interpolated) (hrs)	3.00	3.00	3.25	4.00
Fire Storage Required: A (m^3)	2,041	2,264	2,662	3,600
Equalization Storage: B = 25% of MXDY (m^3)	1,483	1,836	2,223	2,743
Emergency Storage: C = 25% of [A+B] (m^3)	881	1,025	1,221	1,586
Total Storage Volume Required: A + B + C (m^3)	4,406	5,125	6,106	7,928
Existing Storage Available - WFP Clearwells (m^3)	3,971	3,971	3,971	3,971
Existing Storage Available - EST (m^3)	2,365	2,365	2,365	2,365
Total Storage Volume Available (m^3)	6,336	6,336	6,336	6,336
Additional Storage Volume Required (m^3)	-	-	-	1,592

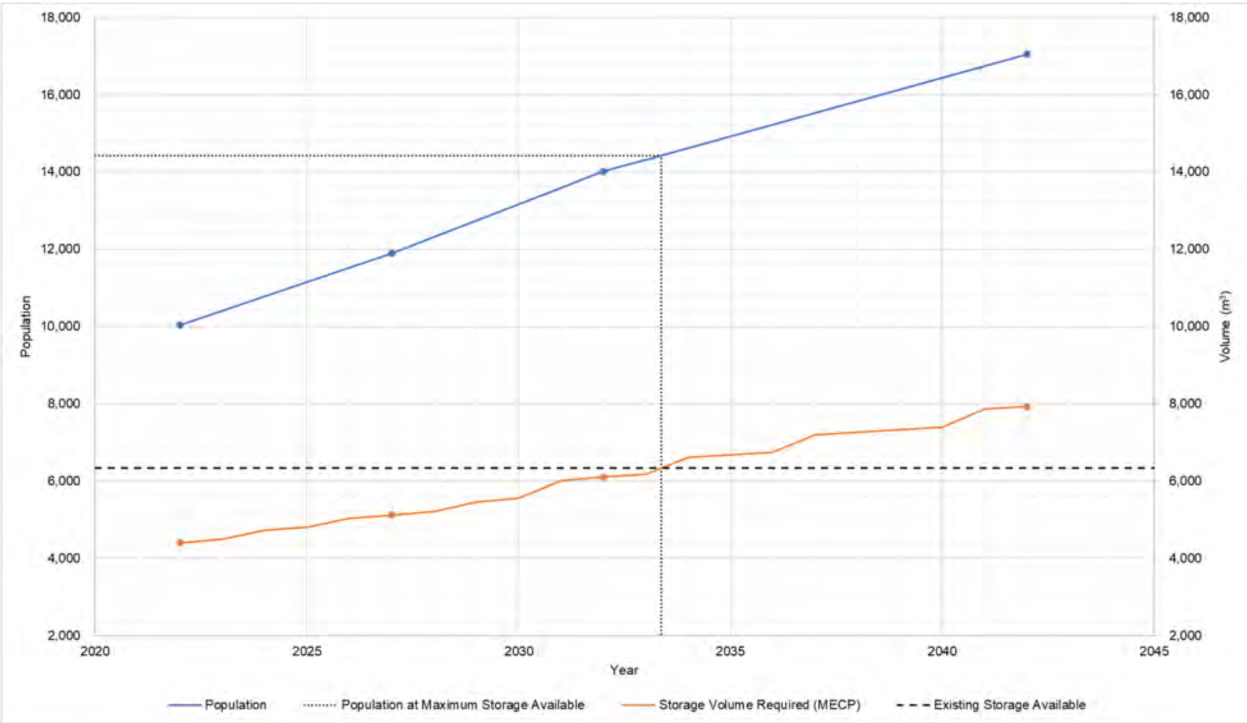


Figure 5-41: Potable Water Storage Requirements

5.5.2.4 Pumping

Assessment of the system's future pumping capacity is presented in **Table 5-33** and **Figure 5-42**. By assuming that 50% of the EST's operating volume would be available for fire flow conditions as described in **Section 5.2.2.3**, the existing high lift firm pumping capacity in conjunction with elevated storage is sufficient to supply total MXDY demand and fire flows that meet the MECP requirements until the end of 2034, or to a population of approximately 14,620 people. After 2034, an expansion of the HLPs' capacity will be required to accommodate future growth. By the end of 2042 (20-year planning horizon), the additional pumping capacity that will be needed is about 45 L/s.

Table 5-33: Future (Growth) Conditions Potable Water HLP Capacity Assessment

	Existing (2022)	5-Year Horizon (2027)	10-Year Horizon (2032)	20-Year Horizon (2042)
Population Projections (ppl)	10,038	11,899	14,016	17,050
Total MXDY Demand (L/s)	68.67	84.99	102.93	126.98
Fire Flow Required (Interpolated) (L/s)	189.00	209.67	227.50	250.00
Duration (Interpolated) (hrs)	3.00	3.00	3.25	4.00
Total MXDY Demand + MECP Fire Flow (L/s)	257.67	294.66	330.43	376.98
Pump Rated Capacity at WFP - Pump 1 (L/s)	125	125	125	125
Pump Rated Capacity at WFP - Pump 2 (L/s)	125	125	125	125
Pump Rated Capacity at WFP - Pump 3 (L/s)	125	125	125	125
Firm Pumping Capacity at WFP (L/s)	250	250	250	250
Existing Storage Available at EST (m^3)	2,365	2,365	2,365	2,365
Assumed % of the EST's operating volume that would be available for fire flow conditions	50%	50%	50%	50%
Available Fire Flow Supplied by EST (L/s)	109.49	109.49	101.07	82.12
Total Capacity: Fire Pumping Capacity at WFP + Available Fire Flow Supplied by EST (L/s)	359.49	359.49	351.07	332.12
Total Additional Pumping Capacity Required (L/s)	-	-	-	44.86

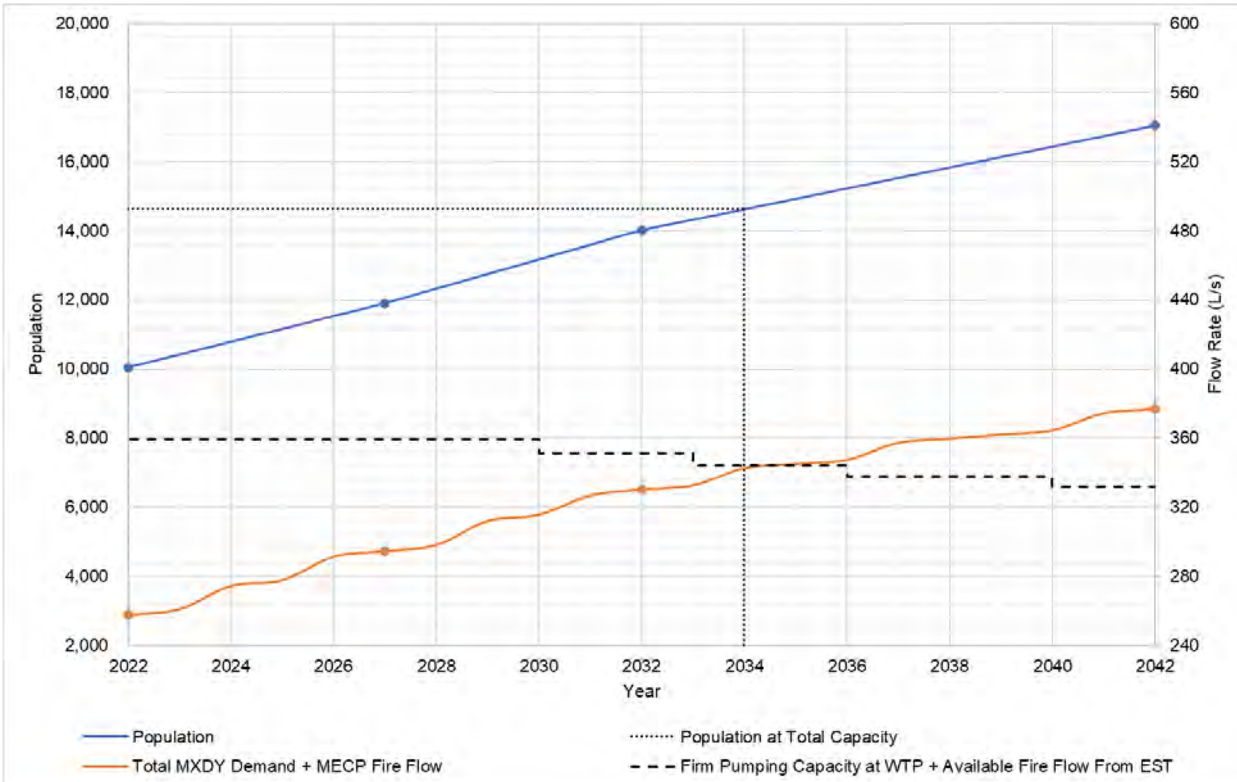


Figure 5-42: Potable Water HLP Requirements

5.5.2.5 Distribution Pipe Network

The existing water distribution network is assessed for the 5-year (2027), 10-year (2032), and 20-year (2042) planning horizons by applying future water demands for growth areas as described in **Section 5.4.2**. For future conditions, all hydraulic parameters of the EST and the reservoir and HLPs at the WFP remain unchanged as per **Section 5.1.2.1**.

Hydraulic model results for AVDY, MXDY, and MXDY + fire flow demand scenarios under future conditions are presented in **Appendix C.4**. AVDY and MXDY scenarios were simulated over an extended period of time (72-hr), while MXDY + fire flow scenarios were run in the steady-state assuming two HLPs are in service.

5.5.2.5.1 System Head / Pressures

Model results of maximum pressures throughout the water distribution system under AVDY demands are shown in **Figure C4-1** (2027), **Figure C4-4** (2032), and **Figure C4-7** (2042) in **Appendix C**. The results under future conditions show no new pressure issues with the additional demands from growth areas. The overall pressure range and pressure distribution in each planning horizon remain the same as per the existing conditions.

Model results of minimum pressures throughout the water distribution system under MXDY demands (at PKHR) are shown in **Figure C4-2** (2027), **Figure C4-5** (2032), and **Figure C4-8** (2042) in **Appendix C**. Hydraulic modelling shows minimum pressures ranging from 50 to 98 psi in the 5-year horizon (2027), 49 to 97 psi in the 10-year horizon (2032), and 49 to 98 psi in the 20-year horizon (2042), which are similar to the minimum pressure range under the existing conditions. For both the 2027 and 2032 conditions, the results show the EST operates between the typical operation range of about 60 to 80%. However, the EST operates between 54 to 80% full in 2042 conditions. Considering the lower water level in the EST under 2042 conditions, servicing strategies that are presented in **Chapter 3** (**Section 6**) include recommendations to add the operation of a second HLP. In terms of the overall pressure distribution, no minimum pressures less than 40 psi are observed. When compared to the existing conditions with no areas having minimum pressure below 50 psi, additional areas with minimum pressure slightly lower than 50 psi but greater than 40 psi are anticipated mainly near Vanjumar Dr / Russett Dr in both the 10-year and 20-year horizons.

5.5.2.5.2 Fire Flows

Model results of available fire flows at a residual pressure of 20 psi throughout the water distribution system under MXDY plus fire flow demands are shown in **Figure C4-3** (2027), **Figure C4-6** (2032), and **Figure C4-9** (2042) in **Appendix C**. No further issues with respect to available fire flows are identified under future conditions with the additional demands from growth areas. Locations having available fire flows less than 33.33 L/s in each planning horizon remain the same as those in the existing conditions.

5.6 Chapter 2 Conclusions

Chapter 2 presents the assessment of the Town's existing wastewater collection system and potable water distribution system under existing and future (growth) conditions, including the following discussions:

- Hydraulic model updates (Section 5.1);
- Assessment of existing hydraulic conditions (Section 5.2);
- Growth projections (Section 5.3);
- Future wastewater flows and water demands (Section 5.4); and,
- Assessment of existing infrastructure under future flows and demand conditions ("do nothing" alternative; **Section 5.5**).

The following are findings from the calibration and existing and future conditions wastewater collection system assessment, for consideration for servicing alternatives in **Chapter 3** (**Section 6**):

- Overall, the calibration resulted in acceptable DWF and WWF calibration to the periods and events evaluated. The calibrated parameters were therefore used for the existing and growth conditions assessments within this MP.
- HGL issues under the 25-year design event were identified along William St E (southeast of Daniel St), William St W (northwest of Daniel St), Russell St, Albert St, and Riverview Dr/Fourth Ave and Mulvihill Cr.
  - These HGL issues are indicative of potential sewer capacity constraints, however, most occur in locations with adverse or flat pipes, or pipes with inferred inverts. It is recommended that these inverts be confirmed prior to proceeding with the implementation of any solutions.
  - The issues along William St W, Russell St and William St E are expected to be eliminated by planned sewer separation projects, and are therefore not further assessed as problem areas.
  - Other HGL issues (risks of basement flooding) are observed throughout the system, however these are due to shallow sewers rather than pipe capacity issues.
  - The results under future (growth) conditions do not show any new HGL issues due to the additional flows generated in the growth areas. The HGL issues identified under existing conditions remain.
- The PSs firm capacities (largest pump offline at each PS) were compared to the modelled incoming flow under DWF conditions and in the 10-year and 25-year design events.
  - Peak incoming DWF flows can be conveyed at all of the PSs under existing and growth conditions.

  - It was found that PS #1, PS #2 and PS #3 are at capacity under the 10-year and 25-year design event, such that backwater upstream of the PSs may occur, which could generate HGL issues within the sanitary collection system. The peak incoming flows to PS #1, PS #2, and PS #5 do not increase (i.e., no growth is expected upstream of these PSs), however the peak incoming flows to PS #3 under the 10-year and 25-year design events will increase in the 20-year horizon, as overall growth is expected east of the Madawaska River.

- The WWTP's peak hour flow (PHF) capacity was compared against the modelled incoming flow under DWF conditions and in the 25-year design event.
  - The modelled incoming flow under DWF conditions is within the WWTP's PHF capacity under existing and growth conditions.
  - The modelled incoming flow under the 25-year design event near the WWTP's PHF capacity, and a CSO is triggered at the Albert St/Victoria St weir. Under growth conditions, the peak modelled incoming flows to the WWTP and CSO volumes at the Albert St weir will further increase.
  - In general, it is expected that the Town's planned sewer separations will help reduce the peak flows to the WWTP and the bypass volumes at the Albert St CSO. Nonetheless, flows should be monitored as sewer separation projects are completed, to confirm the resulting reduction in flows.
  - While the model provides incoming flow and overflow results, the WWTP capacity assessment considers historical average daily flows and peak hour flows, which are compared against the corresponding CoA design flows. The peak hour flows in 2018-2022 were within the WWTP's peak hour design flow, which also supports that the WWTP did not experience capacity issues during this time period. This aligns with the conclusions based on the average daily flows. Overall, the WWTP is expected to have capacity to service future growth within the MP's 20-year planning horizons. However, this should be confirmed by updating the WWTP's capacity assessment regularly (e.g., every 5 years), as growth occurs and planned sewer separation projects are completed.

The following recommendations also arose from the wastewater collection system assessment, for consideration for solutions development and the next Master Plan update.

- Reviewing and confirming sewer invert profiles, such as in the sewer sections identified in the Chapter 1 Engineering Validation, in **Section 5.1.1.1.2** and **Section 5.2.1.2**;
- Confirming actual PS operations and conditions (on/off setpoints, current pump performance, pump and system curves, pump efficiency and head losses);
- Monitoring water consumption and wastewater flows downstream of high-water users to understand their sewage generation rates, such as the Nylene facility;

- Monitoring wastewater flows downstream of the Madawaska Village subdivision, upstream of PS #5, to confirm flows to PS #5;
- Continuously collecting PS wet well level and flow data;
- Providing frequent sewer flushing to reduce sediment and its impact on flow conditions;
- Validating the modelled existing conditions assessment findings against historical (anecdotal) evidence of WWTP and PS performance under large events, to confirm bypasses and overflows, and if any impacts on the sanitary collection system were observed under these conditions; and,
- Assessing multi-year diurnal flows to the WWTP and at other key locations within the system to understand the impact of changes in diurnal habits as they relate to land use.

The following are findings from the existing and future conditions potable water distribution system assessment, for consideration for servicing alternatives in **Chapter 3** (**Section 6**):

- When using the average of historical maximum demand from 2016 to 2021 while excluding all outlier flows due to watermain breaks, refilling of the EST, and reported clearwell issue, the WFP's rated treatment capacity of 10,340 m^3/d can supply the existing MXDY demand as well as future MXDY demand until the end of the year 2038 or when the projected population increases to about 16,130 people. To accommodate the projected population growth in the Town, additional treatment capacity would be required at the WFP prior to the 20-year planning horizon.
- The total capacity of 6,336 m^3 provided by the EST and clearwells at the WFP meets the storage need for the existing population and the projected population up to approximately 14,430 people or at the middle of the year 2033. Additional storage volume should be considered prior to the 20-year planning horizon.
- The existing high lift firm pumping capacity along with elevated storage (assuming 50% of the EST's operating volume available for fire flow conditions) is capable to supply total MXDY demand and fire flows that meet the MECP requirements for a population up to approximately 14,620 people or until the end of 2034. Thus, an expansion of the HLPs' capacity will be needed to accommodate future growth prior to the 20-year planning horizon.
- Issues related to pressures and fire flows were identified based on hydraulic modelling results.
  - Maximum pressures under AVDY demands in both the existing and future conditions:
    - Maximum pressures greater than 100 psi are observed in low-lying areas along the shorelines of the Ottawa River and Madawaska River.
    - Maximum pressures above 80 psi but below 100 psi are identified in lower elevation areas, northeast of Caruso St, Mary St, and Havey St, and north of the Canadian National Railway corridor.

- Minimum pressures under MXDY demands (at PKHR):
  - Based on model results, the EST is shown to operate between 54 to 80% full, the lower end of which is just below the typical range of 60 to 80% (the EST typically operates between 60% to 80% full under existing conditions according to SCADA data).
- Available fire flows at a residual pressure of 20 psi under MXDY plus fire flow demands in both the existing and future conditions:
  - Available fire flows less than 33.33 L/s are observed in areas generally serviced by a local watermain with size less than 150 mm in diameter and having only one connection to the water distribution system (i.e., no looping).

- Considering that the growth area RES37 at Van Dusen Dr (Tartan Homes) will serve more than 50 dwellings, a second feedermain should be provided to enhance reliability of water service to this area. Details of the second watermain required to feed the RES37 area should be investigated as part of solutions development.

The following recommendations also arose from the potable water distribution system assessment, for consideration for solutions development and the next Master Plan update.

- Conducting further calibration and validation for model fire flow using data from new hydrant tests to further improve the reporting of the available fire flows in the network, considering that the hydrant flow data currently used are from tests completed in 2018 which happened prior to network and demand changes due to recent development.
- Reviewing details of climate change analysis, as discussed in **Section 5.2.2.1.2**, to determine the scenarios of interest that will be assessed during solutions development.
- Reviewing and confirming the future conditions fire flow requirements for storage and pumping capacity assessment.
- Adding a second HLP to the system in the 2042 MXDY demand scenario to ensure the EST operating within the typical range of 60 to 80% full.

Following the findings presented herein, servicing alternatives are identified and assessed in **Chapter 3** (**Section 6**).

6 Chapter 3: Servicing Strategy

The purpose of **Chapter 3** is to present and evaluate strategies to address existing constraints and service projected growth. This report also assesses the serviceability of areas outside the Town's current boundaries.

6.1 Summary of Servicing Constraints

6.1.1 WASTEWATER COLLECTION SYSTEM SERVICING CONSTRAINTS

In this chapter, servicing alternatives are assessed based on problems identified in the 20-year horizon as summarized below:

- Collection system HGL issues and pipe capacity constraints in the following problem areas:
  - Problem Area PA-1 – Riverview Dr/Fourth Ave/Mulvihill Cr
  - Problem Area PA-2 –Daniel St
  - Problem Area PA-3 – Edward St
- PS capacity constraints at the following PSs:
  - PS #1
  - PS #2
  - PS #3

Additionally, this chapter addresses servicing of growth areas.

6.1.2 POTABLE WATER DISTRIBUTION SYSTEM SERVICING CONSTRAINTS

In this chapter, servicing alternatives are assessed based on problems identified in the 20-year horizon as summarized below.

- Maximum pressures under AVDY demands:
  - Maximum pressures above 100 psi are identified in low-lying areas along the shorelines of the Ottawa River and Madawaska River.
  - Maximum pressures greater than 80 psi but less than 100 psi are observed in lower elevation areas, northeast of Caruso St, Mary St, and Havey St, and north of the Canadian National Railway corridor.

- Minimum pressures under MXDY demands [at peak hour (PKHR)]:
  - o Based on model results, the EST is shown to operate between 54 to 80% full, the lower end of which is just below the typical range of 60 to 80% (the EST typically operates between 60% to 80% full under existing conditions according to SCADA data).
- Available fire flows at a residual pressure of 20 psi under MXDY plus fire flow demands:
  - o Available fire flows below 33.33 L/s are observed in areas generally serviced by a local watermain less than 150 mm diameter in size with only one connection to the water distribution system (i.e., no looping).

Additionally, as discussed in **Chapter 2** (**Section 5**), details of the second watermain required to feed the growth area RES37 at Van Dusen Dr (Tartan Homes) would be investigated as part of solutions development in this chapter, in order to improve reliability of water service to this residential subdivision with more than 50 dwellings.

6.2 Evaluation Criteria

The proposed servicing alternatives for the wastewater collection and water distribution systems were assessed based on the criteria presented in **Table 6-1**.

Each alternative is qualitatively assessed against each criteria using a reasoned argument approach, according to the following 5-point scale:

- Very well aligned with criteria;
- Well aligned with criteria;
- Somewhat aligned with criteria;
- Not well aligned with criteria; and
- Low alignment with criteria.

Table 6-1: Evaluation Criteria

Criteria Category	Criteria	Criteria Indicators
1. Environmental	a. Protects Environmental Features	• Protect sensitive natural features and regulated areas. • Minimize the potential impact from construction and operation to existing terrestrial and aquatic habitats/features, species at risk, vegetation, wetlands, woodlots, and steep slopes. • Allow for scheduling and roll-out of construction activities in a way and at a time of year that would limit the negative impacts on the vegetation of the site and surrounding area.
	b. Protects Groundwater, Streams and Rivers	• Protect groundwater / surface water, and meet *Clean Water Act* requirements. • Minimize sewage discharge to the environment during design conditions, and mitigate spills during extreme rainfall. • Minimize impacts within Madawaska River and Ottawa River regulated areas.
	c. Minimizes Impact on Climate Change	• Minimize greenhouse gas (GHG) emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g., changes vicinity plant cover). • Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands. • Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts.
2. Social/Cultural	a. Minimizes Long-Term Impacts to the Community Related to Noise, Odour, Traffic and Aesthetics	• Minimize noise, odour, and traffic affecting the community during system operation and maintenance. • Maintain access to, and aesthetics of, public spaces. • Minimize negative impacts that may result due to changes to the neighbourhood characteristics (e.g., recreational features, green space, property values).
	b. Minimizes Impacts to Businesses and Major Transportation Corridors	• Maintain access for businesses during construction and system operation. • Minimize potential negative effects on short-term and long-term business vitality, and community growth and development. • Minimize potential negative impacts on major transportation corridors and bus routes.
	c. Manages and Minimizes Short-Term Construction Impacts	• Minimize noise, odour, road closures, and truck traffic affecting the community during construction.
	d. Protects Health and Safety	• Minimize the potential risk to public health and safety, particularly on downstream users (including for recreation and tourism). • Minimize the potential risk to operator and maintenance staff health and safety.
	e. Protects Cultural Heritage Resources	• Minimize potential impact to cultural heritage resources.
3. Economic	a. Provides Low Lifecycle Costs	• Minimize capital, operation and maintenance (life cycle) costs over a 50-year period.
4. Technical	a. Meets Existing and Future Needs	• Addresses the existing system capacity constraints. • Mitigate the impact on level-of-service performance of existing infrastructure. • Meets the long-term capacity requirements to service the projected population growth to 2042.
	b. Provides Ease of Maintenance	• Provide operational improvements to allow for safe and efficient maintenance activities. • Minimize increases in operational and/or maintenance complexity of the system.
	c. Aligns with Existing and Planned Infrastructure	• Optimize existing infrastructure investment. • Minimize requirement for upgrades/expansion to recent infrastructure. • Align with other planned infrastructure initiatives (Transportation, Stormwater Master Plans, Capital projects). • Ability to implement in a phased manner over time.
	d. Aligns with Existing and Future Land Use	• Evaluate need to acquire land for new/expanded utility corridors or facilities (pumping stations, storage tanks) including ownership requirements.
	e. Aligns with Efficient Approval and Permitting Process	• Minimize the complexity and time spent to obtain approvals from various regulatory agencies.
	f. Manages and Minimizes Construction Risks	• Minimize complexity of construction and maximize ability to maintain adequate water/wastewater servicing during construction.
	g. Ability to Adapt to Climate Change	• Promote resiliency to extreme weather events. • Prioritize climate change adaptation to minimize risk associated with variation in climate parameters (temperature, precipitation, wind gusts, or other) and natural hazards (flooding, high river levels, or other). • Prioritize the surrounding area's ability to be resilient and maintain its adaptive capacity to climate change.

6.3 Alternatives Development

Per the Municipal Class Environmental Assessment (MCEA) requirements, alternative solutions must be considered and evaluated. The following section presents the high-level servicing strategies. These strategies are evaluated in **Section 6.4** (against the criteria presented in **Section 6.2**), and the preferred alternative is further refined in **Section 6.5**.

6.3.1 DO NOTHING

The *Do Nothing* alternative maintains the existing wastewater collection and water distribution system "as is". This alternative does not address system constraints [as identified in **Chapter 2** (**Section 5**)], however, it is included as a benchmark against which all other alternatives may be considered. A decision to *Do Nothing* may be made if the financial and environmental costs of all other alternatives outweigh the benefits. However, a *Do Nothing* approach does not allow for growth to occur beyond the existing potable water and wastewater system's capabilities, as it does not provide the infrastructure needed to meet future growth requirements projected in the Town's Official Plan.

6.3.2 I/I REDUCTION, WATER CONSERVATION AND RE-USE

This alternative consists of implementing water conservation measures to reduce water consumption rates. Examples of water conservation measures include implementing a bylaw to control outdoor water use during the spring and summer months and establishing water re-use program to optimize the overall water use. The primary objective of water conservation measures is to reduce per capita water consumption from both the existing and future users; however, the efficiency of the measures would have to be verified with WFP data. In general, it is unlikely that water conservation measures will be sufficient to meet future demand needs without upgrading the existing potable water system.

The resulting reduced water usage is expected to reduce the volume of sanitary flows produced. However, the Town cannot rely on water efficiency measures alone to offset the larger contributing factor of wet weather infiltration and inflow (I/I). I/I remains a contributor to elevated flows during wet weather and during spring melt conditions, and PS bypasses and overflows at the Albert St CSO which have been reported. I/I reduction alone cannot resolve existing conveyance deficiencies nor offset future growth demands. Nonetheless, I/I reduction and mitigation is a prudent measure of collection system management that complements conveyance system upgrades, building in resiliency to uncertain implications of climate change.

6.3.3 COMMUNAL POTABLE WATER AND WASTEWATER SYSTEMS

Communal Systems are smaller systems that may be considered as an alternative to a larger municipal system, when certain constraints are identified where connections to an existing municipal system could be too costly to implement and operate.

6.3.3.1 Communal Wastewater Collection System

Communal wastewater collection systems consist of small diameter gravity sewers, pressure sewers and vacuum sewers. These alternative wastewater collection technologies are viable options where conventional sewers may be too costly to construct, operate and maintain. Typical conditions which could be beneficial for communal sewers include unserviced areas with very rocky, hilly terrain, and/or high ground water tables. However, these conditions are not applicable to the Town's municipal sewer system, which is centrally located and provides access to all development areas within the Town's municipal boundary. The Town's geological, hydrogeological and topographical conditions are appropriate for conventional sewers.

In terms of wastewater treatment, as reported in **Chapter 2** (**Section 5**), the Town's WWTP is expected to have capacity to service the growth projected in the current MP's planning horizons. The Town's WWTP is located centrally, and sewage flows can be conveyed by the wastewater collection network from all development areas within the Town's municipal boundary.

6.3.3.2 Communal Potable Water System

Communal potable water systems that utilize groundwater wells are typically considered in rural areas where the construction and operation of a municipal water system is not feasible due to specific constraints, such as cost and contaminated water source. In some cases, communal potable water systems might not supply the fire flow (i.e., fire protection would be provided by tanker and pumper truck), and therefore reduce the required pipe size and associated pumping and storage infrastructure. Considering the population density and the existing municipal water distribution system in the Town with good water source from the river, communal potable water systems that would require additional and unnecessary operations and maintenance are not deemed beneficial.

6.3.4 PARTIAL SERVICES PRIVATE/COMMUNAL AND MUNICIPAL

Partial Services consist of a combination of municipal services, and private and/or communal services in different areas of the Town. Partial services have been considered in communities where implementing full municipal services is cost-prohibitive, and implementing full municipal services is not feasible within the foreseeable development horizon. However, where full municipal services are readily established and can be easily expanded to new developments, the implementation of partial services is not preferred.

6.3.5 IMPROVEMENT AND EXPANSION OF THE MUNICIPAL POTABLE WATER DISTRIBUTION AND WASTEWATER COLLECTION SYSTEMS

This servicing alternative consists of improving and expanding the existing municipal wastewater collection and potable water distribution, and treatment systems. Given the Town's size, projected growth, and outside interests, improving and expanding its existing systems are a reasonable alternative to meet future needs.

6.3.5.1 Improvement and Expansion of the Municipal Wastewater Collection System

Improving and expanding the existing wastewater collection system allows for an optimized use of existing infrastructure and provides a centrally located treatment process. This alternative includes considerations for upgrading and expanding the wastewater collection network, PSs and WWTP, to meet future growth needs.

6.3.5.2 Improvement and Expansion of the Municipal Potable Water Distribution System

The alternative of improving and expanding the existing potable water system would be a cost-efficient option which optimizes the use of existing infrastructure, including the water distribution network, the EST, and the centrally located WFP. Based on potable water system assessment results presented in **Chapter 2** (**Section 5**), upgrades and expansion of the existing municipal potable water system would be required to meet future growth requirements.

6.3.6 OTHER ALTERNATIVES

The following alternatives were also considered, but not further evaluated.

6.3.6.1 Limit Future Growth

The *Limit Future Growth* alternative essentially reduces or eliminates future wastewater and water servicing requirements by limiting collection system flow generation and water demands. This would involve limiting future residential, industrial, commercial and institutional growth and does not conform with the Town's Official Plan long-term objective, "including continued business growth and support" needed as part of implementing the Province of Ontario's Provincial Policy Statement (2014, replaced in 2020). Additionally, this alternative does not address system limitations under existing conditions. Therefore, this alternative was not further evaluated.

6.3.6.2 Private Well and Septic Servicing

The *Private Well and Septic Servicing* alternative consists of servicing future growth areas with private well and septic systems for each property. Private services can limit the potential to develop the surrounding land, as a wellhead protection area would need to be established, and the areas around a septic tank should remain clear. While private services would reduce the volume of sanitary flows, they would not address existing constraints due to I/I. The Town's current bylaws do no permit private well and septic servicing as a servicing strategy for new developments, with exceptions considered in specific instances. Private systems could be considered when a distant property wishes to develop prior to municipal services being readily available. Therefore, while private systems are not allowed from a master planning perspective (and are therefore not further evaluated), they could be considered on a case-by-case basis by the Town, as part of the alternative to provide *Partial Services Private/Communal and Municipal* (see **Section 6.3.4**).

6.4 Alternatives Evaluation

The alternatives identified in **Section 6.3** are evaluated against the criteria outlined in **Section 6.2**, for each of the wastewater collection and water distribution systems.

6.4.1 WASTEWATER COLLECTION SYSTEM ALTERNATIVES EVALUATION

The following sub-sections summarizes the assessment of each criterion outlined in **Section 6.2**, for the wastewater collection system. A detailed evaluation table for the wastewater collection system is presented in **Appendix D.1**.

6.4.1.1 Wastewater Collection System Alternatives Evaluation - Environmental

The *Communal Systems*, *Partial Services* and *Improvement and Expansion of Existing Municipal Systems* alternatives are expected to have the largest impact on environmental features and lead to an increase in GHG emissions due to construction requirements. Furthermore, these alternatives could also require the removal of trees, which could be replanted to renew the resources. The *Do Nothing* alternative is expected to have no impact on environmental features compared to existing conditions. The *I/I Reduction, Water Conservation and Re-Use* alternative has the potential to reduce the flows into the Town's systems. Limiting future growth is expected to have a minor impact on environmental features due to reduced development.

6.4.1.2 Wastewater Collection System Alternatives Evaluation - Social/Cultural

The *Do Nothing* alternative has high potential for negative effects on long-term business vitality, community growth and development as existing infrastructure does not have sufficient capacity to accommodate future demands and flows.

I/I Reduction, Water Conservation and Re-Use measures have the potential to lessen the servicing needs and extend the lifecycle of existing infrastructure. Since the Town's wastewater collection system is partially separated, it is expected that activities such as sewer separation could contribute to I/I reduction, however this would have to be confirmed with further monitoring. Implementing private or communal servicing, and improvements to the existing infrastructure are expected to have the highest social/cultural impact related to construction projects. These construction projects would be short-term in duration; however, it is expected that new facilities would result in an increased operational and maintenance activity requirements.

6.4.1.3 Wastewater Collection System Alternatives Evaluation - Economic

The *Do Nothing* alternative does not involve any capital costs, however there is potential for increased lifecycle costs due to system aging and replacement/emergency needs.

I/I Reduction would conceptually require limited cost (when compared to infrastructure needs for the *Communal Systems, Partial Servicing, and Improvement and Expansion of the Existing Municipal Systems* alternatives). The potential gain from this alternative is not expected to be significant by comparison, but is part of an overall strategic approach to improved system management that may help to defer capital projects should significant public I/I sources be found with a direct mitigation measure of smaller scale.

Improvement and expansion of the existing system is expected to have major capital costs. Along with *Communal Systems* and *Partial Servicing,* these alternatives have the potential for cost sharing with developers. Furthermore, higher long-term costs are expected if new PSs are built, operated, and maintained.

6.4.1.4 Wastewater Collection System Alternatives Evaluation - Technical

The *Do Nothing* and *I/I Reduction* alternatives are all the easiest to implement. They all however significantly do not meet the technical requirements and are therefore not satisfactory within the context of satisfying the Town's long-term servicing needs.

6.4.1.5 Wastewater Collection System Alternatives Evaluation - Servicing Evaluation Summary

Of the alternatives assessed, *improving and expanding the existing system* is the only one that can meet the future requirements for the system while meeting the Town's Official Plan objective of "continued business growth and support". Therefore, this was carried forward to be further refined in **Section 6.5**.

I/I reduction and mitigation measures are proposed to complement the recommended solution in areas where they could be beneficial, however, their impact would need to be confirmed through further monitoring. The full evaluation of the wastewater servicing alternatives is provided in **Appendix D.1**.

6.4.2 POTABLE WATER DISTRIBUTION SYSTEM ALTERNATIVES EVALUATION

The assessment of the potable water distribution system alternatives based on criteria listed in **Section 6.2** is summarized in sub-sections below. Refer to **Appendix D.2** for a detailed evaluation table for the potable water distribution system.

6.4.2.1 Potable Water Distribution System Alternatives Evaluation – Environmental

The *Do Nothing* alternative is expected to have no impact on the existing environment as no new construction/upgrades to the potable water system are proposed. The *Water Conservation and Re-Use* alternative is expected to have minor impacts on fish and fish habitats considering potentially reduced water taking, as well as impacts on GHG emissions due to water conservation and re-use measure.

The *Communal System*, *Partial Servicing*, and *Improvement and Expansion of Existing Municipal System* alternatives are considered to have greater impacts on environment as construction/upgrades are required. Some negative impacts on environmental features due to these four alternatives could be minimized by various means, such as replanting of removed trees.

6.4.2.2 Potable Water Distribution System Alternatives Evaluation – Social/Cultural

The *Do Nothing* alternative is anticipated to have high negative impacts on long-term business vitality, community growth and development since the existing potable water system is unable to accommodate future growth needs under 2042 conditions based on the assessment presented in **Chapter 2** (**Section 5**).

The remaining five alternatives all involve new construction which lead to short-term impacts on the residents and communities. While the *Water Conservation and Re-Use* alternative has low potential to meet community growth and development, the *Communal System*, *Partial Servicing*, and *Improvement and Expansion of Existing Municipal System* options are expected to have greater ability to accommodate future growth with new or upgraded infrastructure. However, it should be noted that the ability to meet future demand needs for the *Communal System*, and *Partial Servicing* alternatives is limited depending on groundwater supply regarding quantity and quality. Furthermore, aquifers that service the groundwater wells would have to be protected which restricts the types of development that could be built.

6.4.2.3 Potable Water Distribution System Alternatives Evaluation – Economic

The *Do Nothing* alternative is expected to have the lowest costs as it involves only operation and maintenance costs but no capital cost. The *Water Conservation and Re-Use* alternative would require relatively low capital costs to initiate water conservation program, along with operation and maintenance costs for the existing potable water system. It is anticipated that the operation and maintenance costs for these three options would increase over time due to system aging and emergency needs.

The other four alternatives involving new construction would have higher capital costs. Operation and maintenance costs are also required for these alternatives. When comparing to the *Improvement and Expansion of Existing Municipal System* alternative, the *Communal System* and *Partial Servicing* options are expected to have greater long-term costs to operate and maintain the new facilities.

6.4.2.4 Potable Water Distribution System Alternatives Evaluation – Technical

The *Do Nothing* and *Water Conservation and Re-Use* alternatives are all simple options involving little to no construction. However, they are unable to address existing constraints or meet long-term capacity requirements to service the projected population growth. The *Communal System* and *Partial Servicing* options that utilize groundwater as the source, have the potential capability to accommodate future growth needs, but would depend on the quantity and quality of groundwater supply. Additionally, water taking from aquifers could increase vulnerability to drought which reduces the ability to adapt to climate change. As for the *Improvement and Expansion of Existing Municipal System* alternative, it has the ability to address existing constraints and meet future demand needs while aligning with planned infrastructure initiatives.

6.4.2.5 Potable Water Distribution System Alternatives Evaluation – Servicing Evaluation Summary

According to the evaluation table for potable water servicing alternatives presented in **Appendix D.2**, the *Improvement and Expansion of Existing Municipal System* alternative is the most aligned with criteria. Therefore, it was carried forward for further evaluation.

6.5 Refined Alternatives

The following section presents the refined alternatives for the wastewater collection and water distribution system servicing strategies, with the intent of developing the implementation plan which is presented in **Chapter 4** (**Section 7**).

6.5.1 REFINED ALTERNATIVE – IMPROVEMENT AND EXPANSION OF THE WASTEWATER COLLECTION SYSTEM

Improvements to the wastewater collection system consist of upgrades to existing infrastructure (sewers, PSs) to accommodate projected flows. Expanding the system consists of identifying new trunk sewers and PSs to service areas which cannot be directly serviced by the existing system.

6.5.1.1 Refined Alternatives – Improvements to Existing Sewers

The *Improvement of the Municipal Wastewater Infrastructure* for the sewer collection system involves the implementation of capital projects such as upgraded sewers, twinned sewers, inline/offline storage, and/or modifications to existing infrastructure to both address existing constraints and meet the needs to future growth. In most cases, the approach identifies a gravity solution (i.e., a new or upgraded new sewer) as preferred to one requiring a new pumping station and accompanying forcemains. This is due to a range of benefits (overall) from environmental, social/cultural, economic, technical, and financial perspectives.

In general, improvements to the Town's existing wastewater collection system by replacing/upgrading sewers is the preferred approach for local system deficiencies. Nonetheless, the conceptual replacement/upgrade strategy presented herein should be confirmed during detailed design, during which the following should be further investigated:

- Confirm feasible and preferred alignments;
- Confirm that design guideline requirements with respect to depth of cover, velocities, and other criteria are met;
- Identify whether twinning, or inline/offline storage should be implemented; and
- Identify potential conflicts with other utilities.

6.5.1.1.1 Problem Area PA-1 – Riverview Dr/Fourth Ave/Mulvihill Cr Upgrades

PA-1 consists of 300 mm to 450 mm diameter sewers along Mulvihill Cr, Riverview Dr, and Fourth Ave. The peak HGL profile under 2042 25-year design event conditions is shown in **Figure 6-1**. No projects from **Table 5-27** are planned upstream of PA-1, which will have an impact on the future flows.

Under the refined alternative (Existing system improvements), the following is recommended to increase sewer capacity and eliminate HGL issues, as shown in **Figure 6-2:**

- **SEW-PA1-A)** Confirm the inverts along Riverview Dr with a topographical survey;
- **SEW-PA1-B)** Increase slopes to address existing adverse and flat sewer inverts along 316 m of 450 mm diameter sewers along Riverview Dr;
- **SEW-PA1-C)** Upgrade 356 m of 300 mm and 375 mm diameter sewers to 525 mm along Riverview Dr;
    - While not surcharged, the 204 m of 300 mm diameter sewers along Riverview Dr from Second St to Madawaska Blvd should be upsized to provide continuity in the diameters, and avoid new downstream capacity issues as the upstream sewers' capacity is increased.

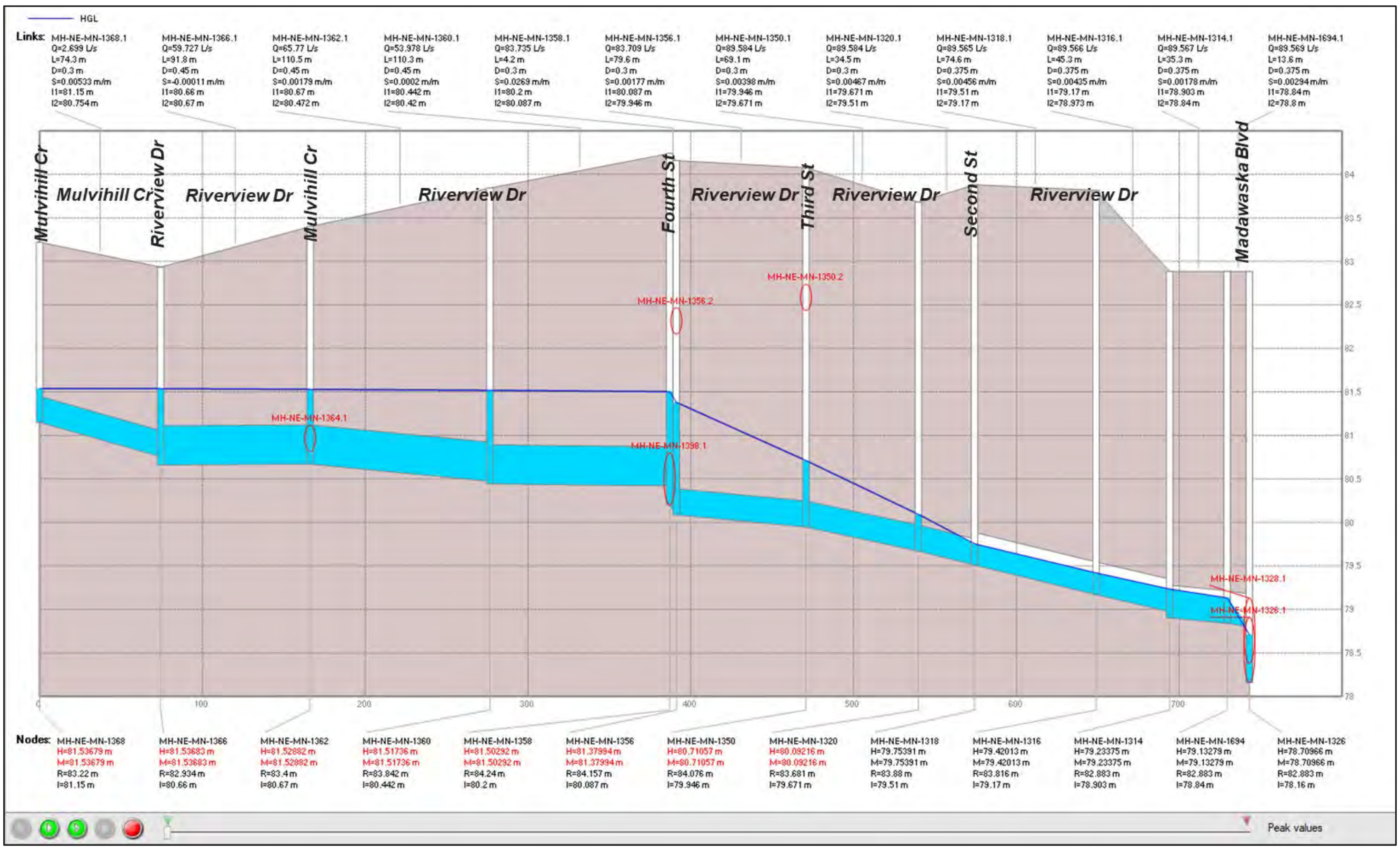


Figure 6-1: Problem Area PA-1 - 2042 Conditions 25-Year Event Peak HGL Profile (Existing Infrastructure, with Planned Sewer Separations and Edey St Redirection)

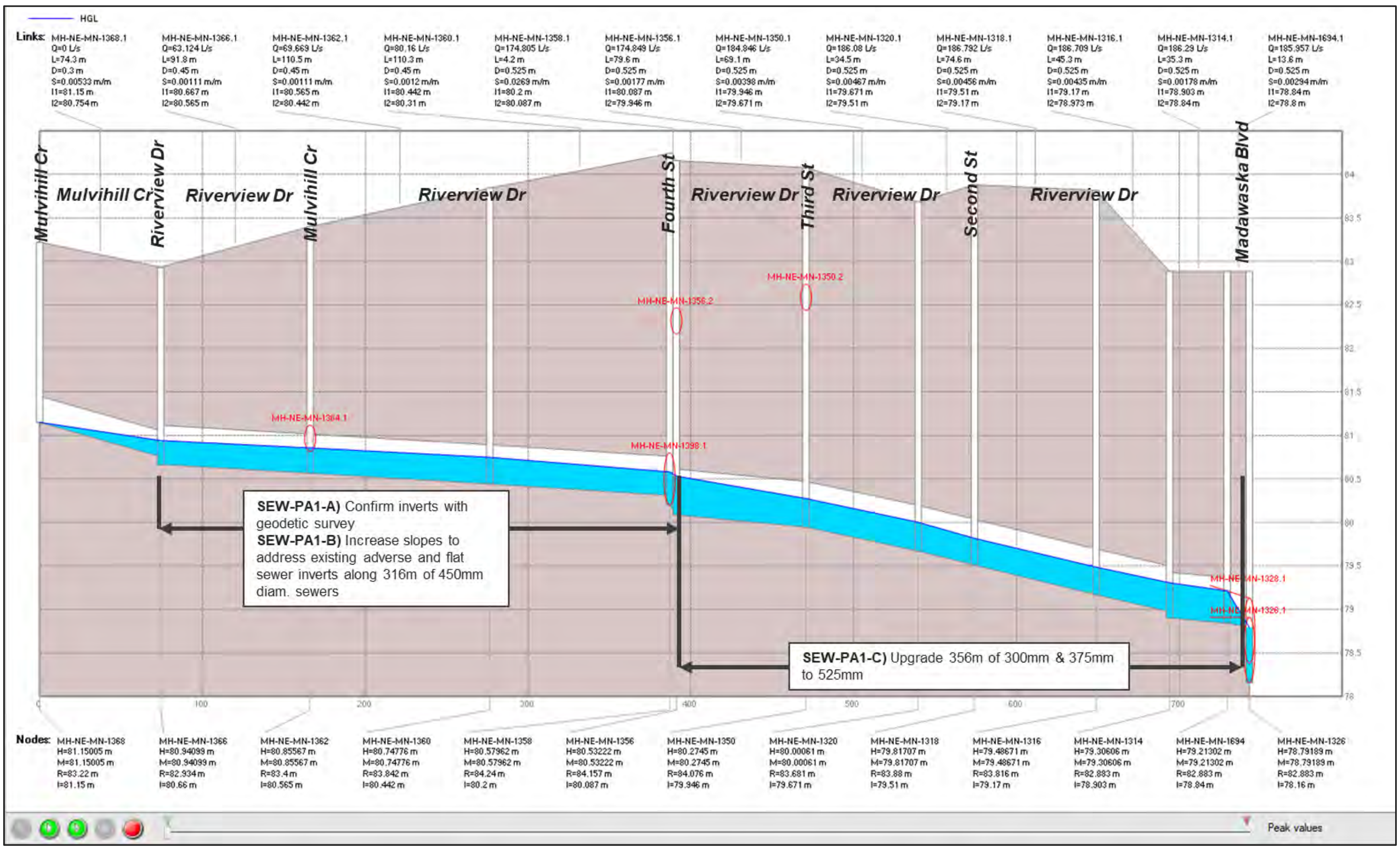


Figure 6-2: Problem Area PA-1 - 2042 Conditions 25-Year Event Peak HGL Profile (Post-Upgrade)

6.5.1.1.2 Problem Area PA-2 - Daniel St/Albert St Upgrades

PA-2 consists of 600 mm diameter sewers along Daniel St and Albert St. The peak HGL profile under 2042 25-year design event conditions with future (planned) projects (sewer separations, Edey St redirection) is shown in **Figure 6-3**.

Under the refined alternative (Existing system improvements), the following is recommended to increase sewer capacity and eliminate HGL issues, as shown in **Figure 6-4**:

- **SEW-PA2-A)** Upgrade the sewers along Daniel St and Albert St as follows:
    - SEW-PA2-A1: Upgrade 66 m of 600 mm diameter sewers to 675 mm along Daniel St from south of Madawaska St to Madawaska St., and
    - SEW-PA2-A2: Upgrade 198 m of 600 mm diameter sewers to 675 mm along Daniel St/Albert St from Madawaska St to Victoria St.
        - This section overlaps with the Town's planned project to upgrade the Albert St sewers from McEwen St to Madawaska St (project SEW-FUT-6 in Table 5-27). The sizing proposed herein can be used to inform the next stages of planning and design of this project.

Additionally, PA-2 is also identified as a problem area under climate change conditions in **Section 6.7.1.1.1**. Recommended sewer upsizing to consider climate change are therefore presented.

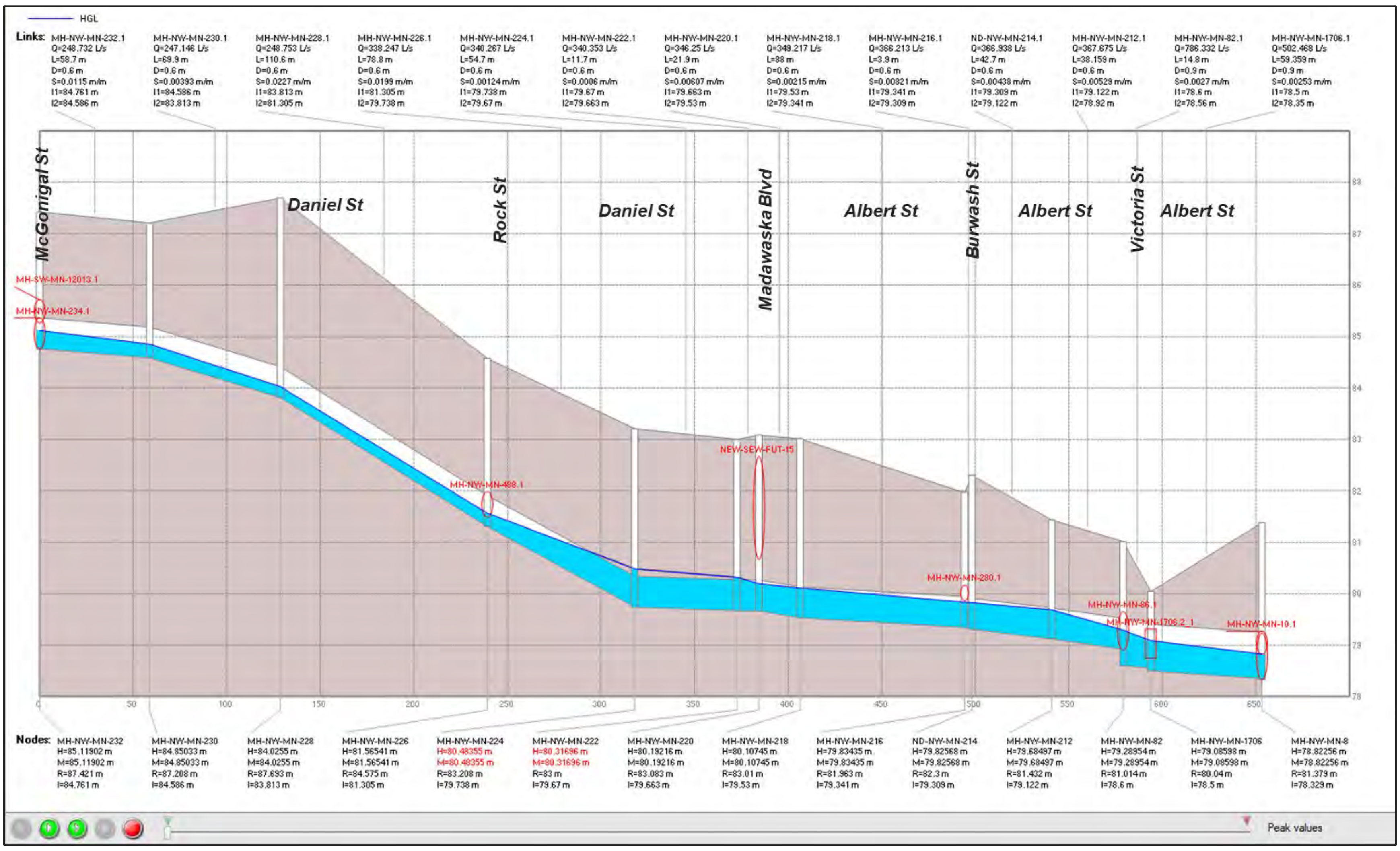


Figure 6-3: Problem Area PA-2 - 2042 Conditions 25-Year Event Peak HGL Profile (Existing Infrastructure, with Planned Sewer Separations and Edey St Redirection)

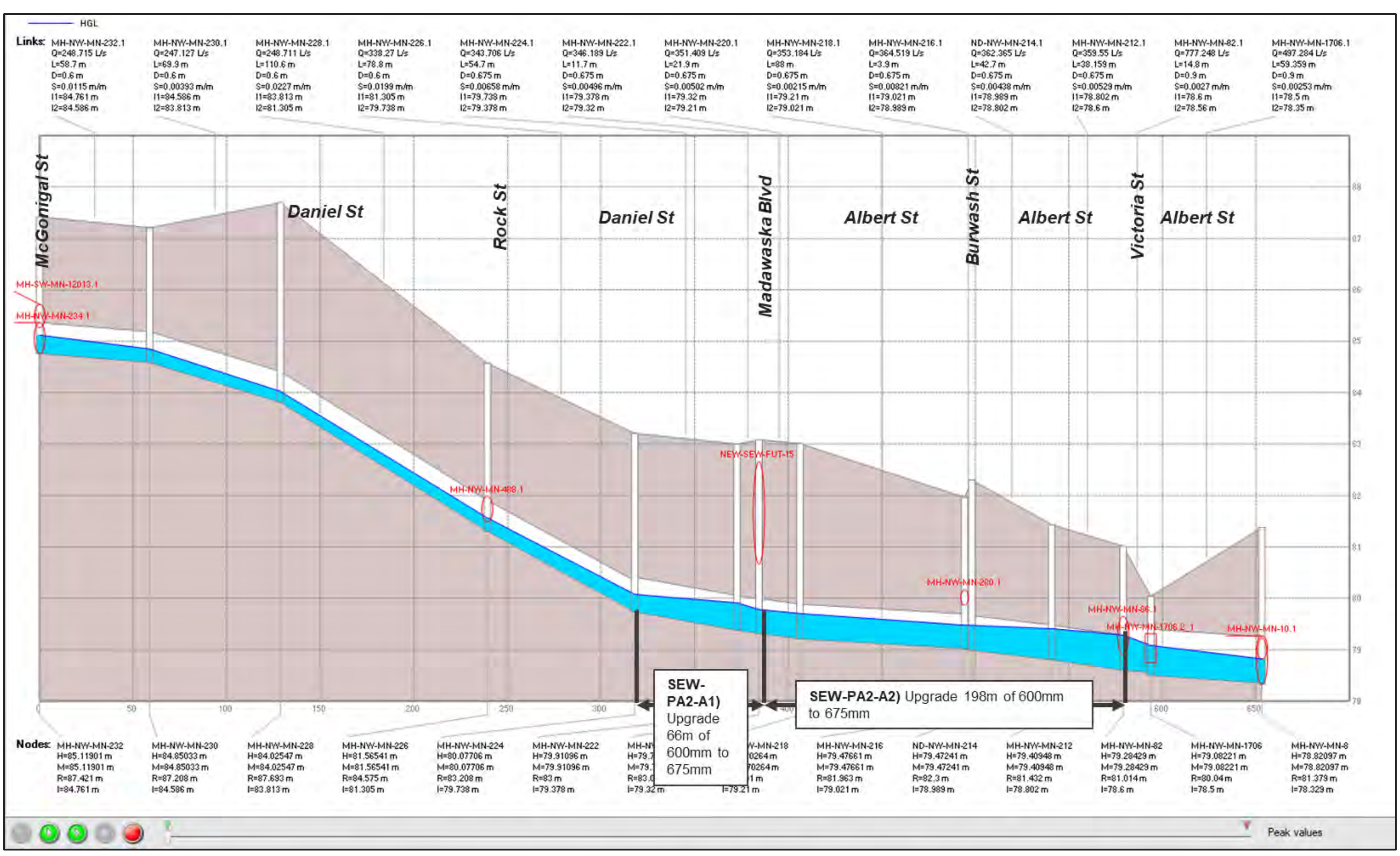


Figure 6-4: Problem Area PA-2 - 2042 Conditions 25-Year Event Peak HGL Profile (Post-Upgrade)

6.5.1.1.3 Problem Area PA-3 - Edward St

PA-3 consists of 200 mm diameter sewers along Edward St. The peak HGL profile under 2042 25-year design event conditions with future (planned) projects (sewer separations, Edey St redirection) is shown in **Figure 6-5**.

Under the refined alternative (Existing system improvements), the following is recommended to increase sewer capacity and eliminate HGL issues, as shown in **Figure 6-6:**

- **SEW-PA3-A)** Confirm the inverts along Edward St with a topographical survey;
- **SEW-PA3-B)** Upgrade 112 m of 200 mm diameter sewers to 250 mm along Edward St.

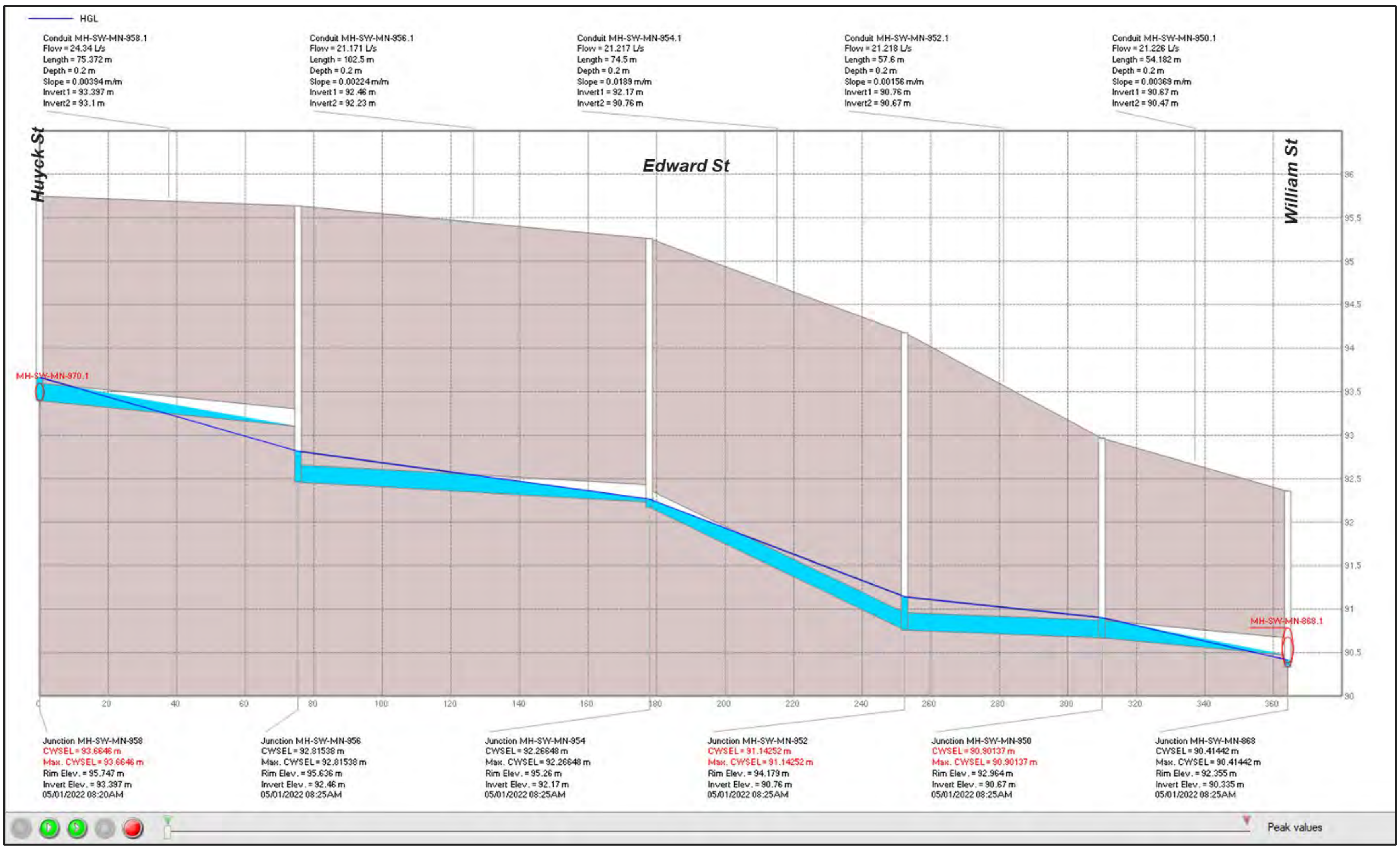


Figure 6-5: Problem Area PA-3 - 2042 Conditions 25-Year Event Peak HGL Profile (Existing Infrastructure, with Planned Sewer Separations and Edey St Redirection)

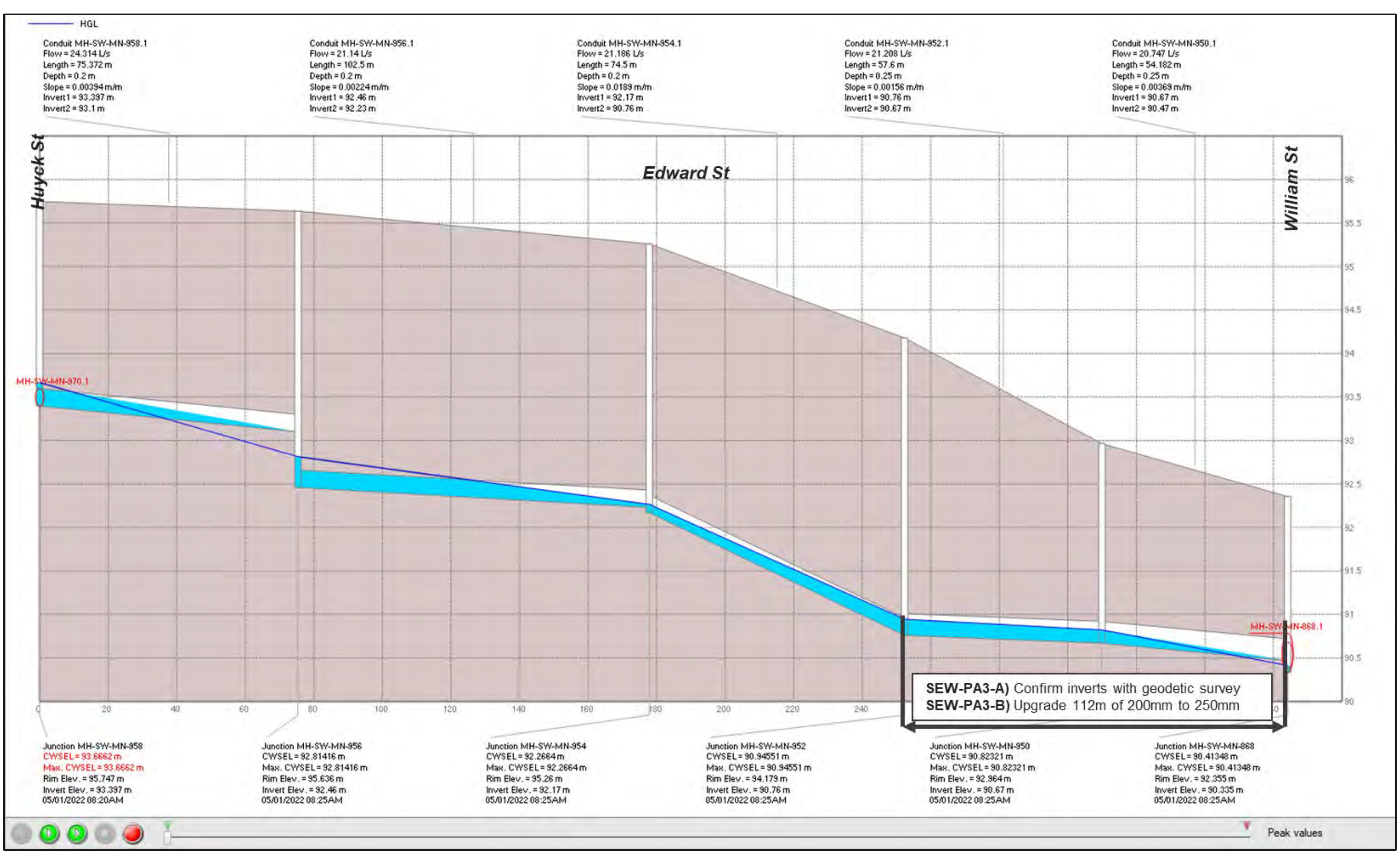


Figure 6-6: Problem Area PA-3 - 2042 Conditions 25-Year Event Peak HGL Profile (Post-Upgrade)

6.5.1.2 Refined Alternatives – Improvements to Existing Pumping Stations

The *Improvement of the Municipal Wastewater Infrastructure* for the PSs involves the upgrades to existing PS facilities to both address existing constraints and meet the needs to future growth.

6.5.1.2.1 Post-Upgrade Flows to Pumping Stations

Following the sewer upgrades presented in **Section 6.5.1.1**, more flow can be conveyed downstream. This will result in an increase in the flows modelled at the PSs. For the improvements to the existing PSs, the flows considering the upstream sewer upgrades are used to size the required upgrade. The modelled peak incoming flows are presented in **Table 6-2**. The results with the proposed sewer upgrades are also inclusive of the Town's planned sewer separation and Edey St redirection projects presented in **Table 5-27**. For PS #1, the flows with and without the upstream sewer separations are reported, as their efficacy in reducing peak flows should first be confirmed with monitoring once sewer separation is completed.

The main impact of the sewer upgrade recommendations is on the peak incoming flows to PS #3, which are projected to increase once the proposed upgrades along PA-1 on Riverview Dr are implemented (see **Section 6.5.1.1.1**) and more flows are conveyed downstream.

The recommended design event per the MECP guidelines is the 10-year design event.

Table 6-2: 2042 Peak Incoming Flows to PSs (Pre- and Post-Upgrades)

Name	Location	Number of Pumps at PS	Firm Capacity (Largest Pump Out of Service) (L/s)	20-Year Horizon (2042) Peak Modelled Incoming Flows (L/s) With Existing Infrastructure Only *With Planned Projects(1)*			
				10-Year Design Event		25-Year Design Event	
				Original (No Upgrades)	With Proposed Sewer Upgrades(2)	Original (No Upgrades)	With Proposed Sewer Upgrades(2)
PS #1	Elgin St E at Claude St	2	25	81 *44*	81(3) *44*	96 *53*	96(3) *53*
PS #2	McNab St at Seventh Ave	2	59	71 *71*	*71*	84 *84*	*84*
PS #3	Madawaska Blvd, west of Bridge St	3(1)	275	306 *306*	*371*	338 *338*	*436*
PS #5	Wolff Cres	2	7	5.4 *5.4*	*5.4*	6.1 *6.1*	*6.1*

Notes:
(1) Future (planned) projects presented in **Table 5-27**.
(2) Proposed sewer upgrades presented in **Section 6.5.1.1**.
(3) Without upstream sewer separation (project SEW-FUT-8 in **Table 5-27**).

6.5.1.2.2 PS #1

The modelled flows to PS #1 exceed the PS's firm capacity under existing and future 10-year and 25-year design event conditions. Furthermore, the PS has bypassed twice between 2017 and 2022 due to heavy precipitation, as well as during the high-intensity rainstorm of September 7th, 2023. The following is therefore recommended, to address the PS capacity constraints identified:

- **PS1-A)** Undertake combined sewer separation activities planned upstream of PS #1 (see project SEW-FUT-8 in **Table 5-27**) and in the areas draining to Russell St and Elgin St (east of Daniel St; see project SEW-FUT-9 in **Table 5-27**)
- **PS1-B)** Monitor flows upstream and downstream of PS #1 and update the Town's model to reflect.
- **PS1-C)** Should the projected flows still exceed the PS #1 capacity, an upgrade to PS #1 should be undertaken.
    - Under a scenario without the combined sewer separation planned in PS1-A, PS #1 should be upgraded to accommodate peak incoming flows of 81 L/s under the 10-year design event for a 20-year planning horizon, per the MECP guidelines.
    - With the combined sewer separation planned in PS1-A, PS #1 should be upgraded to accommodate peak incoming flows of 44 L/s under the 10-year design event.
    - The PS #1 upgrades were costed in **Chapter 4** (**Section 7**), assuming that a PS capacity expansion within the existing PS footprint is feasible. However, a study will be required to determine the required extent of the PS expansion, and whether the expansion will be an exempt project, or a Schedule B or C project.

6.5.1.2.3 PS #2

The modelled flows to PS #2 exceed the PS's firm capacity under existing and future 10-year and 25-year design event conditions. However, there were no bypasses here during the events that caused these elsewhere between 2017 to 2022.

The bypass history therefore does not support a PS upgrade recommendation in the short-term. Furthermore, the PS is located downstream of the Nylene facility, for which a peak DWF contribution of 5.8 L/s was modelled [which is comparable to the average water consumption of 7.1 L/s (666 m^3/d) reported in **Chapter 2** (**Section 5**)]. The Town has noted that water consumption for the Nylene facility has been decreasing, which could also be reflected in the sewage flows. Therefore, the following is recommended to further characterize the flows from the Nylene facility and to PS #2:

- **PS2-A)** Monitor upstream flows and review the PS #2 capacity based on updated flow monitoring data. Update the Town's model as warranted.

- **PS2-B)** Should the updated projected flows still exceed the PS #2 capacity, an upgrade to PS #2 should be undertaken.
    - Under the current flow projections, PS #2 should be upgraded to accommodate peak incoming flows of 71 L/s under the 10-year design event for a 20-year planning horizon, per the MECP guidelines.
    - The PS #2 upgrades were costed in **Chapter 4** (**Section 7**), assuming that a PS capacity expansion within the existing PS footprint is feasible. However, a study will be required to determine the required extent of the PS expansion, and whether the expansion will be an exempt project or a Schedule B or C project.

6.5.1.2.4 PS #3

The modelled flows to PS #3 exceed the PS's firm capacity under existing and future 10-year and 25-year design event conditions. Furthermore, the PS #3 bypass history reports annual bypasses between 2020 and 2022 due to heavy precipitation/snowmelt, including a total of 3 bypasses in 2022, as well as during the high-intensity rainstorm of September 7th, 2023. Unlike PS #1, PS #3 is located downstream of separated areas, therefore the increase in I/I during wet weather events may be due to roof drains from the upstream ICI areas, or other potential cross-connections. Additionally, the WWF calibration was completed using flow monitoring data collected upstream of PS #3 during an event with a return frequency of approximately 1:2 year, which may lead to high flows when extrapolated to a 10-year event. Recommendations are therefore made to prioritize establishing confidence in the design basis of PS #3. Finally, the Town has noted the lack of reliability of the single sewage forcemain from PS #3 to the WWTP.

The following is therefore recommended, to address the PS capacity constraints identified:

- **PS3-A)** Investigate and address sources of I/I upstream of PS #3.
    - Examples of I/I investigation measures include: Micromonitoring, CCTV inspections, smoke testing, MH inspections.
    - Proceed with mitigation of I/I sources to remove these from the flows received at PS #3.
- **PS3-B)** Continue flow monitoring upstream of PS #3 to assess the efficacy of I/I reduction measures and capture the response under a variety of larger WWF events.
- **PS3-C)** Upgrade PS #3 to accommodate peak incoming flows of 371 L/s under the 10-year design event for a 20-year planning horizon, per the MECP guidelines.
    - The PS #3 upgrades were costed in **Chapter 4** (**Section 7**), assuming that a PS capacity expansion within the existing PS footprint is feasible. However, a study will be required to determine the required extent of the PS expansion, and whether the expansion will be an exempt project or a Schedule B or C project.

  - The requirement and extent of the upgraded needed will depend on the following:
    - Upstream I/I investigation (**PS3-A**) and reduction measures (**PS3-B**): It is possible that the removal of the I/I from the upstream system would be adequate to negate the need for a PS upgrade.
    - Sewer upgrades along Riverview Dr (**SEW-PA-1C**): Undertaking those sewer upgrades would allow flows to be conveyed downstream, possibly increasing peak flows to PS #3.
- **PS3-D)** Twin the existing sewage forcemain from PS #3 to the WWTP with a new 260 m long 350 mm diameter forcemain.

Since the PS #3 forcemain also discharges directly upstream of the WWTP, an increase in the PS #3 capacity will lead to an increase in the flows conveyed to the WWTP. As discussed in **Chapter 2** (**Section 5**), the WWTP capacity is assessed on the basis of historical average day and peak hour flows, rather than on modelled instantaneous flows. It is therefore recommended that, as PS #3 upgrades are implemented, the flows to the WWTP be reviewed against its capacity (see recommendation WWTP-5 in **Section 6.5.1.3**).

6.5.1.2.5 PS #5

The modelled flows to PS #5 are within the PS's firm capacity under existing and future 25-year design event conditions. PS #5 has not bypassed based on the records provided. As discussed in **Chapter 2** (**Section 5**), it was found that the FM 5 WWF parameters were not applicable to the areas upstream of PS #5, since these parameters were averaged over a large metershed comprising ICI areas with potential cross-connections, generating a high WWF response. Instead, the FM 1 parameters were applied to the areas upstream of PS #5. While no PS upgrades are recommended for PS #5, the following is recommended to further characterize the flows to PS #5:

- **PS5-A)** Monitor upstream flows and review the PS #5 capacity based on updated flow monitoring data and modelling results.

6.5.1.3 Refined Alternatives – WWTP

Capacity constraints at the WWTP were not identified under existing nor future growth conditions [see **Chapter 2** (**Section 5**)]. A historical downward trend in average flows to the WWTP has been observed, due to decreased water consumption at the Nylene facility and the elimination of watermain dead-end flushers continuously discharging into the sanitary sewers (replaced with bi-weekly hydrant flushing and looping of dead-end watermains). This trend is expected to stabilize with growth, as population increases while water consumption decreases.

As presented in **Table 5-6**, overflows at the Albert St weir and CSO have been observed yearly between 2016 and 2022 due to heavy precipitation events and snowmelt. An overflow was also observed during the high-intensity rainstorm of September 7th, 2023. Per the WWTP CoA and Town operations, these overflows constitute WWTP bypasses, which are triggered when levels in the WWTP inlet channel exceed 900 mm. While the occurrence of these overflows is not used as a measure for the WWTP capacity, and it is understood that these are reported to the MECP, the Town could consider further assessment to ensure the MECP's F-5-5 guidelines for the *Determination of treatment requirements for municipal and private combined sewage systems* are met.

Therefore, from an overall WWTP capacity perspective, the following is recommended:

- **WWTP-1)** Maintain activities to reduce I/I into the sanitary collection system;
- **WWTP-2)** Develop criteria to monitor and further assess the Albert St CSO, e.g., using the MECP's F-5-5, which notably includes (but is not limited to) the following criteria:
  - Maximizing flows to the WWTP when capacity is available; and,
  - Establishing a volumetric control criterion, composed of capturing and treating the average DWF + 90% of the WWF volume, during the period from April to October.
- **WWTP-3)** Continuously update the WWTP committed capacity assessment, as new development interests are identified; and,
- **WWTP-4)** Monitor the impact of upstream infrastructure upgrades on incoming flows to the WWTP.

From a treatment process perspective, the 2020 Stantec study on the Town's total nitrogen issues recommended the following:

- **WWTP-5)** Plan for the addition of an anoxic zone to improve pH control and support nitrification in the shoulder seasons.
- **WWTP-6)** Undertake a study of the organic and solids loading to the WWTP versus loading capacity.
  - Measured loads based on 2019 data used for the 2020 Total Nitrogen study suggest that the WWTP may be near its loading capacity. It is common to find that loads to WWTPs increase faster than the flows to the WWTP with the implementation of water-saving fixtures and appliances. However, the reported sludge production rate does not support this finding. This discrepancy should be resolved to confirm the remaining load capacity of the WWTP.

6.5.1.4 Refined Alternatives – Expansion of Existing Wastewater Collection System

The *Expansion of the Existing Wastewater Collection System* alternative consists of new trunk sewers, PSs and forcemains which will connect to the existing network, to service new growth areas. The following sub-sections identify the new infrastructure needed to expand the existing wastewater collection system.

6.5.1.4.1 Direct Servicing of Growth Areas

Based on a review of the projected growth areas' proximity to the existing sewer collection network, most growth areas can be directly serviced from the adjacent local or trunk sewers, such that the existing wastewater collection system would not require expansion to service these areas. **Table 6-3** lists the feasible direct wastewater servicing connections for each growth area, with additional considerations and alternative servicing options which could be explored at a detailed design stage. Where available, information provided by the Town on planned servicing from ongoing development applications was also considered.

The trunk sewer residual capacities are illustrated in **Figure 6-11** for the 2042 growth conditions with the planned projects (sewer separations, Edey St redirection) presented in **Table 5-27** and the solutions presented in **Section 6.5.1.1**. The growth areas were already considered as part of the growth assessment and refined alternatives to improve the wastewater collection system. However, local (non-modelled) residual sewer capacities were not confirmed as part of this Master Plan. It is recommended that local and trunk sewer capacities be reviewed as the servicing strategy for each growth area is established, and development proceeds as required.

Table 6-3: Direct Wastewater Servicing of Growth Areas

Growth Area ID	20-Year Horizon (2042) Modelled(1) Peak WWF (L/s)	Proposed Direct Wastewater Servicing Solution	Additional Considerations and Alternative Servicing Options
SC1_FUT	2.8 L/s	Direct connection to existing 600 mm diam. trunk sewer on Vanjumar Dr	
SC10_FUT	0.4 L/s	Direct connection to existing 600 mm diam. trunk sewer on Staye Ct Dr	
SC111_FUT	0.4 L/s	Direct connection to existing 250 mm diam. local sewer on Dan St, draining to existing 600 mm diam. trunk sewer on Victoria St	Local sewer on Dan St was not modelled, capacity was not confirmed
SC121_FUT	5.6 L/s	Direct connection to existing 600 mm diam. trunk sewer on Daniel St	
SC15_FUT	0.6 L/s	Direct connection to existing 600 mm diam. trunk sewer on Daniel St	
SC169_FUT	1.3 L/s	Direct connection to existing internal subdivision network, draining to existing 450 mm diam. trunk sewer on Edey St	Flows could be diverted from Edey St to Edward St and to MacDonald St (both 250 mm diameter)
SC172_FUT	1.2 L/s	Direct connection to existing internal subdivision network, draining to existing 375 mm diam. trunk sewer on William St E	
SC180_FUT	0.4 L/s	Direct connection to existing 250 mm diam. trunk sewer on Edward St	
SC182_FUT	0.1 L/s	Direct connection to existing 200 mm diam. local sewer on Dan St, draining to existing 600 mm diam. trunk sewer on Victoria St	
SC44_FUT	0.7 L/s	Direct connection to existing 200 mm diam. local sewer on Private St from Sheffield St to Jack Cr, draining to existing 450 mm diam. trunk sewer on Jack Cr	Alternative: direct connection to existing 250 mm diam. local sewer on Sheffield St, draining to existing 450 mm diam. trunk sewer on Jack Cr
SC48_FUT	0.1 L/s	Direct connection to existing 600 mm diam. trunk sewer on Madawaska Blvd	
SC9_FUT	0.1 L/s	Direct connection to existing 600 mm diam. trunk sewer on Staye Ct Dr	
SC92_FUT	0.5 L/s	Direct connection to existing 250 mm diam. trunk sewer on MacDonald St	
SC-FUT_ICI105	4.4 L/s	Direct connection to existing 450 mm diam. trunk sewer on Beth Shaw Pkwy	
SC-FUT_ICI15	0.6 L/s	Direct connection to existing 375 mm diam. trunk sewer on DeCosta St	
SC-FUT_ICI17	6.8 L/s	Direct connection to existing 300 mm diam. trunk sewer on DeCosta St	
SC-FUT_ICI98	1.2 L/s	Direct connection to existing 250 mm diam. local sewer on Winners Circle, draining to existing 600 mm diam. trunk sewer on Daniel St	Alternative: direct connection to existing 450 mm diam. trunk on Baskin Dr E
SC-FUT_ICI99	2.5 L/s	Direct connection to existing 450 mm diam. trunk sewer on Baskin Dr	Alternative: direct connection to existing 250 mm diam. local sewer on Winners Circle, draining to existing 600 mm diam. trunk on Daniel St
SC-FUT_RES0	3.0 L/s	Direct connection to existing 450 mm diam. trunk sewer on Jack Cr	
SC-FUT_RES12	2.1 L/s	Direct connection to existing 600 mm diam. trunk sewer on Fourth Ave	
SC-FUT_RES13	2.7 L/s	Direct connection to existing 600 mm diam. trunk sewer on Fourth Ave	
SC-FUT_RES2	2.9 L/s	Direct connection to existing 450 mm diam. trunk sewer on Jack Cr	
SC-FUT_RES22	9.5 L/s	Direct connection to existing 450 mm diam. trunk sewer on Baskin Dr	
SC-FUT_RES24	0.2 L/s	Direct connection to existing 600 mm diam. trunk sewer on Daniel St	
SC-FUT_RES34	2.7 L/s	Direct connection to existing 375 mm diam. trunk sewer on William St E	
SC-FUT_RES39	1.4 L/s	Direct connection to existing internal subdivision network, draining to existing 600 mm diam. trunk sewer on Vanjumar Dr	
SC-FUT_RES40	14.4 L/s	Direct connection to existing internal subdivision network, draining to existing 600 mm diam. trunk sewer on Madawaska Blvd	
SC-FUT_RES7	3.1 L/s	Direct connection to existing 200 mm diam. local sewer on Dan St, draining to existing 600 mm diam. trunk sewer on Victoria St	

Note:
(1) Refer to **Chapter 2** (**Section 5**) for flow generation parameters applied to growth areas in hydraulic model.

6.5.1.4.2 New Gravity Trunk Sewers

Growth areas which are not adjacent to the existing wastewater collection network will require new infrastructure to connect to the existing system. New gravity trunk sewers were identified as presented in **Table 6-4** and illustrated in **Figure 6-28**. Where applicable, previous projects recommended in the 2013 W&WWMP were further carried over, and sizing reviewed based on updated flow projections. The recommended minimum sizing and length should be reviewed and confirmed at a further design stage. The following is noted:

- **SC-FUT_RES14**: This area is directly adjacent to Phase 3 of the Callahan Development (growth area SC169_FUT). While a direct connection to the Callahan Development (further draining to Edey St and Edward St) is an alternative for servicing this growth area, the Town has noted potential constraints in the sewers within the existing phases of the Callahan Development which could limit servicing of additional growth areas. For the current MP, an alternative servicing solution is presented, which consists of extending the local sewer along Baskin Dr W westwards, which will also service the growth areas SC188_FUT and SC-FUT_RES45, and further drain to the Allan Dr trunk sewer.
- **SC-FUT_RES36**: The 2013 W&WWMP recommended 575 m of 300 mm diameter sewer. The sewer length was revised based on updated development servicing information provided by the Town. The sewer diameter was revised based on updated peak flows, and aligns with the proposed development servicing connection. The downstream trunk sewer connection to Frieday St remains unchanged from the 2013 W&WWMP. Based on updated development servicing information, flows can also drain to the trunk sewer on Bellwood Dr.
- **SC-FUT_RES43**: Based on topography, the current W&WWMP identified the need for a PS to service this area. This area is currently undergoing the development application process, and a common PS within SC-FUT_RES37 and dual forcemains were proposed by the consultant. These are carried forward for the purposes of master planning and presented in **Section 6.5.1.4.3**; however, the recommendation may be subject to change and alternative options selected as the proposed strategy is reviewed by the Town. Under this servicing strategy, a new gravity trunk sewer from SC-FUT_RES43 to SC-FUT_RES37 would be needed. The consultant has noted that the diameter of the gravity sewer would be 250 mm or 300 mm. For master planning purposes, the larger diameter (300 mm) is carried forward into the implementation plan and opinion of probable cost.

Table 6-4: New Gravity Trunk Sewers to Service Growth Areas

Growth Area ID	20-Year Horizon (2042) Peak WWF (L/s)	Proposed New Gravity Trunk Sewer			Downstream Modelled Trunk Sewer Connection	Additional Considerations & Alternative Servicing Options
		ID	Diameter (mm)	Length (m)		
SC188_FUT **SC-FUT_RES14** **SC-FUT_RES45**	6.6 L/s	**SEW-GRW1**	200	620	250 mm diameter trunk on Allan Dr W	Connect to existing 250 mm diameter sewer on Baskin Dr W (not modelled), which drains into Allan Dr trunk sewer.
SC-FUT_RES21 **SC-FUT_RES23**	2.4 L/s	**SEW-GRW2**	200	300	450 mm diameter trunk on Baskin Dr E	Areas could be directly serviced from adjacent growth area SC-FUT_RES22's internal network, if SC-FUT_RES22 is developed first.
SC-FUT_RES36(1)	21 L/s	**SEW-GRW3**	250	310	300 mm diameter trunk on Frieday St 300 mm diameter trunk on Bellwood Dr	Planned connection into Campbellbrook Phase 4 250 mm diameter sewer bifurcation on Stonehaven Way.
SC-FUT_RES43	7.2 L/s	**SEW-GRW5**	300	490	Drains to SC-FUT_RES37 (see **Table 6-5**), with forcemain discharging into 450 mm diameter trunk on Bev Shaw Pkwy	Combined servicing strategy with SC-FUT_RES37. Consultant identified need for either 250 mm or 300 mm diameter gravity sewer.

Note:
(1) Extension of planned Campbellbrook Phase 4 development, for which servicing drawings were provided by the Town.

6.5.1.4.3 New PSs & Forcemains

Growth areas which are not adjacent to the existing wastewater collection network will require new infrastructure to connect to the existing system. Where the topography restricts the implementation of new gravity trunk sewers, new PSs and forcemains were identified as presented in **Table 6-5** and illustrated in **Figure 6-28**. Where applicable, previous projects recommended in the 2013 W&WWMP were further carried over. The following should be noted:

- **SC-FUT_ICI89**: The 2013 W&WWMP recommended a PS and 100 m of 100 mm diameter forcemain to service a larger area comprising SC-FUT_ICI89 and adjacent growth east, towards Lake Madawaska. Based on updated growth projections, the adjacent growth is not foreseen within the current MP's planning horizon. Nonetheless, the PS and forcemain are still needed to service SC-FUT_ICI89, and will also benefit future adjacent growth. The forcemain should be twinned for redundancy and resiliency.

- **SC-FUT_RES37 & SC-FUT_RES43**: Based on topography, the current W&WWMP identified the need for PSs to service each of those areas. These areas are currently undergoing the development application process, and the recommended common PS and dual forcemains were proposed by the consultant. These are carried forward for the purposes of master planning, however, the recommendation may be subject to change and alternative options selected as the proposed strategy is reviewed by the Town.

Table 6-5: New PSs and Forcemains to Service Growth Areas

Growth Area ID	20-Year Horizon (2042) Peak WWF (L/s)	Proposed New PS and Forcemain			Downstream Modelled Trunk Sewer Connection		Additional Considerations & Alternative Servicing Options
		ID	New PS Location	Forcemain Diameter (mm)	Forcemain Length (m)		
SC-FUT_ICI89	2.8 L/s	**PS-GRW4**	Within SC-FUT_ICI89, between Baskin Dr E and Hwy 417	Dual 100 mm forcemains	100	450 mm diameter trunk on Baskin Dr E	Forcemain length and diameter previously recommended in 2013 W&WWMP.
SC-FUT_RES37	19 L/s	**PS-GRW5**	Within SC-FUT_RES37	Dual 200 mm forcemains	2,200	450 mm diameter trunk on Beth Shaw Pkwy	Servicing option proposed by consultant; to be reviewed.
SC-FUT_RES43							

6.5.1.5 Refined Alternatives – Overall Wastewater Collection System

As part of expanding & improving the existing Municipal Wastewater Infrastructure, the following overarching strategies are recommended:

- **SAN-1)** Continue flow monitoring in key areas of interest. Potential future monitoring sites include:
  - Downstream of the Nylene facility (upstream of PS #2);
  - Upstream of PS #5;
  - Upstream and downstream of PS #1 (following the planned sewer separation activities, see PS1-A in **Section 6.5.1.2.2**);
  - Downstream of infrastructure upgrades recommended in **Section 6.5.1.1** and **6.5.1.2**; and,
  - Downstream of areas newly developed and other areas of operational and growth interests.

- **SAN-2)** Continue sewer separation activities and monitor resulting flows to understand the achieved benefits.
- **SAN-3)** Implement measures to reduce sewage generation rates, including:
  - o Water conservation measures;
  - o Promoting the use of efficient fixtures.
- **SAN-4)** Continue implementing measures to reduce I/I into the system
- **SAN-5)** Continue expanding the hydraulic model to local areas of interest, with the long-term goal of building an all-pipe model.

6.5.2 REFINED ALTERNATIVE – IMPROVEMENT & EXPANSION OF THE POTABLE WATER SYSTEM

The refined alternative for potable water system includes upgrades to existing treatment, storage, and pumping facilities, as well as expansion of distribution pipe network to supply water to growth areas that cannot be serviced directly by the existing system.

6.5.2.1 Refined Alternatives – Treatment, Storage, and High Lift Pumping

As discussed in **Chapter 2** (**Section 5**), additional treatment, storage, and pumping needs are required to satisfy future capacity requirements in the 20-year planning horizon. **Table 6-6** summarizes the results of the growth capacity assessment, which includes hydraulic trigger years in which the demand requirements reach the available capacity, and additional capacity needed to meet future (2042) demands.

Table 6-6: Summary of Growth Capacity Treatment, Storage, and High Lift Pumping Requirements

Infrastructure	Hydraulic Trigger Year	Projected Population at Hydraulic Trigger Year	Additional Capacity Required by 2042
Treatment	2038	16,130	631 m^3/d
Storage	2033	14,430	1,592 m^3
High Lift Pumping	2034	14,620	45 L/s

The growth capacity assessment is based on the projected growth as presented in **Chapter 2** (**Section 5**) of this report. Details of upgrades on treatment, storage, and pumping capacities should be explored based on the actual growth rate of the community during detailed design. It is recommended that actual system treatment/consumption (e.g., SCADA) and growth rate in the Town (e.g., master plan updates, official plans, etc.) be monitored on a regular basis to confirm the actual time when system upgrades are required. Additional measures, such as water conservation program, water leakage management, water restrictions for industrial properties, and process optimization, could be used to optimize water use and therefore decelerate demand growth.

6.5.2.2 Refined Alternatives – Improvements and Expansion of Existing Potable Water Distribution System

According to the updated hydraulic model results as presented in **Chapter 2** (**Section 5**), the existing potable water distribution system is able to meet the minimum operating pressure requirements under the future growth conditions, without incorporating the outstanding watermain upgrades at Daniel St, Staye Court Dr, Elgin St, Norma St, and Caruso St that were previously recommended in the 2013 W&WWMP (refer to **Appendix F.2**).

Based on a review of the Town's watermain GIS data, a number of new watermains have been installed/replaced post 2011 (where 2011 network information would have been used to represent existing conditions in the 2013 W&WWMP), as presented in **Appendix F.3**. New watermains were constructed in 2018/2020 for the Fairgrounds subdivision (near Mac Beattie Dr) and the Callagan Phase 2 subdivision (near Leo Moskos St) which provide additional looping to Daniel St and Staye Court Dr. The new/upsized 200 mm dia. Watermains along William St, McGonigal St, and Elgin St (installed in 2017/2018) and the upgraded 300 mm dia. Madawaska River crossing near Russell St (installed in 2020) also provide additional conveyance capacity and looping to the area. Per the updated analysis with the current growth projections, the additional conveyance capacity and looping provided by these new/upgraded watermains helps defer the need for the Daniel St, Staye Court Dr, Elgin St, Norma St, and Caruso St watermain upsizing projects that were previously proposed in the 2013 W&WWMP to past 2042.

Although the modeling results are no longer showing the requirement for these 2013 W&WWMP projects before 2042, some watermain replacements will provide some added hydraulic capacity and reliability to the distribution system by further extending the backbone watermains to the west along Daniel St / Staye Court Dr and north along Elgin St. From a hydraulics standpoint, the improvements observed under 2042 buildout conditions (without incorporating the additional watermain replacements/additions in existing conditions and planned waterwork projects, as noted in **Section 5.5.2.1**) include the following:

- Upgrading the Daniel St / Staye Court Dr watermains provides a slight improvement in PKHR minimum pressures in this area of up to +1.6 psi. Upgrades would also provide an increase of approximately +17 L/s in available fire flow under MXDY+FF conditions on average in this area.
- Upgrading the Victoria St / Elgin St / Norma St / and Caruso St watermains provides a marginal improvement in PKHR minimum pressures in this area of up to +0.1 psi. Upgrades would also provide a small increase of approximately +2 L/s in available fire flow under MXDY+FF conditions on average in this area.

The hydraulic improvements of the projects noted above are not significant enough to warrant continuing with these upgrades based on hydraulics alone. Although there are no proposed wastewater servicing solutions in these areas, these projects (particularly along Daniel St / Staye Court Dr) may however still be considered as part of future planned road renewal works in these areas. Additionally, although the hydraulic benefit is marginal for the Victoria St / Elgin St / Norma St / and Caruso St projects, renewal of some of these aging watermains (particularly the +100 year-old CI pipes along Norma St) may be considered as part of lifecycle renewal plans.

Considering the model results and the review of watermain upgrades previously proposed in the 2013 W&WWMP (as discussed above), no upgrades to existing pipes are required, except for expansion of the existing distribution pipe network to growth areas that are not currently serviced directly by the existing system (e.g., development by Tartan Homes at Van Dusen Dr) and extension/upsizing of watermains specifically for future growth areas (i.e., upsize the existing 150 mm dia. watermains on Elizabeth St to 250 mm and extend the new 250 mm dia. watermain to provide connection between growth areas RES21/22/23 and the existing 250 mm dia. pipe on Charles St).

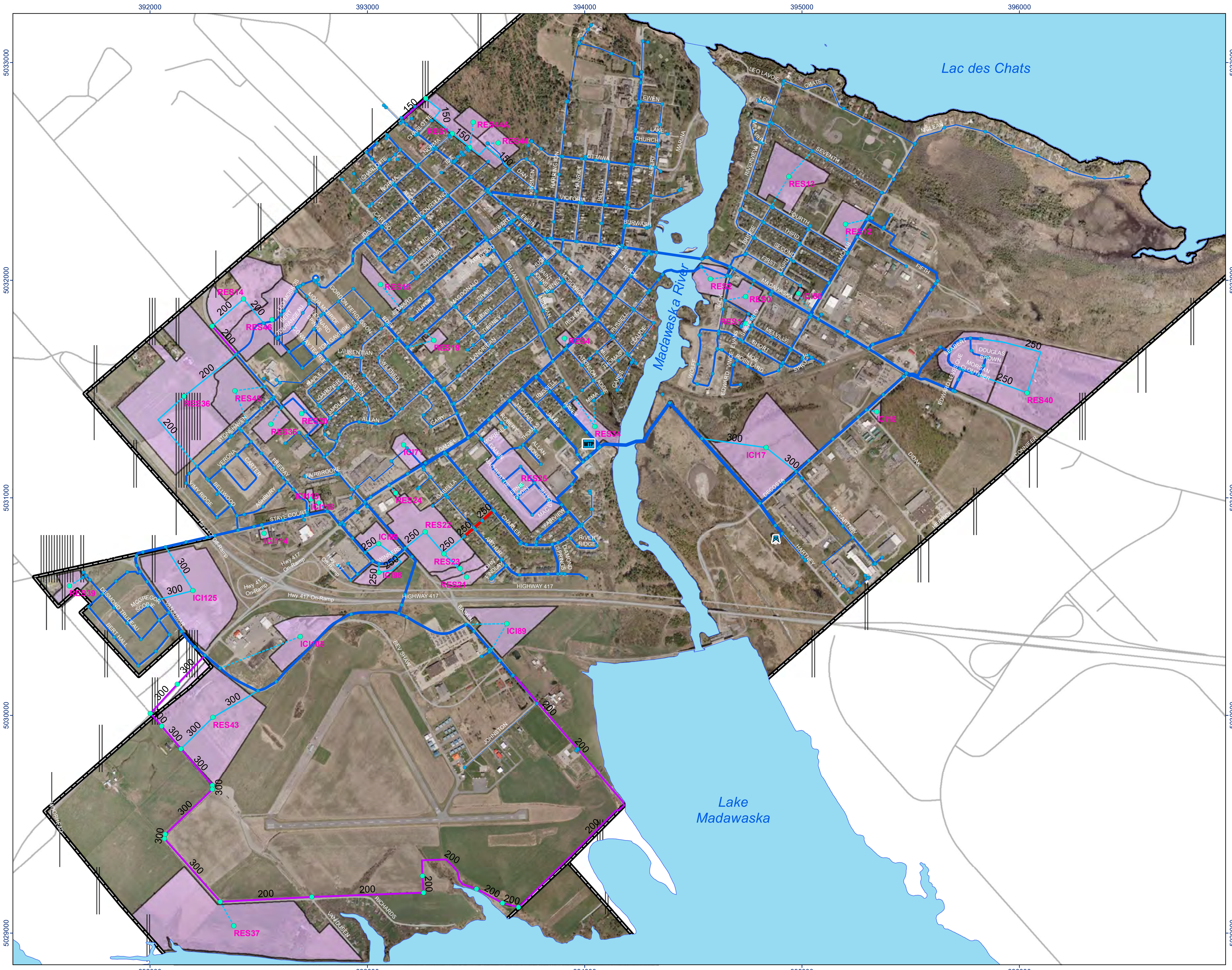
Additional refinements that were made in the model under 2042 conditions are summarized as follows:

- Locations of water service connection were adjusted for growth areas RES13 at 124 Fourth Ave and RES34 at 18 Thomas St based on developers' servicing plans provided by the Town. An additional connection to the existing 150 mm dia. watermain on Seventh Ave was added for area RES13 to provide a looped system for the proposed development. As for growth area RES34, watermain connection points were adjusted from single feed from Havey St to looped connections fed from Thomas St and Mima St, respectively.
- All residential growth areas with 50 or more dwellings and ICI growth areas with AVDY demands greater than 50 m^3/d were provided with a second feed to avoid the creation of vulnerable areas, as per the City of Ottawa Water Distribution Design Guidelines. In particular, the existing 100 mm dia. watermain on Baskin Dr E upsizing to 200 mm dia. and a new 200 mm dia. watermain connecting the upsized 200 mm dia. pipe to the new 300 mm dia. watermain at VanDusen Dr were proposed to provide a looped connection for growth area RES37 (i.e., subdivision by Tartan Homes). It is noted that this proposed watermain routing would require an easement through or acquisition of airport land as well as a water crossing east of Richards Ln. An alternative pipe alignment is to have two parallel pipes along VanDusen Dr which is the easiest with respect to constructability; however, this alternative is typically not considered as the preferred solution as a watermain break in one line would likely affect the other pipe in the event of a washout.
- A second HLP at the WFP was proposed to be called into service under MXDY demand conditions to ensure that the EST operates within its typical range of 60 to 80% full, which in turn requires re-programming of the SCADA to allow for the second pump to kick in. In the model, a second HLP is assumed to open when the EST is less than 58% full (i.e., level in the EST drops below 6.59 m), which is the lowest EST level observed from the provided SCADA data, and close when the water in the EST reaches 80% of the overall volume (i.e., level in the EST goes above 8.74 m).

Figure 6-7 presents the updated water distribution network in the ultimate 2042 conditions. The staging of these upgrades are discussed further in **Chapter 4** (**Section 7**).

Figure 6-8 to **Figure 6-10** show hydraulic model results for AVDY, MXDY, and MXDY + fire flow demand scenarios under 2042 conditions based on the refined model as described above. In general, the model results are similar to that presented in **Chapter 2** (**Section 5**). High pressures greater than 100 psi under AVDY demand conditions are observed in low-lying areas along the shorelines of the Ottawa River and Madawaska River. Pressure reduction measures to critical areas (e.g., installation of pressure reducing valves) are encouraged to prevent excessive pressures in the system. In terms of available fire flows, low flows less than 33.33 L/s (2,000 L/min) are anticipated in local watermains with dead ends. Considerations should be given to provide looping where possible (e.g., watermain on McLean Ave) to ensure adequate fire protection for identified problem areas.

Additionally, peak watermain velocity and head loss per km length of watermain were also examined under MXDY demand conditions, to identify vulnerable areas with high velocities and/or head losses (see **Figure F1-1** and **Figure F1-2** in **Appendix F.1**). Watermains with maximum velocities exceeding 2.0 m/s and/or high head loss rates are typically considered to be more susceptible to failure. It is therefore recommended that watermains with higher modelled velocities and head losses (e.g., 400 mm Madawaska River crossing near the WFP) be monitored for the potential occurrence of watermain breaks.



Stantec

Legend

- Nodes Added for Growth Areas / Solutions
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Growth Areas with Future Water Demands

Existing Watermains - Diameter (mm)

- < 75 mm
- 75 mm - 152 mm
- 152 mm - 225 mm
- 225 mm - 350 mm
- 350 mm - 610 mm
- Modelled Junctions
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 200 400 600 Meters

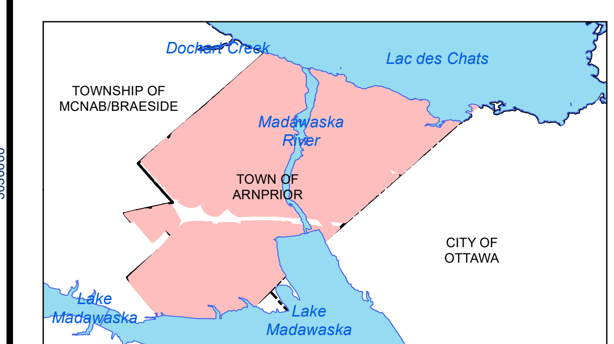
(At original document size of 11x17)
1:18,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N

2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *0837ARNP.sid*, *Arnprior_PropertyParcels_wAssessment_20220324.shp*, *Arnprior_Roads_20220324.shp* and *WTR_NODE.shp* provided by the Town of Arnprior

3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-08-04
Revised by CZ on 2024-01-30

Client/Project
163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
6-7

Title
Water Distribution Network (2042 Conditions with Solutions)

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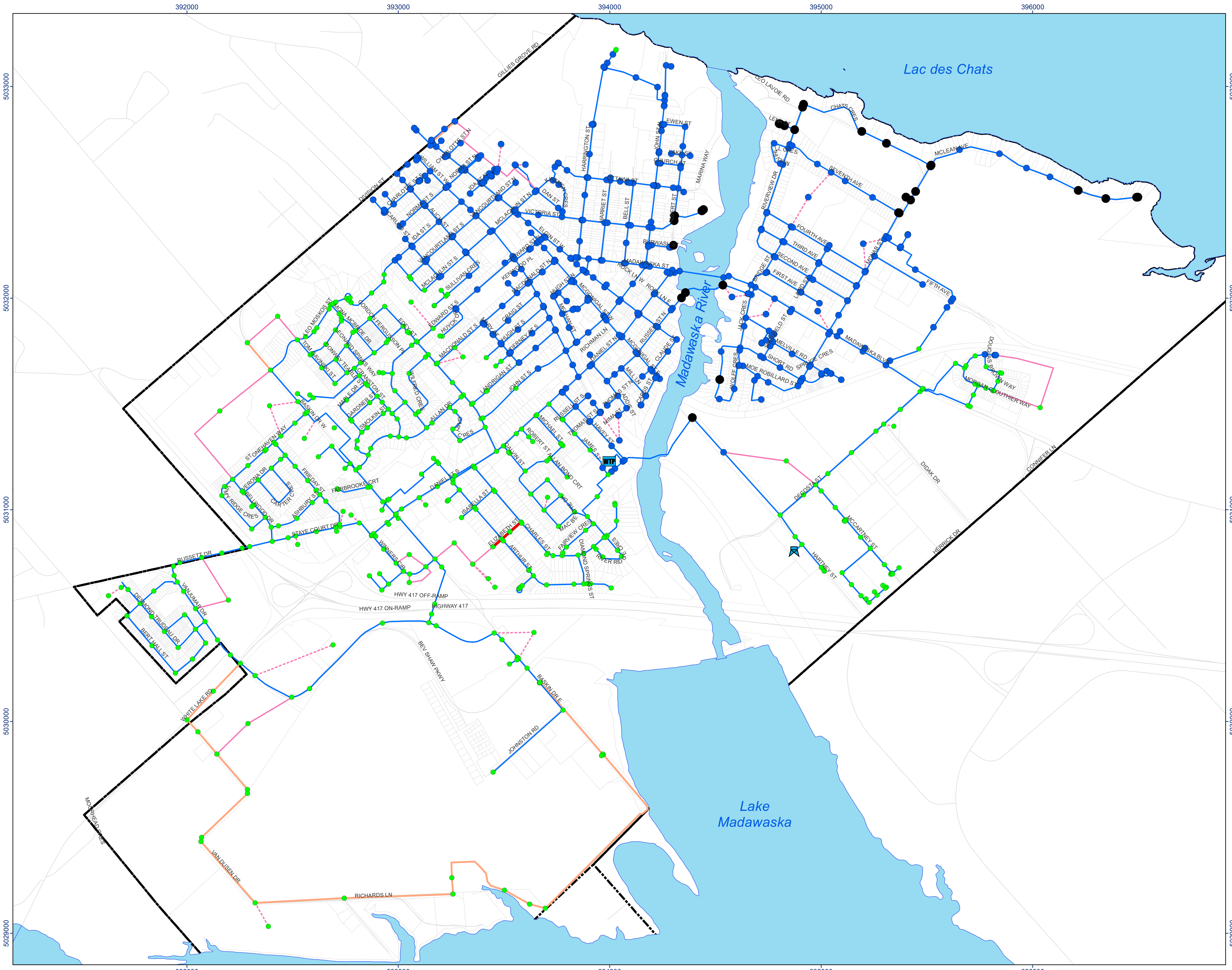


Stantec

Legend

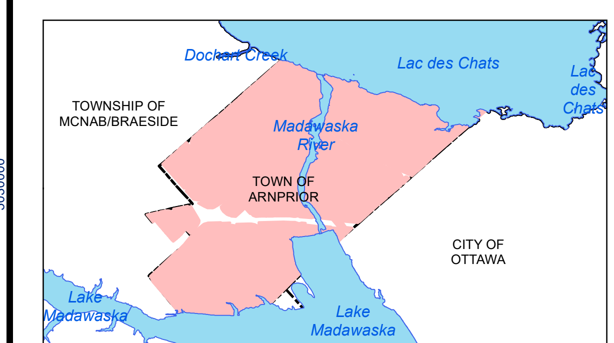
Maximum Pressure

- Max. Pressure ≤ 40 psi
- 40 psi < Max. Pressure ≤ 60 psi
- 60 psi < Max. Pressure ≤ 80 psi
- 80 psi < Max. Pressure ≤ 100 psi
- Max. Pressure > 100 psi
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-08-04
Revised by CZ on 2024-01-25

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
6-8

Title
Model Results: 2042 Conditions with Solutions – AVDY Maximum Pressures

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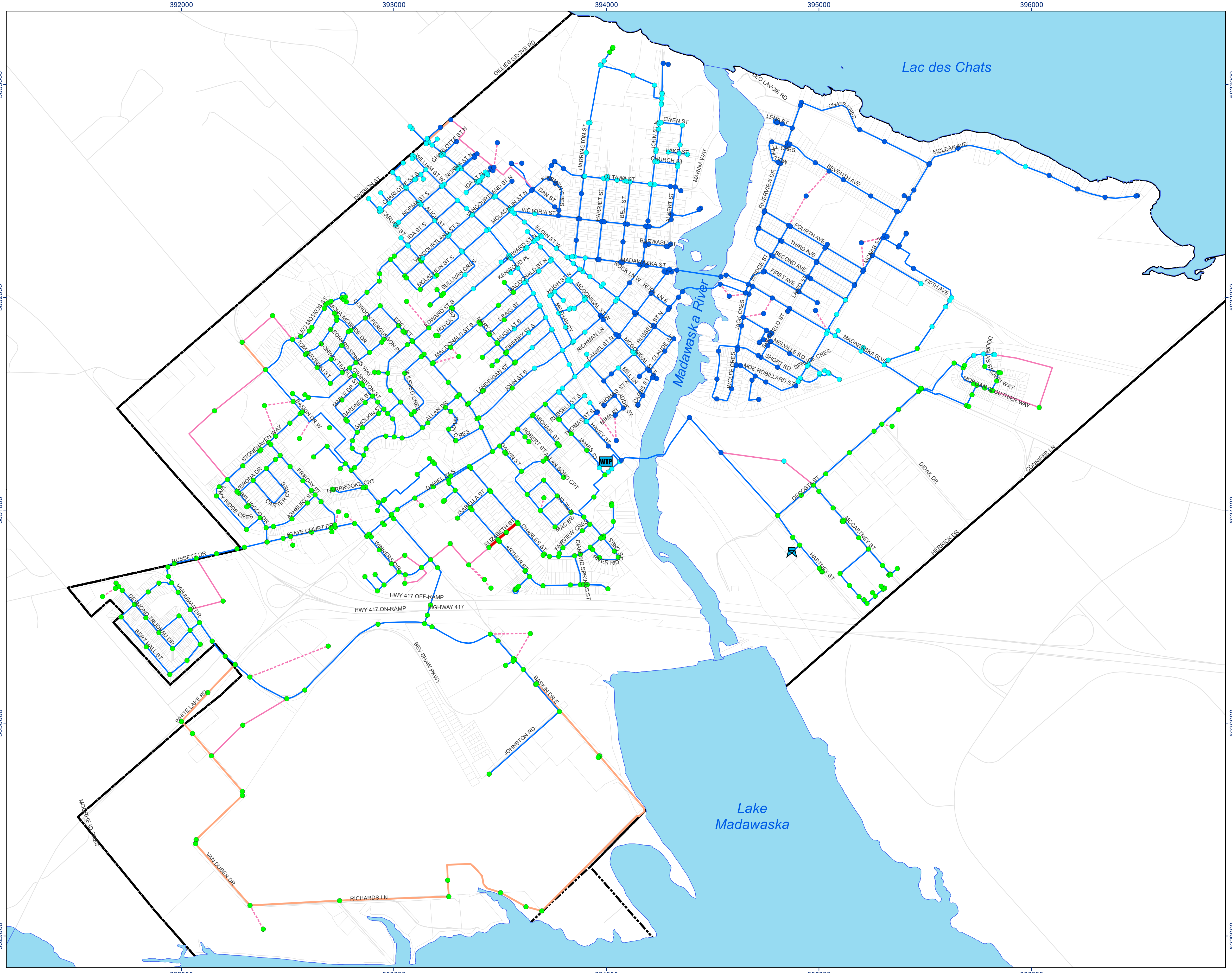

Stantec

Legend

Minimum Pressure

- Min. Pressure ≤ 20 psi
- 20 psi < Min. Pressure ≤ 40 psi
- 40 psi < Min. Pressure ≤ 50 psi
- 50 psi < Min. Pressure ≤ 70 psi
- 70 psi < Min. Pressure ≤ 80 psi
- 80 psi < Min. Pressure ≤ 100 psi
- Min. Pressure > 100 psi
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

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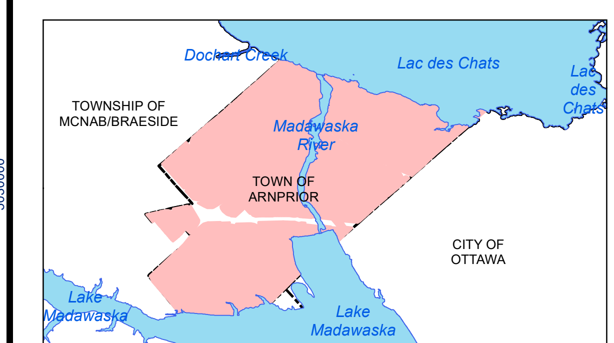
Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp,* and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



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Prepared by CZ on 2023-08-04
Revised by CZ on 2024-01-25

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
6-9

Title
Model Results: 2042 Conditions with Solutions – MXDY Minimum Pressures

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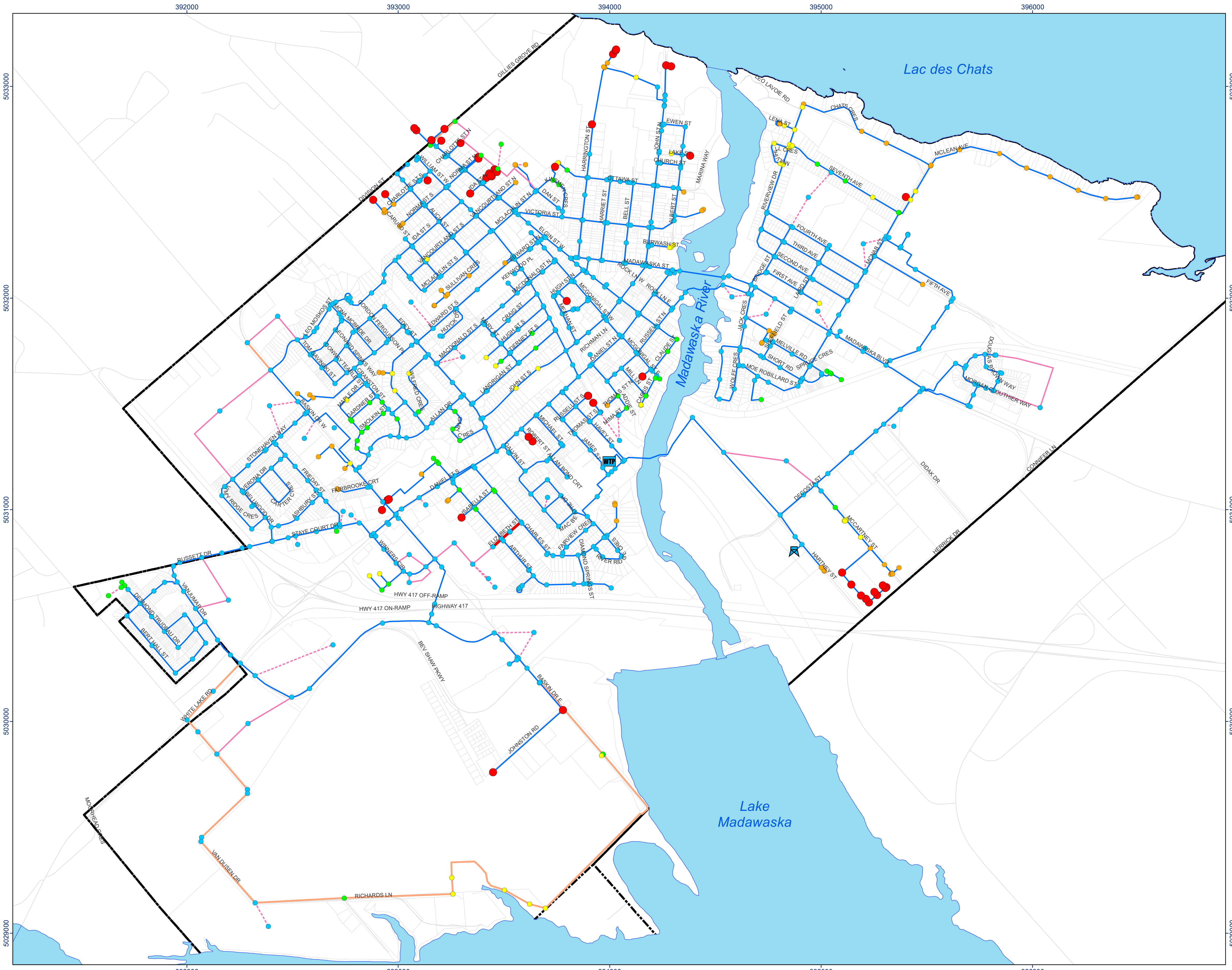


Stantec

Legend

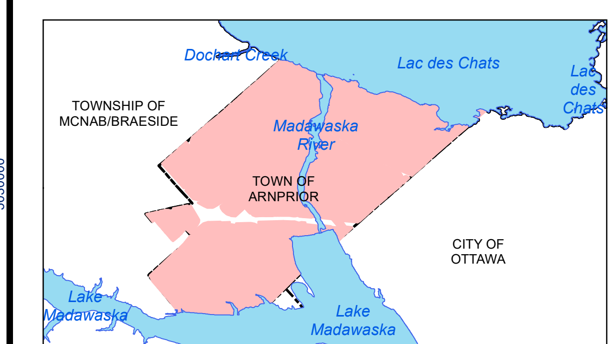
Available Fire Flow at 20 psi (AFF)

- AFF < 33.33 L/s
- 33.33 L/s ≤ AFF ≤ 75 L/s
- 75 L/s < AFF ≤ 100 L/s
- 100 L/s < AFF ≤ 125 L/s
- AFF > 125 L/s
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

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Revised by CZ on 2024-01-25

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
6-10

Title
Model Results: 2042 Conditions with Solutions – MXDY Available Fire Flow at 20psi

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6.6 Outside Interests

The following section addresses the potential to service development interests outside the current municipal boundary.

6.6.1 OVERVIEW OF OUTSIDE INTERESTS

The Town has identified two areas which could connect to the existing municipal water and wastewater infrastructure. Those areas are summarized in **Table 6-7**, with the populations estimated based on the City of Ottawa design guidelines' criteria for population density.

Table 6-7: Outside Interests for Servicing from the Town's Existing Municipal Systems

Area #	Area Name	Area (ha)	Population Density (persons/ha)	Population (ppl)
1	McNab & Braeside	60	60(1)	3,600
2	City of Ottawa	35		2,100

Note:
(1) Rate recommended in the City of Ottawa Sewer Design Guidelines.

6.6.2 WASTEWATER COLLECTION SYSTEM SERVICING OF OUTSIDE INTERESTS

To identify potential connection points from outside development interests to the Town's wastewater collection network, the available residual capacity within the modelled sewers was reviewed against the expected peak wet weather flow (PWWF) from the outside growth areas, summarized in **Table 6-8**. The available residual capacities in the trunk sewers under 2042 growth conditions with the proposed sewer upgrades are illustrated in **Figure 6-11**. The residual capacities under existing conditions (with and without solutions and planned projects) and 2042 growth conditions without solutions and planned projects are illustrated in the figures in **Appendix E.1**.

The PWWF of 36.1 L/s for Area 1 – McNab & Braeside exceeds the residual capacity of the existing 250 mm to 300 mm diameter sewers along Allan Dr. The currently proposed 2042 upgrades do not include upgrades to the Allan Dr sewers; however these may be considered as growth within the Town progresses, and serviceability solutions for Area 1 are developed. Alternatively, this area may be serviced from a new sewer along Division St and connecting to the existing 300 mm to 600 mm diameter trunk sewers on Elgin St W, which mostly have residual capacity to accommodate Area 1's PWWF. Short sections of sewers (< 100 m long) might pose constraints on the additional PWWF, however this should be reviewed as the serviceability of Area 1 is further assessed.

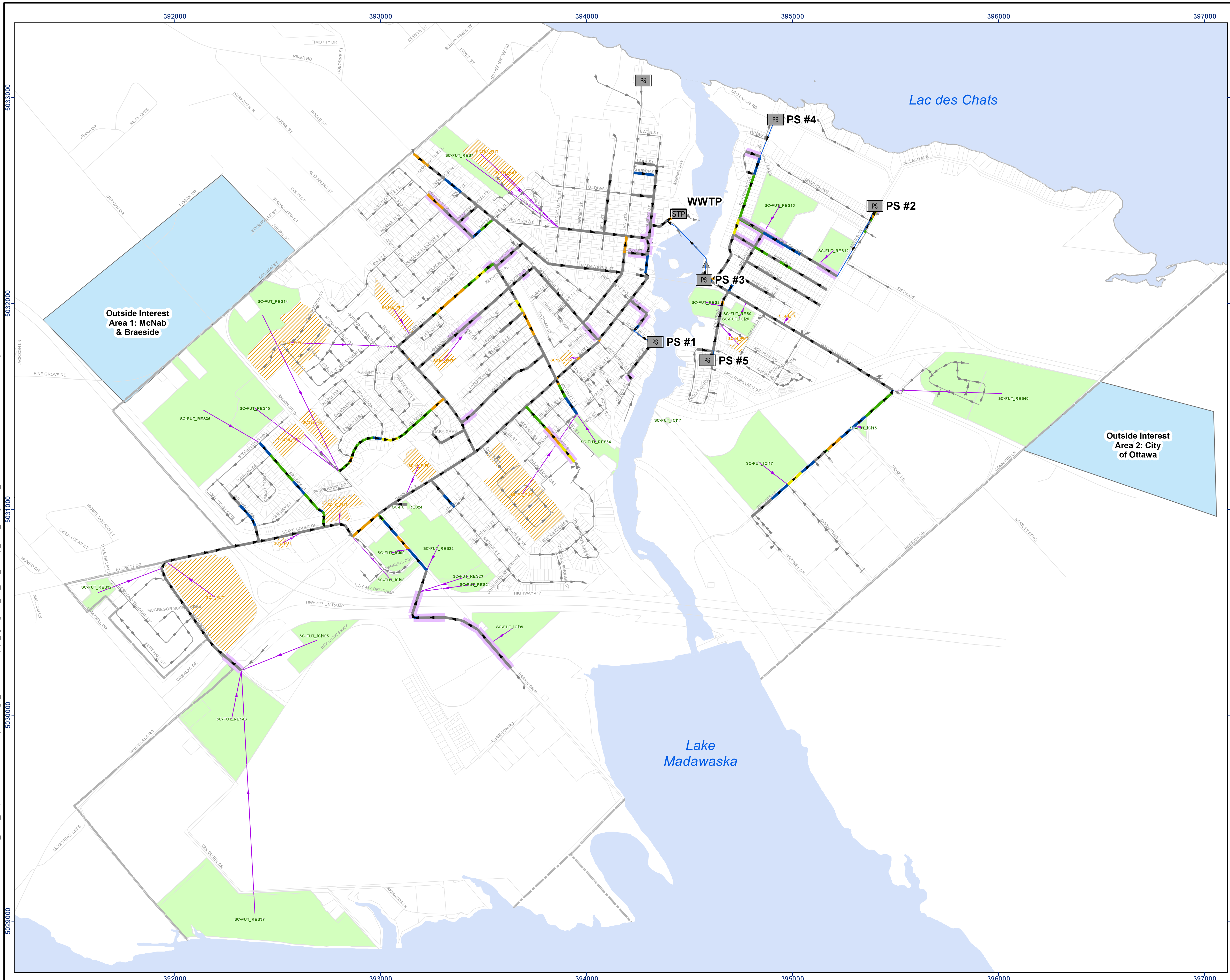
The PWWF of 21.1 L/s for Area 2 – City of Ottawa is within the residual capacity of the existing 600 mm to 750 mm diameter sewers along Madawaska Blvd. This area would also drain into the PS #3, and may need to be considered in the proposed PS #3 upgrades' design and as serviceability solutions for Area 2 are developed.

As discussions with outside interests continue and growth within the Town progresses, the residual capacities in the sewers should be reviewed as part of confirming the serviceability of these new areas, and other new areas identified in the future. Potential impacts on existing PSs capacity should be reviewed as applicable. The Town should also continue updating its WWTP reserve capacity assessment.

Table 6-8: Sanitary Flow Generation for Outside Interests

Area #	Area Name	Area (ha)	Population Density (persons/ha)	Population (ppl)	Average Sewage Flow[1] (L/s)	Peak Sewage Flow[2] (L/s)	GWI[3] (L/s)	PDWF (L/s)	Wet Weather Extraneous Flows[4] (L/s)	PWWF (L/s)
1	McNab & Braeside	60	60[1]	3,600	11.7	16.3	3.0	19.3	16.8	36.1
2	City of Ottawa	35		2,100	6.8	9.5	1.8	11.3	9.8	21.1

Notes:
(1) Residential sewage generation rate of 280 L/c/d from the City of Ottawa Design Guidelines.
(2) Peaking factor of 1.4 from the flow monitoring FM 1 diurnal pattern.
(3) GWI rate of 0.05 L/s/ha from the City of Ottawa Design Guidelines.
(4) Wet weather extraneous flow contribution of 0.28 L/s/ha from the City of Ottawa Design Guidelines.



Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant (WWTP)
- Sanitary Sewer (Not Modelled)
- Forcemains

Sewer WWF Residual Capacity

- No Capacity (0 L/s; Sewer is Surcharged)
- Limited Capacity (0 L/s; Sewer is not Surcharged)
- <= 5 L/s
- 5 - 25 L/s
- 25 - 50 L/s
- > 50 L/s

Growth Areas

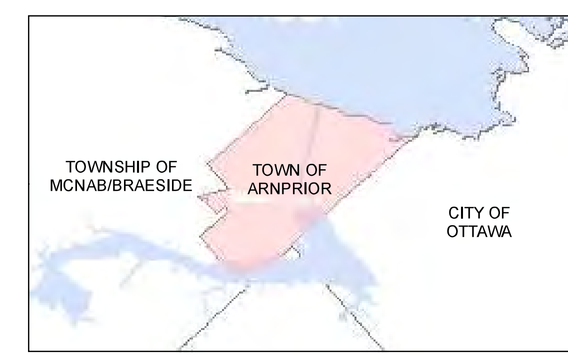
- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment
- Outside Interest

N

0 250 500 Meters
(At original document size of 11x17)
1:19,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant



Project Location
Arnprior, ON

Prepared by CR on 2023-11-08
Revised by CR on 2024-02-02

Client/Project
163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
6-11

Title
Sewer Residual Capacity – 2042 Growth Conditions with Planned Projects & Proposed Upgrades

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6.6.3 POTABLE WATER SYSTEM SERVICING OF OUTSIDE INTERESTS

For the potable water system, an analysis was conducted based on flow capacity and HGL/pressure in the system, to identify possible connection points from the Town's potable water distribution network to service the areas with development interests outside the current municipal boundary.

It should be noted that this potable water system analysis for servicing of outside interests is based on the currently identified demands and growth projection. The residual capacities in watermains and HGL at the potential connection points should be further reviewed incorporating any changes in water demands and growth within the Town to confirm the serviceability of these outside interest areas and other new areas proposed in the future.

6.6.3.1 Flow Capacity Analysis

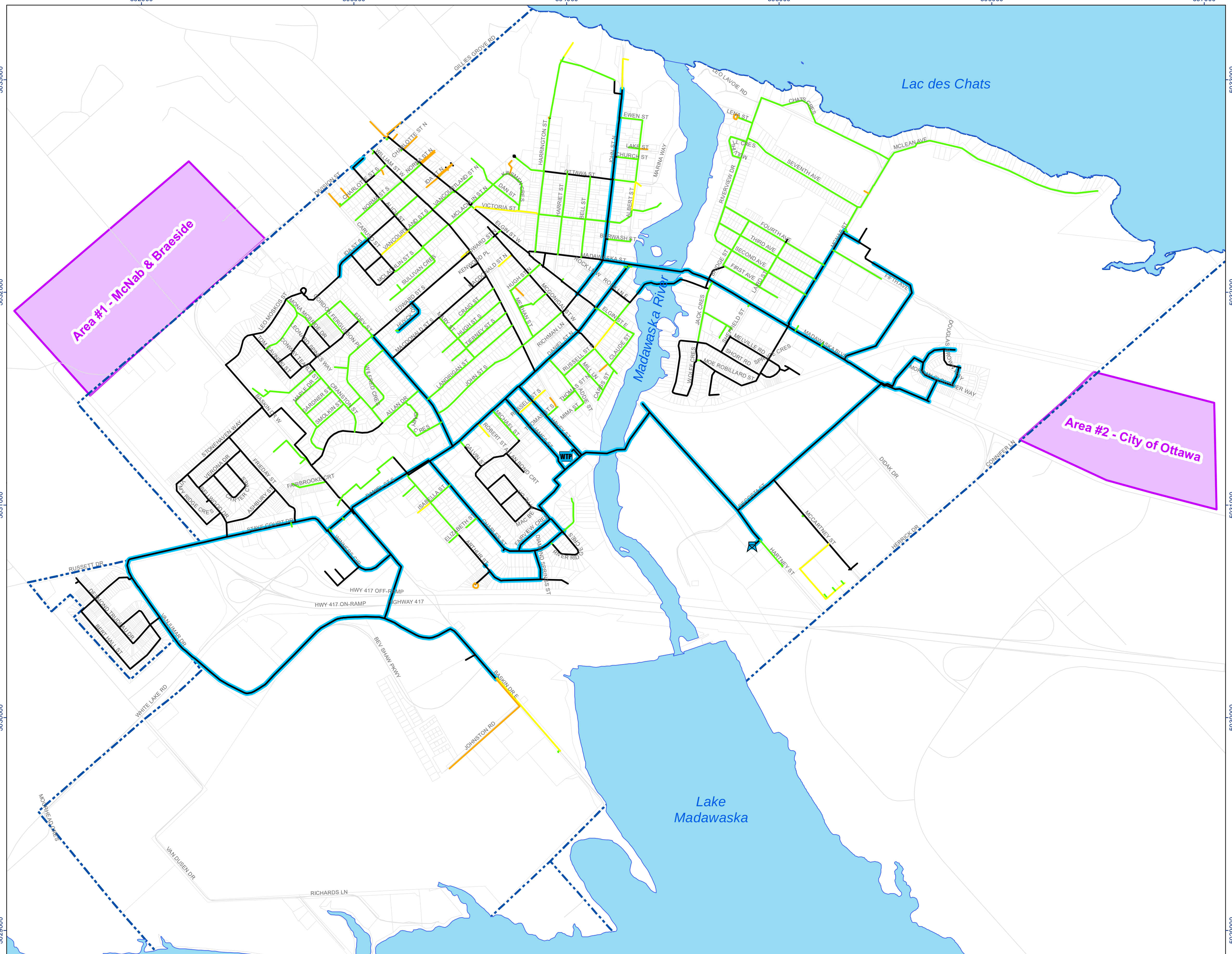
The available residual capacities for all watermains were calculated by subtracting the modelled 2022 and 2042 average flows under MXDY demand conditions from the watermain flow capacity at a maximum velocity of 1.5 m/s (as per the City of Ottawa Water Distribution Design Guidelines). The results are illustrated in **Figure 6-12** (existing conditions with existing infrastructure) and **Figure 6-13** (2042 growth conditions with proposed watermain upgrades). The residual capacities within the watermains were the compared against the projected demands for the outside interest areas, as summarized in **Table 6-9**.

Table 6-9: Potable Water Demand Projection for Outside Interests

Area #	Area Name	Area (ha)	Population Density (1) (persons/ha)	Population (ppl)	AVDY Demand (2) (L/s)	MXDY Demand (3) (L/s)
1	McNab & Braeside	60	60	3,600	11.7	22.2
2	City of Ottawa	35		2,100	6.8	12.9

Notes:
(1) Population density rate of 60 ppl/ha recommended in the City of Ottawa Sewer Design Guidelines.
(2) Residential average daily consumption rate of 280 L/c/d from the City of Ottawa Water Distribution Design Guidelines.
(3) Peaking factor of 1.9 from the MECP Design Guidelines for Drinking-Water Systems (based on population of the entire town).

Based on the velocity criteria (maximum velocity of 1.5 m/s) under MXDY demands, there are no constraints in servicing the two outside interest areas with respect to watermain flow capacity in both the existing conditions and 2042 conditions with proposed solutions. Area 1 (McNab & Braeside) with a projected MXDY demand of 22.2 L/s could be potentially serviced from the 200 mm diameter watermain along Baskin Dr near Division St, the 200 mm diameter watermain on Elgin St or William St near Division St, or the 300 mm diameter watermain on Staye Court Dr near Highway 417. For Area 2 (City of Ottawa) with a MXDY demand of 12.9 L/s, possible connection points could include the 300 mm diameter watermain on Madawaska Blvd at Decosta St, the 400 mm diameter watermain along Hartney St near the EST, and the 200 mm diameter watermain on McCartney St near Herrick Dr. Watermain at any of these potential connection points has adequate flow capacity (e.g., residual capacity greater than 30 L/s) to service each outside interest area; however, a minimum of two connections are required for reliability as per the City of Ottawa Water Distribution Design Guidelines, since each of these areas would likely have more than 50 residential dwellings or ICI AVDY demand greater than 50 m^3/d.



Stantec

Legend

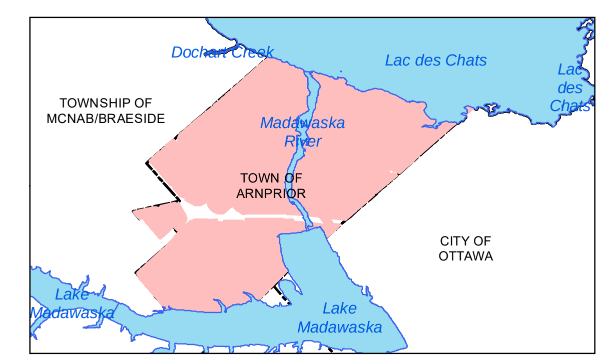
Watermain Residual Capacity at a Maximum Velocity = 1.5 m/s

- No Capacity
- 0 L/s < Capacity ≤ 10 L/s
- 10 L/s < Capacity ≤ 20 L/s
- 20 L/s < Capacity ≤ 30 L/s
- Capacity > 30 L/s
- Backbone / Feeder Main (Diameter ≥ 250mm)
- Outside Interest Areas
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



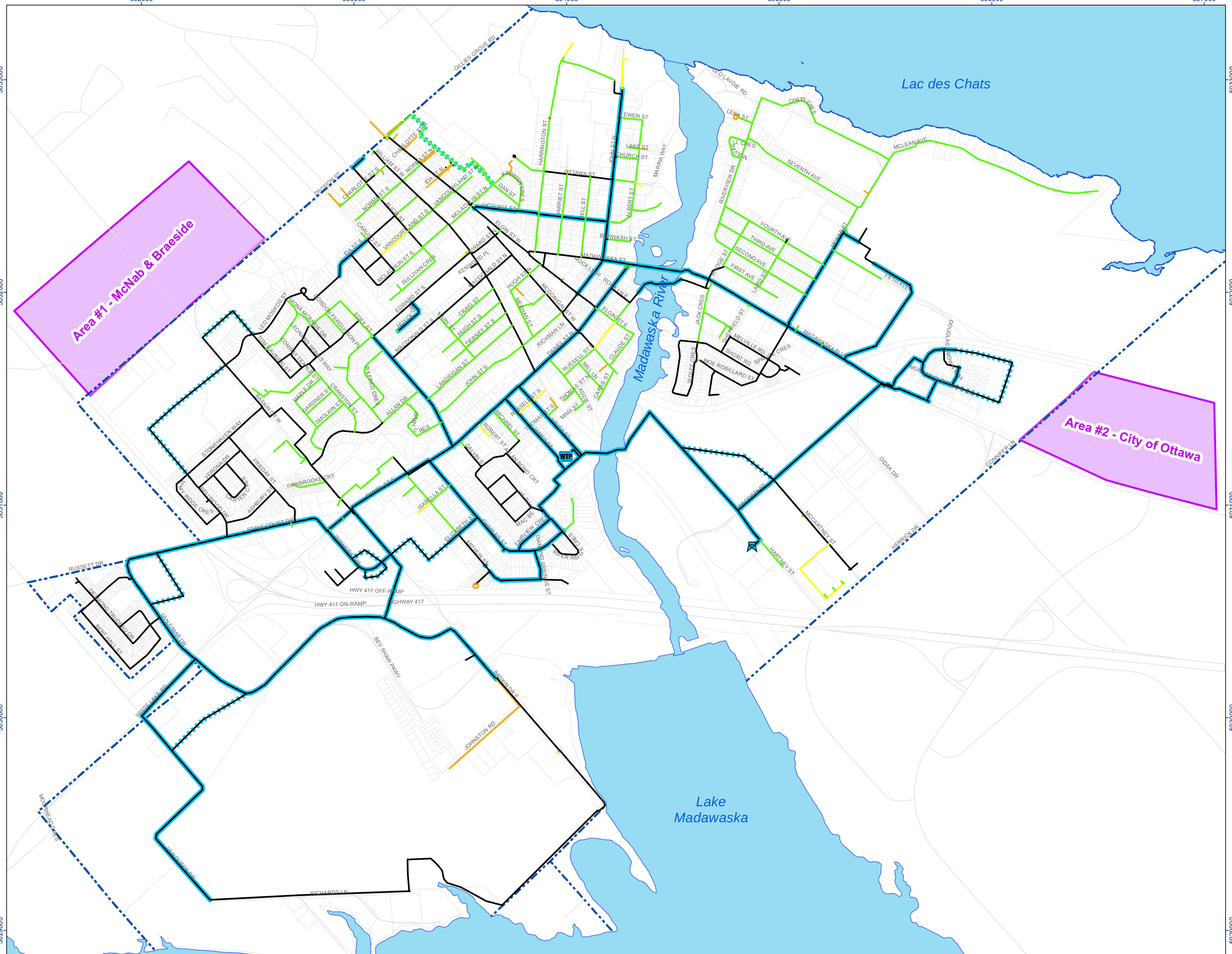
Project Location Prepared by CZ on 2023-10-19
Arnprior, ON

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
6-12

Title
Watermain Residual Capacity - Existing Conditions (2022) with Existing Infrastructure (MXDY Scenario)

\\Ca0218-ppfss01\01-634\active\1634_01723\planning\drawing\gis\MXDs\tm3_figs\fig7-2_arn_wtr_2022_ex_cond_MXDY_wm_res_capacity_20231117.mxd Revised: 2023-11-17 By: jsidhu



Stantec

Legend

Watermain Residual Capacity at a Maximum Velocity = 1.5 m/s

- No Capacity
- 0 L/s < Capacity ≤ 10 L/s
- 10 L/s < Capacity ≤ 20 L/s
- 20 L/s < Capacity ≤ 30 L/s
- Capacity > 30 L/s
- Backbone / Feeder Main (Diameter ≥ 250mm)
- Assumed Future Local Distribution Looping
- Outside Interest Areas
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

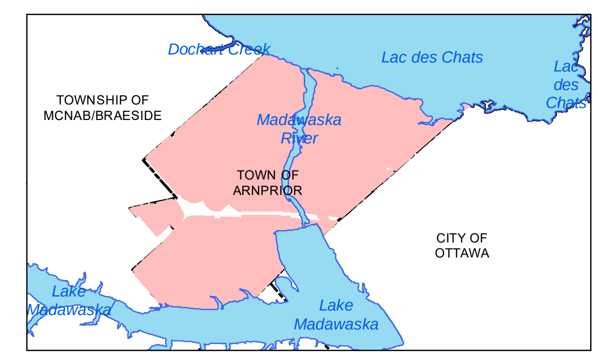
N

0 250 500 Meters

(At original document size of 11x17)
1:18,500

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location Prepared by CZ on 2023-10-19

Arnprior, ON

Client/Project 163401723

Town of Arnprior
2022 W&WW Master Plan Update

Figure No.

6-13

Title

Watermain Residual Capacity - 2042 Growth Conditions with Proposed Upgrades (MXDY Scenario)

6.6.3.2 HGL / Pressure Analysis

In addition to flow capacity analysis, the modelled minimum HGL (under MXDY demands) at the possible connection points identified in **Section 6.6.3.1** were further reviewed against the corresponding HGL required to satisfy a minimum pressure requirement of 40 psi ([.e., maximum ground elevation + 28.1 m (i.e., head equivalent to 40 psi)]. The HGL requirements and minimum HGL at potential connection points for each outside interest area are summarized in **Table 6-10**, **Table 6-11**, and **Table 6-12** below. Based on the model results, minimum HGL at all potential connection points are higher than the 40 psi equivalent HGL for the outside interest areas under both the existing conditions and 2042 conditions with proposed watermain upgrades. Therefore, no additional boosting would be required to service these two areas from the identified possible connection points.

Table 6-10: HGL Requirements for Outside Interest Areas

Area #	Area Name	Maximum Ground Elevation [1] (m)	40 psi Equivalent HGL at Maximum Ground Elevation (m)
1	McNab & Braeside	115	143.1
2	City of Ottawa	106	134.1
Note: (1) Ground elevations based on LiDAR data.			

Table 6-11: Minimum HGL under MXDY Demands at Possible Connection Points for Area 1 – McNab & Braeside

Scenario	Minimum HGL under MXDY Demands			
	Baskin Dr near Division St	Elgin St / Division St	William St / Division	Staye Court Dr / Hwy 417
Existing Conditions (2022) with Existing Infrastructure	147.1	147.1	147.1	147.1
2042 Growth Conditions with Proposed Upgrades	144.7	145.0	145.0	144.7

Table 6-12: Minimum HGL under MXDY Demands at Possible Connection Points for Area 2 – City of Ottawa

Scenario	Minimum HGL under MXDY Demands		
	Madawaska Blvd / Decosta St	Hartney St near EST	McCartney St near Herrick Dr
Existing Conditions (2022) with Existing Infrastructure	147.4	148.6	148.1
2042 Growth Conditions with Proposed Upgrades	145.5	148.4	147.1

6.7 Climate Change Considerations

The following section presents the assessment of the proposed refined wastewater and potable water system alternatives presented in **Section 6.5** with respect to climate change. Additional constraints associated with climate change are identified, and alternatives to address these constraints are presented.

Appropriate interpretation of these climate change considerations remains important. Whereas our analysis identifies enhancements or new recommendations to accommodate the currently projected climate change conditions, this does not equate to a need to implement these. The climate change analysis is meant to be a stress-test of the improvements that are being recommended. Within this context, upgrades that are identified may be further developed incorporating resiliency to be able to accommodate the climate change condition. In certain instances, this may not be feasible. In those instances, we recommend the Town consider the impacts of not accommodating the climate change condition. Other mitigative measures may be available and we recommend these be considered.

6.7.1 CLIMATE CHANGE CONSIDERATIONS FOR WASTEWATER COLLECTION SYSTEM ALTERNATIVES

The following subsection presents the assessment of the proposed wastewater collection system upgrades under a climate change scenario. Projects triggered by the climate change considerations are presented. The assessment of the upgraded wastewater collection system under climate change conditions consists of generating an updated design event, which is then used to evaluate the capacity of the upgraded sewers and PSs.

6.7.1.1 Updated Design Event under Climate Change

The online IDF_CC Tool[1] from the Institute for Catastrophic Loss Reduction (ICLR) was used to derive intensity-duration-frequency (IDF) parameters under a climate change scenario for the Environment Canada Shawville Station. This scenario is based on the shared socioeconomic pathway (SSP) 8.5, which generally represents the higher end of future greenhouse gas (GHG) emissions pathways. The climate change projections to 2100 were selected, as this horizon encompasses the lifespan of the infrastructure.

Updated 10-year and 25-year 6-hour design events were derived using the IDF parameters adjusted for climate change. **Figure 6-14** (10-year design event) and **Figure 6-15** (25-year design event) compare the rainfall hyetographs under historical (using the Environment Canada Shawville Station data) and climate change (exported from the IDF_CC tool) conditions. Under climate change conditions for the selected scenario, total rainfall volume and intensity increase by ~22-24%. As a result, the 10-year design event under climate change conditions is approximately equivalent to the historical 25-year design event, and

[1] Simonovic, S.P., A. Schardong, R. Srivastav, and D. Sandink (2015), IDF_CC Web-based Tool for Updating Intensity-Duration-Frequency Curves to Changing Climate – ver 7.0, Western University Facility for Intelligent Decision Support and Institute for Catastrophic Loss Reduction, open access https://www.idf-cc-uwo.ca.

the 25-year design event under climate change conditions is approximately equivalent to the historical 50-year design event. The 2042 growth conditions scenario with the sewer upgrades proposed in **Section 6.5** was simulated with the updated design events.

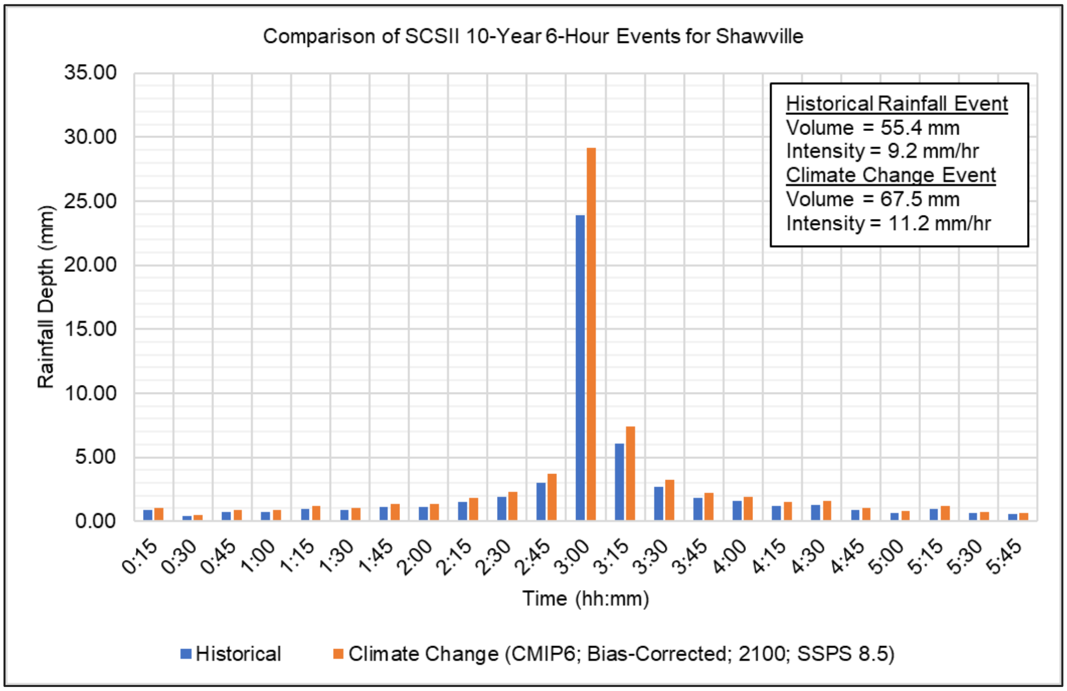


Figure 6-14: Comparison of 10-Year 6-Hour Design Event at the Shawville Station under Historical and Climate Change Conditions

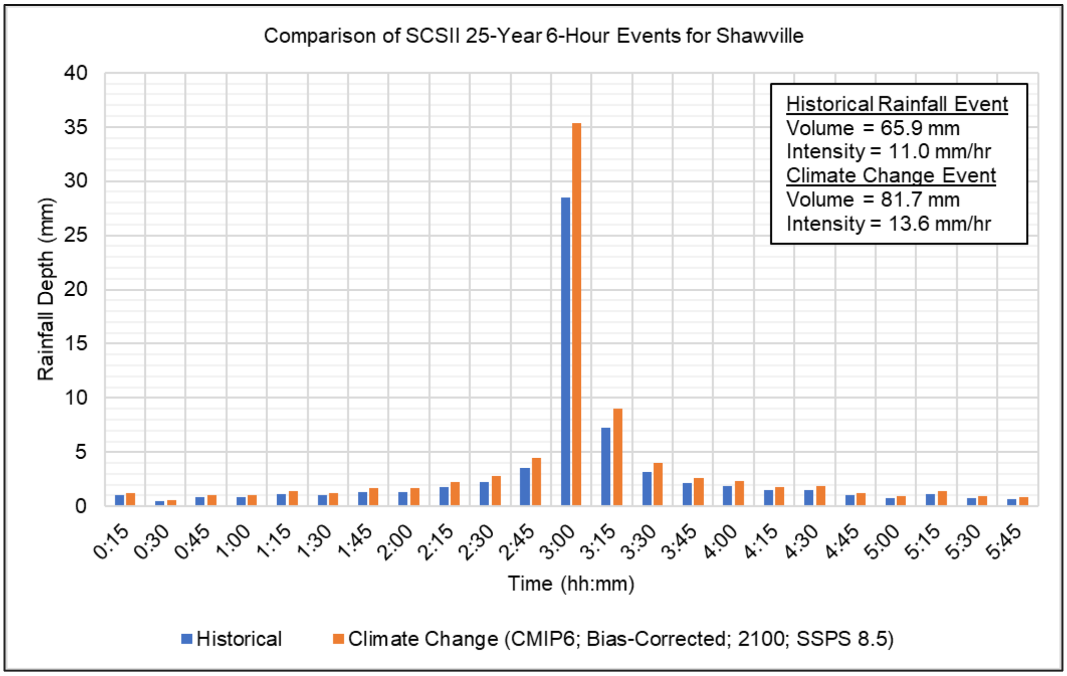


Figure 6-15: Comparison of 25-Year 6-Hour Design Event at the Shawville Station under Historical and Climate Change Conditions

6.7.1.1.1 Sewer System Performance under Climate Change

The wastewater collection system hydraulic model was used to assess the system under 2042 growth conditions with the planned projects (sewer separations, Edey St redirection) presented in **Table 5-27** and the sewer upgrades proposed in **Section 6.5.1.1** to address growth needs, and using the WWF design event adjusted for climate change. The same freeboard and pipe surcharge criteria were used to identify problem areas triggered by climate change. **Figure 6-16** shows the results of the system assessment and the location of problem areas for which servicing solutions to consider climate change were developed.

This assessment also assumes ideal pumps (flow in = flow out), such that conservative flows are conveyed downstream of the pump stations. Overall, the assessment shows 2 key locations of potential constraints related to climate change, for which solutions were developed:

- **Problem Area PA-2(CC) –Daniel St/Albert St**: Risks of basement flooding are observed along the shallow sewers on Albert St just upstream of the CSO location. While these sewers are shallow and upgrades for growth were previously recommended in **Section 6.5.1.1.2**, capacity constraints under the 25-year event under climate change conditions are observed. This indicates a need to further upsize the sewers to accommodate the higher peak flows observed when considering climate change.
- **Problem Area PA-4(CC) – James St**: Risks of basement flooding are observed along the shallow sewers on James St, from the WFP to Russell St. HGL issues (risk of basement flooding) were originally identified in **Chapter 2** (**Section 5**) (see **Figure 5-22**). However, those issues

were associated with the sewers' shallow depth (pipe obvert < 1.8 m) rather than pipe capacity constraints, and therefore did not trigger the need for pipe upgrades to accommodate growth to 2042. Nonetheless, under climate change conditions, the pipes along James St experience capacity constraints, indicating a need to upgrade the sewers to accommodate the higher peak flows observed when considering climate change.

Stantec

Legend

- Sanitary Pump Station (PS)
- Overflow
- Wastewater Treatment Plant
- Sanitary Sewer (Not Modelled)
- Forcemains

HGL Freeboard

- At or Above
- Within Basement Level (Within 1.8 m of Surface)

Pipe Surcharge State

- Bottleneck (Undersized Sewer)
- Backwater Conditions
- Free-Flowing Conditions
- Shallow Pipes (Obvert Within 1.8 m of Surface)
- Problem

Growth Areas

- Growth Area
- Existing Subcatchment (with Redevelopments or Development/Occupancy of Vacant Properties)
- New Subcatchment

N

0 250 500 Meters
(At original document size of 11x17)
1:19,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Export_Output_Parcel_Fabric.shp*, *Export_Output_Roads.shp*, *Export_Output_San_MH.shp* and *Export_Output_SAN_SEWER.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant

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Arnprior, ON

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Town of Arnprior
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Figure No.
6-16

Title
2042 Growth Conditions with Planned Projects & Proposed Infrastructure - 25-Year SCS II 6 Hour Event (Climate Change)

6.7.1.1.2 Pumping Stations Performance under Climate Change

The PS capacities were also compared to the peak modelled incoming flows under the 10-year and 25-year design event with and without climate change, for the 2042 horizon. The results are summarized in **Table 6-13**. This assessment assumes ideal pumps (flow in = flow out), in order to identify the peak incoming flows that the PS should convey under this scenario. PS upgrades were previously recommended to accommodate the flows under the 10-year 2042 growth conditions (see **Section 6.5.1.2**). The PS upgrades should therefore consider the potential increased peak incoming flows under climate change conditions.

Table 6-13: 2042 Peak Modelled Incoming Flows to Pumping Station (Original Results & Climate Change Considerations)

Name	Location	Number of Pumps at PS	Firm Capacity (Largest Pump Out of Service) (L/s)	20-Year Horizon (2042) Peak Modelled Incoming Flows (L/s) *With Planned Projects*(1) and with Proposed Infrastructure Upgrades(2)			
				10-Year Design Event		25-Year Design Event	
				Original	Climate Change	Original	Climate Change
PS #1	Elgin St E at Claude St	2	25	81(3) *44*	98(3) *54*	96(3) *53*	119(3) *65*
PS #2	McNab St at Seventh Ave	2	59	*71*	*84*	*84*	*100*
PS #3	Madawaska Blvd, west of Bridge St	3(1)	275	*371*	*445*	*436*	*534*
PS #5	Wolff Cres	2	7	*5.4*	*6.2*	*6.1*	*7.2*

Notes:
(1) Future (planned) projects presented in **Table 5-27**.
(2) Proposed sewer upgrades presented in **Section 6.5.1.1**.
(3) Without upstream sewer separation (project SEW-FUT-8 in **Table 5-27**).

6.7.1.1.3 WWTP Performance under Climate Change

The WWTP performance assessment [**Chapter 2** (**Section 5**)] did not identify the need for WWTP capacity upgrades, based on recent historical trends in average daily flows. Historical multi-year trends in peak hour and peak daily flows were not evaluated against rainfall events due to limitations in the availability of sub-daily rainfall data. Nonetheless, it is generally expected that climate change will impact the occurrence of extremes. That is to say, the peak and minimum flow conditions. As a result, climate change should be considered in terms of how wet and drought conditions may impact the WWTP's processes and capacities.

6.7.1.2 Improvements to Sewers with Climate Change Considerations

The following improvements to the sewer collection system are recommended to consider climate change.

6.7.1.2.1 Problem Area PA-2(CC) – Daniel St Upgrades with Considerations for Climate Change

PA-2(CC) consists of 600 mm diameter sewers along Daniel St and Albert St. Upgrades to the 600 mm diameter sewers to accommodate growth to 2042 were previously identified in **Section 6.5.1.1.2**. The peak HGL profile in the upgraded sewers under 2042 25-year design event conditions, adjusted for climate change, is shown in **Figure 6-17**.

The following is recommended to increase sewer capacity and eliminate HGL issues under climate change conditions, as shown in **Figure 6-18**:

- **SEW-PA2(CC)-A)** Upgrade the sewers along Daniel St and Albert St, as follows:
  - SEW-PA2(CC)-A1: Upgrade 66 m of 600 mm diameter sewers to 675 mm along Daniel St from south of Madawaska St to Madawaska St,
  - SEW-PA2(CC)-A2: Upgrade 160 m of 600 mm diameter sewers to 675 mm along Daniel St/Albert St from Madawaska St to Victoria St, and
  - SEW-PA2(CC)-A3: Upgrade 38 m of 600 mm diameter sewers to 825 mm along Albert St from Madawaska St to Victoria St.
    - Sections SEW-PA2(CC)-A2 overlaps with the Town's planned project to upgrade the Albert St sewers from McEwen St to Madawaska St (project SEW-FUT-6 in **Table 5-27**). The sizing proposed herein can be used to inform the next stages of planning and design of this project.

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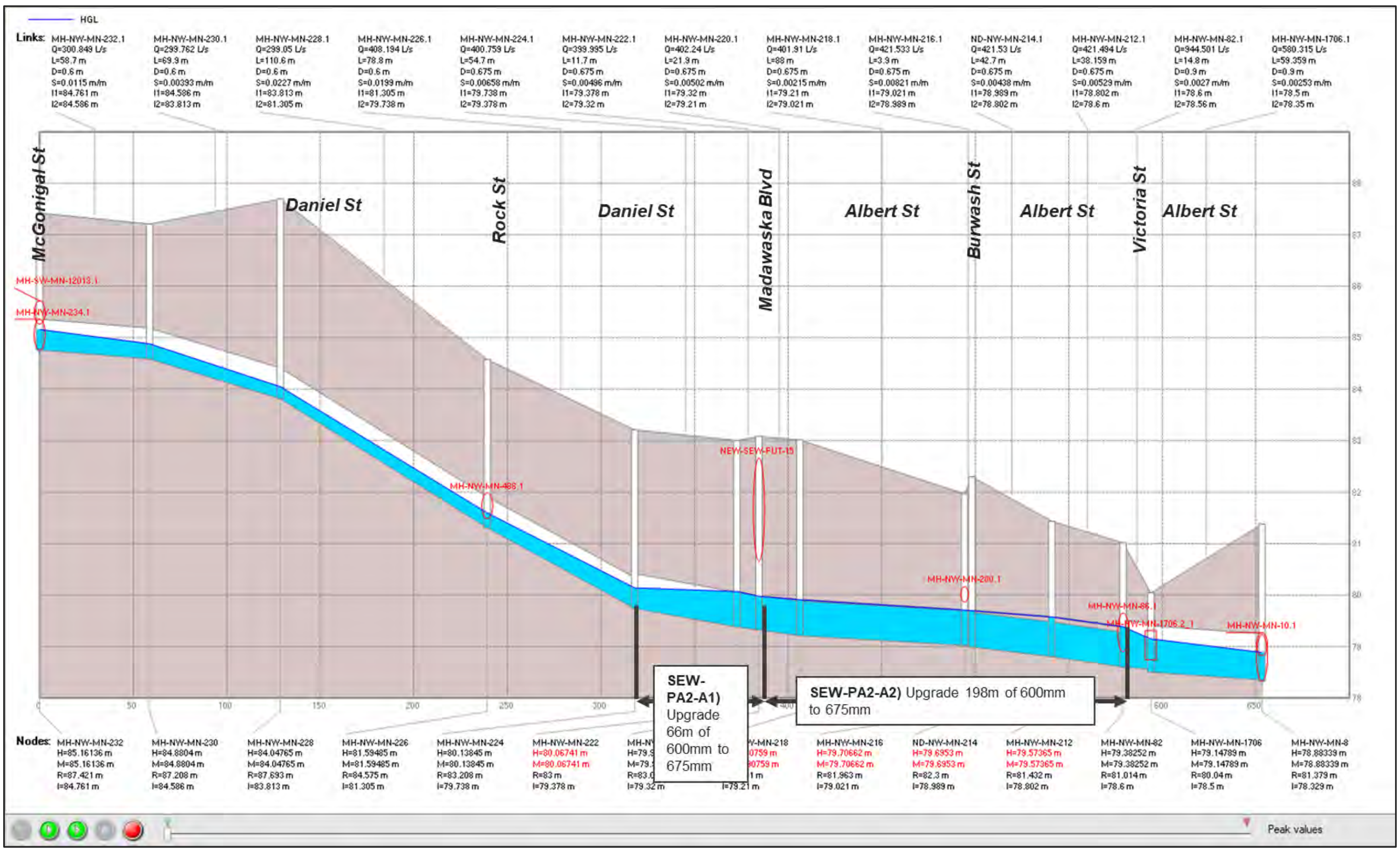


Figure 6-17: Problem Area PA-2(CC) - 2042 Conditions 25-Year Event (with Climate Change) Peak HGL Profile (Post-Upgrade)

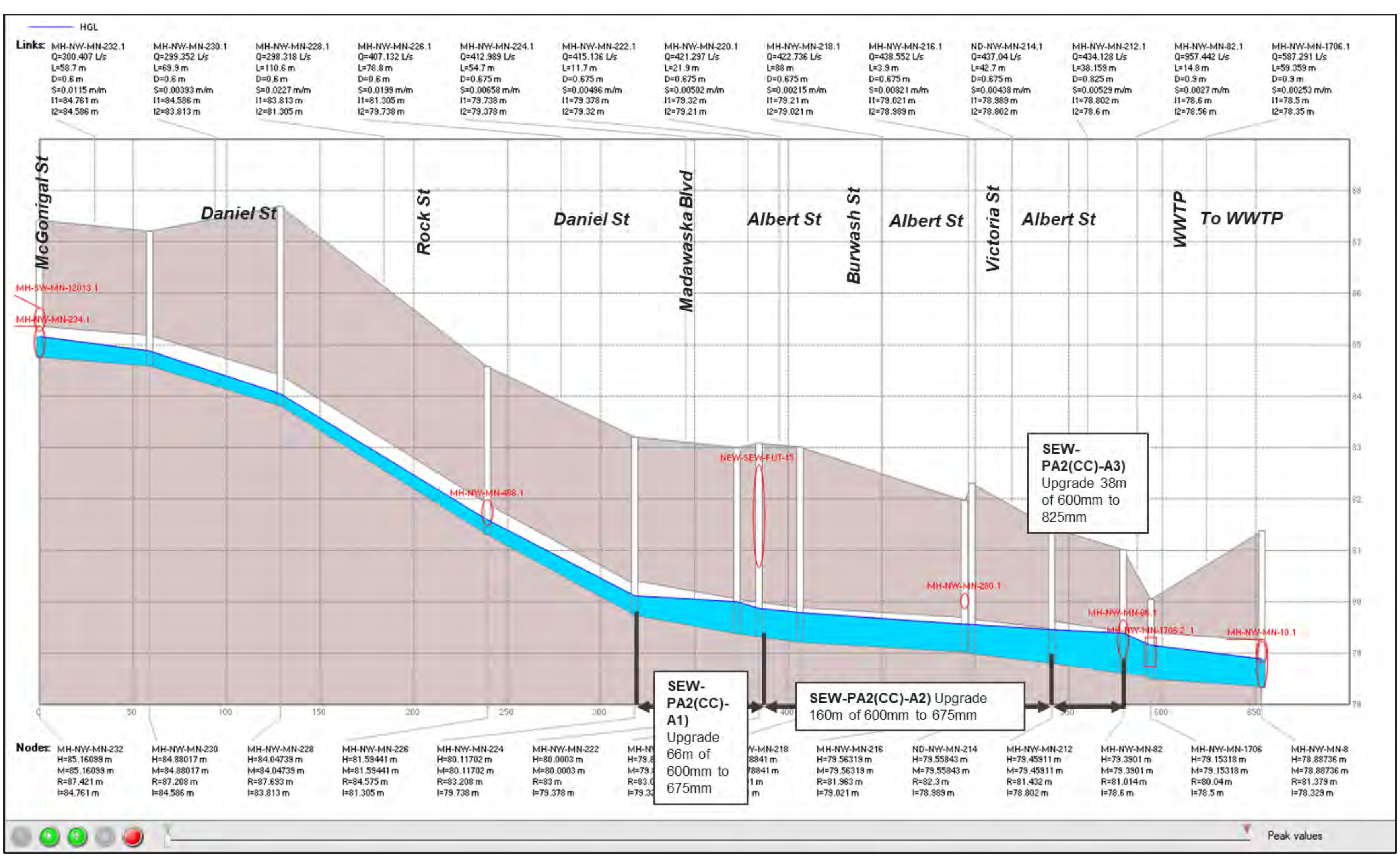


Figure 6-18: Problem Area PA-2(CC) - 2042 Conditions 25-Year Event (with Climate Change) Peak HGL Profile (Post-Upgrade, with Additional Climate Change Considerations)

6.7.1.2.2 Problem Area PA-4(CC) – James St Upgrades with Considerations for Climate Change

PA-4(CC) consists of 250 mm and 300 mm diameter sewers along James St, from the Water Filtration Plant to Daniel St. This area includes combined sewers, which are planned for separation, as presented in **Table 5-27** (project SEW-FUT-10). Following sewer separation, HGL issues (risk of basement flooding) were originally identified in **Chapter 2** (see **Figure 5-22**). However, those issues were associated with the sewers' shallow depth (pipe obvert < 1.8 m) rather than pipe capacity constraints, and therefore did not trigger the need for pipe upgrades to accommodate growth to 2042. Nonetheless, under climate change conditions, the pipes along James St experience capacity constraints. The peak HGL profile under 2042 25-year design event conditions, adjusted for climate change, is shown in **Figure 6-19**.

The following is recommended to increase sewer capacity and eliminate HGL issues under climate change conditions, as shown in **Figure 6-20**:

- **SEW-PA4(CC)-A)** Confirm inverts and ground elevations along James St with a topographical survey
- **SEW-PA4(CC)-B)** Upgrade 215 m of 250 mm diameter sewers to 300 mm along James St, from the WFP to east of Russell St:
    - The existing combined sewers along James St are currently planned for separation (project SEW-FUT-10 in **Table 5-27**). The proposed sewer upgrade could be implemented as part of the planned sewer separation.
- **SEW-PA4(CC)-C)** Lower the upgraded sewers along James St, from the WFP to Daniel St.
    - Upgrading the sewers increases their conveyance capacity, however, HGL issues (risk of basement flooding) still arise if the sewers remain shallow. Laying the sewers deeper along James St to match the lowest elevation at the intersection with Daniel St and reducing the slope of the most upstream sewer partially eliminate the HGL issues. However, the depth of cover is still low at the most upstream end, where risks of basement flooding are still observed. Confirming the ground elevations along James St should be prioritized to further validate those risks of HGL issues, and additional solutions to increase the depth of cover should be explored at a detailed design stage.

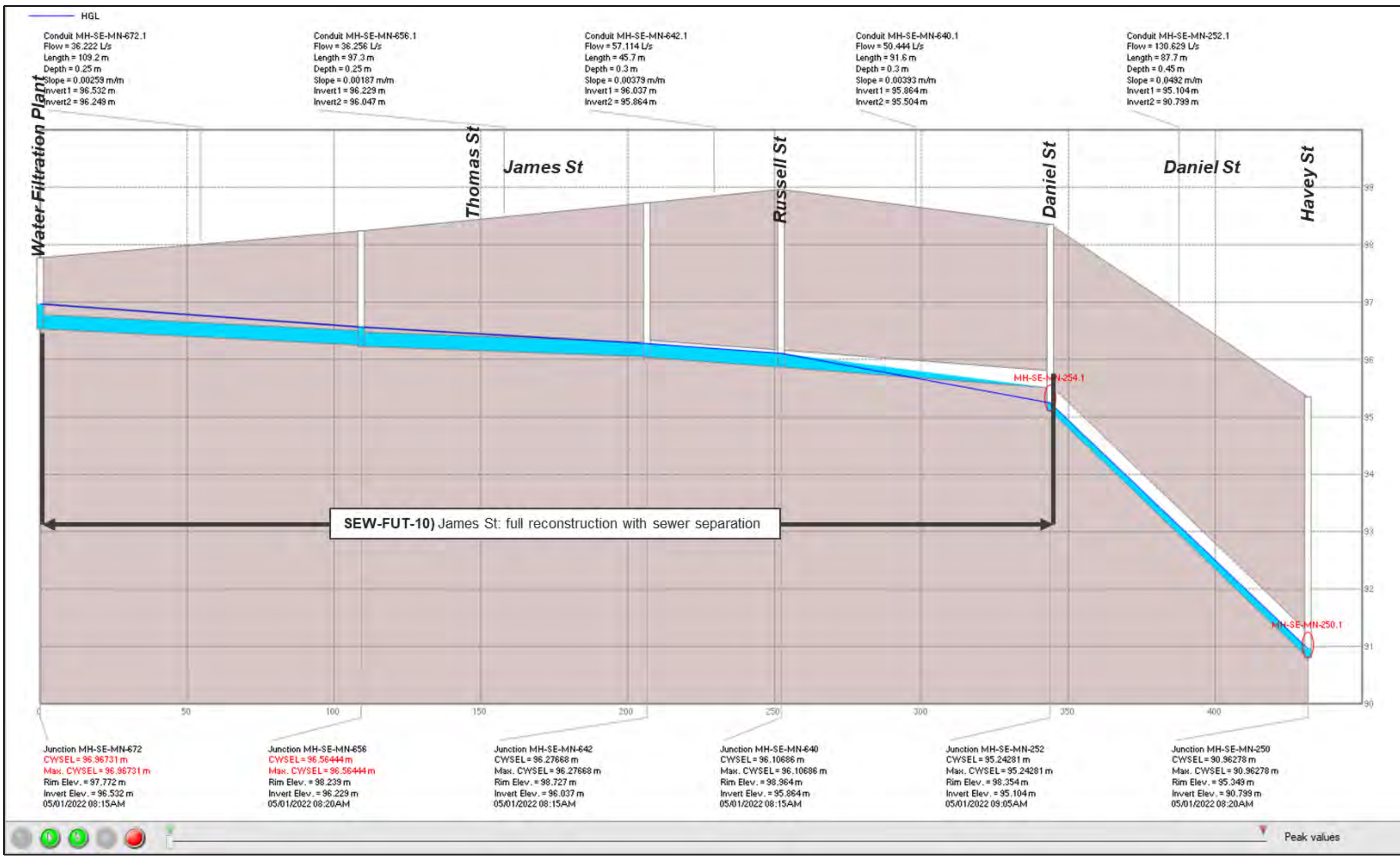


Figure 6-19: Problem Area PA-4(CC) - 2042 Conditions 25-Year Event (with Climate Change) Peak HGL Profile (Existing Infrastructure, with Planned Sewer Separations & Edey St Redirection)

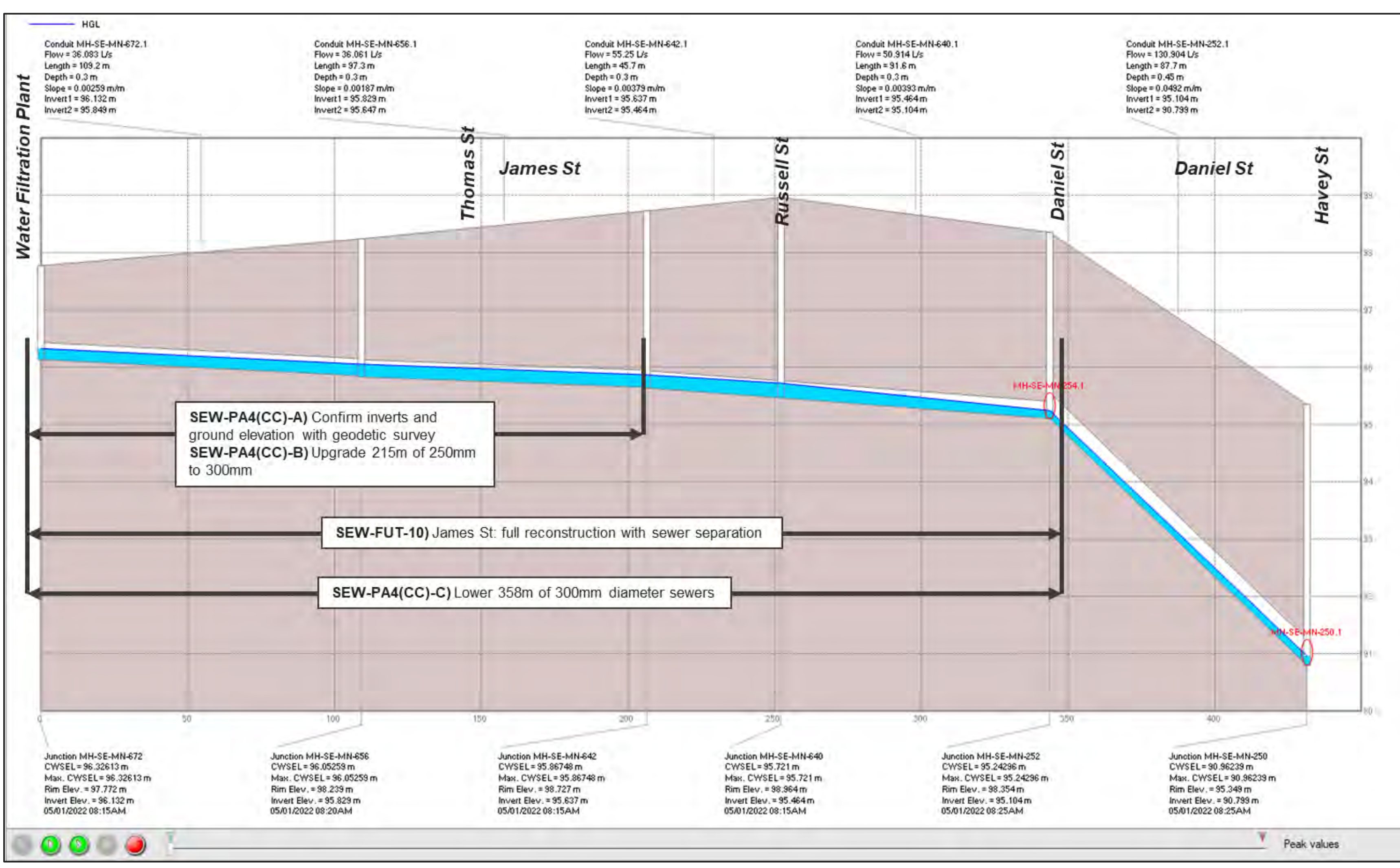


Figure 6-20: Problem Area PA-4(CC) - 2042 Conditions 25-Year Event (with Climate Change) Peak HGL Profile (Post-Upgrade)

6.7.1.3 Improvements to Pumping Stations with Climate Change Considerations

As shown in **Table 6-13**, peak modelled incoming flows to the PSs are expected to increase under climate change conditions. The PS upgrades identified in **Section 6.5.1.2** should therefore consider the potential higher peak flows in the PS sizing, as presented in **Table 6-14**.

Table 6-14: Climate Change Considerations for the Sizing of PSs

Name	Location	PS Upgrade Project for Growth	PS Upgrade Project for Growth with Climate Change Considerations
PS #1	Elgin St E at Claude St	**PS1-C)** Upgrade PS #1 to accommodate peak incoming flows of **81 L/s** under the 10-year design event for a 20 year planning horizon. May be reduced with upstream sewer separation.	**PS1(CC)-C)** Upgrade PS #1 to accommodate peak incoming flows of **98 L/s** under the 10-year design event for a 20 year planning horizon. May be reduced with upstream sewer separation.
PS #2	McNab St at Seventh Ave	**PS2-B)** Upgrade PS #2 to accommodate peak incoming flows of **71 L/s** under the 10-year design event for a 20 year planning horizon.	**PS2(CC)-B)** Upgrade PS #2 to accommodate peak incoming flows of **84 L/s** under the 10 year design event for a 20 year planning horizon.
PS #3	Madawaska Blvd, west of Bridge St	**PS3-A)** Upgrade PS #3 to accommodate peak incoming flows of **371 L/s** under the 10 year design event for a 20 year planning horizon.	**PS3(CC)-A)** Upgrade PS #3 to accommodate peak incoming flows of **445 L/s** under the 10 year design event for a 20 year planning horizon.
PS #5	Wolff Cres	No upgrade required	No upgrade required

6.7.1.4 WWTP Climate Change Considerations

Overall, climate change should be considered throughout the different recommendations presented in **Section 6.5.1.3.** The following is further recommended to consider climate change impacts on the WWTP:

- **WWTP(CC)-7)** Undertake climate change resiliency studies, to identify the main risks to the WWTP related to climate change and potential adaptation measures. Examples of climate change impacts which could be considered in a resiliency study are presented in **Table 6-15**.

Table 6-15: Examples of Potential Climate Change Impacts and Adaptation Measures for the WWTP

Climate Parameter	Impact	Potential Adaptation Measures
More intense precipitation events	Increased peak incoming flows to the WWTP	Design processes to accommodate potential upgrades of equipment without major infrastructure upgrades if peak flows increase. Consider upgrades within the sanitary collection system to reduce peak inflows to the WWTP.
More severe storms		
More intense spring melt (due to higher temperatures combined with greater snow loads)		
More intense precipitation events	Flooding	Build new process structures and buildings above the floodplain limit, with a buffer to accommodate future floods. Relocating equipment away from flood-prone areas. Verify and update emergency measures for flooding.
Decreased precipitation	Lower river flows and reduced assimilative capacity	Design processes to adjust treatment, considering potential reduced assimilation capacity.
Prolonged droughts		
Temperature increase	Odour generation	Consider higher oxygen demand and lower oxygen transfer capacity in design of aeration facilities.
Severe storms	Interruption of deliveries, power outages	Design storing capacity to provide additional reserve and minimize impacts of delayed deliveries on plant operation. Size backup power generators for critical plant processes. Co-generation of energy.

6.7.2 CLIMATE CHANGE CONSIDERATIONS FOR POTABLE WATER SYSTEM ALTERNATIVES

The following subsections present the assessment of the proposed potable water distribution system upgrades under climate change conditions. Moreover, assessment of the system under certain emergency scenarios (i.e., failures of key feedermains, HLPs, and EST) are also presented.

6.7.2.1 Potable Water System Assessment under Climate Change

As described in **Chapter 2** (**Section 5**), this assessment is representative of climate change impacts, where demands would increase with temperatures and extreme weather events. For this assessment, a sensitivity analysis was performed by increasing the MXDY demand projections by a factor of 10%. Both the impacts on growth capacity triggers and distribution system level of service (LOS) were assessed.

6.7.2.1.1 Treatment, Storage, and High Lifting Pumping

Table 6-16 summarizes the capacity triggers comparison between the baseline demand projections as presented in **Section 5.5.2** and the increased demand projections. Details of capacity requirements are illustrated in **Figure 6-21**, **Figure 6-22**, and **Figure 6-23**.

Based on the analysis, increasing demand projections by 10% would accelerate the need for WFP treatment upgrades by 4 years to 2034. Additional storage would be required 2 years earlier in 2031, while the pumping upgrades at the WFP would be required 1 year earlier, by 2033.

Table 6-16: Sensitivity of Capacity Triggers to Increased Demands

Infrastructure	Capacity Triggers			Additional Capacity Required by 2042	
	Baseline Demand Projections	+10% Increase in Demand Projections	Difference in Triggers	Baseline Demand Projections	+10% Increase in Demand Projections
Treatment	2038	2034	4 years earlier	631 m^3/d	1,728 m^3/d
Storage	2033	2031	2 years earlier	1,592 m^3	1,935 m^3
High Lift Pumping	2034	2033	1 year earlier	45 L/s	58 L/s

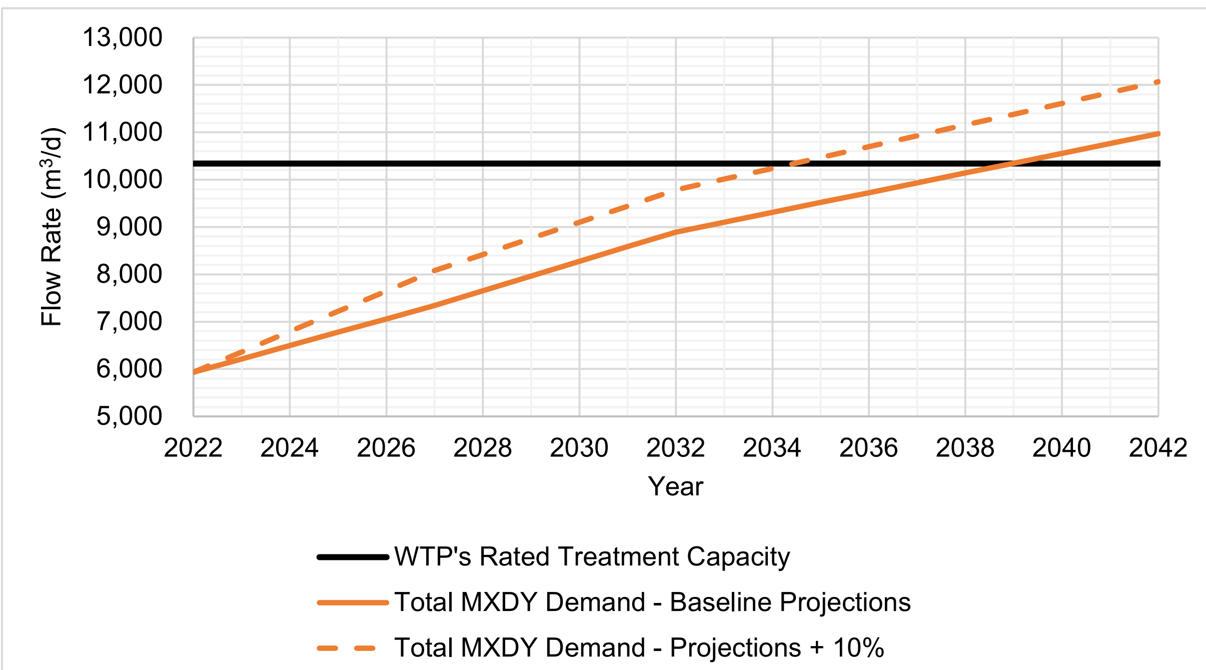


Figure 6-21: Treatment Capacity Requirements – Sensitivity Analysis

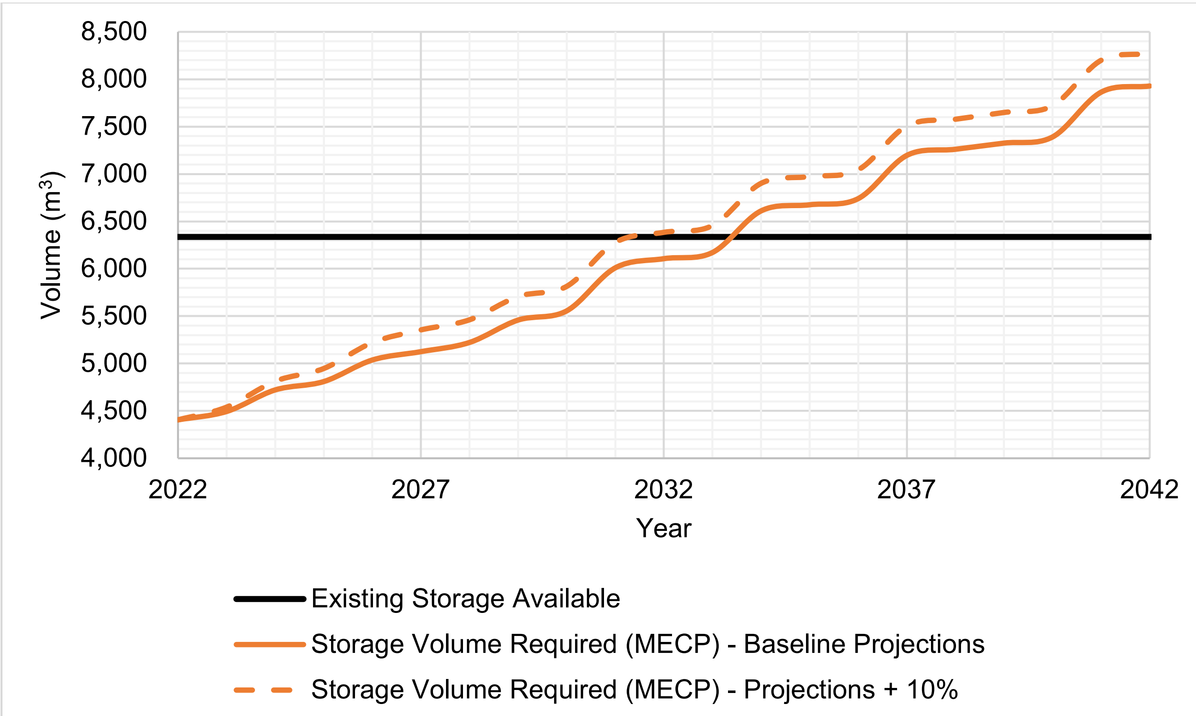


Figure 6-22: Storage Capacity Requirements – Sensitivity Analysis

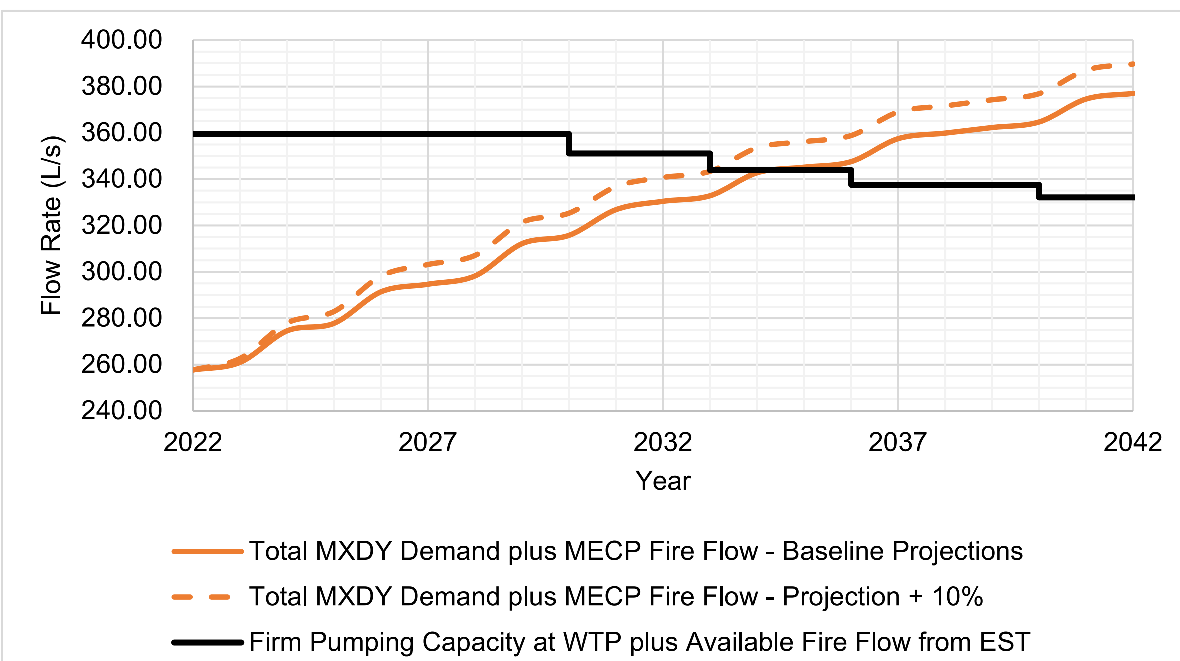
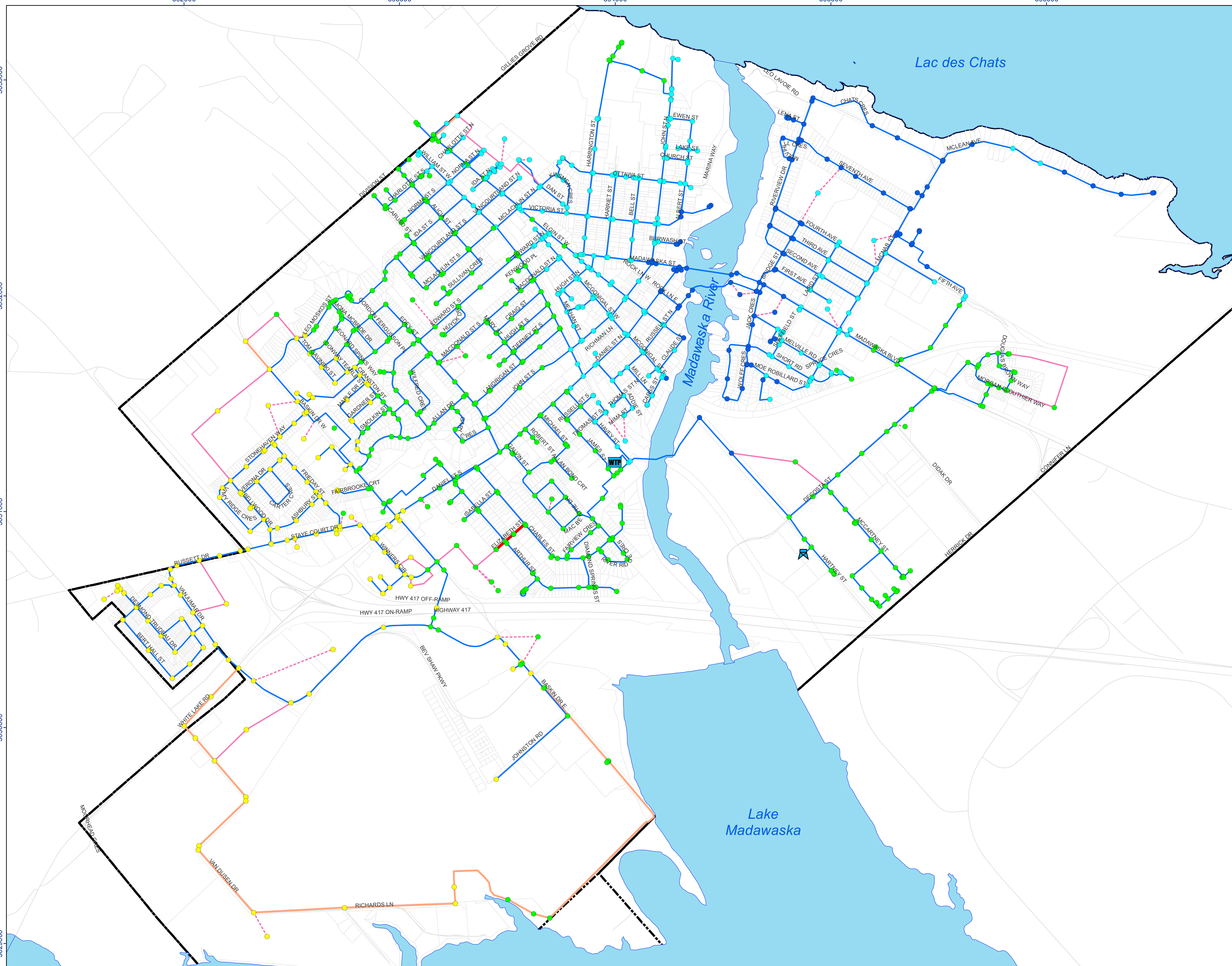


Figure 6-23: Pumping Capacity Requirements – Sensitivity Analysis

6.7.2.1.2 Distribution Pipe Network

The 2042 model scenario including the proposed potable water distribution system upgrades and 10% increase in demands was run under MXDY demand conditions, with all boundary conditions remained unchanged as presented in **Section 6.5.2.2**. The minimum pressure results are illustrated in **Figure 6-24**. Hydraulic modelling shows minimum pressures ranging from 44 to 92 psi with the EST operating between 59 to 80% full. No minimum pressures less than 40 psi are anticipated. Therefore, no further water distribution system upgrades are needed given the climate change considerations.



Stantec

Legend

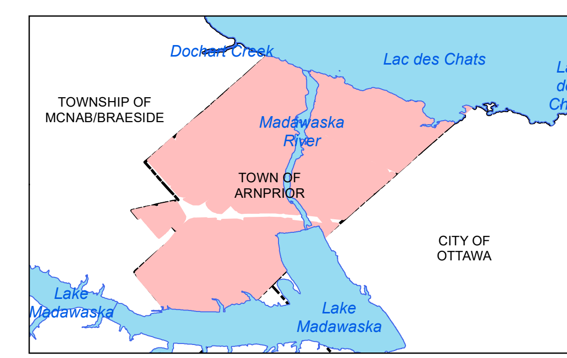
Minimum Pressure

- Min. Pressure ≤ 20 psi
- 20 psi < Min. Pressure ≤ 40 psi
- 40 psi < Min. Pressure ≤ 50 psi
- 50 psi < Min. Pressure ≤ 70 psi
- 70 psi < Min. Pressure ≤ 80 psi
- 80 psi < Min. Pressure ≤ 100 psi
- Min. Pressure > 100 psi
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-08-09
Revised by CZ on 2024-01-25

Client/Project 163401723
Town of Arnprior
2022 W&WW Master Plan Update

Figure No.
6-24

Title
Model Results: 2042 Conditions with Solutions and 10% Increase in Demand Projections – MXDY Minimum Pressures

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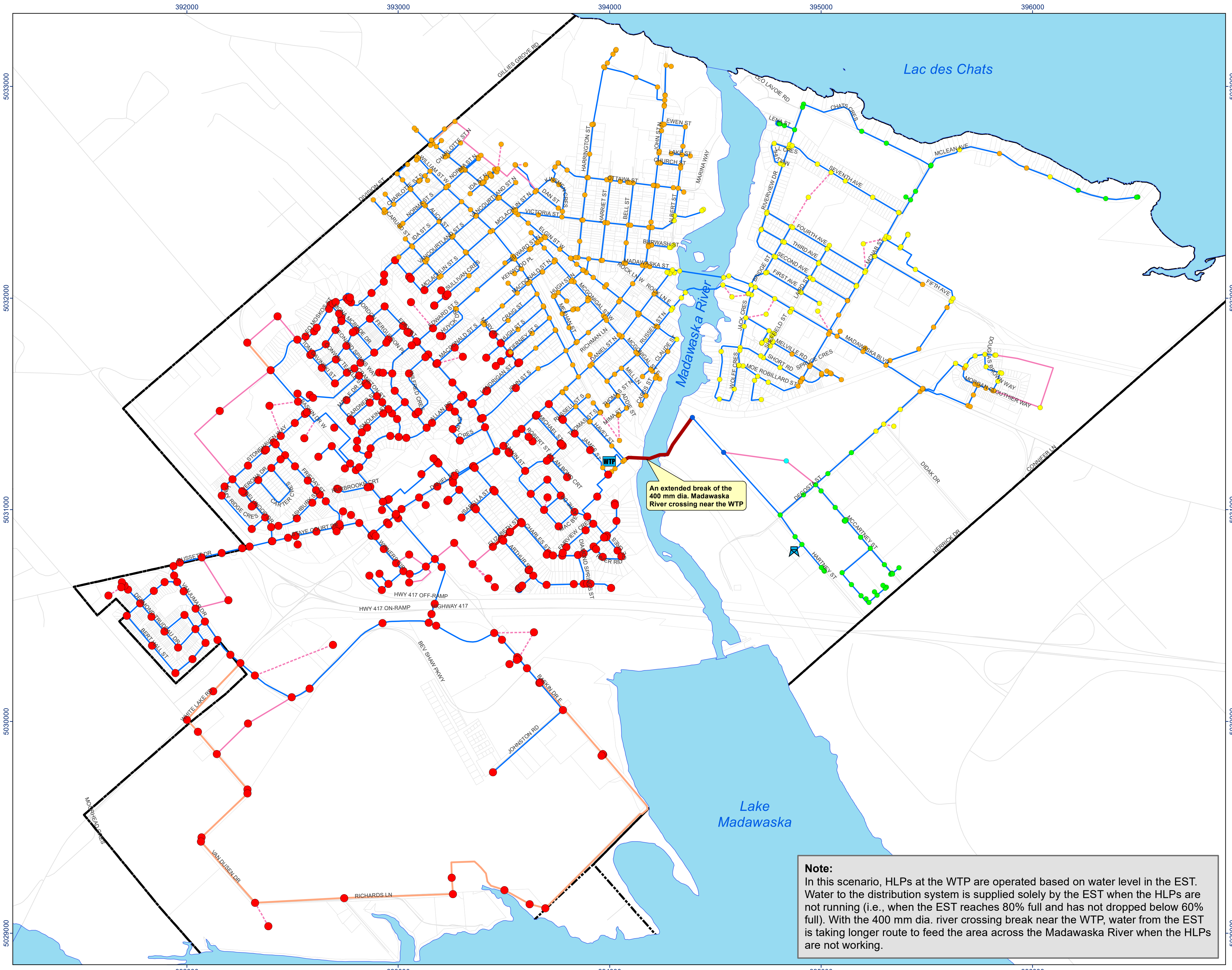
6.7.2.2 Potable Water System Assessment under Emergency Scenarios

In addition to the sensitivity analysis, a reliability analysis was conducted to assess the performance of the system under future (2042) emergency/failure scenarios. Five emergency scenarios with major infrastructure failure including key feedermain breaks, HLP failure, and EST out of service were modelled for 72-hr under 2042 AVDY demand conditions. Details of each emergency scenario simulated for the reliability assessment are summarized as follows:

- Feedermain break #1: This scenario assumes an extended break of the 400 mm dia. Madawaska River crossing near the WFP. This 400 mm dia. river crossing is the direct feed from the WFP to the EST. During this watermain break, water to the EST could be fed alternatively via a less direct route through the two 300 mm dia. river crossings near Madawaska Blvd.
- Feedermain break #2: This scenario assumes an extended break of the 300 mm dia. Madawaska River crossing along Madawaska Blvd. In comparison to the other 300 mm dia. river crossing near Russell St, the watermain on Madawaska Blvd was selected due to its greater simulated flow and older pipe age.
- Feedermain break #3: This scenario assumes an extended break of the 610 mm dia. watermain immediately downstream of the WFP on Havey St. A secondary feed to the areas serviced primarily by the 610 mm dia. pipe could be provided by the 250 mm dia. watermain along James St.
- HLP failure: This scenario assumes extended outage of the three HLPs in the WFP. For this scenario, the system operates in “level mode” with all pumps at the WFP were turned off and the initial level in the EST was set to its maximum level (i.e., 10.7 m).
- EST out of service: This scenario assumes that the EST is taken out of service (e.g., during maintenance of the tank). Under this scenario with the modelled tank offline, the system would operate in “pressure mode” with one pump on at the WFP and set to operate such that a maximum discharge pressure of 92 psi is not exceeded.

Figure 6-25 to **Figure 6-27** show the results of the reliability analysis for three feedermain breaks scenarios under 2042 conditions, with proposed infrastructure upgrades. According to the hydraulic modelling results, the potable water distribution system with proposed upgrades can provide AVDY demands while maintaining a pressure of 40 psi during the 300 mm dia. river crossing break on Madawaska Blvd (break #2) and 610 mm dia. watermain break on Havey St (break #3). However, the minimum required LOS (i.e., 40 psi) cannot be maintained in the event of a watermain break in the 400 mm dia. river crossing near the WFP (break #1), especially in the southwestern area of the Town. In this scenario, HLPs at the WFP are operated under normal system operating conditions (i.e., one HLP operating at a time based on water level in the EST); water to the distribution system would be supplied solely by the EST when the HLP is not running (i.e., when the EST reaches 80% full and has not dropped below 60% full). During the 400 mm dia. river crossing break (break #1), water from the EST would take longer route to feed the area across the Madawaska River when the HLP is not working, which results in lower pressure (less than 40 psi) in the southwestern area. This scenario demonstrates the critical nature of this 400 mm dia. watermain that acts as the most direct feedermain between the WFP/southwestern area and the EST, and which in turn sees relatively high head losses as presented in **Figure F1-2** in **Appendix F.1**. Therefore, in the event of a failure of this feedermain, it is recommended that the system be operated similar to that under pressure mode conditions (i.e., HLP operating within a required pressure range to feed the distribution system, especially the southwestern area, at all times during the feedermain break) such that the minimum required pressure of 40 psi can be maintained throughout the system until repairs can be completed. An additional alternative feed across the river with a similar direct route to the EST may also be considered.

In terms of pumping reliability analysis, deficits were identified based on hydraulic modelling results. The hydraulic analysis shows that the full EST is able to supply AVDY demands for 10-hr without additional water fed from the WFP, while maintaining the minimum pressure requirement of 40 psi. The Town is encouraged to establish an emergency plan to ensure that the pumping capacity can be restored within 10-hr. Additional standby capacity assessments and facility upgrades (if needed) are also recommended to provide sufficient standby pumping capacity and backup power at the WFP. As for storage reliability, the hydraulic analysis indicates that minimum pressures greater than 40 psi throughout the water distribution system can be sustained solely by water pumping from the WFP. As noted by the Town, the system was operated with the EST taken out of service for re-painting for a month in 2021, which confirmed that the HLPs are capable to operate within a required range of pressure without over-pressurizing the system.



Stantec

Legend

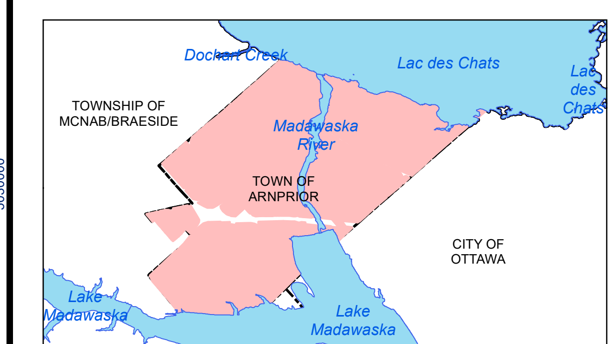
Minimum Pressure

- Min. Pressure ≤ 20 psi
- 20 psi < Min. Pressure ≤ 40 psi
- 40 psi < Min. Pressure ≤ 50 psi
- 50 psi < Min. Pressure ≤ 70 psi
- 70 psi < Min. Pressure ≤ 80 psi
- 80 psi < Min. Pressure ≤ 100 psi
- Min. Pressure > 100 psi
- Reliability Analysis Failure Location - Watermain Break #1
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-08-09
Revised by CZ on 2024-01-25

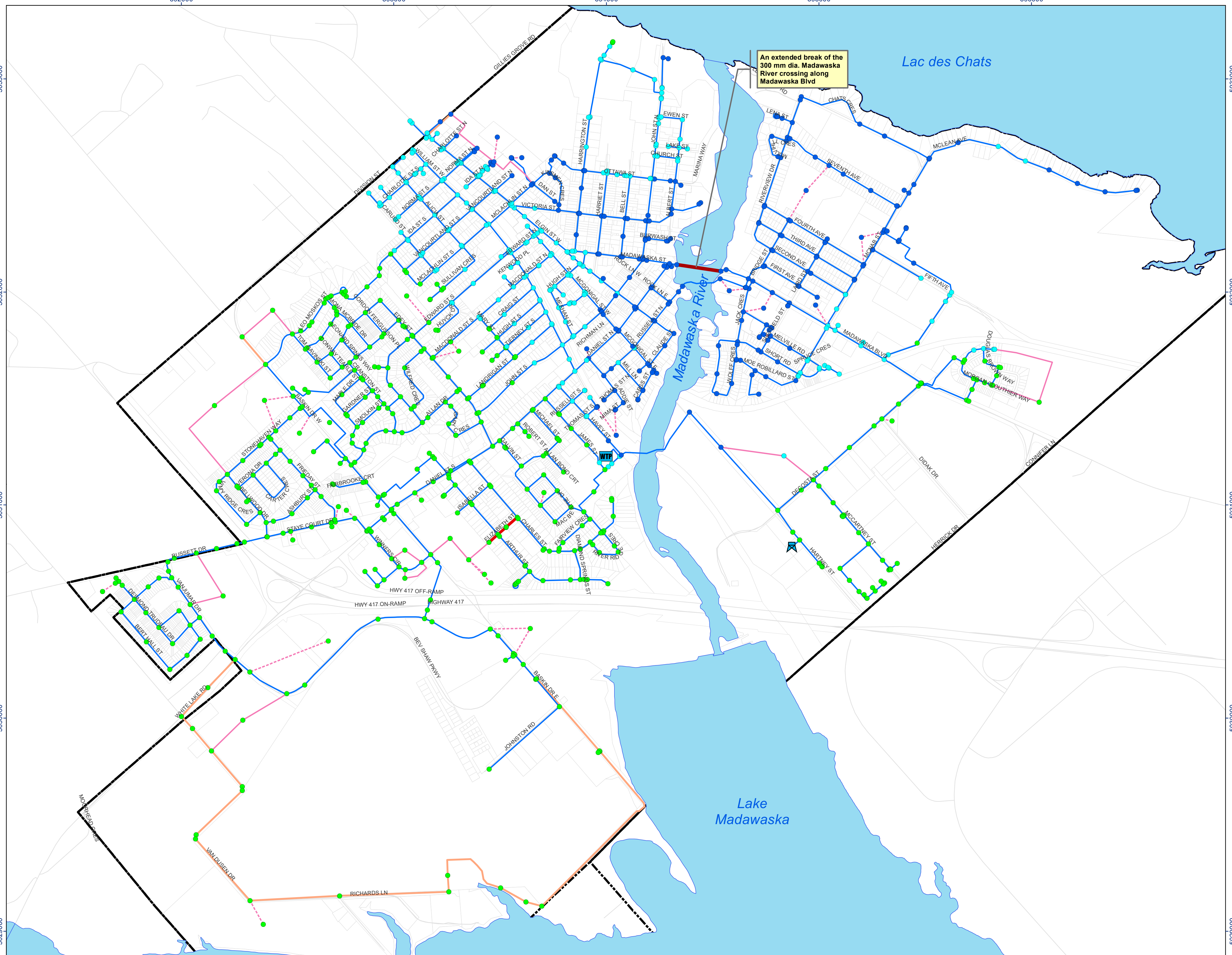
Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
6-25

Title
Model Results: 2042 Conditions with Solutions and Watermain Break #1 – AVDY Minimum Pressures

C:\Users\chzheng\Documents\My Documents\temp\163401723 Arnprior Water Master Plan\figures\MP_Report\mxd\fig6-25_am_wt_2042_w_solns_wm_break1_model_results_20240125.mxd Revised: 2024-01-25 By: chzheng



Legend

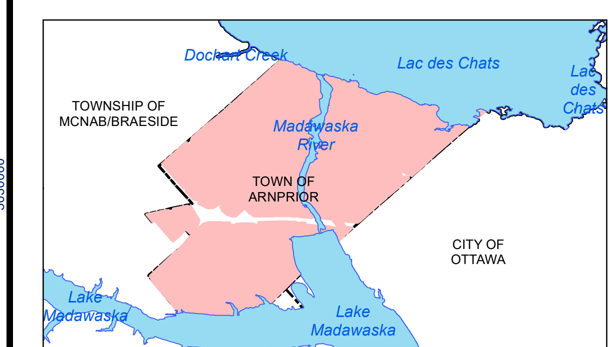
Minimum Pressure

- Min. Pressure ≤ 20 psi
- 20 psi < Min. Pressure ≤ 40 psi
- 40 psi < Min. Pressure ≤ 50 psi
- 50 psi < Min. Pressure ≤ 70 psi
- 70 psi < Min. Pressure ≤ 80 psi
- 80 psi < Min. Pressure ≤ 100 psi
- Min. Pressure > 100 psi
- Reliability Analysis Failure Location - Watermain Break #2
- Existing Watermains
- Dummy Pipes Added for Growth Areas
- Assumed Future Local Distribution Looping (Internal to Development Area)
- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

N

0 250 500 Meters
(At original document size of 11x17)
1:18,500

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *Arnprior_Roads_20220324* and *Arnprior_PropertyParcels_wAssessment_20220324.shp* provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario



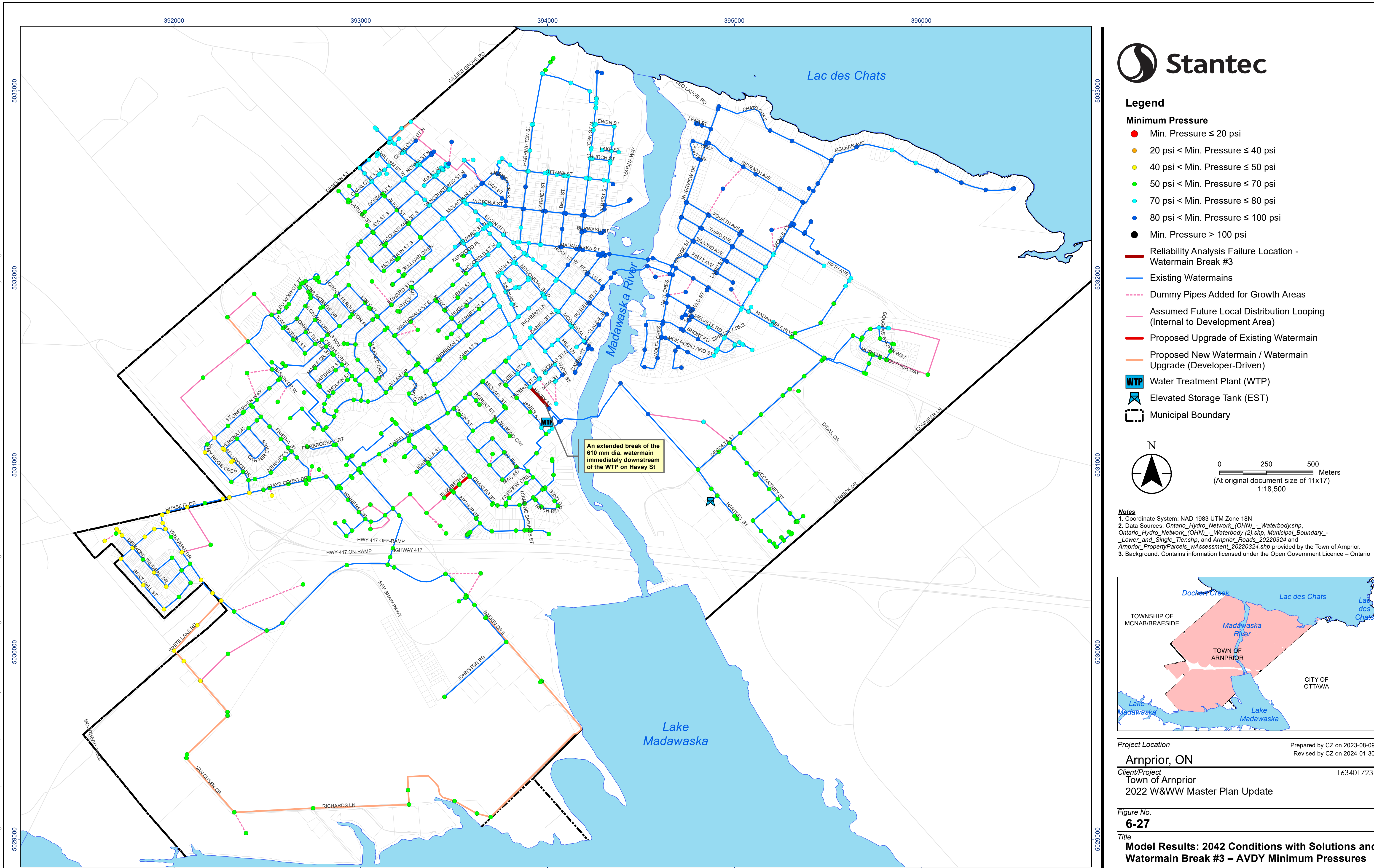
Project Location
Arnprior, ON

Prepared by CZ on 2023-08-09
Revised by CZ on 2024-01-30

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update
163401723

Figure No.
6-26

Title
Model Results: 2042 Conditions with Solutions and Watermain Break #2 – AVDY Minimum Pressures


Stantec
Legend
Minimum Pressure
Min. Pressure ≤ 20 psi
20 psi < Min. Pressure ≤ 40 psi
40 psi < Min. Pressure ≤ 50 psi
50 psi < Min. Pressure ≤ 70 psi
70 psi < Min. Pressure ≤ 80 psi
80 psi < Min. Pressure ≤ 100 psi
Min. Pressure > 100 psi
Reliability Analysis Failure Location - Watermain Break #3
Existing Watermains
Dummy Pipes Added for Growth Areas
Assumed Future Local Distribution Looping (Internal to Development Area)
Proposed Upgrade of Existing Watermain
Proposed New Watermain / Watermain Upgrade (Developer-Driven)
Water Treatment Plant (WTP)
Elevated Storage Tank (EST)
Municipal Boundary
N
0 250 500 Meters
(At original document size of 11x17) 1:18,500
Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: Ontario_Hydro_Network_(OHN)_-_Waterbody.shp, Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp, Municipal_Boundary_-_Lower_and_Single_Tier.shp, and Arnprior_Roads_20220324 and Arnprior_PropertyParcels_wAssessment_20220324.shp provided by the Town of Arnprior.
3. Background: Contains information licensed under the Open Government Licence – Ontario
An extended break of the 610 mm dia. watermain immediately downstream of the WTP on Havey St
Lac des Chats
Madawaska River
Lake Madawaska
TOWNSHIP OF MCNAB/BRAESIDE
TOWN OF ARNPRIOR
CITY OF OTTAWA
Project Location
Arnprior, ON
Prepared by CZ on 2023-08-09
Revised by CZ on 2024-01-30
Client/Project
163401723
Town of Arnprior
2022 W&WW Master Plan Update
Figure No.
6-27
Title
Model Results: 2042 Conditions with Solutions and Watermain Break #3 – AVDY Minimum Pressures

6.8 Servicing Summary

The following summarizes the wastewater collection system and potable water system servicing strategies, outlining and illustrating the projects identified.

6.8.1 WASTEWATER SERVICING SUMMARY

Ongoing and planned wastewater collection system projects identified by the Town are listed in **Table 5-27** (and were previously illustrated in **Figure 5-35**), and mainly consist of sewer separation projects and the Edey St sewer redirection. Additional wastewater servicing recommendations identified in the current W&WWMP to address existing system constraints and service growth are summarized in **Table 6-18** and illustrated in **Figure 6-28**. The recommendations are based on the refined alternatives presented in **Section 6.5.1**, with the additional considerations for climate change discussed in **Section 6.7.1**.

The recommendations' sizing and alignments are subject to change, as each project will undergo additional studies as needed, and detailed design. For master planning purposes, an implementation plan for these recommendations were developed in **Chapter 4** (**Section 7**), considering prioritization, phasing and costing of the projects.

Table 6-17: Planned Wastewater Collection Infrastructure Projects

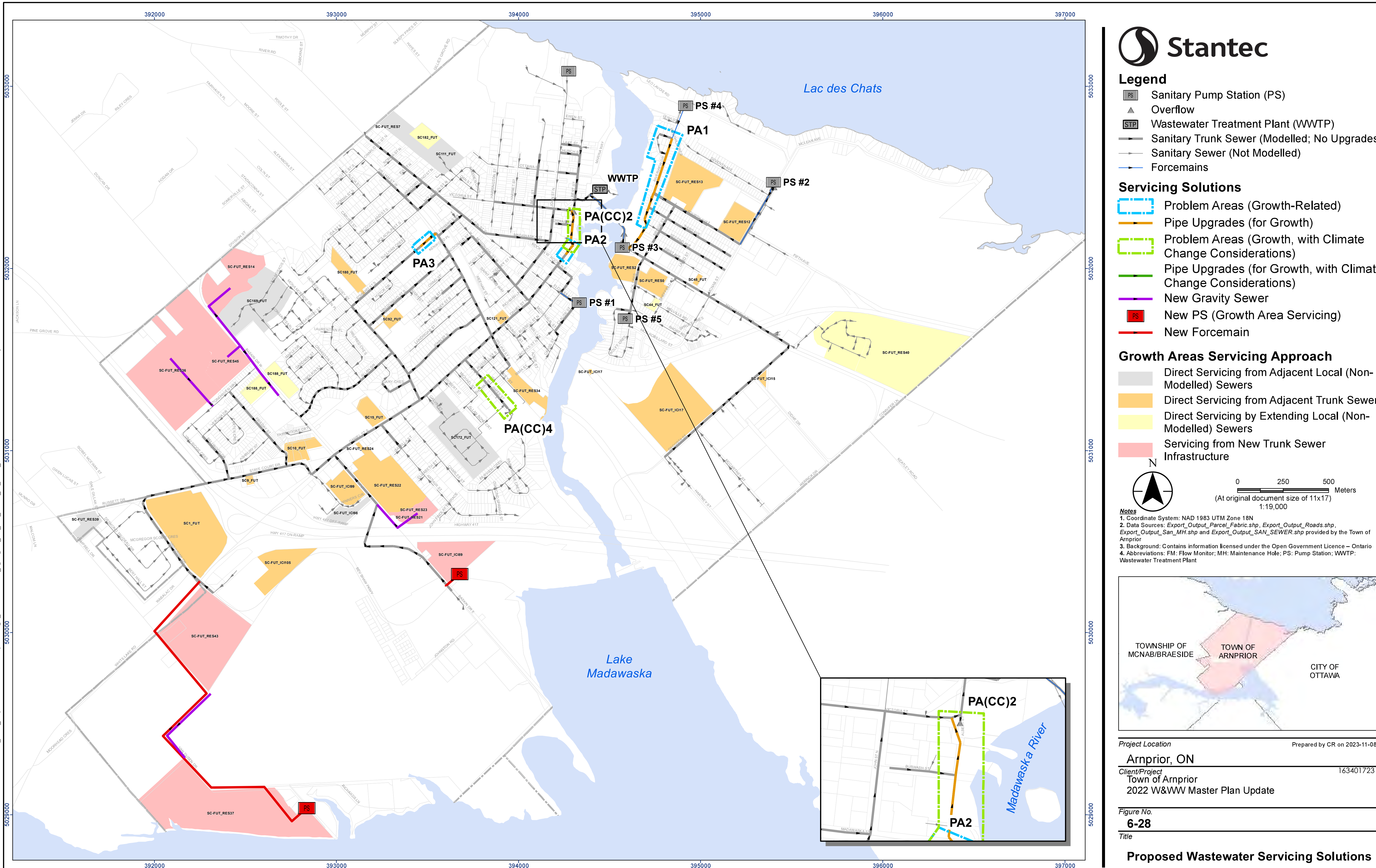
Project ID	Year of Completion(1)	Description
SEW-FUT-1	2027	Tierney St N, from McGonigal to St John's Way: Road reconstruction; full reconstruction with sewer separation
SEW-FUT-2	2024	MacDonald St, from McGonigal St to Edey St: Sanitary sewer upsizing/separation, partial watermain replacement, and road reconstruction
SEW-FUT-3	2025	Edey St, from MacDonald St to Allan Dr: full reconstruction with sanitary sewer upsizing
SEW-FUT-4	2027	Hugh St N, from McGonigal to St John's Way: full reconstruction, watermain replacement, sewer separation, sidewalk rehabilitation
SEW-FUT-5	2027	Third Ave, from Riverview Dr to McNab St: full reconstruction, watermain and sanitary sewer replacement
SEW-FUT-6	2028	Albert St, from Ewen St to Madawaska St: full reconstruction and sewer separation, including sanitary upsize
SEW-FUT-7	2026	Atkinson St full reconstruction with sewer separation
SEW-FUT-8	2030	Claude St, Elgin St E, McGonigal St E: full reconstruction with sewer separation
SEW-FUT-9	2031	Rock Ln E, Russel St N: full reconstruction with sewer separation
SEW-FUT-10	2033	James St: full reconstruction with sewer separation
SEW-FUT-11	2036	Charlotte St S & Ida St, from Alicia St to William St: full reconstruction with sewer separation
SEW-FUT-12	2041	Isabella St: full reconstruction with sewer separation
SEW-FUT-13	2040	Gary Cr, from Edey St to second bend: full reconstruction with sewer separation
SEW-FUT-14	2036	Elgin St W, from McLachlin St to Madawaska St: sanitary sewer & watermain replacement
SEW-FUT-15	2037	Madawaska St, from Elgin St to Daniel St: full reconstruction with new sanitary sewer, new watermain
SEW-FUT-16	2034	Edward St, from Edey St to Elgin St: full reconstruction with sewer separation
SEW-FUT-17	2025	Victoria St, from Elgin St to John St: full reconstruction with sewer and watermain replacement

Note:
(1) Year of completion inferred from long-range capital forecasts (final year of planned capital investment).

Table 6-18: Summary of Wastewater Servicing Recommendations

Project ID	Description
Improvements to Existing Sewers & PSs	
SEW-PA1-A	Confirm inverts along Riverview Dr with a topographical survey
SEW-PA1-B	Increase slopes to address existing adverse and flat sewer inverts along 316m of 450mm diameter sewers along Riverview Dr
SEW-PA1-C	Upgrade 356m of 300mm & 375mm to 525mm along Riverview Dr
SEW-PA2-A	SEW-PA2-A1: Upgrade 66 m of 600 mm diameter sewers to 675 mm along Daniel St from south of Madawaska St to Madawaska St SEW-PA2-A2: Upgrade 160 m of 600 mm diameter sewers to 675 mm along Daniel St/Albert St from Madawaska St to Victoria St SEW-PA2-A3: Upgrade 38 m of 600 mm diameter sewers to 675 mm along Albert St from Madawaska St to Victoria St
SEW-PA2(CC)-A(1)	SEW-PA2(CC)-A1: Upgrade 66 m of 600 mm diameter sewers to 675 mm along Daniel St from south of Madawaska St to Madawaska St SEW-PA2(CC)-A2: Upgrade 160 m of 600 mm diameter sewers to 675 mm along Daniel St/Albert St from Madawaska St to Victoria St SEW-PA2(CC)-A3: Upgrade 38 m of 600 mm diameter sewers to 825 mm along Albert St from Madawaska St to Victoria St
SEW-PA3-A	Confirm inverts along Edward St with a topographical survey
SEW-PA3-B	Upgrade 112 m of 200 mm diameter sewers to 250 mm along Edward St
SEW-PA4(CC)-A	Confirm inverts and ground elevations along James St with a topographical survey
SEW-PA4(CC)-B	Upgrade 215 m of 250 mm diameter sewers to 300 mm along James St, from the WFP to east of Russell St (in conjunction with planned sewer separations)
SEW-PA4(CC)-C	Lower the upgraded sewers along James St, from the WFP to Daniel St
PS1-A	Undertake combined sewer separation activities planned upstream of PS #1 and in the areas draining to Russell St and Elgin St (east of Daniel St)
PS1-B	Monitor flows to upstream and downstream of PS #1
PS1-C	Upgrade PS #1 to accommodate peak incoming flows of 81 L/s under the 10-year design event for a 20 year planning horizon.
PS1(CC)-C(1)	Upgrade PS #1 to accommodate peak incoming flows of 98 L/s under the 10-year design event for a 20 year planning horizon.
PS2-A	Monitor upstream flows
PS2-B	Upgrade PS #2 to accommodate peak incoming flows of 71 L/s under the 10-year design event for a 20 year planning horizon.
PS2(CC)-B(1)	Upgrade PS #2 to accommodate peak incoming flows of 84 L/s under the 10-year design event for a 20 year planning horizon.
PS3-A	Investigate and address sources of I/I upstream of PS #3.
PS3-B	Continue flow monitoring upstream of PS #3 to assess the efficacy of I/I reduction measures and capture the response under a variety of larger WWF events.
PS3-C	Upgrade PS #3 to accommodate peak incoming flows of 371 L/s under the 10-year design event for a 20 year planning horizon.
PS3(CC)-C(1)	Upgrade PS #3 to accommodate peak incoming flows of 445 L/s under the 10-year design event for a 20 year planning horizon.
PS3-D	Twin the existing sewage forcemain from PS #3 to the WWTP with a new 260 m long 350 mm diameter forcemain.
PS5-A	Monitor upstream flows
Improvements to WWTP	
WWTP-1	Maintain activities to reduce I/I into the sanitary collection system
WWTP-2	Develop criteria to monitor and assess Albert St CSO, e.g., using the MECP's F-5-5, which notably includes (but is not limited to) the following criteria:
WWTP-3	Continuously update the WWTP committed capacity assessment, as new development interests are identified
WWTP-4	Monitor the impact of upstream infrastructure upgrades on incoming flows to the WWTP
WWTP-5	Plan for the addition of an anoxic zone to improve pH control and support nitrification in the shoulder seasons.
WWTP-6	Undertake a study of the organic and solids loading to the WWTP versus loading capacity.
New Infrastructure to Service Growth Areas	
SEW-GRW1	New 620 m long 200 mm diameter gravity sewer along Baskin Dr W to service growth areas SC188_FUT, SC-FUT_RES14 and SC-FUT_RES45.
SEW-GRW2	New 300 m long 200 mm diameter gravity sewer along Baskin Dr E to service growth areas SC-FUT_RES21 and SC-FUT_RES23
SEW-GRW3	New 310 m long 250 mm diameter gravity sewer within future SC-FUT_RES36 growth area.
SEW-GRW5	New 490 m long 300 mm diameter gravity sewer from the growth area SC-FUT_RES43 to SC-FUT_RES37.
PS-GRW4	New PS within growth area SC-FUT_ICI89 with 100 m of new dual 100 mm diameter forcemains connected to existing 450 mm diameter trunk sewer on Baskin Dr.
PS-GRW5	New PS within growth area SC-FUT_RES37, to service both SC-FUT_RES37 and SC-FUT_RES43, with 2,200 m of new dual 200 mm diameter forcemains connected to existing 450 mm diameter trunk sewer on Beth Shaw Pkwy.
Overall Wastewater Collection System Recommendations	
SAN-1	Continue flow monitoring in key areas of interest
SAN-2	Continue sewer separation activities and monitor resulting flows.
SAN-3	Implement measures to reduce sewage generation rates
SAN-4	Continue implementing measures to reduce I/I into the system
SAN-5	Continue expanding the hydraulic model to local areas of interest, with the long-term goal of building an all-pipe model.

Note:
(1) Recommendation includes considerations for climate change, as described in **Section 6.7.1**.


Lac des Chats
Lake Madawaska
Madawaska River
PA1
PA2
PA3
PA(CC)2
PA(CC)4
WWTP
PS #1
PS #2
PS #3
PS #4
PS #5
Stantec
Legend
Sanitary Pump Station (PS)
Overflow
Wastewater Treatment Plant (WWTP)
Sanitary Trunk Sewer (Modelled; No Upgrades)
Sanitary Sewer (Not Modelled)
Forcemains
Servicing Solutions
Problem Areas (Growth-Related)
Pipe Upgrades (for Growth)
Problem Areas (Growth, with Climate Change Considerations)
Pipe Upgrades (for Growth, with Climate Change Considerations)
New Gravity Sewer
New PS (Growth Area Servicing)
New Forcemain
Growth Areas Servicing Approach
Direct Servicing from Adjacent Local (Non-Modelled) Sewers
Direct Servicing from Adjacent Trunk Sewer
Direct Servicing by Extending Local (Non-Modelled) Sewers
Servicing from New Trunk Sewer Infrastructure
0 250 500 Meters
(At original document size of 11x17)
1:19,000
Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: Export_Output_Parcel_Fabric.shp, Export_Output_Roads.shp, Export_Output_San_MH.shp and Export_Output_SAN_SEWER.shp provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario
4. Abbreviations: FM: Flow Monitor; MH: Maintenance Hole; PS: Pump Station; WWTP: Wastewater Treatment Plant
TOWNSHIP OF MCNAB/BRAESIDE
TOWN OF ARNPRIOR
CITY OF OTTAWA
Project Location
Prepared by CR on 2023-11-08
Arnprior, ON
Client/Project
163401723
Town of Arnprior
2022 W&WW Master Plan Update
Figure No.
6-28
Title
Proposed Wastewater Servicing Solutions

6.8.2 POTABLE WATER SERVICING SUMMARY

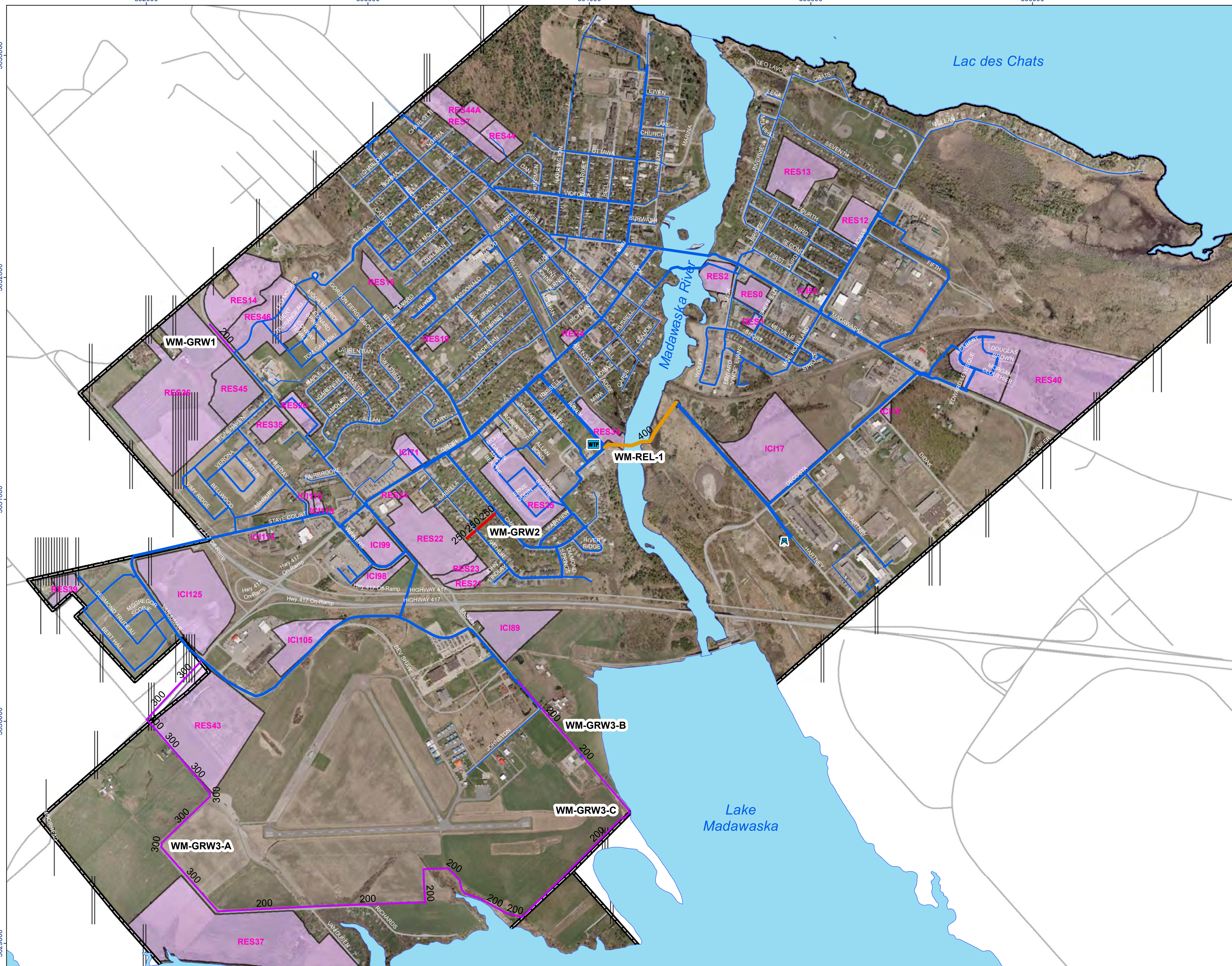
The potable water servicing recommendations to address existing system constraints and service growth are summarized in **Table 6-19**. This table includes the refined alternatives as presented in **Section 6.5.2**, as well as the recommendations based on sensitivity and reliability analysis as discussed in **Section 6.7.2**. Locations of the proposed watermain upgrade/expansion are presented in **Figure 6-29**. It should be noted that all figures in **Section 6.5.2**, **Section 6.6.3**, and **Section 6.7.2** indicate a new 150 m long 150 mm diameter watermain along Division St N. It is the pipe proposed in the hydraulic model to service growth area RES7 (Mackie Homes subdivision). However, it was advised by the Town that the developer is currently proposing a different routing to avoid installing the new watermain on Division St which is the boundary between the Town of Arnprior and the Township of McNab Braeside. Therefore, the 150 mm diameter watermain servicing growth area RES7 on Division St N is not included as part of the potable water servicing recommendations.

An implementation plan was developed in **Chapter 4** (**Section 7**), including prioritization, phasing, and costing for these recommendations. It shall be noted that all recommended upgrades and pipe sizing and alignments are subject to change. They will need to be reviewed and confirmed by additional assessments during detailed design stage.

Table 6-19: Summary of Potable Water Servicing Recommendations

Project ID	Description
Improvements to WFP	
WTP-TRT-1	Upgrade treatment capacity by 2038 to provide an additional treatment capacity of about 631 m^3/d for a 20-year planning horizon.
WTP-STR-1	Upgrade storage capacity by 2033 to provide an additional storage volume of about 1,592 m^3 for a 20-year planning horizon.
WTP-PMP-1	Upgrade high lift pumping capacity by 2034 to provide an additional pumping capacity of about 45 L/s for a 20-year planning horizon.
WTP-PMP-2	Adjust the operating philosophy of HLPs to have two HLPs called into service under high demand conditions in the 20-year planning horizon. SCADA programming would need to be adjusted to allow for the second HLP to kick in.
WTP-TRT-1-CC [(2)]	Upgrade treatment capacity by 2034 to provide an additional treatment capacity of about 1,728 m^3/d for a 20-year planning horizon.
WTP-STR-1-CC [(2)]	Upgrade storage capacity by 2031 to provide an additional storage volume of about 1,935 m^3 for a 20-year planning horizon.
WTP-PMP-1-CC [(2)]	Upgrade high lift pumping capacity by 2033 to provide an additional pumping capacity of about 58 L/s for a 20-year planning horizon.
WTP-REL-1 [(3)]	Plan for potential occurrence of HLP failure to ensure that the pumping capacity can be restored within 10 hours.
WTP-REL-2 [(3)]	Perform additional standby capacity assessments and upgrade the facility as needed based on study results.
WTP-REL-3 [(3)]	Operate the system in pressure mode (i.e., HLP operating within a required pressure range to feed the distribution system) when the EST is out of service and/or in the event of the failure of the 400 mm dia. Madawaska River crossing near the WFP.
Improvements & Expansion of Distribution Pipe Network [(1)]	
WM-GRW1	New 170 m long 200 mm diameter watermain along Baskin Dr W to service growth area RES14.
WM-GRW2	Upsize the existing 130 m long 150 mm diameter watermains on Elizabeth St to 250 mm and extend the new 250 mm diameter watermain to provide connection between growth areas RES21/22/23 and the existing 250 mm diameter pipe on Charles St.
WM-GRW3-A	New 1,530 m long 300 mm diameter watermain along White Lake Rd and VanDusen Dr to service growth area RES37.
WM-GRW3-B	Upsize the existing 460 m long 100 mm diameter watermain on Baskin Dr E to 200 mm diameter watermain.
WM-GRW3-C	New 2,630 m long 200 mm diameter watermain connecting the upsized 200 mm diameter pipe on Baskin Dr E to new 300 mm diameter watermain at VanDusen Dr to provide a secondary feed for growth area RES37.
WM-REL-1 [(3)]	Provide a secondary direct feed from the WFP to the EST near the existing 400 mm diameter river crossing.
Overall Potable Water Distribution System Recommendations	
WAT-1	Implement pressure reduction measures (e.g., installation of PRVs) in areas where high pressures are anticipated.
WAT-2	Provide watermain looping (where possible) for areas with low available fire flows.
WAT-3	Monitor high-risk watermains (i.e., watermains with high head loss) for the potential occurrence of watermain breaks.

Notes:
(1) This table does not include distribution mains within growth areas assumed in the hydraulic model. Sizing and alignments of these distribution mains are subject to change and will be designed by developers.
(2) Recommendation based on sensitivity analysis (climate change), as described in **Section 6.7.2.1**.
(3) Recommendation based on reliability analysis, as discussed in **Section 6.7.2.2**.



Stantec

Legend

- Proposed Upgrade of Existing Watermain
- Proposed New Watermain / Watermain Upgrade (Developer-Driven)
- Critical Watermain where a Secondary Feed is Recommended
- Growth Areas with Future Water Demands

Existing Watermains - Diameter (mm)

- < 75 mm
- 75 mm - 150 mm
- 150 mm - 225 mm
- 225 mm - 350 mm
- 350 mm - 600 mm
- WTP Water Treatment Plant (WTP)
- Elevated Storage Tank (EST)
- Municipal Boundary

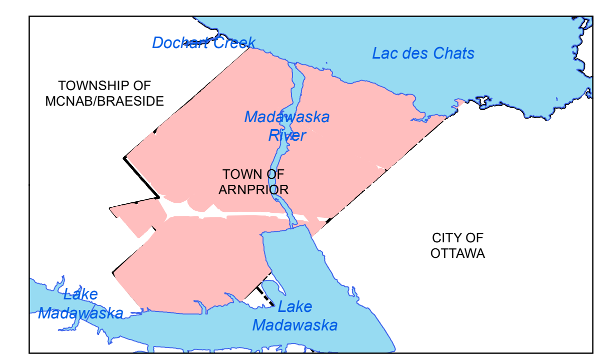
N

0 200 400 600 Meters

(At original document size of 11x17)
1:18,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Data Sources: *Ontario_Hydro_Network_(OHN)_-_Waterbody.shp*, *Ontario_Hydro_Network_(OHN)_-_Waterbody (2).shp*, *Municipal_Boundary_-_Lower_and_Single_Tier.shp*, and *0837ARNP.sid*, *Arnprior_PropertyParcels_wAssessment_20220324.shp*, *Arnprior_Roads_20220324.shp* and *WTR_NODE.shp* provided by the Town of Arnprior
3. Background: Contains information licensed under the Open Government Licence – Ontario



Project Location
Arnprior, ON

Prepared by CZ on 2023-08-09
Revised by CZ on 2024-03-05

Client/Project
Town of Arnprior
2022 W&WW Master Plan Update

163401723

Figure No.
6-29

Title
Proposed Watermain Upgrades / Expansion

6.9 Chapter 3 Conclusions

Chapter 3 proposes servicing solutions to address the Town's existing wastewater collection system and potable water distribution system's existing constraints, and to service future (growth), and includes the following discussions:

- Review of existing system constraints (**Section 6.1**);
- Presentation of the alternatives evaluation criteria (**Section 6.2**);
- Development of the servicing alternatives (**Section 6.3**);
- Evaluation of the servicing alternatives (**Section 6.4**);
- Presentation of a refined alternative (**Section 6.5**);
- Assessment of the systems' capacity to service outside interests (**Section 6.6**);
- Assessment of the upgraded systems' capacity under climate change conditions (**Section 6.7**).

The following recommendations arose from the wastewater collection system assessment and servicing strategy development:

- The servicing alternative which is most aligned to the evaluation criteria is to improve and expand the existing municipal wastewater collection system;
- As part of the refined servicing strategy, projects were identified to:
    - Improve the existing collection system with sewer upgrades (**Section 6.5.1.1**);
    - Improve existing PSs' capacity (**Section 6.5.1.2**);
    - Improve the WWTP's treatment processes (**Section 6.5.1.3**);
    - Expand the existing infrastructure to service new growth areas (**Section 6.5.1.4**).
- Overall recommendations to continue improving the wastewater collection system were also presented (**Section 6.5.1.5**);
- The potential to service outside interests was reviewed (**Section 6.6.2**);
- The proposed upgrades were also sized to consider the impact of climate change. New projects triggered under climate change conditions were also identified (**Section 6.7.1**).

Recommendations arose from the potable water distribution system assessment and servicing strategy development are as follows:

- The servicing alternative which is most aligned to the evaluation criteria is to improve and expand the existing municipal potable water distribution system;

- The following upgrades and recommendations were identified as part of the refined servicing strategy:
    - Upgrade the existing infrastructure with respect to treatment, storage, and high lift pumping capacities (**Section 6.5.2.1**);
    - Improve and expand the existing infrastructure to service new growth areas (**Section 6.5.2.2**).
- The potential to service outside interests was reviewed (**Section 6.6.3**);
- The potable water distribution system with proposed upgrades were assessed under climate change conditions and emergency scenarios.
    - The impacts on growth capacity triggers and distribution system LOS were identified (**Section 6.7.2.1**);
    - Additional recommendations based on reliability analysis results were proposed (**Section 6.7.2.2**).

Following the servicing strategies presented herein, opinions of probable cost and implementation plans were developed in **Chapter 4** (**Section 7**).

7 Chapter 4: Implementation Plan and Cost Estimates

The purpose of **Chapter 4** is to present the implementation plan for the recommended wastewater and potable water servicing strategies, by identifying critical timelines for required projects to service long-term growth interests. The implementation plan also includes Class D cost estimates for the recommended infrastructure upgrades.

7.1 Implementation Plan and Capital Project Costs

Water and wastewater infrastructure projects and additional studies and operational activities were identified in **Chapter 3** (**Section 6**). Subsequently, Class D opinions of probable costs (OPC) and timelines were developed for the following recommendations:

- Projects which will be undertaken by the Town and funded by the Town and/or through development charges, per the Town's Development Charges Background Study (Watson & Associates Economists Ltd., 2023).
- Additional studies, planning and operational activities that the Town could undertake.

OPCs are not presented for infrastructure which constitute local service to development areas. This infrastructure will be *"direct developer responsibility"* per the Development Charges Background Study. The infrastructure projects' OPC presented include the following components:

- Construction costs (in 2023$);
- Capital cost components & risk factors (engineering, project management, utilities, permitting, geotechnical issues), equivalent to 35% of the construction costs; and
- Class D contingency of 40% applied to the subtotal of construction costs + capital costs & risk components.

The construction costs presented are based on the required ultimate sizing for a 20-year planning horizon based on growth needs using acceptable design standards and guidelines as established in **Chapter 1** (**Section 4**), and do not include additional costing for sizing or designing to address potential risks associated with severe weather events attributed to climate change. Additional infrastructure needs or sizing to accommodate severe weather events attributed to climate change are presented in **Chapter 3** (**Section 6**), and are further discussed in **Section 7.2**.

The recommended timelines consider the concurrent implementation of water and wastewater infrastructure projects and aligns them with the Town's other planned capital projects (e.g., road rehabilitation), where feasible. In some cases, based on the assessment presented in **Chapter 3** (**Section 6**), the recommended projects are needed earlier than the currently planned road renewal timeline.

Table 7-1 summarizes the implementation plan and costs for the recommended water and wastewater infrastructure projects, additional studies and operational activities. Infrastructure projects are divided between projects that are *Required*, based on identified system constraints and needs, and projects that are *Study Dependent*, and could be reviewed or deferred based on the outcome of other infrastructure projects, studies or activities. Monitoring is recommended as changes are undertaken in the systems, to confirm the impact on the identified projects.

Costs by service area are further outlined in **Table 7-2** (infrastructure projects) and **Table 7-3** (studies & activities).

Table 7-1: Master Plan Recommendations Implementation Plan and Costs

Master Plan Infrastructure Recommendations Implementation Plan and Costs – *Refer to **Table 7-2** for breakdown by site*							
Project Type	**Horizon**	**3-5 Years**		**5-10 Years**		**10-20 Years**	
	Total Site Costs ($)	**Required**	**Study Dependent**	**Required**	**Study Dependent**	**Required**	**Study Dependent**
Existing Sanitary Sewer Upgrades & Sewer Separation	$17,305,000	$11,340,000	$2,006,000	$3,683,000	$276,000	-	-
Existing Sanitary PS & Forcemain Upgrades	$12,096,000	-	-	-	$10,395,000	-	$1,701,000
Existing Watermain Upgrades & Pressure Reduction Measures	$5,096,000	$151,000	$4,367,000	$578,000	-	-	-
WFP Upgrades	$7,862,000	-	-	$7,862,000	-	-	-
Total – Infrastructure Recommendations	**$42,359,000**	**$11,491,000**	**$6,373,000**	**$12,123,000**	**$10,671,000**	**-**	**$1,701,000**

Master Plan Studies & Activities Recommendations Implementation Plan and Costs – *Refer to **Table 7-3** for breakdown by site*						
Study/Activity Type	**Horizon / Frequency**	**Annually**	**Every 5-10 Years (or as Development Occurs, or per Other Requirements)**	**3-5 Years**	**5-10 Years**	**10-20 Years**
	Total Site Study Costs ($)					
Studies/Activities for Sanitary PS	$130,000	-	-	$50,000	$80,000	-
Studies/Activities for Overall Wastewater Collection Network	$190,000	$110,000	$80,000	-	-	-
Studies/Activities for WWTP	$190,000	$60,000	$30,000	-	$100,000	-
Studies/Activities for Overall Water Distribution Network	$150,000	$100,000	-	-	$50,000	-
Studies/Activities for WFP	$190,000	-	-	-	$190,000	-
Total – Studies & Activities	**$850,000**	**$270,000**	**$110,000**	**$50,000**	**$420,000**	**-**

Table 7-2: Master Plan Infrastructure Recommendations Implementation Plan and Costs (Based on Acceptable Current Design Standards and Guidelines)

Site	Upgrade Type	Upgrade	Timeline	2023 Construction Cost (Nearest $1,000)	Capital Cost Components & Risk Factors (35% of Construction Cost) (Nearest $1,000)	Construction + Capital Costs ($)	Contingency (40% of Construction + Capital Costs) ($)	Total (Construction + Capital) + Contingency ($)	Total Site Costs ($)	Comments
Riverview Dr / McNab St	Confirm the inverts along Riverview Dr with a topographical survey		Within 3-5 years	*Costs included in preliminary design (considered in sewer upgrade capital cost components)*						Invert confirmation needed to review sewer capacity.
	Existing Sanitary Sewer Upgrade	316 m @ 450 mm		$474,000	$166,000	$640,000	$256,000	$896,000	$2,006,000	Road renewal planned post-2042. Sewer upgrades are needed earlier to address existing constraints under the 25-year design event [see **Chapter 3** (**Section 6**)].
		356 m @ 525 mm		$587,000	$206,000	$793,000	$317,000	$1,110,000		
	Water distribution pressure reduction measures			$80,000	$28,000	$108,000	$43,000	$151,000	$151,000	Installation of pressure reduction valves on Riverview Dr and McNab St to mitigate high pressures along McLean Ave [see **Chapter 3** (**Section 6**)].
Daniel St / Albert St	Existing Sanitary Sewer Upgrade	66 m @ 675 mm	Within 5-10 years	$112,000	$39,000	$151,000	$60,000	$211,000	$848,000	Daniel St reconstruction from William St to Madawaska St planned in 2039-2040. Sewer upgrades are needed earlier to address 2032 sewer surcharge under the 25-year design event [see **Chapter 3** (**Section 6**)]. Sewers have also experienced surcharge in 2023 (see discussion of September 7th, 2023 event in **Section 5.2.1.2**).
		160 m @ 675 mm		$272,000	$95,000	$367,000	$147,000	$514,000		
		38 m @ 675 mm		$65,000	$23,000	$88,000	$35,000	$123,000		
Edward St	Confirm the inverts along Edward St with a topographical survey		Within 5-10 years	*Costs included in preliminary design (considered in sewer upgrade capital cost components)*						
	Existing Sanitary Sewer Upgrade	112 m @ 250 mm		$146,000	$51,000	$197,000	$79,000	$276,000	$276,000	Edward St reconstruction and sewer separation planned in 2034.
Elizabeth St	Existing Watermain Upgrades	180 m @ 250 mm	Within 5-10 years	$306,000	$107,000	$413,000	$165,000	$578,000	$578,000	
WFP/River Crossing	Twin of Existing Watermain River Crossing	420 m @ 400 mm	Within 3-5 years	$2,310,000	$809,000	$3,119,000	$1,248,000	$4,367,000	$4,367,000	Twinning of river crossing recommended for reliability. Existing pipe will be replaced in 2024 (project WTR-FUT-1 in **Table 5-30**), which could reduce the likelihood of failure and defer the need for twinning.
Sanitary PS#1	Monitor flows to upstream and downstream of PS #1		Within 5-10 years	*Refer to **Table 7-3** for site study cost*						Flow monitoring needed to confirm peak flows to PS #1, impact of sewer separations and required PS upgrade.
	Sewer Separation Measures			$1,500,000	$525,000	$2,025,000	$810,000	$2,835,000	$5,670,000	Planned sewer separations upstream and downstream of PS#1 [see **Chapter 3** (**Section 6**)]; OPC derived from Town LRCF.
	Existing Sanitary PS & Forcemain Upgrade	+56 L/s	Within 5-10 years	$1,500,000	$525,000	$2,025,000	$810,000	$2,835,000		PS upgrade sizing assuming no reduction in peak flows following sewer separation measures and updated flow monitoring. PS upgrade with existing forcemain replacement.
Sanitary PS#2	Monitor upstream flows		Within 5-10 years	*Refer to **Table 7-3** for site study cost*						Study needed to confirm peak flows to PS #2 and required PS upgrade.
	Existing Sanitary PS Upgrade	+12 L/s	Within 10-20 years	$900,000	$315,000	$1,215,000	$486,000	$1,701,000	$1,701,000	PS upgrade sizing assuming no reduction in peak flows following updated flow monitoring. PS upgrade only (existing forcemain can accommodate future peak flows).

Site	Upgrade Type	Upgrade	Timeline	2023 Construction Cost (Nearest $1,000)	Capital Cost Components & Risk Factors (35% of Construction Cost) (Nearest $1,000)	Construction + Capital Costs ($)	Contingency (40% of Construction + Capital Costs) ($)	Total (Construction + Capital) + Contingency ($)	Total Site Costs ($)	Comments
Sanitary PS#3	Investigate and address sources of I/I upstream of PS #3		Within 3-5 years	*Refer to **Table 7-3** for site study cost*						Study needed to reduce peak flows to PS #3 and required PS upgrade.
	Continue flow monitoring upstream of PS #3 to assess the efficacy of I/I reduction measures		Within 5-10 years	*Refer to **Table 7-3** for site study cost*						Flow monitoring needed to confirm reduction in peak flows to PS #3 and required PS upgrade.
	Existing Sanitary PS & Forcemain Upgrade	+96 L/s	Within 5-10 years	$4,000,000	$1,400,000	$5,400,000	$2,160,000	$7,560,000	$7,560,000	PS upgrade sizing assuming no reduction in peak flows following I/I investigation and updated flow monitoring. PS upgrade sizing assuming increase in peak flows following Riverview Dr sewer upgrades. PS upgrade with existing forcemain replacement (upsizing) & twinning. Without PS upgrade: OPC for existing forcemain twinning only (keep existing forcemain): $1,229,000 OPC for existing forcemain replacement (upsizing) & twinning: $2,646,000
Water Filtration Plant (WFP)	WFP Upgrade (Treatment Capacity)	+631 m^3/d	Within 5-10 years	$1,500,000	$525,000	$2,025,000	$810,000	$2,835,000	$7,862,000	
	WFP Upgrade (Clearwell Expansion)	+1,592 m^3		$2,000,000	$700,000	$2,700,000	$1,080,000	$3,780,000		
	WFP Upgrade (High-Lift Pumping Upgrade)	+45 L/s		$660,000	$231,000	$891,000	$356,000	$1,247,000		
Overall Wastewater Collection Network	Sewer Separation Measures		Annually, or based on sewer separation projects' timelines	$6,000,000	$2,100,000	$8,100,000	$3,240,000	$11,340,000	$11,340,000	Planned sewer separations by 2042 across the wastewater collection network (except directly upstream/downstream of PS#1); OPC derived from Town LRCF.

Table 7-3: Master Plan Study & Activities Recommendations Implementation Plan and Costs

Site	Description	Timeline	2023 Study Cost ($)	Total Site Study Costs ($)	Comments
Sanitary PS#1	Monitor flows to upstream and downstream of PS #1	Within 5-10 years	$20,000	$20,000	
Sanitary PS#2	Monitor upstream flows	Within 5-10 years	$20,000	$20,000	
Sanitary PS#3	Investigate and address sources of I/I upstream of PS #3	Within 3-5 years	$50,000	$70,000	Investigate upstream metershed, with a total parcel area of 151 ha.
	Continue flow monitoring upstream of PS #3 to assess the efficacy of I/I reduction measures and capture the response under a variety of larger WWF events	Within 5-10 years	$20,000		
Sanitary PS#5	Monitor upstream flows	Within 5-10 years	$20,000	$20,000	
Overall Wastewater Collection Network	Continue flow monitoring in key areas of interest	Every 5 years, or as development occurs	$50,000	$190,000	
	Implement measures to reduce sewage generation rates	Annually	$10,000		Assumed Town-led initiative to encourage water conservation measures and use of efficient fixtures.
	Continue implementing measures to reduce I/I into the system	Annually	$100,000		
	Continue expanding the hydraulic model to local areas of interest, with the long-term goal of building an all-pipe model.	Every 5-10 years	$30,000		
Overall Potable Water Distribution Network	Provide watermain looping (where possible) for areas with low available fire flows.	Within 5-10 years	$50,000	$150,000	Costing study to identify locations of looping
	Monitor high-risk watermains (i.e., watermains with high head loss) for the potential occurrence of watermain breaks.	Annually	$100,000		OPC for monitoring key watermains through e.g., wire-tracing, hydrant pressure monitoring, watermain inspections, acoustic detection.
Water Filtration Plant (WFP)	Operate the system in pressure mode (i.e., high-lift-pump (HLP) operating within a required pressure range to feed the distribution system) when the EST is out of service and/or in the event of the failure of the 400 mm dia. Madawaska River crossing near the WFP.	Within 5-10 years	$30,000	$190,000	
	Adjust the operating philosophy of HLPs to have two HLPs called into service under high demand conditions in the 20-year planning horizon. SCADA programming would need to be adjusted to allow for the second HLP to kick in.	Within 5-10 years	$100,000		
	Plan for potential occurrence of HLP failure to ensure that the pumping capacity can be restored within 10 hours.	Within 5-10 years	$30,000		
	Perform additional standby capacity assessments and upgrade the facility as needed based on study results.	Within 5-10 years	$30,000		OPC for standby capacity assessment only, which may include a review of existing available backup power onsite (for HLP); identifying backup power level of service requirements; and identifying any deficits/need for additional standby (backup power) capacity.
Wastewater Treatment Plant (WWTP)	Develop criteria to monitor and assess Albert St CSO, e.g., using the MECP's F-5-5	Frequency based on Ministry of the Environment, Conservation & Parks (MECP) requirements	$30,000	$190,000	
	Continuously update the WWTP committed capacity assessment, as new development interests are identified	Annually, or as development occurs	$10,000		Assumed assessment completed internally by Town.
	Monitor the impact of upstream infrastructure upgrades on incoming flows to the WWTP	Annually, or based on sewer separation projects' timelines	$50,000		
	Plan for the addition of an anoxic zone to improve pH control and support nitrification in the shoulder seasons.	Within 5-10 years	$50,000		
	Undertake a study of the organic and solids loading to the WWTP versus loading capacity.	Within 5-10 years	$50,000		

7.2 Climate Change Considerations

The potential impacts of climate change are considered as they relate to the effectiveness of the baseline recommendations provided. Many climate models exist, which consider the effectiveness of encouraged and legislated societal behavioural change, and the results of these are yet to be realized. As a result, there is a degree of uncertainty in the long-term projections of climate conditions and its impacts. Nonetheless, it is recommended to consider providing resilience against the potential impacts of climate change.

It is generally recommended that adaptability for future expansions to satisfy the climate change condition be incorporated in the design of the upgrades. Additional infrastructure needs or sizing to accommodate climate change were identified in **Chapter 3** (**Section 6**). The resulting additional costs are presented in **Table 7-4**, and consist of:

- Additional costs to upsize sewers (+$21,000);
- New sewer upgrades (+$914,000);
- Additional costs to upsize sanitary PSs and forcemains (+$756,000); and
- Additional costs to upsize the WFP treatment capacity, clearwell and high-lift pumping capacity (+$3,951,000).

Furthermore, the Town can undertake planning and operational measures to address the impacts of climate change, such that the recommended infrastructure upgrades could be deferred, or their sizing reduced. The required sizing should be reviewed in future planning endeavours and as the projects advance through design stages, considering the effectiveness of additional activities undertaken by the Town to address the impacts of climate change.

Table 7-4: Climate Change Impacts on Infrastructure Recommendation and Costs

Site	Upgrade Type	Upgrade (Baseline Level of Service)	Total Site Costs (Baseline Level of Service) ($)	Upgrade (With Climate Change Considerations)	Timeline	Opinion of Probable Cost (with Climate Change Considerations)						Difference (Total Site Costs with Climate Change Considerations – Baseline Level of Service)	Climate Change Consideration
						2023 Construction Cost (Nearest $1,000)	Capital Cost Components & Risk Factors (35% of Construction Cost) (Nearest $1,000)	Construction + Capital Costs ($)	Contingency (40% of Construction + Capital Costs) ($)	Total (Construction + Capital) + Contingency ($)	Total Site Costs ($)		
Daniel St / Albert St	Existing Sanitary Sewer Upgrade	66 m @ 675 mm	$848,000	66 m @ 675 mm	2032	$112,000	$39,000	$151,000	$60,000	$211,000	$869,000	+$21,000	
		160 m @ 675 mm		160 m @ 675 mm		$272,000	$95,000	$367,000	$147,000	$514,000			
		38 m @ 675 mm		38 m @ 825 mm		$76,000	$27,000	$103,000	$41,000	$144,000			Pipe upsizing needed for climate change consideration.
James St	Existing Sanitary Sewer Upgrade	No Upgrade	-	215 m @ 300 mm	2032	$290,000	$102,000	$392,000	$157,000	$549,000	$914,000	+$914,000	James St reconstruction and sewer separation planned in 2033. Existing sewer diameter upsizing & lowering recommended as a climate change consideration [see **Chapter 3** (**Section 6**)].
				143 m @ 300 mm		$193,000	$68,000	$261,000	$104,000	$365,000			
Sanitary PS#1	Sewer Separation Measures		$5,670,000	Sewer Separation Measures	2032	$1,500,000	$525,000	$2,025,000	$810,000	$2,835,000	$5,859,000	+$189,000	
	Existing Sanitary PS & Forcemain Upgrade	+56 L/s		+73 L/s		$1,600,000	$560,000	$2,160,000	$864,000	$3,024,000			Larger pumps needed for climate change consideration.
Sanitary PS#2	Existing Sanitary PS Upgrade	+12 L/s	$1,701,000	+25 L/s	2042	$1,000,000	$350,000	$1,350,000	$540,000	$1,890,000	$1,890,000	+$189,000	PS upgrade sizing assuming no reduction in peak flows following updated flow monitoring. Larger pumps needed for climate change consideration.
Sanitary PS#3	Existing Sanitary PS & Forcemain Upgrade	+96 L/s	$7,560,000	+170 L/s	2032	$4,200,000	$1,470,000	$5,670,000	$2,268,000	$7,938,000	$7,938,000	+$378,000	Larger pumps, faster motors, larger new twin forcemains needed for climate change consideration.
WFP	WFP Upgrade (Treatment Capacity)	+631 m^3/d	$7,862,000	+1,728 m^3/d	2032	$3,000,000	$1,050,000	$4,050,000	$1,620,000	$5,670,000	$11,813,000	+$3,951,000	Larger volume (and storage footprint) needed for climate change consideration.
	WFP Upgrade (Clearwell Expansion)	+1,592 m^3		+1,935 m^3		$2,400,000	$840,000	$3,240,000	$1,296,000	$4,536,000			Larger volume (and storage footprint) needed for climate change consideration.
	WFP Upgrade (High-Lift Pumping Upgrade)	+45 L/s		+58 L/s		$850,000	$298,000	$1,148,000	$459,000	$1,607,000			Larger pumps needed for climate change consideration.
Total Difference (Additional Costs to Provide Resilience to Climate Change)												**$5,642,000**	
Total Difference – Existing Sanitary Sewer Upgrades & Sewer Separation												$935,000	
Total Difference – Existing Sanitary PS & Forcemain upgrades												$756,000	
Total Difference – WFP Upgrades												$3,951,000	

Orange Shading = New upgrade or upgrade sizing updated for climate change considerations

7.3 Chapter 4 Conclusions

Chapter 4 presents the implementation plan and opinion of probable costs for the servicing solutions identified to address the Town's existing wastewater collection system and potable water distribution system's existing constraints, and to service future (growth), and includes the following discussions:

- Presentation of the proposed implementation plan & capital project costs (**Section 7.1**); and,
- Impact of climate change on the proposed infrastructure recommendations & costs (**Section 7.2**).

The following conclusions and recommendations arose from the proposed implementation plan & capital project costs:

- Class D opinions of probable costs (OPC) and timelines were developed for projects which will be undertaken by the Town and funded by the Town and/or through development charges, and additional studies, planning and operational activities that the Town could undertake.
- The OPC consist of construction costs, capital costs & risk components (35% of construction costs), and contingency (40% of construction + capital costs & risk components).
- Project timelines were established, considering the concurrent implementation of water and wastewater infrastructure projects, and aligns them with the Town's other planned capital projects (e.g., road rehabilitation), where feasible.
- The total infrastructure project OPC is $42,359,000, of which:
  - $17,305,000 will fund wastewater collection system existing gravity sewer upgrades and sewer separations;
  - $12,096,000 will fund existing sanitary pump station and forcemain upgrades;
  - $5,096,000 will fund existing watermain upgrades and pressure reduction measures; and,
  - $7,882,000 will fund WFP upgrades.
- The total study & activities OPC is $850,000, of which:
  - $130,000 will fund studies & activities for sanitary pump stations monitoring & I/I management;
  - $190,000 will fund studies & activities for the overall wastewater collection network;
  - $190,000 will fund studies & activities for the WWTP;
  - $150,000 will fund studies & activities for the overall water distribution network; and,
  - $190,000 will fund studies & activities for the WFP.

- The impact of climate change on the proposed upgrades was also assessed. Infrastructure needs and sizing to increase resilience to climate change amount to an additional +$5,642,000, of which:
    - +$21,000 are needed to provide resilience to climate change by further upsizing sewers;
    - +$914,000 are needed to provide resilience to climate change with additional sewer upgrades;
    - +$756,000 are needed to provide resilience to climate change by further upsizing sanitary PSs and forcemains; and,
    - +$3,951,000 are needed to provide resilience to climate change by further upsizing the WFP treatment capacity, clearwell and high-lift pumping capacity.
- Furthermore, the Town can also undertake planning and operational measures to address the impacts of climate change, such that the recommended infrastructure upgrades could be deferred, or their sizing reduced. The required sizing should be reviewed in future planning endeavours and as the projects advance through design stages, considering the effectiveness of additional activities undertaken by the Town to address the impacts of climate change.

8 Class EA Areas of Interest

The following section describes how the current Master Plan and identified projects fulfil the MECP's interests with regards to the Class EA process, or how these will be addressed as part of future project-specific investigations for the projects identified in **Chapter 3** (**Section 6**) and **Chapter 4** (**Section 7**).

8.1 Planning and Policy

As described in **Section 3.2**, this Master Plan is prepared with consideration given to the Town of Arnprior's 2017 Official Plan policies and objectives, needed as part of implementing the Province of Ontario's Provincial Policy Statement (2014, replaced in 2020). These policies were considered in the assessment of the high-level servicing alternatives presented in **Chapter 3** (**Section 6**).

For the projects identified in this Master Plan, other applicable plans and policies should be reviewed on an individual project basis, as part of the next planning and design phases. Potentially relevant policies for the projects identified include:

- The Safe Drinking Water Act (2002, last amended in 2021)
- The Sustainable Water and Sewage Systems Act (2002)
- The Ontario Water Resources Act (last amended in 2021)
- The Ontario environmental Protection Act (1990, last emended in 2021)

Other potentially relevant policies should be identified and their requirements addressed in the next planning and design phases.

8.2 Source Water Protection

The following project is located near the Town's WFP raw water intake:

- WFP/River crossing (crossing the Madawaska River).

For this project, as well as for other projects identified in this Master Plan, the proximity to sources of drinking water (municipal or other) and any delineated vulnerable areas should be assessed in the next project-specific planning and design stages. Potential impacts to source protection areas due to construction or operational activities should be identified and mitigated.

8.3 Climate Change

Climate change mitigation and adaptation were considered in the overall assessment of the high-level servicing alternatives presented in **Chapter 3** (**Section 6**). As the projects identified in this Master Plan proceed with further investigations and design stages, climate change mitigation and adaptation should be further considered in the assessment of alternative solutions and alternative designs.

8.3.1 CLIMATE CHANGE MITIGATION

The following projects have the potential to produce GHG emissions and have impacts on carbon sinks:

- Sanitary PS #1 upgrade (pump upgrades, backup generator)
- Sanitary PS #2 upgrade (pump upgrades, backup generator)
- Sanitary PS #3 upgrade (pump upgrades, backup generator)
- WFP high-lift pumping upgrade (pump upgrades, backup power)

In general, GHG emissions and impacts on carbon sinks would occur throughout the lifecycle of any project. Therefore, for the projects listed above, as well as for other projects identified in this Master Plan, climate change mitigation should be considered during each project's individual planning and design phases, when assessing alternative solutions and designs.

8.3.2 CLIMATE CHANGE ADAPTATION

The impacts of climate change on the servicing solutions identified in this Master Plan were assessed and presented in **Chapter 3** (**Section 6**). Additional resilience measures through design were identified and considered in the implementation plan and cost estimates presented in **Chapter 4** (**Section 7**). Climate change adaptation should be further considered during each project's individual planning and design phases, when assessing alternative solutions and design.

Furthermore, the Town can undertake planning and operational measures to address the impacts of climate change. The required sizing should be reviewed in future planning endeavours and as the projects advance through design stages, considering the effectiveness of additional activities undertaken by the Town to address the impacts of climate change.

8.4 Air Quality, Dust and Noise

As the projects identified in this Master Plan proceed with further investigations and design stages, sensitive receptors within each study area should be identified, and an assessment of air quality/odour impact may be needed to determine the impacts and appropriate mitigation measures. Dust and noise control measures should be included in the construction plans and include requirements per the Town's Noise Control By-law (number 6764-17).

8.5 Ecosystem Protection and Restoration

Natural heritage and hydrologic features were identified and documented in **Section 3.1**. As each project identified in this Master Plan proceeds with further planning and design studies, these should include further reviews of potential impacts to natural heritage and to the local ecosystem within the specific study areas, and the development of appropriate mitigation measures, to align with the MECP's requirements as well as the Town's Official Plan policies on the protection of natural heritage.

8.6 Species at Risk

Species at Risk (SARs) with potential habitat within the Town of Arnprior were identified in a desktop background review as documented in **Section 3.1**. This review can inform project-specific preliminary screening and detailed site investigations for SARs once the projects identified in this Master Plan undergo separate planning and design studies.

8.7 Surface Water

The following projects are located near watercourses, cross watercourses, or have the potential to impact watercourses:

- WFP/River crossing (crossing the Madawaska River);
- Sanitary PS #1 upgrade (near the Madawaska River, with overflow discharging to the river);
- Sanitary PS #3 upgrade (near the Madawaska River, with overflow discharging to the river);
- Sanitary PS #3 forcemain upgrade (forcemain crosses the Madawaska River);
- WFP Upgrades (increased water-taking from the Madawaska River).

For these projects, as well as for other projects identified in this Master Plan, potential impacts to watercourses due to construction or operational activities should be identified and mitigated. This should be addressed in each project's individual planning and design process.

8.8 Groundwater

Potential impacts to any well water supplies should be identified and addressed in the next planning and design steps for each individual project identified in this Master Plan. The current recommended potable water servicing strategy (*Improvement & Expansion of the Potable Water System*) does not involve any groundwater taking. The Town's current bylaws do no permit private well servicing as a servicing strategy for new developments, with exceptions considered in specific instances.

Groundwater should be protected from the potential for spills, dewatering and wood pole preservative during construction. A plan should be in place for preventing and dealing with spills. All spills that could potentially cause damage to the environment should be reported to the Spills Action Centre of the Ministry of the Environment, Conservation and Parks at 1-800-268-6060.

8.9 Excess Materials Management

During the design and construction of each project identified in this Master Plan, activities involving the management of excess soil should be conducted in accordance with the Environmental Protection Act regulation titled *On-Site and Excess Soil Management* (O. Reg. 406/19) and with the MECP's current guidance *Management of Excess Soil – A Guide for Best Management Practices* (2014). All waste generated during construction should be disposed of in accordance with the MECP's requirements.

8.10 Contaminated Sites

At a Master Plan level, no current or historical waste disposal sites or contaminated sites were identified for the study area of the Town of Arnprior. Nonetheless, as each project identified in this Master Plan proceeds with further investigations and design stages, the presence of contaminated sites within each specific study area should be confirmed, and appropriate testing and soil removal undertaken.

8.11 Servicing, Utilities and Facilities

As the projects identified in this Master Plan proceed with further investigations and design stages, any above or underground utilities and servicing infrastructure within each study area should be identified. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

At a high-level, this Master Plan already considers the potential for projects within the same study area or right-of-way in the development of the implementation plan and cost estimates presented in **Chapter 4** (**Section 7**).

8.12 Mitigation and Monitoring

The projects identified in this Master Plan will proceed with separate Class EA studies (applicable to potential Schedule B or Schedule C projects), design and construction. For each project, these next steps shall include the identification, documentation and implementation of measures to mitigate impacts to the environment, and to rehabilitate or enhance any impacted areas. Construction and post-construction effects monitoring strategies and programs should be documented.

8.13 Consultation

Consultation efforts undertaken as part of this Master Plan are documented in **Section 2.2**. Potential Schedule B or Schedule C projects may require that additional consultation be conducted as part of project-specific Class EA studies.

8.14 Class EA Process

As described in **Section 2.1**, this Master Plan was initiated and conducted in accordance with Approach #1 of the Master Planning Process, involving analyses on a system scale, to enable the Town to identify needs and establish broader infrastructure alternatives and solutions. Specific projects required to achieve the preferred solution described in the Master Plan were identified, however more detailed investigations at the project-specific level are required in order to fulfil the MCEA requirements for specific Schedule B and C projects identified within the Master Plan.

Table 8-1 lists the Master Plan projects identified in **Chapter 4** (**Section 7**), and includes the potential project type, based on the 2023 MCEA classification. Most watermain and sewer replacement projects are expected to occur within the municipal road allowance or existing utility corridors, such that they are *Exempt* from the requirements of the EAA. Sanitary PS upgrades and WFP upgrades are *Eligible for Screening to Exempt*, and require further investigation to confirm whether they are *Exempt* from the requirements of the EAA or will need to meet the requirements of Schedule B or Schedule C projects. Projects which require water crossings have the potential for some adverse environmental and social effects, and were classified as *Schedule B* projects.

Subsequent permitting or approvals required for the implementation of each project should be identified in the following project-specific planning and design studies.

Table 8-1: Master Plan Infrastructure Recommendations Implementation Plan and 2023 MCEA Project Type

Site	Upgrade Type	Upgrade	Timeline	2023 MCEA Project Type *To be confirmed in project-specific follow up study*
Riverview Dr / McNab St	Confirm the inverts along Riverview Dr with a topographical survey		Within 3-5 years	Exempt
	Existing Sanitary Sewer Upgrade	316 m @ 450 mm		
		356 m @ 525 mm		
	Water distribution pressure reduction measures			Exempt
Daniel St / Albert St	Existing Sanitary Sewer Upgrade	66 m @ 675 mm	Within 5-10 years	Exempt
		160 m @ 675 mm		
		38 m @ 675 mm		
Edward St	Confirm the inverts along Edward St with a topographical survey		Within 5-10 years	Exempt
	Existing Sanitary Sewer Upgrade	112 m @ 250 mm		
Elizabeth St	Existing Watermain Upgrades	180 m @ 250 mm	Within 5-10 years	Exempt
WFP/River Crossing	Twin of Existing Watermain River Crossing	420 m @ 400 mm	Within 3-5 years	Schedule B
Sanitary PS#1	Monitor flows to upstream and downstream of PS #1		Within 5-10 years	Exempt
	Sewer Separation Measures			Exempt
	Existing Sanitary PS & Forcemain Upgrade	+56 L/s	Within 5-10 years	Eligible for Screening to Exempt
Sanitary PS#2	Monitor upstream flows		Within 5-10 years	Exempt
	Existing Sanitary PS Upgrade	+12 L/s	Within 10-20 years	Eligible for Screening to Exempt
Sanitary PS#3	Investigate and address sources of I/I upstream of PS #3		Within 3-5 years	Exempt
	Continue flow monitoring upstream of PS #3 to assess the efficacy of I/I reduction measures		Within 5-10 years	Exempt
	Existing Sanitary PS & Forcemain Upgrade	+96 L/s	Within 5-10 years	Schedule B
Water Filtration Plant (WFP)	WFP Upgrade (Treatment Capacity)	+631 m^3/d	Within 5-10 years	Eligible for Screening to Exempt
	WFP Upgrade (Clearwell Expansion)	+1,592 m^3		
	WFP Upgrade (High-Lift Pumping Upgrade)	+45 L/s		
Overall Wastewater Collection Network	Sewer Separation Measures		Annually, or based on sewer separation projects' timelines	Exempt

9 Conclusions

This report presents the updated master plan for the Town's wastewater collection system and potable water distribution system's existing constraints, and to service future (growth), and includes the following discussions:

- Introduction of study area and problem statement (**Section 1**);
- Presentation of the Environmental Assessment Master Planning process (**Section 2**);
- Review of existing conditions (**Section 3**);
- Review of background data and data gap analysis (**Section 4 – Chapter 1**);
- Assessment of existing infrastructure (**Section 5 – Chapter 2**);
- Development of a servicing strategy (**Section 6 – Chapter 3**);
- Development of an implementation plan and cost estimates (**Section 7 – Chapter 4**);
- Review of the Class EA areas of interest (**Section 8**).

The following conclusions arose from this master plan:

- The residential population in the Town is projected to grow from a baseline of 10,038 (2022 estimate) to 17,051 in the 20-year horizon (2042). ICI areas are projected to grow from a baseline of 250 ha (2022 estimate) to 267 ha in the 20-year horizon (2042). The Town has also identified interest from areas outside of its municipal boundaries to connect to the municipal wastewater and water systems.
- Upgrades and expansion of the existing municipal wastewater collection and potable water distribution systems will be needed to service existing users and meet growth needs over a 20-year horizon.
- Supporting planning and operational studies and activities were also identified.
- Class D opinions of probable costs (OPC) and timelines were developed for projects which will be undertaken by the Town and funded by the Town and/or through development charges, and additional studies, planning and operational activities that the Town could undertake.
- The impact of climate change on sizing and timing of the proposed upgrades was also assessed, and measures to increase resilience to climate change were considered.

This Master Plan update satisfies Phases 1 and 2 of the Municipal Class Environmental Assessment (MCEA) process. Following completion of this Master Plan, the next steps for the Town include:

- Undertaking detailed investigations to confirm project types and complete associated Class EA studies;

- Proceed with the functional and detailed design of projects, once required Class EA requirements are fulfilled;
- Consider this Master Plan's findings and recommendations in reviewing the proposed servicing of new developments.

This Master Plan presents a long-term plan for providing potable water and wastewater infrastructure to meet future growth requirements. Nonetheless, growth projections may change over time and aging infrastructure may also affect the systems' performance. Therefore, it is recommended that this Master Plan be reviewed and updated regularly. Per the MCEA document, potential changes which may trigger the need for a review of the Master Plan include:

- Major changes to the assumptions;
- Major changes to the components of the Master Plan;
- Significant new environmental effects; and,
- Major changes in the proposed timing of projects.

APPENDICES

Available upon request

ARNPRIOR

Town of Arnprior Staff Report

Subject: Water Filtration Plant and Water Pollution Control Centre Building Condition Assessments

Report Number: 24-11-25-04

Report Author and Position Title: Patrick Foley, Engineering Officer

Department: Operations

Meeting Date: November 25, 2024

Recommendations:

That Council adopt the Water Filtration Plant and Water Pollution Control Centre Condition Assessment Summary Reports, prepared by J.L. Richards & Associates Limited, for use as a long-range planning tool to guide future infrastructure policy planning; and

Further That Council direct staff to prioritize and incorporate the condition assessment recommendations into the long-range capital forecast (LRCF).

Background:

The Town's Walter E. Prentice Water Filtration Plant (WFP) was originally constructed in 1967 and expanded in 2005 and 2011. The Town's Water Pollution Control Centre (WPCC) was originally constructed in 1966 and expanded in 1996 and 2011.

On May 23, 2023, Town Council awarded a Contract to J.L. Richards & Associates (JLR) to complete the outlined scope of work, inclusive of:

- Inventory of Non-Linear Water and Wastewater Assets
- Development of Estimated Replacement Values for Applicable Assets
- Development of risk matrix for assets
- Development of Capital Project Definition and List of Essential Maintenance Activities
- Update Draft Inventory Assessment to Include Planning Sheets

The purpose of this assessment is to provide insights to the Town to facilitate decision-making regarding maintenance, repair, and replacement priorities for the facility's assets. The facility's asset inventory, along with their respective attributes, were populated in Microsoft Excel using construction drawings. The asset database was integrated with ArcGIS Survey123 software, enabling JLR staff to input visual assessments directly into the spreadsheet during the field assessment. These assessments were then used to package recommendations into capital projects, studies and operations and maintenance projects.

Over the past several months, Staff from the Engineering and Waterworks branches have worked closely with J.L. Richards to establish accurate information, risk metrics and prioritizations.

Discussion:

Condition assessments carried out in this scope of work are a snapshot of the way the assets appeared on the date of inspection. Replacements may be reprioritized if an asset's condition were to decline faster or slower than expected depending on risk factors. The report was written with recommendations given based on an ideal scenario in terms of funding.

To streamline the evaluation process, an algorithm leveraging mathematical equations and industry-standard values was used to estimate the required replacement year for each asset. This algorithm provides a baseline cash flow projection based on the following factors:

- Visual Condition Rating
- Estimated Useful Life
- Age-Based Condition
- Likelihood of Failure
- Consequence of Failure
- Default Replacement Year

Factored into the consequence of failure is availability of parts and equipment. Because water and wastewater treatment is such a specialized industry, components are not always available within Canada or even North America. In some cases, the failure of a piece of equipment may result in months of down time while awaiting custom fabrication and/or shipment from overseas. For example, the ongoing WFP Filter Remediation project required anthracite sand to be shipped from the United Kingdom and custom-made stainless-steel underdrains to be shipped from Calgary. This aspect factors into proactive replacements, maintenance activities, redundancy and stocking of spare parts.

Water Pollution Control Centre

A total of 668 assets were assessed within the WPCC with a total estimated replacement value of $64,220,000 per be the below table:

Asset Category	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Architectural	66	3.7	2.7	4.7	12	$3,380,000
Building Mechanical	53	3.2	3.4	5.8	16	$2,520,000
Electrical	89	3.4	3.3	8.3	18	$2,380,000
Instrumentation and Controls	181	3.6	3.6	8.3	18	$1,300,000
Process Piping and Equipment	204	3.1	3.6	9.1	16	$15,150,000
Siteworks	7	3.6	2.4	2.8	5	$6,690,000
Structural	68	3.8	2.6	9.4	15	$32,800,000
Total	**668**					**$64,220,000**

The value of all assets assessed to be in “Fair” to “Good” condition (581 of 668 assets) totals $60,250,000 or 94% of the total value of assets within the WPCC. 12 assets with a cumulative value of $300,000 were assessed to have a condition rating of “Unacceptable”. Most of these assets are in areas of the WPCC with harsh conditions and steps have been taken to replace failed assets and adjust processes for assets that cannot be immediately replaced. None of the assets with a condition rating of “Unacceptable” are high risk or of immediate major concern at this time.

The total recommended investment into the WPCC over the next 10 years is $18,340,000 which includes $11,690,000 for capital projects, $440,000 for studies, $2,860,000 operations and maintenance projects and $3,350,000 for major maintenance activities.

Water Filtration Plant

A total of 430 assets were assessed within the WFP with a total estimated replacement value of $36,850,000 per be the below table:

Asset Category	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Architectural	42	3.9	2.7	4.6	14	$2,360,000
Building Mechanical	48	3.3	3.5	6.0	18	$970,000
Electrical	41	3.5	3.2	7.9	14	$1,410,000
Instrumentation and Controls	88	3.8	3.3	7.9	20	$870,000
Process Piping and Equipment	155	3.1	3.5	9.3	20	$8,350,000
Siteworks	14	3.2	2.6	4.0	10	$2,010,000
Structural	42	3.8	2.7	10.2	20	$20,880,000
Total	**430**					**$36,850,000**

The value of all assets assessed to be in “Fair” to “Good” condition (360 of 430 assets) totals $25,020,000 or 68% of the total value of assets within the WFP. 16 assets with a cumulative value of $1,510,000 were assessed to have a condition rating of “Unacceptable”. Steps have been taken to replace failed assets and adjust processes for assets that cannot be immediately replaced. Included in this value are the underdrains associated with the filters that are currently being refurbished. None of the assets with a condition rating of “Unacceptable” are high risk or of immediate major concern at this time.

The total recommended investment into the WFP over the next 10 years is $12,500,000 which includes $10,430,000 in capital projects, $260,000 for studies, $1,420,000 operations and maintenance projects and $460,000 for major maintenance activities.

Some of these recommended projects are already in progress such as the Filter Refurbishments (construction budget: $750,000) and the design for the replacement of Clearwell #1 (construction budget: $4,100,000).

Options:

i) Council could adopt the Building Condition Assessments as presented as planning tools to support future decision-making with respect to Water and Wastewater services and facilities.

ii) Council could provide feedback or direction to staff for the inclusion of further amendments to the Building Condition Assessments.

Policy Considerations:

The Town of Arnprior 2024-2027 Strategic Plan includes Asset Management among the Town's five key priority areas and includes the following statement within the Town's mission statement:

The Town of Arnprior is dedicated to fostering sustainable growth and implementing effective asset management practices that enhance the quality of life for our residents and preserve the unique character of our community We aim to foster sustainable development that enhances our community's prosperity while preserving our natural resources and heritage. Our commitment to growth and asset management is rooted in a vision that embraces economic progress, environmental stewardship, and the well-being of our residents.

The adoption of these reports is considered to be an effective asset management tool to maintain optimally functioning facilities to process drinking water and wastewater.

Financial Considerations:

All reported financial figures are current to 2024 valuations and replacement values are based on a "like for like" situation. Assets that can be replaced with internal forces do not have a recorded labour cost. As the designs for these projects are completed, costs may change based on upgrades to capacity, redundancy and/or growth factors.

The report was written with recommendations given based on an ideal scenario in terms of funding. There continue to be competing priorities within waterworks and the Town as a whole that factor into prioritizations that may fall outside of the recommendations of the report. This report along with the Water/Wastewater master plan will factor in to the 2025 Long Range Capital Forecast (LRCF) as well as the upcoming 2025 Asset Management Plan (AMP).

Meeting Dates:

- 05/23/2023 - Council meeting to award of WFP & WPCC BCA scope of work

Consultation:

- J.L. Richards & Associates

Documents:

1. Draft Water Filtration Plant Condition Assessment Summary Report

2. Draft Water Pollution Control Centre Condition Assessment Summary Report

Signatures

Reviewed by Department Head: John Steckly

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

JLR No.: 31068-006
Revision: 1

August 28, 2024

Prepared for:

TOWN OF ARNPRIOR
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Water Filtration Plant Condition Assessment Summary Report

Town of Arnprior

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through **service** and **commitment**

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Executive Summary

J.L. Richards & Associates Limited (JLR) was retained by the Town of Arnprior (the Town) to complete an inventory, condition and capital planning assessment of the major building, process and sitework assets for the Water Filtration Plan (WFP) (the Facility) located at 73 James St, Arnprior, Ontario. The purpose of this assessment is to provide insights to the Town to facilitate decision-making regarding maintenance, repair, and replacement priorities for the facility's assets.

The facility's asset inventory, along with their respective attributes, were populated in Microsoft Excel using construction drawings. The asset database was integrated with ArcGIS Survey123 software, enabling JLR staff to input visual assessments directly into the spreadsheet during the field assessment. These assessments were then used to package recommendations into capital projects, studies and operations and maintenance projects.

A total of 430 WFP assets were inspected, with 16 assets assigned a condition rating of "1-Unacceptable" and 40 assets assigned a condition rating of "2-Poor." These assets are noted as assets of concern and are listed in Table 9.

Table ES-1 summarizes the recommended projects, studies and average annual investment for the next 10 years. An estimated total investment of $10,790,000 will be required for capital projects, $260,000 for studies and $1,420,000 operations and maintenance projects, at Arnprior’s Water Filtration Plant over the next 10 years. Table ES-2 outlines the preventative maintenance activities recommended for major assets, which may not currently be part of routine operations and maintenance. Implementing these activities could increase Operation and Maintenance costs by approximately $460,000 over the next 10 years.

The total estimated project cost covers both materials and installations, where applicable. For labour costs, a 100% markup was applied to the total material cost. However, this markup was not applied where installation or repairs are intended to be performed by the plant operators. Furthermore, these costs do not include allowances for plant expansion, project administration, and construction requirements.

This report is intended as a summary and complements the higher level of detail provided in the Asset Inventory Database appended in Appendix A.

Table ES-1: Capital Project Definition and Sequencing and Renewal Summary

Index	**Project Name**	**Implementation Year(s)**	**Estimated Cost ($)**
Capital Projects (Material and Labour)			
1	Filter #2 Media and Underdrain Replacement	2024	$320,000
2	WFP Immediate HVAC Upgrades	2024	$100,000
3	WFP Misc. Building Repairs	2024	$160,000
4	Alum Storage Tank Replacement	2025	$50,000
5	Filter #1 Media and Underdrain Replacement and Concrete Restoration	2025	$490,000
6	Filter #3 Media and Underdrain Replacement	2025	$440,000
7	Clearwell #1 Replacement	2025	$4,040,000
8	Roof Repairs for High Lift Pump Area and Raw Water Pumping Station	2025	$80,000
9	Sodium Bisulphite Room Refurbishment	2025	$100,000
10	Raw Water Pumping Station Refurbishment	2025	$410,000
11	Distribution Watermain Twinning	2026	$100,000
12	Fluoride Room Relocation	2026	$230,000
13	High Lift Pump #3 Replacement	2026	$400,000
14	Separated Water Valve Replacement	2027	$80,000
15	Backwash Equipment Replacement	2028	$940,000
16	Actiflo #1 Rebuild	2029	$130,000
17	High Lift Pump #1 Replacement	2029	$480,000
18	Low Lift Pumping Station	2029	$210,000
19	Filter Appurtenance Rebuild	2030	$1,250,000
20	WFP Chemical Systems	2031	$130,000
21	High Lift Pump #2 Replacement	2033	$400,000
22	Actiflo #2 Rebuild	2034	$130,000
Total Cost ($)	**$10,790,000**		
Studies			
1	Filter #1 Inspection	2024	$30,000

Index	Project Name	Implementation Year(s)	Estimated Cost ($)
2	Misc. Building Repairs Study	2024	$30,000
4	Raw Water Pumping Station Inspection	2024	$130,000
5	Roof Repairs Study	2024	$40,000
6	Fluoride Room Relocation	2025	$30,000
Total Cost ($)	**$260,000**		
O&M Activities (Materials Only)			
1	Operations and Maintenance	2024	$110,000
2		2025	$10,000
3		2027	$220,000
4		2028	$180,000
5		2029	$120,000
6		2030	$80,000
7		2032	$230,000
8		2033	$120,000
9		2034	$350,000
Total Cost ($)	**1,420,000**		
Average Annual Cost ($)	**$140,000**		

Table ES-2: Overview of Major Maintenance Activities Required Over the Next 10 Years

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Actiflo	Tankage	Once every 10 years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$3,000
Filtration	Underdrains & Backwash system	Once every 3-5 years	• Inspect underdrains and backwash system during media replacement.	$12,192
	Media	Once every 3-5 years	• Analyze filter media to determine effective size and uniformity coefficient and compare it with design specifications. • Measure freeboard and filter media depth and compare it with design specifications.	$20,320
	Media & Coating	Assay Dependent	• Replace filter media and coating based on lab results.	$423,000
Total Cost ($)	**$458,512**			

1.0 Project Objectives and Background

1.1 Overview of the Inspected System

The Arnprior WFP is located near the Madawaska River at 73 James Street. The inspected infrastructure includes the Main Building, High Lift Pump Room, Generator Room, and a Raw Water Pumping Station (RWPS) located a short distance away on the west bank of the Madawaska River. The WFP consists of raw water handling, ballasted flocculation pretreatment, filtration and filter backwash residuals handling, chemical storage and chemical feed systems. An aerial photo of the Arnprior WFP is provided in Figure 1.

Figure 1: WFP Aerial Photo

The following structures were not inspected: the interior of the RWPS wet well, clearwells #1 and #2, the exterior roof of the RWPS, and yard piping.

1.2 Project Objectives

The objectives of this project are to:

- Prepare an inventory spreadsheet of major building (structural, architectural, electrical, mechanical), process (piping, equipment, electrical, instrumentation), and sitework processes, components, and equipment.

- Perform a high level, non-destructive on-site visual inspection of the existing facility building, process, and siteworks assets and document observed code or performance issues.
- Estimate replacement costs and develop repair/replacement comments for assets with issues.
- Provide costs for repairs/replacements over a 10-year period and forecast replacement costs over a 50-year period.
- Develop planning sheets for capital projects, O&M projects, and studies.
- Develop a list of essential maintenance activities for major equipment.
- Complete a draft and final summary report.

1.3 Process Overview

A raw water pumping station pumps screened water from the Madawaska River to the WFP. The WFP is a chemically assisted filtration facility, which consists of the addition of coagulant and polymer followed by a ballasted flocculation Actiflo System and dual media filters. Filtered water flows through clearwells where it is disinfected by chlorine (primary disinfection) and ammonia (secondary disinfection). Soda ash, phosphoric acid, and hydrofluorosilicic acid are also added as required to prepare the water for consumption. High lift pumps draw clean water from the clearwells and discharge to the distribution system, which includes a 2,700 m^3 elevated water storage tank. The WFP currently has a rated capacity of 10,340 m^3/day. The WFP is composed of the following processes.

- Raw Water Handling
- Ballasted Flocculation Pretreatment (Actiflo®)
- Actiflo® Residuals Settling
- Filtration and Filter Backwash Residuals Handling
- Storage and Transmission
- Chemical Storage/Feed System

1.4 Facility History

Table 1 summarizes the Facility's history.

Table 1: WTP History

Year	Projects
1967	Original construction and commissioning of WFP for a rated capacity of 7,300 m^3/d. Limited upgrades to Raw Water Pumping Station.
1970	Installation of fluoridation facilities.
1996	Replacement of fluoridation system, upgrades to control and instrumentation, initiation of SCADA system and replacement of filter media.
2001	Replacement of low lift pumps with new pumps each rated at 9,810 m^3/d.

Year	Projects
2005	Major upgrades were completed which included: retrofits to the coagulation system, a new backwash pump, additional clearwell, new ammonia secondary disinfection facilities, new high-lift pumps, a new process waste management system (residuals treatment), a new standby power generator, and upgrades to the controls and instrumentation.
2011	Plant expanded to increase rated capacity to 10,340 m³/d. Expansion included the addition of two new ballasted flocculation units (Actiflo®), an additional filter, a chemical systems upgrade, replacement of failing exterior facades, and Raw Water Pumping Station upgrade.
2017	Condition survey of Clearwell #1 was completed.
2018	Process, electrical and structural upgrades to soda ash feed system were completed.

The following documents provided by the Town were reviewed for this project:

- WFP Contract Drawings, J.L. Richards & Associates Limited (1966)
- WFP Upgrades As-Constructed Drawings, J.L. Richards & Associates Limited (2006)
- WFP Upgrades As-Constructed Drawings, J.L. Richards & Associates Limited (2011)
- WFP Clearwell #1 Inspection and Evaluation, Stantec (2017)
- WFP & WPCC Asset Worksheet, Stantec (2017)
- WFP & WPCC Background Data, Stantec (2017)
- WFP Upgrades As-Constructed Drawings, Stantec (2018)
- Asbestos Reassessment, Pinchin (2023)
- WFP O&M Table of Contents, Harrington Mechanical Limited
- WFP & WPCC Roof Photos, Town of Arnprior (2023)
- Draft Master Plan Report - 7 Chapter 4: Implementation Plan & Cost Estimates, Stantec (2023)
- AWI Filter Inspection Proposal, AWI (2023)
- AWI Filter Inspection Report (2024)

1.5 Known Future Projects/ Ongoing Projects

The Town of Arnprior is in the process of updating their Water and Wastewater Master Plan with Stantec Consulting Ltd. (Stantec). Based on the available information provided to date, the table below summarizes the water and wastewater capacity requirements planned for the next 5-10 years. This table is for informational purposes only, and it is recommended that the scope of capacity upgrades be reviewed once the Master Plan is finalized.

Table 2: Master Plan Infrastructure Recommendations for the WFP

Upgrade Type	Upgrade	Total (Construction + Capital) + Contingency
Treatment Capacity	+631 m^3/d	$2,835,000
Additional Storage Tank	+1,592 m^3	$3,780,000
High Lift Pumping Upgrade	+45 L/s	$1,247,000

1.6 Assumptions

- Assessments are based strictly on visual assessments; no type of destructive or other specialty testing techniques were used.
- In cases where the age of equipment or assets was unknown, it was assumed to be original to the plant construction or upgrade unless otherwise specified by the Town.
- The summary of essential maintenance activities will be limited to major process equipment only.
- Costing values contained herein are high level budgetary estimates only based on available information, and our professional judgement and experience. All costs are in market rates current to 2024 with no allowances made for inflation. JLR has observed extraordinary market conditions in effect and beyond its reasonable control, including, but not limited to, rising inflation, ongoing supply chain disruptions, availability of any or sufficient number of tender bid submissions, and unusual increases in material costs. These market conditions could have a material impact on the accuracy of any cost estimates.

1.7 Exclusions

The scope of work for this project does not include the following:

- Mould identification, review, investigation and remediation.
- Asbestos identification, review, investigation, and remediation.
- Destructive testing or testing of any kind.
- Review of any buried or inaccessible elements, or elements within confined spaces or elements not accessible from the ground (or permanent platforms). Fall arrest equipment will not be used to perform the reviews.
- Conceptual or detailed design of repairs or replacements of any elements.
- Abatement of any designated substances.

2.0 Asset Inventory Database

An asset inventory database was built using Microsoft Excel to analyze the current conditions of the assets to facilitate decisions made by subject matter experts when developing capital expenditure programs. Refer to Appendix A to review the Asset Inventory Database (Excel).

2.1 Asset Inventory Structure

The inventory structure was developed to logically organize the assets based on useful attributes outlined in Table 3. This structure establishes relationships between assets that were used to support subsequent asset management analysis.

Table 3: Categories in Inventory Structure

Area	Asset Category
• Actiflo Basement • Underground Equipment • Former High Lift Pump Area • Generator Room • High Lift Pump Area • Main Building • Outside • Raw Water Pumping Station	• Architectural • Building Mechanical • Electrical • Instrumentation and Controls • Process Piping and Equipment • Siteworks • Structural
Process	**Asset Type**
• Ballasted Flocculation • Building Services • Buildings • Disinfection • Electrical System • Filtration • Fluoridation • Process Monitoring • Raw Water Pumping • Residuals Handling • Safety • Site • Treated Water Storage and Distribution • Water Distribution • Water Sampling	• Agitator • Analyzer • Boiler • Catch Basin • Check Valve • Chemical Pump • Concrete Tank • Electrical Panel • Emergency Lights • Exterior Stairs • Exterior Walls/ Columns • Eye Wash Station • Interior Doors • Pavement • Etc.

2.2 Asset Information Input

Prior to the inspection, a preliminary asset inventory database was populated with key information extracted from construction drawings provided by the Town. The purpose of this preliminary inventory database is to list information that would facilitate JLR staff in collecting data during the visual assessment. The preliminary database included the following items:

- Asset Name
- Equipment Tag
- Quantity
- Size
- Facility
- Location
- Asset Type
- Asset Category
- In-Service Date

The inventory database was integrated into ArcGIS Survey123 software. This software offers a user-friendly data collection platform which enabled JLR staff to input data directly into the inventory database using a mobile device. The following information was collected during the site inspection.

- Visual Condition Rating
- Condition Comment
- Pictures

2.3 Decision Support Algorithm

To streamline the evaluation process, an algorithm leveraging mathematical equations and industry-standard values was used to estimate the required replacement year for each asset. This algorithm provides a baseline cash flow projection based on the following factors:

- Visual Condition Rating
- Estimated Useful Life
- Age-Based Condition
- Likelihood of Failure
- Default Replacement Year

The following parameters were also assigned to assets to support decision making and capital planning:

- Consequence of Failure
- Risk

2.3.1 Visual Condition Rating

The visual condition rating (C_v) signifies the overall health of an asset based on the level of physical deterioration observed during the inspection. Visual condition ratings were assigned by JLR staff in the field according to the definitions listed in Table 4.

Table 4: Condition Rating Criteria

Rating	Condition	Description
1	Unacceptable	• Failed or failure imminent. Immediate need to replace most or all of asset. Health and safety hazards exist, or asset cannot be serviced or operated without risk to personnel / public / environment. • Major work or replacement required urgently.
2	Poor	• Poor physical condition – heavy wear and tear, failure is likely in short term. • Substantial work required in short term, asset barely serviceable.
3	Fair	• Acceptable physical condition – moderate wear and tear, moderate risk of physical failure. • Minor components or isolated sections of the asset may need replacement or repair now, but asset still functions safely at adequate level of service.

Rating	Condition	Description
		• Minor work may be required, but asset is still serviceable
4	Good	• Acceptable physical condition – minor wear and tear, minimum risk of physical failure. • No immediate repair work required, or only minor work required
5	Excellent	• Like-new physical condition.
NI	Non-Inspected	• Could not locate or access.

2.3.2 Estimated Useful Life

The estimated useful life (EUL) of an asset is the theoretical duration for which the asset is anticipated to remain operationally effective for its intended purpose. Initial EUL values were assigned based on the asset type using industry-standard assumptions and engineering judgment. These values were adjusted following feedback from the Town.

2.3.3 Age-Based Condition

The age-based condition rating (C_{age}) serves as an overall health indicator, considering the asset's age relative to the EUL. Asset age information was obtained from construction drawings and updated by the Town. The age-based condition scale ranges from 1 to 5, where 1 indicates an Unacceptable Condition (the asset has reached or exceeded its estimated useful life), while 5 indicates an Excellent Condition (the asset is new, with 100% of the estimated useful life remaining). The following formula is used to calculate the age-based condition rating.

$$C_{age} = 5 - \left(\frac{Minimum\ of\,(EUL, Age)}{EUL}\right) \times 4$$

2.3.4 Likelihood of Failure (LOF)

The likelihood of failure (LOF) assesses the probability that a particular asset is expected to fail in the near future. The LOF is calculated based on both the visual condition rating and the age-based condition rating. Combining these rating in this manner provides a balanced assessment approach to mitigate the limitations in using each method alone. For example:

- Asset age may not be known with certainty.
- The EUL is assigned based on the asset type using industry-standard assumptions applicable to water filtration plants, but actual service life depends on factors like maintenance, quality, usage intensity and frequency, and environmental conditions. Assets may surpass or fall short of the typical EUL.
- Visual inspections are limited to an asset's exterior, thereby omitting the assessment of internal components, which may not always correlate to the actual condition of the asset.

The overall LOF rating scale ranges from 1 to 5, where 1 indicates a very low likelihood of failure, and 5 denotes a very high likelihood of failure. The following formula is used to calculate LOF, where C_{age} and C_v are the age-based condition rating and visual condition rating, respectively.

$$LOF = 6 - \frac{C_v + C_{age}}{2}$$

If an asset has a C_v of 1, then the LOF is automatically assigned a value of 5. For assets that were not inspected, particularly for inaccessible assets like buried equipment, then only the C_{age} is considered when calculating the LOF.

2.3.5 Consequence of Failure

The Consequence of Failure (COF) is an indicator that signifies the relative severity of the consequences likely to occur if an asset was to fail. The scale ranges from 1 to 5, where 1 indicates a very low consequence, and 5 denotes a very high consequence. Initial COF values were assigned based on Asset Type, and then adjusted in collaboration with the Town based on known health and safety or redundancy issues. Table 5 reflects the consequence of failure of the individual asset relative to the overall functioning of the plant as well as health, safety, regulatory or financial risks.

Table 5: Consequence of Failure Rating Scale

Rating	Consequence	Description
1	Very Low	• Service not affected or minimal impact o Redundancy based on demand and capacity is greater than 100% o Regulatory objectives and requirements are met o Loss of equipment does not impact service or has minimal impact • Repair, loss of revenue, damages, losses or fines of <$10,000 • Negligible injuries
2	Low	• Localized disruption of service o Redundancy based on demand and capacity is >75%<100% o Regulatory objectives and requirements are met o Loss of equipment causes localized disruption of non-essential service • Repair, loss of revenue, damages, losses or fines of $10,000-50,000 • Minor injuries, no medical attention required
3	Moderate	• Localized disruption of service o Redundancy based on demand and capacity is <75%

Rating	Consequence	Description
		o Regulatory objectives not met but requirements are met o Loss of equipment causes localized disruption of essential service • Repair, loss of revenue, damages, losses or fines of $50,000-$500,000 • Minor injuries, medical attention required
4	High	• Widespread short disruption or long-term localization of disruption of service o No redundancy based on demand and capacity o Regulatory objectives and requirements are not met o Loss of equipment causes widespread short disruption or long-term localization of disruption of essential service • Repair, loss of revenue, damages, losses or fines of $500,000-$1,000,000 • Serious injuries, multiple minor injuries
5	Very High	• Widespread short disruption and long-term disruption of service o No redundancy based on demand and capacity o Regulatory objectives and requirements are not met o Loss of equipment causes wide spread short disruption or long-term disruption of essential service • Repair, loss of revenue, damages, losses or fines of >1,000,000 • Multiple serious injuries, loss of life

2.3.6 Risk

Risk is defined as the potential consequence of not replacing or repairing a specific asset, calculated as the product of LOF and COF. The resulting values ranges from 1 (Very Low) to 25 (Very High). Assets with higher risk rating are expected to necessitate more attention. This approach to measure risk is typically used in many Ontario municipalities for prioritizing expenditure and the renewal of existing infrastructure. Figure 2 shows a combination of COF and LOF ratings alongside their corresponding risk scores. Risk ratings of 9 or below are considered “Low” and are shaded green, risk ratings of 10 to 15 would be considerate “Moderate” and are shaded yellow, and risk ratings of 16 to 25 would be considered “High” and are shaded red.

		Likelihood of Failure (LOF)				
		1 (Very Low)	2 (Low)	3 (Moderate)	4 (High)	5 (Very High)
Consequence of Failure (COF)	1 (Very Low)	1	2	3	4	5
	2 (Low)	2	4	6	8	10
	3 (Moderate)	3	6	9	12	15
	4 (High)	4	8	12	16	20
	5 (Very High)	5	10	15	20	25

Figure 2: Risk Rating

2.3.7 Default Replacement Year

The default replacement year for a particular asset is computed based on its likelihood of failure and its estimated useful life, as indicated in the formula below.

$$Default\ Replacement\ Year = 2024 + (\frac{5 - LOF}{4}) \times EUL$$

The spending forecast for each year was then determined assuming that each asset would be first replaced on its default replacement year and thereafter at a frequency equal to its EUL.

3.0 Condition Assessment Findings

To analyze the condition assessment information effectively, the data collected from inspecting the WFP assets were systematically organized. This process involved breaking down the data into smaller, more manageable segments to facilitate the grouping and sequencing of renewal or repair projects over the 10-year timeframe. To this end, the tables and figures in this section summarize the condition of these assets using the decision support system described in the section above. The goal of this section is to provide structured insights of the health of the inspected assets.

3.1 Overall Summary

Of the 430 WFP assets inspected, the majority of assets were assigned a condition rating of “4-Good” or better; however, 16 assets were assigned a condition rating of “1-Unacceptable”, and 40 assets were assigned a condition rating of “2-Poor.” These assets are noted as assets of concern and are listed in Table 9. The total estimated material and labour cost for the assets of concern is approximately $3,800,000. Refer to Figure 3 and Figure 4 for a summary of the assets’ visual condition rating compared to asset count and replacement cost, respectively.

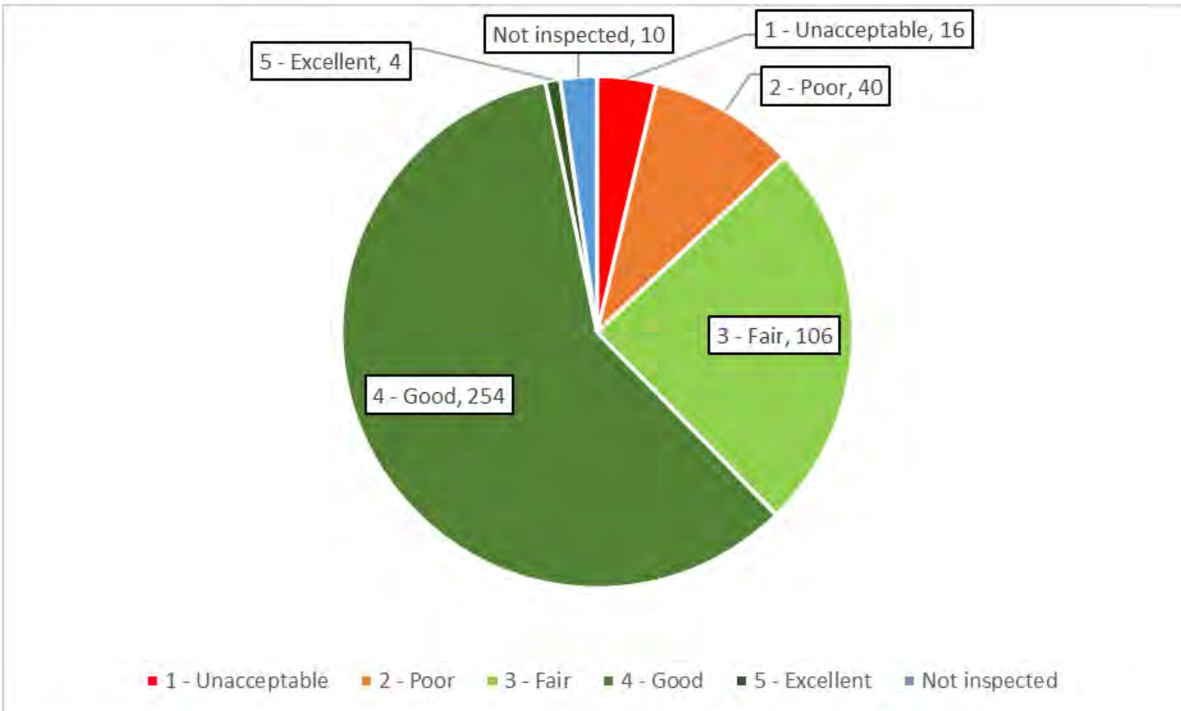

Figure 3: Visual Condition Rating by Asset Count

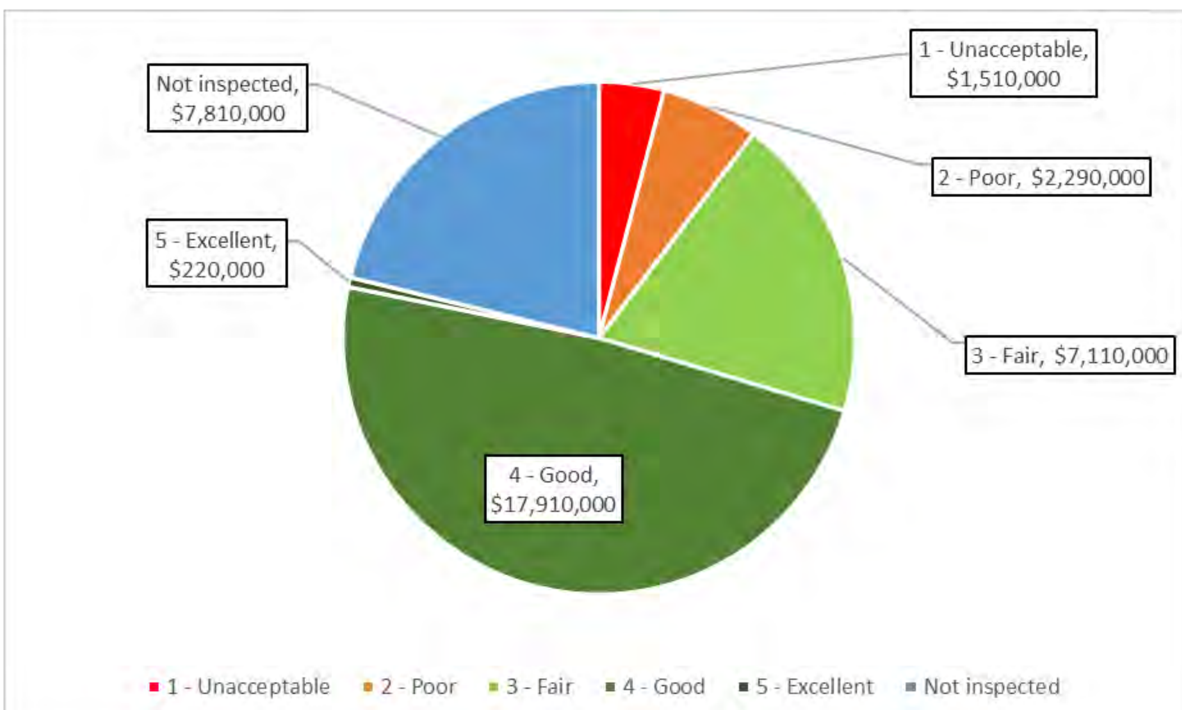

Figure 4: Visual Condition Rating by Replacement Cost

3.2 Condition Assessment Summary

The tables in this section summarize findings based on average visual condition rating, average LOF, average risk, and maximum risk. They are organized by area, asset category and process, and include the material replacement cost for all assets falling within those categories. The total cost includes the material replacement cost and a 100% markup for labour.

The table below summarizes assets' condition and replacement cost grouped by area. Assets throughout all areas except for the former high lift pump area have average LOF scores in the "Moderate" range; the high light pump area has an average LOF value in the "Moderate" to "High" range. The average risk per area is generally low; however, the raw water pumping station, high lift pumping area, former high lift pump area, outside area and main building have maximum risk values in the "High" range (i.e. at or above 16). Underground equipment, including clearwell #1, clearwell #2, the backwash residuals tank, and the backwash residuals tank switch, were not inspected and is therefore assigned an average visual condition of "N/A".

Table 6: Summary of WFP Asset Conditions by Area

Area	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Generator Room	**2**	**2.5**	**3.5**	**8.0**	**10**	**$420,000**
High Lift Pump Area	**68**	**3.4**	**3.2**	**7.9**	**20**	**$4,610,000**
Main Building	**204**	**3.5**	**3.2**	**8.0**	**20**	**$16,770,000**
Outside	**31**	**3.2**	**3.0**	**6.1**	**18**	**$3,420,000**
Raw Water Pumping Station	**34**	**3.7**	**2.9**	**7.5**	**20**	**$2,170,000**
Former High Lift Pump Area	**56**	**3.2**	**3.7**	**9.2**	**20**	**$2,330,000**
Actiflo Basement	**31**	**3.5**	**3.4**	**8.2**	**12**	**$940,000**
Underground Equipment	**4**	**N/A**	**3.5**	**9.3**	**15**	**$6,190,000**
Total	**430**					**$36,850,000**

The table below summarizes the condition and replacement cost of assets grouped by asset category. The average LOF ratings are generally in the "Moderate" range, except for the architectural, instrumentation and controls, and structural categories, which have LOF ratings ranging from "moderate" to "High". The average risk per asset category is low, except for the structural category, which has an average risk rating in "Moderate" range. The maximum risk scores for the building mechanical, instrumentation and controls, process piping and equipment, and structural categories are in the "High" range.

Table 7: Summary of WFP Asset Conditions by Asset Category

Asset Category	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Architectural	42	3.9	2.7	4.6	14	$2,360,000
Building Mechanical	48	3.3	3.5	6.0	18	$970,000
Electrical	41	3.5	3.2	7.9	14	$1,410,000
Instrumentation and Controls	88	3.8	3.3	7.9	20	$870,000
Process Piping and Equipment	155	3.1	3.5	9.3	20	$8,350,000
Siteworks	14	3.2	2.6	4.0	10	$2,010,000
Structural	42	3.8	2.7	10.2	20	$20,880,000
Total	**430**					**$36,850,000**

The table below summarizes assets' condition and replacement cost grouped by process. Average LOF scores ranged from 2.4 (pH Adjustment) to 5.0 (Water Distribution), with Fluoridation also having a notably high average LOF (4.5). All processes except for the water distribution scored average LOF scores within the "Moderate" to "High" range; the water distribution process scored an average LOF in the "Very High" range. The average risk per process is generally within the "low" to "Moderate" range; however, the ballasted flocculation, buildings, disinfection, filtration, raw water pumping, and safety scored processes have maximum risk values in the "High" range.

Table 8: Summary of WFP Asset Conditions by Process

Process	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Ballasted Flocculation	55	3.5	3.4	8.1	14	$3,590,000
Building Services	70	3.4	3.3	6.3	12	$1,710,000
Buildings	74	3.9	2.7	7.1	18	$11,150,000
Controls	21	3.9	3.3	7.9	14	$450,000
Disinfection	14	3.4	3.3	10.9	20	$270,000
Electrical System	30	3.8	3.1	7.8	14	$790,000
Emergency Power	1	3.0	2.5	7.5	8	$10,000
Filtration	52	3.3	3.5	10.3	20	$6,680,000
Fluoridation	5	2.0	4.5	13.5	14	$200,000
pH Adjustment	24	3.7	2.4	6.1	11	$400,000
Process Monitoring	6	3.2	3.8	5.6	7	$60,000

Process	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Raw Water Pumping	9	3.1	3.7	10.0	20	$690,000
Residuals Handling	22	2.8	3.8	8.8	12	$960,000
Safety	4	2.5	4.3	15.0	18	$60,000
Site	15	3.3	2.6	4.0	10	$2,030,000
Treated Water Storage and Distribution	25	3.0	3.9	9.1	15	$7,770,000
Water Distribution	1	1.0	5.0	15.0	15	$30,000
Water Sampling	2	3.0	4.0	12.0	14	$3,000
Total	**430**					**$36,850,000**

3.3 Assets of Concern

As summarized above, the majority of assets were noted to be in good condition with low to moderate likelihood of failure. However, concerns related to specific areas or assets at the plant were noted. Key issues are as follows:

- Low Lift Pump #3 was inoperable
- Filter media and underdrains have failed
- Corrosion and/or leaking was observed on various valves, gates, process piping/supports, and building mechanical equipment, particularly within especially corrosive environments, such as the Fluoride Room, Sodium Bisulfite Room, or below floor grating in channels or sumps.
- Cracking, efflorescence or spalling of concrete observed at Main Building exterior stairs and Equipment Room No. 2.
- Instrumentation which is still functional but is outdated and therefore no longer supported and/or parts not available for repair.

Some high-value and/or high-COF assets could not be inspected but may be approaching end of life based on age, such as the RWPS Wet Well structure and Clearwell #1 (known to be leaking).

JLR inspectors also identified concerns not specifically related to condition; for example, the absence of emergency lights in the high lift pump room.

The table below presents more detailed condition assessment findings for all assets that had a visual condition rating either "1-Unacceptable" or "2-Poor", sorted by Area. Photos of these assets are included in the asset database appended as Appendix A.

Table 9: Assets of Concern Summary

Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
Actiflo Residual Tank Effluent Valve #1	Actiflo Basement	Ballasted Flocculation	Process Piping and Equipment	1 - Unacceptable	Leaking, lots of surface rust.	10 - Moderate
Actiflo Residual Tank Effluent Valve #2	Actiflo Basement	Ballasted Flocculation	Process Piping and Equipment	1 - Unacceptable	Leaking, severely rusted.	10 - Moderate
Actiflo Residual Tank Effluent Valve #3	Actiflo Basement	Ballasted Flocculation	Process Piping and Equipment	1 - Unacceptable	Leaking, severely rusted.	10 - Moderate
Sodium Bisulphite Unit Heater	Former High Lift Pump Area	Residuals Handling	Building Mechanical	1 - Unacceptable	Completely rusted.	5 - Low
Section Of Raw Water Piping To Actiflo Treatment	Former High Lift Pump Area	Water Distribution	Process Piping and Equipment	1 - Unacceptable	Section of raw water piping below grating is severely rusted and leaking.	15 - Moderate
Sump Pump- N/E 3rd Floor	Former High Lift Pump Area	Building Services	Building Mechanical	2 - Poor	Old, rusted.	5 - Low
Sump Pump S/E 3rd Floor	Former High Lift Pump Area	Building Services	Building Mechanical	2 - Poor	Old, rusted.	5 - Low
Sodium Bisulphite Room Exhaust Fan	Former High Lift Pump Area	Residuals Handling	Building Mechanical	2 - Poor	Fan making noises, everything is rusted.	9 - Low
Sodium Bisulphite Eyewash And Hot Water Tank	Former High Lift Pump Area	Safety	Building Mechanical	2 - Poor	Surface rust.	18 - High
Sodium Bisulphite Room Leak Detector	Former High Lift Pump Area	Residuals Handling	Instrumentation and Controls	2 - Poor	Appears to be in poor condition.	9 - Low
Ammonia System Process Piping And Misc. Appurtenances	Former High Lift Pump Area	Disinfection	Process Piping and Equipment	2 - Poor	Leakage reported by Town.	12 - Moderate
Treated Water Distribution Isolation Valve	Former High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Fully rusted.	9 - Low

Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
Separated Water Valve	Former High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Surface corrosion.	9 - Low
Raw Water Sample Pump	Former High Lift Pump Area	Water Sampling	Process Piping and Equipment	2 - Poor	Old, significant surface rust surrounding the pump.	14 - Moderate
WFP Generator Enclosure Fan and Dampers	Generator Room	Building Services	Building Mechanical	1 - Unacceptable	Generator exhaust fan and dampers may have an issue. When generator is running it creates a vacuum inside the enclose and makes it very hard to open the doors. Unable to test.	10 - Moderate
High Lift Pump Room Emergency Lights	High Lift Pump Area	Building Services	Electrical	1 - Unacceptable	No emergency lights in this area.	10 - Moderate
High Lift Pump Room Hydronic Unit Heaters	High Lift Pump Area	Building Services	Building Mechanical	2 - Poor	Hydronic piping is rusted. Could only locate 3 unit heaters in the high lift pump room.	5 - Low
Filtered Water Process Piping	High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Section of the filter water piping is in good condition with the exception of the filtered waterline to clear well no. 1. Picture 4, significant amount of surface rust.	12 - Moderate
Clearwell 1 To 2 Isolation Valves	High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	VF30004 is missing operator and there is significant surface rust.	9 - Low
Clearwell 1 To 2 Process Piping	High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Two of the welds in the high lift pump room are leaking.	9 - Low
High Lift Pump #3	High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Gets more use than the other two. More rust overall. All three high lift pumps are controlled to be on the same run cycles.	14 - Moderate
Pressure Relief Valve	High Lift Pump Area	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Valve leaking and significant surface rust.	9 - Low
Backwash Residuals	High Lift Pump Area	Residuals Handling	Process Piping and Equipment	2 - Poor	Missing operator on some valves. Missing swing weight on VAC-61001.	9 - Low

Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
Treatment Check Valves						
Backwash Residuals Treatment Isolation Valves	High Lift Pump Area	Residuals Handling	Process Piping and Equipment	2 - Poor	Lots of surface rust.	9 - Low
Backwash Tank Sludge Effluent Valve	High Lift Pump Area	Residuals Handling	Process Piping and Equipment	2 - Poor	Lots of surface rust.	9 - Low
Filter #3 Filter-To-Waste Valve	Main Building	Filtration	Process Piping and Equipment	1 - Unacceptable	Client noted cannot be operated by hand, ideally new one could have option to operate manually.	10 - Moderate
Filter #1 Media and Underdrains	Main Building	Filtration	Process Piping and Equipment	1 - Unacceptable	Identified as failed state by Town.	15 - Moderate
Filter #2 Media and Underdrains	Main Building	Filtration	Process Piping and Equipment	1 - Unacceptable	Identified as failed state by Town.	10 - Moderate
Filter #3 Media and Underdrains	Main Building	Filtration	Process Piping and Equipment	1 - Unacceptable	Identified as failed state by Town.	15 - Moderate
Hach Turbidity Meter	Main Building	Process Monitoring	Process Piping and Equipment	1 - Unacceptable	Not functioning.	5 - Low
Fluoride Room Mechanical Equipment Fan/Louver/ Dampers	Main Building	Building Services	Process Piping and Equipment	1 - Unacceptable	Equipment has failed. Operator comment is to demo this room and build a dedicated fluoride room in the main building. Extremely rusted equipment.	10 - Moderate
Sump Pump - Fluoride Room	Main Building	Building Services	Building Mechanical	2 - Poor	Old, rusted.	4 - Low
Fluoride Room Shower/Eyewash Station	Main Building	Safety	Building Mechanical	2 - Poor	Rusty pipes.	18 - High
Lighting Panel - Basement	Main Building	Electrical System	Electrical	2 - Poor	Mild corrosion.	9 - Low
Coagulant System Process Piping	Main Building	Ballasted Flocculation	Process Piping and Equipment	2 - Poor	Supports are rusting.	12 - Moderate
Filter #1 Filter-To-Waste Valve	Main Building	Filtration	Process Piping and Equipment	2 - Poor	Surface rust, gaskets are in bad condition.	14 - Moderate

Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
Filter #2 Filter-To-Waste Valve	Main Building	Filtration	Process Piping and Equipment	2 - Poor	Surface rust, gaskets are in bad condition.	14 - Moderate
Fluoride Pump	Main Building	Fluoridation	Process Piping and Equipment	2 - Poor	Surface rust.	14 - Moderate
Fluoride Transfer Pump	Main Building	Fluoridation	Process Piping and Equipment	2 - Poor	Surface rust, old.	14 - Moderate
Fluoride Day Tank	Main Building	Fluoridation	Process Piping and Equipment	2 - Poor	Signs of leaking.	14 - Moderate
Fluoride Storage Tanks	Main Building	Fluoridation	Process Piping and Equipment	2 - Poor	Old, surface rust.	14 - Moderate
Fluoride System Process Piping And Misc. Appurtenances	Main Building	Fluoridation	Process Piping and Equipment	2 - Poor	The water pipes are severely corroded.	14 - Moderate
Separated Hot Water Recirculation Pump	Main Building	Building Services	Process Piping and Equipment	2 - Poor	Old	12 - Moderate
DR 2800 Spectrophotometer	Main Building	Process Monitoring	Process Piping and Equipment	2 - Poor	Parts are hard to find.	5 - Low
Main Building (Basement) Floors/Slabs On Grade	Main Building	Buildings	Structural	2 - Poor	Appears to be generally in good to locally poor condition. Wide cracks with efflorescence noted in the conveyor room.	18 - High
WFP Undefined Storm Drain	Outside	Site	Siteworks	1 - Unacceptable	Unknown outlet.	4 - Low
Main Building (1966) Exterior Stairs	Outside	Buildings	Architectural	2 - Poor	Appears to be generally in poor condition. The stairs at main entrance appears to have concrete delamination and spalls with exposed corroded reinforcing steel at multiple locations. The stairs at the loading dock appears to have a large spall with exposed corroded reinforcing steel on the underside of the stairs.	14 - Moderate
WFP Retaining Wall - South East Side	Outside	Site	Siteworks	2 - Poor	The blocks are leaning away and appear to be loose.	4 - Low

Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
Sluice Gates	Outside	Treated Water Storage and Distribution	Process Piping and Equipment	2 - Poor	Old, surface rust.	9 - Low
Main Building (1966) Foundation / Retaining Walls	Outside	Buildings	Structural	2 - Poor	Retaining wall south east of entrance appears to have failed (see photo 3). Exposed area of foundation walls appears to be generally in good condition. Does not appear to present evidence of movement or settlement.	18 - High
RWPS Receptacles	Raw Water Pumping Station	Building Services	Electrical	1 - Unacceptable	2/4 Uncovered, 1 blocked off.	5 - Low
Low Lift Pump #3	Raw Water Pumping Station	Raw Water Pumping	Process Piping and Equipment	1 - Unacceptable	It was noted on site that this pump loses its prime during operation, this could be a result of a suction leak.	15 - Moderate
RWPS Isolation Valves	Raw Water Pumping Station	Raw Water Pumping	Process Piping and Equipment	2 - Poor	Valves have significant amount of surface rust. No leaking.	8 - Low

4.0 Financial Forecast and Replacement Program

4.1 50-Year Cash Flow Projections

Figure 5 below presents the 50-year cash flow projection for replacing WFP assets, based on “default replacement year” only. The average annual expenditure, approximately $990,000, is indicated by the red line across the chart. The cost includes material replacement cost, as well as an assumed labour markup of 100%. These costs do not include allowances for plant expansion, project administration, and construction requirements.

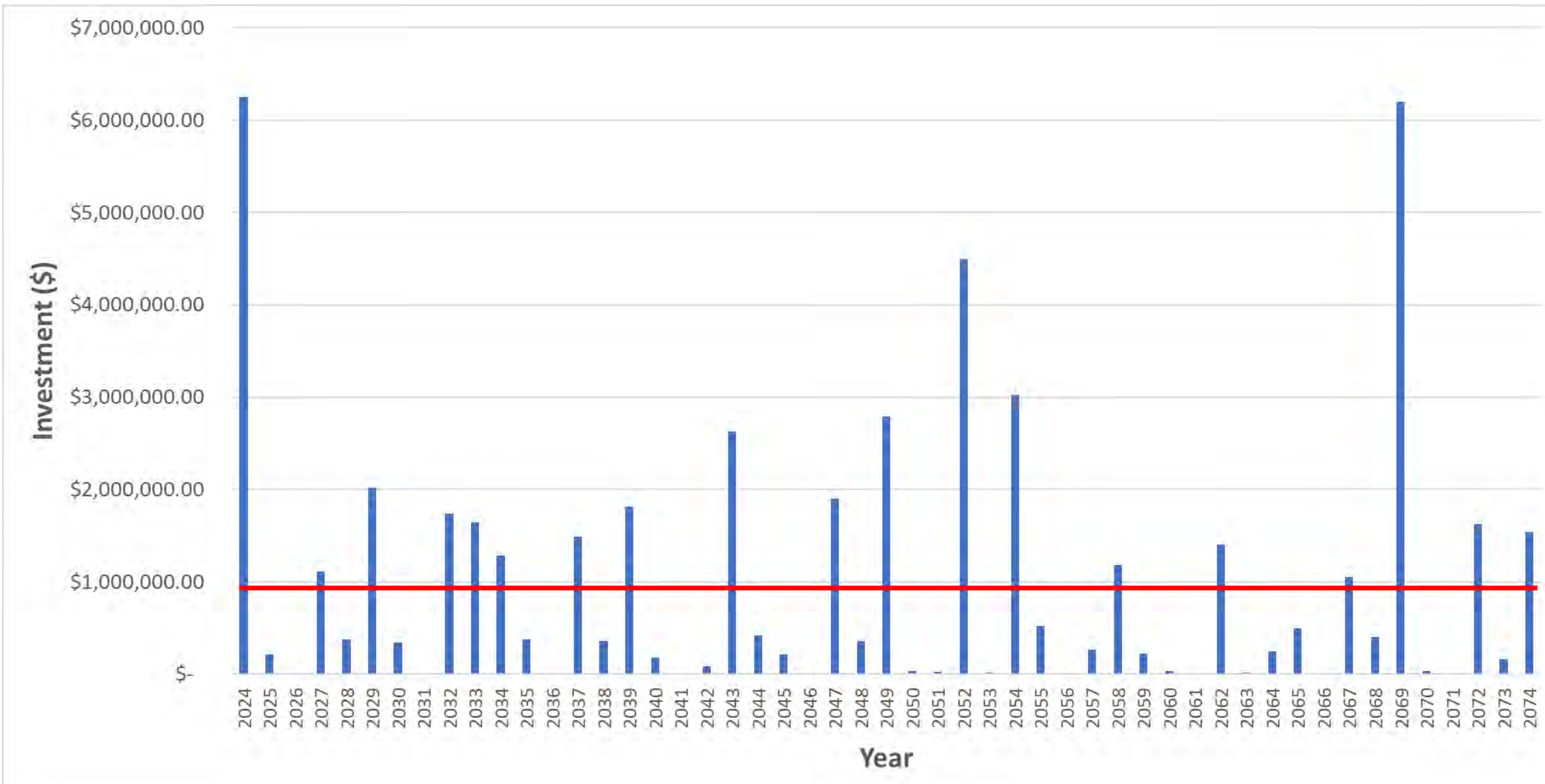

Figure 5: 50-Year Cash Flow Projection

4.2 Capital Project Definition and List of Maintenance Activities

The goal of the capital project definition phase is to organize recommendations into capital projects that can be issued as single assignment over the next 10 years, studies that need to be undertaken to refine recommendations, and operation and maintenance activities. Table 10 summarizes JLR's general approach in defining these projects. Preliminary projects groupings were discussed with the Town in a collaborative workshop and refined based on feedback received. Refer to Appendix E to review the Workshop meeting minutes and presentation.

Table 10: JLR's Approach for Project/ Study/ O&M Program Groupings

Grouping	Capital Project	Studies	O&M Projects
Description of Work	• Replacements • Requires engineering or design work • Like-for-like replacements for major equipment • Larger groupings of assets that should be replaced at the same time.	• Assets that need further investigation.	• Repairs • Like-for-like replacement of minor equipment

4.2.1 Capital Projects

Table 11 summarizes the recommended capital projects over the next 10 years, which were developed collaboratively with the Town. To estimated project costs for each project, the sum of individual asset material costs was doubled to account for labour. Refer to Appendix B for details of each capital project.

Table 11: Capital Projects and Sequencing Summary

Project Name	Recommended Action Year	Estimated Cost ($) (Material + Labour)	Project Description
Filter #2 Media and Underdrain Replacement	2024	$320,000	Replace media and underdrain for filter #2 (in progress).
WFP Immediate HVAC Upgrades	2024	$100,000	Upgrade fluoride room and sodium bisulphite room HVAC equipment.
WFP Misc. Building Repairs	2024	$160,000	Replace/repair of miscellaneous building components and equipment.
Alum Storage Tank Replacement	2025	$50,000	Replace alum storage tank, reconfiguration of plumbing, and anchor adjustments.
Filter #1 Media and Underdrain Replacement and Concrete Restoration	2025	$490,000	Replace filter #1 media and underdrain and repair structural tanks as needed.
Filter #3 Media and Underdrain Replacement	2025	$440,000	Replace filter #3 media and underdrain.
Clearwell #1 Replacement	2025	$4,040,000	Replace clearwell #1 and Milltronics and repair former high lift pump room concrete wall.
Roof Repairs	2025	$80,000	Repair roofing in RWPS, high lift pump room and main building following study recommendations
Sodium Bisulphite Room Refurbishment	2025	$100,000	Replace/repair mechanical, electrical, and plumbing systems in sodium bisulphite room.
Raw Water Pumping Station Refurbishment	2025	$410,000	Replace low lift pump #3 and repair low lift pump well following study.
Distribution Watermain Twinning	2026	$100,000	Install a redundant distribution watermain.

Project Name	Recommended Action Year	Estimated Cost ($) (Material + Labour)	Project Description
Fluoride Room Relocation	2026	$230,000	Replace fluoride room equipment following study recommendation.
High Lift Pump #3 Replacement	2026	$400,000	Replace high lift pump #3.
Separated Water Valve Replacement	2027	$80,000	Replace separated water valve.
Backwash Equipment Replacement	2028	$940,000	Replace valves, flow meter, process piping and pump.
Actiflo #1 Rebuild	2029	$130,000	Replace Actiflo #1 valve, pumps and process piping.
High Lift Pump #1 Replacement	2029	$480,000	Replace high light pump and valves.
Low Lift Pumping Station	2029	$210,000	Replace low lift pumps #1 and #2 and valves.
Filter Appurtenance Rebuild	2030	$1,250,000	Replace valves, gates and air scour blower.
WFP Chemical Systems	2031	$130,000	Replace chlorinator systems #1 and #2 and ammonia system process piping and miscellaneous appurtenances.
High Lift Pump #2 Replacement	2033	$400,000	Replace high lift pump #2.
Actiflo #2 Rebuild	2034	$130,000	Replace Actiflo #2 valve, pumps and process piping.
Total Cost ($)	**$10,790,000**		

4.2.2 Recommended Studies

Table 12 outlines the investigations required to confirm or refine recommendations for applicable assets. These include assets that were inaccessible or that otherwise required a more detailed review. Recommendations and capital projects have been provided for these assets; however, the scope and budget are likely to change based on study results. Refer to Appendix C for the list of assets that require studies.

Table 12: Studies Summary

Study Name	Recommended Action Year	Estimated Cost ($)	Project Description
Filter #1 Inspection	2024	$30,000	Inspect tank surface and underdrain system to identify required repairs.
Misc. Building Repairs Study	2024	$30,000	Investigate floor cracking and generator exhaust malfunction.

Study Name	Recommended Action Year	Estimated Cost ($)	Project Description
Raw Water Pumping Station Inspection	2024	$130,000	Complete a structural inspection of the tank interior and conduct an inspection of the suction line for low lift pump #3.
Roof Repairs Study	2024	$40,000	Perform a detailed roofing inspection for the RWPS, former high lift pump room, high lift pump room, and main building.
Fluoride Room Relocation	2025	$30,000	Conduct a study to define scope of fluoride room relocation.
Total Cost ($)	**$260,000**		

4.2.3 Operations and Maintenance Projects

Table 13 summarizes the recommended Operations and Maintenance (O&M) projects for the upcoming 10 years. These projects generally consist of minor repairs or low-capital assets that can be replaced like-for-like internally at the end of the service life. The costs include material replacement only and exclude potential labour costs. A summary of estimated O&M expenditure is presented in Table 13**Error! Reference source not found.** with a more d etailed list included in Appendix D. Actual spending within a given year is expected to differ based on actual asset failure timing where assets are intended to be run to failure; proactive replacement may be prioritized based on factors such as LOF and Risk as noted for each asset in Appendix D.

Table 13: Estimated O&M Project Expenditures

Project Name	Recommended Action Year	Estimated Cost ($) (Material)	Description
Operations and Maintenance	2024	$110,000	Repair or replacement of various instrumentation, valves, control panels and other miscellaneous equipment.
	2025	$10,000	
	2027	$220,000	
	2028	$180,000	
	2029	$120,000	
	2030	$80,000	
	2032	$230,000	
	2033	$120,000	
	2034	$350,000	
Total Cost ($)	$1,420,000		
Average Annual Cost ($/Year)	$140,000		

4.2.4 Summary of Major Maintenance Activities

Table 14 summarizes typical preventative maintenance activities that are performed for major assets that may not be currently part of normal operations and maintenance routines. This information was obtained from Operations and Maintenance Manuals, major equipment supplier (AWI), and JLR project experience. Performing these activities is expected to increase Operation and Maintenance spending by approximately $460,000 over the next 10 years.

The Actiflo system comprises two Actiflo trains and an Actiflo Residuals Treatment Tank. It is recommended that these tanks undergo inspection every 10 years to check for potential corrosion, concrete delamination, cracking, and spalling. The cost to inspect each concrete tank is estimated at $10,000, resulting in a total estimated cost of $30,000 for inspecting all three tanks over the next 10 years.

The filtration system consists of a total of three tanks. Each tank requires inspections for the filter media, underdrains, and backwash system. According to pricing provided by AWI, the cost to inspect the filter media for all three tanks is $20,320 per inspection cycle. To ensure the filter media remains effective over the next 10 years, the tanks will need to be inspected at least twice, resulting in a total inspection cost of $40,640. Additionally, the cost to replace the filter media for the three tanks is estimated at $141,000. Assuming the filter media needs to be replaced once in the next 10 years, the total cost for replacing the media and coating for all three tanks is estimated at $423,000.

Table 14: Summary of Major Maintenance Activities

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Actiflo	Tankage	Once every 10 years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$30,000
Filtration	Underdrains & Backwash system	Once every 3-5 years	• Inspect underdrains and backwash system during media replacement.	$12,192
	Media	Once every 3-5 years	• Analyze filter media to determine effective size and uniformity coefficient and compare it with design specifications. • Measure freeboard and filter media depth and compare it with design specifications.	$40,640

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
	Media & Coating	Assay Dependent	• Replace filter media and coating based on lab results.	$423,000
Total Cost ($)	**$458,512**			

4.2.5 10-Year Spending Projections

The 10-year cash flow projection for the recommended capital projects, operations and maintenance projects, and studies is presented in Figure 6. This cash flow projection generally does not include the major maintenance activities listed in Table 14. As detailed in the previous sections, costs for these groupings are determined as follows:

- Capital Projects: Costs include both material expenses and an assumed 100% markup for labour.
- Operations and Maintenance Projects: Costs cover material replacement only.
- Studies: Costs cover the labour required for investigations. Assets identified for study are also included in capital projects; however, the costs are subject to adjustment following study recommendations.

The cash flow projection does not include major maintenance activities listed in Table 14 or expenses related to future plant expansions.

Figure 6: WFP 10-Year Cash Flow Projection

5.0 Conclusion

JLR completed an inventory, condition, and capital planning assessment of the Arnprior Water Filtration Plant (WFP). This assessment aimed to provide practical and comprehensive recommendations for maintenance and capital budget planning.

The findings from the condition assessment were used to consolidate mid-term projects (within 10 years) into manageable packages that can be addressed as single assignments. It is estimated that a total annual cost of $10,790,000 will be required for capital projects, $260,000 for studies and $1,420,000 operations and maintenance projects, at Arnprior's Water Filtration Plant over the next 10 years. Figure 7 shows a breakdown of these costs organized by project type. These costs do not include allowances for plant expansion, project administration, and construction requirements. Major maintenance activities may require an additional $460,000 over the next 10 years. For details, refer to Section 4.0.

The total estimated project cost covers both materials and installations, where applicable. For labour costs, a 100% markup was applied to the total material cost. However, this markup does not apply where installation or repairs are intended to be performed by the plant operators. Furthermore, these costs do not include allowances for plant expansion, project administration, and construction requirements.

This report is intended as a summary and complements the higher level of detail provided in the Asset Inventory Database appended in Appendix A.

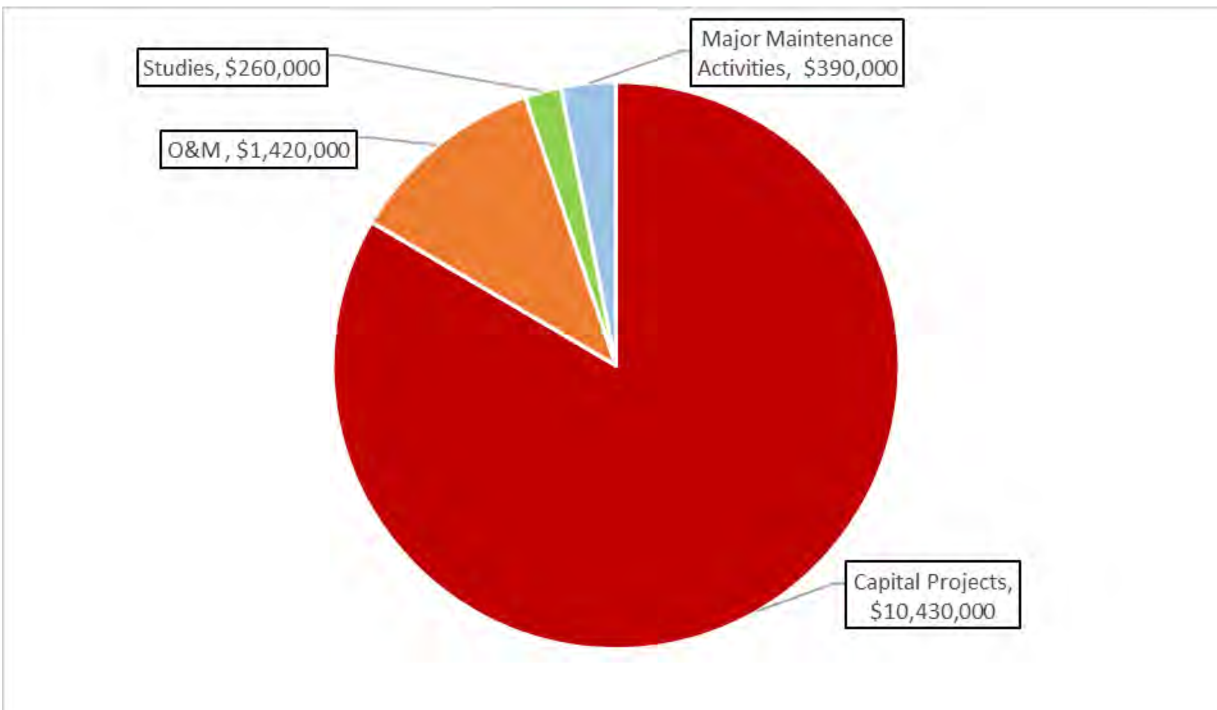

Figure 7: Annual Financial Investments Required over 10 years by Project Type

6.0 Limitations

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

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Appendix A

Asset Inventory Database (Excel)

Appendix B

Capital Projects Sheet

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP110	Filter #2 Media and Underdrains	Main Building	1 - Unacceptable	Identified as failed state by Town.	Replace (completed now).	Filter #2 Media and Underdrain Replacement	2024	$ 442,000
WFP832	Fluoride Room Mechanical Equipment Fan/Louver/Dampers	Main Building	1 - Unacceptable	Equipment has failed. Operator comment is to demo this room and build a dedicated fluoride room in the main building. Extremely rusted equipment.	Upgrade fluoride room HVAC equipment immediately, in advance of study.	WFP Immediate HVAC Upgrades	2024	$ 50,000
WFP914	Sodium Bisulphite Room Exhaust Fan	Former High Lift Pump Area	2 - Poor	Fan making noises, everything is rusted.	Upgrade sodium bisulphite room ventilation immediately.	WFP Immediate HVAC Upgrades	2024	$ 50,000
WFP038	Alum Storage Tank #2	Main Building	3 - Fair	Not anchored.	Provide anchors to secure tank. Future replacement must account for the fact that tank had to be brought in in pieces.	WFP Misc. Building Repairs	2024	$ 1,000
WFP248	Boiler	Actiflo Basement	4 - Good	Looks in good condition but there is strong smell of natural gas.		WFP Misc. Building Repairs	2024	$ 80,000
WFP281	Former High Lift Pump Room Exterior Doors	Former High Lift Pump Area	4 - Good	Appears to be generally in good condition. The exterior door in photo 1 doesn't appear to latch.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WFP Misc. Building Repairs	2024	$ 500
WFP285	Former High Lift Pump Room Interior Doors / Fire doors - Latches	Former High Lift Pump Area	4 - Good	Appears to be generally in good condition. The exterior door in photo 1 doesn't appear to latch.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WFP Misc. Building Repairs	2024	$ 500
WFP296	High Lift Pump Room Concrete Beams	High Lift Pump Area	4 - Good	Appears to be generally in good to locally poor condition. Medium cracks with efflorescence on concrete corbel (see photos 2 and 3).	Repair concrete corbel.	WFP Misc. Building Repairs	2024	$ 10,000
WFP300	High Lift Pump Room Exterior Doors	High Lift Pump Area	4 - Good	Appears to be generally in good condition. Both exterior doors in photos 1 and 2 don't appear to latch.	Address door latch issue.	WFP Misc. Building Repairs	2024	$ 500
WFP304	High Lift Pump Room Interior Doors / Fire doors - Latches	High Lift Pump Area	4 - Good	Appears to be generally in good condition. The interior door in photo 1 doesn't appear to latch.	Address door latch issue.	WFP Misc. Building Repairs	2024	$ 500

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP317	Main Building (1966) Interior Doors / Fire doors - Latches	Main Building	4 - Good	Appears to be generally in good condition. The interior door within the main lobby (photos 1 and 2) should be a fire rated door and doesn't appear to latch.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WFP Misc. Building Repairs	2024	$ 500
WFP329	Main Building (1966) Foundation / Retaining Walls	Outside	2 - Poor	Retaining wall south east of entrance appears to have failed (see photo 3). Exposed area of foundation walls appears to be generally in good condition. Does not appear to present evidence of movement or settlement.	Following further review, repair retaining wall.	WFP Misc. Building Repairs	2024	$ 15,000
WFP355	RWPS Retaining Walls	Raw Water Pumping Station	4 - Good	Retaining wall appears in generally good condition with narrow cracks, and drains appear to require extensions.	Following further review, repair concrete wall.	WFP Misc. Building Repairs	2024	$ 10,000
WFP436	Main Building (Basement) Floors/Slabs On Grade	Main Building	2 - Poor	Appears to be generally in good to locally poor condition. Wide cracks with efflorescence noted in the conveyor room.	Repair per study recommendations. Budget assumes 20% of replacement cost.	WFP Misc. Building Repairs	2024	$ 12,800
WFP840	WFP Generator Enclosure Fan And Dampers	Generator Room	1 - Unacceptable	Generator exhaust fan and dampers may have an issue. When generator is running it creates a vacuum inside the enclose and makes it very hard to open the doors. Unable to test.	Repair per study recommendations. Budget assumes 20% of replacement cost.	WFP Misc. Building Repairs	2024	$ 24,000
WFP841	Polymer Room Lighting	Main Building	3 - Fair	Missing cover.	Secure or replace missing covers. Ensure properly maintained and cleaned.	WFP Misc. Building Repairs	2024	$ 500
WFP842	RWPS Receptacles	Raw Water Pumping Station	1 - Unacceptable	2/4 Uncovered , 1 blocked off.	Replace all missing covers immediately. Replace receptacles as required.	WFP Misc. Building Repairs	2024	$ 200
WFP845	Chlorine Room Lighting	Main Building	3 - Fair	Missing cover.	Secure or replace missing covers. Ensure properly maintained and cleaned.	WFP Misc. Building Repairs	2024	$ 500
WFP037	Alum Storage Tank #1	Main Building	3 - Fair	Not anchored. Appears to be in fair conditionl. In-Service Date provided by the Town.	Replace; reconfigure plumbing and anchor properly. Note that building was built around tank.	Alum Storage Tank Replacement	2025	$ 52,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP169	Clearwell #1 Milltronics	Former High Lift Pump Area	3 - Fair	-	Replace. Town has indicated that this will be replaced with Clearwell #1.	Clearwell #1 Replacement	2025	Included in WFP170
WFP170	Clearwell #1	Underground Equipment	Not Inspected	Could not access. It is our understanding that there is a leak and that a leakage study was in progress.	Replace (currently in design)	Clearwell #1 Replacement	2025	$ 4,037,500
WFP274	Former High Lift Pump Room Interior Walls/Columns	Former High Lift Pump Area	4 - Good	Appears to be generally in good condition. Light to moderate scaling is observed on the interior walls within room (see photo 2) and hairline cracks were observed on the interior walls (see photo 3).	Clean and repair concrete wall (note: included in Clearwell 1 replacement project).	Clearwell #1 Replacement	2025	Included in WFP170
WFP109	Filter #1 Media and Underdrains	Main Building	1 - Unacceptable	Identified as failed state by Town.	Replace	Filter #1 Media and Underdrain Replacement and Concrete Restoration	2025	$ 442,000
WFP111	Filter #1 Tankage	Main Building	3 - Fair	Light corrosion, discoloured components observed at the water level; there appears to be a coating which has failed (see photo 1). Large opening in grating at pump which may be a hazard. Did not access within the tank, but concrete likely in fair condition based on inspection of Filter #2.	Repair as required per study recommendations and consider replacing any original protective coatings.	Filter #1 Media and Underdrain Replacement and Concrete Restoration	2025	$ 50,000
WFP115	Filter #3 Media and Underdrains	Main Building	1 - Unacceptable	Identified as failed state by Town.	Replace	Filter #3 Media and Underdrain Replacement	2025	$ 442,000
WFP003	Low Lift Pump #3	Raw Water Pumping Station	1 - Unacceptable	It was noted on site that this pump loses its prime during operation, this could be a result of a suction leak.	Replace pump (or repair depending on study recommendations).	Raw Water Pumping Station Refurbishment	2025	$ 60,000
WFP009	RWPS Low Lift Pump Well/ Building Foundation	Raw Water Pumping Station	Not Inspected	Did not access within the tank. Town noted that concrete is original to the plant. From exterior, concrete appears to be generally in fair to locally poor condition. Delamination noted on exposed foundation at the back of the building.	Repair structure as required depending on study recommendations.	Raw Water Pumping Station Refurbishment	2025	$ 350,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP279	Former High Lift Pump Room Exterior Roofing Materials	Former High Lift Pump Area	3 - Fair	Appears to be generally in fair to locally poor condition. It appears to present evidence of water pooling (see photo 2), and evidence of some bulges (see photo 1).	Repair per study recommendations. Budget assumes 20% of replacement cost.	Roof Repairs for High Lift Pump Area and Raw Water Pumping Station	2025	$ 11,453
WFP298	High Lift Pump Room Exterior Roofing Materials	High Lift Pump Area	4 - Good	Appears to be generally in good condition. Appears to present evidence of water pooling (see photo 2).	Repair per study recommendations. Budget assumes 20% of replacement cost.	Roof Repairs for High Lift Pump Area and Raw Water Pumping Station	2025	$ 20,990
WFP311	Main Building (1966) Exterior Roofing Materials	Outside	4 - Good	Based on photos provided by client. Appears to be generally in good condition. Appears to present evidence of water pooling.	Repair per study recommendations. Budget assumes 20% of replacement cost.	Roof Repairs for High Lift Pump Area and Raw Water Pumping Station	2025	$ 35,280
WFP356	RWPS Exterior Roofing Materials	Raw Water Pumping Station	Not Inspected	Could not access.	Repair per study recommendations. Budget assumes 20% of replacement cost.	Roof Repairs for High Lift Pump Area and Raw Water Pumping Station	2025	$ 10,000
WFP913	Sodium Bisulphite Unit Heater	Former High Lift Pump Area	1 - Unacceptable	Completely rusted.	Replace or repair all other mechanical, electrical, plumbing in this room after ventilation has been upgraded. (Note that electrical and plumbing items in this room are not individual assets in this database.)	Sodium Bisulphite Room Refurbishment	2025	$ 100,000
WFP941	WFP Watermain Yard Piping	Outside	Not Inspected	-	Install a redundant distribution watermain. Additional investigation is recommended to scope the extents, connection locations, valving, instrumentation and remote functionality of the proposed redundant WM connection.	Distribution Watermain Twinning	2026	$ 100,000
WFP138	Fluoride Pump	Main Building	2 - Poor	Surface rust.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 20,400
WFP139	Fluoride Transfer Pump	Main Building	2 - Poor	Surface rust, old.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 10,000
WFP140	Fluoride Day Tank	Main Building	2 - Poor	Signs of leaking.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 10,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP141	Fluoride Storage Tanks	Main Building	2 - Poor	Surface rust, old.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 100,000
WFP142	Fluoride System Process Piping And Misc. Appurtenances	Main Building	2 - Poor	The water pipes are severely corroded.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 60,000
WFP258	Sump Pump - Fluoride Room	Main Building	2 - Poor	Old, rusted.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 20,000
WFP916	Fluoride Room Shower/Eyewash Station	Main Building	2 - Poor	Rusty pipes.	Replace and relocate following study.	Fluoride Room Relocation	2026	$ 6,000
WFP180	High Lift Pump #3	High Lift Pump Area	2 - Poor	Gets more use than the other two. More rust overall. All three high lift pumps are controlled to be on the same run cycles.	Replace	High Lift Pump #3 Replacement	2026	$ 400,000
WFP924	Separated Water Valve	Former High Lift Pump Area	2 - Poor	Surface corrosion.	Replace	Separated Water Valve Replacement	2027	$ 80,000
WFP073	Backwash Pump	High Lift Pump Area	3 - Fair	-	Replace	Backwash Equipment Replacement	2028	$ 500,000
WFP074	Treated Water Flow Meter - HLP Discharge	Former High Lift Pump Area	3 - Fair	-	Replace	Backwash Equipment Replacement	2028	$ 10,000
WFP075	Backwash Flow Meter	High Lift Pump Area	4 - Good	-	Replace	Backwash Equipment Replacement	2028	$ 10,000
WFP076	Backwash Modulating Valve	High Lift Pump Area	3 - Fair	-	Replace	Backwash Equipment Replacement	2028	$ 90,000
WFP077	Backwash Check Valve	High Lift Pump Area	3 - Fair	-	Replace	Backwash Equipment Replacement	2028	$ 24,000
WFP078	Backwash Isolation Valves	High Lift Pump Area	3 - Fair	Town noted 2 valves went in in 2005, 1 went in in 2010.	Replace	Backwash Equipment Replacement	2028	$ 30,600
WFP165	Filtered Water Isolation Valves	High Lift Pump Area	4 - Good	One found in a separate room and that one is in fair condition due to surface rust.	Replace	Backwash Equipment Replacement	2028	$ 90,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP166	Filtered Water Process Piping	High Lift Pump Area	2 - Poor	Section of the filter water piping is in good condition with the exception of the filtered waterline to clear well no. 1. Picture 4, significant amount of surface rust.	Replace	Backwash Equipment Replacement	2028	$ 99,000
WFP208	Backwash Tank Supernatant Effluent Valve	High Lift Pump Area	3 - Fair	-	Replace	Backwash Equipment Replacement	2028	$ 90,000
WFP019	Actiflo #1 Influent Valve	Actiflo Basement	4 - Good	-	Replace	Actiflo #1 Rebuild	2029	$ 76,000
WFP021	Actiflo #1 Recirculation Pump	Actiflo Basement	3 - Fair	-	Replace	Actiflo #1 Rebuild	2029	$ 30,000
WFP031	Actiflo Polymer Feed Pump #1	Main Building	3 - Fair	-	Replace	Actiflo #1 Rebuild	2029	$ 20,400
WFP034	Coagulant System Process Piping	Main Building	2 - Poor	Supports are rusting.	Replace	Actiflo #1 Rebuild	2029	$ 6,000
WFP178	High Lift Pump #1	High Lift Pump Area	3 - Fair	-	Maintain until replacement; space 3-5 years from HLP#3 if possible.	High Lift Pump #1 Replacement	2029	$ 400,000
WFP182	High Lift Pumps 1-3 Check Valves	High Lift Pump Area	4 - Good	-	Replace	High Lift Pump #1 Replacement	2029	$ 37,800
WFP183	High Lift Pumps 1-3 Isolation Valves	High Lift Pump Area	4 - Good	-	Replace	High Lift Pump #1 Replacement	2029	$ 37,800
WFP001	Low Lift Pump #1	Raw Water Pumping Station	3 - Fair	-	Replace	Low Lift Pumping Station	2029	$ 60,000
WFP002	Low Lift Pump #2	Raw Water Pumping Station	4 - Good	-	Replace	Low Lift Pumping Station	2029	$ 60,000
WFP004	RWPS Check Valves	Raw Water Pumping Station	3 - Fair	-	Replace	Low Lift Pumping Station	2029	$ 37,800
WFP005	RWPS Isolation Valves	Raw Water Pumping Station	2 - Poor	Valves have significant amount of surface rust. No leaking.	Replace	Low Lift Pumping Station	2029	$ 50,400
WFP080	Air Scour Blower	Main Building	4 - Good	-	Replace proactively and keep the old one for redundancy	Filter Appurtenance Rebuild	2030	$ 70,000
WFP082	Filter #3 Filter-To-Waste Valve	Main Building	1 - Unacceptable	Client noted cannot be operated by hand, ideally new one could have option to operate manually.	Replacement valve to have option to operate manually	Filter Appurtenance Rebuild	2030	$ 40,000
WFP085	Filter #3 Air Scour Valve	Main Building	4 - Good	-	Replace	Filter Appurtenance Rebuild	2030	$ 60,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP086	Filter #3 Effluent Valve	Main Building	3 - Fair	Surface rust.	Replace	Filter Appurtenance Rebuild	2030	$ 76,000
WFP087	Filter #3 Backwash Influent Valve	Main Building	4 - Good	-	Replace	Filter Appurtenance Rebuild	2030	$ 90,000
WFP096	Filter #1 Filter-To-Waste Valve	Main Building	2 - Poor	Surface rust, gaskets are in bad condition.	Replace	Filter Appurtenance Rebuild	2030	$ 40,000
WFP097	Filter #2 Filter-To-Waste Valve	Main Building	2 - Poor	Surface rust, gaskets are in bad condition.	Replace	Filter Appurtenance Rebuild	2030	$ 40,000
WFP098	Filter #1 Air Scour Valve	Main Building	4 - Good	-	Replace	Filter Appurtenance Rebuild	2030	$ 60,000
WFP099	Filter #2 Air Scour Valve	Main Building	4 - Good	-	Replace	Filter Appurtenance Rebuild	2030	$ 60,000
WFP100	Filter #1 Effluent Valve	Main Building	3 - Fair	Surface rust.	Replace	Filter Appurtenance Rebuild	2030	$ 76,000
WFP101	Filter #2 Effluent Valve	Main Building	3 - Fair	-	Replace	Filter Appurtenance Rebuild	2030	$ 76,000
WFP102	Filter #1 Backwash Influent Valve	Main Building	3 - Fair	Surface rust.	Replace	Filter Appurtenance Rebuild	2030	$ 90,000
WFP103	Filter #2 Backwash Influent Valve	Main Building	3 - Fair	Surface rust.	Replace	Filter Appurtenance Rebuild	2030	$ 90,000
WFP104	Filters 1, 2 Process Piping	Main Building	3 - Fair	Surface rust on piping.	Replace	Filter Appurtenance Rebuild	2030	$ 26,000
WFP105	Filter #1 Drain-Inlet Gates	Main Building	3 - Fair	Reflection makes it so you cannot see gate.	Replace	Filter Appurtenance Rebuild	2030	$ 120,000
WFP106	Filter #2 Drain-Inlet Gates	Main Building	3 - Fair	-	Replace	Filter Appurtenance Rebuild	2030	$ 120,000
WFP113	Filter #3 Drain-Inlet Gates	Main Building	3 - Fair	-	Replace	Filter Appurtenance Rebuild	2030	$ 120,000
WFP118	Ammonia System Process Piping And Misc. Appurtenances	Former High Lift Pump Area	2 - Poor	Leakage reported by Town.	Replace	WFP Chemical Systems	2031	$ 7,800
WFP127	Chlorinator System #1	Main Building	3 - Fair	Town has indicated that this asset is rebuilt annually.	Replace	WFP Chemical Systems	2031	$ 60,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WFP128	Chlorinator System #2	Main Building	3 - Fair	Town has indicated that this asset is rebuilt annually.	Replace	WFP Chemical Systems	2031	$ 60,000
WFP179	High Lift Pump #2	High Lift Pump Area	3 - Fair	-	Maintain until replacement; space 3-5 years from HLP#1 if possible.	High Lift Pump #2 Replacement	2033	$ 400,000
WFP020	Actiflo #2 Influent Valve	Actiflo Basement	4 - Good	-	Replace	Actiflo #2 Rebuild	2034	$ 76,000
WFP022	Actiflo #2 Recirculation Pump	Actiflo Basement	4 - Good	-	Replace	Actiflo #2 Rebuild	2034	$ 30,000
WFP032	Actiflo Polymer Feed Pump #2	Main Building	3 - Fair	-	Replace	Actiflo #2 Rebuild	2034	$ 20,400

Appendix C

Studies Sheet

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WFP003	Low Lift Pump #3	Raw Water Pumping Station	1 - Unacceptable	It was noted on site that this pump loses its prime during operation, this could be a result of a suction leak.	15	Raw Water Pumping Station Inspection	Inspect suction line by a diver at the same time as structural inspection.	2024	$ 25,000
WFP009	RWPS Low Lift Pump Well/ Building Foundation	Raw Water Pumping Station	Not Inspected	Did not access within the tank. Town noted that concrete is original to the plant. From exterior, concrete appears to be generally in fair to locally poor condition. Delamination noted on exposed foundation at the back of the building.	20	Raw Water Pumping Station Inspection	Complete a structural inspection of tank interior. Cost is dependent on factors such as ability to take offline/ bypass, need for diver, etc.	2024	$ 100,000
WFP111	Filter #1 Tankage	Main Building	3 - Fair	Light corrosion, discoloured components observed at the water level; there appears to be a coating which has failed (see photo 1). Large opening in grating at pump which may be a hazard. Did not access within the tank, but concrete likely in fair condition based on inspection of Filter #2.	12	Filter #1 Inspection	Inspect tank surface during next media inspection/replacement.	2024	$ 25,000
WFP279	Former High Lift Pump Room Exterior Roofing Materials	Former High Lift Pump Area	3 - Fair	Appears to be generally in fair to locally poor condition. It appears to present evidence of water pooling (see photo 2), and evidence of some bulges (see photo 1).	8	Roof Repairs Study	Perform more detailed inspection of roofing condition and causes.	2024	$ 10,000
WFP298	High Lift Pump Room Exterior Roofing Materials	High Lift Pump Area	4 - Good	Appears to be generally in good condition. Appears to present evidence of water pooling (see photo 2).	7	Roof Repairs Study	Perform more detailed inspection of roofing condition and causes.	2024	$ 10,000
WFP311	Main Building (1966) Exterior Roofing Materials	Outside	4 - Good	Based on photos provided by client. Appears to be generally in good condition. Appears to present evidence of water pooling.	7	Roof Repairs Study	Perform more detailed inspection of roofing condition and causes.	2024	$ 10,000
WFP356	RWPS Exterior Roofing Materials	Raw Water Pumping Station	Not Inspected	Could not access.	8	Roof Repairs Study	Study to determine condition of the roof.	2024	$ 10,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WFP436	Main Building (Basement) Floors/Slabs On Grade	Main Building	2 - Poor	Appears to be generally in good to locally poor condition. Wide cracks with efflorescence noted in the conveyor room.	18	Misc. Building Repairs Study	Perform structural investigation into cause of floor cracking.	2024	$ 15,000
WFP840	WFP Generator Enclosure Fan And Dampers	Generator Room	1 - Unacceptable	Generator exhaust fan and dampers may have an issue. When generator is running it creates a vacuum inside the enclose and makes it very hard to open the doors. Unable to test.	10	Misc. Building Repairs Study	Study to determine cause of vacuum issue.	2024	$ 10,000
WFP138	Fluoride Pump	Main Building	2 - Poor	Surface rust.	13.5	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP139	Fluoride Transfer Pump	Main Building	2 - Poor	Surface rust, old.	13.5	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP140	Fluoride Day Tank	Main Building	2 - Poor	Signs of leaking.	13.5	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP141	Fluoride Storage Tanks	Main Building	2 - Poor	Surface rust, old.	13.5	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP142	Fluoride System Process Piping And Misc. Appurtenances	Main Building	2 - Poor	The water pipes are severely corroded.	13.5	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP258	Sump Pump - Fluoride Room	Main Building	2 - Poor	Old, rusted.	4	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832
WFP832	Fluoride Room Mechanical Equipment Fan/Louver/Dampers	Main Building	1 - Unacceptable	Equipment has failed. Operator comment is to demo this room and build a dedicated fluoride room in the main building. Extremely rusted equipment.	10	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	$ 25,000
WFP916	Fluoride Room Shower/Eyewash Station	Main Building	2 - Poor	Rusty pipes.	18	Fluoride Room Relocation Study	Study to define scope of fluoride room relocation.	2025	See WFP832

Appendix D

Operations and Manual Sheet

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP433	WFP Undefined Storm Drain	Outside	1 - Unacceptable	Unknown outlet.	10	Inspect and confirm exsistance of storm sewer outlet. If confirmed, provide a catch basin, alternatively regrade area to provide postive drainage away from the building.	2024	$ 5,000.00
WFP015	Actiflo Residual Tank Effluent Valve #3	Actiflo Basement	1 - Unacceptable	Leaking, severely rusted.	10	Needs immediate replacement .as it is leaking	2024	$ 20,000.00
WFP013	Actiflo Residual Tank Effluent Valve #1	Actiflo Basement	1 - Unacceptable	Leaking, lots of surface rust.	10	Needs immediate replacement as it is leaking.	2024	$ 20,000.00
WFP014	Actiflo Residual Tank Effluent Valve #2	Actiflo Basement	1 - Unacceptable	Leaking, severely rusted.	10	Needs immediate replacement as it is leaking.	2024	$ 20,000.00
WFP089	Filter #3 Turbidity Analyzer	Main Building	4 - Good	-	10	Provide a shelf spare to mitigate risk.	2024	$ 6,000.00
WFP232	High Lift Pump Room Emergency Lights	High Lift Pump Area	1 - Unacceptable	No emergency lights in this area.	10	Recommend adding emergency lights.	2024	$ 1,200.00
WFP112	Filter #2 Tankage	Main Building	3 - Fair	Light corrosion, discoloured components observed at the water level; there appears to be a coating which has failed (see photo 1). Inspected within tank during underdrain replacement and found concrete to be in fair condition; refer to letter dated February 16, 2024.	12	Repair areas of severe scaling; refer to letter dated February 16, 2024 (complete now). Consider replacement of original protective coating for additional protection.	2024	$ 10,000.00
WFP168	Clearwell 1 To 2 Process Piping	High Lift Pump Area	2 - Poor	Two of the welds in the high lift pump room are leaking.	9	Repair leak in process piping	2024	$ 5,000.00
WFP190	Backwash Residuals Tank High Level	Underground Equipment	Not Inspected	Unable to see (inside tank); condition unknown.	10	Replace	2024	$ 150.00
WFP416	Hach Turbidity Meter	Main Building	1 - Unacceptable	No functioning.	5	Replace	2024	$ 12,000.00
WFP930	Section Of Raw Water Piping To Actiflo Treatment	Former High Lift Pump Area	1 - Unacceptable	Section of raw water piping below grating is severely rusted and leaking.	15	Replace	2024	$ 15,000.00

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP224	Former High Lift Pump Room Interior Lighting	Former High Lift Pump Area	3 - Fair	Clean and secure covers.	7	Secure or replace missing covers. Ensure properly maintained and cleaned.	2024	$ 500.00
WFP417	DR 2800 Spectrophotometer	Main Building	2 - Poor	Parts are hard to find.	4.5	Replace	2025	$ 8,000.00
WFP193	Sodium Bisulphite Room Leak Detector	Former High Lift Pump Area	2 - Poor	Appears to be in poor condition.	9	Replace. Consider replacing sensor with something that would provide quicker leak detection response inside the secondary containment. Note conduits and receptacle in the room should be replaced.	2025	$ 150.00
WFP023	Actiflo #1 Clarified Water Turbidity	Actiflo Basement	3 - Fair	-	12	Replace	2027	$ 6,000.00
WFP024	Actiflo #2 Clarified Water Turbidity	Actiflo Basement	3 - Fair	-	12	Replace	2027	$ 6,000.00
WFP027	Actiflo #1 Recirculation Pump Discharge Pressure	Actiflo Basement	4 - Good	-	7	Replace	2027	$ 1,700.00
WFP028	Actiflo #2 Recirculation Pump Discharge Pressure	Actiflo Basement	4 - Good	-	7	Replace	2027	$ 1,700.00
WFP043	Microsand Recirculation Pressure Transmitters	Actiflo Basement	4 - Good	Same for both. Good condition.	7	Replace	2027	$ 2,000.00
WFP058	Filter #1 Flow Meter	Main Building	3 - Fair	-	8	Replace	2027	$ 5,000.00
WFP092	Air Scour Blower Discharge Pressure	Main Building	4 - Good	-	7	Replace	2027	$ 1,700.00
WFP167	Clearwell 1 To 2 Isolation Valves	High Lift Pump Area	2 - Poor	VF30004 is missing operator and there is significant surface rust.	9	Replace	2027	$ 45,000.00
WFP174	Treated Water Pressure Sensor	Former High Lift Pump Area	4 - Good	-	7	Replace	2027	$ 5,500.00
WFP204	Backwash Residuals Treatment Check Valves	High Lift Pump Area	2 - Poor	Missing operator on some valves. Missing swing weight on VAC-61001.	9	Replace	2027	$ 14,000.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP205	Backwash Residuals Treatment Isolation Valves	High Lift Pump Area	2 - Poor	Lots of surface rust.	9	Replace	2027	$ 15,300.00
WFP206	Backwash Tank Sludge Effluent Valve	High Lift Pump Area	2 - Poor	Lots of surface rust.	9	Replace	2027	$ 25,000.00
WFP214	Sump Pump- N/E 3rd Floor	Former High Lift Pump Area	2 - Poor	Old, rusted.	4.5	Replace	2027	$ 10,000.00
WFP215	Sump Pump S/E 3rd Floor	Former High Lift Pump Area	2 - Poor	Old, rusted.	4.5	Replace	2027	$ 10,000.00
WFP235	High Lift Pump Room Hydronic Unit Heaters	High Lift Pump Area	2 - Poor	Hydronic piping is rusted. Could only locate 3 unit heaters in the high lift pump room.	4.5	Replace	2027	$ 12,000.00
WFP405	Lighting Panel - Basement	Main Building	2 - Poor	Mild corrosion.	9	Replace	2027	$ 3,300.00
WFP849	Power Factor Corrector - Former High Lift Pump Area	Former High Lift Pump Area	3 - Fair	-	8	Replace	2027	$ 2,350.00
WFP918	Sodium Bisulphite Eyewash And Hot Water Tank	Former High Lift Pump Area	2 - Poor	Surface Rust.	18	Replace	2027	$ 6,000.00
WFP922	Sluice Gates	Outside	2 - Poor	Old, surface rust.	9	Replace	2027	$ 30,000.00
WFP923	Treated Water Distribution Isolation Valve	Former High Lift Pump Area	2 - Poor	Fully rusted.	9	Replace	2027	$ 5,100.00
WFP932	Raw Water Sample Pump	Former High Lift Pump Area	2 - Poor	Old, significant surface rust surrounding the pump.	13.5	Replace	2027	$ 1,000.00
WFP119	Ammonia Room Sensor	Former High Lift Pump Area	3 - Fair	-	16	Replace (confirm if required with change of chemical).	2027	$ 1,000.00
WFP181	Pressure Relief Valve	High Lift Pump Area	2 - Poor	Valve leaking and significant surface rust.	9	Replace valves	2027	$ 4,000.00
WFP192	Sodium Bisulphite Tank Level	Former High Lift Pump Area	3 - Fair	Mislabelled.	8	Replace. Correct label.	2027	$ 2,000.00
WFP007	RWPS Wet Well Level	Raw Water Pumping Station	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP017	Actiflo #1 Influent Flow Meter	Actiflo Basement	4 - Good	-	7	Replace	2028	$ 5,000.00
WFP018	Actiflo #2 Influent Flow Meter	Actiflo Basement	4 - Good	-	7	Replace	2028	$ 5,000.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP025	Actiflo #1 Clarified Water pH Analyzer	Actiflo Basement	4 - Good	-	10.5	Replace	2028	$ 6,000.00
WFP026	Actiflo #2 Clarified Water pH Analyzer	Actiflo Basement	4 - Good	-	10.5	Replace	2028	$ 6,000.00
WFP035	Alum Storage Tank #1 Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP036	Alum Storage Tank #2 Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP044	Actiflo #1 Scraper Torque Sensor	Main Building	4 - Good	-	7	Replace	2028	$ -
WFP045	Actiflo #2 Scraper Torque Sensor	Main Building	4 - Good	-	7	Replace	2028	$ -
WFP046	Actiflo #1 Level High-High	Main Building	4 - Good	-	7	Replace	2028	$ 150.00
WFP047	Actiflo #2 Level High-High	Main Building	4 - Good	-	7	Replace	2028	$ 150.00
WFP052	Actiflo Polymer Mixing Tank Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP053	Actiflo Polymer Day Tank 1 Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP054	Actiflo Polymer Day Tank 2 Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP059	Filter #2 Flow Meter	Main Building	4 - Good	-	7	Replace	2028	$ 5,000.00
WFP061	Filter #2 Headloss Meter	Main Building	4 - Good	-	7	Replace	2028	$ 5,000.00
WFP071	Filter Influent Channel Level	Main Building	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP072	Influent Channel High-High Level	Main Building	4 - Good	-	7	Replace	2028	$ 450.00
WFP090	Filter #3 Headloss Meter	Main Building	4 - Good	-	7	Replace	2028	$ 5,000.00
WFP093	Air Scour Blower Discharge Temp. High	Main Building	4 - Good	Need photo at better angle.	7	Replace	2028	$ 500.00
WFP107	Filter #1 Level	Main Building	4 - Good	-	10.5	Replace	2028	$ 2,000.00
WFP108	Filter #2 Level	Main Building	4 - Good	-	10.5	Replace	2028	$ 2,000.00
WFP114	Filter #3 Level	Main Building	4 - Good	-	10.5	Replace	2028	$ 2,000.00
WFP126	Chlorinator Room Gas Sensor	Main Building	4 - Good	-	14	Replace	2028	$ 1,000.00
WFP131	Chlorine Injectors	Main Building	3 - Fair	-	12	Replace	2028	$ 4,000.00
WFP171	Clearwell# 2 Influent Flow Meter	Former High Lift Pump Area	4 - Good	-	7	Replace	2028	$ 5,000.00

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP172	Clearwell #2 Milltronics	High Lift Pump Area	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP177	Treated Water Total Cl2 Analyzer	Former High Lift Pump Area	4 - Good	-	10.5	Replace	2028	$ 6,000.00
WFP189	Backwash Residuals Tank Level	High Lift Pump Area	4 - Good	-	7	Replace	2028	$ 2,000.00
WFP316	Main Building (1966) Exterior Stairs	Outside	2 - Poor	Appears to be generally in poor condition. The stairs at main entrance appears to have concrete delamination and spalls with exposed corroded reinforcing steel at multiple locations. The stairs at the loading dock appears to have a large spall with exposed corroded reinforcing steel on the underside of the stairs.	13.5	Replace	2028	$ 5,112.00
WFP374	ACP-200 PLC Control Cabinet In High Lift Pump Gallery	Former High Lift Pump Area	4 - Good	-	14	Replace	2028	$ 25,000.00
WFP383	Main PLC Control Cabinet For The Plant	Main Building	4 - Good	-	14	Replace	2028	$ 50,000.00
WFP388	UPS For FCP-300	Main Building	4 - Good	-	7	Replace	2028	$ 1,500.00
WFP389	Verbatim Auto Dialer	Main Building	4 - Good	-	7	Replace	2028	$ 4,000.00
WFP390	UPS For Office Computer System	Main Building	4 - Good	-	7	Replace	2028	$ -
WFP394	UPS - Former High Lift Pump Area	Former High Lift Pump Area	4 - Good	-	7	Replace	2028	$ 1,500.00
WFP395	RWPS PLC Control Cabinet	Raw Water Pumping Station	4 - Good	-	14	Replace	2028	$ 10,000.00
WFP846	Polymer Mixing Room PLC Panel	Main Building	4 - Good	-	14	Replace	2028	$ 2,000.00
WFP869	High Lift Flow Meter	Former High Lift Pump Area	4 - Good	-	7	Replace	2028	$ 5,000.00
WFP091	Filter #3 Effluent Flow Meter	Main Building	5 - Excellent	-	6	Replace	2029	$ 5,000.00
WFP122	Aqueous Ammonia Drum	Former High Lift Pump Area	3 - Fair	-	12	Replace	2029	$ 5,000.00
WFP187	Backwash Residuals Mixer #1	Outside	3 - Fair	Surface rust.	8	Replace	2029	$ 16,000.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP188	Backwash Residuals Mixer #2	Outside	3 - Fair	Some surface rust.	8	Replace	2029	$ 16,000.00
WFP197	Sodium Bisulphite Day Tank	Former High Lift Pump Area	3 - Fair	-	12	Replace	2029	$ 7,000.00
WFP198	Residuals Sludge Pump #1	Former High Lift Pump Area	3 - Fair	-	12	Replace	2029	$ 17,400.00
WFP199	Residuals Sludge Pump #2	Former High Lift Pump Area	3 - Fair	-	12	Replace	2029	$ 17,400.00
WFP225	Sump Pump- S/W 3rd Floor	High Lift Pump Area	3 - Fair	-	4	Replace	2029	$ 10,000.00
WFP259	Separated Hot Water Recirculation Pump	Main Building	2 - Poor	Old	12	Replace	2029	$ 2,400.00
WFP396	RWPS UPS For ACP-500	Raw Water Pumping Station	5 - Excellent	Was replaced.	6	Replace	2029	$ 1,500.00
WFP925	Clearwell 1 Drain Valves	Former High Lift Pump Area	3 - Fair	Original valves have been abandoned under grating see picture.	8	Replace	2029	$ 3,400.00
WFP927	Isolation Valve 400mm	Former High Lift Pump Area	3 - Fair	Rusty.	8	Replace	2029	$ 14,000.00
WFP157	Soda Ash System Bag Empty Detector	Main Building	3 - Fair	Needs maintenance/cleaning.	6	Replace (with bag system)	2029	$ -
WFP158	Soda Ash Hopper Level Low-Low	Main Building	3 - Fair	-	6	Replace (with mixing tank)	2029	$ -
WFP062	Filter #1 Turbidity Analyzer	Main Building	4 - Good	-	7.5	Replace	2030	$ 6,000.00
WFP217	Former High Lift Pump Room Radiant Tube Heater	Former High Lift Pump Area	3 - Fair	-	4	Replace	2030	$ 2,500.00
WFP228	High Lift Pump Room Radiant Tube Heater	High Lift Pump Area	3 - Fair	-	4	Replace	2030	$ 2,500.00
WFP229	High Lift Pump Room Exhaust Fan	High Lift Pump Area	3 - Fair	-	8	Replace	2030	$ 4,800.00
WFP410	Lighting Panel - Ground Floor Entrance Foyer	Main Building	3 - Fair	-	8	Replace	2030	$ 2,800.00
WFP419	Backflow Preventors (3)	Main Building	3 - Fair	Minor surface rust.	8	Replace	2030	$ 18,000.00
WFP829	Main Building Hydronic Heaters South Side	Main Building	3 - Fair	-	4	Replace	2030	$ 3,000.00
WFP830	Transfer Fan	Main Building	3 - Fair	-	8	Replace	2030	$ 3,500.00

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP833	Separated Water Back Flow Preventer	Former High Lift Pump Area	3 - Fair	-	8	Replace	2030	$ 6,000.00
WFP920	Eye Wash Station	Main Building	3 - Fair	No flow switch.	16	Replace	2030	$ 3,000.00
WFP371	Ammonia Room Alarm Panel	High Lift Pump Area	3 - Fair	Identified as not in use and not planned for replacement.	8	Replace (confirm if required with change of chemical).	2030	$ 5,000.00
WFP156	Soda Ash Hopper Level High-High	Main Building	4 - Good	-	5	Replace (with mixing tank)	2030	$ -
WFP159	Soda Ash Mixing Tank Level Switch	Main Building	4 - Good	-	5	Replace (with mixing tank)	2030	$ -
WFP384	Existing Control Cabinet Next To ACP-100	Main Building	3 - Fair	-	8	Replace components as required.	2030	$ 20,000.00
WFP397	Residuals Polymer System Field Control Panel	Outside	3 - Fair	Label missing/fallen off.	8	Replace label immediately; replace at end of life.	2030	$ 5,000.00
WFP937	Actiflo #2 Coagulation Tank Mixer	Main Building	3 - Fair	Coagulation mixer 2 may have oil leak.	7	Address oil leak immediately. Replace at end of life.	2032	$ 40,000.00
WFP042	Actiflo #2 Flash Mix Tank Mixer	Main Building	3 - Fair	-	7	Replace	2032	$ 40,000.00
WFP094	Filter #1 Sample Pump	Main Building	3 - Fair	-	10.5	Replace	2032	$ 1,600.00
WFP095	Filter #2 Sample Pump	Main Building	3 - Fair	-	10.5	Replace	2032	$ 1,600.00
WFP130	Chlorine Room Scale #1 And #2	Main Building	3 - Fair	-	10.5	Replace	2032	$ 7,200.00
WFP196	Sodium Bisulphite Transfer Pump #1	Former High Lift Pump Area	4 - Good	-	10.5	Replace	2032	$ 1,000.00
WFP226	Sump Pump N/W 3rd Floor	High Lift Pump Area	4 - Good	-	3.5	Replace	2032	$ 10,000.00
WFP823	Injection Tank Drain Valve	Actiflo Basement	3 - Fair	-	7	Replace	2032	$ 10,000.00
WFP824	Flash Mix Tank Drain Valve	Actiflo Basement	3 - fair	-	7	Replace	2032	$ 10,000.00
WFP827	Expansion Tank For Hydronic Heater System	Actiflo Basement	4 - Good	-	10.5	Replace	2032	$ 1,000.00
WFP865	Soda Ash Day Tank	Main Building	4 - Good	-	10.5	Replace	2032	$ 16,000.00
WFP866	Soda Ash Day Tank Mixer	Main Building	4 - Good	-	7	Replace	2032	$ 6,500.00
WFP926	Clearwell 2 Drain Valves	Former High Lift Pump Area	4 - Good	-	7	Replace	2032	$ 3,400.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP931	Filtered Water Sample Pump	Main Building	4 - Good	-	10.5	Replace	2032	$ 500.00
WFP936	Actiflo #2 Maturation Tank Mixer	Main Building	3 - Fair	-	7	Replace	2032	$ 40,000.00
WFP938	Actiflo #2 Injection Tank Mixer	Main Building	3 - Fair	-	7	Replace	2032	$ 40,000.00
WFP432	WFP Retaining Wall - South East Side	Outside	2 - Poor	The blocks are leaning away and appear to be loose.	3.5	Inspect and maintain periodically.	2033	$ 2,100.00
WFP060	Filter #1 Headloss Meter	Main Building	4 - Good	-	3	Replace	2033	$ 5,000.00
WFP129	Chlorine Storage Room Gas Sensor	Main Building	4 - Good	-	6	Replace	2033	$ 1,000.00
WFP245	Main Building (1966) Exterior Lighting	Outside	3 - Fair	-	7	Replace	2033	$ 2,000.00
WFP260	Lab/Control Room Fan Coil Unit	Main Building	3 - Fair	-	7	Replace	2033	$ 10,000.00
WFP261	Exhaust Extractor Arm	Main Building	3 - Fair	-	7	Replace	2033	$ 15,000.00
WFP269	Exterior Lighting	Outside	3 - Fair	Pole mounted.	7	Replace	2033	$ 2,000.00
WFP349	WFP Laboratory Millworks And Cabinetry	Main Building	4 - Good	Appears to be generally in good condition.	3.5	Replace	2033	$ 12,500.00
WFP379	Soda Ash System HMI/Control Panel	Main Building	3 - Fair	-	7	Replace	2033	$ 5,000.00
WFP398	Basement 600VAC Distribution	Main Building	4 - Good	-	7	Replace	2033	$ 8,000.00
WFP400	High Lift Pump Gallery 600 Vac Distribution	High Lift Pump Area	4 - Good	-	7	Replace	2033	$ 8,000.00
WFP401	Lighting Panel - High Lift Pump Gallery	High Lift Pump Area	4 - Good	-	7	Replace	2033	$ 3,300.00
WFP402	Distribution Transformer Bb - Main Building	High Lift Pump Area	4 - Good	-	14	Replace	2033	$ 6,000.00
WFP404	Lighting Panel - Basement	Main Building	3 - Fair	-	7	Replace	2033	$ 3,300.00
WFP835	Old High Lift Pump Room Gas Water Heater	Former High Lift Pump Area	4 - Good	Two water heaters.	3.5	Replace	2033	$ 5,000.00
WFP836	High Lift Pump Room Damper And Louver	High Lift Pump Area	4 - Good	-	3.5	Replace	2033	$ 600.00
WFP837	Main Building Rooftop Fan	Main Building	3 - Fair	-	7	Replace	2033	$ 4,800.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP847	Ammonia Room Unit Heater	Former High Lift Pump Area	4 - Good	-	3.5	Replace	2033	$ 3,000.00
WFP848	Ammonia Room Exhaust Fan And HVAC Equipment	Former High Lift Pump Area	4 - Good	-	7	Replace	2033	$ 3,500.00
WFP851	Sump Pump Local Control Panel	High Lift Pump Area	4 - Good	-	7	Replace	2033	$ 5,000.00
WFP852	Main Building Basement Local Control Panel	Main Building	3 - Fair	-	7	Replace	2033	$ 7,000.00
WFP867	Post-Chlorinator Chlorine Weigh Scale	Main Building	4 - Good	-	7	Replace	2033	$ 2,000.00
WFP868	Pre-Chlorinator Chlorine Weigh Scale	Main Building	4 - Good	-	7	Replace	2033	$ 2,000.00
WFP223	Former High Lift Pump Room Exit Signs	Former High Lift Pump Area	3 - Fair	1966 style chemical signs.	7	Replace as required with electrically powered exit signs.	2033	$ 670.00
WFP233	High Lift Pump Room Exit Signs	High Lift Pump Area	3 - Fair	1966 style chemical signs.	7	Replace as required with electrically powered exit signs.	2033	$ 670.00
WFP255	Main Building Expansion Exit Signs	Main Building	3 - Fair	1966 style chemical signs.	7	Replace as required with electrically powered exit signs.	2033	$ 1,000.00
WFP184	High Lift Pumps 1-3 Suction Piping And Valves	High Lift Pump Area	3 - Fair	-	10.5	Repair as required	2034	$ 10,000.00
WFP008	Low Lift Pressure Release Valve	Raw Water Pumping Station	4 - Good	3 automatic air valves, pump #3 suction side 1 manual air valve.	6	Replace	2034	$ 12,000.00
WFP041	Actiflo #1 Flash Mix Tank Mixer	Main Building	4 - Good	-	6	Replace	2034	$ 40,000.00
WFP051	Actiflo Polymer Mixer	Main Building	4 - Good	-	6	Replace	2034	$ 5,000.00
WFP055	Actiflo Polymer Day Tank 1	Main Building	4 - Good	-	9	Replace	2034	$ 7,000.00
WFP056	Actiflo Polymer Day Tank 2	Main Building	4 - Good	-	9	Replace	2034	$ 7,000.00
WFP057	Actiflo Polymer Mixing Tank	Main Building	4 - Good	-	9	Replace	2034	$ 7,000.00
WFP081	Filter #3 Sample Pump	Main Building	4 - Good	-	9	Replace	2034	$ 1,600.00
WFP083	Air Scour Check Valve	Main Building	4 - Good	-	6	Replace	2034	$ 5,000.00
WFP084	Air Scour Isolation Valve	Main Building	4 - Good	-	6	Replace	2034	$ 2,200.00

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WFP247	Boiler Recirculation Pump	Actiflo Basement	4 - Good	-	9	Replace	2034	$ 10,200.00
WFP380	UPS For FCP-400	Main Building	4 - Good	Town reports that this unit was recently replaced due to lower capacity requirements.	2	Replace	2034	$ 800.00
WFP418	Hach One pH Meter	Main Building	4 - Good	-	3	Replace	2034	$ 2,000.00
WFP933	Actiflo #1 Maturation Tank Mixer	Main Building	4 - Good	-	6	Replace	2034	$ 40,000.00
WFP935	Actiflo #1 Injection Tank Mixer	Main Building	4 - Good	-	6	Replace	2034	$ 40,000.00
WFP939	Actiflo #1 Coagulation Tank Mixer	Main Building	4 - Good	-	6	Replace	2034	$ 40,000.00
WFP039	Scraper Actiflo Train #1	Main Building	4 - Good	-	6	Town noted to change parts only.	2034	$ 40,000.00
WFP040	Scraper Actiflo Train #2	Main Building	4 - Good	-	6	Town noted to change parts only.	2034	$ 40,000.00
WFP048	Actiflo Hydrocyclone	Main Building	4 - Good	-	6	Town noted to replace components as they wear out.	2034	$ 40,000.00

Appendix E

April 29, 2024, Workshop Meeting
Minutes and Presentation

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Arnprior WFP-WPCC Conditions Assessments

Project Meeting
Minutes of Meeting No. 3

Attendance:			
	Patrick Foley	Town of Arnprior (Town)	pfoley@arnprior.ca
	John Steckly	Town of Arnprior (Town)	jsteckly@arnprior.ca
	Scott Matthews	Town of Arnprior (Town)	smatthews@arnprior.ca
	Ben Ritchie	Town of Arnprior (Town)	britchie@arnprior.ca
	Mark Buchanan	J.L. Richards & Associates Limited (JLR)	mbuchanan@jlrichards.ca
	Carolyn Chan	J.L. Richards & Associates Limited (JLR)	cchan@jlrichards.ca
	Yazeed Al Adawi	J.L. Richards & Associates Limited (JLR)	yaladawi@jlrichards.ca

The meeting commenced at 1:00 p.m. on Monday, April 29, 2024 on Microsoft Teams (Virtual).

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		**ACTION BY**
	New Business	
3.1	WFP & WPCC – 10 Year Projects and General Feedback	
	JLR presented a breakdown of the 10-year projects assigned to the WFP and WPCC and discussed the overall cost projections along with the project listing.	INFO
	Repair/replacement costing as presented is for materials only. Town requested that the final report show capital project budgets with 100% mark-up for labour. O&M costs will be left as is.	JLR
	JLR noted that in some cases, a more detailed study was recommended to define the scope of a future capital project. The current project list includes budget for the study but nothing for the future capital project. Town requested that a capital project be defined for each case with the caveat that the scope and budget would be refined by the study. JLR to look into modifying database structure for this purpose.	JLR
	Town prefers that O&M recommendations be distributed more evenly over the 10 years, and that high risk assets be prioritized. JLR to look into modifying recommendations and/or data presentation within report.	JLR
3.2	WFP – Town Comments & Feedback	
	The Town presented their feedback and provided an Excel spreadsheet to reference their major recommendations and concerns. The following items were discussed during the meeting:	
	Actiflo and Filter Rebuild:	

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Arnprior WFP-WPCC Conditions Assessments

Project Meeting
Minutes of Meeting No. 3

ITEM	**ACTION BY**
• The Town noted that they generally run both Actiflo #1 and Actiflo #2 simultaneously, but they considered the option of operating one at a reduced capacity while keeping the other fully operational during repair/replacement works. They suggested breaking into three distinct projects: Actiflo #1, Actiflo #2, and Filter Appurtenances. It was also recommended to stagger the Actiflo replacements by 5 years.	JLR
Filter Media Replacements	
• The Town noted that the underdrains in Filter #2 are in poor condition, and they suspect that the underdrains in Filter #1 and Filter #3 might also be in similar shape because they are showing signs of comparable failures. To address this, the Town plans to expedite the repair schedule to 2025. JLR to include underdrain replacement in each Filter Media Replacement capital project.	JLR
Fluoride Room	
• The Town noted that fumes from the fluoride room are damaging equipment and that a stainless-steel pipe is deteriorating prematurely, and advised that they plan to complete HVAC and heating improvements in 2024 (i.e. prior to the fluoride room re-location study/ implementation). JLR to include $50,000 in 2024 for this work; discussed assigning to a representative asset such as a fan, similar to Sodium Bisulphite room (see below).	JLR
Low Lift Pump #3 Replacement	
• Commenting on JLR recommendation of a hydraulic study for LLP#3, the Town noted that they have been experiencing issues with Pump #3 since its installation and have already studied several potential issues; consider most likely explanation to be an issue with the suction line. Recommendation (study/ repair/ replacement) for LLP#3 must include this piping; should be inspected via diver. JLR to modify recommendation.	JLR
Separated Water Valve Replacement/ Distribution Yard Piping	
• The Town noted the need for a redundant distribution discharge pipe extending outside the plant; has been discussed during separate JLR project related to new river crossing. This would make replacement of the separated water valve much simpler. The Town suggested handling the redundant pipe as a separate capital project to be completed ahead of the valve replacement. JLR to add a capital project for a second water main and increase the COF value for the existing water main. Town to provide costing.	JLR Town
WFP Chemical Systems	

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

ITEM		ACTION BY
	• The Town noted that they disagree with the current assessment of the soda ash pump. While the connections are in rough shape, the pump itself was replaced in 2017 and has remained in good condition since then. JLR to adjust their recommendations and change the condition rating to "Fair".	JLR
	The Town recommended adding the following as new projects:	
	Coagulant Tank	
	• The Town noted that the tank needs to be replaced as it has been in place since 1960. They also indicated a need to reconfigure the plumbing around the tank.	JLR
	Sodium Bisulphite Room	
	• The Town noted that fumes in the Sodium Bisulphite Room are damaging equipment. As in the fluoride room, the plan is to improve ventilation in the short term to prevent further damage, then replace the mechanical plumbing components on a like-for-like basis. JLR to add recommendation.	JLR
3.3	WPCC – Town Comments & Feedback	
	The following items were discussed during the meeting:	
	Chemical Building Refurbishment Scoping Study	
	• The Town noted the need to push this study to 2025 and requested anticipated repair/replacement costs after the study is completed, acknowledging that actual scope of repair/replacement would not be known at this time. JLR to use total asset replacement costs as placeholder value, noting that scope will be refined after study.	JLR
	• The Town asked whether a joint ventilation scoping study for chemical building with the WFP fluoride room would provide economy of scale benefits. JLR to consider grouping.	
	Digester and Gas Flare Equipment	
	• The Town noted that operators are having difficulties operating the valves in this system. JLR to flag this within database.	JLR
	Headworks Blower #1	

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Arnprior WFP-WPCC Conditions Assessments

Project Meeting
Minutes of Meeting No. 3

ITEM	**ACTION BY**
• The Town noted that the blower is in good condition and that they prefer to stock spare parts and do routine maintenance (e.g. every 5-7 years) rather than replace. JLR to modify recommendation.	JLR
Headworks Manual Screen	
• The Town noted that cleaning the screen in its current state is dangerous. They recommended moving this item up the queue to 2025 for operations and maintenance. Cost appears to be too low. JLR to modify.	JLR
Digesters/Gas Proofing	
• The Town asked for clarification around the $360,000 item for inspection; JLR confirmed that this would include cleaning out the digesters. JLR noted that sometimes both gas proofing and digester roof need to be replaced at the same time for gas proofing company to provide warranty. Town asked for a new project following this study representing actual gas proofing repairs and roof replacement. JLR to add.	JLR
Final Clarifiers	
• The Town noted that the weir in Final Clarifier #2 is detached from the concrete structure. The Town showed photos of the weirs, and noted that they attempted to re-anchor the steel into the concrete in Final Clarifier #2 during the summer of 2018, but these efforts were unsuccessful. The plan is to use a stainless-steel insert to replace the current weirs. The Town recommended conducting an options analysis to determine the best course of action for addressing this issue. For example, instead of fastening the weirs directly into the concrete, it may be preferable to bolt the weirs to a stainless steel angle bolted to the concrete structure at a better location. Preferred alternative would allow weir height to be adjusted. JLR will review this item with the structural team and add a Study for recommended options analysis.	JLR
Odour Control System	
• The Town requested expediting the replacement of the filter media for the odour control system and providing a cost estimate for this work. JLR to add.	JLR
Blower Building Basement Floor	
• The Town noted that a study to investigate the cause of floor cracking is not required. JLR to review.	JLR
Grit Slurry Pump # 1	
• The Town noted that the pump is being replaced. JLR to modify recommendation.	JLR

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Arnprior WFP-WPCC Conditions Assessments

Project Meeting
Minutes of Meeting No. 3

ITEM		**ACTION BY**
	Clarifier Mechanisms	
	• The Town noted that they would like to order chain and flight collectors to keep in the shelf in case of breakage. They also noted that they would prefer the purchase of material as a capital project scheduled for either 2025 or 2026. JLR to modify recommendations.	JLR
	Sludge Mixing Pump	
	• The Town noted that they have an extra sludge mixing pump in the shelf such that purchase of a new unit is not required at end of life. JLR to modify recommendation.	JLR
	Generator	
	• The Town noted that the automatic transfer switch for the generator will require repair prior to genset replacement. JLR to modify recommendation.	JLR
3.4	Next Steps	
	JLR to modify database per feedback and discussions. Aim to submit two draft reports for end of May.	

Meeting adjourned at 2:30 p.m.

Next meeting date is TBD.

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

Prepared by: Issued on: May 10, 2024

Yazeed Al Adawi,
Environmental Engineering Intern

Distribution: All attendees
CC:

April 29, 2024

Town of Arnprior WFP & WPCC Condition Assessment

Phase 4 – Workshop Presentation

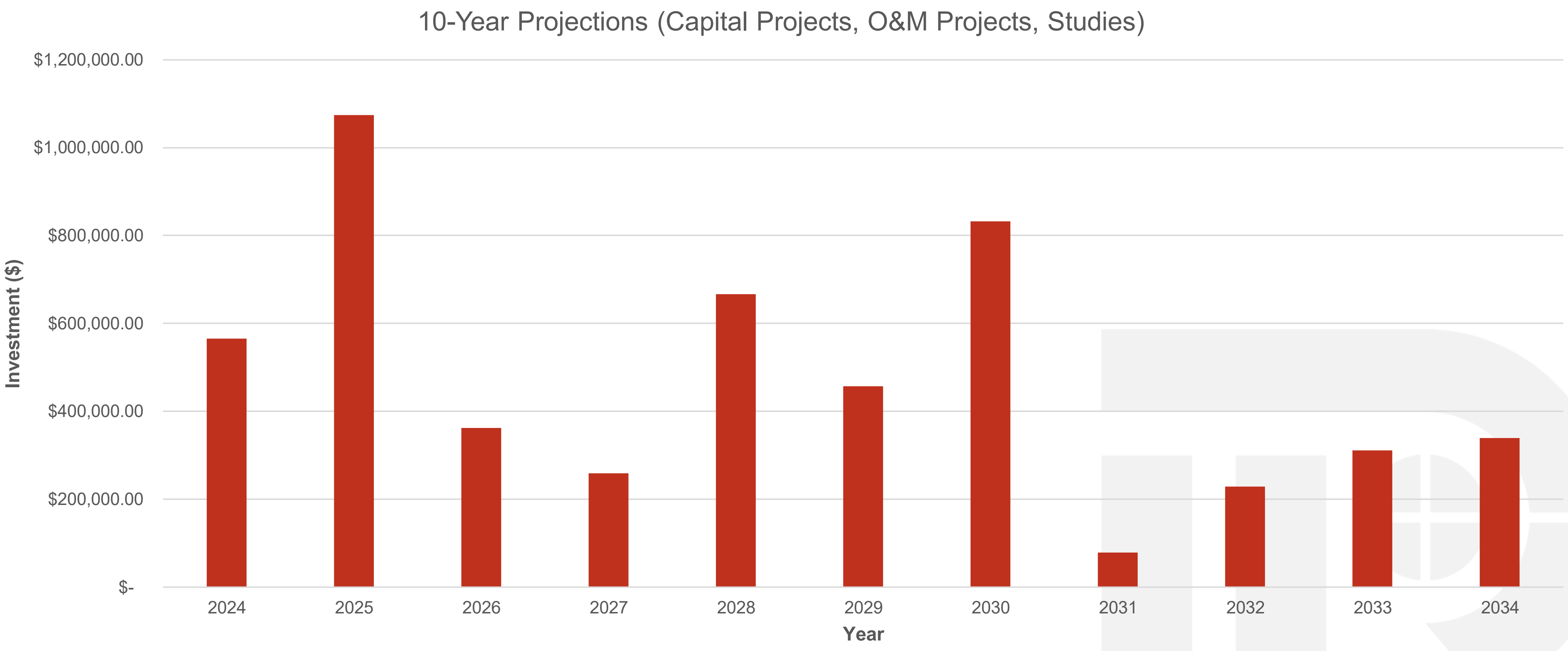
CANADA BEST MANAGED COMPANIES Platinum member

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

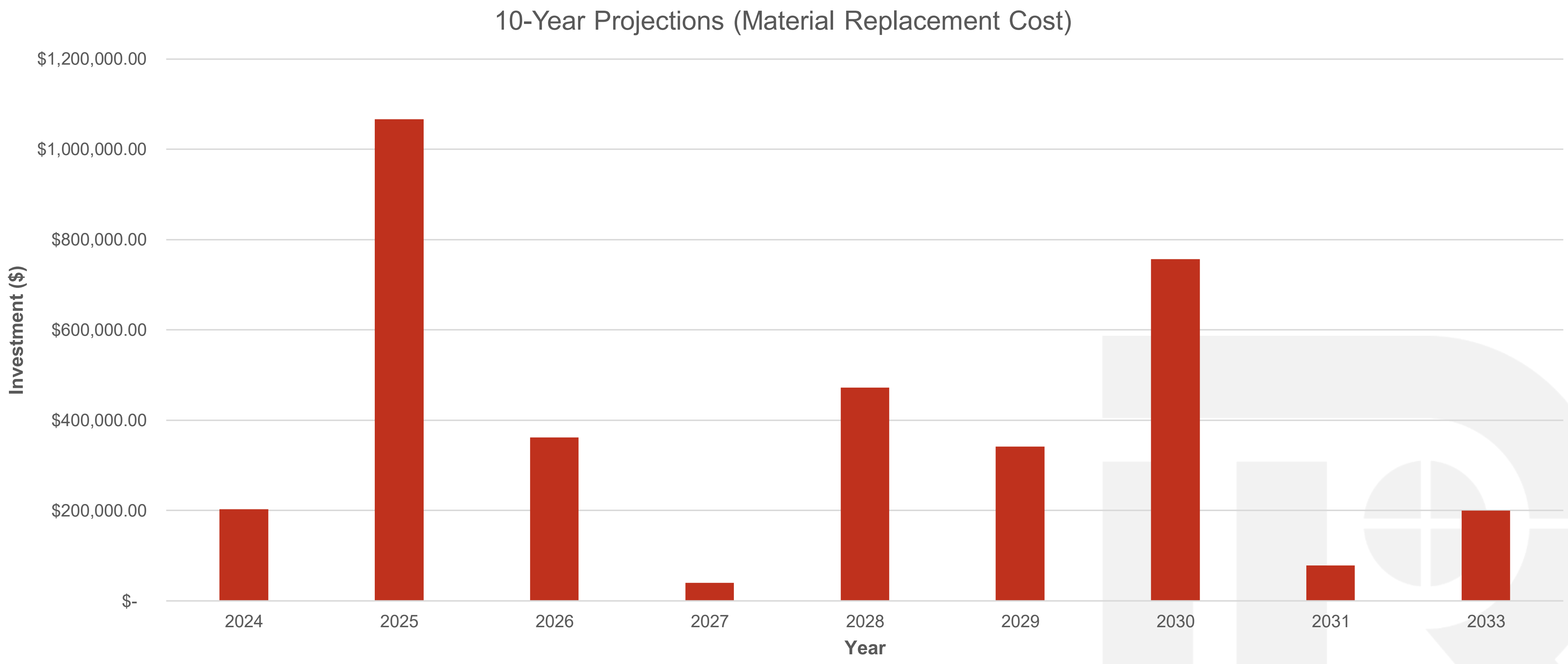
Overview

- **Water Filtration Plant:**
  - 10-year investment projections:
    - Capital projects
    - Operation and maintenance projects
    - Studies
  - Project Summaries
- **Water Pollution Control Centre:**
  - 10-year investment projections:
    - Capital projects
    - Operation and maintenance
    - Studies
  - Project summaries
- **Combined Projections**
- **Review Town of Arnprior's comments on the assessment results**

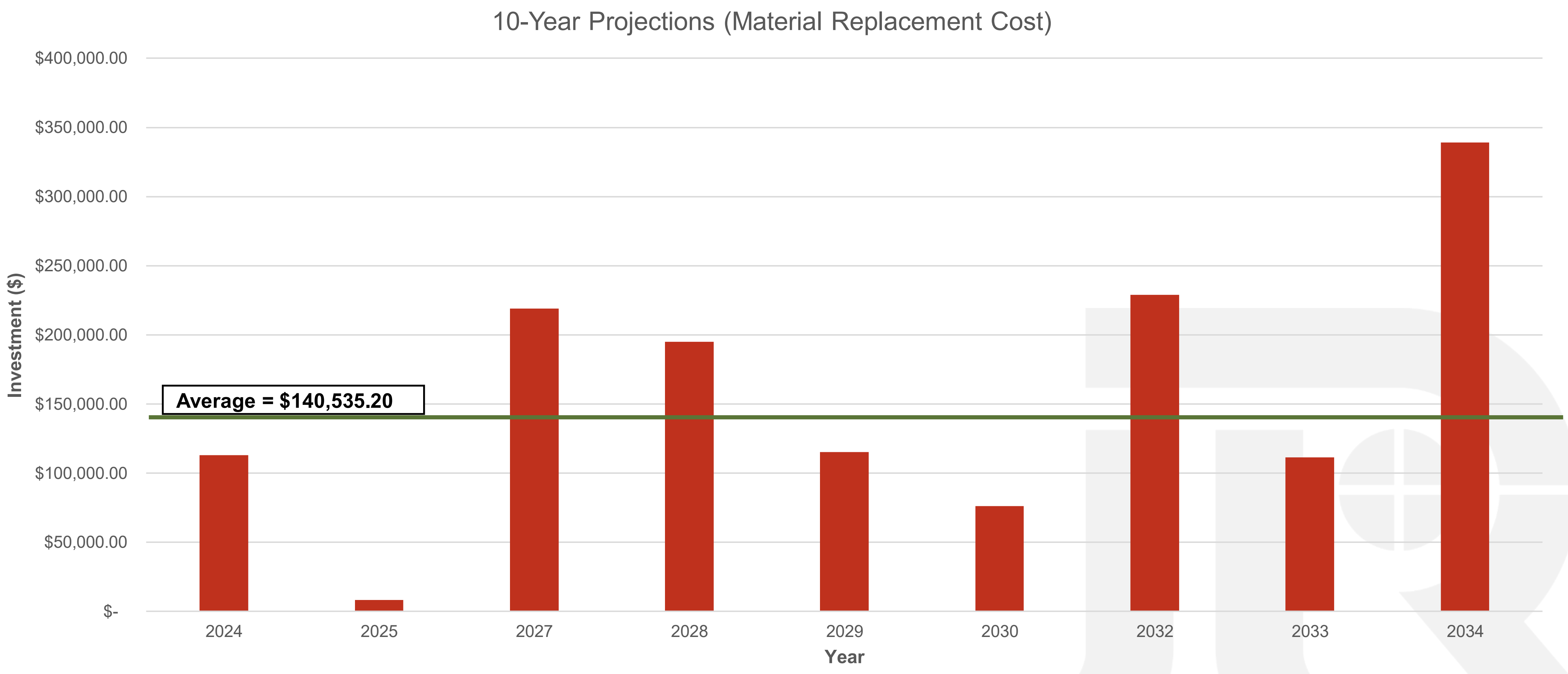
WFP - 10 Year Investment Projections



WFP - Capital Projects



WFP - Operations and Maintenance



WFP – Capital Projects Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Filter #2 Media Replacement	2024	$ 162,000.00	Replacement of filter #2 media (In progress).
Misc. Building Repairs	2024	$ 40,700.00	Replacement/repair of alum storage tanks and various doors, concrete beams, retaining walls, lighting and receptacles.
Clearwell #1 Replacement	2025	$ 904,000.00	Replacement of clearwell #1, militronics and former high lift pump room interior walls/columns.
Filter #1 Media Replacement	2025	$ 162,000.00	Replacement of filter #1 media
Filter #3 Media Replacement	2026	$ 162,000.00	Replacement of filter #3 media
High Lift Pump #3 Replacement	2026	$ 200,000.00	Replacement of high lift pump #3.
Separated Water Valve Replacement	2027	$ 40,000.00	Replacement of separated water valve.
Backwash Equipment Replacement	2028	$ 471,800.00	Replacement of valves, flow meter, piping and pump.
High Lift Pump #1 Replacement	2029	$ 237,800.00	Replacement of high lift pump #1 and valves for pumps #1 to #3.
Low Lift Pumping Station	2029	$ 104,100.00	Replacement of low lift pumps #1 and #2 and valves.
Actiflo and Filter Rebuild	2030	$ 756,400.00	Replacement of process piping, valves, pumps, and blower.
WFP Chemical Systems	2031	$ 78,900.00	Replacement of chlorinator systems #1 and #2, soda ash feed pump #1 and ammonia system process piping and miscellaneous appurtenances.
High Lift Pump #2 Replacement	2033	$ 200,000.00	Replacement of high lift pump #2.
Total		**$ 3,519,700.00**	

WFP – Operations and Maintenance Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Operations and Maintenance	2024	$ 112,850.00	Replacement of various instrumentation, valves, control panels and other miscellaneous equipment within the WFP.
	2025	$ 8,150.00	
	2027	$ 219,150.00	
	2028	$ 194,862.00	
	2029	$ 115,100.00	
	2030	$ 76,100.00	
	2032	$ 228,800.00	
	2033	$ 111,340.00	
	2034	$ 339,000.00	
Total		**$ 1,405,352.00**	
Average Annual Cost		**$ 140,535.20**	

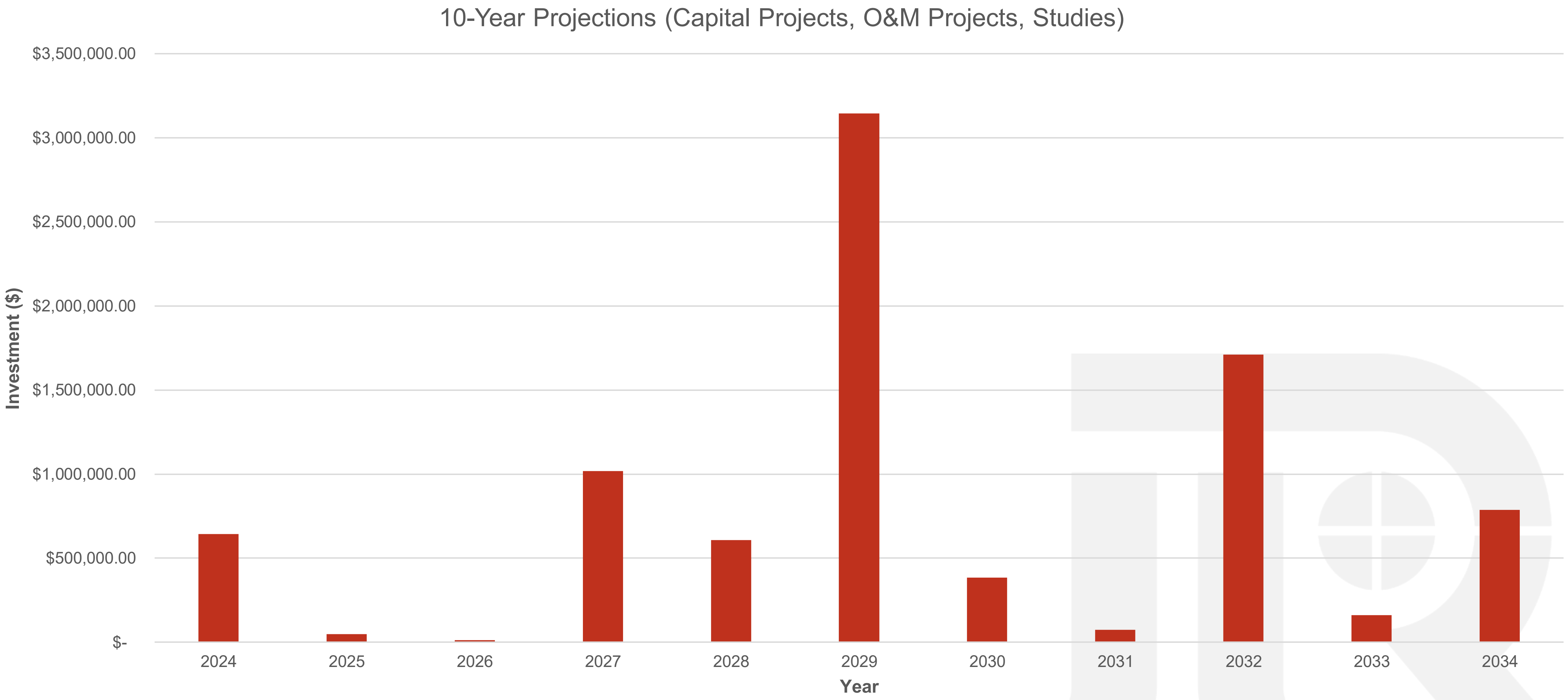
WFP – Studies Summary

Project Name	Recommended Action Year	Recommended Cost	Project Description
Fluoride Room Relocation	2024	$ 25,000.00	Conduct a study to define scope of fluoride room relocation.
Low Lift Pump #3 Replacement	2024	$ 25,000.00	Conduct a study to determine appropriate pump replacement design.
RWPS Low Lift Pump Well Inspection	2024	$ 100,000.00	Complete a structural inspection of tank interior.
Filter #1 Inspection	2024	$ 25,000.00	Inspect tank surface to identify required repairs.
Natural Gas Odour Investigation	2024	$ 10,000.00	Determine the cause of natural gas smell in the boiler room.
Roofing Inspections	2024	$ 40,000.00	Perform more detailed inspection of roofing of former high lift pump room, high lift pump room, main building and Raw Water Pumping Station.
Structural Investigation	2024	$ 15,000.00	Perform structural investigation into cause of floor cracking in main building floor.
Vacuum Study	2024	$ 10,000.00	Conduct a study to determine cause of vacuum issue in generator room.
Total		**$ 250,000.00**	

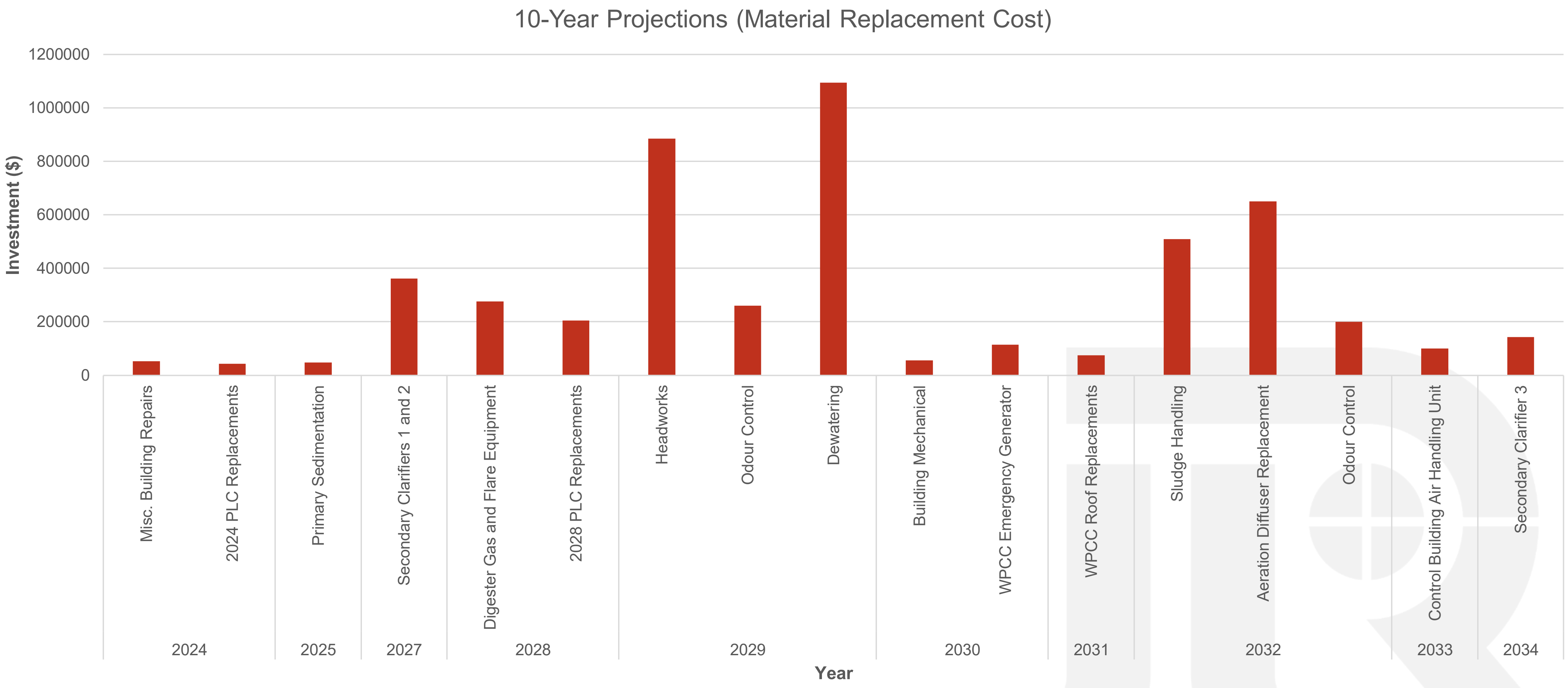
WFP – Overall Summary

Budget	Total Cost
Capital	$ 3,159,700.00
Operations and Maintenance	$ 1,405,352.00
Studies	$ 250,000.00
Total	$ 5,175,052

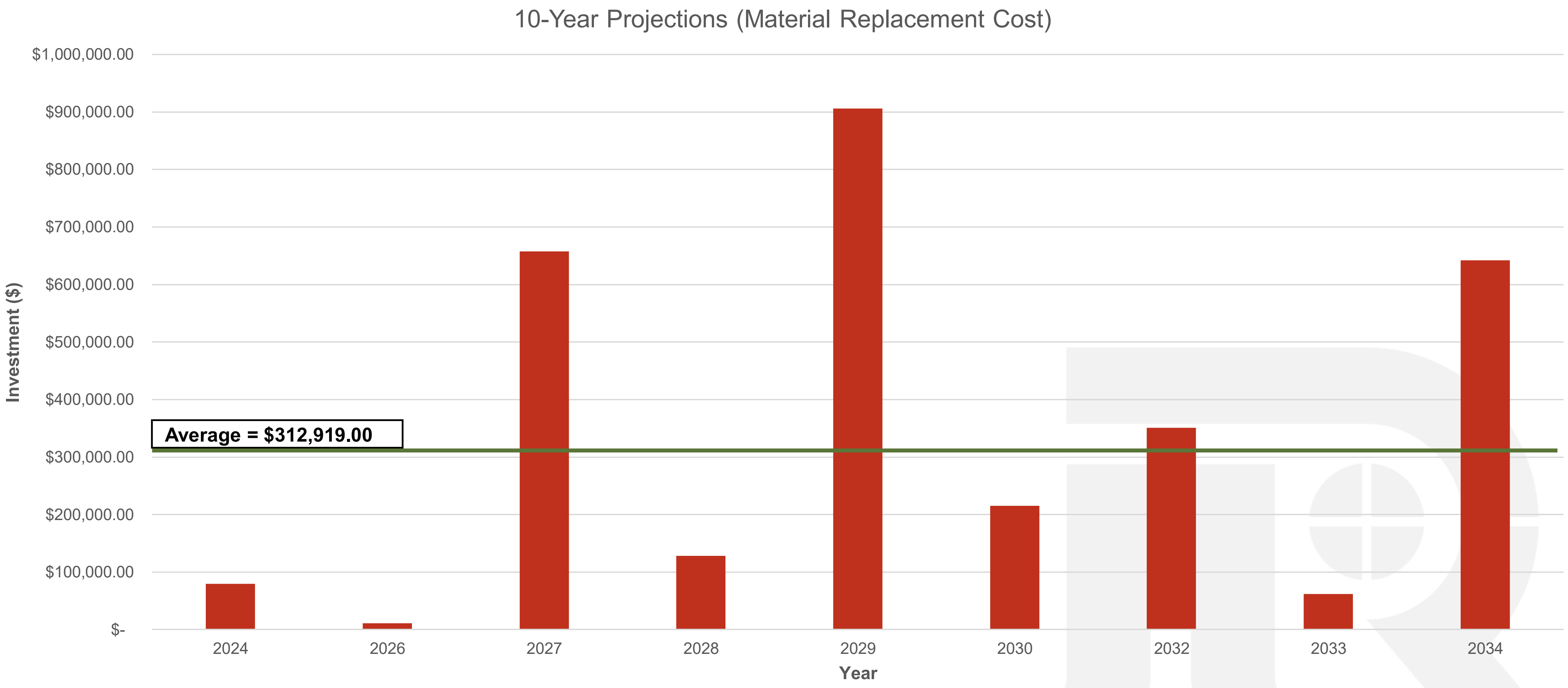
WPCC - 10 Year Investment Projections



WPCC - Capital Projects



WPCC – Operations and Maintenance



WPCC – Capital Projects Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
2024 PLC Replacements	2024	$ 43,000.00	Replacement of PLC panels in control building, chemical building and headworks.
Misc. Building Repairs	2024	$ 52,200.00	Replacement/repair of tanks, boiler #2, doors, walls/columns, ceiling, roof slabs, windows, stairs, railing, grating, field control panel, transformers and process piping.
Primary Sedimentation	2025	$ 48,200.00	Replacement of primary sedimentation scum trough and primary clarifiers #3 and #4 weirs.
Secondary Clarifier 1 and 2	2027	$ 361,200.00	Replacement of hand gates, and secondary clarification #1 and #2 collectors and weirs.
2028 PLC Replacements	2028	$ 204,000.00	Replacement of PLC panels in headworks, digester facility, control building and blower building.
Digester Gas and Flare Equipment	2028	$ 276,000.00	Replacement of digester flow meter, valves, frame arresters, pressure switches, waste gas flare and temperature element.
Dewatering	2029	$ 1,095,000.00	Replacement of dewatering centrifuge, sludge valves and centrifuge control panel.
Headworks	2029	$ 885,000.00	Replacement of blower #1, mechanical screens, manual screen, grit classifier, grit screws and motorized screening conveyor.

WPCC – Capital Projects Summary (Continued)

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Odour Control	2029	$ 260,000.00	Replacement of dewatering and headworks odour control system.
Building Mechanical	2030	$ 55,500.00	Replacement of miscellaneous building mechanical equipment.
WPCC Emergency Generator	2030	$ 114,000.00	Replacement of transfer switch and emergency generator.
WPCC Roof Replacement	2031	$ 73,854.00	Replacement of headworks and pump room no. 2 roofing materials.
Aeration Diffuser Replacement	2032	$ 650,000.00	Replacement of aeration diffuser.
Odour Control	2032	$ 200,000.00	Replacement of digester facility odour control system.
Sludge Handling	2032	$ 509,700.00	Replacement of sludge pumps, piping, valves, blower and screw conveyor.
Control Building Air Handling Unit	2033	$ 100,000.00	Replacement of control building air handling unit.
Secondary Clarifier 3	2034	$ 143,500.00	Replacement of secondary clarifier #3 collectors and weirs.
Total		**$ 5,071,154.00**	

WPCC – Operations and Maintenance Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Operations and Maintenance	2024	$ 79,400.00	Replacement of various instrumentation, valves, control panels and other miscellaneous equipment within the WPCC.
	2026	$ 11,000.00	
	2027	$ 657,440.00	
	2028	$ 128,450.00	
	2029	$ 905,900.00	
	2030	$ 214,900.00	
	2030	$ 350,700.00	
	2033	$ 62,000.00	
	2034	$ 642,400.00	
Total		**$ 3,129,190.00**	
Average Annual Cost		**$ 312,919.00**	

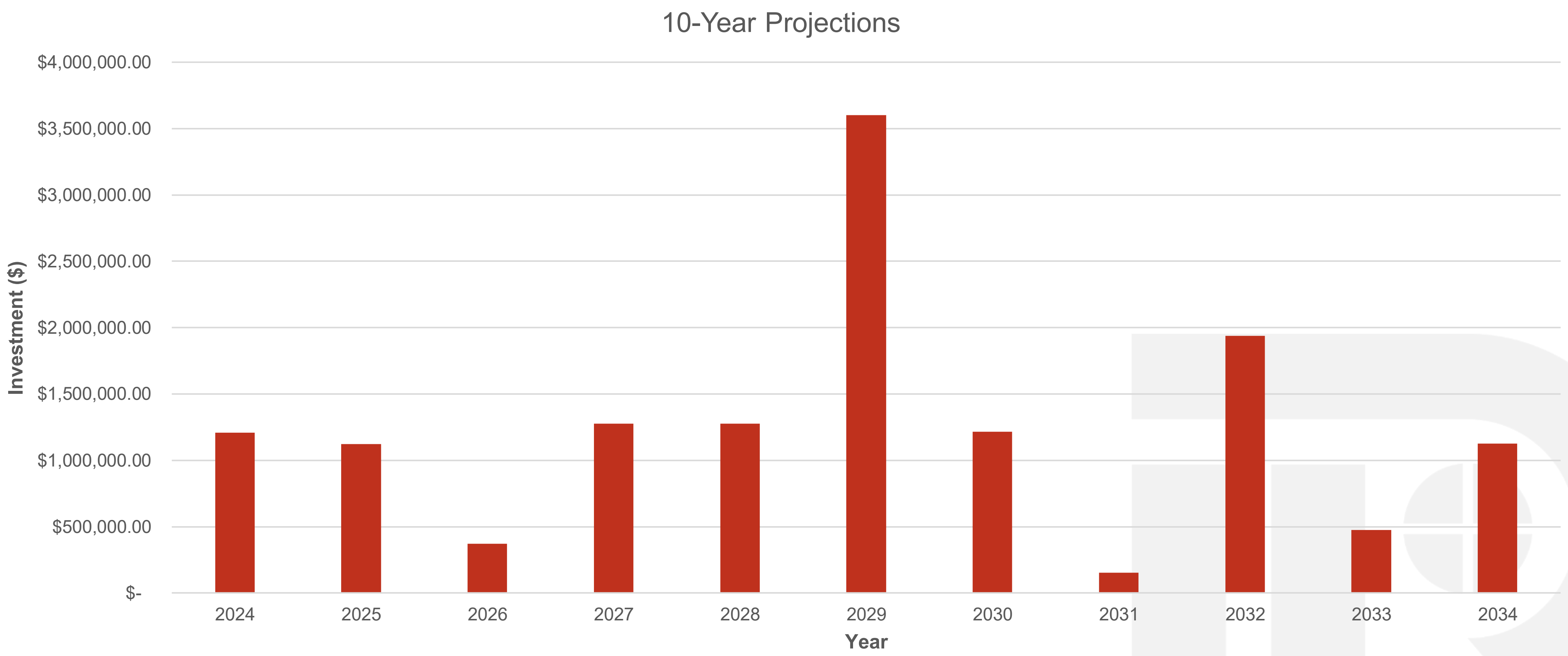
WPCC – Studies Summary

Project Name	Recommended Action Year	Recommendation Cost	Project Description
Chemical Building Refurbishment Scoping Study	2024	$ 50,000.00	Scoping study of chemical building refurbishment.
Clarifier #1 health and safety improvements	2024	$ 10,000.00	Study to scope health and safety improvements.
Control building roof replacement construction sequencing	2024	$ 30,000.00	Study to determine required construction sequencing for Control Building roof replacement.
Control building water damage source investigation	2024	$ 5,000.00	Study to investigate source of water damage.
Gas proofing investigation	2024	$ 360,000.00	Study to determine condition of gas proofing prior to replacing roof. Study cost includes the cost of emptying and cleaning both digesters.
Structural investigation of blower building basement floor cracking	2024	$ 15,000.00	Perform structural investigation into cause of floor cracking in blower building basement.
Total		**$ 470,000.00**	

WPCC – Overall Summary

Budget	Total Cost
Capital	$ 5,071,154.00
Operations and Maintenance	$ 3,052,190.00
Studies	$ 470,000.00
Total	$8,593,344.00

WFP & WPCC – Combined Projections



WFP & WPCC – Combined Summary

Budget	Total Cost
Capital	$ 8,590,854.00
Operations and Maintenance	$ 4,457,542.00
Studies	$ 720,000.00
Total	$13,768,396.00

Thank you!

J.L.Richards
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JLR No.: 31068-006
Revision: 1

August 28, 2024

Prepared for:

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Water Pollution Control Centre Condition Assessment Summary Report

Town of Arnprior

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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Executive Summary

J.L. Richards & Associates Limited (JLR) was retained by the Town of Arnprior (the Town) to conduct an inventory, condition and capital planning assessment of the major building, process and site works assets for the Water Pollution Control Centre (WPCC) (the Facility), located 233 Albert St, Arnprior, Ontario. The purpose of this assessment is to provide insights to the Town to facilitate decision-making regarding maintenance, repair, and replacement priorities for the facility's assets.

The facility's asset inventory, along with their respective attributes, were populated in Microsoft Excel using construction drawings. The asset database was integrated with ArcGIS Survey123 software, enabling JLR staff to input visual assessments directly into the spreadsheet during the field assessment. These assessments were then used to package recommendations into capital projects, operations and maintenance projects and studies.

A total of 662 WPCC assets were inspected, with 12 assets assigned a condition rating of "1-Unacceptable" and 67 assets assigned a condition rating of "2-Poor." These assets are noted as assets of concern and are listed in Table 7.

Table ES-1 summarizes the recommended projects, studies and average annual investment for the next 10 years. It is estimated that approximately $11,690,000 will be required for capital projects, $440,000 in studies, and $2,860,000 in operation and maintenance lifecycle renewals at Arnprior’s Water Pollution Control Centre over the next 10 years. Table ES-2 outlines the preventative maintenance activities recommended for major assets, which may not currently be part of routine operations and maintenance. Implementing these activities could increase Operation and Maintenance costs by approximately $3,350,000 over the next 10 years.

The total estimated project cost covers both materials and installations, where applicable. For labour costs, a 100% markup was applied to the total material cost. However, this markup was not applied where installation or repairs are intended to be performed by the plant operators. Furthermore, these costs do not include allowances for plant expansion, project administration, and construction requirements.

This report is intended as a summary and complements the higher level of detail provided in the Asset Inventory Database appended in Appendix A.

Table ES-1: Capital Project Definition and Sequencing and Renewal Summary

Index	Project Name	Implementation Year(s)	Estimated Cost ($)
Capital Projects (Material and Labour)			
1	2024 PLC Replacements	2024	$90,000
2	WPCC Misc. Building Repairs	2024	$50,000
3	Primary Clarifier Collector Spares	2025	$360,000
4	Secondary Clarifier Collector Spares	2025	$360,000
5	Primary Sedimentation	2025	$100,000
6	Headworks Screen Safety Upgrades	2025	$50,000
7	Odour Control Media Replacement	2025	$80,000
8	Chemical Building Refurbishment	2026	$1,840,000
9	Digester Roof Replacement	2027	$440,000
10	Grit Classifier and Conveyor Replacement	2027	$360,000
11	Secondary Clarifier Weir and Gate Replacements	2027	$360,000
12	2028 PLC Replacements	2028	$410,000
13	Digester Gas and Flare Equipment	2028	$550,000
14	Mechanical Screen #1 Replacement	2028	$360,000
15	Dewatering	2029	$2,190,000
16	Grit Screw #1 Replacement	2029	$240,000
17	Grit Screw #2 Replacement	2029	$240,000
18	Odour Control	2029	$520,000
19	Building Mechanical	2030	$110,000
20	WPCC Emergency Generator	2030	$200,000
21	Roof Replacements for Headworks Building and Pump Room #2	2031	$150,000
22	Aeration Diffuser Replacement	2032	$1,300,000
23	Sludge Handling	2032	$770,000
24	Control Building Air Handling Unit	2033	$200,000
25	Mechanical Screen #2 Replacement	2034	$360,000
Total Cost ($)	**$11,690,000**		

Index	Project Name	Implementation Year(s)	Estimated Cost ($)
Studies			
1	Option Analysis Study for Weir Replacement	2024	$30,000
2	Chemical Building Refurbishment Study	2024	$50,000
3	Gas Proofing Study	2026	$360,000
Total Cost ($)	**$440,000**		
O&M Activities (Materials Only)			
1	Operations and Maintenance	2024	$80,000
2		2026	$10,000
3		2027	$480,000
4		2028	$130,000
5		2029	$750,000
6		2030	$230,000
7		2032	$430,000
8		2033	$60,000
9		2034	$690,000
Total Cost ($)	**$2,860,000**		
Average Annual Cost ($)	**$290,000**		

Table ES- 2: Overview of Major Maintenance Activities Required Over the Next 10 Years

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Primary Clarifier	Tankage	Once Every 10 Years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$40,000
Aeration	Tankage	Once Annually	• Stop liquid flow to the tank. • Reduce air flow to 0.5 scfm per diffuser and drain liquid. • Turn off air when the liquid level is 2 feet from the diffussers. • Drain and clean tanks.	$200,000
	Diffusers and piping system	Once Annually	• Clean equipment using low pressure hosing. • Restore air to the system to 1 scfm. • Use a soft brittle brish on the surface of the diffuser if necessary.	
	Connections	Once Annually	• After cleaning, confirm that hardware connections, pipe joints, and diffuser retainer rings are secure. • Confirm that blank diffuser holder locations have an orifice plug. • Confirm that there are no leaks.	
Secondary Clarifier	Tankage	Once Every 10 Years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$30,000
Digesters	Tankage	Once Every 10 - 15 Years	• Drain and de-sludge the digesters. This work is perfromed by specialized contractors. • Inspect condition of concrete and piping after draining and de-sludging.	$3,000,000
	Gas-Proof Lining and Digester Roofing		• Replace gas-proof lining after draining and de-sluding of digesters. • Replace roofing based on condition.	
	Link Seals, Piping, Heat Exchanger, Electrical Components, Pumps, etc.		• As part of the digester drainage, cleanout and inspection, all other parts should simulataneously be inspected and replaced as needed.	

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Odour control	Odour control media	Once Annually	• Carbon-based odour filters should be replaced earlier if odours are detected.	$80,000
Total Cost ($)	**$3,350,000**			

1.0 Project Objectives and Background

1.1 Overview of the Inspected System

The Arnprior WPCC is located near the Madawaska River at 233 Albert St. The WPCC consists of degritting and primary treatment, secondary biological treatment, disinfection, anaerobic digestion and odour treatment. An aerial photo of the Arnprior WPCC is provided in Figure 1.

Figure 1: WPCC Aerial Photo

1.2 Project Objectives

The objectives of this project are to:

- Prepare an inventory spreadsheet of major building (structural, architectural, electrical, mechanical), process (piping, equipment, electrical, instrumentation), and sitework processes, components, and equipment.

- Perform a high level, non-destructive on-site visual inspection of the existing facility building, process, and siteworks assets and document code or performance issues.
- Estimate replacement costs and develop repair/replacement comments for assets with issues.
- Provide costs for repairs/replacements over a 10-year period and forecast replacement costs over a 50-year period.
- Develop a list of essential maintenance activities for major equipment.
- Develop planning sheets for capital projects, O&M projects, and studies.
- Complete a draft and final summary report.

1.3 Process Overview

The WPCC is owned and operated by the Town of Arnprior and was originally commissioned as a primary wastewater treatment facility in 1963. The current WPCC is rated for an average day flow of 9,700 m^3/d.

Raw sewage is conveyed from the east side of the Madawaska River through a 350 mm diameter forcemain and magnetic flow meter. Raw sewage from the west side of the Madawaska River flows by gravity to the WPCC though a 900 mm diameter unmetered sewer. The two raw sewage streams are combined and conveyed to the Headworks Building. The rated capacity of the plan is 9,700 m^3/d for average day flow, with peak flows for primary and secondary treatment processes of 59,000 m^3/d and 29,100 m^3/d, respectively. Flow in excess of 48,000 m^3/d are bypassed to the Madawaska River at the Albert Street bypass. The WPCC consists of the following treatment processes:

- Pre-treatment; Screening and Degritting
- Primary Treatment
- Secondary Biological Treatment
- Disinfection
- Anaerobic Digestion
- Odour Treatment

1.4 Facility History

The table below summarizes the facility's history.

Table 1: WPCC History

Year	Project
1963	The facility was commissioned to provide primary treatment with phosphorus removal and chlorination at an average daily flow of 6,820 m^3/d.
1989	A schedule 'C' Class EA was completed to increase sewage treatment capacity.
1992	An Environmental Study Report (ESR) was completed for expanding the facility and upgrading treatment to secondary treatment.
1996	Certain upgrades recommended in the 1992 ESR were implemented, increasing the treatment capacity to 7,900 m^3/d.

Year	Project
2005	Upgrades and additions to the existing sludge handling system were completed, along with the installation of a replacement duty system for sludge dewatering.
2008	The 2008 ESR Addendum was completed and filed in July 2008 to upgrade the facility.
2011	The facility’s capacity was expanded from 7,900 m^3/day to 9,700 m^3/day.

The following drawings, documents, and reports provided by the Town reviewed for this project:

- WPCC Operations Manual, (2012)
- WFP & WPCC Roof Photos, Town of Arnprior (2023)
- Draft Water/Wastewater Master Plan Report, Stantec (2023)
- WPCC Upgrades as Built Drawings (1996)
- Asbestos Reassessment, Pinchin (2023)
- Town of Arnprior Water & Wastewater Servicing Strategy (2023)

1.5 Assumptions

- Assessments are based strictly on visual assessments; no type of destructive or other specialty testing techniques were used.
- In cases where the age of equipment or assets was unknown, it was assumed to be original to the plant construction or upgrade unless otherwise specified by the Town.
- The summary of essential maintenance activities will be limited to major process equipment only.
- Costing values contained herein are high level budgetary estimates only based on available information, and our professional judgement and experience. All costs are in market rates current to 2024 with no allowances made for inflation. JLR has observed extraordinary market conditions in effect and beyond its reasonable control, including, but not limited to, rising inflation, ongoing supply chain disruptions, availability of any or sufficient number of tender bid submissions, and unusual increases in material costs. These market conditions could have a material impact on the accuracy of any cost estimates.

1.6 Exclusions

The scope of work for this project does not include the following:

- Mould identification, review, investigation and remediation.
- Asbestos identification, review, investigation, and remediation.
- Destructive testing or testing of any kind.
- Review of any buried or inaccessible elements, or elements within confined spaces or elements not accessible from the ground (or permanent platforms). Fall arrest equipment will not be used to perform the reviews.
- Conceptual or detailed design of repairs or replacements of any elements.
- Abatement of any designated substances.

2.0 Asset Inventory Database

An asset inventory database was built using Microsoft Excel to analyze the current conditions of the assets to facilitate decisions made by subject matter experts when developing capital expenditure programs. Refer to Appendix A to review the Asset Inventory Database (Excel).

2.1 Asset Inventory Structure

The inventory structure was developed to logically organize the assets based on useful attributes outlined in Table 2. This structure establishes relationships between assets that were used to support subsequent asset management analysis.

Table 2: Categories in Inventory Structure

Area	Asset Category
• Outside • Chemical Building • Digester Facility • Headworks • Blower Building • Control Building • Pump Room No.2	• Architectural • Building Mechanical • Electrical • Instrumentation and Controls • Process Piping and Equipment • Siteworks • Structural
Process	**Asset Type**
• Aeration • Biogas • Building Services • Buildings • Chemical Phosphorus Removal • Chemical Treatment • Controls • Digestion • Disinfection • Electrical System • Odour Control • Primary Sedimentation • Process Monitoring • Safety • Screening and Degritting • Secondary Sedimentation • Site • Sludge Handling • Water Sampling	• Agitator • Air Handling Unit • Analyzer • Autodialer • Backflow Prevention Valve • Blower • Boiler • Chemical Piping • Chemical Pump • Chemical Tank • Chlorinator • Concrete Tank • Conveyor • Domestic Plumbing System • Drainage • Electrical Panel • End Suction Pump • Exit Signs • Etc.

2.2 Asset Information Input

Prior to the inspection, a preliminary asset inventory database was populated with key information extracted from construction drawings provided by the Town. The purpose of this preliminary inventory database is to list information that would facilitate JLR staff in collecting data during the visual assessment. The preliminary database included the following items:

- Asset Name
- Equipment Tag
- Quantity
- Size
- Facility
- Location
- Asset Type
- Asset Category
- In-Service Date

The inventory database was integrated into ArcGIS Survey123 software. This software offers a user-friendly data collection platform which enabled JLR staff to input data directly into the inventory database using a mobile device. The following information was collected for the inspected assets during the site inspection.

- Visual Condition Rating
- Condition Comment
- Pictures

2.3 Decision Support System

To streamline the evaluation process, an algorithm leveraging mathematical equations and industry-standard values was used to estimate the default replacement years for these assets. This algorithm provides a baseline cash flow projection based on the following factors:

- Visual Condition
- Estimated Useful Life
- Age-Based Condition
- Likelihood of Failure
- Consequence of Failure
- Risk
- Default Replacement Year

2.3.1 Visual Condition Rating

The visual condition rating (C_v) signifies the overall health of an asset based on the level of physical deterioration observed during the inspection. Visual condition ratings were assigned by JLR staff in the field according to the definitions listed in Table 3.

Table 3: Condition Rating Criteria

Rating	Condition	Description
1	Unacceptable	• Failed or failure imminent. Immediate need to replace or repair the asset.
2	Poor	• Poor physical condition – heavy wear and tear, failure is likely in short term.
3	Fair	• Acceptable physical condition – moderate wear and tear.
4	Good	• Acceptable physical condition – moderate wear and tear, moderate risk or physical failure.
5	Excellent	• Like new physical condition.
NI	Non-Inspected	• Could not locate or access.

2.3.2 Estimated Useful Life

The estimated useful life (EUL) of an asset is the theoretical duration for which the asset is anticipated to remain operationally effective for its intended purpose. Initial EUL values were assigned based on the asset type using industry-standard assumptions and engineering judgment. These values were adjusted following feedback from the Town.

2.3.3 Age-Based Condition

The age-based condition rating (C_{age}) serves as an overall health indicator, considering the asset's age relative the EUL. Asset age information was obtained from the construction drawings and updated by the Town. The age-based condition scale ranges from 1 to 5, where 1 indicates an Unacceptable Condition (the asset has reached or exceeded its estimated useful life), while 5 indicates an Excellent Condition (the asset is new, with 100% of the estimated useful life remaining). The following formula is used to calculate the age-based condition rating.

$$C_{age} = 5 - \left(\frac{Minimum\ of\ (EUL, Age)}{EUL}\right) \times 4$$

2.3.4 Likelihood of Failure (LOF)

The likelihood of failure (LOF) assesses the probability that a particular asset is expected to fail in the near future. The LOF is calculated based on both the visual condition rating and the age-based condition rating. Combining these rating in this manner provides a balanced assessment approach to mitigate the limitations in using each method alone. For example:

- Asset age may not be known with certainty.
- The EUL is assigned based on the asset type using industry-standard assumptions applicable to water filtration plants, but actual service life depends on factors like

maintenance, quality, usage intensity and frequency, and environmental conditions. Assets may surpass or fall short of the typical EUL.

- Visual inspections are limited to an asset's exterior, thereby omitting the assessment of internal components, which may not always correlate to the actual condition of the asset.

The overall LOF rating scale ranges from 1 to 5, where 1 indicates a very low likelihood of failure, and 5 denotes a very high likelihood of failure. The following formula is used to calculate LOF, where C_{age} and C_v are the age-based condition rating and visual condition rating, respectively.

$$LOF = 6 - \frac{C_v + C_{age}}{2}$$

If an asset has a C_v of 1, then the LOF is automatically assigned a value of 5. For assets that were not inspected, particularly for inaccessible assets like buried equipment, then only the C_{age} is considered when calculating the LOF.

2.3.5 Consequence of Failure

The Consequence of Failure (COF) is an indicator that signifies the relative severity of the consequences likely to occur if an asset was to fail. The scale ranges from 1 to 5, where 1 indicates a very low consequence, and 5 denotes a very high consequence. Initial COF values were assigned based on Asset Type, and then adjusted in collaboration with the Town based on known health and safety or redundancy issues. Table 5 reflects the consequence of failure of the individual asset relative to the overall functioning of the plant as well as health, safety, regulatory or financial risks. The scale is based on COF ratings adopted by a number of major municipalities in Ontario and can be adjusted by the Town.

Table 5: Consequence of Failure Rating Scale

Grade	Consequence	Description
1	Very Low	• Service not affected or minimal impact o Redundancy based on demand and capacity is greater than 100% o Regulatory objectives and requirements are met o Loss of equipment does not impact service or has minimal impact • Repair, loss of revenue, damages, losses or fines of <$10,000 • Negligible injures
2	Low	• Localized disruption of service o Redundancy based on demand and capacity is >75%<100% o Regulatory objectives and requirements are met o Loss of equipment causes localized disruption of non-essential service • Repair, loss of revenue, damages, losses or fines of $10,000-50,000 • Minor injuries, no medical attention required

Grade	Consequence	Description
3	Moderate	• Localized disruption of service o Redundancy based on demand and capacity is <75% o Regulatory objectives not met but requirements are met o Loss of equipment causes localized disruption of essential service • Repair, loss of revenue, damages, losses or fines of $50,000-$500,000 • Minor injuries, medical attention required
4	High	• Widespread short disruption or long-term localization of disruption of service o No redundancy based on demand and capacity o Regulatory objectives and requirements are not met o Loss of equipment causes widespread short disruption or long-term localization of disruption of essential service • Repair, loss of revenue, damages, losses or fines of $500,000-$1,000,000 • Serious injuries, multiple minor injuries
5	Very High	• Widespread short disruption and long-term disruption of service o No redundancy based on demand and capacity o Regulatory objectives and requirements are not met o Loss of equipment causes widespread short disruption or long-term disruption of essential service • Repair, loss of revenue, damages, losses or fines of >1,000,000 • Multiple serious injuries, loss of life

2.3.6 Risk

Risk is defined as the potential consequence of not replacing or repairing a specific asset, calculated as the product of LOF and COF. The resulting values ranges from 1 (Very Low) to 25 (Very High). Assets with higher risk rating are expected to necessitate more attention. This approach to measure risk is typically used in many Ontario municipalities for prioritizing expenditure and the renewal of existing infrastructure. Figure 2 shows a combination of COF and LOF ratings alongside their corresponding risk ratings. Risk ratings of 9 or below are considered “Low” and are sharded green, risk ratings of 10 to 15 would be considerate “Moderate” and are shaded yellow, and risk ratings of 16 to 25 would be considered “High” and are shaded red.

		Likelihood of Failure (LOF)				
		1 (Very Low)	2 (Low)	3 (Moderate)	4 (High)	5 (Very High)
Consequence of Failure (COF)	1 (Very Low)	1	2	3	4	5
	2 (Low)	2	4	6	8	10
	3 (Moderate)	3	6	9	12	15
	4 (High)	4	8	12	16	20
	5 (Very High)	5	10	15	20	25

Figure 2: Risk Rating

2.3.7 Default Replacement Year

The default replacement year for a particular asset is computed based on its likelihood of failure and its estimated useful life, as indicated in the formula below.

$$Default\ Replacement\ Year = 2024 + \left(\frac{5 - LOF}{4}\right) \times EUL$$

The spending forecast for each year was then determined assuming that each asset would be first replaced on its default replacement year and thereafter at a frequency equal to its EUL.

3.0 Condition Assessment Findings

To analyze the condition assessment information effectively, the data collected from inspecting the 662 WPCC assets was systematically organized. This process involves breaking down the data into smaller, more manageable segments to facilitate the grouping and sequencing of renewal or repair projects over the 10-year timeframe. To this end, the tables and figures in this section summarize the condition of these assets using the decision support system described in the section above. The goal of this section is to provide structured insights of the health of the inspected assets.

A total of 662 WPCC assets were reviewed, the majority of assets were assigned a condition rating of “4-Good” or better; however, 12 assets were assigned a condition rating of "1-Unacceptable”, and 67 assets were assigned a condition rating of “2-Poor.” These assets are noted as assets of concern and are listed in Table 7. The estimated total cost for replacing these assets, including labour, is approximately $3,620,000. Refer to Figure 3 and Figure 4 for a summary of the assets’ visual condition rating compared to asset count and replacement cost, respectively.

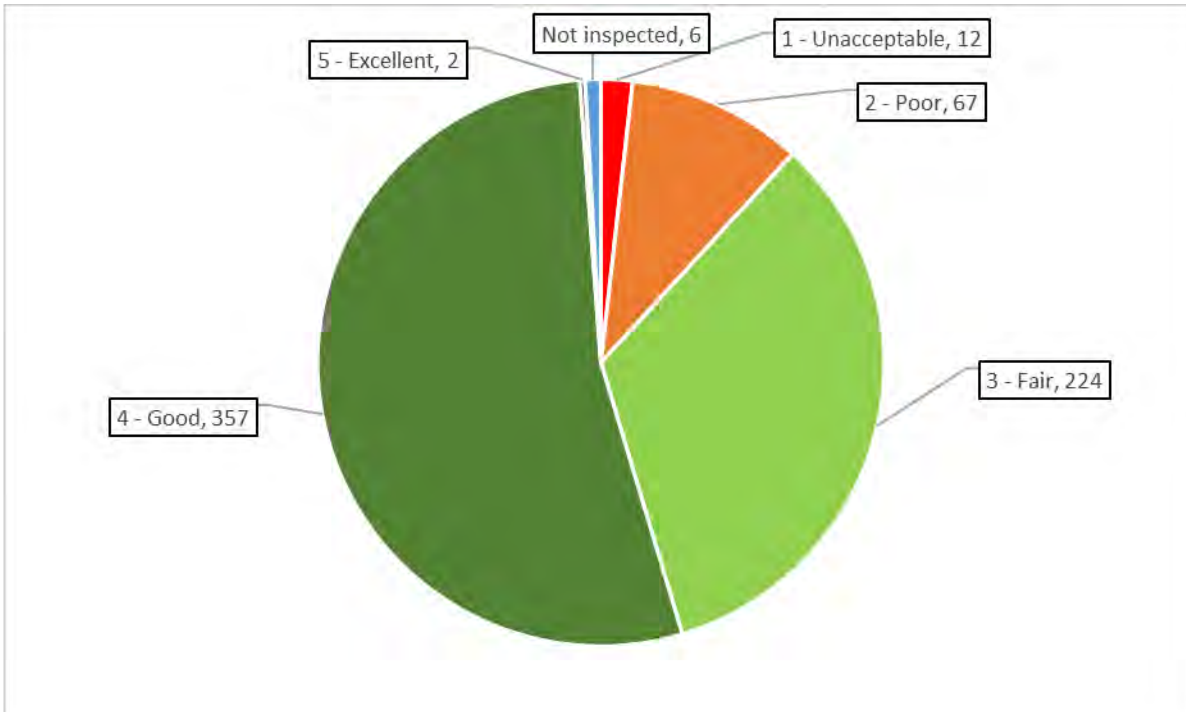

Figure 3: Visual Condition Rating by Asset Count

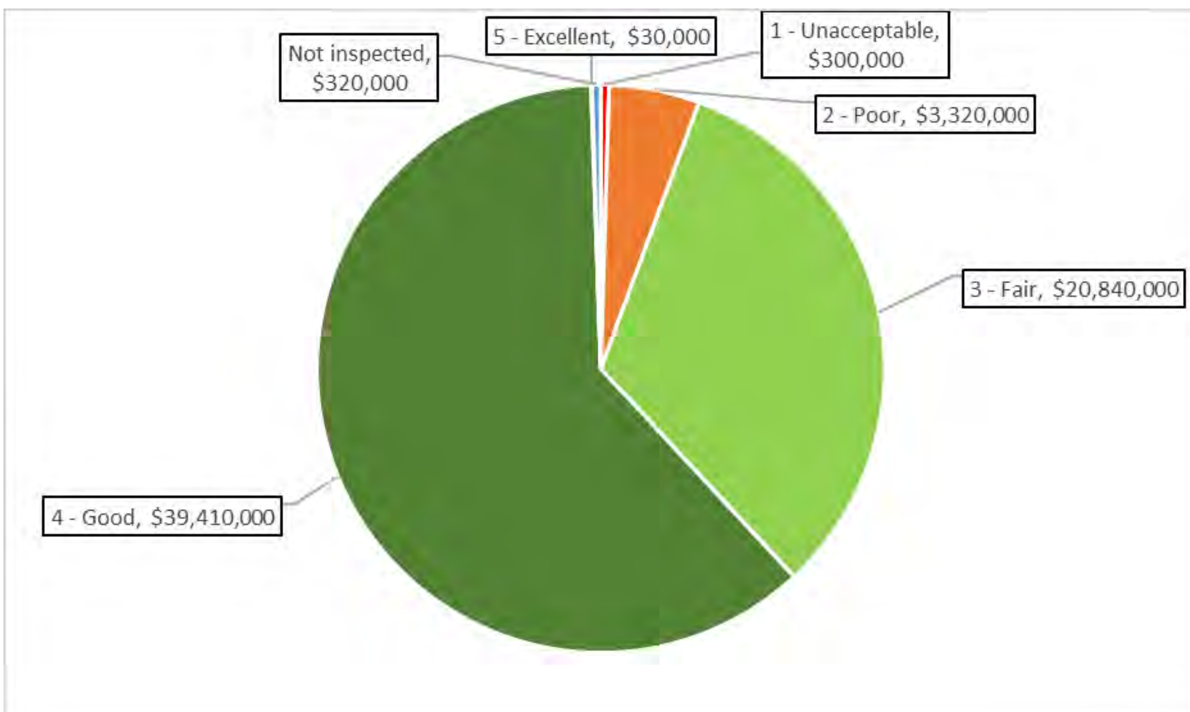

Figure 4: Replacement Cost by Visual Condition Rating

3.1 Condition Assessment Summary

The tables in this section summarize findings based on average visual condition rating, average LOF, average risk, and maximum risk. They are organized by area, asset category, process, and include the material replacement cost for all assets falling within those categories.

The table below summarizes assets' condition and replacement costs categorized by area. Assets throughout all areas have average LOF ratings in the moderate to high range, with the Chemical Building having the highest LOF score of 3.9. Although the average risk per area is generally low, the maximum for all areas are in the "High" range.

Table 4: Summary of WPCC Asset Conditions by Area

Area	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Outside	81	3.0	3.5	8.6	16	$24,970,000
Chemical Building	78	2.9	3.9	9.5	18	$1,930,000
Digester Facility	147	3.8	3.0	7.0	16	$16,910,000
Headworks	71	3.3	3.6	9.1	16	$5,430,000
Blower Building	104	3.5	3.3	8.3	16	$4,470,000
Control Building	154	3.5	3.2	7.5	16	$9,790,000
Pump Room No.2	33	3.4	3.3	7.7	16	$730,000
Total	**668**					$64,220,000

The table below summarizes assets' condition and replacement cost grouped by asset category. Average LOF ratings range from 2.7 for Architectural to 3.8 for Structural. Average risk per asset category is generally low; however, building mechanical, instrumentation and controls, electrical and process piping and equipment categories have maximum risk values in the "High" range.

Table 5: Summary of WPCC Asset Conditions by Asset Category

Asset Category	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Architectural	66	3.7	2.7	4.7	12	$3,380,000
Building Mechanical	53	3.2	3.4	5.8	16	$2,520,000
Electrical	89	3.4	3.3	8.3	18	$2,380,000

Asset Category	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Instrumentation and Controls	181	3.6	3.6	8.3	18	$1,300,000
Process Piping and Equipment	204	3.1	3.6	9.1	16	$15,150,000
Siteworks	7	3.6	2.4	2.8	5	$6,690,000
Structural	68	3.8	2.6	9.4	15	$32,800,000
Total	**668**					$64,220,000

The table below summarizes assets' condition and replacement cost grouped by process. Average LOF values range from 2.4 (Site) to 4.3 (Chemical Phosphorus Removal). Several processes have average risk values in the moderate range (10-15) and maximum values in the "High" range.

Table 6: Summary of WPCC Asset Conditions by Process

Process	Total Assets	Average Visual Condition	Average LOF	Average Risk	Max Risk	Estimated Replacement Cost ($) (Material + Labour)
Aeration	33	3.4	3.4	8	15	$6,400,000
Biogas	27	4.0	3.1	8	12	$770,000
Building Services	124	3.4	3.4	7	12	$2,490,000
Buildings	118	3.8	2.6	7	12	$13,680,000
Chemical Phosphorus Removal	14	2.4	4.3	10	15	$180,000
Chemical Treatment	1	3.0	4.0	12	12	$1,200
Controls	32	3.7	3.5	11	18	$670,000
Digestion	41	3.8	3.2	7	12	$11,080,000
Disinfection	30	2.6	4.1	10	15	$3,260,000
Electrical System	88	3.5	3.1	8	18	$2,310,000
Odour Control	6	3.3	3.2	8	12	$1,110,000
Primary Sedimentation	34	2.6	3.9	10	15	$6,170,000
Process Monitoring	8	2.8	3.9	8	10	$110,000
Safety	24	3.5	3.7	9	16	$40,000
Screening and Degritting	24	3.0	3.8	9	16	$2,970,000
Secondary Sedimentation	34	3.1	3.7	9	15	$2,850,000
Site	7	3.6	2.4	3	5	$6,690,000

Sludge Handling	21	3.5	3.5	9	12	$3,360,000
Water Sampling	2	3.0	4.0	16	16	$60,000
Total	**668**					$64,220,000

3.2 Assets of Concern

As summarized above, the majority of assets were noted to be in good condition with moderate likelihood of failure scores on average. However, concerns related to specific areas or assets at the plant were noted. Key issues are as follows:

- Corrosion and/or leaking was observed on various valves, gates, process piping/supports, chemical tanks, building elements (e.g. steel beams), electrical and building mechanical equipment within the Chemical Building. A corrosive environment appears to be causing accelerated deterioration of metallic components.
- Clarifier weirs were not functioning properly due to issues such as warping and corrosion, and previous attempts at repair had not been successful.
- The manual bar screen in the headworks could not be cleaned out safely.
- Various equipment throughout the plant showed signs of age-based deterioration such as corrosion, leaking, deformation, fading, etc.
- Some older equipment was identified as being outdated.

The table below presents more detailed condition assessment findings for all assets that had a visual condition rating either "1-Unacceptable" or "2-Poor", sorted by Area. Photos of these assets are included in the asset database appended as Appendix A.

Table 7: Assets of Concern Summary

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC062	Process Air Blower #1	Blower Building	Aeration	Process Piping and Equipment	2 - Poor	Outdated and a lot of heat loss	14 - Moderate
WPC063	Process Air Blower #2	Blower Building	Aeration	Process Piping and Equipment	2 - Poor	Outdated and some heat loss	14 - Moderate
WPC106	Polymer System (WAS) Solenoid Valves	Blower Building	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Operational but currently not in use. Operators are not happy with the quality of the system	9 - Low
WPC112	Secondary Scum Check Valve	Blower Building	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Old, some surface rust	9 - Low
WPC114	RAS Pump 1 (M501)	Blower Building	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Significant surface rust	14 - Moderate
WPC298	Sump Pump 402	Blower Building	Building Services	Building Mechanical	2 - Poor	Significant surface rust, possible signs of leaking	5 - Low
WPC299	Sump Pump 401	Blower Building	Building Services	Building Mechanical	2 - Poor	Significant surface rust, possible signs of leaking	5 - Low
WPC874	Blower Building Roof Drain	Blower Building	Building Services	Process Piping and Equipment	2 - Poor	Old, Rusted	5 - Low
WPC094	Ferric Chloride Piping	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	1 - Unacceptable	Visible signs of leakage.	15 - Moderate
WPC170	Sodium Hypochlorite Tank	Chemical Building	Disinfection	Process Piping and Equipment	1 - Unacceptable	Signs of leaking flanges and corrosion. Anchors are corroded on both tanks 1 and 2. Repairs have been made on the rear side of the tank. Tank manhole cover appears to be open and venting into the room.	15 - Moderate
WPC314	Chemical Building Fans	Chemical Building	Building Services	Building Mechanical	1 - Unacceptable	Visible rust on all fans, signs of age. Appear to be in poor condition. Dampers all appear to be corroded. Damper switch for fan EF-601 is broken. Ventilation system appears to be operating	10 - Moderate

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
						inefficiently, leading to severe corrosion inside."	
WPC092	Ferric Chloride Pump #1	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Visible signs of leakage. Old outdated pumps.	14 - Moderate
WPC093	Ferric Chloride Pump #2	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Poor condition visible signs of leakage and old age.	14 - Moderate
WPC101	Ferric Chloride Tank #2	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Visible signs of leaky connections and flanges.	14 - Moderate
WPC102	Ferric Chloride Tank #1	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Tank 1 appears to be in better condition than Tank 2. Still visible signs in minor leakage on pipe nozzles.	14 - Moderate
WPC104	Ferric Chloride Isolation Valves	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Valves appear to be leaking in multiple locations on the system.	9 - Low
WPC105	Ferric Chloride System Pressure Relief Valves	Chemical Building	Chemical Phosphorus Removal	Process Piping and Equipment	2 - Poor	Only one pressure relief valve installed back to inlet header. Poor condition visible rust and signs of leakages.	9 - Low
WPC152	Sodium Bisulphite Tank #1 Current Level	Chemical Building	Disinfection	Instrumentation and Controls	2 - Poor	Appears to be in poor condition.	9 - Low
WPC157	Sodium Bisulphite System Isolation Valves	Chemical Building	Disinfection	Process Piping and Equipment	2 - Poor	Signs of age. PVC piping appears to be holding up although operators have mentioned the chemical lines to be drying out and cracking when servicing equipment.	9 - Low
WPC160	Sodium Hypochlorite Pump #2	Chemical Building	Disinfection	Process Piping and Equipment	2 - Poor	Pump appears to be in poor condition. Cap has been broken off.	14 - Moderate
WPC161	Sodium Hypochlorite Pump #3	Chemical Building	Disinfection	Process Piping and Equipment	2 - Poor	Pump appears to be in poor condition. Significant surface rust and seems out dated.	14 - Moderate

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC169	Sodium Hypochlorite Tank	Chemical Building	Disinfection	Process Piping and Equipment	2 - Poor	Visible signs of leaking. Metal bolts are severely corroded in some places and beginning to corrode in others.	14 - Moderate
WPC173	Sodium Hypochlorite System Isolation Valves	Chemical Building	Disinfection	Process Piping and Equipment	2 - Poor	Overall the valves appear to be in fair condition with the exception of a couple valves and piping have clear signs of leakage.	9 - Low
WPC309	Chemical Building Exterior Lighting	Chemical Building	Building Services	Electrical	2 - Poor	Bug nests	9 - Low
WPC315	Chemical Building Hydronic Unit Heaters	Chemical Building	Building Services	Building Mechanical	2 - Poor	Visible signs of corrosion on sodium hypochlorite and ferric chloride rooms unit heaters. One unit heater in sodium bisulphate room is in fair condition.	5 - Low
WPC316	Chemical Building Misc. Building Mechanical	Chemical Building	Building Services	Building Mechanical	2 - poor	Visible signs of rust and wear. Chemical appear to be leaking and affecting the environment.	5 - Low
WPC433	Chemical Building Exterior Doors	Chemical Building	Buildings	Architectural	2 - Poor	Appears to be generally in poor condition. Main door doesn't appear to latch (Photo 2). Two secondary doors next to the main door latches but appear to be corroded from the inside (see photo 4).	4 - Low
WPC551	Chemical Building Control Panel	Chemical Building	Controls	Instrumentation and Controls	2 - Poor	Needs maintenance/cleaning	18 - High
WPC594	Chemical Building Power Panel	Chemical Building	Electrical System	Electrical	2 - Poor	Needs maintenance/cleaning. Discovered blown capacitors and fuses while panel was open.	9 - Low
WPC595	Lighting Transformer For Lap-J	Chemical Building	Electrical System	Electrical	2 - Poor	Needs replacement	18 - High
WPC632	Lighting Panel #7 - Chemical Building	Chemical Building	Electrical System	Electrical	2 - Poor	Needs replacement	9 - Low
WPC888	Heat Tracing Cable Control Panel	Chemical Building	Electrical System	Instrumentation and Controls	2 - Poor	Needs maintenance/cleaning	9 - Low

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC459	Control Building (Original) Exterior Windows	Control Building	Buildings	Architectural	1 - Unacceptable	Appears to be generally in poor condition. Seal appear to have failed on majority of windows.	5 - Low
WPC033	Primary Tank #1 Raw Sludge Motorized Valve #1	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Signs of age	7 - Low
WPC034	Primary Tank #1 Raw Sludge Motorized Valve #2	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Signs of age	6 - Low
WPC035	Primary Tank #2 Raw Sludge Motorized Valve #1	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Signs of age	9 - Low
WPC036	Primary Tank #2 Raw Sludge Motorized Valve #2	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Signs of age	9 - Low
WPC037	Raw Sludge Pump 2 (P-21201)	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Signs of age	14 - Moderate
WPC039	Raw Sludge Pump 1 (P-21101)	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - poor	Signs of age, leaking	14 - Moderate
WPC041	Raw Sludge And Scum Check Valves	Control Building	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Old, surface rust, possible signs of leaking	9 - Low
WPC291	Pressure Washer New	Control Building	Building Services	Building Mechanical	2 - Poor	Poor condition. Has replacement	5 - Low
WPC321	Control Building Domestic Plumbing System	Control Building	Building Services	Building Mechanical	2 - Poor	Bolts on valves are rusting	9 - Low
WPC462	Control Building (Original) Interior Doors / Fire doors - Latches	Control Building	Buildings	Architectural	2 - Poor	Appears to be generally in good condition. Dewatering room interior door doesn't appear to close	4 - Low
WPC892	Control Building Garage Electrical Panel	Control Building	Electrical System	Electrical	2 - Poor	Needs replacement	9 - Low
WPC007	Grit Classifier	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Lots of surface corrosion	14 - Moderate
WPC008	Grit Screw #1	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Signs of corrosion and leaking	9 - Low

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC009	Grit Screw #2	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Signs of corrosion and leaking	9 - Low
WPC012	Headworks Solenoid Valves	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Old, some surface rust. Town noted that 1 in waterline is replaced every 5 yrs, 3 in air lift grit system are out of service as of 2010	8 - Low
WPC027	Grit Slurry Pump #2	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Subject to leaking/drips. Signs of corrosion.	12 - Moderate
WPC029	Grit Slurry Check Valves	Headworks	Screening and Degritting	Process Piping and Equipment	2 - Poor	Some rusting	9 - Low
WPC385	Sump Pump M109	Headworks	Screening and Degritting	Building Mechanical	2 - Poor	Very rusty. Discharge pipe on the ceiling is leaking	5 - Low
WPC902	Headworks Building Roof Drain	Headworks	Building Services	Process Piping and Equipment	2 - Poor	One drain has ferns growing out of it.	5 - Low
WPC175	Effluent Level Meter #1	Outside	Disinfection	Instrumentation and Controls	1 - Unacceptable	Needs replacement	10 - Moderate
WPC671	Raw Sewage Sampler	Outside	Process Monitoring	Process Piping and Equipment	1 - Unacceptable	Not working	10 - Moderate
WPC672	Effluent Level Meter #2	Outside	Process Monitoring	Instrumentation and Controls	1 - Unacceptable	Needs replacement	10 - Moderate
WPC673	Clarifier Bypass Flow Meter	Outside	Process Monitoring	Instrumentation and Controls	1 - Unacceptable	Needs replacement	10 - Moderate
WPC907	Primary Clarifiers #3 And 4 Weirs	Outside	Primary Sedimentation	Process Piping and Equipment	1 - Unacceptable	Holes in weirs, warping, bending	15 - Moderate
WPC909	Secondary Clarifier #2 Weirs	Outside	Secondary Sedimentation	Process Piping and Equipment	1 - Unacceptable	Water isn't using the weirs. Water is going in cracks, below or beside. Weirs are uneven	15 - Moderate
WPC910	Secondary Clarifier #3 Weirs	Outside	Secondary Sedimentation	Process Piping and Equipment	1 - Unacceptable	Water is seeping below, beside, or through the weirs. Warping. Weirs are uneven and/or broken.	15 - Moderate
WPC912	Grit Channel Air Pipe	Outside	Aeration	Process Piping and Equipment	1 - Unacceptable	Air pipe is broken and is leaking. This is located underground next to the primary clarification tanks	15 - Moderate
WPC049	P.T. #1 And #2 Long. Collector	Outside	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Appears to be in poor condition.	14 - Moderate

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC050	P.T. #3 Cross Collector	Outside	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Chain links are sagging and due for replacement	14 - Moderate
WPC051	P.T. #3 And #4 Long. Collector	Outside	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Chain links are sagging and due for replacement	12 - Moderate
WPC052	P.T. #4 Cross Collector	Outside	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Chain links are sagging and due for replacement	12 - Moderate
WPC080	Aeration Tank #2 Process Air Valves	Outside	Aeration	Process Piping and Equipment	2 - Poor	VF-22214 operator is completely broken and unacceptable. Other 5 valves are in good condition	8 - Low
WPC086	Aeration Tank #1 RAS Piping	Outside	Aeration	Process Piping and Equipment	2 - Poor	One of them is not discharging water. Visible rust.	14 - Moderate
WPC134	Secondary Clarification Hand Gates	Outside	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Handles are broken on several hand gates. Several missing sealing gaskets	9 - Low
WPC138	S.T. Cross Collector #1	Outside	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Visibly noticeable rust. Motor and drive have visible rust	9 - Low
WPC178	Flash Mixer	Outside	Disinfection	Process Piping and Equipment	2 - Poor	M614 is leaking oil.	9 - Low
WPC647	Outdoor Light Standards	Outside	Electrical System	Electrical	2 - Poor	Needs maintenance/cleaning	9 - Low
WPC654	S.T.Long Collector #2 Local Control Panel	Outside	Electrical System	Electrical	2 - Poor	Bugs; Needs maintenance/cleaning	9 - Low
WPC908	Secondary Clarifier #1 Weirs	Outside	Secondary Sedimentation	Process Piping and Equipment	2 - Poor	Minor warping	12 - Moderate
WPC055	Primary Tank #4 Raw Sludge Motorized Valve	Pump Room No.2	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Surface rust and leakage	8 - Low
WPC058	Primary Scum Pump	Pump Room No.2	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Surface rust	14 - Moderate
WPC059	Raw Sludge Pump 3 (M203)	Pump Room No.2	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Old, surface rust	14 - Moderate
WPC060	Raw Sludge Pump 4 (M204)	Pump Room No.2	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Old, Surface rust	14 - Moderate
WPC399	Pump Room No.2 Emergency Lights	Pump Room No.2	Building Services	Electrical	2 - Poor	Needs maintenance/cleaning	9 - Low

ID (JLR)	Asset Name	Area	Process	Asset Category	Visual Condition Rating	Condition Comment	Risk
WPC934	Primary Scum Pump Check Valve	Pump Room No.2	Primary Sedimentation	Process Piping and Equipment	2 - Poor	Surface rust. Check valve is broken and needs to be replaced.	9 - Low

4.0 Financial Forecast and Replacement Program

4.1 50-Year Cash Flow Projections

Figure 5 below shows the 50-year cash flow projection for replacing WPCC assets, based solely on the 'default replacement year'. The average annual expenditure, approximately $1,750,000, is represented by the red line across the chart. These cost includes material replacement and assumes a labour markup of 100%. It does not account for plant expansion, project administration, or construction requirements.

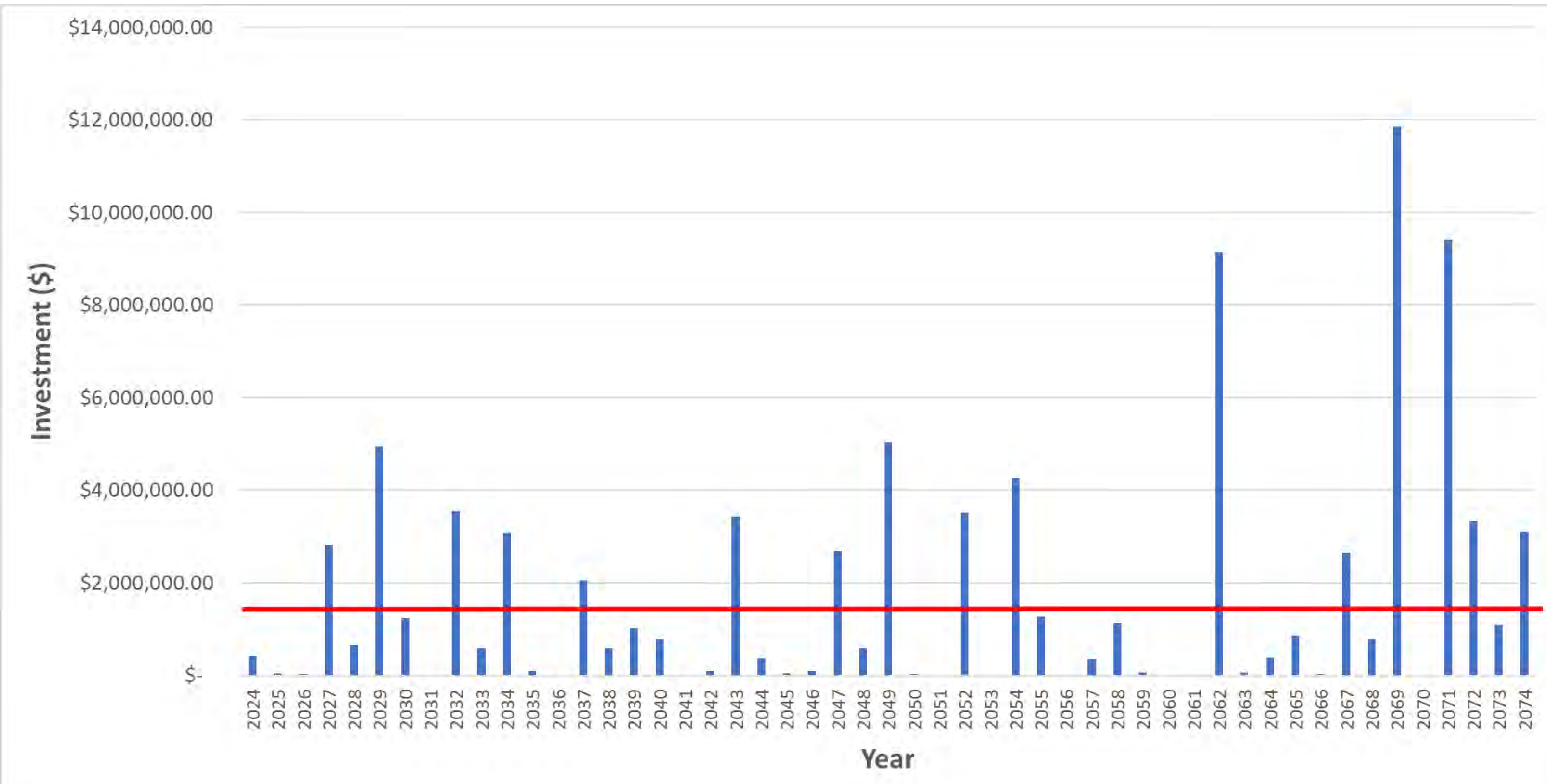

Figure 5: 50-Year Cash Flow Project

4.2 Capital Project Definition and List of Maintenance Activities

The goal of the capital project definition phase is to organize recommendations into capital projects that can be issued as single assignment over the next 10 years, studies that need to be undertaken to refine recommendations, and operation and maintenance activities. Table 8 summarizes JLR's general approach in defining these projects. Preliminary project groupings were discussed with the Town in a collaborative workshop and refined based on feedback received. Refer to Appendix E to review the Workshop meeting minutes and presentation.

Table 8: JLR's Approach for Project/ Study/ O&M Program Groupings

Grouping	Capital Project	Study	O&M
Description of Work	• Replacements • Requires engineering or design work • Like-for-like replacements for major equipment • Larger groupings of assets that should be replaced at the same time	• Assets that need further investigation	• Repairs • Replacement for building assets • Like-for-like replacement of minor equipment

4.2.1 Capital Projects

Table 9 summarizes the recommended capital projects over the next 10 years, which were developed collaboratively with the Town. To estimated project costs for each project, the sum of individual asset material costs was doubled to account for labour. Refer to Appendix B for details of each capital project.

Table 9: Capital Projects and Sequencing Summary

Project Name	Recommended Action Year	Estimated Cost ($) (Material + Labour)	Project Description
2024 PLC Replacements	2024	$90,000	Replacement of PLC panels in control building, chemical building and headworks.
WPCC Misc. Building Repairs	2024	$50,000	Replacement/repair of miscellaneous building components and equipment.
Primary Clarifier Collector Spares	2025	$360,000	Ordering spare primary clarifier collectors.
Secondary Clarifier Collector Spares	2025	$360,000	Ordering spare secondary clarifier collectors.
Primary Sedimentation	2025	$100,000	Replacement of primary sedimentation scum trough and primary clarifiers #3 and #4 weirs.
Headworks Screen Safety Upgrades	2025	$50,000	Installation of a manual raking system and reconfigure grating.
Odour Control Media Replacement	2025	$80,000	Replacement of media for the odour control system.
Chemical Building Refurbishment	2026	$1,840,000	Repair/replacement of equipment in the chemical building. Scope to be confirmed by Chemical Building Refurbishment Study.
Digester Roof Replacement	2027	$440,000	Repair/replacement of digester roofing materials per study recommendations.
Grit Classifier and Conveyor Replacement	2027	$360,000	Replacement of grit classifier and motorized screening conveyor.
Secondary Clarifier Weir and Gate Replacements	2027	$360,000	Replacement of hand gates and repair/replacement of clarifier #1, clarifier #2 and clarifier #3 weirs. Tank modifications as required to enable safe weir replacement, per results of Options Analysis Study.
2028 PLC Replacements	2028	$410,000	Replacement of PLC panels in headworks, digester facility, control building and blower building.

Digester Gas and Flare Equipment	2028	$550,000	Replacement of digester flow meter, valves, frame arresters, pressure switches, waste gas flare and temperature element.
Mechanical Screen #1 Replacement	2028	$360,000	Replacement of mechanical screen #1.
Dewatering	2029	$2,190,000	Replacement of dewatering centrifuge, valves and centrifuge control panel.
Grit Screw #1 Replacement	2029	$240,000	Replacement of grit screw #1.
Grit Screw #2 Replacement	2029	$240,000	Replacement of grit screw #2.
Odour Control	2029	$520,000	Replacement of dewatering and headworks odour control system.
Building Mechanical	2030	$110,000	End-of-life replacement of miscellaneous building mechanical equipment.
WPCC Emergency Generator	2030	$200,000	Replacement of emergency generator.
Roof Replacements for Headworks Building and Pump Room #2	2031	$150,000	Replacement of headworks and pump room no. 2 roofing materials.
Aeration Diffuser Replacement	2032	$1,300,000	Replacement of aeration diffusers.
Sludge Handling	2032	$770,000	Replacement of sludge pumps, piping, valves, blower and screw conveyor.
Control Building Air Handling Unit	2033	$200,000	Replacement of control building air handling unit.
Mechanical Screen #2 Replacement	2034	$360,000	Replacement of mechanical screen #2.
Total Cost ($)	**$11,690,000**		

4.2.2 Recommended Studies

Table 10 outlines the investigations required to confirm or refine recommendations for applicable assets. These include assets that were inaccessible or that otherwise required a more detailed review. Recommendations and capital projects have been provided for these assets; however, the scope and budget are likely to change based on study results. Refer to Appendix C for the list of assets that require studies.

Table 10: Studies Summary

Study Name	Recommended Action Year	Estimated Cost ($)	Study Description
Option Analysis Study for Weir Replacement	2024	$30,000	Options analysis study to determine preferred solution for weir replacement.
Chemical Building Refurbishment Study	2024	$50,000	Conduct a study to define scope of chemical building refurbishment.
Gas Proofing Study	2026	$360,000	Study to determine condition of gas proofing prior to replacing roof.
Total Cost ($)	**$440,000**		

4.2.3 Operations and Maintenance Projects

Table 11 summarizes the recommended Operations and Maintenance (O&M) projects for the upcoming 10 years. These projects generally consist of minor repairs or low-capital assets that can be replaced like-for-like internally at the end of the service life. The costs include material replacement only and exclude potential labour costs. A summary of estimated O&M expenditure is presented in Table 11, with a more detailed list included in Appendix D. Actual spending within a given year is expected to differ based on actual asset failure timing where assets are intended to be run to failure; proactive replacement may be prioritized based on factors such as LOF and Risk as noted for each asset in Appendix D.

Table 11: Estimated O&M Project Expenditures

Project Name	Recommended Action Year	Estimated Cost ($) (Material)	Description
Operations and Maintenance	2024	$80,000	Repair or replacement of various instrumentation, valves, control panels and other miscellaneous equipment.
	2026	$10,000	
	2027	$480,000	
	2028	$130,000	
	2029	$750,000	
	2030	$230,000	
	2032	$430,000	
	2033	$60,000	
	2034	$690,000	

Total Cost ($)	**$ 2,860,000**
Average Annual Cost ($/Year)	**$ 290,000**

4.2.4 Summary of Major Maintenance Activities

Table 12 summarizes typical preventative maintenance activities that are performed for major assets that that may not be currently part of normal operations and maintenance routines. This information was obtained from Operations and Maintenance Manuals, discussions with the Town, and JLR's project experience. Performing these activities is expected to increase Operation and Maintenance spending by approximately $3,350,000 over the next 10 years.

The primary clarification system consists of four tanks, which should be inspected once every 10 years for corrosion, concrete delamination, cracking, and spalling. The estimated cost for inspecting each tank is $10,000, totaling $40,000 for all four tanks over the 10-year period. Similarly, the secondary clarification system, with three tanks, requires inspections at an estimated total cost of $30,000 over the same period.

The aeration system consists of two tanks, each equipped with diffusers, piping, and connections. Annual inspections are required at an estimated cost of $10,000 per tank per year, totaling $40,000 for the next 10 years.

Maintenance for the digesters involves draining and de-sludging by specialized contractors, followed by a thorough inspection of the concrete, piping, gas-proofing, link seals, heat exchangers, pumps, and electrical components. It is estimated that this equipment will need to be inspected and replaced once over the next 10 years, with a total estimated cost of $3,000,000 for both digesters.

The Odour Control system requires annual replacement of carbon-based odour filters. The cost to replace the filters is estimated at $8,000 per year, totaling $80,000 over the next 10 years.

Table 12: Summary of Major Maintenance Activities

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Primary Clarifier	Tankage	Once Every 10 Years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$40,000
Aeration	Tankage	Once Annually	• Stop liquid flow to the tank. • Reduce air flow to 0.5 scfm per diffuser and drain liquid. • Turn off air when the liquid level is 2 feet from the diffussers. • Drain and clean tanks.	$200,000
	Diffusers and piping system	Once Annually	• Clean equipment using low pressure hosing. • Restore air to the system to 1 scfm. • Use a soft brittle brish on the surface of the diffuser if necessary.	
	Connections	Once Annually	• After cleaning, confirm that hardware connections, pipe joints, and diffuser retainer rings are secure. • Confirm that blank diffuser holder locations have an orifice plug. • Confirm that there are no leaks.	
Secondary Clarifier	Tankage	Once Every 10 Years	• Drain and clean tanks. • Visually inspect tanks for signs of corrosion, concrete spalling, delamination and cracking.	$30,000
Digesters	Tankage	Once Every 10 - 15 Years	• Drain and de-sludge the digesters. This work is perfromed by specialized contractors. • Inspect condition of concrete and piping after draining and de-sludging.	$3,000,000
	Gas-Proof Lining and Digester Roofing		• Replace gas-proof lining after draining and de-sluding of digesters. • Replace roofing based on condition.	

System	Equipment	Frequency	Maintenance Activity	Estimated Cost ($)
Digesters	Link Seals, Piping, Heat Exchanger, Electrical Components, Pumps, etc.		• As part of the digester drainage, cleanout and inspection, all other parts should simulataneously be inspected and replaced as needed.	
Odour control	Odour control media	Once Annually	• Carbon-based odour filters should be replaced earlier if odours are detected.	$80,000
Total Cost ($)	**$3,350,000**			

4.2.5 10 Year Spending Projections

The 10-year cash flow projection for the recommended capital projects, operations and maintenance projects and studies is shown in Figure 6. As detailed in the previous sections, costs for these groupings are determined as follows:

- Capital Projects: Costs include both material expenses and an assumed 100% markup for labour.
- Operations and Maintenance Projects: Costs cover material replacement only.
- Studies: Costs cover the labour required for investigations. Assets identified for study are also included in capital projects; however, the costs are subject to adjustment following study recommendations.

This cash flow projection generally does not include the major maintenance activities listed in Table 12.

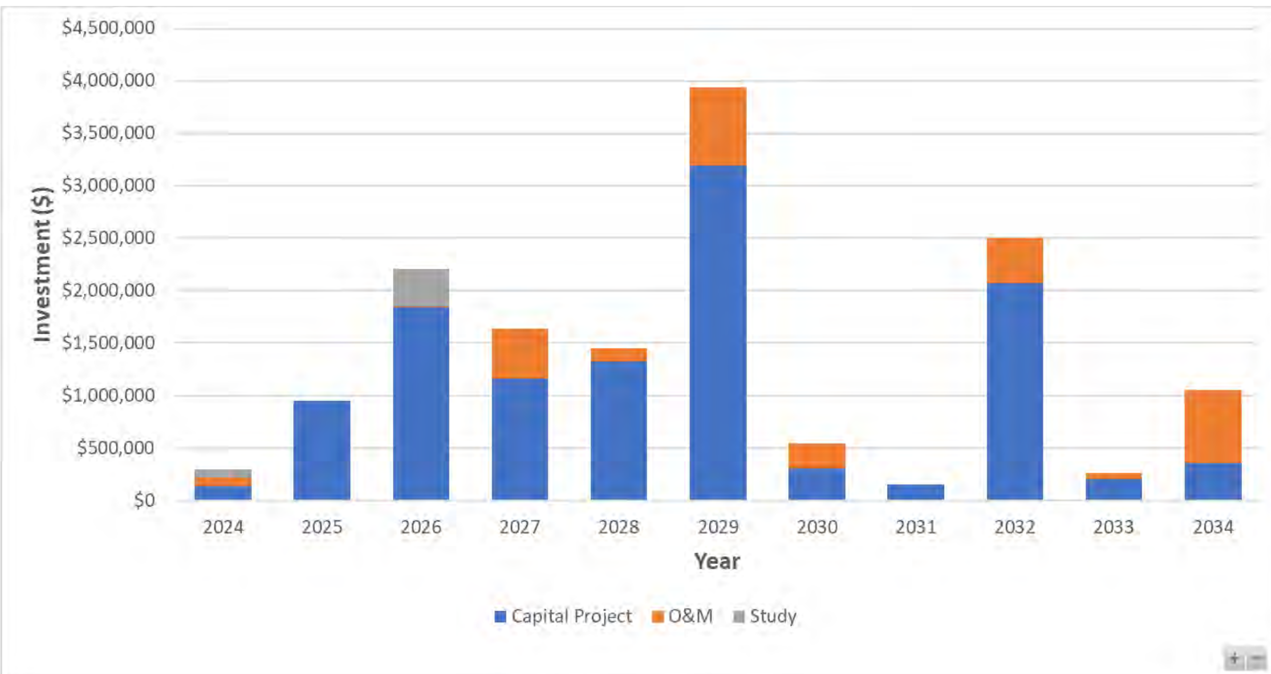

Figure 6: WPCC 10-Year Cash Flow Projection

5.0 Conclusion

JLR completed an inventory, condition, and capital planning assessment of the Arnprior Water Pollution Control Centre (WPCC). This assessment aimed to provide practical and comprehensive recommendations for maintenance and capital budget planning.

The findings from the condition assessment were used to consolidate mid-term projects (within 10 years) into manageable packages that can be addressed as single assignments. It is estimated that a total of $11,690,000 will be required for capital projects, $440,000 for studies and $2,860,000 operations and maintenance projects, at Arnprior's Water Pollution Control Centre over the next 10 years. Figure 7 shows a breakdown of these costs organized by project type. These costs do not include allowances for plant expansion, project administration, and construction requirements. Major maintenance activities may require an additional $3,350,000 over the next 10 years. For details, refer to Section 4.0.

The total estimated project cost covers both materials and installations, where applicable. For labour costs, a 100% markup was applied to the total material cost. However, this markup does not apply where installation or repairs are intended to be performed by the plant operators. Furthermore, these costs do not include allowances for plant expansion, project administration, and construction requirements.

This report is intended as a summary and complements the higher level of detail provided in the Asset Inventory Database appended in Appendix A.

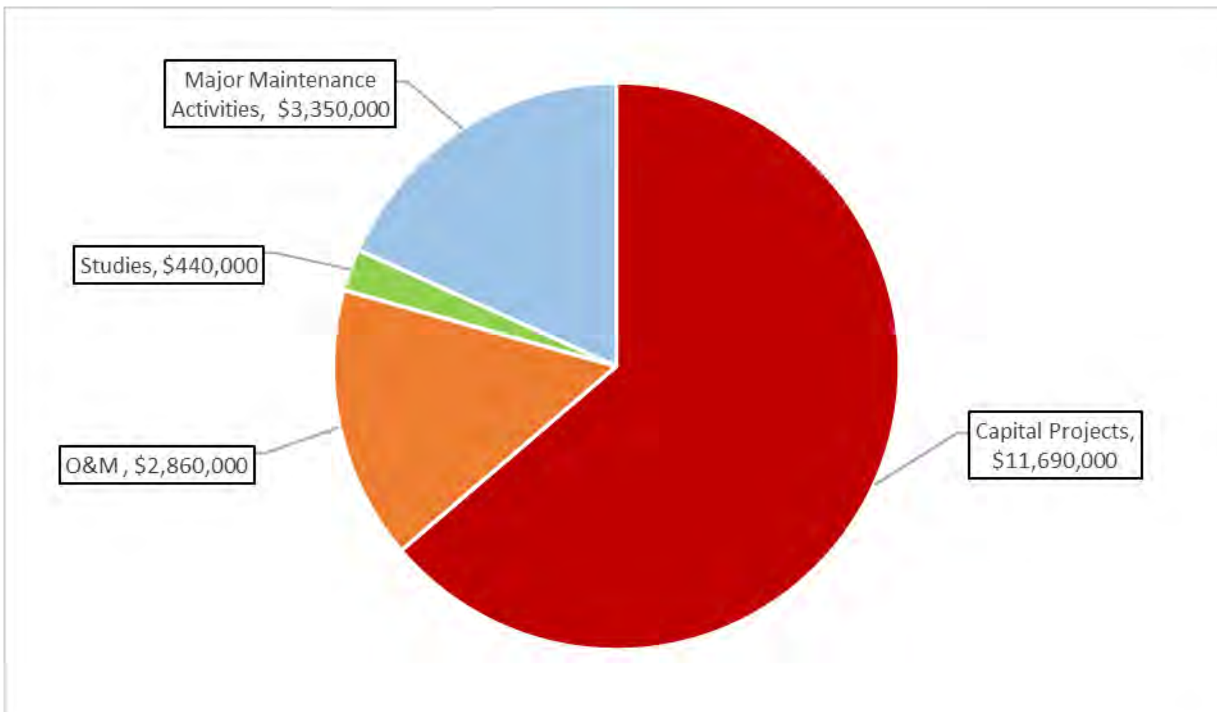

Figure 7: Annual Financial Investments Required over 10 years by Project Type.

6.0 Limitations

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Appendix A

Asset Inventory Database (Excel)

Appendix B

Capital Projects Sheet

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC551	Chemical Building Control Panel	Chemical Building	2 - Poor	Needs maintenance/cleaning.	Replace; already budgeted for 2024.	2024 PLC Replacements	2024	$ 36,000
WPC553	Control Building PLC Control Panel (1996)	Control Building	3 - Fair	-	Replace; already budgeted for 2024.	2024 PLC Replacements	2024	$ 30,000
WPC570	Headworks PLC Control Panel (1996)	Headworks	3 - Fair	-	Replace; already budgeted for 2024.	2024 PLC Replacements	2024	$ 20,000
WPC176	Chlorine Contact Tank	Outside	3 - Fair	Appears to be generally in fair condition. Some corrosion at the water level (see photo 2). Expansion joint appears to be failing (see photo 2). Narrow cracks on walls (see photo 4). Medium spall at hatch. Hatches don’t appear to have open assistance and don't appear to close on their own (see photo 3). Did not access within the tank. Last two runs were installed in 2011.	Repair spall.	WPCC Misc. Building Repairs	2024	$ 500
WPC414	Blower Building Exterior Doors	Blower Building	4 - Good	Appears to be generally in good condition. The back door doesn't appear to latch (photo 1).	Address door latch issue.	WPCC Misc. Building Repairs	2024	$ 500
WPC418	Blower Building Interior Doors / Fire doors - Latches	Blower Building	4 - Good	Appears to be generally in good condition. Interior doors don't appear to latch (photos 1 and 2). Door in Photo 3 doesn't appear to completely close.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC425	Blower Building Exterior Walls/Columns	Blower Building	4 - Good	Appears to be generally in good condition. Cracks at the expansion joints (see photos 2 and 3).	Replace expansion joint seal.	WPCC Misc. Building Repairs	2024	$ 1,000
WPC428	Blower Building Interior Walls/Columns	Blower Building	4 - Good	Appears to be generally in good to locally poor condition. A masonry unit atop the closet appears to be detaching.	Repair loose block.	WPCC Misc. Building Repairs	2024	$ 500
WPC429	Blower Building Roof Slabs	Blower Building	4 - Good	Appears to be generally in good condition. Paint appears to be peeling.	Retouch paint.	WPCC Misc. Building Repairs	2024	$ 1,000

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WPC451	Control Building Floors/Slabs On Grade	Control Building	4 - Good	Appears to be generally in good condition. Rust stains, narrow cracks (see photos 1 and 3). Localized delamination on Boiler Room Floor and Workshop Floor (see Photos 2 and 4).	Repair delamination areas.	WPCC Misc. Building Repairs	2024	$ 5,000
WPC453	Control Building Interior Walls/Columns	Control Building	4 - Good	Appears to be generally in good condition. Pipe support with no anchors (see photos 3 and 4).	Install anchors.	WPCC Misc. Building Repairs	2024	$ 1,000
WPC458	Control Building (Original) Exterior Doors	Control Building	3 - Fair	Appears to be generally in good condition. The main door doesn’t appear to latch (photo 1). The side door in (photo 4) next to the vehicle doors doesn't appear to close by itself. The exterior doors for the control building appear to have light to moderate corrosion.	Address door latch issue.	WPCC Misc. Building Repairs	2024	$ 500
WPC459	Control Building (Original) Exterior Windows	Control Building	1 - Unacceptable	Appears to be generally in poor condition. Seal appear to have failed on majority of windows.	Replace seals.	WPCC Misc. Building Repairs	2024	$ 5,000
WPC462	Control Building (Original) Interior Doors / Fire doors - Latches	Control Building	2 - Poor	Appears to be generally in good condition. Dewatering room interior door doesn't appear to close photo 1 and 2.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC471	Control Building Expansion Exterior Doors	Control Building	3 - Fair	Appears to be generally in good condition. Door doesn't appear to latch (see photo 1).	Address door latch issue.	WPCC Misc. Building Repairs	2024	$ 500
WPC492	Digester Facility Exterior Doors	Digester Facility	4 - Good	Appears to be generally in good condition. The side door into the main section doesn’t appear to close (photo 2).	Address door latch issue.	WPCC Misc. Building Repairs	2024	$ 500
WPC496	Digester Facility Interior Doors / Fire doors - Latches	Digester Facility	4 - Good	Appears to be generally in good condition. Internal door next to stairs doesn't close photo 1.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC511	Headworks Building Exterior Doors	Headworks	3 - Fair	Appears to be generally in good condition. The vehicle door does not close fully to concrete slab (see photo 3).	Address door latch issue.	WPCC Misc. Building Repairs	2024	$ 500

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WPC514	Headworks Building Exterior Stairs	Headworks	3 - Fair	Appears to be generally in good condition. Vegetation (photo 1).	Cut back vegetation.	WPCC Misc. Building Repairs	2024	$ 500
WPC534	Pump Room No.2 Interior Doors / Fire doors - Latches	Pump Room No.2	3 - Fair	Door doesn't latch (see photos 1 and 2).	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC559	Waste Gas Flare Control Panel	Digester Facility	3 - Fair	Needs weed removal.	Cut back vegetation.	WPCC Misc. Building Repairs	2024	$ 500
WPC645	Main Outdoor Substation	Outside	3 - Fair	Needs weed removal maintenance.	Cut back vegetation.	WPCC Misc. Building Repairs	2024	$ 500
WPC646	Main Padmount Transformer	Outside	3 - Fair	-	Cut back vegetation.	WPCC Misc. Building Repairs	2024	$ 500
WPC714	Digester Building Basement Floor	Digester Facility	4 - Good	Appears to be generally in good to locally poor condition. Localized delamination (see photos).	Repair delamination areas.	WPCC Misc. Building Repairs	2024	$ 1,500
WPC721	Aeration Tanks Railing	Outside	4 - Good	Appears to be generally in good condition. Missing bolt at base plate at the west side of Aeration tank 2. Did not access within the tank.	Replace bolt.	WPCC Misc. Building Repairs	2024	$ 200
WPC725	WPC Grating	Outside	4 - Good	Appears to be generally in good condition. Localized light corrosion next to control building. Majority of gratings don't appear to include hold down anchors and some grating appear to be deformed causing trip hazards.	Following further review, replace deformed grating and install hold down clips.	WPCC Misc. Building Repairs	2024	$ 15,000
WPC804	Blower Building Basement Doors	Blower Building	4 - Good	Appears to be generally in good condition. The doors don't appear to latch (see photos in the added comments).	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC809	Control Building Laboratory Interior Doors	Control Building	4 - Good	Appears to be generally in good condition. Missing/not-in-place door in photo 1. Door in photo 2 doesn't appear to latch.	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC811	Control Building Workshop Interior Doors	Control Building	3 - Fair	Appears to be generally in good condition. Left section of the door in photo 1 doesn't appear to latch. Rust stain at the doors (see photos).	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500

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WPC813	Control Building Garage Interior Doors	Control Building	4 - Good	Appears to be generally in good condition. Door doesn't appear to close by itself (see photos).	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC815	Control Building Laboratory Main Entrance Interior Doors	Control Building	4 - Good	Appears to be generally in good condition. The main door doesn't appear to close by itself (see photos).	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC816	Control Building Laboratory Ceiling	Control Building	3 - Fair	Appears to be generally in fair condition. Water spots and gaps (see photos)	Investigate source of water damage and repair.	WPCC Misc. Building Repairs	2024	$ 5,000
WPC819	Control Building Laboratory External Windows	Control Building	3 - Fair	Appears to be generally in good condition. Sealing is loose (see photos)	Repair sealing.	WPCC Misc. Building Repairs	2024	$ 1,000
WPC821	Control Building Basement Interior Doors	Control Building	4 - Good	Appears to be generally in good condition. The door doesn't appear to latch (see photo 2)	Address door latch issue. Note that fire rated interior door latches may not meet current building code.	WPCC Misc. Building Repairs	2024	$ 500
WPC912	Grit Channel Air Pipe	Outside	1 - Unacceptable	Air pipe is broken and is leaking. This is located underground next to the primary clarification tanks	Repair	WPCC Misc. Building Repairs	2024	$ 5,000
WPC024	Manual Screen	Headworks	3 - Fair	Unable to visible inspect working as it should. Town notes that it cannot be cleaned safely.	Install a manual raking system and reconfigure grating to improve health and safety.	Headworks Screen Safety Upgrades	2025	$ 50,000
WPC659	Digester Facility Odour Control System	Digester Facility	3 - Fair	Fair visual condition; media likely requires replacement.	Replace media.	Odour Control Media Replacement	2025	$ 75,000
WPC049	P.T. #1 And #2 Long. Collector	Outside	2 - Poor	-	Replace; order materials in advance.	Primary Clarifier Collector Spares	2025	$ 120,000
WPC050	P.T. #3 Cross Collector	Outside	2 - Poor	Chain links are sagging and due for replacement.	Replace; order materials in advance.	Primary Clarifier Collector Spares	2025	$ 60,000
WPC051	P.T. #3 And #4 Long. Collector	Outside	2 - Poor	Chain links are sagging and due for replacement.	Replace; order materials in advance.	Primary Clarifier Collector Spares	2025	$ 120,000
WPC052	P.T. #4 Cross Collector	Outside	2 - Poor	Chain links are sagging and due for replacement.	Replace; order materials in advance.	Primary Clarifier Collector Spares	2025	$ 60,000
WPC905	Primary Sedimentation Scum Trough	Outside	3 - Fair	Appears to be in fair condition. Town commented that a stainless steel insert would improve operations/ redundancy.	Replace. Add one piece stainless steel insert per Town request.	Primary Sedimentation	2025	$ 52,800

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WPC907	Primary Clarifiers #3 And 4 Weirs	Outside	1 - Unacceptable	Holes in weirs, warping, bending.	Replace	Primary Sedimentation	2025	$ 43,600
WPC138	S.T. Cross Collector #1	Outside	2 - Poor	Visibly noticeable rust. Motor and drive have visible rust.	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC139	S.T. Cross Collector #2	Outside	3 - Fair	-	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC140	S.T. Cross Collector #3	Outside	4 - Good	-	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC141	S.T. Long Collector #1	Outside	3 - Fair	Some surface rust.	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC142	S.T. Long Collector #2	Outside	3 - Fair	-	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC143	S.T. Long Collector #3	Outside	4 - Good	-	Purchase shelf spares (to be installed by staff on failure).	Secondary Clarifier Collector Spares	2025	$ 60,000
WPC094	Ferric Chloride Piping	Chemical Building	1 - Unacceptable	Visible signs of leakage.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 1,200
WPC097	Ferric Chloride Tank #1 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC098	Ferric Chloride Tank #2 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC099	Ferric Chloride Tank #1 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC100	Ferric Chloride Tank #2 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC101	Ferric Chloride Tank #2	Chemical Building	2 - Poor	Visible signs of leaky connections and flanges.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 52,000
WPC102	Ferric Chloride Tank #1	Chemical Building	2 - Poor	Tank 1 appears to be in better condition than Tank 2. Still visible signs in minor leakage on pipe nozzles.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 52,000
WPC103	Ferric Chloride Check Valve	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC104	Ferric Chloride Isolation Valves	Chemical Building	2 - Poor	Valves appear to be leaking in multiple locations on the system.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 12,000
WPC105	Ferric Chloride System Pressure Relief Valves	Chemical Building	2 - Poor	Only one pressure relief valve installed back to inlet header. Poor condition visible rust and signs of leakages.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 12,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC150	Sodium Bisulphite Pump 1	Chemical Building	3 - Fair	Signs of age and wearing.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,400
WPC151	Sodium Bisulphite Pump 2	Chemical Building	3 - fair	Signs of age and wearing.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,400
WPC152	Sodium Bisulphite Tank #1 Current Level	Chemical Building	2 - Poor	Appears to be in poor condition.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 4,000
WPC153	Sodium Bisulphite Tank High Level Switch	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC154	Sodium Bisulphite Tank Low Level Switch	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC155	Sodium Bisulphite Tank	Chemical Building	3 - Fair	Minor corrosion on flanges, and nozzles.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,000
WPC156	Sodium Bisulphite System Check Valve	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 600
WPC157	Sodium Bisulphite System Isolation Valves	Chemical Building	2 - Poor	Signs of age. PVC piping appears to be holding up although operators have mentioned the chemical lines to be drying out and cracking when servicing equipment.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 8,000
WPC158	Sodium Bisulphite System Pressure Relief Valves	Chemical Building	3 - Fair	Sings of aging.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 12,000
WPC159	Sodium Hypochlorite Pump #1	Chemical Building	3 - Fair	Signs of aging.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,400
WPC160	Sodium Hypochlorite Pump #2	Chemical Building	2 - Poor	Pump appears to be in poor condition. Cap has been broken off.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,400
WPC161	Sodium Hypochlorite Pump #3	Chemical Building	2 - Poor	Pump appears to be in poor condition. Significant surface rust and seems out dated.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 20,400
WPC163	Hypochlorite Tank #1 Current Level	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 4,000
WPC164	Hypochlorite Tank #2 Current Level	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 4,000
WPC165	Sodium Hypochlorite Tank #1 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC166	Sodium Hypochlorite Tank #2 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300

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WPC167	Sodium Hypochlorite Tank #1 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC168	Sodium Hypochlorite Tank #2 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 300
WPC169	Sodium Hypochlorite Tank	Chemical Building	2 - Poor	Visible signs of leaking. Metal bolts are severely corroded in some places and beginning to corrode in others.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 52,000
WPC170	Sodium Hypochlorite Tank	Chemical Building	1 - Unacceptable	Signs of leaking flanges and corrosion. Anchors are corroded on both tanks 1 and 2. Repairs have been made on the rear side of the tank. Tank manhole cover appears to be open and venting into the room.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 52,000
WPC171	Sodium Hypochlorite System Back Pressure Valves	Chemical Building	3 - Fair	Only one back pressure valve was observed on site. Signs of aging.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 18,000
WPC172	Sodium Hypochlorite System Check Valves	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 600
WPC173	Sodium Hypochlorite System Isolation Valves	Chemical Building	2 - Poor	Overall the valves appear to be in fair condition with the exception of a couple valves and piping have clear singes of leakage.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 14,000
WPC174	Sodium Hypochlorite System Pressure Relief Valves	Chemical Building	3 - Fair	Only 2 pressure relief valves are installed on the system.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 18,000
WPC307	Chemical Building Emergency Lights	Chemical Building	3 - Fair	Needs maintenance/cleaning.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 2,080
WPC308	Chemical Building Exit Signs	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 2,680
WPC309	Chemical Building Exterior Lighting	Chemical Building	2 - Poor	Bug nests.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 2,000
WPC310	Chemical Building Interior Lighting	Chemical Building	3 - Fair	Needs maintenance/cleaning.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 8,000
WPC311	Chemical Building Low Temp	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 1,000

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WPC312	Chemical Building Room Temp	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 1,000
WPC313	Chemical Building Domestic Plumbing System	Chemical Building	3 - fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 30,000
WPC314	Chemical Building Fans	Chemical Building	1 - Unacceptable	Visible rust on all fans, signs of age. Appear to be in poor condition. Dampers all appear to be corroded. Damper switch for fan EF-601 is broken. Ventilation does not seem to be operating efficiently causing severe corrosion inside.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 38,400
WPC315	Chemical Building Hydronic Unit Heaters	Chemical Building	2 - Poor	Visible signs of corrosion on sodium hypochlorite and ferric chloride rooms unit heaters. One unit heater in sodium bisulphate room is in fair condition.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 48,000
WPC316	Chemical Building Misc. Building Mechanical	Chemical Building	2 - poor	Visible signs of rust and wear. Chemical appear to be leaking and affecting the environment.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 16,000
WPC431	Chemical Building Exterior Roofing Materials	Chemical Building	4 - Good	Based on photos provided by client. Appears to be generally in good condition. Appears to present evidence of previous water pooling. Light corrosion on utilities. Debris accumulation on at roof drains. Does not appear to have direct access to the roof.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 135,737
WPC432	Chemical Building Exterior Cladding	Chemical Building	4 - Good	Appears to be generally in good condition. Vegetation see (photo 3).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 109,060
WPC433	Chemical Building Exterior Doors	Chemical Building	2 - Poor	Appears to be generally in poor condition. Main door doesn't appear to latch (Photo 2). Two secondary doors next to the main door latches but appear to be corroded from the inside (see photo 4).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 14,400
WPC434	Chemical Building Exterior Windows	Chemical Building	4 - Good	Appears to be generally in good condition.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 22,824

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WPC437	Chemical Building Interior Doors / Fire doors - Latches	Chemical Building	4 - Good	Appears to be generally in good condition. Door in photo 1 doesn't appear to latch. Door in photo 2 doesn't appear to close by itself	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 10,800
WPC439	Chemical Building Interior Railing / Code	Chemical Building	4 - Good	Appears to be generally in good condition.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 15,200
WPC440	Chemical Building Interior Stairs / Code	Chemical Building	4 - Good	Appears to be generally in good condition. Rust stain (photos 1-3).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 72,000
WPC444	Chemical Building Exterior Walls/Columns	Chemical Building	4 - Good	Appears to be generally in good condition. Cracks at the expansion joints see (photo 4).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 311,300
WPC445	Chemical Building Floors/Slabs On Grade	Chemical Building	3 - Fair	Appears to be generally in good to locally poor condition. Large area of spalling, medium cracks, and delamination at northeast side (see photos 1, 2, 3, 4).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 151,200
WPC447	Chemical Building Interior Walls/Columns	Chemical Building	4 - Good	Appears to be generally in good locally poor condition. Expansion joints appear to be failing see (photo 4).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 90,000
WPC448	Chemical Building Roof Slabs	Chemical Building	3 - Fair	Appears to be generally in fair condition. With light to moderate corrosion on the underside of deck.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 39,400
WPC449	Chemical Building Steel Beams	Chemical Building	3 - Fair	Appears to be generally in fair condition. Light to locally moderate corrosion on north side of the building (see photo 1).	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 157,600
WPC593	Chemical Building Electrical Conduit And Wiring	Chemical Building	3 - Fair	Sodium Hypo Storage lots of leaking.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 42,000
WPC594	Chemical Building Power Panel	Chemical Building	2 - Poor	Needs maintenance/cleaning. Discovered blown capacitors and fuses while panel was open.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 12,000
WPC595	Lighting Transformer For Lap-J	Chemical Building	2 - Poor	Needs replacement.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 7,000
WPC596	Chemical Lines Heat Trace Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 4,000
WPC632	Lighting Panel #7 - Chemical Building	Chemical Building	2 - Poor	Needs replacement.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 6,600

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WPC878	Ferric Chloride Tank 1 Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC879	Ferric Chloride Tank 2 Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC880	UPS Electrical Panel	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,200
WPC881	Chemical Tank Vents	Chemical Building	3 - Fair	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 1,200
WPC882	Chemical Building Roof Drain	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 400
WPC883	Pump 606 & 607 Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 10,000
WPC884	Chemical Building Sodium Bisulphite Field Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 10,000
WPC885	Sodium Hypochlorite Tank 1 Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC886	Sodium Hypochlorite Tank Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC887	Sodium Hypochlorite Tank 601 Control Panel	Chemical Building	4 - Good	-	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 3,000
WPC888	Heat Tracing Cable Control Panel	Chemical Building	2 - Poor	Needs maintenance/cleaning.	Replace or repair per study recommendations.	Chemical Building Refurbishment	2026	$ 10,000
WPC490	Digester Facility Exterior Roofing Materials	Digester Facility	3 - Fair	Appears to be generally in fair with local poor conditions. Large areas of bulging and loose roof materials at east digester. Water accumulation (photo 2). Proper step and handrail not present to digester roofs. (see photo 3 and 4). Guardrail not present along perimeter of roof. Vegetation noted.	Repair or replace per study recommendations.	Digester Roof Replacement	2027	$ 435,778
WPC007	Grit Classifier	Headworks	2 - Poor	Lots of surface corrosion.	Replace. Note that work would ideally be scheduled during dry season.	Grit Classifier and Conveyor Replacement	2027	$ 120,000
WPC011	Motorized Screenings Conveyor	Headworks	3 - Fair	-	Replace	Grit Classifier and Conveyor Replacement	2027	$ 240,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC134	Secondary Clarification Hand Gates	Outside	2 - Poor	Handles are broken on several hand gates. Several missing sealing gaskets.	Replace with mechanical sluice gates; rework configuration to be more practical.	Secondary Clarifier Weir and Gate Replacements	2027	$ 168,000
WPC135	Secondary Clarifier #1 Tank	Outside	3 - Fair	Was empty during inspection. Appears to be generally in fair condition. Light corrosion on steel components (see photos 1 and 2) Narrow cracks around the posts and at the tank walls (see photo 2). Moderate scaling and rust staining at the tank walls. Did not access within the tank. Operators report issues re-attaching weirs due to local concrete condition.	Repair/modify to enable safe weir replacement per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 25,000
WPC136	Secondary Clarifier #2 Tank	Outside	3 - Fair	Appears to be generally in fair condition. Corrosion (see photo 3) Cracks in the walls between the tanks (see photo 2). Operators report issues re-attaching weirs due to local concrete condition.	Repair/modify to enable safe weir replacement per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 25,000
WPC137	Secondary Clarifier #3 Tank	Outside	4 - Good	Appears to be generally in good condition. Light corrosion and narrow cracks noted. Did not access within the tank. Operators report issues re-attaching weirs due to local concrete condition.	Repair/modify to enable safe weir replacement per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 25,000
WPC908	Secondary Clarifier #1 Weirs	Outside	2 - Poor	Minor warping.	Replace per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 40,800
WPC909	Secondary Clarifier #2 Weirs	Outside	1 - Unacceptable	Water isn't using the weirs. Water is going in cracks, below or beside. Weirs are uneven.	Replace per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 33,600
WPC910	Secondary Clarifier #3 Weirs	Outside	1 - Unacceptable	Water is seeping below, beside, or through the weirs. Warping. Weirs are uneven and/or broken.	Replace per study recommendations.	Secondary Clarifier Weir and Gate Replacements	2027	$ 47,000
WPC548	Blower Building PLC Control Panel (2010)	Blower Building	4 - Good	-	Replace	2028 PLC Replacements	2028	$ 80,000
WPC552	Control Building PLC Control Panel (2010)	Control Building	4 - Good	-	Replace	2028 PLC Replacements	2028	$ 120,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC555	Control Panel In Centrifuge Area	Control Building	4 - Good	-	Replace	2028 PLC Replacements	2028	$ 8,000
WPC561	Digester Facility PLC Control Panel (2010)	Digester Facility	4 - Good	-	Replace	2028 PLC Replacements	2028	$ 90,000
WPC569	Headworks PLC Control Panel (2010)	Headworks	3 - Fair	-	Replace	2028 PLC Replacements	2028	$ 60,000
WPC571	Screen #1 PLC Control Panel	Headworks	4 - Good	-	Replace	2028 PLC Replacements	2028	$ 50,000
WPC273	Digester Gas Flow Meter	Digester Facility	4 - Good	Second unit with same name found.	Replace	Digester Gas and Flare Equipment	2028	$ 10,000
WPC274	Digester Gas Motorized Shutoff Valve	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 20,000
WPC275	Digester Gas Regulator Valve	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 26,000
WPC276	Digester Gas Check Valve	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 3,000
WPC277	Digester Gas Flame Arrester Package	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 8,000
WPC278	Digester Gas Booster Discharge Pressure Switch	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 5,000
WPC279	Waste Gas Flare High Gas Pressure	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 5,000
WPC280	Gas Booster Low Gas Pressure Switch	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 5,000
WPC281	A.S.S.O. Valve Low-Low Gas Pressure Switch	Digester Facility	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 5,000
WPC282	Digester Gas Isolation Valves	Digester Facility	4 - Good	Good visual condition; Town indicated that valves in this system are not easily operable.	Replace; ensure replacement valves are more easily operable.	Digester Gas and Flare Equipment	2028	$ 28,000
WPC283	Digester Pressure Vacuum Relief Valves	Digester Facility	3 - Fair	-	Replace	Digester Gas and Flare Equipment	2028	$ 120,000
WPC285	Waste Gas Flame Arrester Package	Outside	4 - Good	Flame arrester package is insulated so it could not be visually inspected. Town indicated that this asset was rebuilt in 2023.	Replace	Digester Gas and Flare Equipment	2028	$ 8,000
WPC286	Waste Gas Flare	Outside	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 300,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC287	Natural Gas Piping, Valves, Regulator For Waste Gas Flare	Outside	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 8,000
WPC288	Flare Pilot Temperature Element	Outside	4 - Good	-	Replace	Digester Gas and Flare Equipment	2028	$ 1,000
WPC006	Mechanical Screen #1	Headworks	3 - Fair	-		Mechanical Screen #1 Replacement	2028	$ 360,000
WPC250	Dewatering Centrifuge	Control Building	3 - fair	-	Replace	Dewatering	2029	$ 1,800,000
WPC251	Sludge Dewatering Isolation Valves	Control Building	3 - fair	-	Replace	Dewatering	2029	$ 220,000
WPC254	Sludge Pressure Relief Valves	Control Building	Not Inspected	Might be associated to the pumps in the basement of the control building.	Replace	Dewatering	2029	$ 120,000
WPC556	Andrtiz Centrifuge Control Panel	Control Building	4 - Good	-	Replace at same time as Centrifuge.	Dewatering	2029	$ 50,000
WPC008	Grit Screw #1	Headworks	2 - Poor	Signs of corrosion and leaking.	Replace	Grit Screw #1 Replacement	2029	$ 240,000
WPC009	Grit Screw #2	Headworks	2 - Poor	Signs of corrosion and leaking.	Replace	Grit Screw #2 Replacement	2029	$ 240,000
WPC664	Dewatering And Headworks Odour Control System Incl Fan	Outside	3 - Fair	-	Replace	Odour Control	2029	$ 520,000
WPC394	Headworks Building Misc. Building Mechanical	Headworks	3 - Fair	-	Replace	Building Mechanical	2030	$ 61,000
WPC408	Pump Room No.2 Misc. Building Mechanical	Pump Room No.2	3 - Fair	-	Replace	Building Mechanical	2030	$ 50,000
WPC644	Emergency Generator	Outside	3 - Fair	-	Replace	WPCC Emergency Generator	2030	$ 200,000
WPC509	Headworks Building Exterior Roofing Materials	Headworks	3 - Fair	Based on photos provided by client. Appears to be generally in good condition. Missing flashing on east side (see photo 2). Does not appear to have direct access to the roof.	Replace	Roof Replacements for Headworks Building and Pump Room #2	2031	$ 100,387
WPC528	Pump Room No.2 Exterior Roofing Materials	Pump Room No.2	4 - Good	Based on photos provided by client. Appears to be generally in good condition. Does not appear to have direct access to the roof.	Replace	Roof Replacements for Headworks Building and Pump Room #2	2031	$ 47,320

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Recommendation	Project Name	Recommendation Action Year	Recommendation Cost (Material + Labour)
WPC081	Aeration Diffuser Systems	Outside	3 - Fair	Aeration system in tank was checked within 6 months. Visibly cannot assess aeration system.	Replace	Aeration Diffuser Replacement	2032	$ 1,300,000
WPC038	Raw Sludge And Scum Process Piping	Control Building	3 - fair	Possible evidence of past leak in the control building workshop. Town noted past clogging issues.	Replace; consider upsizing.	Sludge Handling	2032	$ 35,000
WPC111	Secondary Scum Piping	Blower Building	3 - Fair	-	Replace	Sludge Handling	2032	$ 1,200
WPC120	RAS Isolation Valves	Blower Building	4 - Good	Some are leaking. A new valve is needed for the RAS system.	Replace	Sludge Handling	2032	$ 123,200
WPC124	Waste Activated Sludge Piping	Blower Building	3 - Fair	Minimal surface rust, minor leaking.	Replace	Sludge Handling	2032	$ 16,800
WPC181	Sludge Heat Exchanger	Digester Facility	4 - Good	-	Replace	Sludge Handling	2032	$ 300,000
WPC243	Sludge Storage Blower	Control Building	4 - Good	-	Replace	Sludge Handling	2032	$ 50,000
WPC936	Screw Conveyor #2	Control Building	4 - Good	The town noted that the auger was replaced in 2023 for 30k.	Replace	Sludge Handling	2032	$ 240,000
WPC895	Control Building Air Handling Unit	Control Building	3 - Fair	-	Replace	Control Building Air Handling Unit	2033	$ 200,000
WPC010	Mechanical Screen #2	Headworks	4 - Good	-	Replace	Mechanical Screen #2 Replacement	2034	$ 360,000

Appendix C

Studies Sheet

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC135	Secondary Clarifier #1 Tank	Outside	3 - Fair	Was empty during inspection. Appears to be generally in fair condition. Light corrosion on steel components (see photos 1 and 2) Narrow cracks around the posts and at the tank walls (see photo 2). Moderate scaling and rust staining at the tank walls. Did not access within the tank. Operators report issues re-attaching weirs due to local concrete condition.	9	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	$ 25,000
WPC136	Secondary Clarifier #2 Tank	Outside	3 - Fair	Appears to be generally in fair condition. Corrosion (see photo 3) Cracks in the walls between the tanks (see photo 2). Operators report issues re-attaching weirs due to local concrete condition.	9	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	See WPC136
WPC137	Secondary Clarifier #3 Tank	Outside	4 - Good	Appears to be generally in good condition. Light corrosion and narrow cracks noted. Did not access within the tank. Operators report issues re-attaching weirs due to local concrete condition.	6	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	See WPC136
WPC908	Secondary Clarifier #1 Weirs	Outside	2 - Poor	Minor warping.	12	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	See WPC136
WPC909	Secondary Clarifier #2 Weirs	Outside	1 - Unacceptable	Water isn't using the weirs. Water is going in cracks, below or beside. Weirs are uneven.	15	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	See WPC136
WPC910	Secondary Clarifier #3 Weirs	Outside	1 - Unacceptable	Water is seeping below, beside, or through the weirs. Warping. Weirs are uneven and/or broken.	15	Option Analysis Study for Weir Replacement	Options analysis study to determine preferred solution for weir replacement.	2024	See WPC136
WPC444	Chemical Building Exterior Walls/Columns	Chemical Building	4 - Good	Appears to be generally in good condition. Cracks at the expansion joints see (photo 4).	10	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	$ 50,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC150	Sodium Bisulphite Pump 1	Chemical Building	3 - Fair	Signs of age and wearing.	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC151	Sodium Bisulphite Pump 2	Chemical Building	3 - fair	Signs of age and wearing.	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC152	Sodium Bisulphite Tank #1 Current Level	Chemical Building	2 - Poor	Appears to be in poor condition.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC153	Sodium Bisulphite Tank High Level Switch	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC154	Sodium Bisulphite Tank Low Level Switch	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC155	Sodium Bisulphite Tank	Chemical Building	3 - Fair	Minor corrosion on flanges, and nozzles.	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC156	Sodium Bisulphite System Check Valve	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC157	Sodium Bisulphite System Isolation Valves	Chemical Building	2 - Poor	Signs of age. PVC piping appears to be holding up although operators have mentioned the chemical lines to be drying out and cracking when servicing equipment.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC158	Sodium Bisulphite System Pressure Relief Valves	Chemical Building	3 - Fair	Sings of aging.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC159	Sodium Hypochlorite Pump #1	Chemical Building	3 - Fair	Signs of aging.	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC160	Sodium Hypochlorite Pump #2	Chemical Building	2 - Poor	Pump appears to be in poor condition. Cap has been broken off.	13.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC161	Sodium Hypochlorite Pump #3	Chemical Building	2 - Poor	Pump appears to be in poor condition. Significant surface rust and seems out dated.	13.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC163	Hypochlorite Tank #1 Current Level	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC164	Hypochlorite Tank #2 Current Level	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC165	Sodium Hypochlorite Tank #1 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC166	Sodium Hypochlorite Tank #2 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC167	Sodium Hypochlorite Tank #1 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC168	Sodium Hypochlorite Tank #2 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC169	Sodium Hypochlorite Tank	Chemical Building	2 - Poor	Visible signs of leaking. Metal bolts are severely corroded in some places and beginning to corrode in others.	13.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC170	Sodium Hypochlorite Tank	Chemical Building	1 - Unacceptable	Signs of leaking flanges and corrosion. Anchors are corroded on both tanks 1 and 2. Repairs have been made on the rear side of the tank. Tank manhole cover appears to be open and venting into the room.	15	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC171	Sodium Hypochlorite System Back Pressure Valves	Chemical Building	3 - Fair	Only one back pressure valve was observed on site. Signs of aging.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC172	Sodium Hypochlorite System Check Valves	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC173	Sodium Hypochlorite System Isolation Valves	Chemical Building	2 - Poor	Overall the valves appear to be in fair condition with the exception of a couple valves and piping have clear singes of leakage.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC174	Sodium Hypochlorite System Pressure Relief Valves	Chemical Building	3 - Fair	Only 2 pressure relief valves are installed on the system.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC307	Chemical Building Emergency Lights	Chemical Building	3 - Fair	Needs maintenance/cleaning.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC308	Chemical Building Exit Signs	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC309	Chemical Building Exterior Lighting	Chemical Building	2 - Poor	Bug nests.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC310	Chemical Building Interior Lighting	Chemical Building	3 - Fair	Needs maintenance/cleaning.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC311	Chemical Building Low Temp	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC312	Chemical Building Room Temp	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC313	Chemical Building Domestic Plumbing System	Chemical Building	3 - fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC314	Chemical Building Fans	Chemical Building	1 - Unacceptable	Visible rust on all fans, signs of age. Appear to be in poor condition. Dampers all appear to be corroded. Damper switch for fan EF-601 is broken. Ventilation does not seem to be operating efficiently causing severe corrosion inside.	10	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC315	Chemical Building Hydronic Unit Heaters	Chemical Building	2 - Poor	Visible signs of corrosion on sodium hypochlorite and ferric chloride rooms unit heaters. One unit heater in sodium bisulphate room is in fair condition.	4.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC316	Chemical Building Misc. Building Mechanical	Chemical Building	2 - poor	Visible signs of rust and wear. Chemical appear to be leaking and affecting the environment.	4.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC431	Chemical Building Exterior Roofing Materials	Chemical Building	4 - Good	Based on photos provided by client. Appears to be generally in good condition. Appears to present evidence of previous water pooling. Light corrosion on utilities. Debris accumulation on at roof drains. Does not appear to have direct access to the roof.	7	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC432	Chemical Building Exterior Cladding	Chemical Building	4 - Good	Appears to be generally in good condition. Vegetation see (photo 3).	2.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC433	Chemical Building Exterior Doors	Chemical Building	2 - Poor	Appears to be generally in poor condition. Main door doesn't appear to latch (Photo 2). Two secondary doors next to the main door latches but appear to be corroded from the inside (see photo 4).	3.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC434	Chemical Building Exterior Windows	Chemical Building	4 - Good	Appears to be generally in good condition.	2.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC437	Chemical Building Interior Doors / Fire doors - Latches	Chemical Building	4 - Good	Appears to be generally in good condition. Door in photo 1 doesn't appear to latch. Door in photo 2 doesn't appear to close by itself.	2.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC439	Chemical Building Interior Railing / Code	Chemical Building	4 - Good	Appears to be generally in good condition.	7.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC440	Chemical Building Interior Stairs / Code	Chemical Building	4 - Good	Appears to be generally in good condition. Rust stain (photos 1-3).	7.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC445	Chemical Building Floors/Slabs On Grade	Chemical Building	3 - Fair	Appears to be generally in good to locally poor condition. Large area of spalling, medium cracks, and delamination at northeast side (see photos 1, 2, 3, 4).	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC447	Chemical Building Interior Walls/Columns	Chemical Building	4 - Good	Appears to be generally in good locally poor condition. Expansion joints appear to be failing see (photo 4).	10	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC448	Chemical Building Roof Slabs	Chemical Building	3 - Fair	Appears to be generally in fair condition. With light to moderate corrosion on the underside of deck.	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC449	Chemical Building Steel Beams	Chemical Building	3 - Fair	Appears to be generally in fair condition. Light to locally moderate corrosion on north side of the building (see photo 1).	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC593	Chemical Building Electrical Conduit And Wiring	Chemical Building	3 - Fair	Sodium Hypo Storage lots of leaking.	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC594	Chemical Building Power Panel	Chemical Building	2 - Poor	Needs maintenance/cleaning. Discovered blown capacitors and fuses while panel was open.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC595	Lighting Transformer For Lap-J	Chemical Building	2 - Poor	Needs replacement.	18	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC596	Chemical Lines Heat Trace Panel	Chemical Building	4 - Good	-	6	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC632	Lighting Panel #7 - Chemical Building	Chemical Building	2 - Poor	Needs replacement.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC878	Ferric Chloride Tank 1 Control Panel	Chemical Building	4 - Good	-	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC879	Ferric Chloride Tank 2 Control Panel	Chemical Building	4 - Good	-	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC880	UPS Electrical Panel	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC881	Chemical Tank Vents	Chemical Building	3 - Fair	-	12	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC882	Chemical Building Roof Drain	Chemical Building	4 - Good	-	3	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC883	Pump 606 & 607 Control Panel	Chemical Building	4 - Good	-	6	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC884	Chemical Building Sodium Bisulphite Field Control Panel	Chemical Building	4 - Good	-	6	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC885	Sodium Hypochlorite Tank 1 Control Panel	Chemical Building	4 - Good	-	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC886	Sodium Hypochlorite Tank Control Panel	Chemical Building	4 - Good	-	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC887	Sodium Hypochlorite Tank 601 Control Panel	Chemical Building	4 - Good	-	14	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC888	Heat Tracing Cable Control Panel	Chemical Building	2 - Poor	Needs maintenance/cleaning.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC094	Ferric Chloride Piping	Chemical Building	1 - Unacceptable	Visible signs of leakage.	15	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC097	Ferric Chloride Tank #1 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC098	Ferric Chloride Tank #2 High Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC099	Ferric Chloride Tank #1 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC100	Ferric Chloride Tank #2 Low Level Switch	Chemical Building	3 - Fair	Could not see inside tank.	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC101	Ferric Chloride Tank #2	Chemical Building	2 - Poor	Visible signs of leaky connections and flanges.	13.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Study Name	Study Description	Recommendation Action Year (Study)	Study Cost
WPC102	Ferric Chloride Tank #1	Chemical Building	2 - Poor	Tank 1 appears to be in better condition than Tank 2. Still visible signs in minor leakage on pipe nozzles.	13.5	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC103	Ferric Chloride Check Valve	Chemical Building	3 - Fair	-	8	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC104	Ferric Chloride Isolation Valves	Chemical Building	2 - Poor	Valves appear to be leaking in multiple locations on the system.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC105	Ferric Chloride System Pressure Relief Valves	Chemical Building	2 - Poor	Only one pressure relief valve installed back to inlet header. Poor condition visible rust and signs of leakages.	9	Chemical Building Refurbishment Study	Study to confirm scope of Chemical Building Refurbishment.	2025	See WPC444
WPC490	Digester Facility Exterior Roofing Materials	Digester Facility	3 - Fair	Appears to be generally in fair with local poor conditions. Large areas of bulging and loose roof materials at east digester. Water accumulation (photo 2). Proper step and handrail not present to digester roofs. (see photo 3 and 4). Guardrail not present along perimeter of roof. Vegetation noted.	6	Gas Proofing Study	Study to determine condition of gas proofing prior to replacing roof. Study cost includes the cost of emptying and cleaning both digesters.	2026	$ 360,000

Appendix D

Operations and Manual Sheet

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC092	Ferric Chloride Pump #1	Chemical Building	2 - Poor	Visible signs of leakage. Old outdated pumps.	13.5	Replace immediately.	2024	$ 10,200
WPC093	Ferric Chloride Pump #2	Chemical Building	2 - Poor	Poor condition visible signs of leakage and old age.	13.5	Replace immediately.	2024	$ 10,200
WPC019	Automatic Screen Upstream Level #1	Headworks	Not Inspected	Located beneath hatch; could not access.	10	Replace	2024	$ 2,000
WPC021	Automatic Screen Downstream Level #1	Headworks	Not Inspected	Located beneath hatch; could not access.	10	Replace	2024	$ 2,000
WPC175	Effluent Level Meter #1	Outside	1 - Unacceptable	Needs replacement.	10	Replace	2024	$ 2,000
WPC671	Raw Sewage Sampler	Outside	1 - Unacceptable	Not working.	10	Replace immediately.	2024	$ 15,000
WPC672	Effluent Level Meter #2	Outside	1 - Unacceptable	Needs replacement.	10	Replace	2024	$ 2,000
WPC673	Clarifier Bypass Flow Meter	Outside	1 - Unacceptable	Needs replacement.	10	Replace	2024	$ 5,000
WPC178	Flash Mixer	Outside	2 - Poor	M614 is leaking oil.	9	Replace immediately. Provide spare parts for redundancy.	2024	$ 27,000
WPC547	RACO Auto Dialer	Control Building	3 - Fair	-	8	Replace	2024	$ 4,000
WPC333	Boiler #1 Flue Gas Pressure	Control Building	3 - Fair	-	8	Replace	2026	$ 5,500
WPC334	Boiler #2 Flue Gas Pressure	Control Building	3 - Fair	-	8	Replace	2026	$ 5,500
WPC568	Grit Pump Room Sump Control Panel	Headworks	3 - Fair	-	16	Replace	2027	$ 5,000
WPC574	Screening Conveyor Control Panel	Headworks	3 - Fair	-	16	Replace	2027	$ 4,000
WPC684	Gas Sensor LEL Gas Room	Digester Facility	3 - Fair	-	16	Replace	2027	$ 1,000
WPC692	Screen Room LEL Gas Concentration	Headworks	3 - Fair	-	16	Replace	2027	$ 2,000
WPC693	Screen Room H2S Gas Concentration	Headworks	3 - Fair	-	16	Replace	2027	$ 2,000
WPC037	Raw Sludge Pump 2 (P-21201)	Control Building	2 - Poor	Signs of age.	13.5	Replace	2027	$ 17,400
WPC039	Raw Sludge Pump 1 (P-21101)	Control Building	2 - poor	Signs of age, leaking.	13.5	Replace	2027	$ 17,400
WPC058	Primary Scum Pump	Pump Room No.2	2 - Poor	Surface rust.	13.5	Replace	2027	$ 17,400
WPC059	Raw Sludge Pump 3 (M203)	Pump Room No.2	2 - Poor	Old, surface rust.	13.5	Replace	2027	$ 17,400

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC060	Raw Sludge Pump 4 (M204)	Pump Room No.2	2 - Poor	Old, Surface rust.	13.5	Replace	2027	$ 17,400
WPC062	Process Air Blower #1	Blower Building	2 - Poor	Outdated and a lot of heat loss.	13.5	Replace	2027	$ 70,000
WPC063	Process Air Blower #2	Blower Building	2 - Poor	Outdated and some heat loss.	13.5	Replace	2027	$ 70,000
WPC114	RAS Pump 1 (M501)	Blower Building	2 - Poor	Significant surface rust.	13.5	Replace	2027	$ 39,000
WPC179	Redox Analyzer	Outside	3 - Fair	Needs maintenance/cleaning.	12	Replace	2027	$ 2,000
WPC029	Grit Slurry Check Valves	Headworks	2 - Poor	Some rusting.	9	Replace	2027	$ 3,400
WPC035	Primary Tank #2 Raw Sludge Motorized Valve #1	Control Building	2 - Poor	Signs of age.	9	Replace	2027	$ 20,000
WPC036	Primary Tank #2 Raw Sludge Motorized Valve #2	Control Building	2 - Poor	Signs of age.	9	Replace	2027	$ 20,000
WPC041	Raw Sludge And Scum Check Valves	Control Building	2 - Poor	Old, surface rust, possible signs of leaking.	9	Replace	2027	$ 8,500
WPC106	Polymer System (WAS) Solenoid Valves	Blower Building	2 - Poor	Operational but Currently not in use. Operators are not happy with the quality of the system.	9	Replace	2027	$ 6,000
WPC112	Secondary Scum Check Valve	Blower Building	2 - Poor	Old, some surface rust.	9	Replace	2027	$ 1,700
WPC399	Pump Room No.2 Emergency Lights	Pump Room No.2	2 - Poor	Needs maintenance/cleaning.	9	Replace	2027	$ 640
WPC647	Outdoor Light Standards	Outside	2 - Poor	Needs maintenance/cleaning.	9	Replace	2027	$ 30,000
WPC654	S.T.Long Collector #2 Local Control Panel	Outside	2 - Poor	Bugs; Needs maintenance/cleaning.	9	Replace	2027	$ 5,000
WPC892	Control Building Garage Electrical Panel	Control Building	2 - Poor	Needs replacement.	9	Replace	2027	$ 1,000
WPC934	Primary Scum Pump Check Valve	Pump Room No.2	2 - Poor	Surface rust. Check valve is broken and needs to be replaced.	9	Replace	2027	$ 5,100
WPC023	Grit Pump Room Flood High Level Switch	Headworks	3 - Fair	-	8	Replace	2027	$ 450
WPC042	Raw Sludge Density To Digesters	Control Building	3 - Fair	-	8	Replace	2027	$ 2,000
WPC043	Raw Sludge Flow Meter #1	Control Building	3 - Fair	Needs maintenance/cleaning.	8	Replace	2027	$ 5,000
WPC044	Raw Sludge Flow Meter #2	Control Building	3 - Fair	Needs maintenance/cleaning.	8	Replace	2027	$ 5,000
WPC064	Blower Air Flow Meter	Blower Building	3 - Fair	-	8	Replace	2027	$ 5,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC075	Blower #1 Low Pressure Switch	Blower Building	3 - Fair	-	8	Replace	2027	$ 2,500
WPC076	Blower #2 Low Pressure Switch	Blower Building	3 - Fair	-	8	Replace	2027	$ 2,500
WPC077	Process Air Temperature Element	Blower Building	3 - Fair	Located within FCP-223 according to Process drawings.	8	Replace	2027	$ 500
WPC095	Ferric Tank #1 Current Level Meter	Chemical Building	3 - Fair	-	8	Order parts to keep on shelf; perform maintenance every 5-7 years.	2027	$ 2,000
WPC096	Ferric Tank #2 Current Level Meter	Chemical Building	3 - Fair	-	8	Order parts to keep on shelf; perform maintenance every 5-7 years.	2027	$ 2,000
WPC180	Outfall Flow Meter	Outside	3 - Fair	-	8	Replace	2027	$ 5,000
WPC188	Primary Digester Overflow Box High Level Switch	Digester Facility	3 - Fair	-	8	Replace	2027	$ 450
WPC190	Digester Sump PIT High Level Switch	Digester Facility	3 - Fair	-	8	Replace	2027	$ 150
WPC191	Digester Sump PIT High-High Level Switch	Digester Facility	3 - Fair	-	8	Replace	2027	$ 150
WPC192	Digester Sump PIT Low Level Switch	Digester Facility	3 - Fair	-	8	Replace	2027	$ 150
WPC193	Digester Sump PIT Low Level Switch	Digester Facility	3 - Fair	Refer to WPC192.	8	Replace	2027	$ 150
WPC210	Sludge Transfer Pump #2 Temp	Digester Facility	3 - Fair	-	8	Replace	2027	$ 500
WPC214	Digested Sludge Density Transmitter	Digester Facility	3 - Fair	-	8	Replace	2027	$ 2,000
WPC375	Glycol Fill Pressure Switch	Digester Facility	3 - Fair	-	8	Replace	2027	$ 2,500
WPC573	UPS For ACP-100	Headworks	3 - Fair	-	8	Replace	2027	$ 1,500
WPC665	Primary Clarifiers Influent Channel #1 Flow Meter	Outside	3 - Fair	-	8	Replace	2027	$ 5,000
WPC666	Primary Clarifiers Influent Channel #2 Flow Meter	Outside	3 - Fair	-	8	Replace	2027	$ 5,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC674	Gas Alarm Stack Light And Horn	Outside	3 - Fair	-	8	Replace	2027	$ 500
WPC679	Digester Facility HVAC Fault Stack Light #3	Digester Facility	3 - Fair	-	8	Replace	2027	$ 150
WPC688	Gas Room Occupied Stack Light	Digester Facility	3 - Fair	-	8	Replace	2027	$ 250
WPC689	Gas Room Alarm Horn #1	Digester Facility	3 - Fair	-	8	Replace	2027	$ 200
WPC694	Screen Room Gas Warning Stack Light	Headworks	3 - Fair	-	8	Replace	2027	$ 200
WPC695	Screen Room HVAC Fault Stack Light	Headworks	3 - Fair	-	8	Replace	2027	$ 200
WPC696	Screen Room Occupied Stack Light	Headworks	3 - Fair	-	8	Replace	2027	$ 200
WPC697	Screening Room Alarm Horn	Headworks	3 - Fair	-	8	Replace	2027	$ 1,500
WPC074	Aeration Tanks Blower Header Pressure	Blower Building	4 - Good	-	7	Replace	2027	$ 1,700
WPC264	Primary Digester Gas Pressure Transmitter	Digester Facility	4 - Good	-	7	Replace	2027	$ 2,000
WPC265	Secondary Digester Gas Pressure Transmitter	Digester Facility	4 - Good	-	7	Replace	2027	$ 2,000
WPC332	Hot Water Supply Circ. Pressure	Control Building	4 - Good	-	7	Replace	2027	$ 1,700
WPC291	Pressure Washer New	Control Building	2 - Poor	Poor condition. Has replacement.	4.5	Replace	2027	$ 4,000
WPC298	Sump Pump 402	Blower Building	2 - Poor	Significant surface rust, possible signs of leaking.	4.5	Replace sump pump.	2027	$ 10,000
WPC299	Sump Pump 401	Blower Building	2 - Poor	Significant surface rust, possible signs of leaking.	4.5	Replace sump pump.	2027	$ 10,000
WPC385	Sump Pump M109	Headworks	2 - Poor	Very rusty. Discharge pipe on the ceiling is leaking.	4.5	Replace	2027	$ 10,000
WPC874	Blower Building Roof Drain	Blower Building	2 - Poor	Old, Rusted.	4.5	Replace	2027	$ 2,000
WPC902	Headworks Building Roof Drain	Headworks	2 - Poor	One drain has ferns growing out of it.	4.5	Replace	2027	$ 2,000
WPC550	Blower Building Control Panel	Blower Building	4 - Good	-	14	Replace	2028	$ 8,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC681	Gas Sensor LEL Drip Trap Room	Digester Facility	4 - Good	-	14	Replace	2028	$ 1,000
WPC682	Drip Trap Room LEL Gas Concentration	Digester Facility	4 - Good	-	14	Replace	2028	$ 2,000
WPC683	Gas Room LEL Gas Concentration	Digester Facility	4 - Good	-	14	Replace	2028	$ 2,000
WPC876	Air Blower 1 Control Panel	Blower Building	4 - Good	-	14	Replace	2028	$ 2,000
WPC877	Air Blower 2 Control Panel	Blower Building	4 - Good	-	14	Replace	2028	$ 2,000
WPC086	Aeration Tank #1 RAS Piping	Outside	2 - Poor	One of them is not discharging water. Visible rust.	13.5	Replace	2028	$ 5,000
WPC088	Aeration Tank #1 Dissolved Oxygen	Outside	4 - Good	-	10.5	Replace	2028	$ 2,000
WPC089	Aeration Tank #2 Dissolved Oxygen	Outside	4 - Good	-	10.5	Replace	2028	$ 2,000
WPC321	Control Building Domestic Plumbing System	Control Building	2 - Poor	Bolts on valves are rusting.	9	Replace	2028	$ 30,000
WPC122	RAS Flow Meter	Blower Building	4 - Good	-	7	Replace	2028	$ 5,000
WPC127	WAS Flow Meter	Blower Building	4 - Good	-	7	Replace	2028	$ 5,000
WPC144	WAS Polymer Day Tank Level	Blower Building	4 - Good	-	7	Replace	2028	$ 2,000
WPC182	Digested Sludge Transfer Flow Meter	Digester Facility	4 - Good	-	7	Replace	2028	$ 5,000
WPC186	Primary Digester Level Indicating Transmitter	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,000
WPC187	Secondary Digester Level Indicating Transmitter	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,000
WPC189	Secondary Digester Overflow Box High Level Switch	Digester Facility	4 - Good	-	7	Replace	2028	$ 450
WPC194	Digester Heating HWS Temperature	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC209	Sludge Transfer Pump #1 Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC215	Digested Sludge High Discharge Press Pressure Switch #1	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC216	Digested Sludge High Discharge Press Pressure Switch #2	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC217	Sludge Heat Exchanger HWS Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC218	Sludge Heat Exchanger Inlet Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC219	Sludge Heat Exchanger Discharge Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC224	Sludge Tank #1 Level Meter	Control Building	4 - Good	Missing tags.	7	Replace	2028	$ 2,000
WPC225	Sludge Tank #2 Level Meter	Control Building	4 - Good	Missing tags.	7	Replace	2028	$ 2,000
WPC266	Primary Digester High Gas Pressure Switch	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC267	Secondary Digester High Gas Pressure Switch	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC268	Primary Digester Low Gas Pressure Switch	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC269	Secondary Digester Low Gas Pressure Switch	Digester Facility	4 - Good	-	7	Replace	2028	$ 2,500
WPC306	Blower Building MCC Room Temp	Blower Building	4 - Good	-	7	Replace	2028	$ 500
WPC325	Blower Room Temperature	Blower Building	4 - Good	-	7	Replace	2028	$ 500
WPC335	Boiler Room Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC336	Hot Water Return Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC337	Hot Water Supply Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC338	Boiler #1 HWS Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC339	Boiler #2 HWS Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC340	Boiler #1 Flue Gas Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC341	Control Building HWS Temp	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC342	Blower Building HWS Temp	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC343	Digester HWS Temp	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC344	Boiler #2 Flue Gas Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC354	Control Building Office Temperature	Control Building	4 - Good	-	7	Replace	2028	$ 500
WPC368	Digester Electrical Room Temperature	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC376	Glycol Return Temperature	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC377	Air Handling Unit Discharge Air Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC379	Outside Ambient Air Temperature	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC380	Digester Odour Control Room Temperature	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC383	Gas Room Supply Fan Discharge Air Temp	Digester Facility	4 - Good	-	7	Replace	2028	$ 500
WPC386	Grit Pump Room Temperature	Headworks	4 - Good	-	7	Replace	2028	$ 500
WPC396	Headworks MCC Room Temperature	Headworks	4 - Good	-	7	Replace	2028	$ 500
WPC549	UPS For ACP-400	Blower Building	4 - Good	-	7	Replace	2028	$ 1,500
WPC557	UPS For Scada	Control Building	4 - Good	-	7	Replace	2028	$ 1,500
WPC558	UPS For ACP-200	Control Building	4 - Good	-	7	Replace	2028	$ 1,500
WPC564	UPS For ACP-500	Digester Facility	4 - Good	-	7	Replace	2028	$ 1,500
WPC675	Digester Facility HVAC Fault Stack Light #1	Digester Facility	4 - Good	-	7	Replace	2028	$ 150
WPC676	Digester Facility Occupied Stack Light #1	Digester Facility	4 - Good	-	7	Replace	2028	$ 150

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC677	Digester Facility HVAC Fault Stack Light #2	Digester Facility	4 - Good	-	7	Replace	2028	$ 150
WPC678	Digester Facility Occupied Stack Light #2	Digester Facility	4 - Good	-	7	Replace	2028	$ 150
WPC680	Digester Facility Occupied Stack Light #3	Digester Facility	4 - Good	-	7	Replace	2028	$ 150
WPC685	Gas Room Alarm Stack Light	Digester Facility	4 - Good	-	7	Replace	2028	$ 250
WPC686	Gas Room Warning Stack Light	Digester Facility	4 - Good	-	7	Replace	2028	$ 250
WPC687	Gas Room HVAC Fault Stack Light	Digester Facility	4 - Good	-	7	Replace	2028	$ 250
WPC690	Gas Room Alarm Horn #2	Digester Facility	4 - Good	-	7	Replace	2028	$ 1,500
WPC890	Control Building Basement Flow Meter	Control Building	4 - Good	-	7	Replace	2028	$ 5,000
WPC904	Headworks Screen Room Flow Meter	Headworks	4 - Good	-	7	Replace	2028	$ 5,000
WPC872	Sample Sink And Exhaust Fan	Blower Building	3 - Fair	-	16	Replace	2029	$ 17,000
WPC929	Sample Sink	Pump Room No.2	3 - Fair	-	16	Replace	2029	$ 15,000
WPC027	Grit Slurry Pump #2	Headworks	2 - Poor	Subject to leaking/drips. Signs of corrosion.	12	Repair	2029	$ 40,000
WPC110	Secondary Scum Pump 1 (M508)	Blower Building	3 - Fair	Minimal surface rust.	12	Replace	2029	$ 12,000
WPC115	RAS Pump 2 (M502)	Blower Building	3 - Fair	-	12	Replace	2029	$ 39,000
WPC116	RAS Pump 3 (M503)	Blower Building	3 - Fair	-	12	Replace	2029	$ 39,000
WPC255	Polymer Feed Pump (Dewatering)	Control Building	3 - fair	Town noted that they have an unused backup pump from 2005 in their inventory.	12	Replace	2029	$ 17,000
WPC411	Various Drum Pumps	Chemical Building	3 - Fair	Only one was found in fair condition in the chemical room.	12	Replace	2029	$ 1,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC001	Headworks Blower #1	Control Building	4 - Good	-	9	Rebuild as required. Order spare parts for shelf (cost shown is 25% of replacement cost) and perform preventative maintenance every 5-7 years.	2029	$ 22,500
WPC012	Headworks Solenoid Valves	Headworks	2 - Poor	Old, some surface rust. Town noted that 1 in waterline is replaced every 5 yrs, 3 in air lift grit system are out of service as of 2010.	8	Replace	2029	$ 8,000
WPC030	Grit Slurry Isolation Valves	Headworks	3 - fair	-	8	Replace	2029	$ 8,400
WPC040	Raw Sludge And Scum Isolation Valves	Control Building	3 - fair	-	8	Replace	2029	$ 21,600
WPC053	Primary Tank Hand Gates (HG)	Outside	3 - Fair	Minor leakage. Some of the gaskets have disappeared and will need replacement.	8	Replace; consider providing mechanical sluice gates and/or reworking layout.	2029	$ 76,000
WPC055	Primary Tank #4 Raw Sludge Motorized Valve	Pump Room No.2	2 - Poor	Surface rust and leakage.	8	Replace	2029	$ 20,000
WPC068	Blower Room Process Air Check Valves (1996)	Blower Building	3 - Fair	-	8	Replace	2029	$ 12,600
WPC069	Blower Room Process Air Isolation Valves (1996)	Blower Building	3 - Fair	-	8	Replace	2029	$ 25,200
WPC080	Aeration Tank #2 Process Air Valves	Outside	2 - Poor	Vf-22214 operator is completely broken and unacceptable. Other 5 valves are in good condition.	8	Replace	2029	$ 10,200
WPC113	Secondary Scum Isolation Valves	Blower Building	3 - Fair	-	8	Replace	2029	$ 3,400
WPC119	RAS Check Valves	Blower Building	3 - Fair	-	8	Replace	2029	$ 20,000
WPC125	WAS Control Valve #1	Blower Building	3 - Fair	Minimal surface rust.	8	Replace	2029	$ 25,000
WPC126	WAS Control Valve #2	Blower Building	3 - Fair	-	8	Replace	2029	$ 25,000
WPC252	Sludge Dewatering Solenoid Valves	Control Building	3 - fair	-	8	Replace	2029	$ 2,000
WPC256	Screw Conveyor #1	Control Building	3 - fair	-	8	Replace	2029	$ 120,000
WPC257	Screw Conveyor #3	Control Building	3 - fair	-	8	Replace	2029	$ 120,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC258	Sludge Conveyor Drain Motorized Valve	Control Building	3 - fair	Some surface rust.	8	Replace	2029	$ 20,000
WPC935	Raw Sludge Pump Isolation Valve	Pump Room No.2	3 - Fair	-	8	Replace	2029	$ 8,500
WPC403	Sump Pump #M218	Pump Room No.2	3 - Fair	-	4	Replace	2029	$ 10,000
WPC404	Sump Pump #M219	Pump Room No.2	3 - Fair	-	4	Replace	2029	$ 10,000
WPC582	Lighting Transformer For Lap-F	Blower Building	3 - Fair	-	16	Replace	2030	$ 6,000
WPC583	Lighting Transformer For Lap-G	Blower Building	3 - Fair	-	16	Replace	2030	$ 3,500
WPC585	Transfer Switch	Blower Building	3 - Fair	Fair visual condition; Town noted performance issues.	16	Replace	2030	$ 14,000
WPC600	Lighting Transformer For Lap-A	Blower Building	3 - Fair	-	16	Replace	2030	$ 3,500
WPC641	Lighting Transformer For Lap-H	Headworks	3 - Fair	-	16	Replace	2030	$ 3,500
WPC296	Blower Building Exterior Lighting	Blower Building	3 - Fair	-	8	Replace	2030	$ 4,500
WPC297	Blower Building Interior Lighting	Blower Building	3 - Fair	Burnt bulbs.	8	Replace with LED.	2030	$ 8,500
WPC301	Blower Building Fans	Blower Building	3 - Fair	-	8	Replace	2030	$ 33,600
WPC317	Control Building Emergency Lights	Control Building	3 - Fair	-	8	Replace	2030	$ 1,300
WPC318	Control Building Exit Signs	Control Building	3 - Fair	-	8	Replace as required with electrically powered exit signs.	2030	$ 4,000
WPC322	Control Building Exhaust Fans	Control Building	3 - Fair	-	8	Replace	2030	$ 21,000
WPC349	Control Building Expansion Exit Signs	Control Building	3 - Fair	Combination of 1966 style chemical & electrical signs.	8	Replace as required with electrically powered exit signs.	2030	$ 1,000
WPC387	Headworks Building Emergency Lights	Headworks	3 - Fair	-	8	Replace	2030	$ 1,200
WPC388	Headworks Building Exit Signs	Headworks	3 - Fair	-	8	Replace as required with electrically powered exit signs.	2030	$ 1,000

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC389	Headworks Building Exterior Lighting	Headworks	3 - Fair	-	8	Replace	2030	$ 3,000
WPC393	Headworks Building Exhaust Fans	Headworks	3 - Fair	-	8	Replace	2030	$ 14,400
WPC397	Screen Room Supply Fan	Headworks	3 - Fair	Minor surface corrosion on ducts.	8	Replace	2030	$ 10,800
WPC401	Pump Room No.2 Exterior Lighting	Pump Room No.2	3 - Fair	-	8	Replace	2030	$ 1,000
WPC402	Pump Room No.2 Interior Lighting	Pump Room No.2	3 - Fair	-	8	Replace	2030	$ 3,500
WPC586	Lighting Panel #1 - Blower Building	Blower Building	3 - Fair	-	8	Replace	2030	$ 3,300
WPC587	Lighting Panel #2 - Blower Building	Blower Building	3 - Fair	-	8	Replace	2030	$ 2,200
WPC590	RAS Pump 1 Control Panel	Blower Building	3 - Fair	-	8	Replace	2030	$ 5,000
WPC591	RAS Pump 2 Control Panel	Blower Building	3 - Fair	Needs maintenance/cleaning.	8	Replace	2030	$ 5,000
WPC592	RAS Pump 3 Control Panel	Blower Building	3 - Fair	Needs maintenance/cleaning.	8	Replace	2030	$ 3,000
WPC615	Lighting Panel #3 - Control Building	Control Building	3 - Fair	-	8	Replace	2030	$ 2,800
WPC620	Polymer System (CIBA) Control Panel	Control Building	3 - Fair	-	8	Replace	2030	$ 5,000
WPC642	Lighting Panel #3 - Headworks Building	Headworks	3 - Fair	-	8	Replace	2030	$ 3,300
WPC648	Plant Odour Control Unit Panel	Control Building	3 - Fair	-	8	Replace	2030	$ 5,000
WPC649	Primary Scum Pump Local Control Panel	Outside	3 - Fair	-	8	Replace	2030	$ 5,000
WPC655	Secondary Scum Pump Control Station #1	Outside	3 - Fair	Needs maintenance/cleaning.	8	Replace	2030	$ 1,000
WPC656	S.T. Collectors Local Control Panel	Outside	3 - Fair	-	8	Replace	2030	$ 5,000
WPC875	Blower Building Exhaust Fans	Blower Building	3 - fair	-	8	Replace	2030	$ 17,500
WPC303	Blower Building Misc. Building Mechanical	Blower Building	3 - Fair	-	4	Replace	2030	$ 8,500

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC392	Headworks Building Hydronic Unit Heaters	Headworks	3 - Fair	-	4	Replace	2030	$ 18,000
WPC078	Aeration Tanks Unwatering Piping And Valves	Blower Building	3 - Fair	Refer to WPC118 and WPC 124 for pictures.	12	Replace	2032	$ 39,600
WPC232	Polymer System (Dewatering) Piping And Valves	Control Building	3 - Fair	-	12	Replace	2032	$ 300
WPC657	Dewatering Area Odorous Air Piping	Control Building	3 - Fair	-	12	Replace	2032	$ 33,000
WPC800	Pump Room Hatch	Control Building	3 - Fair	Appears to be generally in good condition. Does not appear to have open assistance or internal grating (see photos).	12	Replace	2032	$ 10,000
WPC026	Grit Slurry Pump #1	Headworks	3 - Fair	Some signs of corrosion. Town notes that pump is being rebuilt in 2024.	10.5	Replace or rebuild as required.	2032	$ 40,000
WPC211	Sludge Transfer Pump #1	Digester Facility	3 - Fair	-	10.5	Replace	2032	$ 40,000
WPC212	Sludge Transfer Pump #2	Digester Facility	3 - Fair	-	10.5	Replace	2032	$ 40,000
WPC221	Sludge Recirculation Pump #1	Digester Facility	3 - Fair	Tiny bit of oil leaking.	10.5	Replace	2032	$ 40,000
WPC259	Polymer Day Tank #2 (Dewatering)	Control Building	4 - Good	-	10.5	Replace	2032	$ 26,000
WPC292	Blower Building Hot Water Pump #1	Blower Building	4 - Good	-	10.5	Replace	2032	$ 9,400
WPC293	Blower Building Hot Water Pump #2	Blower Building	4 - Good	-	10.5	Replace	2032	$ 9,400
WPC330	Primary Heating Water Pump #1	Control Building	3 - fair	Some surface rust.	10.5	Replace	2032	$ 9,400
WPC331	Primary Heating Water Pump #2	Control Building	3 - fair	Some surface rust.	10.5	Replace	2032	$ 9,400
WPC370	Heating Hot Water Pump #1	Digester Facility	3 - Fair	Minor rust on pumps.	10.5	Replace	2032	$ 4,700
WPC373	Heat Exchanger Hot Water Pump #2	Digester Facility	3 - Fair	-	10.5	Replace	2032	$ 4,700
WPC374	Glycol Heating Loop Pump	Digester Facility	3 - Fair	Appear to be in good working condition.	10.5	Replace	2032	$ 4,700

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ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC378	Glycol Fill Pump	Digester Facility	3 - Fair	Minor rust on connection.	10.5	Replace	2032	$ 3,000
WPC004	Headworks Blower #1 Isolation Valves	Blower Building	3 - Fair	-	7	Replace	2032	$ 5,100
WPC025	Headworks Hand Gates (HG)	Headworks	4 - Good	-	7	Replace	2032	$ 40,000
WPC033	Primary Tank #1 Raw Sludge Motorized Valve #1	Control Building	2 - Poor	Signs of age.	7	Replace	2032	$ 20,000
WPC056	Scum Chamber #1 Motorized Valve	Pump Room No.2	4 - Good	-	7	Replace	2032	$ 20,000
WPC057	Scum Chamber #2 Motorized Valve	Pump Room No.2	4 - Good	-	7	Replace	2032	$ 20,000
WPC260	Polymer System Isolation Valves	Control Building	4 - Good	-	7	Replace	2032	$ 2,000
WPC391	Headworks Building Domestic Plumbing System	Headworks	3 - Fair	-	8	Replace	2033	$ 15,000
WPC871	Main Service Breaker Blower Building	Blower Building	3 - Fair	Needs replacement.	8	Replace	2033	$ 6,500
WPC390	Headworks Building Interior Lighting	Headworks	4 - Good	-	7	Replace	2033	$ 17,000
WPC395	Grit Pump Room Supply Fan	Headworks	4 - Good	-	7	Replace	2033	$ 3,500
WPC572	Headworks Occupancy Relay Panel	Headworks	4 - Good	-	7	Replace	2033	$ 5,000
WPC636	Screen Room Exhaust Fan Panel	Headworks	4 - Good	-	7	Replace	2033	$ 5,000
WPC637	Screen Room Supply Fan Panel	Headworks	4 - Good	-	7	Replace	2033	$ 5,000
WPC643	Mechanical Screen #1 Local Control Panel	Headworks	4 - Good	-	7	Replace	2033	$ 5,000
WPC213	Sludge Mixing Pump (Primary Digester)	Digester Facility	4 - Good	-	12	Swap out with existing shelf spare on failure. Cost assumes new shelf spare may be ordered at the same time.	2034	$ 46,600
WPC061	Process Air Blower #3	Blower Building	4 - Good	Town noted that blower is oversized.	9	Replace; review sizing prior to ordering.	2034	$ 130,000
WPC117	RAS Pump 4	Blower Building	4 - Good	-	9	Replace	2034	$ 39,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC220	Sludge Recirculation Pump #2	Digester Facility	4 - Good	-	9	Replace	2034	$ 40,000
WPC326	Control Building Heating Water Pump #1	Control Building	4 - Good	-	9	Replace	2034	$ 2,400
WPC327	Control Building Heating Water Pump #2	Control Building	4 - Good	-	9	Replace	2034	$ 2,400
WPC329	Headworks Heating Water Pump #2	Control Building	4 - Good	-	9	Replace	2034	$ 2,400
WPC371	Heating Hot Water Pump #2	Digester Facility	4 - Good	-	9	Replace	2034	$ 4,700
WPC372	Heat Exchanger Hot Water Pump #1	Digester Facility	4 - Good	-	9	Replace	2034	$ 4,700
WPC893	Control Building Heat Pump	Control Building	4 - Good	-	9	Replace	2034	$ 10,000
WPC896	Control Building Boiler Stack	Control Building	4 - Good	-	9	Replace	2034	$ 5,000
WPC898	Misc. Vents	Control Building	4 - Good	-	9	Replace	2034	$ 600
WPC003	Headworks Blower #1 Check Valve	Blower Building	4 - Good	-	6	Replace	2034	$ 1,700
WPC034	Primary Tank #1 Raw Sludge Motorized Valve #2	Control Building	2 - Poor	Signs of age.	6	Replace	2034	$ 20,000
WPC065	Process Air Tank #1 Motorized Valve	Blower Building	4 - Good	Lines are 150mm not 250mm.	6	Replace	2034	$ 25,000
WPC066	Process Air Tank #2 Motorized Valve	Blower Building	4 - Good	Lines are 150mm not 250mm.	6	Replace	2034	$ 25,000
WPC067	Blower Room Process Air Check Valve (2010)	Blower Building	4 - Good	-	6	Replace	2034	$ 6,300
WPC070	Blower Room Process Air Isolation Valves (2010)	Blower Building	4 - Good	Not all valves are 250mm, some are 150mm.	6	Replace	2034	$ 25,200
WPC079	Aeration Tank #1 Process Air Valves	Outside	4 - Good	-	6	Replace	2034	$ 10,200
WPC090	Aeration Tank #1 Slide Gates	Outside	4 - Good	Slide gates are below water and not able to be inspected. Seems in good condition.	6	Replace	2034	$ 80,000
WPC091	Aeration Tank #2 Slide Gates	Outside	4 - Good	Slide gates are under water and unable to be inspected but seem in good condition.	6	Replace	2034	$ 80,000

ID (JLR)	Asset Name	Area	Visual Condition Rating	Condition Comment	Risk	Recommendation	Recommendation Action Year	Recommendation Cost (Material)
WPC107	Separated Cold Water Solenoid Valves - RAS/WAS Pump Lines	Blower Building	4 - Good	-	6	Replace	2034	$ 10,000
WPC121	RAS Control Valve	Blower Building	4 - Good	-	6	Replace	2034	$ 30,000
WPC195	Digested Sludge Transfer Pressure Relief Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 4,000
WPC196	Digested Sludge Transfer Check Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 3,400
WPC197	Digested Sludge Transfer Isolation Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 20,400
WPC200	Digesters Eql/Sl Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 6,800
WPC202	Digesters Raw Sludge Feed Isolation Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 6,800
WPC204	Digesters Sludge Recirculation Check Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 6,800
WPC205	Digesters Sludge Recirculation Isolation Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 1,700
WPC208	Primary To Secondary Sludge Transfer Valves	Digester Facility	4 - Good	-	6	Replace	2034	$ 3,400
WPC223	Digester Hydronics Motorized Valve	Digester Facility	4 - Good	-	6	Replace	2034	$ 10,000
WPC270	Digester Gas Sediment And Condensate Trap	Digester Facility	4 - Good	-	6	Replace	2034	$ 6,000
WPC271	Digester Gas Drip Traps	Digester Facility	4 - Good	-	6	Replace	2034	$ 8,000
WPC933	Primary Scum Pump Isolation Valves	Pump Room No.2	4 - Good	-	6	Replace	2034	$ 8,500
WPC899	Control Building Roof Drain	Control Building	4 - Good	-	3	Replace	2034	$ 2,000

Appendix E

April 29, 2024, Workshop Meeting
Minutes and Presentation

J.L.Richards
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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

Attendance:

Patrick Foley	Town of Arnprior (Town)	pfoley@arnprior.ca
John Steckly	Town of Arnprior (Town)	jsteckly@arnprior.ca
Scott Matthews	Town of Arnprior (Town)	smatthews@arnprior.ca
Ben Ritchie	Town of Arnprior (Town)	britchie@arnprior.ca
Mark Buchanan	J.L. Richards & Associates Limited (JLR)	mbuchanan@jlrichards.ca
Carolyn Chan	J.L. Richards & Associates Limited (JLR)	cchan@jlrichards.ca
Yazeed Al Adawi	J.L. Richards & Associates Limited (JLR)	yaladawi@jlrichards.ca

The meeting commenced at 1:00 p.m. on Monday, April 29, 2024 on Microsoft Teams (Virtual).

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM		ACTION BY
	New Business	
3.1	WFP & WPCC – 10 Year Projects and General Feedback	
	JLR presented a breakdown of the 10-year projects assigned to the WFP and WPCC and discussed the overall cost projections along with the project listing.	INFO
	Repair/replacement costing as presented is for materials only. Town requested that the final report show capital project budgets with 100% mark-up for labour. O&M costs will be left as is.	JLR
	JLR noted that in some cases, a more detailed study was recommended to define the scope of a future capital project. The current project list includes budget for the study but nothing for the future capital project. Town requested that a capital project be defined for each case with the caveat that the scope and budget would be refined by the study. JLR to look into modifying database structure for this purpose.	JLR
	Town prefers that O&M recommendations be distributed more evenly over the 10 years, and that high risk assets be prioritized. JLR to look into modifying recommendations and/or data presentation within report.	JLR
3.2	WFP – Town Comments & Feedback	
	The Town presented their feedback and provided an Excel spreadsheet to reference their major recommendations and concerns. The following items were discussed during the meeting:	
	Actiflo and Filter Rebuild:	

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Arnprior WFP-WPCC Conditions Assessments

Project Meeting
Minutes of Meeting No. 3

ITEM	ACTION BY
• The Town noted that they generally run both Actiflo #1 and Actiflo #2 simultaneously, but they considered the option of operating one at a reduced capacity while keeping the other fully operational during repair/replacement works. They suggested breaking into three distinct projects: Actiflo #1, Actiflo #2, and Filter Appurtenances. It was also recommended to stagger the Actiflo replacements by 5 years.	JLR
Filter Media Replacements	
• The Town noted that the underdrains in Filter #2 are in poor condition, and they suspect that the underdrains in Filter #1 and Filter #3 might also be in similar shape because they are showing signs of comparable failures. To address this, the Town plans to expedite the repair schedule to 2025. JLR to include underdrain replacement in each Filter Media Replacement capital project.	JLR
Fluoride Room	
• The Town noted that fumes from the fluoride room are damaging equipment and that a stainless-steel pipe is deteriorating prematurely, and advised that they plan to complete HVAC and heating improvements in 2024 (i.e. prior to the fluoride room re-location study/ implementation). JLR to include $50,000 in 2024 for this work; discussed assigning to a representative asset such as a fan, similar to Sodium Bisulphite room (see below).	JLR
Low Lift Pump #3 Replacement	
• Commenting on JLR recommendation of a hydraulic study for LLP#3, the Town noted that they have been experiencing issues with Pump #3 since its installation and have already studied several potential issues; consider most likely explanation to be an issue with the suction line. Recommendation (study/ repair/ replacement) for LLP#3 must include this piping; should be inspected via diver. JLR to modify recommendation.	JLR
Separated Water Valve Replacement/ Distribution Yard Piping	
• The Town noted the need for a redundant distribution discharge pipe extending outside the plant; has been discussed during separate JLR project related to new river crossing. This would make replacement of the separated water valve much simpler. The Town suggested handling the redundant pipe as a separate capital project to be completed ahead of the valve replacement. JLR to add a capital project for a second water main and increase the COF value for the existing water main. Town to provide costing.	JLR Town
WFP Chemical Systems	

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

ITEM | **ACTION BY**

- The Town noted that they disagree with the current assessment of the soda ash pump. While the connections are in rough shape, the pump itself was replaced in 2017 and has remained in good condition since then. JLR to adjust their recommendations and change the condition rating to "Fair". — JLR

The Town recommended adding the following as new projects:

Coagulant Tank

- The Town noted that the tank needs to be replaced as it has been in place since 1960. They also indicated a need to reconfigure the plumbing around the tank. — JLR

Sodium Bisulphite Room

- The Town noted that fumes in the Sodium Bisulphite Room are damaging equipment. As in the fluoride room, the plan is to improve ventilation in the short term to prevent further damage, then replace the mechanical plumbing components on a like-for-like basis. JLR to add recommendation. — JLR

3.3 WPCC – Town Comments & Feedback

The following items were discussed during the meeting:

Chemical Building Refurbishment Scoping Study

- The Town noted the need to push this study to 2025 and requested anticipated repair/replacement costs after the study is completed, acknowledging that actual scope of repair/replacement would not be known at this time. JLR to use total asset replacement costs as placeholder value, noting that scope will be refined after study. — JLR
- The Town asked whether a joint ventilation scoping study for chemical building with the WFP fluoride room would provide economy of scale benefits. JLR to consider grouping.

Digester and Gas Flare Equipment

- The Town noted that operators are having difficulties operating the valves in this system. JLR to flag this within database. — JLR

Headworks Blower #1

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

ITEM	**ACTION BY**
• The Town noted that the blower is in good condition and that they prefer to stock spare parts and do routine maintenance (e.g. every 5-7 years) rather than replace. JLR to modify recommendation.	JLR
Headworks Manual Screen	
• The Town noted that cleaning the screen in its current state is dangerous. They recommended moving this item up the queue to 2025 for operations and maintenance. Cost appears to be too low. JLR to modify.	JLR
Digesters/Gas Proofing	
• The Town asked for clarification around the $360,000 item for inspection; JLR confirmed that this would include cleaning out the digesters. JLR noted that sometimes both gas proofing and digester roof need to be replaced at the same time for gas proofing company to provide warranty. Town asked for a new project following this study representing actual gas proofing repairs and roof replacement. JLR to add.	JLR
Final Clarifiers	
• The Town noted that the weir in Final Clarifier #2 is detached from the concrete structure. The Town showed photos of the weirs, and noted that they attempted to re-anchor the steel into the concrete in Final Clarifier #2 during the summer of 2018, but these efforts were unsuccessful. The plan is to use a stainless-steel insert to replace the current weirs. The Town recommended conducting an options analysis to determine the best course of action for addressing this issue. For example, instead of fastening the weirs directly into the concrete, it may be preferable to bolt the weirs to a stainless steel angle bolted to the concrete structure at a better location. Preferred alternative would allow weir height to be adjusted. JLR will review this item with the structural team and add a Study for recommended options analysis.	JLR
Odour Control System	
• The Town requested expediting the replacement of the filter media for the odour control system and providing a cost estimate for this work. JLR to add.	JLR
Blower Building Basement Floor	
• The Town noted that a study to investigate the cause of floor cracking is not required. JLR to review.	JLR
Grit Slurry Pump # 1	
• The Town noted that the pump is being replaced. JLR to modify recommendation.	JLR

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

ITEM		**ACTION BY**
	Clarifier Mechanisms	
	• The Town noted that they would like to order chain and flight collectors to keep in the shelf in case of breakage. They also noted that they would prefer the purchase of material as a capital project scheduled for either 2025 or 2026. JLR to modify recommendations.	JLR
	Sludge Mixing Pump	
	• The Town noted that they have an extra sludge mixing pump in the shelf such that purchase of a new unit is not required at end of life. JLR to modify recommendation.	JLR
	Generator	
	• The Town noted that the automatic transfer switch for the generator will require repair prior to genset replacement. JLR to modify recommendation.	JLR
3.4	Next Steps	
	JLR to modify database per feedback and discussions. Aim to submit two draft reports for end of May.	

Meeting adjourned at 2:30 p.m.

Next meeting date is TBD.

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Arnprior WFP-WPCC Conditions Assessments
Project Meeting **Minutes of Meeting No. 3**

Prepared by: Issued on: May 10, 2024

Yazeed Al Adawi,
Environmental Engineering Intern

Distribution: All attendees
CC:

April 29, 2024

Town of Arnprior WFP & WPCC Condition Assessment

Phase 4 – Workshop Presentation

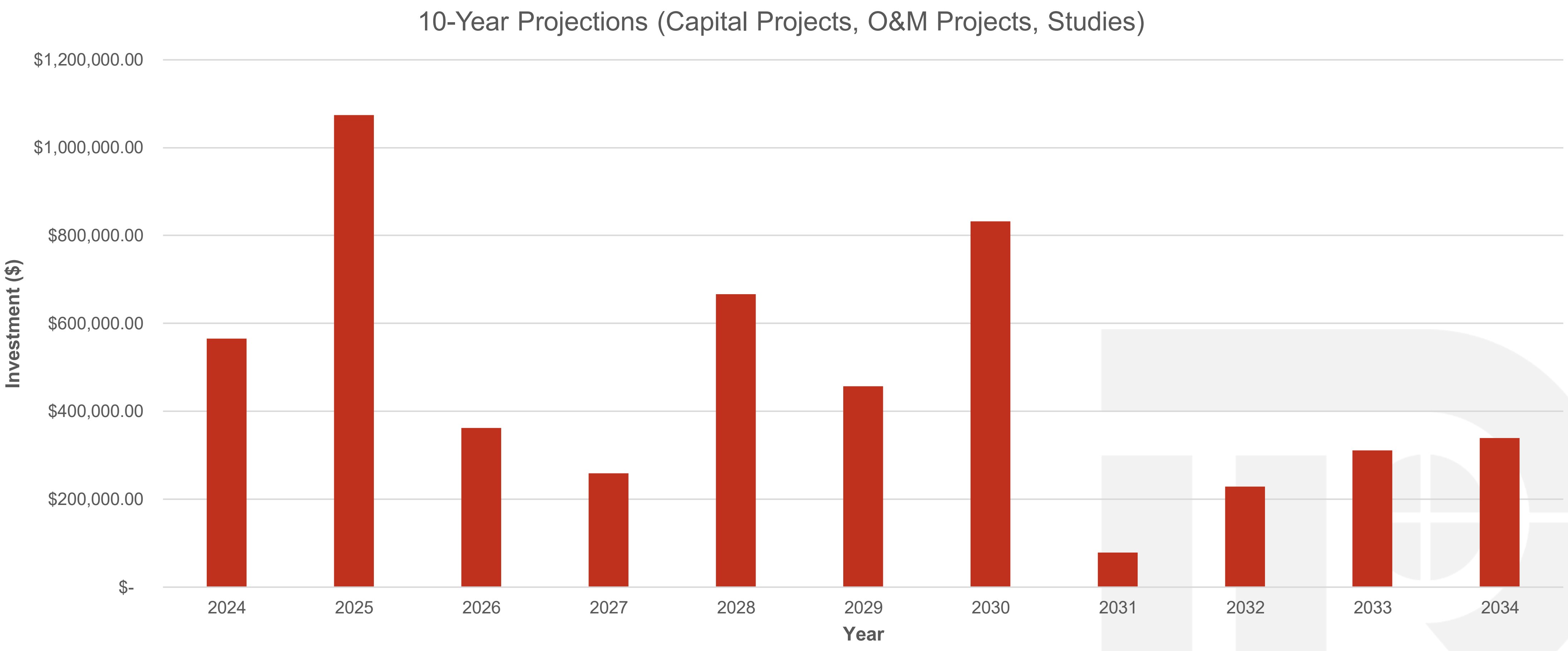
CANADA BEST MANAGED COMPANIES Platinum member

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

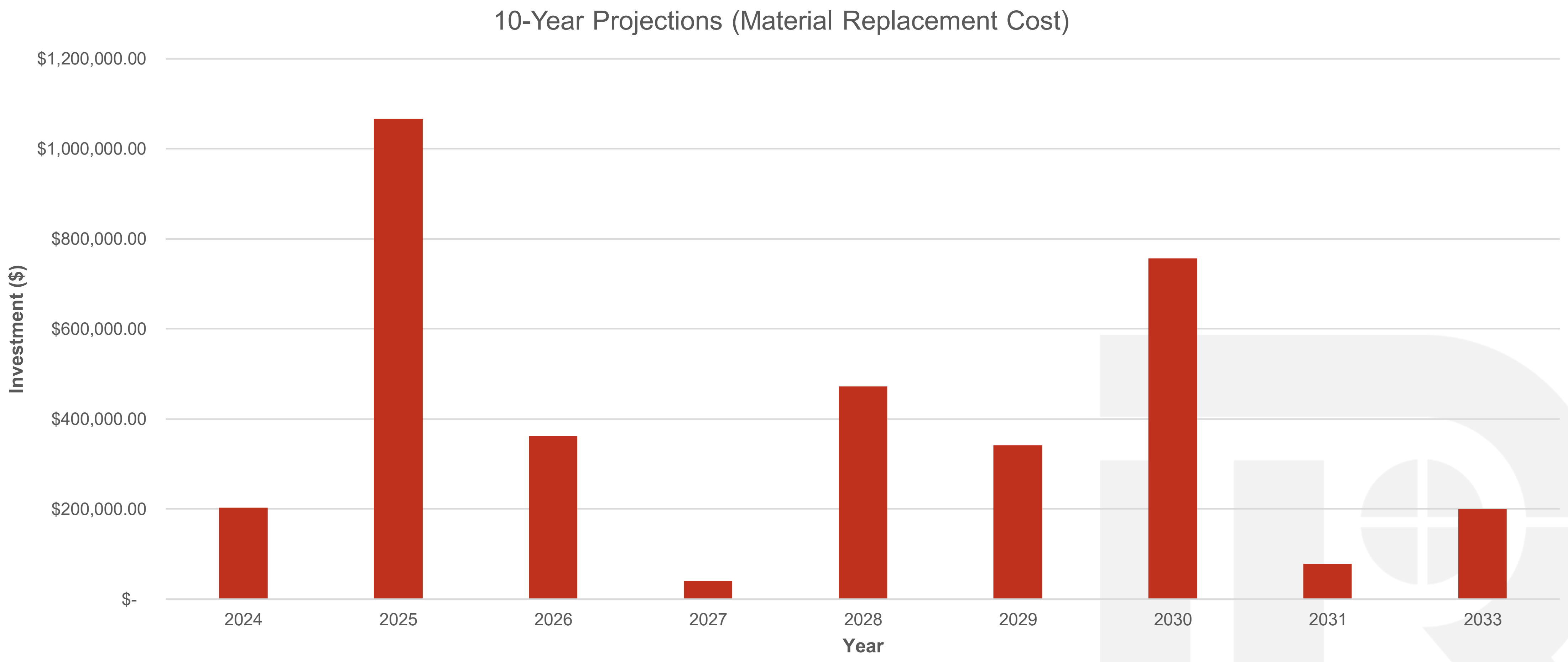
Overview

- **Water Filtration Plant:**
  - 10-year investment projections:
    - Capital projects
    - Operation and maintenance projects
    - Studies
  - Project Summaries
- **Water Pollution Control Centre:**
  - 10-year investment projections:
    - Capital projects
    - Operation and maintenance
    - Studies
  - Project summaries
- **Combined Projections**
- **Review Town of Arnprior's comments on the assessment results**

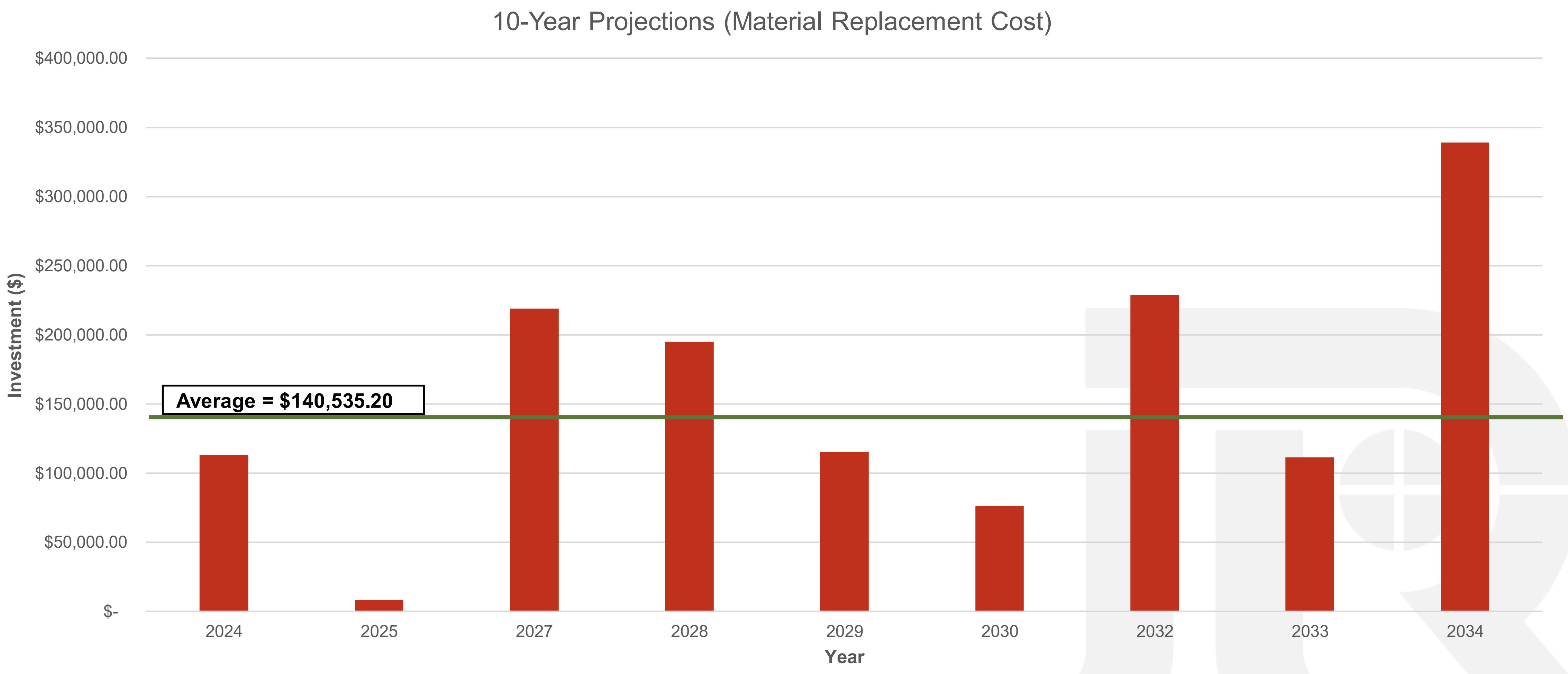
WFP - 10 Year Investment Projections



WFP - Capital Projects



WFP - Operations and Maintenance



WFP – Capital Projects Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Filter #2 Media Replacement	2024	$ 162,000.00	Replacement of filter #2 media (In progress).
Misc. Building Repairs	2024	$ 40,700.00	Replacement/repair of alum storage tanks and various doors, concrete beams, retaining walls, lighting and receptacles.
Clearwell #1 Replacement	2025	$ 904,000.00	Replacement of clearwell #1, militronics and former high lift pump room interior walls/columns.
Filter #1 Media Replacement	2025	$ 162,000.00	Replacement of filter #1 media
Filter #3 Media Replacement	2026	$ 162,000.00	Replacement of filter #3 media
High Lift Pump #3 Replacement	2026	$ 200,000.00	Replacement of high lift pump #3.
Separated Water Valve Replacement	2027	$ 40,000.00	Replacement of separated water valve.
Backwash Equipment Replacement	2028	$ 471,800.00	Replacement of valves, flow meter, piping and pump.
High Lift Pump #1 Replacement	2029	$ 237,800.00	Replacement of high lift pump #1 and valves for pumps #1 to #3.
Low Lift Pumping Station	2029	$ 104,100.00	Replacement of low lift pumps #1 and #2 and valves.
Actiflo and Filter Rebuild	2030	$ 756,400.00	Replacement of process piping, valves, pumps, and blower.
WFP Chemical Systems	2031	$ 78,900.00	Replacement of chlorinator systems #1 and #2, soda ash feed pump #1 and ammonia system process piping and miscellaneous appurtenances.
High Lift Pump #2 Replacement	2033	$ 200,000.00	Replacement of high lift pump #2.
Total		**$ 3,519,700.00**	

WFP – Operations and Maintenance Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Operations and Maintenance	2024	$ 112,850.00	Replacement of various instrumentation, valves, control panels and other miscellaneous equipment within the WFP.
	2025	$ 8,150.00	
	2027	$ 219,150.00	
	2028	$ 194,862.00	
	2029	$ 115,100.00	
	2030	$ 76,100.00	
	2032	$ 228,800.00	
	2033	$ 111,340.00	
	2034	$ 339,000.00	
Total		**$ 1,405,352.00**	
Average Annual Cost		**$ 140,535.20**	

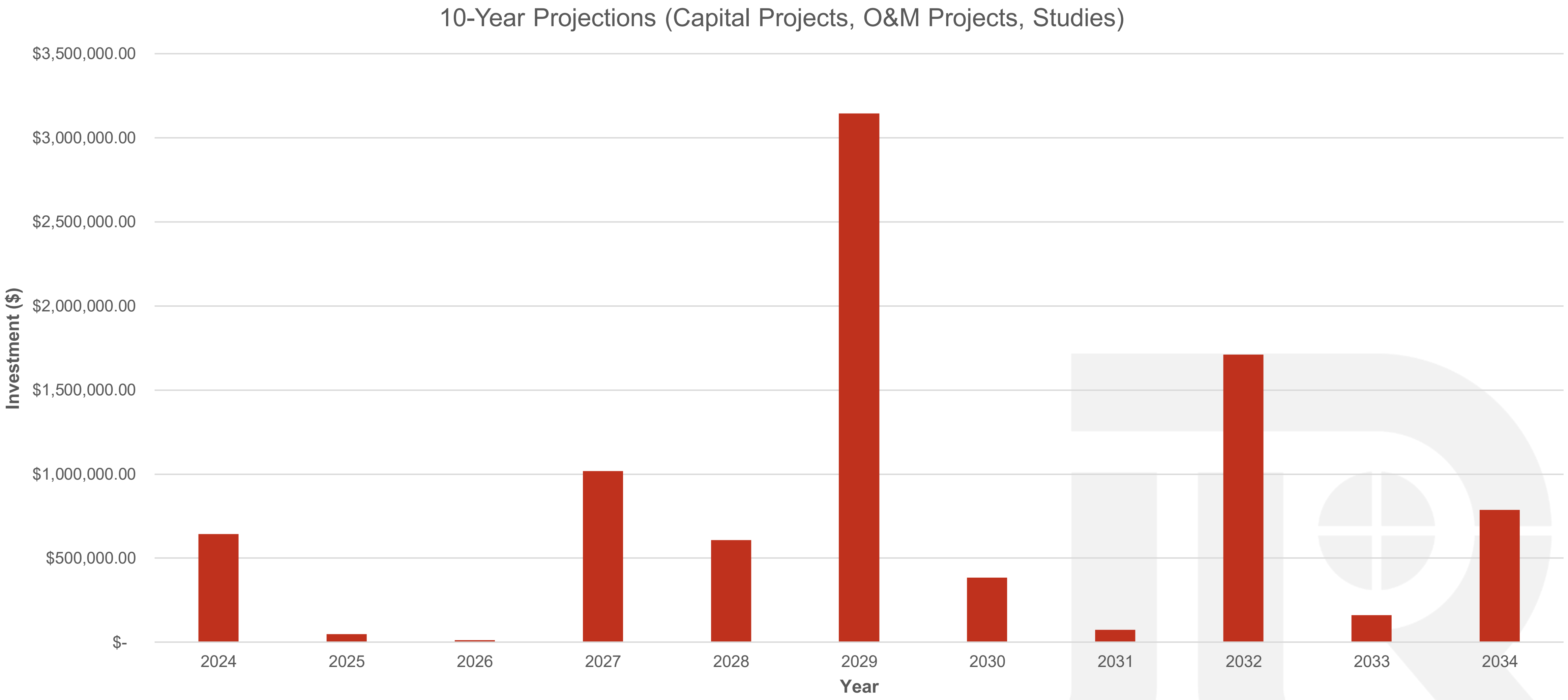
WFP – Studies Summary

Project Name	Recommended Action Year	Recommended Cost	Project Description
Fluoride Room Relocation	2024	$ 25,000.00	Conduct a study to define scope of fluoride room relocation.
Low Lift Pump #3 Replacement	2024	$ 25,000.00	Conduct a study to determine appropriate pump replacement design.
RWPS Low Lift Pump Well Inspection	2024	$ 100,000.00	Complete a structural inspection of tank interior.
Filter #1 Inspection	2024	$ 25,000.00	Inspect tank surface to identify required repairs.
Natural Gas Odour Investigation	2024	$ 10,000.00	Determine the cause of natural gas smell in the boiler room.
Roofing Inspections	2024	$ 40,000.00	Perform more detailed inspection of roofing of former high lift pump room, high lift pump room, main building and Raw Water Pumping Station.
Structural Investigation	2024	$ 15,000.00	Perform structural investigation into cause of floor cracking in main building floor.
Vacuum Study	2024	$ 10,000.00	Conduct a study to determine cause of vacuum issue in generator room.
Total		**$ 250,000.00**	

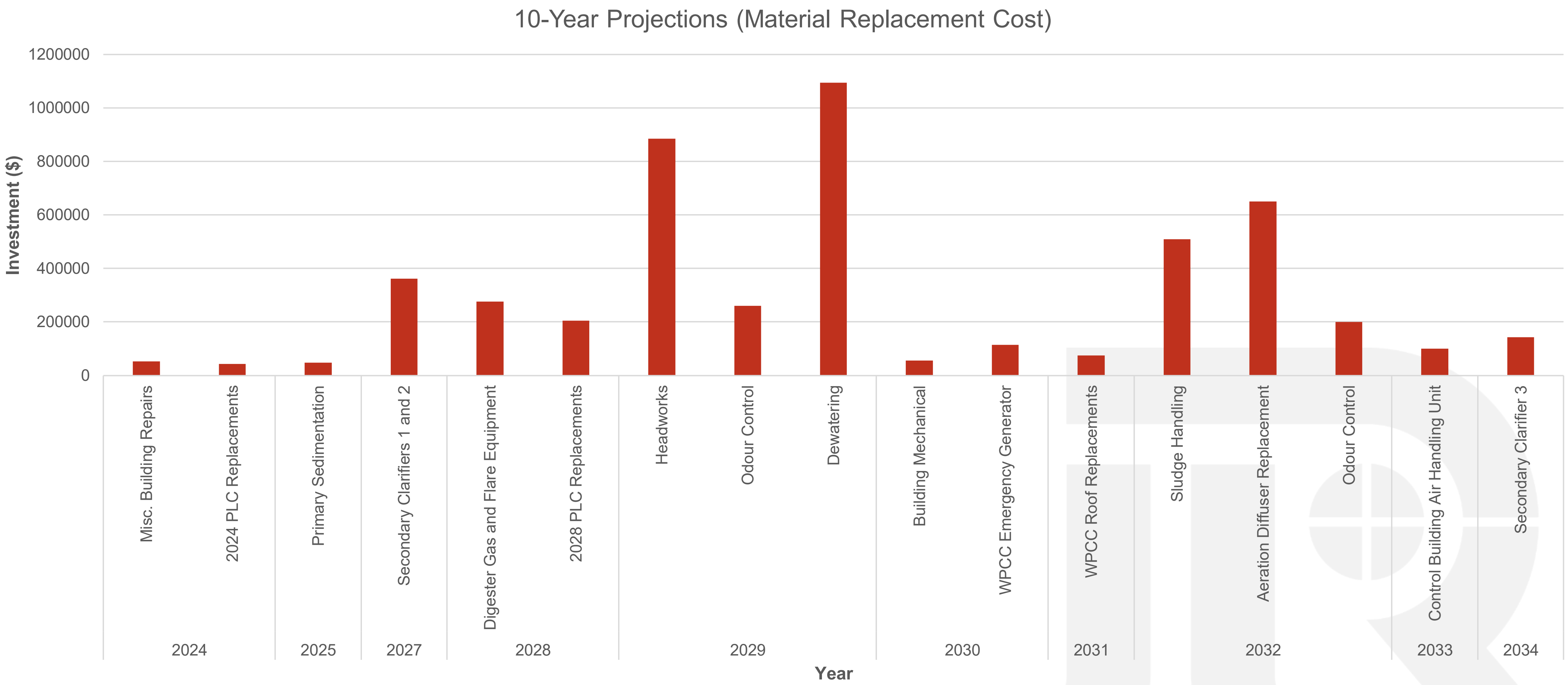
WFP – Overall Summary

Budget	Total Cost
Capital	$ 3,159,700.00
Operations and Maintenance	$ 1,405,352.00
Studies	$ 250,000.00
Total	$ 5,175,052

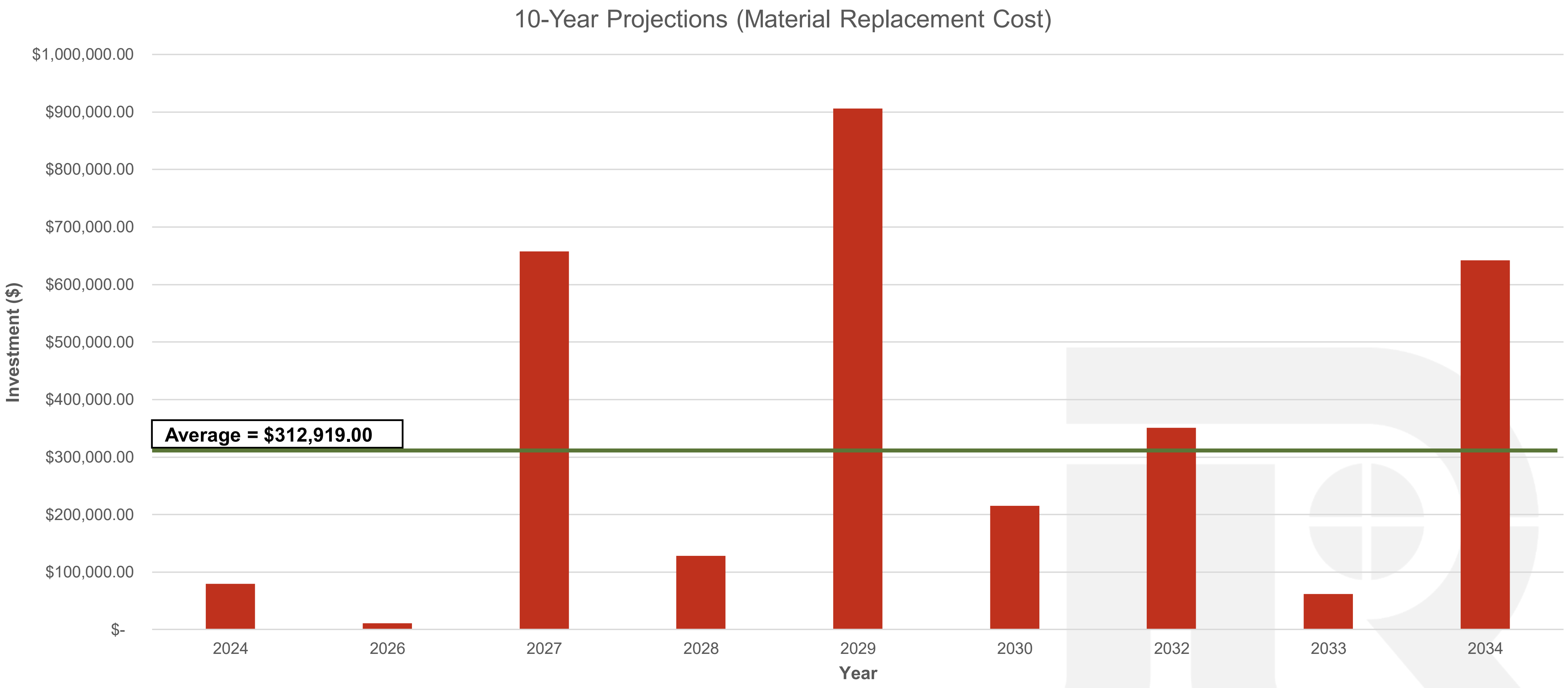
WPCC - 10 Year Investment Projections



WPCC - Capital Projects



WPCC – Operations and Maintenance



WPCC – Capital Projects Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
2024 PLC Replacements	2024	$ 43,000.00	Replacement of PLC panels in control building, chemical building and headworks.
Misc. Building Repairs	2024	$ 52,200.00	Replacement/repair of tanks, boiler #2, doors, walls/columns, ceiling, roof slabs, windows, stairs, railing, grating, field control panel, transformers and process piping.
Primary Sedimentation	2025	$ 48,200.00	Replacement of primary sedimentation scum trough and primary clarifiers #3 and #4 weirs.
Secondary Clarifier 1 and 2	2027	$ 361,200.00	Replacement of hand gates, and secondary clarification #1 and #2 collectors and weirs.
2028 PLC Replacements	2028	$ 204,000.00	Replacement of PLC panels in headworks, digester facility, control building and blower building.
Digester Gas and Flare Equipment	2028	$ 276,000.00	Replacement of digester flow meter, valves, frame arresters, pressure switches, waste gas flare and temperature element.
Dewatering	2029	$ 1,095,000.00	Replacement of dewatering centrifuge, sludge valves and centrifuge control panel.
Headworks	2029	$ 885,000.00	Replacement of blower #1, mechanical screens, manual screen, grit classifier, grit screws and motorized screening conveyor.

WPCC – Capital Projects Summary (Continued)

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Odour Control	2029	$ 260,000.00	Replacement of dewatering and headworks odour control system.
Building Mechanical	2030	$ 55,500.00	Replacement of miscellaneous building mechanical equipment.
WPCC Emergency Generator	2030	$ 114,000.00	Replacement of transfer switch and emergency generator.
WPCC Roof Replacement	2031	$ 73,854.00	Replacement of headworks and pump room no. 2 roofing materials.
Aeration Diffuser Replacement	2032	$ 650,000.00	Replacement of aeration diffuser.
Odour Control	2032	$ 200,000.00	Replacement of digester facility odour control system.
Sludge Handling	2032	$ 509,700.00	Replacement of sludge pumps, piping, valves, blower and screw conveyor.
Control Building Air Handling Unit	2033	$ 100,000.00	Replacement of control building air handling unit.
Secondary Clarifier 3	2034	$ 143,500.00	Replacement of secondary clarifier #3 collectors and weirs.
Total		**$ 5,071,154.00**	

WPCC – Operations and Maintenance Summary

Project Name	Recommended Action Year	Material Replacement Cost	Project Description
Operations and Maintenance	2024	$ 79,400.00	Replacement of various instrumentation, valves, control panels and other miscellaneous equipment within the WPCC.
	2026	$ 11,000.00	
	2027	$ 657,440.00	
	2028	$ 128,450.00	
	2029	$ 905,900.00	
	2030	$ 214,900.00	
	2030	$ 350,700.00	
	2033	$ 62,000.00	
	2034	$ 642,400.00	
Total		**$ 3,129,190.00**	
Average Annual Cost		**$ 312,919.00**	

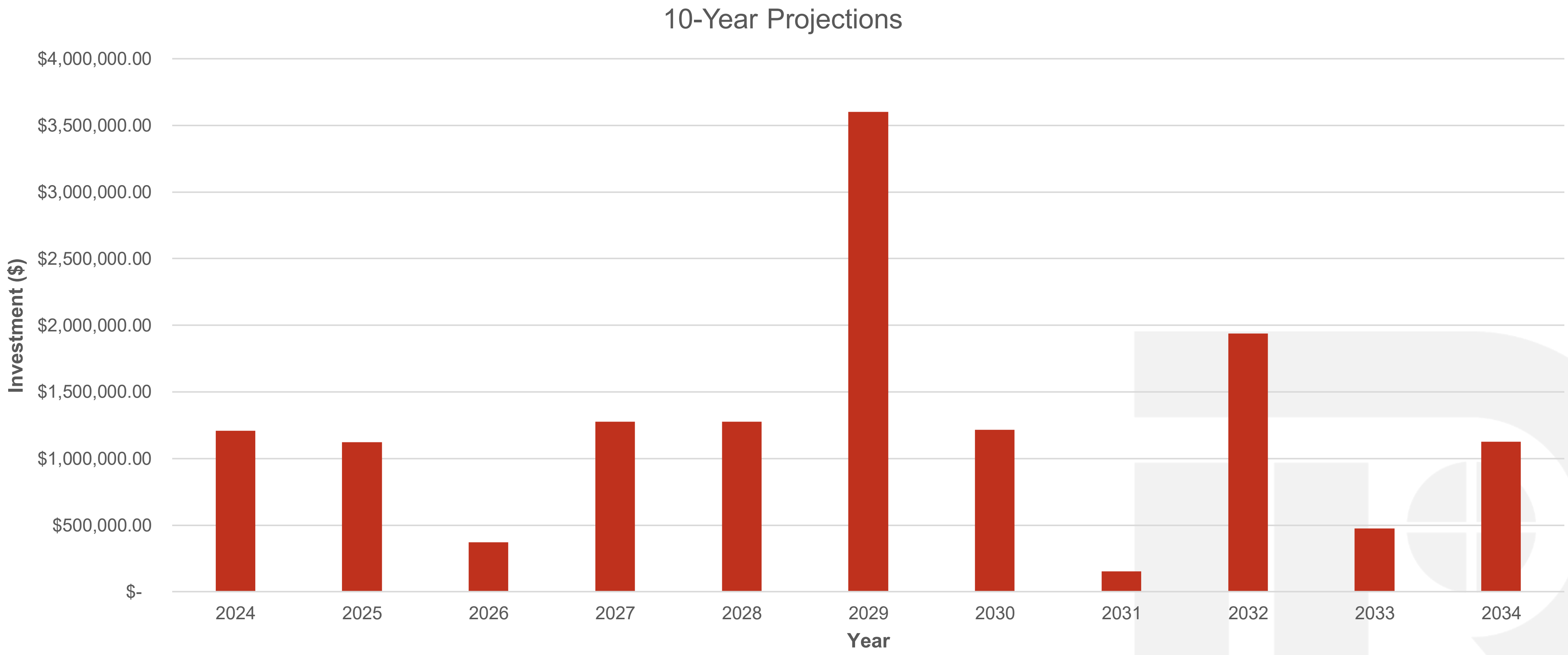
WPCC – Studies Summary

Project Name	Recommended Action Year	Recommendation Cost	Project Description
Chemical Building Refurbishment Scoping Study	2024	$ 50,000.00	Scoping study of chemical building refurbishment.
Clarifier #1 health and safety improvements	2024	$ 10,000.00	Study to scope health and safety improvements.
Control building roof replacement construction sequencing	2024	$ 30,000.00	Study to determine required construction sequencing for Control Building roof replacement.
Control building water damage source investigation	2024	$ 5,000.00	Study to investigate source of water damage.
Gas proofing investigation	2024	$ 360,000.00	Study to determine condition of gas proofing prior to replacing roof. Study cost includes the cost of emptying and cleaning both digesters.
Structural investigation of blower building basement floor cracking	2024	$ 15,000.00	Perform structural investigation into cause of floor cracking in blower building basement.
Total		**$ 470,000.00**	

WPCC – Overall Summary

Budget	Total Cost
Capital	$ 5,071,154.00
Operations and Maintenance	$ 3,052,190.00
Studies	$ 470,000.00
Total	$8,593,344.00

WFP & WPCC – Combined Projections



WFP & WPCC – Combined Summary

Budget	Total Cost
Capital	$ 8,590,854.00
Operations and Maintenance	$ 4,457,542.00
Studies	$ 720,000.00
Total	$13,768,396.00

Thank you!

J.L.Richards
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Town of Arnprior Staff Report

Subject: Bill 185 - Development Charges By-Law Amendment
Report Number: 24-11-25-05
Report Author and Position Title: J. Morawiec, GM Client Services / Treasurer
Department: Client Services
Meeting Date: November 25, 2024

Recommendations:

That Council accept report 24-11-25-05 as information; and

Further That Council enact a by-law authorizing an amendment to By-Law No. 7369-23 Development Charges By-Law for updates including the costs of growth-related studies and removing the mandatory phase-in requirements.

Background:

The *Development Charges Act, 1997*, as amended (the "Act") provides that the council of a municipality may by by-law impose development charges against land to pay for increased capital costs required because of increased needs for services. As the Town of Arnprior has and will continue to experience growth through development, the implementation of development charges helps ensure that the capital cost of meeting growth related demands for Town services does not place an undue financial burden on the Town or its taxpayers.

On April 10, 2024, the Province released proposed changes to the Development Charges Act via Bill 185: *Cutting Red Tape to Build More Homes Act, 2024*. The Bill received Royal Assent on June 6, 2024. This Bill reversed many of the key changes that were implemented through Bill 23: *More Homes Built Faster Act*.

Discussion:

The purpose of this report is to provide for updates to the Town's Development Charges by-law to align with the Act as amended by Bill 185, in particular to include the costs of growth-related studies and remove the mandatory phase-in sections. A comprehensive memorandum prepared by Watson & Associates Economists Inc. is attached, providing support to substantiate the proposed amendments to the Development Charges By-law:

- Revise the definition of capital cost to include studies as per the D.C.A.;
- Repeal the mandatory phase-in section;
- Add growth studies as a class of service; and
- Revise Schedule A and B to include growth studies.

Bill 185 allows municipalities to undertake minor amendments to their D.C. by-laws, if the D.C. by-law being amended was passed after November 28, 2022, and before Bill 185 came into effect, however the amending by-law must be passed within six months of Bill 185 taking effect. These minor amendments, to impose development charges for studies and to remove the provisions related to the mandatory phase-in, can be implemented without adherence to specific requirements, such as preparation of a background study, hosting a public meeting and the ability to appeal the by-law to the Ontario Land Tribunal.

Options:

Council could choose to not amend the Development Charges By-law for legislative changes under Bill 185; however, this is not recommended as it would result in the Town's Development Charges By-law containing provisions that would not align with the *Development Charges Act* and it would result in the growth portion of administrative studies being funded from levy instead of development charges.

Policy Considerations:

- Development Charges By-Law 7369-23
- Development Charges Background Study By-Law 7368-23
- Bill #185 *Cutting Red Tape to Build More Homes Act, 2024*

Meeting Dates:

N/A

Consultation:

Watson & Associates Economists Ltd

Financial Considerations:

As the amendment to the Development Charges By-Law has to be reflected in 2023 values, the table below outlines an indexed version of Schedule "B" which would be effective upon passing of the by-law amendment.

Schedule "B"
By-Law No. 7369-23
Schedule of Development Charges
March 13th, 2024 - March 12th, 2025

Service	Residential					Non-Residential
	Single and Semi-Detached Dwelling	Multiples	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Special Care / Special Dwelling Units	(per ft² of Gross Floor Area)
Municipal Wide Services / Class of Service:						
Services Related to a Highway	5,472	4,422	3,612	2,473	2,473	3.07
Public Works (Facilities and Fleet)	695	562	459	314	314	0.39
Fire Protection Services	236	191	156	107	107	0.13
Parks and Recreation Services	4,168	3,368	2,751	1,883	1,883	0.59
Library Services	593	479	391	268	268	0.09
Total Municipal Wide Services / Class of Servi	**11,164**	**9,021**	**7,370**	**5,045**	**5,045**	**4.27**
Urban Services						
Wastewater Services	6,973	5,635	4,603	3,151	3,151	2.46
Water Services	11,336	9,161	7,485	5,124	5,124	4.00
Total Urban Services	**18,309**	**14,796**	**12,088**	**8,275**	**8,275**	**6.46**
Staye Court Area Specific Charges						
Wastewater Services	654	529	432	295	295	0.81
Water Services	744	602	492	336	336	0.88
Total Area Specific Services	**1,398**	**1,131**	**924**	**632**	**632**	**1.69**
Grand Total Municipal Wide Area	11,164	9,021	7,370	5,045	5,045	4.27
Grand Total Urban Area	29,473	23,816	19,458	13,320	13,320	10.73
Grand Total with Staye Court	30,871	24,947	20,382	13,951	13,951	12.42

*Development Charges Act, 2001 section 5 (5) regarding phase-in values repealed under Bill 185 effective June 6, 2024.

Documents:

1. Development Charges By-Law Amendment – Growth Studies, Watson & Associates Economists Ltd, dated November 20, 2024

Signatures

Reviewed by Department Head: Jennifer Morawiec

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

Memorandum

To	Jennifer Morawiec
From	Byron Tan
Date	November 20, 2024
Re:	Development Charges By-Law Amendment – Growth Studies

Fax ☐ Courier ☐ Mail ☐ Email ☒

1. Introduction

The Town of Arnprior (Town) currently imposes Town-wide development charges (D.C.) through By-law 7369-23. At the time of the by-law's passage, the *Development Charges Act* (D.C.A.) did not include studies as an eligible cost to be funded through development charges.

On April 10, 2024, the Province released proposed changes to the Development Charges Act (D.C.A.) via Bill 185: *Cutting Red Tape to Build More Homes Act, 2024*. The Bill received Royal Assent on June 6, 2024. This Bill reversed many of the key changes that were implemented through Bill 23: *More Homes Built Faster Act*. As such, the purpose of this memo is to provide for updates to the D.C. by-law to align with the D.C.A. as amended by Bill 185.

2. Legislative Background

The following section provides details on the revisions to the D.C.A. as a result of Bill 185.

Revised Definition of Capital Costs

Bill 185 reversed the capital cost amendments of Bill 23 by reinstating studies as an eligible capital cost. The following paragraphs were added to subsection 5(3) of the D.C.A.:

> 5. *Costs to undertake studies in connection with any of the matters referred to in paragraphs 1 to 4.*
>
> 6. *Costs of the development charge background study required under section 10.*

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The amendment allows municipalities to fund studies, consistent with by-laws passed prior to Bill 23.

Removal of Mandatory Phase-in

Bill 23 required the phase-in of charges imposed in a D.C. by-law over a five-year term for any by-laws passed after January 1, 2022. Bill 185 removed this mandatory phase-in.

For site plan and zoning by-law amendment applications that were made prior to Bill 185 receiving Royal Assent, the charges payable will be the charges that were in place on the day the planning application was made (i.e., including the mandatory phase-in).

Process for Minor Amendments to D.C. By-laws

Section 19 of the D.C.A. requires that a municipality must follow sections 10 through 18 of the D.C.A. (with necessary modifications) when amending D.C. by-laws. Sections 10 through 18 of the D.C.A. generally requires the following:

- Completion of a D.C. background study, including the requirement to post the background study 60 days prior to passage of the D.C. by-law;
- Passage of a D.C. by-law within one year of the completion of the D.C. background study;
- A public meeting, including notice requirements; and
- The ability to appeal the by-law to the Ontario Land Tribunal.

Bill 185 allows municipalities to undertake minor amendments to D.C. by-laws for the following purposes without adherence to the requirements noted above (with the exception of the notice requirements):

1. To repeal a provision of the D.C. by-law specifying the date the by-law expires or to amend the provision to extend the expiry date (subject to the 10-year limitations provided in the D.C.A.);

2. To impose D.C.s for studies, including the D.C. background study; and

3. To remove the provisions related to the mandatory phase-in of D.C.s.

Minor amendments related to items 2 and 3 noted above may be undertaken only if the D.C. by-law being amended was passed after November 28, 2022, and before Bill 185 came into effect. Moreover, the amending by-law must be passed within six months of Bill 185 taking effect.

Notice requirements for these minor amending by-laws are similar to the typical notice requirements, with the exception of the requirement to identify the last day for appealing the by-law (as these provisions do not apply).

Reduction of D.C. Rate Freeze Timeframe

Changes to the D.C.A. in 2020 provided for the requirement to freeze D.C.s imposed on developments subject to a site plan and/or a zoning by-law amendment application. The D.C. rate for these developments is "frozen" at the rates that were in effect at the time the site plan and/or zoning by-law amendment application was submitted (subject to applicable interest). Once the application is approved by the municipality, if the date the D.C. is payable is more than two years from the approval date, the D.C. rate freeze would no longer apply. Bill 185 reduced the two-year timeframe to 18 months. Note, this change is not subject to the minor amendment provisions introduced and must follow the full D.C. by-law amendment process.

Modernizing Public Notice Requirements

The D.C.A. sets out the requirements for municipalities to give notice of public meetings and of by-law passage. These requirements are prescribed in sections 9 and 10 of O. Reg. 82/98 and include giving notice in a newspaper of sufficiently general circulation in the area to which the by-law would apply. The regulatory changes modernize the public notice requirements by allowing municipalities to provide notice on a municipal website if a local newspaper is not available. Note, this change is in effect as of July 1, 2024.

3. Changes to the Current D.C. By-law

The purpose of this memorandum is to provide the basis for the proposed amendment to the Town's D.C. by-law to include the costs of growth-related studies and remove the mandatory phase-in sections.

3.1 Mandatory Phase-in

The Town's D.C. by-law contains the phase-in provisions that were introduced under Bill 23: *More Homes Built Faster Act, 2022*. As mentioned in the previous section, Bill 185 allows for a minor amendment to a D.C. by-law to remove the phase-in in accordance with subsection 19 (1.3) of the D.C.A. Although section 2.13 of the Town's D.C. by-law references the D.C.A. (and no longer imposes the mandatory phase-in), the amending by-law will repeal this section for greater clarity.

3.2 Growth Studies

The D.C.A. permits the inclusion of studies undertaken to facilitate the completion of the Town's capital works program. These studies have been included as a class of service under Growth Studies, where each study relates to at least one of the Town's D.C. services.

Table 2-1 summarizes the studies that have been included in the D.C. calculations, which identify the gross capital costs, anticipated timing, deductions, and D.C. eligible costs.

Table 1
Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development 2023-2032	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2023$)	Post Period Benefit	Other Deductions (to recognize benefit to non-D.C. services)	Net Capital Cost	Less: Benefit to Existing Development	Less: Grants, Subsidies and Other Contributions Attributable to New Development	Potential D.C. Recoverable Cost: Total	Potential D.C. Recoverable Cost: Residential Share (Service Specific)	Potential D.C. Recoverable Cost: Non-Residential Share (Service Specific)
1	Development Charges Study Update	All D.C. Services	2023	5,000	-		5,000	-	-	5,000	4,050	950
2	Development Charges Study	All D.C. Services	2028	40,000	-		40,000	-	-	40,000	32,400	7,600
3	Water and Wastewater Master Plan	Water Services and Wastewater Services	2031	200,000	-		200,000	50,000	-	150,000	121,500	28,500
4	Storm Water Study	Stormwater Services	2028	150,000	-		150,000	75,000	-	75,000	60,750	14,250
5	Transportation Masterplan	Services Related to a Highway	2023	75,000	-		75,000	18,750	-	56,250	45,563	10,688
6	Fire Masterplan	Fire Protection Services	2028	60,000	-		60,000	45,000	-	15,000	12,150	2,850
7	Integrated Waste Management Study	Waste Diversion	2025	100,000	-	72,900	27,100	13,550	-	13,550	12,873	678
8	Strategic Plan	All Services	2023	12,500	-	1,250	11,250	5,625	-	5,625	4,556	1,069
9	Strategic Plan	All Services	2027	12,500	-	1,250	11,250	5,625	-	5,625	4,556	1,069
10	Official Plan - 5 Year Update	All Services	2026	55,000	-	5,500	49,500	-	-	49,500	40,095	9,405
11	Official Plan - 5 Year Update	All Services	2031	55,000	-	5,500	49,500	-	-	49,500	40,095	9,405
12	Facility Needs Study	All Services	2026	100,000	-	10,000	90,000	45,000	-	45,000	36,450	8,550
13	Reserve Fund Adjustment		Reserve	255,682	-		255,682	-	-	255,682	207,102	48,580
	Total			**1,120,682**	**-**	**96,400**	**1,024,282**	**258,550**	**-**	**765,732**	**622,140**	**143,592**

Based on Table 1, the Town has identified approximately $1.1 million in growth-related studies (which includes the recovery of the existing reserve fund deficit of $255,682). The following deductions have been made:

- $23,500 to recognize the portion of the planning studies that benefit non-D.C. services;
- $72,900 to recognize the portion of the Integrated Waste Management Study that is not related to waste diversion; and
- $258,550 to recognize the benefit to the existing community.

Therefore, the net amount to be included in the D.C. for Growth Studies is $765,732.

The net capital costs for each study have been allocated on a residential and non-residential basis using the incremental growth in population to employment for the 10-year forecast period provided in the 2023 D.C. background study. With respect to the Integrated Waste Management Study, the net D.C. amount has been allocated 95% residential and 5% non-residential based on estimated tonnage information. These amounts are then divided by the 10-year growth forecast contained within the 2023 D.C. background study to calculate the residential and non-residential D.C. rates.

Table 2 provides for the D.C. calculations and Table 3 presents the amended schedule of D.C.s with the addition of Growth Studies.

Table 2
Growth Studies D.C. Calculations (2023$)

Service / Class of Service D.C. Calculations	Residential	Non-Residential
Growth Studies D.C. Eligible Costs	622,140	143,592
Population / Gross Floor Area (sq.ft.)	1,317	200,600
Cost per capita / Non-Residential Cost per sq.ft.	**$ 472.39**	**$ 0.72**

Residential Unit Type	Persons Per Unit	D.C. per Residential Unit
Single and Semi-Detached Dwelling	2.434	**$ 1,150**
Multiples	1.967	**$ 929**
Apartments - 2 Bedrooms +	1.607	**$ 759**
Apartments - Bachelor and 1 Bedroom	1.100	**$ 520**
Special Care/Special Dwelling Units	1.100	**$ 520**

Table 3
Amended Schedule of Development Charges (2023$)

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Multiples	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Special Care/Special Dwelling Units	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Class of Service:						
Services Related to a Highway	5,076	4,102	3,351	2,294	2,294	2.85
Public Works (Facilities and Fleet)	645	521	426	291	291	0.36
Fire Protection Services	219	177	145	99	99	0.12
Parks and Recreation Services	3,866	3,124	2,552	1,747	1,747	0.55
Library Services	550	444	363	249	249	0.08
Growth Studies	1,150	929	759	520	520	0.72
Total Municipal Wide Services/Class of Services	**11,506**	**9,297**	**7,596**	**5,200**	**5,200**	**4.68**
Urban Services						
Wastewater Services	6,468	5,227	4,270	2,923	2,923	2.28
Water Services	10,516	8,498	6,943	4,753	4,753	3.71
Total Urban Services	**16,984**	**13,725**	**11,213**	**7,676**	**7,676**	**5.99**
Staye Court Area Specific Charges						
Wastewater Services	607	491	401	274	274	0.75
Water Services	690	558	456	312	312	0.82
Total Staye Court	**1,297**	**1,049**	**857**	**586**	**586**	**1.57**
GRAND TOTAL URBAN AREA	**28,490**	**23,022**	**18,809**	**12,876**	**12,876**	**10.67**
GRAND TOTAL WITH STAYE COURT	**29,787**	**24,071**	**19,666**	**13,462**	**13,462**	**12.24**

By comparison to the 2023 calculated charges, the amended charge for a Town-wide single and semi-detached residential unit would increase by $1,150 (+4%) from $27,340 to $28,490. It is noted that these amounts will need to be inflated to 2024 dollars.

3.3 Amendments to the D.C. By-law

D.C. By-law 7369-24 will be amended as follows:

- Revise the definition of capital cost to include studies as per the D.C.A.;
- Repeal the mandatory phase-in section;
- Add growth studies as a class of service; and
- Revise Schedule A and B to include growth studies.

The draft amending by-law is included in Appendix A to this memo.

Appendix A
Draft Amending By-law

The Corporation of the Town of Arnprior
By-Law Number XXXX-24

Being a By-Law of the Town of Arnprior To Amend By-Law 7369-23

WHEREAS the Development Charges Act, 1997 c. 27 (hereinafter called "the Act") provides that the council of a municipality may by by-law impose development charges against land to pay for increased capital costs required because of increased need for services;

AND WHEREAS Section 19 of the Act provides for amendments to be made to Development Charges by-laws;

AND WHEREAS subsections 19 (1.2) and 19 (1.3) of the Act permits a municipality to amend a Development Charges by-law, subject to conditions being met, that do not require the process for by-law amendments under subsection 19 (1) of the Act to be followed.

NOW THEREFORE THE COUNCIL OF THE TOWN OF ARNPRIOR ENACTS AS FOLLOWS:

1. By-law 7369-23 is hereby amended as follows:

   A. The Capital Cost Definition is deleted, and the following definition is substituted, therefore:

      ""Capital cost" means costs incurred or proposed to be incurred by the municipality or a local board thereof directly or by others on behalf of and as authorized by the municipality or local board;

      (a) to acquire land or an interest in land, including a leasehold interest;

      (b) to improve land;

      (c) to acquire, lease, construct or improve buildings and structures;

      (d) to acquire, construct or improve facilities including:

      i. furniture and equipment other than computer equipment;

ii. materials acquired for circulation, reference or information purposes by a library board as defined in the Public Libraries Act; and

iii. rolling stock with an estimated useful life of seven years or more;

(e) to undertake studies in connection with any of the matters referred to in paragraphs (i) to (iv);

(f) costs of the development charge background study required under section 10; and

(g) interest on borrowing for those expenditures under clauses (i) to (iv) above that are growth-related."

B. Section 1.1 of the by-law is deleted and substituted with the following:

"The categories of services/class of services for which development charges are imposed under this By-law are as follows:

(a) Services Related to a Highway;

(b) Public Works;

(c) Fire Protection Services;

(e) Parks and Recreation Services;

(f) Library Services;

(g) Water Services;

(h) Wastewater Services; and

(i) Growth studies.

C. Repeal the Mandatory Phase-in Section 2.13.

D. Schedule "A" is deleted and replaced with Schedule "A" attached to this by-law.

E. Schedule “B” is deleted and replaced with Schedule “B” attached to this by-law.

2. This By-law shall come into force and effect at 12:01AM on XXXX XX, 2024.

3. Except as amended by this By-law, all provisions of By-law 7369-23, are and shall remain in full force and effect.

READ A FIRST AND SECOND TIME THIS XX DAY OF XXXXXX, 2024.

READ A THIRD TIME AND FINALLY PASSED THIS XX DAY OF XXXXXX, 2024.
THE CORPORATION OF THE TOWN OF ARNPRIOR

Lisa McGee, Mayor

_Kaila Zamojski, Town Clerk

SCHEDULE “A”
TO BY-LAW 7369-23
COMPONENTS OF SERVICES AND CLASSES OF SERVICES UNDER THIS BY-LAW

Town-Wide Services/Classes of Services

- Town-wide Services
  - Services Related to a Highway (Roads, Sidewalks, Traffic Signals and Streetlights)
  - Public Works Facilities and Vehicles
  - Fire Protection Services (Fire Facilities, Vehicles, and Equipment)
  - Parks and Recreation Services (Parkland Development, Amenities, Trails, Vehicles, and Recreation Facilities).
  - Library (Facilities and Collection Materials)
  - Growth Studies
- Urban Services
  - Water Services (Supply, Treatment, Storage)
  - Wastewater Services (Treatment, Collection, Distribution and Pumping)

SCHEDULE "B"
TO BY-LAW 7369-23
SCHEDULE OF DEVELOPMENT CHARGES

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Multiples	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Special Care/Special Dwelling Units	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Class of Service:						
Services Related to a Highway	5,076	4,102	3,351	2,294	2,294	2.85
Public Works (Facilities and Fleet)	645	521	426	291	291	0.36
Fire Protection Services	219	177	145	99	99	0.12
Parks and Recreation Services	3,866	3,124	2,552	1,747	1,747	0.55
Library Services	550	444	363	249	249	0.08
Growth Studies	1,150	929	759	520	520	0.72
Total Municipal Wide Services/Class of Services	**11,506**	**9,297**	**7,596**	**5,200**	**5,200**	**4.68**
Urban Services						
Wastewater Services	6,468	5,227	4,270	2,923	2,923	2.28
Water Services	10,516	8,498	6,943	4,753	4,753	3.71
Total Urban Services	**16,984**	**13,725**	**11,213**	**7,676**	**7,676**	**5.99**
Staye Court Area Specific Charges						
Wastewater Services	607	491	401	274	274	0.75
Water Services	690	558	456	312	312	0.82
Total Staye Court	**1,297**	**1,049**	**857**	**586**	**586**	**1.57**
GRAND TOTAL URBAN AREA	**28,490**	**23,022**	**18,809**	**12,876**	**12,876**	**10.67**
GRAND TOTAL WITH STAYE COURT	**29,787**	**24,071**	**19,666**	**13,462**	**13,462**	**12.24**

Town of Arnprior Staff Report

Subject: 2025 Calendar of Meetings
Report Number: 24-11-25-06
Report Author and Position Title: Oliver Jacob, Deputy Clerk
Department: Client Services
Meeting Date: November 25th, 2024

Recommendations:

That Council approve the attached 2025 Calendar of Meetings.

Background:

Council Meeting dates are defined in advance to provide notice to the public of when their elected representatives will be making decisions on their behalf, demonstrating the municipality's commitment to conducting its business in an open and transparent manner.

As outlined in the Procedure By-Law, Regular Meetings of Council are generally held on the second and fourth Mondays of each month at 6:30 PM, with the exception of July, August, and December when meetings are held once per month. If the regularly scheduled date falls on a holiday, the meeting automatically takes place on the next business day at the same time (6:30 PM). Advisory Committee Meetings are scheduled as per the Advisory Committee Terms of Reference By-Law No. 7453-24.

All Council and Advisory Committee meetings are open to the public except for matters considered in closed session in accordance with Section 239 of the *Municipal Act, 2001, S.O. 2001, c. P. 25* as amended.

Discussion:

Each year, in accordance with the Town`s Procedure By-law, the Clerk's Office provides Council with a report setting out the proposed calendar of meetings for the upcoming year as well as any proposed exceptions to the regularly scheduled Council and Advisory Committee Meetings that staff are recommending.

The proposed 2025 Calendar of Council Meetings allows the municipality to conduct its business in an open and transparent manner, while ensuring that there is an appropriate level of public notice for meetings. The proposed Calendar of Council Meetings includes the meeting dates for all Regular and planned Special Meetings of Council known at the time of publication. This proposed calendar has been drafted pursuant to the Town's Procedure By-law. Special Meetings for budget consultations and deliberations have also been outlined for reference (highlighted in dark green).

Advisory Committee Meetings

As amended by Council, By-Law No. 7453-24 (Advisory Committee Terms of Reference) established the mandate, frequency and procedures for all Advisory Committees. It outlined that all Advisory Committees would meet monthly between March and November of each year (except July and August). Where meetings would normally occur on a statutory or observed holiday, the meeting would shift to the next business day.

It is recommended that the Advisory Committees continue to follow the general meeting schedule that was implemented for 2024 as outlined in the table below.

Table 1: Advisory Committee Schedule

Advisory Committee	Meeting Date and Time
Accessibility and Age Friendly Advisory Committee	First Wednesday of each month
Culture and Diversity Advisory Committee	First Monday of each month
Environmental Advisory Committee	Third Monday of each month

Note: The Committee of Adjustment and Property Standards Committee meets as needed and at the call of the Chair.

Proposed Exception(s)

The proposed 2025 Calendar of Meetings does not propose any exceptions as municipal conferences do not conflict with the regularly scheduled meeting dates as outlined.

For reference, below is a listing of the municipal conference dates for 2025:

- Rural Ontario Municipal Association (ROMA) – January 19th to 21st, 2025
- Ontario Small Urban Municipalities (OSUM) – April 30th to May 2nd, 2025
- Federation of Canadian Municipalities (FCM) – May 29th to June 1st, 2025
- Association of Municipalities of Ontario (AMO) – August 17th to 20th, 2025
- Ontario East Municipal Conference (OEMC) – September 17th to 19th, 2025

Upon approval by Council, the 2025 Meeting Calendar will be posted on the municipal website. Extenuating circumstances may cause meeting dates, times and/or locations to change; however, the website events calendar is kept up to date and linked into the Arnprior App. In addition to the events calendar, agendas for Council and Committee meetings are posted on the website prior to the meeting date, as well as sent to the local media for their information.

Options:

Council could consider adopting an alternative schedule for Council and Advisory Committee Meetings.

Policy Considerations:

As outlined herein, Council has adopted Procedure By-law No. 7364-23 to govern the proceedings of Council and its advisory committees as well as the Advisory Committee Terms of Reference By-Law No. 7453-24.

Financial Considerations:

None

Meeting Dates:

None

Consultation:

- Robin Paquette, CAO
- Jennifer Morawiec, General Manager, Client Services / Treasurer
- Kaila Zamojski, Town Clerk

Documents:

1. Document 1 – 2025 Dates and Times of Council & Committee Meetings

2. Document 2 – 2025 Calendar of Meetings

Signatures

Reviewed by Department Head: Jennifer Morawiec

Reviewed by General Manager, Client Services/Treasurer: Jennifer Morawiec

CAO Concurrence: Jennifer Morawiec (for CAO)

Workflow Certified by Town Clerk: Kaila Zamojski

Document 1 - 2025 Dates and Times of Council & Committee Meetings

Date	Time	Meeting
Monday, January 13, 2025	6:30 PM	Council
Monday, January 27, 2025	6:30 PM	Council
Monday, February 3, 2025	5:00 PM	Special Council – Budget Deliberations
Tuesday, February 4, 2025	5:00 PM	Special Council – Budget Deliberations (if needed)
Monday, February 10, 2025	6:30 PM	Council
Monday, February 24, 2025	6:30 PM	Council
Monday, March 3, 2025	6:30 PM	Culture and Diversity Advisory Committee
Wednesday, March 5, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, March 10, 2025	6:30 PM	Council
Monday, March 17, 2025	6:30 PM	Environmental Advisory Committee
Monday, March 24, 2025	6:30 PM	Council
Wednesday, April 2, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, April 7, 2025	6:30 PM	Culture and Diversity Advisory Committee
Monday, April 14, 2025	6:30 PM	Council
Tuesday, April 22, 2025	6:30 PM	Environmental Advisory Committee
Monday, April 28, 2025	6:30 PM	Council
Monday, May 5, 2025	6:30 PM	Culture and Diversity Advisory Committee
Wednesday, May 7, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, May 12, 2025	6:30 PM	Council
Tuesday, May 20, 2025	6:30 PM	Environmental Advisory Committee
Monday, May 26, 2025	6:30 PM	Council
Monday, June 2, 2025	6:30 PM	Culture and Diversity Advisory Committee

Date	Time	Meeting
Wednesday, June 4, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, June 9, 2025	6:30 PM	Council
Monday, June 16, 2025	6:30 PM	Environmental Advisory Committee
Monday, June 23, 2025	6:30 PM	Council
Monday, July 14, 2025	6:30 PM	Council
Monday, August 25, 2025	6:30 PM	Council
Tuesday, September 2, 2025	6:30 PM	Culture and Diversity Advisory Committee
Wednesday, September 3, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, September 8, 2025	6:30 PM	Council
Monday, September 15, 2025	6:30 PM	Environmental Advisory Committee
Monday, September 22, 2025	6:30 PM	Council
Wednesday, October 1, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, October 6, 2025	6:30 PM	Culture and Diversity Advisory Committee
Tuesday, October 14, 2025	6:30 PM	Council
Monday, October 20, 2025	6:30 PM	Environmental Advisory Committee
Monday, October 27, 2025	6:30 PM	Council
Monday, November 3, 2025	6:30 PM	Culture and Diversity Advisory Committee
Wednesday, November 5, 2025	6:30 PM	Accessibility and Age Friendly Advisory Committee
Monday, November 10, 2025	6:30 PM	Council
Monday, November 17, 2025	6:30 PM	Environmental Advisory Committee
Monday, November 24, 2025	6:30 PM	Council
Wednesday, December 3, 2025	6:00 PM	Special Council – Budget Consultations
Monday, December 8, 2025	6:30 PM	Council

2025 Calendar of Meetings

January

S	M	T	W	T	F	S
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27	28	29	30			

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August

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September

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October

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November

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December

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28	29	30	31			

Legend

- Regular Council Meeting
- Special Meeting (Budget)
- Accessibility and Age Friendly Advisory Committee
- Culture and Diversity Advisory Committee
- Environmental Advisory Committee
- ~~Holidays~~

Disclosure Information:

The Town of Arnprior conducts its business in an open and transparent manner; and therefore, all written submissions, documents, correspondence, e-mails or other communications (including your name and address) may be duplicated and distributed in an agenda package which may be disclosed or made available to the general public. Accordingly, when providing such information; you shall be deemed to have consented to its use and disclosure unless such written submissions, documents, correspondence, e-mails or other communications is/are clearly identified to be a confidential matter.

Council Meetings are open to the public except for matters considered in closed session in accordance with Section 239 of the Municipal Act, 2001. Meetings are generally held at 6:30 PM in Council Chambers and meetings are livestreamed to the Town's YouTube page at www.arnprior.ca/youtube. You can also find the meeting materials on the Town's website at www.arnprior.ca/meetings.

ARNPRIOR

Minutes of the Accessibility and Age Friendly Advisory Committee Meeting
October 2nd, 2024
6:30 PM
Town Hall

Committee and Staff Attendance

Committee Members Present:

Tina MacLaren, Chair
Lynn Cloutier, Vice Chair
Tom Burnette, Councillor
Amanda Deschamps, Committee Member
Sarah Tait, Committee Member

Committee Members Absent:
Dave Furgoch, Committee Member
Amanda Harris, Committee Member

Town Staff Present:

Graeme Ivory, Director of Recreation
Kaitlyn Wendland, Client Services Coordinator
Kelley Jaros, Marketing and Economic Development Officer
Oliver Jacob, Deputy Clerk

1. **Call to Order**

   Tina MacLaren, Chair, called the meeting to order at 6:30 PM and welcomed those present.

2. **Roll Call**

   The roll was called, with all Members of the Committee being present except Amanda Harris and Dave Furgoch.

3. **Land Acknowledgment**

   Tina MacLaren asked everyone to take a moment to acknowledge and show respect for the Indigenous Peoples as traditional stewards of the land we operate on, by stating:

   > “I would like to begin by acknowledging that the land on which we work, and gather is the traditional unceded territory of the Anishinaabe People. This Algonquin Nation have lived on this land for thousands of years, long before the arrival of the European settlers, and we are grateful to have the opportunity to be present in this territory.”

4. **Adoption of Agenda**
   Resolution Number 017-24
   Moved by Sarah Tait
   Seconded by Tom Burnette

   Be It Resolved That the agenda for the Accessibility and Age Friendly Advisory Committee Meeting dated October 2nd, 2024 be adopted.

   Resolution Carried

5. **Disclosure of Pecuniary Interest**
   None

6. **Adoption of Minutes of Previous Meeting(s)**
   Resolution Number 018-24
   Moved by Sarah Tait
   Seconded by Amanda Deschamps

   Be It Resolved That the minutes for the September 4th, 2024 Accessibility and Age Friendly Advisory Committee meeting be adopted.

   Resolution Carried

7. **Presentations/ Delegations**
   None

8. **Matters Tabled/ Deferred/ Unfinished Business**
   None

9. **Staff Reports**
   a) **Summary of Accessibility Tours of Town Facilities, Kaitlyn Wendland, Client Services Coordinator**

   Resolution Number 019-24
   Moved by Lynn Cloutier
   Seconded by Sarah Tait

   That the Accessibility and Age Friendly Advisory Committee receive report number 24-10-02-01 as information.

   Resolution Carried

   b) **Community Sport and Recreation Infrastructure Fund, Graeme Ivory, Director of Recreation**

   Resolution Number 020-24
   Moved by Sarah Tait
   Seconded by Lynn Cloutier

Whereas the Province of Ontario has introduced the Community Sport and Recreation Infrastructure Fund providing $200 million in capital funding delivered by the Ministry of Sport to revitalize existing community sport and recreation infrastructure and support new facilities across the province; and

Whereas the Community Sport and Recreation Infrastructure Fund Stream 1 is directed for project funding between $150,000 and $1 million to support projects that will result in the repair and rehabilitation of community sport and recreation facilities/spaces; and

Whereas Council authorized the Nick Smith Centre Revitalization project to be completed in 2025; and

Whereas this project will provide accessibility enhancements to the ice surface, benches, spectators stands and viewing areas; and

Whereas this project will provide accessible meeting rooms and program space; and

Whereas this project will provide elevator access to all second level meeting and public spaces; and

Whereas the Arnprior Accessibility and Age Friendly Advisory Committee provides Council with sound advice and recommendations to Council related to the accessibility of Town programs, services, and facilities for all users; and

Whereas the Arnprior Accessibility and Age Friendly Advisory Committee also serves to promote and facilitate a barrier-free and age friendly community by assisting in the removal and prevention of barriers faced by persons with disabilities and the creation of programs and services that can be enjoyed by residents and visitors of all ages and abilities; and

Therefore Be It Resolved That the Arnprior Accessibility and Age Friendly Advisory Committee supports the Town of Arnprior's application to the Community Sport and Recreation Infrastructure Fund under the Repair and Rehabilitation Stream for the Nick Smith Centre Revitalization project.

Resolution Carried

10. New Business

a) Accessible Businesses, Amanda Deschamps

Amanda Deschamps, Committee Member, presented on accessible business opportunities with the following being a summary of the discussion:

- Committee Members indicated an interest in having resources on the Town's website to promote businesses that are accessible.

- Committee Members indicated that there is a need for further public education regarding the certifications available to businesses, to indicate that they are accessible and support the accessibility needs of their customers.
- Staff indicated they would come back to the committee with an update on how this information can be integrated into the Town's website.

b) Roundtable Discussion

No discussion items.

11. Adjournment

Resolution Number 021-24
Moved by Lynn Cloutier
Seconded by Sarah Tait

That the Accessibility and Age Friendly Advisory Committee adjourn at 7:06 PM.

Resolution Carried

ARNPRIOR

Minutes of the Culture and Diversity Advisory Committee Meeting
October 7th, 2024 at 6:30 PM
Council Chambers – Town Hall

Committee and Staff Attendance

Committee Members Present:
Michael Bradley, Chair
Chris Couper, Vice Chair
Leslie Ann Hook, Committee Member
Jennifer McGuire, Committee Member
Gaganpal Singh Bhasin, Committee Member

Committee Members Absent:
Dan Lynch, County Councillor
Jo Ann Pecaskie, Committee Member

Town Staff Present:
Emily Stovel, Manager of Culture / Curator
Oliver Jacob, Deputy Clerk

1. Call to Order

Michael Bradley, Chair, called the meeting to order at 6:30 PM and welcomed those present.

2. Roll Call

The roll was called, with all Members of the Committee being present except Dan Lynch and Jo Ann Pecaskie.

3. Land Acknowledgment

Chair Michael Bradley asked everyone to take a moment to acknowledge and show respect for the Indigenous Peoples as traditional stewards of the land we operate on, by stating:

> "I would like to begin by acknowledging that the land on which we work and gather is the traditional unceded territory of the Anishinaabe People. This Algonquin Nation have lived on this land for thousands of years, long before the arrival of the European settlers, and we are grateful to have the opportunity to be present in this territory."

4. Adoption of Agenda

Resolution Number 016-24
Moved by Leslie Ann Hook
Seconded by Jennifer McGuire

Be It Resolved That the agenda for the Culture and Diversity Advisory Committee Meeting dated Monday, October 7th, 2024 be adopted.

Resolution Carried

5. **Disclosure of Pecuniary Interest**
   None

6. **Adoption of Minutes of Previous Meeting(s)**
   Resolution Number 017-24
   Moved by Chris Couper
   Seconded by Leslie Ann Hook

   Be It Resolved That the minutes for the May 6th, 2024 and September 3rd, 2024 Culture and Diversity Advisory Committee meetings be adopted.

   Resolution Carried

7. **Presentations/ Delegations**

   a) **September Curator's Report**
   Emily Stovel, Manager of Culture / Curator, provided a PowerPoint Presentation on the activities of the Arnprior and District Museum during the month of September 2024 and responded to questions.

   Discussion ensued amongst Committee Members with the following being a summary of the comments noted:

   - Estimated attendance figures for the 2024 Cultural Night Market were in the range of 1,000 to 1,200 attendees, similar to last year.

   b) **October Curator's Report**
   Emily Stovel, Manager of Culture / Curator, provided a PowerPoint Presentation on the activities of the Arnprior and District Museum during the month of October 2024 and responded to questions.

   Discussion ensued amongst Committee Members with the following being a summary of the comments noted:

   - The Museum welcomes cooperative education students to join their team during the school year. Students are introduced to all parts of the Museum organization in their first few weeks and the Manager of Culture / Curator then works with each student to identify their passions and determine an appropriate project for the remainder of their placement. This has been effective with the current coop student who is exploring the possibility of a cricket exhibit suggested by a CDAC member.
   - Concern was shared with regard to challenges with hiring a permanent Outreach Coordinator and that in the interim the Town elected to hire a fixed-term employee in the role during the summer months.
   - It was shared that the Manager of Culture / Curator is currently working to finalize the 2025 programming line-up at the Arnprior and District Museum and

more information will be brought forward to the next meeting for the committee’s information.

- It was shared that a collaborative alliance of cultural groups may be helpful to further coordinate and work together; however, it was noted that there is a lack of capacity within the sector to action this type of endeavour.
- The committee discussed their goals and objectives as listed in the Advisory Committee Terms of Reference document and shared that they would like to discuss priorities at their next meeting.
- Given her professional work with Urban Runaway, Leslie Anne Hook shared that she would be willing to provide information on their community services work across the region as a delegation at a future meeting.
- The Manager of Culture / Curator shared that the Culture Plan is an evolving document and that her desire is to begin the initial data collection work and start to develop initial recommendations. The Culture Plan will take years to refine; however, she agreed to bring back more information on the planning process at the next committee meeting.
- The Manager of Culture / Curator shared that the Peace Initiative has been working together as a small group with a focus on peace activism in our community. They have held some public meetings over the past few months and they are currently working with the Manager of Culture / Curator to develop a plan for 2025.

8. Matters Tabled / Deferred / Unfinished Business

None

9. Staff Reports

None

10. New Business

a) Roundtable Discussion

Michael Bradley, Chair, shared that this item is an opportunity to share any questions, comments, thoughts and perspectives, with the following being a summary of the discussion topics that took place:

- The Manager of Culture / Curator asked committee members to consider the personalization of land acknowledgements and how folks should approach delivering such acknowledgements.
- It was shared that the feeling of support and connection within the community is a key aspect to attracting and retaining New Canadians and cultural programs / activities can assist in allowing them to feel more at ease.

Infrastructure investments in cultural amenities (i.e. cricket pitches) would be a potential improvement to be considered in future.

- Regarding a question about Remembrance Day activities, the Manager of Culture / Curator shared that the Museum will be hosting a film screening of the Fruit Machine, a 2018 Canadian documentary film focusing on the use of psychological testing to attempt to identify 2SLGBTQ+ employees in the Canadian civil service during the 1950s and 1960s. The film screening will take place on November 9th, 2024 between 2:00 PM and 4:00 PM at the Arnprior and District Museum. In addition, the Collections Coordinator is working on a Remembrance Day pop-up exhibit to complement and staff are collaborating with an ADHS Grade 10 class on a new exhibit on military service.
- Following a discussion on the types of proclamations that are approved by the Town, the committee discussed implementing a cultural lens to help the Town consider using all available communication styles and media to reach as many people as possible.
- There was a conversation about volunteer opportunities and how to find such opportunities for those who are new to the community. It was shared that there may be opportunities to work with the Arnprior Public Library and other community services sector entities to improve the volunteer fair and implement a volunteer portal.

b) Community Belongings Workshop

Emily Stovel, Manager of Culture / Curator, led the committee through a short workshop to better understand the role that community belongings play in the Arnprior and District Museum.

c) 2024 Cultural Night Market Debrief and Next Steps

Emily Stovel, Manager of Culture / Curator, and Oliver Jacob, Deputy Clerk, provided an overview of the 2024 Cultural Night Market and encouraged committee members to share their feedback.

Discussion ensued amongst Committee Members with the following being a summary of the comments noted:

- Committee members expressed positive feedback on the event and reported that parking was sufficient and there was no unruly behaviour. It was good to see the variety of vendors and diversity across the event.
- It will be important for committee members to consider the value proposition for the Cultural Night Market event and discuss what they would like to see next year.

- Additional consideration for volunteers and the requirements to have Criminal Record Checks / Vulnerable Sector Checks will be helpful in the 2025 planning process to support increased volunteer participation.
- For food vendors, they seemed to prioritize providing full meals to attendees and there was some feedback around working with food vendors and local businesses to provide samples (smaller portions) to allow attendees to try more items.
- Discussions ensued regarding possible development of a transparent policy through which decisions are made for vendor, performer and contractor (i.e. artist, photographer, videographer, Master of Ceremonies) applications.

d) Information Items

The committee received the information items listed on the Committee Agenda as information.

1. FCM Guide for Municipalities on UNDRIP
2. Data Analysis Practice

Committee members requested that the reading list on cultural planning that was discussed at a previous meeting be shared with the committee before the next meeting.

11. Adjournment

Resolution Number 018-24
Moved by Chris Couper
Seconded by Leslie Ann Hook

That the Culture and Diversity Advisory Committee adjourn at 8:49 PM.

Resolution Carried

ARNPRIOR

Minutes of the Environmental Advisory Committee Meeting
October 21st, 2024
6:30 PM
Council Chambers – Town Hall

Committee and Staff Attendance

Committee Members Present:

Natalie Deveau, Chair
Chris Toner, Vice Chair
Billy Denault, Councillor
Barry Goodman, Committee Member
Alexis Young, Committee Member

Committee Members Absent:

Ben Shearer, Committee Member
Ted Strike, Committee Member

Town Staff Present:

Graeme Ivory, Director of Recreation
Jessica Schultz, A/Environmental Engineering Officer
John Steckly, GM, Operations
Kaitlyn Wendland, Client Services Coordinator
Kaila Zamojski, Town Clerk

1. **Call to Order**

   Natalie Deveau, Chair, called the meeting to order at 6:30 PM and welcomed those present.

2. **Roll Call**

   The roll was called, with all Members of the Committee being present except Committee Members Ben Shearer and Ted Strike.

3. **Land Acknowledgment**

   Natalie Deveau, Chair, asked everyone to take a moment to acknowledge and show respect for the Indigenous Peoples as traditional stewards of the land we operate on, by stating:

   > "I would like to begin by acknowledging that the land on which we work and gather is the traditional unceded territory of the Anishinaabe People. This Algonquin Nation have lived on this land for thousands of years, long before the arrival of the European settlers, and we are grateful to have the opportunity to be present in this territory."

4. **Adoption of Agenda**
Resolution Number 020-24
Moved by Barry Goodman
Seconded by Chris Toner

Be It Resolved That the agenda for the Environmental Advisory Committee Meeting dated Monday, October 21st, 2024 be adopted.

Resolution Carried

5. **Disclosure of Pecuniary Interest**
None

6. **Adoption of Minutes of Previous Meeting(s)**
Resolution Number 021-24
Moved by Billy Denault
Seconded by Alexis Young

Be It Resolved That the minutes for the September 16th, 2024 Environmental Advisory Committee meeting be adopted.

Resolution Carried

7. **Presentations/ Delegations**
   a) **Butterfly Way**

Kim Berry and Sheena Baum from Butterfly Way provided a presentation to the Committee, as included in the agenda package, regarding biodiversity and pollinators. The following is a summary of the discussion that ensued:

- There are many opportunities for increasing biodiversity in Arnprior, including on municipal property.
- Explore ways to engage individuals and local businesses in transitioning to using more native and pollinators plants in their gardens.
- Community engagement in events, such as an invasive species clean-up, could also help educate residents on these issues.

   b) **Greening Arnprior – EAC Survey Results**

Kaitlyn Wendland, Client Services Coordinator, presented the results of the Greening Arnprior Environmental Advisory Committee Priorities Survey, as included in the Agenda Package. The following is a summary of the discussion that ensued:

- Native species and invasive species seem to have high interest from residents as a priority.

- Next meeting the Committee will create a workplan using the survey results to guide priorities for the Committee Members moving forward.

8. Matters Tabled/ Deferred/ Unfinished Business

a) Review Action Items Summary Table

Natalie Deveau, Chair, asked that the Committee proceed through each item as listed on the Action Items Summary Table. Discussion ensued amongst Committee Members with the following being a summary of the updates received:

Item	Comment / Update
1	Completed.
2	Natalie Deveau, Chair, and Alexis Young, Committee Member, will present this at the next meeting.
3	Completed.
8	Barry Goodman, Committee Member, contacted the Ottawa River Keepers.
9	Staff continue to look for opportunities. Completed.
10	Assigned to Billy Denault, Councillor, and Alexis Young, Committee Member.
11	Kaila Zamojski, Town Clerk, and Kaitlyn Wendland, Client Services Coordinator, to bring forward information at future meeting.
12	Completed.
14	This plan will be presented at a future meeting.
15	This will be discussed at a future meeting.
16	Completed.
17	Barry Goodman, Committee Member, has reached out to Terracycle about this.
18	Completed later in meeting.

Item	Comment / Update
20	Completed

9. Staff Reports

None

10. New Business

a) Marina Invasive Species Signage

Barry Goodman, Committee Member, presented information surrounding signage at the Arnprior Marina, regarding invasive species and the opportunities for increased educational awareness on boating and invasive species control.

b) Richmond Hill Blooms/Garden Awards

Barry Goodman, Committee Member, presented information about the City of Richmond Hill's Garden Awards program. He highlighted some of the successes from this program and asked it to be considered that a similar program be created in the Town of Arnprior.

c) Waste Reduction Week Update

Kaitlyn Wendland, Client Services Coordinator, provided an update to the committee that the Waste Reduction Week Halloween Upcycle Challenge had been launched to the public.

d) Roundtable Discussion

No items.

11. Adjournment

Resolution Number 022-24
Moved by Billy Denault
Seconded by Alexis Young

That the Environmental Advisory Committee adjourn at 8:11 PM.

Resolution Carried

The Corporation of the
Town of Arnprior

By-law Number 7537-24

A by-law to amend By-law Number 6875-18 of the Corporation of the Town of Arnprior, as amended.

Pursuant to Section 34 of the Planning Act, 1990, the Council of the Town of Arnprior enacts as follow:

1. That By-law number 6875-18, as amended, is hereby further amended as follows:

   a. Schedule "A" is amended by zoning those lands being Concession 12 part of Lot 2, Parts 7 and 8 on registered Plan 49R-6886; and part of Part 1 on registered Plan 49R-2437, Town of Arnprior, known as 107 Baskin Drive East from "Airport Development Zone (A-D)" to "Employment Zone Holding Symbol 4 (EMPL(H4))" as shown on the attached Schedule "A".

2. **That** this By-law shall come into full force and effect on the day of its passing**.**

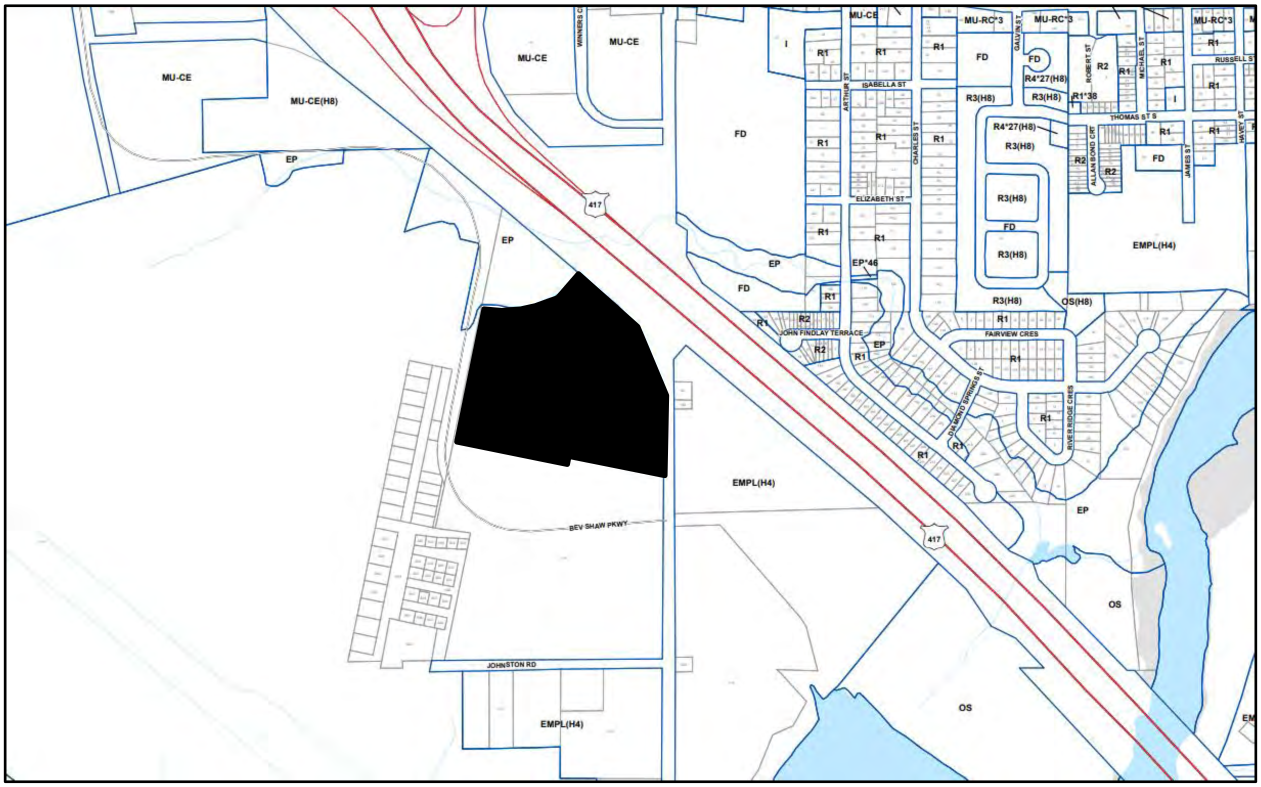
Enacted and **passed** this 25th day of November 2024.

Lisa McGee, Mayor

Kaila Zamojski, Town Clerk

SCHEDULE “A”

From A-D to EMPL(H4)



Schedule “A” to By-law Number 7537-24

Enacted and **Passed** this 25th day of November 2024.

Lisa McGee, Mayor

Kaila Zamojski, Town Clerk

The Corporation of the Town of Arnprior

By-Law Number 7538-24

Being a By-Law of the Town of Arnprior to Amend By-Law 7369-23 regarding Development Charges.

Whereas the Development Charges Act, 1997 c. 27 (hereinafter called "the Act") provides that the council of a municipality may by by-law impose development charges against land to pay for increased capital costs required because of increased need for services; and

Whereas Section 19 of the Act provides for amendments to be made to Development Charges by-laws; and

Whereas subsections 19 (1.2) and 19 (1.3) of the Act permits a municipality to amend a Development Charges by-law, subject to conditions being met, that do not require the process for by-law amendments under subsection 19 (1) of the Act to be followed.

Therefore the Council of the Town of Arnprior enacts as follows:

1. **That** By-law 7369-23 is hereby amended as follows:

   A. The Capital Cost Definition is deleted, and the following definition is substituted, therefore:

      “Capital cost” means costs incurred or proposed to be incurred by the municipality or a local board thereof directly or by others on behalf of and as authorized by the municipality or local board;

      (a) to acquire land or an interest in land, including a leasehold interest;
      (b) to improve land;
      (c) to acquire, lease, construct or improve buildings and structures;
      (d) to acquire, construct or improve facilities including:
         i. furniture and equipment other than computer equipment;
         ii. materials acquired for circulation, reference or information purposes by a library board as defined in the Public Libraries Act; and
         iii. rolling stock with an estimated useful life of seven years or more;
      (e) to undertake studies in connection with any of the matters referred to in paragraphs (i) to (iv);
      (f) costs of the development charge background study required under section 10; and
      (g) interest on borrowing for those expenditures under clauses (i) to (iv) above that are growth-related.”

B. Section 1.1 of the by-law is deleted and substituted with the following:

"The categories of services/class of services for which development charges are imposed under this By-law are as follows:

(a) Services Related to a Highway;
(b) Public Works;
(c) Fire Protection Services;
(e) Parks and Recreation Services;
(f) Library Services;
(g) Water Services;
(h) Wastewater Services; and
(i) Growth studies.

C. Repeal the Mandatory Phase-in Section 2.13.

D. Schedule "A" is deleted and replaced with Schedule "A" attached to this by-law.

E. Schedule "B" is deleted and replaced with Schedule "B" attached to this by-law.

2. **Further That** this By-law shall come into force on the day it is enacts.

3. **Further That** except as amended by this By-law, all provisions of By-law 7369-23, as amended, are and shall remain in full force and effect.

Enacted and Passed this 25th day of November, 2024.

Lisa McGee, Mayor

Kaila Zamojski, Town Clerk

SCHEDULE "A"
TO BY-LAW 7369-23
COMPONENTS OF SERVICES AND CLASSES OF SERVICES UNDER THIS BY-LAW

Town-Wide Services/Classes of Services

- Town-wide Services
  - Services Related to a Highway (Roads, Sidewalks, Traffic Signals and Streetlights)
  - Public Works Facilities and Vehicles
  - Fire Protection Services (Fire Facilities, Vehicles, and Equipment)
  - Parks and Recreation Services (Parkland Development, Amenities, Trails, Vehicles, and Recreation Facilities).
  - Library (Facilities and Collection Materials)
  - Growth Studies
- Urban Services
  - Water Services (Supply, Treatment, Storage)
  - Wastewater Services (Treatment, Collection, Distribution and Pumping)

SCHEDULE "B"
TO BY-LAW 7369-23
SCHEDULE OF DEVELOPMENT CHARGES

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Multiples	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Special Care/Special Dwelling Units	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Class of Service:						
Services Related to a Highway	5,076	4,102	3,351	2,294	2,294	2.85
Public Works (Facilities and Fleet)	645	521	426	291	291	0.36
Fire Protection Services	219	177	145	99	99	0.12
Parks and Recreation Services	3,866	3,124	2,552	1,747	1,747	0.55
Library Services	550	444	363	249	249	0.08
Growth Studies	1,150	929	759	520	520	0.72
Total Municipal Wide Services/Class of Services	**11,506**	**9,297**	**7,596**	**5,200**	**5,200**	**4.68**
Urban Services						
Wastewater Services	6,468	5,227	4,270	2,923	2,923	2.28
Water Services	10,516	8,498	6,943	4,753	4,753	3.71
Total Urban Services	**16,984**	**13,725**	**11,213**	**7,676**	**7,676**	**5.99**
Staye Court Area Specific Charges						
Wastewater Services	607	491	401	274	274	0.75
Water Services	690	558	456	312	312	0.82
Total Staye Court	**1,297**	**1,049**	**857**	**586**	**586**	**1.57**
GRAND TOTAL URBAN AREA	**28,490**	**23,022**	**18,809**	**12,876**	**12,876**	**10.67**
GRAND TOTAL WITH STAYE COURT	**29,787**	**24,071**	**19,666**	**13,462**	**13,462**	**12.24**

The Corporation of the
Town of Arnprior

By-law Number 7539-24

A by-law to amend By-Law No. 7463-24, being a by-law to impose user fees or charges for services, activities or items for purchase.

Whereas in accordance with Section 11 (1) of the *Municipal Act 2001*, S.O. 2001, c. 25, a lower-tier municipality may provide any service or thing that the municipality considers necessary or desirable for the public; and

Whereas the Council of the Corporation of the Town of Arnprior, has pursuant to Section 391 of the *Municipal Act 2001*, S.O. 2001, c. 25 the authority to pass by-laws imposing fees or charges; and

Whereas the Council of the Town of Arnprior adopted the 2024 User Fees and Charges By-Law at the February 12th, 2024 Regular Meeting of Council;

Whereas the Council of the Town of Arnprior deems it expedient to amend the User Fees and Charges By-law for the municipality to provide for new advertising and sponsorship opportunities at the Nick Smith Centre;

Therefore the Council of the Town of Arnprior enacts as follows:

1. **That** Schedule “E” of the User Fees and Charges By-law No. 7463-24 be amended to reflect the fee structure contained in Schedule “E” related to Planning and Economic Development (Nick Smith Centre Advertising) fees hereto forming part of this by-law.

2. **That** any By-laws and/or resolutions or parts of by-laws and/or resolutions that are inconsistent with the provisions of this By-law and the same are hereby repealed or rescinded insofar as it is necessary to give effect to the provisions of this By-law.

3. **That** this By-law shall come into force and effect on the day of its passing**.**

Enacted and **passed** this 25th day of November, 2024.

Lisa McGee, Mayor

Kaila Zamojski, Town Clerk

Schedule E – Planning and Economic Development	
Description	**Fees**
Planning Services Fees	
Consent per new lot created, boundary adjustment or easement requested (not including retained parcel)	$1,500.00
Minor Variance	$1,500.00
Recirculation for Consent or Minor Variance	$500.00
Deferral Fee for Consent or Minor Variance	$300.00
Validation of Title / Certificate of Cancellation	$500.00
If Peer Review of any study is required – Peer Review Costs ($5,000 deposit required)	Actual Costs
Zoning Amendment	$2,000.00
Zoning Lifting of Holding	$1,500.00
OP Amendment	$2,000.00
Site Plan Applications (Fees plus Legal and Engineering Costs) ($5,000 Deposit Required)	$2,000.00
Site Plan Agreement Amendment	$550.00
Subdivision Agreement (Fees plus Legal and Engineering Costs) ($10,000 Deposit Required)	$3,000.00
Subdivision Agreement Amendment	$1,100.00
Review of Red Line changes to Draft Plan	$800.00
Release of Site Plan Agreement Fee	$300.00

Schedule E – Planning and Economic Development	
Description	**Fees**
Development Agreement	$1,100.00
Compliance Reports	$125.00
Deeming by-law	$325.00
Part Lot control (per by-law) or amendment to Part Lot Control By-law for extension	$600.00
Lifting of 0.3 m reserve – per block	$400.00
By-law Requests (Encroachment By-law, Sign By-law Exemption, etc.)	$325.00
Vehicle agency letters	$100.00
Cash-in-lieu of Parking Agreement	$325.00
Cash-in-lieu of Parking – per parking space	$1,600.00
Condominium Approval (Fees plus Legal and Engineering Costs) ($10,000 Deposit Required)	$3,000.00
Condominium - Exemption	$1,500.00
Draft Plan Approval Extension (Required Annually)	$800.00
Purchase and Sale Process Fee for Purchase of Town-Owned Lands	$325.00
Marketing and Economic Development Fees – Advertisements	
Business Card (Size (WxH): 3.5 inch x 2 inch)	$100.00
¼ Page (Size (WxH): 3.75 inch x 5 inch)	$200.00
½ Page (Size (WxH): 7.5 inch x 5 inch)	$400.00

Schedule E – Planning and Economic Development	
Description	**Fees**
Full Page (Size (WxH): 7.5 inch x 10 inch)	$600.00
Cover Half Page (Colour) (Size (WxH): 7.5 inch x 5 inch)	$500.00
Cover Full Page (Colour) (Size (WxH): 7.5 inch x 10 inch)	$700.00
Event sponsorship packages and alternate advertising fees will be determined by the Marketing & Economic Development Officer in consultation with the CAO to allow flexibility for other ad sizes, formats and ensure cost recovery.	
Marketing and Economic Development Fees – Nick Smith Centre Advertising	
Display Screen Ad	$40 / month, $400 / year
Nick Smith Centre Wall Ad – Annual *Requires a 3-Year Commitment	$450.00
Nick Smith Centre Dressing Room Ad – Annual *Requires a 3-Year Commitment	$600.00
Nick Smith Centre Rinkboard Ad – Annual - Includes sponsorship of one public skate per ad per year *Requires a 3-Year Commitment	$800.00
Nick Smith Centre Ice Surface Ad – Annual - Includes sponsorship of one public skate per ad per year *limited availability* *Requires a 3-Year Commitment	$900.00
Nick Smith Centre Arena Meeting Room – Annual - Includes sponsorship of two public skates per year per room *limited availability* *Requires a 5-Year Commitment	$900.00

Schedule E – Planning and Economic Development	
Description	**Fees**
Nick Smith Centre Arena Viewing Area – Annual - Includes sponsorship of three public skates per year *limited availability* *Requires at 5-Year Commitment	$1,200.00
Note: Advertiser is responsible for providing the physical / digital signage	
Sponsorship packages and alternate advertising fees will be determined by the Director of Recreation in consultation with the CAO to allow flexibility for other formats, opportunities and ensure cost recovery.	

ARNPRIOR

Municipal Grants Application – Arnprior Community Choir and Valley Concert Band (2025 Music! Music! Music! Event)

That Council of the Corporation of the Town of Arnprior receive the Municipal Grant request from the Arnprior Community Choir and Valley Concert Band; and

Whereas the Arnprior Community Choir and Valley Concert Band has hosted the "Music! Music! Music!" event for the past eight years and provides an opportunity to showcase and experience musical talent in the local community;

Therefore Be It Resolved That Council approve the request for waiving the Nick Smith Centre Community Hall rental fees (value of approximately $357.50 plus HST) for the 2025 "Music! Music! Music!" event to be held on March 1st, 2025; and

Further That the Arnprior Community Choir and Valley Concert Band be advised that it is mandatory to carry sufficient liability insurance and have the Town of Arnprior added as an additional insured for the event.